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Proceedings of the Regional Consultation on

Engaging with Academia and Research Institutions (ARIs) to Support Family Farmers and Food System Transformation During and Post COVID-19 Pandemic in Asia



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**Engaging with Academia and Research
Institutions (ARIs) to Support Family Farmers and
Food System Transformation During and Post
COVID-19 Pandemic in Asia**

Food and Agriculture Organization of the United Nations
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Organizers

The **Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA)** is one of the 26 specialist institutions of the Southeast Asian Ministers of Education Organization (SEAMEO). Founded on 27 November 1966, SEARCA is mandated to strengthen institutional capacities in agricultural and rural development in Southeast Asia through education and collective learning, research and thought leadership, and emerging innovation for growth. It serves the 11 SEAMEO member countries, namely, Brunei Darussalam, Cambodia, Indonesia, Malaysia, Myanmar, the Philippines, Singapore, Thailand, and Timor-Leste. SEARCA is hosted by the Government of the Philippines on the campus of the University of the Philippines Los Baños (UPLB) in Laguna, Philippines. It is supported by donations from SEAMEO members and associate member states, other governments, and various international donor agencies. (<https://www.searca.org>)

The **Asian Farmers' Association for Sustainable Rural Development (AFA)**, organized in 2002, is a regional farmers' organization with headquarters in the Philippines. It currently has 22 national family farmers organizations and cooperatives in 16 countries as member organizations, with combined membership of 13 million small scale women and men farmers, fishers, indigenous peoples, pastoralists, and herders in farms and forested landscapes. It aims to strengthen the capacities of the leaders and technical staff of national farmer organizations, leading to the eradication of poverty and hunger, increased resilience, and sense of well-being of family farmers in Asia. (<https://asianfarmers.org>)

The **United Nations Educational, Scientific, and Cultural Organization (UNESCO)**, established on 16 November 1945, contributes to the building of a culture of peace, the eradication of poverty, sustainable development, and intercultural dialogue through education, the sciences, culture, communication, and information. With headquarters in Paris, France, it has more than 50 field offices around the world, 195 members and 8 associate members. Its current global priorities are Africa and gender equality. (<https://en.unesco.org>)

The **Centre de coopération internationale en recherche agronomique pour le développement (CIRAD)** is the French agricultural research and cooperation organization working for the sustainable development of tropical and Mediterranean regions. Founded in 1984 as a public establishment following a merger of French tropical agricultural research organizations, it is under the joint authority of the Ministry of Higher Education, Research and Innovation and the Ministry for Europe and Foreign Affairs. As such, it supports French science diplomacy operations. CIRAD works with its partners in more than 50 countries to build knowledge and solutions and

invent resilient farming systems for a more sustainable, inclusive world. It mobilizes science, innovation, and training to achieve the Sustainable Development Goals. Its expertise supports the entire range of stakeholders, from producers to public policymakers, to foster biodiversity protection, agroecological transitions, food system sustainability, health (of plants, animals, and ecosystems), sustainable development of rural territories, and their resilience to climate change. (<https://www.cirad.fr>)

The **Groupe de Recherches et d'Echanges Technologiques (GRET)** is an international development NGO governed by French law. Founded in 1976, it has been working to provide sustainable, innovative responses to the challenges of poverty and inequalities. It is also a professional and innovative NGO, in its vision of the development sector, in its approach involving populations in developing countries, whom it considers as stakeholders in development, and in its practices. To successfully implement its actions, GRET creates alliances and builds diverse long-term partnerships with stakeholders from associations and the economic, public and research sectors in France and in all its countries of operation. Its staff of professionals provide lasting, innovative solutions for fair development in the field and work to positively influence policy. (<https://www.gret.org>)

The **Food and Agriculture Organization (FAO)** is a specialized agency of the United Nations that leads international efforts to defeat hunger. Established in 1945, its goal is to achieve food security for all and make sure that people have regular access to enough high-quality food to lead active, healthy lives. With over 194-member states, FAO works in over 130 countries worldwide, with the belief that everyone can play a part in ending hunger. (<https://www.fao.org>)

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Acronyms

ACU	ASEAN Cyber University
ADDA	Asian Agricultural Development Organization
AE	agroecology
AeIS	Agroecological Innovation Systems
AFA	Asian Farmers' Association for Sustainable Rural Development
AFD	Agence Française de Développement
AFSA	Australian Food Sovereignty Alliance
AIT	Asian Institute of Technology
ALiSEA	Agro-ecological Learning Alliance in Southeast Asia
APAARI	Asia-Pacific Association of Agricultural Research Institutions
ARIs	Academic and Research Institutions
ASEAN	Association of Southeast Asian Nations
ASHA	Adaptation for Smallholders in Hilly Areas
AsiaDHRRRA	Asian Partnership for the Development of Human Resources in Rural Asia
ASSET	Agroecology and Safe Food System Transitions
AWJA	Association of Western Japan Agroecology
BEEP	Basic Education Equivalency Program
BFAR	Bureau of Fisheries and Aquatic Resources
BIN	Business Identification Number
BPN	business permit number
CASRAD	Center for Agrarian Systems Research and Development
CATIE	Latin American Centre for Tropical Agricultural Research and Higher Education
CC	climate change
CDE	Centre for Development and Environment
CFS	Committee on World Food Security
CIAT	International Center for Tropical Agriculture
CIFOR-ICRAF	Center for International Forestry Research and World Agroforestry
CIRAD	Centre de coopération internationale en recherche agronomique pour le développement
COA	Council of Agriculture
CO ₂	carbon dioxide
COP	community of practice
CRA	climate-resilient agriculture

CSA	climate-smart agriculture
CSB	community seed bank
CSOs	civil society organizations
CSVs	climate-smart villages
DA	Department of Agriculture
DCD	Department of Community Development
DeSIRA	Development of Smart Innovation through Research in Agriculture Initiative
DRRM	disaster risk reduction and management
DOST	Department of Science and Technology
EC	European Commission
ECOSUR	El Colegio de la Frontera Sur
ESD	Education for Sustainable Development
EU-INTPA	European Commission International Partnerships
FAO	Food and Agriculture Organization of the United Nations
FDAT	farmer-developed and adapted technologies
FFF	forest and farm facility
FFOs	family farmers organizations
FFPOs	forest and farm producers organizations
FFS	Farmer Field Schools
FLWS	Food, Land, and Water Systems
FPAR	Farmer Participatory Action Research
GESI	Gender Equality and Social Inclusion
GFAR	Global Forum on Agricultural Research and Innovation
GHG	greenhouse gas
GIS	Geographic Information System
GRET	Groupe de Recherches et d'Echanges Technologiques
HEIs	higher education institutions
HLPE	High-level Panel of Experts on Food Security and Nutrition
ICA-AP	International Cooperative Alliance Asia and the Pacific
ICRAF	World Agroforestry Centre
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
ICT	information and communication technology
IDOFS	Integrated Diversified Organic Farming Systems
IEC	Information, Education, and Communication
IFAD	International Fund for Agricultural Development
IFOAM	International Federation of Organic Agriculture Movements
IIED	International Institute for Environment and Development
ILRI	International Livestock Research Institute
INS	Indonesian National Standard
IP	Indigenous Peoples

IPES-FOOD	International Panel of Experts on Sustainable Food Systems
IT	information technology
ITC	Institute of Technology of Cambodia
IUCN	International Union for the Conservation of Nature
IWMI	International Water Management Institute
JAS	Japanese Agricultural Standards
JOAA	Japan Organic Agriculture Association
KAP	knowledge, attitude, and practice
KASA	knowledge, attitude, skills, and aspirations
KM	Knowledge Management
KU	Kasetsart University
LAPA	Local Adaptation Plan for Action
LMS	Learning Management System
LD	land degradation
MASIPAG	Magsasaka at Siyentipiko para sa Pag-unlad ng Agrikultura
MHESI	Ministry of Higher Education, Science, Research, and Innovation
MOKATIL	Movimentu Kamponezes Timor-Leste
NAP	National Action Plan
NGOs	non-governmental organizations
NIPTICT	National Institute of Posts, Telecoms & ICT
NVCARD	North Viet Nam College of Agriculture and Rural Development
OAPA	Organic Agriculture Promotion Act
OxC	Options by Context
PAKISAMA	Pambansang Kilusan ng mga Samahang Magsasaka
PGS-Pilipinas	Participatory Guarantee System-Pilipinas
PO	People's Organization
RECOFTC	The Center for People and Forests
RCSD	Regional Center for Social Sciences and Sustainable Development
R&D	research and development
RUA	Royal University of Agriculture
SAARC	South Asian Association for Regional Cooperation
SCORM	Sharable Content Object Reference Model
SDGs	Sustainable Development Goals
SDHs	Social Determinants of Health
SEA	Southeast Asia
SEACON	Southeast Asian Council for Food Security and Fair Trade
SEARCA	Southeast Asian Regional Center for Graduate Study and Research in Agriculture
SEP	Sufficiency Economy Philosophy
SIAP	Seaweed Industry Association of the Philippines

SIS	Subject-Integrated-Synchronization
SLA	Social Learning Approach
SLM	sustainable land management
SMEs	small and medium-sized enterprises
SPI	Serikat Petani Indonesia
SRI-LMB	System of Rice Intensification in Lower Mekong River Basin
SRI-MAS	Malaysian Agroecology Society
STEM	Science, Technology, Engineering, and Mathematics
STI	Science, Technology, and Innovation
SUCRA	Scaling Up Climate-Resilient Agriculture
TAPE	Tool for Agroecology Performance Evaluation
ToT	Training of Trainers
TPP	Transformative Partnership Platform
TVET	Technical and Vocational Education and Training
UN	United Nations
UNAER	Uniaun Agrikultores Ermera
UNCCD	United Nations Convention to Combat Desertification
UNDER	United Nations Decade of Ecosystem Restoration
UNDF	United Nations Decade of Family Farming
UNESCO	United Nations Educational, Scientific and Cultural Organization
UP	University of the Philippines
USDA	United States Department of Agriculture
VAAS	Vietnamese Academy of Agricultural Science
VFU	Viet Nam Forestry University
VNFU	Viet Nam National Farmers' Union
VOAA	Viet Nam Organic Agriculture Organization
WFP	World Food Programme
WOCAT	World Overview of Conservation Approaches and Technologies
WorldVeg	World Vegetable Center

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Foreword

The Asia region has undergone important changes in its agrifood systems over the past decades, mostly due to rapid economic growth, increasing population and demographic shifts, rapid urbanization, rural and urban transformation, changing food consumption behavior and climate change. The region is now facing several important challenges such as the triple burden of nutrition (malnutrition, obesity and hidden hunger), a growing distrust of consumers towards food quality and food safety due to regular food scandals, loss of biodiversity, the ever-growing impact of climate change and a declining interest of youth in the agriculture sector.

In addition, the COVID-19 pandemic has aggravated the political, economic, social, environmental, and food sectors worldwide. The effects of the pandemic on agriculture have been exacerbated by the way in which the current industrial farming system is set up, and have impacted in particular family farmers, who represent the majority of farmers in the region¹.

This multidimensional threat requires an adequate response to protect the most vulnerable and marginalized groups, not only in cities but also in rural areas. In line with the 2030 Agenda, this situation pushes for urgent transition towards efficient, inclusive, resilient and sustainable agrifood systems.

Agroecology, as a holistic approach, can contribute to addressing these challenges and help transforming agrifood systems. Agroecology seeks to harness key ecological processes and synergies increasing agrobiodiversity, and to contribute to creating complex, wide ranging and quality employment.

While the benefits are clear, more research is warranted. Higher education institutions (HEIs) are key for teaching and analyzing agroecological alternatives and essential to document and build the multi-disciplinary scientific evidence-base for policy maker and farmer decision-making. HEIs can also provide youth and students core knowledge and technical or professional skills needed for decent green jobs in a sustainable agrifood system. Universities are core enabling socioeconomic institutions for training the next generation while they need to better support family farms in rural communities and protect the ecosystems on which all food security depends.

¹ 74% of the world's family farmers are living in the Asia Pacific region (FAO, 2015)

With over 6,000 HEIs in the ASEAN region alone, there is a powerful opportunity to build a new generation of farmers, extensionists and policy makers to address the challenges faced by agrifood systems in Asia. However, we know that no study has adequately documented or assessed how agroecology (including climate resilient agriculture, community sustainability issues) is prioritized, supported, studied or applied among HEIs, and more broadly, among Academia and Research Institutions (ARIs), in the region.

We need to continue to assess critical policy, budgetary, political and curriculum reform challenges as well as gaps faced by ARIs for improving and scaling-up agroecological knowledge, policies, curricula, skills development, decent green agrifood jobs for student graduates, and field applications to ensure a Sustainable AgriFood System.

This publication compiles the proceedings of the two-day virtual regional consultation on *“Engaging with Academia and Research Institutions (ARIs) to Support Family Farmers and Food System Transformation During and Post COVID-19 Pandemic in Asia”* held on 8-9 December 2021. It marked an important milestone in initiating a stocktaking of existing initiatives and collaborations between ARIs, inter-government agencies, and Family Farmers’ Organizations in the region with a specific focus on Agroecology and Sustainable Food Systems. It was a first step towards conducting a participatory assessment of the different ARIs in the region and the development of ad hoc projects to support better inclusion of agroecology in curriculum and research programs.

The FAO Strategic Framework 2022-31 assigns an important role to Family Farmers in achieving the Four Betters: better production, better nutrition, a better environment, and a better life, leaving no one behind. In particular, some FAO Programme Priority Areas like Small-scale Producers’ Equitable Access to Resources and Inclusive Rural Transformation are focused on the role of small-scale producers and family farmers. As FAO’s Chief Scientist, and as a researcher, I believe that harnessing science, technology and innovation is key for leveraging emerging opportunities for reaching a world free from poverty, hunger, and malnutrition. Academia and research institutions, as innovation and knowledge hubs, are crucial partners for FAO in achieving the Organization’s vision and goals and the 2030 Sustainable Development Agenda.

Ismahane Elouafi
Chief Scientist

Preface

This proceedings of the virtual regional consultation on *Engaging with Academia and Research Institutions (ARIs) to Support Family Farmers and Food System Transformation During and Post COVID-19 Pandemic in Asia* document the opportunities that agroecology presents: enhanced rural communities' initiatives and transfer of technologies; implemented regional/local policies and strategies that support family farmers and sustainability of rural livelihoods and communities; established multi-stakeholder networks and platforms enabling co-creation of knowledge and participatory research; and innovated higher education institutions (HEIs) curriculum to better address agroecology and family farming.

One of the recommendations that emerged from this consultation is the importance of transforming the agri-food system. At SEARCA, we do this by promoting transformative mindsets through agricultural human resource development. Our initiatives focus on understanding and adapting to the complex changes in the agri-food system. As I have noted in my presentation, agricultural innovation and biodiversity conservation should be a win-win approach. In helping round up this consultation, SEARCA is pleased to be a part of the discussion to ensure systemic changes in the agricultural system to help make it resilient, sustainable, productive, and inclusive.

The intention of the dialogue would not have been carried out effectively without it being a collaboration with the Asian Farmers' Association for Sustainable Rural Development (AFA). Organizing this consultation with AFA allowed for insights to be gathered directly from colleagues who work on the ground, which further strengthened the conduct of this learning event.

SEARCA is grateful for the technical assistance provided by the FAO Regional Office for Asia and the Pacific (FAO RAP). Working closely with our FAO colleagues helped in fortifying our mission to enhance the exchange of best practices on family farming, which supports the framework of the UN Decade of Family Farming.

SEARCA also acknowledges the expertise provided by the United Nations Educational, Scientific and Cultural Organization (UNESCO), Centre de coopération internationale en recherche agronomique pour le développement (CIRAD), and Groupe de Recherches et d'Echanges Technologiques (GRET). Their participation and valuable contributions in the virtual consultation have demonstrated what collaborations can do towards a sustainable and green rural transformation.

The 11th Five-Year Plan of SEARCA aims to Accelerate Transformation through Agricultural Innovation (ATTAIN). This recently concluded regional consultation supports our Center's mission to elevate the quality of life of farmers and farming families to bigger, better, and smarter industry players thriving in the fourth agricultural revolution not only in the Southeast Asian region, but also beyond.

Glenn B. Gregorio
Director, SEARCA

Message

Our alliance, the Asian Farmers Association for Sustainable Rural Development (AFA), is composed of 22 national farmers' organizations in 16 Asian countries, with a membership of 13 million small-scale women, men, young farmers, engaged in crops, livestock, fisheries, forestry, herding, and pastoralism.

Farming throughout Asia is done mostly by family farmers, and 84 percent of them are small-scale, working on lands two hectares or less. Even then, we produce most of the region's food. However, many of us are poor and hungry; and our children are malnourished and stunted.

The causes of poverty and hunger amongst us are complex. Many of us continue to face persistent challenges such as lack of access and control to land, water, seeds, and forests; affordable agricultural technologies; to appropriate financial services and market resources. Farm inputs remain high for us, while prices of our products remain low. Poor soil health, environmental destruction, natural disasters, and unpredictable weather patterns, exacerbated by the COVID-19 pandemic, have resulted to lower yields, lower incomes, increased debts. All these challenges led to massive migration to urban areas and agriculture-averse rural youth, further threatening food security.

However, over the past years, our members have embarked on environment-friendly, climate-resilient, integrated, diversified, organic, agro-ecological practices and systems in our farms, fisheries, and forests. These innovative solutions have brought good results, in terms of increased incomes, biodiversity, health, and well-being of farming communities.

That is why we believe that family farmers are at the heart and center of sustainable food systems. We are solution providers and can be equal partners in the work of transforming food systems.

We see research institutions as a key partner in our common work towards a more equitable, inclusive, healthy, and empowering food system. Together, in the co-creation of knowledge, we can provide answers to questions and responses to the challenges that farmers have and face - such as how to improve soil health and biodiversity in our farms, improve techniques in seed production and organic pest management, how to process, market and improve shelf life our products, what incentives can work so farmers adopt agroecological practices, what is the nutritional value of our product so we can encourage consumers to buy it, how to reduce drudgery in women's reproductive and productive work and how to attract the youth to agriculture.

From this event, *“Engaging with Academia and Research Institutions (ARIs) to support Family Farmers and Food System Transformation during and post COVID-19 Pandemic in Asia,”* we look forward to exploring opportunities for this equal partnership between research institutions and farmers, as scientists both, in the work for empowering food systems.

U Than Swe
Chairperson, AFA

Acknowledgement

This regional consultation that brought together representatives of universities, family farmer's organizations, agricultural research institutions, government agencies, and development partners was a result of joint efforts among the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA), Asian Farmers' Association for Sustainable Rural Development (AFA), United Nations Educational, Scientific and Cultural Organization (UNESCO), Centre de coopération internationale en recherche agronomique pour le développement (CIRAD), and the Groupe de Recherches et d'Echanges Technologiques (GRET). The regional event would not have been possible without the technical support from the Food and Agriculture Organization Regional Office for Asia and the Pacific (FAO RAP).

We would like to thank all speakers, paper presenters/authors, and commentators for making the regional consultation robust and informative. The presentations and insights that you all have shared will contribute to enhancing the livelihoods of family farmers and developing their capacities to cope with increasing uncertainty caused by current shocks, in particular through Agroecology.

We express our gratitude to the following speakers for sharing their institutions' initiatives and lessons learned: Dr. Md. Baktear Hossain, Dr. Glenn Gregorio, Dr. Susan Vize, Dr. Hildegard Lingnau, Dr. Matthew McCartney, Dr. Fergus Sinclair, Ms. Ilaria Firmain, Dr. Wayne Nelles, Mr. Vijay Kumar, Ms. Ma. Estrella Penunia, Ms. Lim Li Ching, Ms Chukki Nanjundaswamy, Ms Tammi Jonas, Mr. Florante Villas, Dr. Jie-Hye (Alicia) Lee, Dr. Epsi Euriga, Dr. Namita Singh, and Mr. Zainal Arifin Fuad.

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Dr. Hue Tran, Dr. Helmi, Mr. Nguyen Thanh Binh, Ms. Ysabel Anne C. Lee and Mr. Tuyen Huynh, Dr. Koichi Ikegami, Dr. Jean-Christophe Castella, Ms. Suzanne Phillips, Ms. Katuscia Fara, Dr. Ma. Corazon J. Tan, Mr. Thoan Ho, Dr. Patrick Trail, Mr. Pham Thi Hanh Tho, Dr. Gunnar Kirchhof, Dr. Abha Mishra, Dr. Isabelle Providoli, Mr. Tim Sophea, Mr. Bou Channa, Dr. Orachos Napasintuwong, and Dr. Peany Houg.

We would also like to thank the editors of this proceedings, Mr. Pierre Ferrand of FAO RAP and Dr. Nova Ramos of SEARCA, who kindly gave their time to review the contents and flow of this publication.

Appreciation is also extended to participants from the research and academic institutions, farmers' organizations, civil society organizations, and government agencies.

We, the organizers, are hopeful that this event will foster the roles of universities and research institutions in supporting rural communities and farmers in the climate adaptation and transition processes.

Executive Summary

The Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA) and the Asian Farmers' Association for Sustainable Rural Development (AFA) jointly organized a two-day virtual regional consultation titled "Engaging with Academia and Research Institutions (ARIs) to Support Family Farmers and Food System Transformation During and Post COVID-19 Pandemic in Asia." Held on 8–9 December 2021 via Zoom and Facebook Live, this was attended by 157 international participants and 51 speakers coming from different academic and research institutions (ARIs), non-governmental organizations (NGOs) and civil society organizations (CSOs), government agencies, and development partners. The consultation was organized in collaboration with the United Nations Educational, Scientific and Cultural Organization (UNESCO), Centre de coopération internationale en recherche agronomique pour le développement (CIRAD), and Groupe de Recherches et d'Echanges Technologiques (GRET), with technical assistance from the Food and Agriculture Organization of the United Nations (FAO).

The regional consultation highlighted the importance of collaboration among ARIs, family farmers' organizations, government agencies, and development partners in Asia in enhancing the livelihoods of family farmers and developing their capacities to cope with the COVID-19 pandemic through Agroecology. Several recommendations emerged from the regional consultation, primarily on the transformation of agri-food systems. This transformation requires pragmatic thinking and farmer-led approaches, as well as inclusive partnerships and digital transition.

In her welcome remarks, FAO-HQ Chief Scientist Ismahane Elouafi emphasized that regional and local consultations strengthen the scientific and innovative components of collective action and decision making. She mentioned that ARIs enrich agricultural knowledge to improve rural livelihoods. However, ARIs should also acknowledge that small-scale farmers are innovators and must be empowered to be able to co-design, co-create, and co-innovate. Significant progress and impact can be made when interventions are treated collaboratively. Hence, linkages are a must.

During the first day of the consultation, keynote speakers discussed the challenges, initiatives, and the roles of ARIs in supporting the transition toward sustainable food system and agroecology mainstreaming. Mr. Pierre Ferrand, Agriculture Officer (Agroecology) and Regional Focal Point for Family Farming, FAO-RAP, served as the moderator for the first two sessions.

For institutional initiatives, Dr. Md. Baktear Hossain, Director of the South Asian Association for Regional Cooperation (SAARC) Agriculture Center, recommended strategic policy review on family farming through capacity development and technical and financial support to implement regional

action plan on family farming, among others. Meanwhile, Dr. Glenn B. Gregorio, SEARCA Director, pointed out that ARIs should produce graduates with transformative mindsets who are keen to understand and adapt to complex changes in the food system and society as a whole. Dr. Susan Vize, Regional Adviser for Social and Human Sciences, UNESCO Regional Office for Asia and the Pacific, emphasized the importance of integrating sustainability into agricultural education, particularly in providing learning opportunities and delivering services at all levels. Dr. Hildegard Lingnau, Executive Secretary of the Global Forum on Agricultural Research and Innovation (GFAR), shared some of their collective actions on forgotten foods (foods that are neglected by research despite their intrinsic nutritional value and resilience) and inclusive digital transformation to revitalize regional agricultural productivity and mitigate effects of climate change.

On the other hand, Dr. Fergus Sinclair, Chief Scientist, Integrated Leadership and Management Group, Center for International Forestry Research and World Agroforestry (CIFOR-ICRAF), introduced the Transformative Partnership Platform (TPP) on agroecological approaches to build resilient livelihoods and landscapes. TPP invests on agroecosystem management and whole food system to encourage farming that is in harmony with nature. Dr. Matthew McCartney, Principal Researcher of the International Water Management Institute (IWMI) presented the OneCGIAR initiative on scaling-out and continuous innovation for agroecological transitions in geographically-targeted food systems, co-developing business models and financing modalities to support agroecological innovations, and promoting cross-sectoral policy integration to mainstream agroecological principles. Ms. Ilaria Firmian, Regional Specialist, Asia and the Pacific Division, International Fund for Agricultural Development (IFAD), identified some of the major challenges that family farmers face. These include lack of access to ICT needed for inclusive rural information and communication services, limited human capital and capacity building, limited knowledge-sharing capacities of producer organizations, and limited access to markets.

The session that followed was a sharing of from-the-ground experiences of different agricultural organizations. Mr. Vijay Kumar Thallam, Advisor to Government of Andhra Pradesh for Agriculture & Cooperation, India, shared their experiences on community-based natural farming movement in their area. He emphasized that farmers are also scientists who, instead of writing research papers, are busy improving their lives through agriculture. Hence, farmers' works and innovations should be respected. Ms. Ma. Estrella Penunia, AFA Secretary General, discussed the challenges and successes in pursuing AFA's initiatives on agroecology for family farmers. She emphasized that a clear, systematic redirection of investment, funding, research, and policy focus on agroecology by, with, and for small-scale farmers is needed. Ms. Lim Li Ching, Researcher, Third World Network and IPES-FOOD, presented how research can be transformed as support to Agroecology and sustainable food systems. Transforming the research agenda, she said, would require co-creation of knowledge, farmers' participation, focus on the role of women, knowledge sharing and networking, and resource mobilization. Ms. Chukki Nanjundaswamy, Coordinator, Amrita Bhoomi Centre, suggested that universities should be careful in receiving funding from private companies to avoid biased research results that are not pro-farmers. She also stressed the need to work collaboratively with farmers to develop relevant research and to effectively scale-up agroecology. Ms. Tammi Jonas, President of the Australian Food Sovereignty Alliance (AFSA) pointed out that economic, political, knowledge, and cultural lock-ins can limit the ability of farmers to shift to agroecology. She stated that constructing knowledge for food sovereignty, agroecology, and biocultural diversity entails reversing top-down research.

The consultation's first day was concluded with a panel discussion to provide insights on fostering collaboration between ARIs and family farmer organizations (FFOs) toward sustainable and green rural transformation. The panel discussion touched upon the following issues: existing challenges for education and extension to reach out to smallholder farmers and their organizations, the extent and limitation of digital transformation, and strategies to connect ARIs and family farming organizations. The panelists were Mr. Florante Villas of the Asian Partnership for the Development of Human Resources in Rural Areas (AsiaDHRRA), Dr. Jie-Hye Lee of the Korea University International Law Research Center, Dr. Epsi Euriga of Indonesia's Ministry of Agriculture, Dr. Namita Singh of the Digital Green-India, and Mr. Zainal Arifin Fuad of Serikat Petani Indonesia (SPI) and La Via Campesina. In the panel discussion moderated by Mr. Francois Enten of GRET, the panelists agreed that collaboration between ARIs and FFOs can be fostered through increased government subsidies to family farmers and agroecology, continuous dialogue between agroecology advocates and family farmers, establishment of infrastructures to support digital transition, and promotion of agroecology adoption using Big Data.

The organized parallel sessions during the consultation's second day were divided into four major topics: enhancing rural communities' initiatives and transfer of technologies; regional/local policies and strategies to support family farmers and sustainability of rural livelihoods and communities; multi-stakeholder networks and platforms enabling co-creation of knowledge and participatory research; and innovation in higher education institutions (HEIs) curriculum to better address agroecology and family farming.

The parallel sessions elicited some key strategies to support rural transformation, agroecology mainstreaming, and FFOs in building back greener and more resilient agri-food systems. Some of the key strategies include: (1) redefinition of roles of ARIs; (2) customization of digital learning innovations to address the needs of communities; (3) integration of technical knowledge, field evidence-based initiatives, and interpersonal skills with higher education curricula to capacitate the young generation; (4) conduct of regular job market assessment to match curriculum to professional sector; (5) localization of agroecology and supporting of family farms through social community entrepreneurship; (6) investment on R&D potential of universities to generate more agri-entrepreneurs; (7) employment of adaptive scaling strategies, dialogue platforms, agroecology conducive policies, blended financial mechanisms, and public-private partnerships; (8) designing and nurturing alternative practices in innovation while creating an enabling environment for upscaling; and (9) connecting gender, nutrition, and climate-resilient agricultural practices to agroecology.

About the Consultation

Over the past decades, the Southeast Asian region has faced some important changes in its food systems, which were mostly due to rapid globalization, increasing population and demographic shifts, urbanization, changing food consumption behavior, and climate change. This has deeply impacted family farmers and led to several important challenges that need to be addressed. These challenges include nutrition (with the triple burden of malnutrition, obesity, hidden hunger); food safety (with a growing distrust of consumers toward food quality and food safety due to regular food scandals); loss of biodiversity; climate change (with a systemic risk to achievement of food security and to natural systems that support agriculture sector); and the lack of youth engagement in agriculture.

On top of this, the COVID-19 pandemic greatly affected the agricultural productivity in the region, most particularly of family farmers. Agroecology is a potential holistic approach to address these challenges faced by family farmers in building an inclusive, safe, sustainable, and resilient food and agriculture systems.

There are over 6,000 higher education institutions (HEIs) in the region that can provide the necessary knowledge, tools, and opportunities in capacitating a new generation of farmers, extensionists, and policymakers. Initiating collaboration and forming partnership with HEIs could help in supporting family farmers and agri-food systems in Asia.

However, agroecology has not been adequately researched and documented among HEIs, and more broadly, among academia and research institutions (ARIs) in the region. Indeed, it is crucial for ARIs to prioritize the assessment of policy, budgetary, political, and curriculum reform for improving and scaling-up agroecological knowledge, policies, curricula, skills development, decent green agri-food jobs for student graduates, and field applications in achieving a sustainable food system.

Thus, this regional consultation aimed to convene representatives of universities, family farmers' organizations, agricultural research institutions, government agencies, and development partners to discuss the key strategies and identify opportunities for ARIs in Asia to further contribute research and initiatives on agroecology that will enhance the livelihoods of family farmers and develop their capacities to cope with the increasing uncertainty caused by the COVID-19 pandemic.

Specifically, this regional consultation aimed to identify roles of ARIs in the:

1. promotion of rural communities' initiatives, and development and transfer of technologies;
2. harmonization of regional policies and strategies to support family farmers; and
3. strategies to reinforce the capacity and resilience of family farmers, especially women and youth, and their organizations to cope with current shocks.

The regional consultation is considered as an initial step toward a longer-term process that aims to conduct a participatory assessment of the different ARIs in the region and the development of ad hoc projects in supporting better inclusion of Agroecology in different curricula and research programs.

It took place within the framework of the UN Decade of Family Farming (UNDIFF) and the Scaling-up of Agroecology Initiative and contributes to the ongoing regional dialogue about building back greener and more resilient food systems for a post COVID-19 future. In addition, it can be seen as a contribution to the UN Decade of Ecosystem Restoration (UNDESR).

Finally, this regional consultation contributes to the ongoing Agroecological and Safe Food System Transitions (ASSET) project funded by the Agence Française de Développement (AFD) and the EU, and implemented by GRET and CIRAD.

1 Opening Remarks

"Ladies and Gentlemen, let me welcome you to this special regional consultation. My only regret is that I cannot be with you in person.

At FAO, we believe that consultations like this one help to strengthen the science and innovation components of our decisions and collective actions. They enable the sharing of ideas to reach a common understanding, which ultimately increases the impact of our efforts on the ground. Agri-food systems in Asia have undergone important changes over the past decades, mostly due to rapid economic growth, increasing population and demographic shifts, rapid urbanization, rural and urban transformation, changing food consumption behavior, and climate change.

The COVID-19 crisis has clearly demonstrated how vulnerable our current agri-food systems are to disruptions. Climate change is expected to widen the existing vulnerabilities in the agricultural production systems.



معاً لنمو، وتغذى، ونحافظ على الاستدامة.

齐成长、同繁荣、共持续。

Grow, Nourish, Sustain. Together.

Cultiver, nourrir, préserver. Ensemble.

Взрастим, накормим, поддержим. Вместе.

Cultivar, nutrir, preservar. Juntos.

Coltivare, nutrire, preservare. Insieme.



Ms. Ismahane Elouafi
Chief Scientist, FAO HQ

Transforming our agri-food systems requires new thinking and approaches with its valued partners, many of whom are here today. Partnerships are central to transforming our agri-food systems and reaching the goals of the 2030 Agenda; indeed, partnerships are highlighted as one of the ‘five Ps’ for sustainable development and are encapsulated in SDG 17.

Academia and research institutions, in particular, play an important role in bringing academic knowledge to understand and improve rural livelihoods. Significant progress and impact can be made when interventions are undertaken collaboratively between FAO and national and regional academic and research institutions.

FAO is involved at the country level in the development of both the UN Common Country Analysis and the UN Sustainable Development Cooperation Framework to provide strategic and timely contributions as part of the UN collective offer in each country. With their presence in every country and with their knowledge of local strengths and challenges, academia and research institutions can support FAO in its implementation of the Country Planning Frameworks through food security and nutrition activities. This support can be provided by building local

capacities, sharing knowledge and information, and promoting social and technological innovations.

There is an urgent need for a radical shift in the way agri-food systems are governed. The challenge is to sustainably increase food production while conserving the natural resource base and ensuring that agriculture forms part of the solution for mitigating and adapting to climate change. Agroecology and regenerative agriculture are sustainable agricultural approaches that have been developed over several decades in an attempt to reconcile agriculture with natural processes for the mutual benefit of our ecosystem and our livelihoods.

The concept of climate smart agriculture (CSA) was first coined by FAO in 2009 to describe an approach where agriculture could capture synergies in mitigation and adaptation to climate change, while enhancing agricultural productivity and income. While time has passed since these concepts were first developed, the demand has remained high to better understand these approaches, how these approaches can be applied to different contexts and what their potential impact may be for small-scale producers. We need more data, we need more evidence, particularly in different ecosystems.

Agroecology can be a promising approach for achieving multiple benefits for the environment and farming communities, in terms of sustainability, climate mitigation and adaptation, human and planetary health, and livelihoods. However, the evidence is fragmented. In fact, FAO has developed a Tool for Agroecology Performance Evaluation (TAPE) to assess the multidimensional performance of agroecology and it is currently being tested in 29 countries globally.

Small-scale producers have been, and will always be, innovators. They need to be empowered to be able to co-design, co-create, and co-innovate. To support sustainable agri-food transformation, FAO works in close partnership with family farmers’ organizations.

The new FAO Strategic Framework assigns an important role to family farmers in achieving the four betters: better production, better nutrition, a better environment, and a better life, leaving no one behind. In particular, some FAO Program Priority Areas like Small-scale Producers’ Equitable Access to Resources and Inclusive Rural Transformation are

focused on the role of small-scale producers and family farmers. Partnerships are collaborative efforts. Only by converging perspectives and ideas, can a joint vision and mutual goals be created.

At FAO, we know that if we want to achieve the four betters, we cannot do so alone. I very much look forward to hearing from today's speakers as each brings their own perspective in addressing relevant approaches to systematically enhance FAO's engagement with the academic sector. All this will serve to leverage our comparative advantages for transitioning the world's agri-food systems, starting at country level. Thank you."

Challenges, Initiatives, and Role of Academia and Research Institutions (ARIs) in Supporting the Transition toward Sustainable Food System and Agroecology Mainstreaming

Date: December 8, 2021

Moderator: Mr. Pierre Ferrand, FAO-RAP

Overview of Day 1:

On the first day of the regional consultation, FAO-HQ Chief Scientist Ismahane Elouafi delivered her welcome remarks with an emphasis on the strengthening of scientific and innovative components of collective action and decision making through local and regional consultations. This was followed by the discussion sessions of the different keynote speakers. They touched on several diverse topics on the challenges, initiatives, and the roles of ARIs in supporting the transition toward sustainable food system and agroecology mainstreaming. Mr. Pierre Ferrand, Agriculture Officer (Agroecology) and Regional Focal Point for Family Farming, FAO-RAP, served as the moderator for the first two sessions.

The session that followed was a sharing of from-the-ground experiences of different agricultural organizations and brief overviews of their existing initiatives, programs, and projects.

Lastly, the panel discussion, comprised of experts from the field, provided insights on fostering collaboration between ARIs and family farmer organizations (FFOs) toward sustainable and green rural transformation. It touched on the following issues: existing challenges for education and extension to reach out to smallholder farmers and their organizations, the extent and limitation of digital transformation, and strategies to connect ARIs and family farming organizations. In the panel discussion moderated by Mr. Francois Enten of GRET, the panelists agreed that collaboration between ARIs and FFOs can be fostered through increased government subsidies to family farmers and agroecology, continuous dialogue between agroecology advocates and family farmers, establishment of infrastructures to support digital transition, and promotion of agroecology adoption using Big Data.

Institutional Initiatives

A. SAARC Agriculture Center – Dr. Md. Baktear Hossain, Director

The South Asian Association for Regional Cooperation (SAARC) Agriculture Center has been working as the center of excellence with a mandate to undertake agricultural research and development, policy planning, and knowledge management on agriculture, crops, horticulture, fisheries, livestock, natural resources management, and on priority cross-cutting issues, as identified by the member states where partnership and regional collaboration, are the driving force. The South Asian region covers 3 percent landmass, with 1.90 billion people. The agricultural sector in the region employs 70 percent of the population and various contributions to 18 percent of the Gross Domestic Product.

Nearly 60 percent of the regional population depends on agriculture for their livelihood. The various landholdings in the region are less than one hectare and almost 25 percent of the population falls below the poverty line which makes them vulnerable to malnutrition. The 90 percent of the 608 billion farmers in the world are under family farming and produce more

than 80 percent of the world's food contribution. However, smallholder family farmers have less than two hectares of land, and are handicapped due to traditional technology, the lack of access to inputs including improved sales, fertilizers, and credits, and limited access to competitive market for their products. These lead to the agricultural system becoming less productive and less profitable.

Moreover, the major challenges on family farming like labor shortage, loss of agricultural land for urbanization, inadequate irrigation facilities, small lending size, high postharvest losses, and high feed cost, are faced by South Asian family farmers.

To address these challenges, some innovative approaches to family farming may be considered in supporting the transition toward a sustainable food system and agroecology, such as empowerment of youth and women in agricultural farming, climate-smart adaptive technology in agricultural farming, scaling up multistoried or high-value crops in agroforestry practices or diversity production.

The United Nations Decade Family Farming (UNDF) is an opportunity to recognize

the important roles of smallholder family farmers in agriculture and food systems to guide policies in strengthening family farmers and leading them to ensure their livelihood, well-being, and prosperity.

SAARC, in collaboration with FAO, AFA, and International Cooperative Alliance Asia and the Pacific (ICA-AP), has published a book on UNDF for the years 2019 –2028; this is a Regional Action Plan to implement the UNDF for achieving sustainable development goals in South Asia. The book is well-designed and has captured family farming in South Asia. The book could also be an important guideline for the formulation of the national action plan of the UNDF. FAO, in collaboration with other partner organizations, will support the South Asian countries in finalizing the upcoming National Action Plan. As half of the land in South Asia is under rubble, there is a high potentiality for a transformed agriculture and food system in the region.

Food systems encompass all people and all actors, and there are interconnected

activities such as growing, harvesting, packaging, processing, distributing, selling, storing, marketing, consuming, and disposing of food. The pervasive poverty and hunger in the rural areas, especially with male and female farmers who rely on agriculture for their livelihood, infer that the current food system is unjust and unsustainable. Meanwhile, the health issue is being undermined due to a lack of available safe, nutritious, and healthy food. The severity of food insecurity is being further aggravated by the higher rate of food loss or waste estimated to be one-third of all the food produced globally.

At the same time, current food systems contribute up to 29 percent of all greenhouse gas emissions including 44 percent of methane and are harming biodiversity. Therefore, the current food system needs to be transformed to provide more sustainable, fair, and inclusive access to healthy and nutritious food for people so that they can help eradicate hunger.

Moving forward, in consideration of institutional initiatives, SAARC recommends to review policies and strategies on family farming by providing capacity development of the SAARC member states; share the UNDRR regional action plan with the SAARC member states through organizing consultation meetings for strengthening family farming; assist in the implementation of the country action plan on family farming by providing technical support; arrange follow-up meetings on the regional action plan of family farming; emphasize the focus on family farming among donor projects and/or implement among the SAARC member countries; and build and strengthen cooperatives using a value chain approach.

As a concluding remark, SAARC reaffirms and continuously supports the commitment to implement the regional action plan on family farming for the greater benefit of the SAARC region.

B. SEARCA – Dr. Glenn Gregorio, Director

Agricultural innovation and biodiversity conservation should be a win-win approach. Agriculture is a major driver of biodiversity loss, but making it sustainable through agricultural innovation, promotes and enriches biodiversity to ensure high quality and quantity, and sustainability of environmental goods and services.

Agriculture should be looked at, not as an opponent of biodiversity or agrobiodiversity. They should work hand-in-hand to make it sustainable, and the metrics to attain agricultural productivity and biodiversity conservation must consider productivity, stability, sustainability, and equitability. Human well-being underpinned by biodiversity-rich agricultural food systems would be critical in wielding holistic agricultural innovations across the food supply chain.

SEARCA has developed a publication on food security amid the COVID-19 pandemic, research, and development priorities for HEIs in the Philippines and Southeast Asia as well as a Policy Brief on Reshaping Agricultural Research and Development in HEIs in a Time of Pandemic in Southeast Asia. The pandemic has underscored the connection between supply chain and consumption patterns, and there is an urgent need to redefine agricultural systems as food systems. Now, the importance to redefine how we view food and agriculture, and the need to look at these as a food system is realized. This also underscores that the role of research institutions and universities is to produce graduates with a transformative mindset, who are adept at understanding the growing complexity of social concerns and can affect positive changes now and in the future. The intended products should have a transformative mindset, transformative leadership, and look at the whole picture to solve problems.

The questions for ARIs in the time of pandemic to help the small farmers should be:

- What are the major priority areas for research to accelerate the transformation toward sustainable agricultural food systems which include agroecology and biodiversity?
- How can the human capital, like their research and academic initiatives, be fully maximized to solve the societal concerns in times of COVID-19?
- As research funding will be limited, what are the innovative solutions needed to enhance capability in knowledge generation?

To do research, look at the food security pillars which include the availability, accessibility, stability, utilization, and safety of food. In addition, consider the levels of analysis from the biosphere to the ecosystem, landscape level, population, community level, and up to the organization or the gene or cell level. Other factors to consider include the agricultural value chains, the farmers, and the producers, manufacturers, distributors, consumers, and the different methodologies, how to analyze it, or methodologies from transdisciplinary studies that entail working together, interdisciplinary approach, multidisciplinary approach, and even singular disciplinary approach.

Universities and research institutions are engines of social inclusion brought by innovative ways of bringing people into the learning environment. They are the key institutions for meeting the sustainable development goals and solvers of the global challenges that face humanity and the planet. It is crucial to look closer at the contributions to society that have an impact on higher education and research to the extent to which it bridges social and cultural interaction between itself and the community. Interconnectedness is vital to these.

Universities must address the disparities between the wealthiest and the poorest and the balance between the planet and mankind. ARIs have to lead the way in developing a sustainable and responsible pathway to address the challenges in the agricultural and

“ Human well-being underpinned by biodiversity-rich agricultural food systems would be critical in wielding holistic agricultural innovations across the food supply chain. ”

rural development (ARD) landscape. ARIs have to pursue public goods through the alignment of its interests with those of society. This refers to the collective interest as scientists discovering something, and the interest of society, which is food security and health. SDGs should be included in the local agendas proposing changes in education, research, and engaging in global and local communities on sustainable development. The current generation needs to be educated with the necessary knowledge, skills, attitudes, competencies, and partnerships to help produce new SDG leaders. Curricula should undergo transversal reviews and refinements to ensure the mainstreaming of SDG issues across curricula. ARIs have to contribute something to the SDGs and we need to look at the curriculum to make this contribution.

The role of the universities also includes widening and extending access to and successfully participating in higher education by serving the needs of the increasingly diverse student interests. It is important to put in place resilient education systems that can provide students with access to continuous learning opportunities throughout unpredictable and disorganized periods of disaster and recovery.

To emphasize how to capitalize research for development and innovations and the potential of universities and research institutions, there is a need to support local capacity toward being self-sufficient through well-planned local food production systems. Basic research and policy support are needed toward the development of new and relevant crop varieties and livestock breeds, seed and livestock

production, distribution of technologies, agricultural systems technologies, post-harvest management, farm produce transport and logistics systems, facilities in supporting food quality, nutrition, safety maintenance, and diversified farming.

To capitalize R&D and innovations potential of universities and research institutions, ARIs need to support more studies and activities related to improving the design of financial technologies for farmers, encourage more programs and budget allocation, as well as private sector initiatives related to agriculture, promote sustainable and responsible consumption pattern to support cleaner production, environmental conservation, and social inclusion.

The growing interest in agriculture needs to be sustained with more

targeted capacity building activities of relevant government agencies and groups to specifically promote and generate more agri-entrepreneurs. We have to be business-minded. There is a need for more studies to ensure the balance between trade priorities and food security goals particularly under the tenets of ASEAN Economic Cooperation. There should be an effective coordination mechanism among countries to reduce trade and food insecurities both at the national and regional levels.

In 1989, SEARCA established the Southeast Asian University Consortium for Graduate Education in Agriculture and Natural Resources (University Consortium). SEARCA works with the University Consortium members from Southeast Asia, Japan, Taiwan, Canada, and Germany, on education in agriculture and natural resources. The network also aims to pursue agricultural human resource development in Southeast Asia by linking top agricultural universities in the region to facilitate the free exchange of information, facilities, and expertise.

SEARCA works to ensure a systemic transformation of the agricultural system into resilient, sustainable, productive, and inclusive

food systems which are crucial for the future of Southeast Asia. This includes how we could help the small farmers and the potential agri-entrepreneurs in their countries, which requires a transformation in the agricultural food system.

C. UNESCO Regional Office for Asia and the Pacific – Dr. Susan Vize, Regional Adviser for Social and Human Sciences

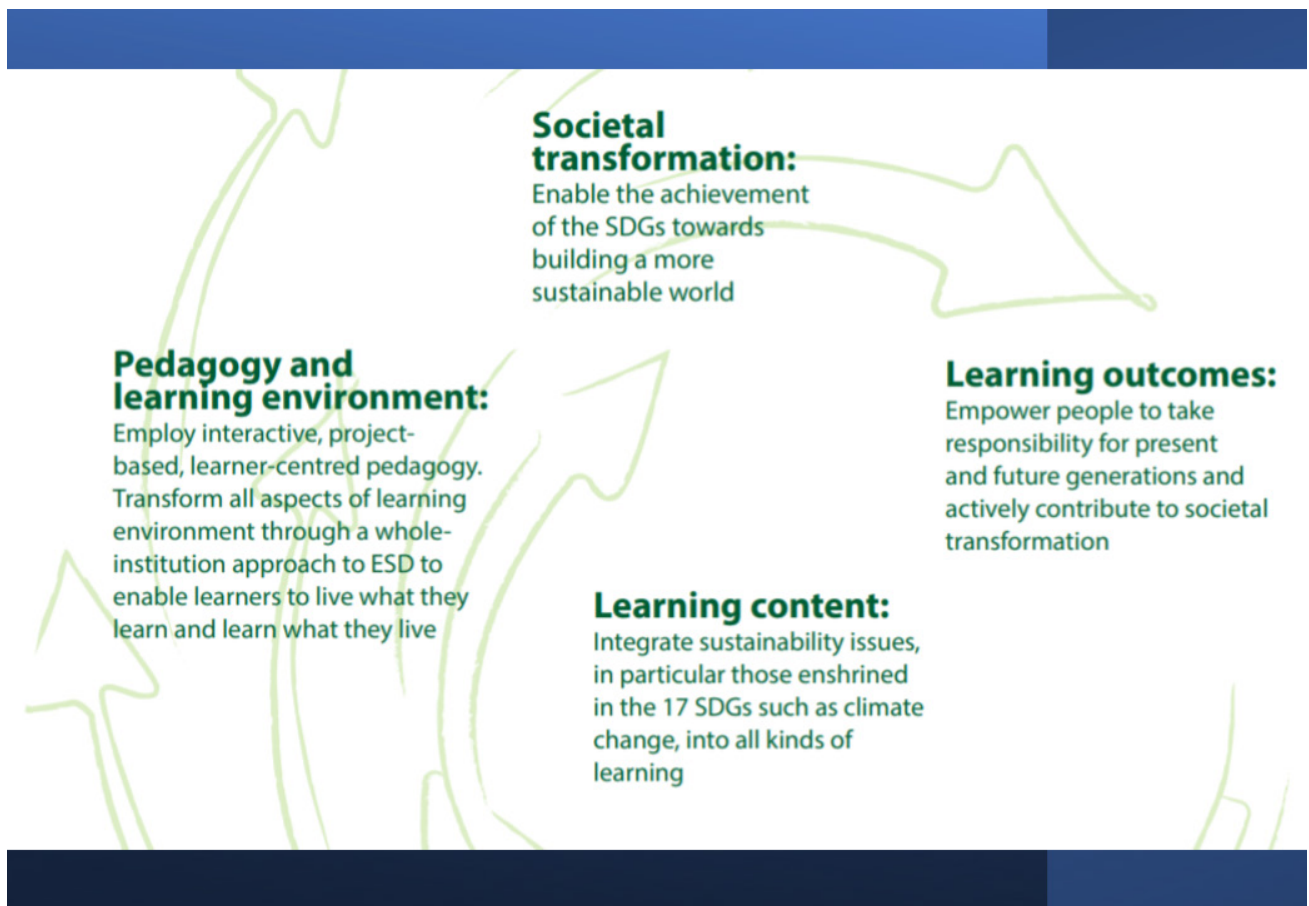
By 2030, the Sustainable Development Goal (SDG) 4 – Quality Education, specifically, Targets 4–7 on Education for Sustainable Development and Global Citizenship, aims that all learners acquire knowledge and skills needed to promote sustainable development, including among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and nonviolence, global citizenship, and appreciation of cultural diversity and of culture’s contribution to sustainable development.

As part of this endeavor, UNESCO has laid out the Education for Sustainable Development (ESD) Roadmap 2030, which emphasizes the importance of actions in the communities, as

this is where meaningful transformative actions are most likely to occur. The key components of the roadmap include learning contents that integrate sustainability issues, specifically those enshrined in the 17 SDGs such as climate change, into all kinds of learning. Another component of this is about Pedagogy and Learning.

The environment where pedagogy occurs should be interactive, project-based, and learner-centered. It should transform all aspects of the learning environment through a whole institution approach to ESD to enable learners to *“live what they learn and learn what they live.”* Another component is the Societal Transformation, which enables the achievement of the SDGs toward building a more sustainable world. Lastly, Learning Outcomes should empower people to take responsibility for the present and future generations and actively contribute to societal transformation. The roadmap covers the movement from the development of content to teaching and transmitting knowledge, and then changing behavior.

Looking at the sustainability side, it is important to ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production. This maintains



(Source: UNESCO Bangkok)

Figure 1. The key components of ESD Roadmap 2030

ecosystems that strengthen the world's capacity for adaptation to climate change, extreme weather, drought, flooding, and other disasters, and that progressively improve land and soil quality. This is embodied in SDG 2 – Zero Hunger, specifically, Targets 2–4 on Sustainable Food Production and Resilient Agricultural Practices.

There is a need to link SDG 2 and 4 or integrate sustainability into agricultural education such as in schools, universities, and farming communities. However, a lack of consistency in approaching sustainability in higher education still exists. There is also a need to see how sustainability concepts are integrated into the school's metrics. Another challenge is the inconsistent data about learning sustainability in agricultural communities.

Moving forward, there is a need for accurate data to better understand how agricultural education is being delivered at all levels and the extent to which sustainability is integrated. Learning opportunities should also be available to ensure that the content on sustainability is incorporated in the curricula at all levels.

Currently, there is a lack of extension services or the existing extension services are delivered by institutions with vested interests. Dedicated extension service is needed to ensure that

information reaches farming communities and provides practical support to enable more sustainable practices. Finally, in terms of monitoring and evaluation, there is a need to develop metrics to monitor learning outcomes and their impact on sustainability, as well as how sustainability concepts are integrated into the school's metrics.

D. GFAR – Dr. Hildegard Lingnau, Executive Secretary

The Global Forum on Agricultural Research and Innovation (GFAR) works with smallholder family farmers on the challenges they are facing in terms of food system transformation. It sees the ARIs as supporters for new learning conditions and advocate for co-research modalities, which stimulate innovation through interdisciplinary pursuit of knowledge and development of professional actors' functional capacities and life skills. The challenges in the emergence of these capacities and institutionalization of the related processes are addressed through curricular change and redefining the roles of research and extension agents in the context of co-experimentation settings with farmers. GFAR is a collective movement for

the transformation of food systems and a catalyst of collective actions with 659 partners working together across 13 constituencies. It brings together partners from different constituencies to tackle development challenges at all levels. GFAR envisions the smallholder farmers at the center of agricultural innovation—shaping and delivering the opportunities and futures that they desire. The members bring their commitments and resources, joining together in collective actions that create change and impact on the ground, as well as ensure that the collective actions are done in an innovative cycle which encourages a feedback loop of learning.

The GFAR Collective Action is a multi-stakeholder program of work at the local, national, regional, or international level, initiated by three or more partners and prioritized by GFAR Partners. Currently, there are two ongoing collective actions, one on Forgotten Foods and another on Inclusive Digital Transformation of Agriculture. This is to be followed by two more new collective actions on Participatory Research and Family Farming and Curricula Change and Higher Education Transformation. The ongoing Collective Action on Forgotten Foods

shows that there is a lot to rediscover on foods that have been neglected by research despite their intrinsic nutritional value and resilience in the face of climate change and adverse factors. GFAR is working to reposition research and innovation in support of food security by making full use of the “Forgotten Foods.”

The “Global Manifesto on Forgotten Foods” is the result of a broad and intensive consultation process carried out in Africa, Asia-Pacific, and the Middle East, gathering hundreds of stakeholders around a common vision. A Global Plan of Action has been put together to frame the development of projects or concepts notes that empower smallholder farmers and their organizations to govern and manage the use of forgotten foods, to enhance their resilience, economic situation, and to bring better nutrition into their fields, plates, and value chains.

The Collective Action on Inclusive Digital Transformation of Agriculture tackles how farmers, specifically smallholder farmers, are not harnessing the benefits of the ongoing and accelerating digital transformation. Digital Agriculture is expected to increase agricultural production and productivity, help adapt to and mitigate



(Source: GFAR/ <https://www.gfar.net/documents/global-manifesto-forgotten-foods>)

Figure 2. The Global Manifesto on Forgotten Foods

the effects of climate change, bring about more economic and efficient use of natural resources, reduce risk and improve resilience in farming, and make agri-food market chains much more efficient. However, farmers do not benefit as much as they should.

The Development of Smart Innovation through Research in Agriculture Initiative (DeSIRA) is a collective body funded by the European Commission (EC) formed to contribute to climate-

relevant, productive, and sustainable transformation of agriculture and food systems in low and middle-income countries. It empowers farmers and communities at the center of innovation and supports knowledge and innovation turned into opportunity and enterprise. Institutional architecture and the capacity of agricultural research and innovation organizations are strengthened while learning is improved and dialogue is enabled among regions. There is also integration and strengthening of knowledge management, policy advocacy, communication, impact demonstration, and investment in transformed agri-food innovation systems.

E. CGIAR, OneCGIAR initiative on “Transformational Agroecology across food, land and water systems” – Dr. Matthew McCartney

A business-as-usual approach will not address the challenges that the world is experiencing today. There is widespread recognition that food, land, and water systems (FLWS) need to transform urgently. Climate change, land degradation, loss of biodiversity, depletion of water resources, and pollution undermine food security and resilience. In many places, current agricultural practices have

undermined FLWS resulting in 40 percent of arable land being degraded, 64 percent of agricultural land contaminated by agrochemicals, and widespread forest and biodiversity loss. The focus on increasing yield and calories has not eliminated world hunger and malnutrition nor reduced poverty in many rural areas.

The transformation of agriculture is underpinned by agroecology. Agroecological innovation for small-scale farmers and other agricultural and food-system actors across different socioecological contexts need to be developed and scaled. To do this, the agroecological initiative needs to:

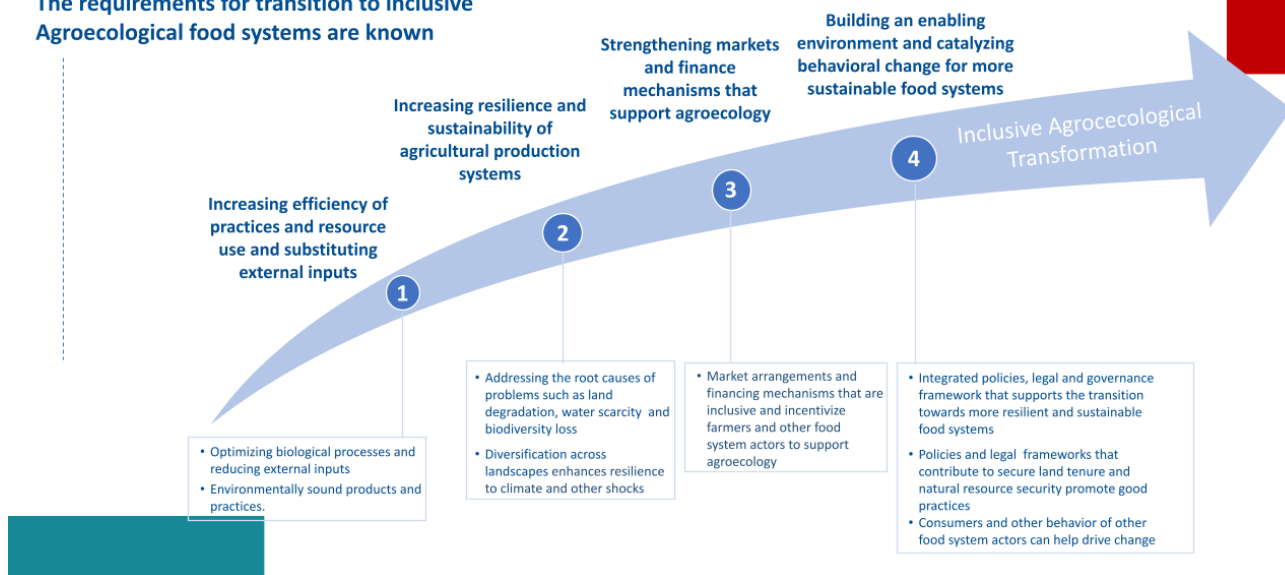
- support scale-out and continuous innovation for agroecological transitions in geographically-targeted food systems;
- co-develop a knowledge base that supports the implementation of context-appropriate agroecological innovations;
- co-develop business models and financing modalities, linking bundled agroecological innovations to markets and investment;

- promote recommendations to affect the cross-sectoral policy integration required to mainstream agroecological principles; and
- create an understanding of mechanisms to drive behavioral change of farmers and consumers needed to implement agroecological transformation.

Transforming to inclusive agroecological food systems requires increasing efficiency of practices and resource use and substituting external inputs. There is also a need to increase the resilience and sustainability of agricultural production systems by addressing the root causes of problems such as land degradation, water scarcity, and biodiversity loss, while diversification across landscapes enhances resilience to climate and other shocks. Markets and finance mechanisms that support agroecology should also be strengthened with market arrangements and financing mechanisms that are inclusive and incentivize farmers and other food system actors. An enabling environment and catalyzing behavioral change for more sustainable food systems should also be developed such as with integrated policies, legal and governance frameworks that

Agroecological Transition

The requirements for transition to inclusive Agroecological food systems are known



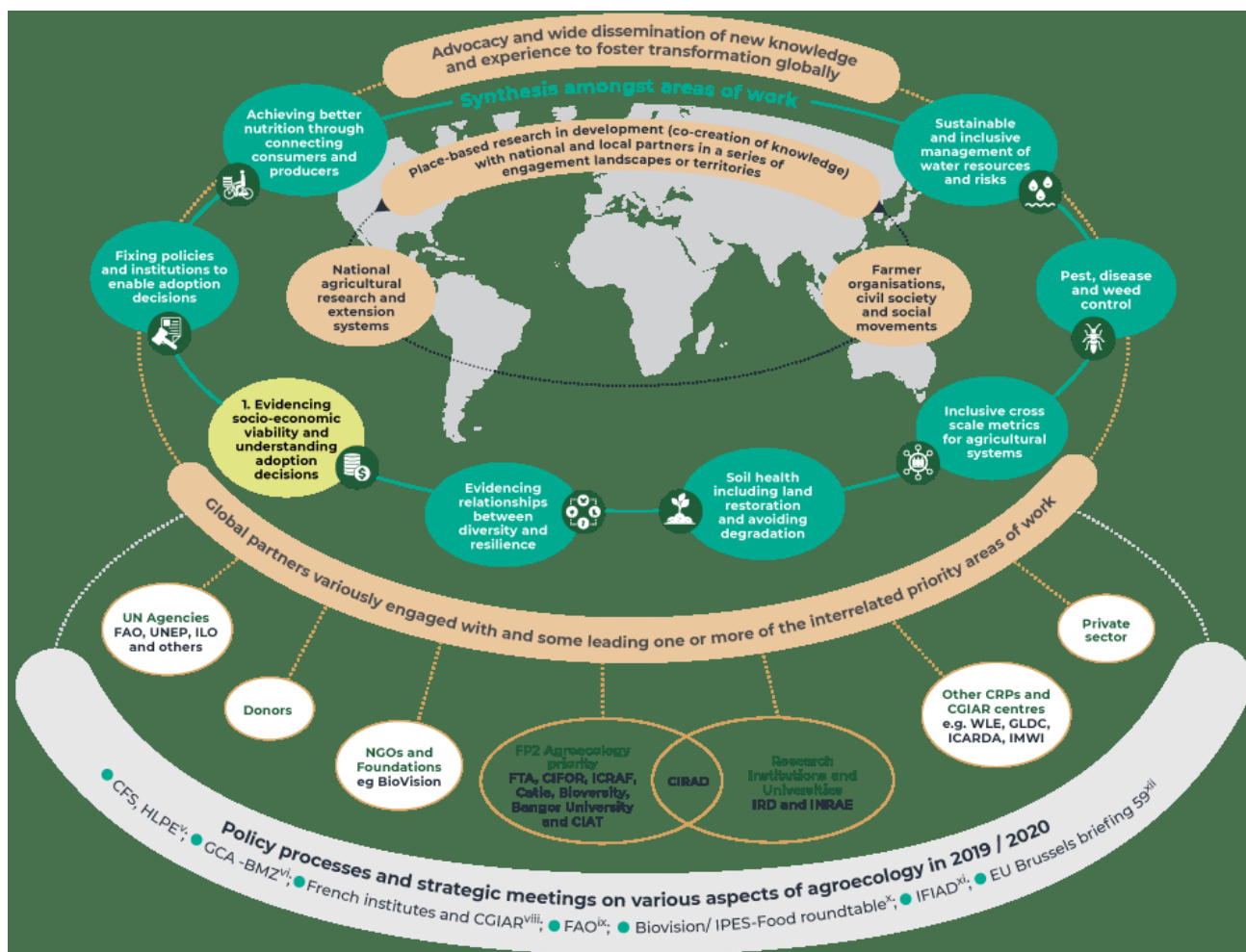
(Source: CGIAR initiative on “Transformational Agroecology across food, land and water systems” –Marcela Quintero and Matthew McCartney)

Figure 3. The requirements for transition to inclusive Agroecological food systems

support the transition toward more resilient and sustainable food systems, policies, and legal frameworks that contribute to secure land tenure and natural resource security. Consumers and the behavior of other food system actors can also help drive change.

F. Transformative Partnership Platform on Agroecology – Dr. Fergus Sinclair, CIFOR-ICRAF

The Transformative Partnership Platform on Agroecology (TPP) adds value by doing research to address knowledge gaps. It can build new research partnerships that are open, inclusive, and participatory among relevant and diverse stakeholders. Likewise, TPP is able to convene the best specialists on specific questions and knowledge gaps and generate evidence. This is not only to combine different sources of knowledge but also to engage in a new kind of theory of change based on stakeholders’ participation. TPP also works with policymakers and stakeholders in addressing implementation gaps to generate impact. It addresses a large diversity of local contexts with a common approach to ensure inclusivity by giving specific attention to the local and territorial contexts for concrete solution-oriented research, producing generic knowledge, and connecting solutions with issues at larger scales. TPP is demand-driven and works bottom-up by ensuring feasible and appropriate solutions, as well as top-down through widespread uptake at the same time.



(Source: Global Landscapes Forum)

Figure 4. The eight domains of the TPP with local and global partners in addressing local needs and priorities

So far, eight working domains have been identified where critical knowledge and implementation gaps are constraining agroecological transition. Six of these domains are currently being addressed by developing a common protocol and then using this across cases in contrasting contexts. One example of a TPP project is the metrics work funded by the European Commission International Partnerships (EU-INTPA) that establishes and applies comprehensive performance measurement and monitoring frameworks. Immediate progress can be made by combining already accepted SDG metrics.

The TPP uses the 13 agroecological principles articulated by the High-Level Panel of Experts on Food Security and Nutrition (HLPE) to guide its work. The principles incorporate and are complementary to the FAO’s 10 elements. Seven of these principles are mainly concerned with agroecosystem management to encourage farming that is in harmony with nature and confers resilience. The other six are concerned with whole food systems and are fundamental for

catalyzing and sustaining transformative change. The need for these principles to be applied simultaneously has led to agroecology manifesting as a science, a set of practices, and a series of social movements. Widespread transformative change is only likely to occur if these three manifestations coalesce and work together.

The first key area of the coalition is on policy recommendations on agroecological and other innovative approaches, guided by the 10 elements of agroecology endorsed by FAO and its Member States and the 13 principles of agroecology set out by the HLPE.

The second key area is on strengthening research and development programs by promoting local innovation, through a transdisciplinary and participatory approach between scientists, farmers, indigenous peoples, and other stakeholders of the food systems.

The third key area is on strengthening the consistency of the various sectoral policies aiming at the agroecological transformation of food systems, including agricultural, forestry, fisheries, environmental, water, energy, health, and trade policies.

The fourth key area is promoting the adoption and large-scale implementation of agroecological practices. Metrics are critical but there are no metrics yet that look at all the impacts. A lot of variables tend to be slow variables without market value.

There is a missing middle between the intention at the national and international level and what happens on the ground, and as the scale goes down further, things must be more integrated across sectors.

G. IFAD – Ms. Ilaria Firmian, Regional Specialist, Asia, and the Pacific, APR

The key challenges faced by family farmers include lack of access to information and communication technology (ICT), which is vital for inclusive rural information and communication services, and knowledge-sharing capacities of producer organizations. Another issue faced by farming families is the limited human capital and capacity building. Farmers are also challenged by slow business services. Hence, there is a need to improve the capacity of enterprises, access to value chains, markets, and finance. Horizontal exchanges between farmers, negotiation, and advocacy skills are likewise lacking and there is a need to identify

climate-resilient diversified production systems and implement them for different landscapes.

Innovation and knowledge can address the said challenges such as closing the digital divide through investments in digital knowledge and skills and providing access to inclusive rural information and communication services. Knowledge-sharing mechanisms can also be strengthened for generating, documenting, and sharing knowledge, as well as exchanging good practices and lessons learned. Building resilience to climate change can be possible by connecting government mitigation, adaptation, restoration, and resilience programs into climate-resilient landscape plans. Innovations in the agroecological market increase the availability of diverse, affordable, safe, healthy, and locally produced foods, and allocate greater value to agroecological products.

ARIs play an important role in the transition toward a sustainable farming system. In terms of partnerships and policy dialogue, partner ARIs work together to identify innovative mechanisms around agroecological production, transformation, and commercialization, and facilitate policy dialogues. ARIs also strengthen family

Key challenges faced by Family Farmers

ICT	Lack of access to ICT: need for inclusive rural information and communication services; and knowledge-sharing capacities of producer organizations
Human Capital	Limited Human Capital: need for investment in human capital and capacity building programmes
Business Services	Slow Business Services: need to improve capacity of enterprises, access to value chains, markets and finance
Voice	Voice and Visibility: need for horizontal exchanges between farmers, negotiation and advocacy skills
Climate Threats	Climate Change Threats: need to identify climate-resilient diversified production systems and implement them for different landscapes



(Source: FAO and IFAD)

Figure 5. Key challenges faced by family farmers

farmers’ organizations by disseminating knowledge and awareness of their rights, roles, and responsibilities, boosting their effective and meaningful participation in multi-actor decision-making processes. ARIs also develop materials to guide the increased use of international instruments, apply best practices, and lessons learned.

The International Fund for Agricultural Development (IFAD) has a long relationship with academic and farming societies through regional grants and has strengthened its commitment to climate resilience.

Agroecology-based projects have higher integration of priorities as seen using the Agroecology Stocktake with projects from 2018 to 2023. There are higher incorporation of the IFAD mainstreaming priorities and indigenous peoples (above 80 percent), with less frequency for youth (67 percent) compared to non-agroecology projects (4 percent nutrition, 12 percent climate change, 27 percent youth, and 46 percent IPs).

H. Open Forum

The open forum was conducted simultaneously with the presentations due to time constraints. The participants were asked to post their questions on the chat box so that the presenters can respond to the questions.

Q1. What is being done to better integrate basic skills for sustainable food system, as well as to address gender inequity and social norms from the start, in conjunction with extension?

A1 [Dr. Susan Vize]. Good data regarding this are not yet available. The SDG 4.7 monitoring includes conduct of data collection on some pilot [project] areas in various countries. This will eventually include primary schools once developed. I am not sure about vocational schools. There are good examples at all levels, but it is hard to keep track of what is happening.

Q2. Who is part of the coalition apart from FAO and member states, and CSO-PO? Which financing institutions are part and how operational is the framework to facilitate our integration in design and implementation?

A2 [Dr. Hildegard Lingnau]. We have too many participants in the Collective Action on Forgotten Foods to

be mentioned here. Please look at our website (www.gfar.net). Funding is mainly provided by the European Commission. The framework (“Global Manifesto”) has been turned into very operational action plans.

Q3. How can organizations or individuals in Zimbabwe be members of the TPP?

A3 [Dr. Fergus Sinclair]. Yes, individuals can become part of the TPP GFLX web platform Community of Practice. Access our website. Institutions can join by completing a simple membership request form indicating their commitment to the aims and modus operandi of the TPP and how they will contribute and add value to the TPP and how the TPP will contribute and add value to the institution wishing to join. Please contact Lisa Fuch, the TPP Scientific Coordinator, l.fuchs@cgiar.org.

Q4. Twenty-eight percent of IFAD investment in Asia during the past decades have been along community-driven development and supporting decentralized process and collaboration with provinces and regions. But, sometimes, there are difficulties to articulate to higher level as well. Have you included in your review the priority entry points for national to support such community and middle-level capacities?

A4 [Dr. Fergus Sinclair]. A draft paper is being revised in relation to inputs from an open e-consultation and a final version will be released shortly. Also, there is a relevant paper on agroecology principles and elements that looks at entry points (<https://link.springer.com/article/10.1007/s13593-020-00646-z>).

Q5. Similar question for the TPP, who is part of the TPP agroecology coalition apart from FAO and member states, and CSO-PO? Which financing institutions are part and how operational is the framework to facilitate our integration in design and implementation?

A5 [Dr. Fergus Sinclair]. To clarify, the TPP focuses on addressing knowledge and implementation gaps constraining agroecological transitions and has incubated the coalition that focuses on action.

Q6. In financial institutions, we often struggle to dedicate sufficient fund for soft investment in ARIs; all the more engaging international institutions for loans, while innovation is core to our work. On the other hand, research institutions often have difficulties to leverage enough fund for scaling pilots. Which mechanism exists to bridge this gap?

A6 [Dr. Fergus Sinclair]. CGIAR (CIFOR-ICRAF) has developed a Research in Development modality. IFAD and EU were instrumental in funding the development of this through a dryland restoration project coupled with major national loan programs. This has led to a new Options by Context (OxC) agronomic paradigm that works with farmers to address heterogeneity of their circumstances and their evaluation criteria.

Q7. *Indeed, it is important to have quality knowledge management (KM) platform, but what will be the sustainability beyond the project life? How to link and rather empower existing knowledge platforms such as WOCAT, which has been working for decades on providing comparable co-created knowledge on SLM?*

A7 [Dr. Matthew McCartney]. This is a very good question and something that CG has often struggled with in past programs. This time the intention is to work with non-research partners who can help with the implementation and hopefully, continue to promote innovations. We certainly hope to work with existing knowledge platforms like ALISEA and WOCAT and have had some preliminary discussions.

A7 [Dr. Fergus Sinclair]. Just to add, the TPP operates on a principle of not repeating or competing and points to and works with existing initiatives.

Voices from the Ground

A. Andhra Pradesh Community-Based Natural Farming Movement – Mr. Vijay Kumar, Advisor to Government of Andhra Pradesh for Agriculture & Cooperation

There are 54 million people located in the South of India and the area has faced disasters such as cyclones and floods which affected some eight million farmers. As such, various land management practices have been promoted by the Andhra Pradesh Community-Based Natural Farming Movement, including keeping the ground covered with diverse live crops, crop residues, minimizing tillage, integrating animals into farming, and using bio stimulates such as cow dung.

Transitioning to natural farming should be as seamless as possible for various activities like seed treatment, crop growth, pest management through botanical extracts, and the promotion of indigenous seeds. The farmers have also combined principles and practices coming from their traditional knowledge.

The impacts of transitioning to natural farming are remarkable. The cost decreased substantially, while farmers' income increased. Agricultural resilience is established through home gardens with rich biodiversity and evident soil fertility. The water consumption decreased; consequently, water savings became an outcome which shows that nature restores the soil.

The goal of Andhra Pradesh is to further reach out to every farm village in the community. Women-led self-help groups and women community leaders are taking this forward and supporting them with knowledge generation, dissemination, and promotion of farmer-field school.

Experiential learning occurs when farmers encourage other farmers to adopt sustainable practices. The challenge to this transition includes going against the mainstream agricultural research and teaching system. Farmers are obligated to adopt “new” technologies from agricultural research as this is prescribed by the experts. In reality, a system should be developed in a way that works for the farmers based on their experiences, existing practices, and environmental conditions. Moreover, extension services are weak and must be set right to make them pro-farmers and pro-communities. There is a need for a better relationship between the conventional institutions and farmers, as well as respecting farmers’ knowledge. Farmers are also scientists, but instead of publishing papers, they are busy improving their lives.

The current system is disadvantageous to farmers. Institutions should join the farmers and see what they

are doing on the ground. They should assess if the farmers have a better system than the “mainstreamed” one. ARIs should incorporate principles of farmers’ traditional knowledge and natural processes in evidence-based research. In this way, farmers are seen as partners and colleagues, not just in agriculture, but also in research and development and decision making.

B. AFA – Ms. Ma. Estrella Penunia, Secretary General

The Asian Farmers’ Association for Sustainable Rural Development (AFA) is active in 20 countries in the region with members coming from both farmers’ associations and farmers’ cooperatives. The Viet Nam Farmer’s Union (VNFU) is the biggest farmer organization with the largest number of farmer members, while Ainoukai in Japan is the smallest farmer organization.

Seventy-four percent of the family farmers of the world resides in Asia, while 83 percent of family farms in Asia are small-scale. Eighty percent of the food consumed in Asia is from small-scale farmers. Family farmers are also the most vulnerable to the effects of climate change. This shows the irony wherein the main producers of the world’s

food system possess a small percentage of the world’s resources.

Poverty and hunger in Asia are prevalent at 62 percent, which are caused by lack of access and control over natural, technological, physical, social, financial, market resources, insignificant involvement in policymaking processes, and degraded ecosystems and vulnerabilities in price and climate shocks. This leads to out-migration, aging, low pride, and low esteem in farming. Without the farmers, there will be obviously no food on the table.

AFA’s programs include multi-stakeholder partnerships on women empowerment, youth in agriculture, FO governance, rights to natural resources, sustainable resilient agroecology, and cooperative development and strengthening.

In Sustainable Agriculture and Agroecological Technologies, AFA members run various projects at field levels, such as community seed banking; integrated, diversified, and organic farming; farmer field schools and training of farmer extensionists; alternative pest management; renewable bioenergy such as coconut briquettes; a system of rice intensification; and community-based

agroforestry, among others. Most of these projects are supported by other non-governmental organizations (NGOs) and country donors. At the regional level, AFA documents their initiatives and innovations through information, education, and communication (IEC) materials, conducts exchange visits, study tours, and brings resource persons to the project sites so that more farmers can learn about the technologies to try and replicate them in their countries.

The Integrated Diversified Organic Farming Systems (IDOFS) by the Pambansang Kilusan ng mga Samahang Magsasaka (PAKISAMA) in the Philippines used different key interventions such as farm planning, seminars, study tours, resource mobilization, and seed selection. The farm includes integration of trees, crops, livestock, fish in a 1.3-hectare farm for pest management, nutrient recycling, reducing food loss and waste, and increasing resilience and income. Results of the intervention include an increase in income, food security, biodiversity, healthy soils, good food, and landscape, and instilling responsibility among the youth.

The Kraing Leav Samaky Agri Coop-FNN in Cambodia

was established in August 2012 to provide agriculture credit, organic rice, vegetable, chicken, pig, and an organic rice mill. In its 200 hectares, 80 hectares are used for organic rice fields. At present, the cooperative is made up of 84 members from the rice producer group, 44 families from the chicken producer group, 18 families from the organic vegetable producer group, and eight families for the pig producer group, as well as agricultural credit groups for a total of 64 families. Results include higher prices and higher incomes, and the cooperative has expanded its marketing channels. There is also an increase in its agricultural credit.

Despite agroecology being good, family farmers are still hesitant because of the following reasons:

- Limited knowledge on agroecology
- Disbeliefs in the principles of agroecology
- Hard, tedious work that comes with agroecology
- Fear of losing income during transition
- Little incentives or lack of support from the government

An example of this is in Sri Lanka, where policy changes from highly chemical to

organic farming was so abrupt that it affected their income. Moreover, the absence of training programs on organic farming for farmers led to the failure of the transition.

Moving forward, it is recommended to develop a clear, systematic redirection of investment, funding, research, and policy focus on agroecology by, with, and for small-scale farmers. There is also a need to strengthen links between research, advisory, and extension, especially with farmer-farmer. Technical assistance should be given with a special focus on women and youth. Further recommendations include farmers' representation in policymaking, project design, and implementation; development of harmonized policies especially at the national and local levels; support for transition to agroecology through incentives, subsidies/grants, soft loans and blended finance, insurance, and documentation and dissemination of information in local languages.

C. Third World Network – IPES-FOOD, Ms. Lim Li Ching, Researcher

Most challenges faced by smallholder family farmers include climate change, loss of agricultural biodiversity, low agricultural productivity,

increased pest and disease occurrences, declining soil fertility, lack of secure land tenure, and lack of access to seeds, credit, and appropriate markets.

Agroecology addresses multiple challenges through its unique holistic capacity to reconcile economic, environmental, and social dimensions simultaneously. It sustainably increases productivity. It also rebuilds soil fertility, sustains yields over time, secures farm livelihoods especially for smallholder farmers, builds environmental and climate resilience, ensures adequate nutrition through diverse diets, and supports circular and solidarity economies that reconnect producers and consumers.

A shift in research is much needed in the context of these questions: What is the research agenda? How are the innovations shared? Who participates in the research?

The research agenda should be a co-creation of knowledge with the farmers. Research from the scientific community should complement and build on farmers' knowledge. It should accept farmers as equal partners in research and development, and innovators and co-creators of knowledge. Farmers should also be integrated into research and development systems and give them tools to do their on-farm research.

Farmers' participation includes their direct involvement in the formulation of the research agenda. Research priorities should be identified in a participatory manner, enabling farmers to play a central role in defining strategic priorities for agricultural research. There should also be active participation of farmers in the process of technological innovation and dissemination.

Figure 6. The integration of farmers into research and development systems and handing out of tools to do their own on-farm research



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Research efforts should recognize and facilitate the pivotal roles women play by encouraging open spaces for women to become more autonomous and empowered in the research process, addressing gender inequities, and making a specific effort to promote women's participation and learn from them.

In terms of knowledge sharing and networking, research and extension systems should support farmer-to-farmer agroecological innovation. This includes provisions for formal and informal means of education and knowledge sharing; increase capacities of farmer and community organizations to innovate and to share their knowledge with other farmers in farmer-to-farmer networks; strengthening networks and alliances to support, document, and share lessons and best practices; and increase networking and knowledge sharing between farmers and researchers.

Resource mobilization entails shifting public research funding toward agroecology research and innovations, as well as to farmers' organizations; integrating agroecology components into other, potentially larger funding envelopes relating to climate change, gender, sustainable livelihoods, and community economic development; and repurposing funding and

policies to shift away from funding detrimental forms of agriculture and development.

**D. Amrita Bhoomi
Centre – Ms. Chukki
Nanjundaswamy,
Coordinator**

Now is the right time to bring the academia and farmers together. Even though the timing is quite late, the initiative is well appreciated and valuable in moving forward.

For the past months, typhoons have caused massive damages in Andhra Pradesh. Most of the crops were ready to be harvested, but farmers were not able to harvest as they did not anticipate the extent of damage. Evidently, climate change can be mitigated by scaling agroecology. The discussion on scaling up of agroecology is not isolated from climate change, which directly affects farmer communities. Most of the time, farmers are the most vulnerable to the effects of climate change.

The perspective of many scientists on sustainability and climate-smart agriculture (CSA) does not match to the experiences of farmers on the ground. Many developed technologies have disregarded farmers' experiences and traditional knowledge. As a whole, we have already lost tacit

knowledge related to farming due to inefficient research, particularly the green revolution where farmers' traditional knowledge was wiped out. Hence, it is important to identify farmers as co-scientists on the ground.

So how do we bring back and connect to that knowledge again? It is crucial to interact with farmers on the same levels—the science community should start listening intently to farmers.

There is a dangerous trend in India where ARIs and agricultural universities accept funding from private companies at the expense of doing research following their agenda. These investments in research are obviously not pro-farmers and only benefit those who funded the research. It is time to end that trend and provide more opportunities to secure funding and grants that favor sustainable agrifood systems and resilient farming communities.

There is a need to work collaboratively with farmers to scale up agroecology. Public investments in research should be directly linked to the farmers. Research should be made relevant by connecting the data with on-the-ground experiences. A smiling farmer is proof enough, more than statistics and scientific papers.

“ ***It is important to identify farmers as co-scientists on the ground... It is crucial to interact with farmers on the same levels—the science community should start listening intently to farmers.*** ”

E. Australian Food Sovereignty Alliance (AFSA) – Ms. Tammi Jonas, President and Farmer

Agroecology is both a science and a social movement. It considers the farmers as scholars and agents of climate-smart agriculture (CSA), so their autonomy must continue. Family farmers produce site-specific knowledge that simplify complex systems. ARIs must reverse the top-down research and let family farmers lead the innovation; and produce young farmers through science-based agriculture curricula. Similar to Orlando Fals Borda’s advocacy on participatory action research with peasants in Colombia, institutions must work closely with farmers and study the history of their struggles to come up with best practices and practical solutions.

Many smallholders from across Asia and the Pacific came together as part of the Peoples’ Autonomous Response to the UN Food Systems Summit to discuss proposals for a radical transformation of the food system. The proposed solutions focused on the following agenda:

- The importance of the agency and autonomy of indigenous peoples, peasants, and fisherfolk in solving the problems faced on the ground is fundamental. It is embedded in place and determined democratically.
- Continuation of stronger alliances across countries and the region to fight the corporate control of the food system
- Continuation of building producer-owned cooperatives for production, processing, and distribution
- Security of land tenure and access to natural resources, and strengthening movements against land grabbing
- A radical paradigm to shift away from Blue Economy to Blue Justice in fisheries, which is crucial for climate justice, encompassing economic, social, and environmental justice
- Promotion and scale-up of agroecology as a science, a set of practices, and a social movement

A feature of peasant and indigenous communities is *mētis*, which is a wide array of practical skills and acquired intelligence in responding to a constantly changing natural and human environment. *Mētis* has been gradually replaced by standardized formulas that are legible only from the center, as a central organizing principle of both the state and large-scale bureaucratic capitalism.

Family farmers become some of the original and best innovators because of deeply place-based knowledge that should be respected. In trying to simplify the interactions with complex systems of nature, multiple crises of biodiversity loss, climate change, and pandemics have been created.

The economic, political, knowledge, and cultural lock-ins can limit the ability of farmers to shift to agroecology. Agroecology tends to be delegitimized by actor networks whose theories of change stymie such transitions. Agroecology is also ignored by some scientists, industries, and government elites as they believe strongly in science and technology to overcome climate constraints.

The enabling dynamics for an agroecological transition are currently coalescing with a global pandemic, a strengthening and increasingly mobilized global food sovereignty movement, and the emergence of more agroecology schools following a pedagogy of horizontal knowledge exchanges.

Across the region, peasants’ organizations are facilitating farmer-to-farmer knowledge exchanges in field schools and workshops. In Timor-Leste, Movimento Kamponezes Timor-Leste’s (MOKATIL) peasant organization members such as Uniaun Agrikultor de Ermera (UNAER) train farmers in leadership and agroecology following Vía Campesina (Paolo Freire) methodologies. SPI facilitates School of Agroecology and Seeds field days, and in 2016, hosted an exchange with the Korean Women Peasants Association (KWPA) in Indonesia for cross-cultural knowledge sharing of agroecology, and the struggle for the right to peasants’ seeds. At the Amritabhoomi Centre in the southern State of Karnataka, India, La Vía Campesina hosts agroecology schools to support the growth of young farmers, and in Australia, AFSA commenced Agroecology Workshops hosted by farms in diverse geographical settings across the country in 2021.

Figure 7. Experiences on farmer-to-farmer knowledge exchange



<p>Farmer to farmer knowledge exchange</p>	<ul style="list-style-type: none"> • Mokatil • Korean Women Peasants Association (KWPA) • Serikat Petonesi Indonesia (SPI) • Amrita Bhoomi Centre
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(Source: Tammi Jonas)

Australia's transition to agroecology and food sovereignty will succeed best if led by farmers and actively supported by ARIs. Farmer-led research can be done through creation and maintenance of research and researchers' public databases around agroecology, connection of honors, postgraduate, and early career researchers to farmers to co-create research projects in both physical and social sciences, and mobilization of support for farmer-led agroecology schools in administrative and financial matters.

F. Open Forum

The open forum was conducted simultaneously with the presentations due to time constraints. The participants were asked to post their questions on the chat box so that the presenters can respond to the questions.

Q1. How important is gender/women and nutrition in facilitating such massive transition to agroecology?

A1 [Mr. Vijay Kumar]. It is very, very important. It is integral to our transformation strategy.

Q2. In your opinion (addressed to Ms. Ma Estrella Penunia of AFA), is agroecology the same with organic farming?

A2 [Ms. Ma Estrella Penunia]. There will be similarities and differences. The main difference is, sometimes, organic farming can be done in mono-cropped farming systems, but agroecology will push for biodiversity enrichment and integration of farms. Agroecology will be concerned with social and political issues aside from economic and environmental concerns. That is why agroecology goes hand-in-hand with land rights of the farmers, women empowerment, gender equality, with more local markers and shorter food miles. In the Philippine experience, there is a nuance—integrated, diversified, organic farming systems. One challenge also is the process of organic certification. Many small-scale farmers and their cooperatives cannot afford third-party certification. So, we are working on participatory guarantee systems.

Q3. If I understand this correctly, organic food and fiber production is, therefore, a prerequisite of agroecology (i.e., it is organic farming embracing all other aspects of farming such as social and economic dimensions).

A3 [Ms. Ma Estrella Penunia]. Agroecology has 10 elements as defined by FAO and 13 principles as defined by the HLPE of CFS.

A3 [Dr. Fergus Sinclair]. I think, while there is an overlap, the agroecological principles beyond agroecosystem management are not required by organic farming. The big difference is that organic farming is prescriptive in practice, which makes it easier to certify, whereas agroecological principles are locally applied through co-creation, which results in diverse, locally relevant practices.

The participant who asked question no. 3 made a follow-up remark on the two provided answers of the presenters. The participant said that it is important that the difference between agroecology and organic farming is made quite explicit.

Panel discussion: What would be needed to foster collaboration between ARIs and Family Farmers and their organizations toward sustainable and green rural transformation?

The panel discussion was moderated by Dr. François Enten from GRET. The panel discussion incited a meaningful exchange to address the following questions:

- Existing challenges for education and extension to reach out to smallholders (and their organizations)

- Digital transformation, how far can it go and what barriers can it address?
- What recommendations to bridge the gap between ARIs and FFOs?

A. Serikat Petani Indonesia (SPI) & La Via Campesina – Mr. Zainal Arifin Fuad

In Indonesia, there are existing challenges for education and extension in reaching out to smallholder farmers and their respective organizations. These obstacles are seen on the adoption of technologies in remote areas and the lack of the government’s effort in providing access to funding, farming inputs, and equipment.

In the process of transitioning from green revolution to agroecology, there are a lot of questions that need to be answered and provided with solutions. This includes some strategies or policy changes in land tenure and land use to ensure that every farmer has the right to till their own land. In where we work, it is a common goal for farmers to work together and solve these challenges head on.

When it comes to transfer of knowledge and technology, there are many instances that face-to-face sessions are more effective than

online classes. There are also issues in conducting online classes such as limited Internet connection and a handful of farmers who own gadgets. On top of these issues, the on-going COVID-19 pandemic has been difficult to pursue the learning initiatives.

In the methodology of collecting and producing information, there is a need to transform and change the mindset of the academia and researchers into a more collective approach that are pro-farmers and pro-environment.

B. Korea University International Law Research Center – Dr. Jie-Hye (Alicia) Lee

For the academic and research institutions, it is important to research how data in digital agriculture aid farmers in poorest locations. Do not let the farmers fall behind—it is crucial to connect farmers together and let them communicate as a network during decision-making activities. To support farmers, the academe should have timely information and integrated data to help farmers make timely informed decisions. There is also a need to create a communication nest where farmers can express themselves and people can hear them out, as well as provide their

needs. Communication between stakeholders is limited due to the COVID-19 pandemic. However, it would be possible to stay connected if all farmers have access to technology. Digital transformation in Asia experiences challenges; even if farmers are willing to learn and communicate, they do not have access to digital tools and technologies. There should be an accessible platform in providing cheaper tools and getting unlimited access to the Internet to take advantage of the digital advancements.

There is also a need to invest in start-ups and the sharing of infrastructure to connect the agriculture department to the farmers. It is also important to develop curricula for the farmers; even if they have the means to communicate, they also need to develop literacy.

It is important for farmers to get accustomed to these technological developments and links to computers and the Internet. The government must establish a full policy support to technological infrastructure and educate farmers using literacy programs. With these strategies, farmers can be capacitated to use technology. These strategies could be implemented through the cooperation between government and different stakeholders.

C. AsiaDHRRA – Mr. Florante Villas, Project Manager

Our collaboration with partner organizations builds these on-the-ground experiences and we make collective efforts to improve them.

The organization capitalizes on searching local and appropriate innovations created by farmer organizations and NGOs. For example, the disagreement between farmers and researchers led to the creation of Magsasaka at Siyentipiko para sa Pag-unlad ng Agrikultura (MASIPAG) farmer-led agricultural research and development. Eventually, this movement branched out to marketing and policymaking.

Researchers must be working with platforms that are farmer-led. Some ARIs were able to accompany farmers to their advocacies, especially in the development of agri-fisheries sector, agrarian reform, and rural development, among others. Likewise, organizations must convince farmers to change the way they view ARIs—not as merely funders, but also allies. In the past, ARIs, upon receiving funds, help in maintaining the status quo and protect the interests of big corporations. It is time to change this perception to a more collaborative regime.

AsiaDHRRA prioritizes value change and policy advocacy as evident in our work with a farmers' organization in Yogyakarta.

The government imposed a requirement for farmers' organizations in order for them to avail of government programs and services. However, the farmer-members did not feel the ownership of the program. Some farmers and other leaders started to realize that they need to reorganize to improve the livelihoods of the members. Eventually, they visited other farmers' unions and ARIs, learned from them, and finally laid out their own agenda to develop the farmers' livelihood based on cacao by improving the market price of cacao, producing their own brand of chocolate and other chocolate-based products, and rehabilitating the cacao farms. They found a potential benefit from selling processed cocoa beans in the market.

They were able to move the products to physical markets, and even online markets such as Shopee and Tokopedia. They utilized the digital platform in marketing and was able to increase the sale of quality fermented cacao beans.

Their membership has increased, they received multiple awards from

the government, and a grant for machinery. All of these resulted from the collaboration between Indonesian farmers' organizations and ARIs. This collaboration is sustained and accompanied the farmers' organizations in all aspects and in whatever agenda they want to achieve. It is recommended to increase the number of collaborations across all levels, especially at the national and local levels.

D. Ministry of Agriculture, Indonesia – Dr. Epsi Euriga

The experiences in providing agricultural extension service and research development processes must be jointly applied to support the agri-food systems and family farmers during and even after the COVID-19 pandemic. Farmers must be provided with basic knowledge on information technology through extension support. This is to strengthen the IT knowledge and digital capacity of farmers especially in the age of digital transformation and COVID-19.

The digital transformation of the agricultural extension services and even higher education curricula can heighten the interest of youth in pursuing agriculture as their profession. In this way, the next generation of

farmers is ensured. Likewise, ARIs should also explore the use of e-commerce in upscaling agriculture.

For example, the Juru Tani is a mobile application that provides farming advisories for better farm management. In this web application, users can also create a discussion group with other users to exchange experiences and insights on planting, harvesting, and farm management. This has

been used all over Indonesia and can be downloaded in the Google Play Store. The use of Juru Tani is increasing slowly but surely. It is proven to raise awareness and provide solutions to the needs of farmers. This ensures the sustainability of the roles of the agricultural sector, the roles of extension worker, and roles of government and academia in making sure that the farmers' innovation is easily adapted to other units and be replicated in other areas.

E. Digital Green, India – Dr. Namita Singh

Digital Green was born out of a research project, which uses digital technology to reach farming communities. Collaborations with ARIs may lead to new agriculture technologies and promote technology adoption. Academic institutions should also provide big data that are relevant in helping farmers.

Through collaborations, organizations can investigate areas that they cannot reach

Figure 8. The Juru Tani mobile application



(Source: Agrozone.id)

previously, and help people on the ground to also bring other perspectives such as gender to the project. ARIs and different stakeholders must help each other to improve farm-level programs and activities to more impactful and to explore untapped areas where critical on-the-ground stories reside. Connecting to a digital network is important such as implementing digital extension which enables the ministry of education to introduce digital technologies. It is important to highlight the effectiveness of digital content in marketing linkages using mobile application. The agricultural extension services that are video-mediated have higher engagements and interest than traditional platforms. Likewise, the use of digital media is more cost-effective. These are evidence to support the effectiveness and efficiency of digital media.

It recommended to foster more collaborations with institutions from diverse fields and policymakers to focus on infrastructures that would enable the shift to the digital world, to ensure that small-scale producers are not on the losing end, and to encourage entrepreneurs to consider marginalized communities.

We should look at multiple ways in employing participatory approaches

as these produce significant outcomes to the livelihoods and well-being of farmers. The integration of participatory activities is more effective and can bring about robust evidence in using digital tools as a better way to work with farmer families.

F. Open Forum

For the open forum, Dr. François Enten (GRET) asked the panelists about their recommendation to policymakers to promote digital tools in upscaling agroecology and transforming the current food systems.

According to Mr. Zainal Arifin Fuad (SPI & La Via Campesina, Indonesia), the goal of information technology is to sell products. Therefore, the government should focus on building digital infrastructures like good Internet connection, signal reception, and equipment in rural areas. Farmers will have the opportunity to venture on online marketing of their products. However, there are still a lot of challenges in the process of turning these would-be policies into reality.

For Dr. Jie-Hye Lee (Korea University International Law Research Center), policymakers must go through the basic investment stage by reviewing

regulatory framework in expanding networks in the region and ensure stable funding in poorest areas. The government's role in providing technological support to the regions must include the promotion of cheaper, simpler, and accessible digital technology. Based on these levels, consider certain aspects like potential benefits, cost investments, and even scenarios in case of market failure. Increase agricultural value in the region by punishing any act that hinder the development of digital agriculture. Require participation and incorporation of each stakeholder to enable sharing aspects of the digital transformation.

Mr. Florante Villas (AsiaDHRRA) recommended increasing the number of partnerships at local, subnational, and national levels. The representation of farmers' organizations is apparent, but there is a need to develop more national and local partnerships between ARIs and family farmers' organizations.

Dr. Epsi Euriga (Ministry of Agriculture, Indonesia) said that the students and alumni need to collaboratively operate Juru Tani, together with the leadership, commitment, and support from the Ministry of Agriculture. This is through the establishment

“ **...There should be a balance between farmers as experts and scientists as experts. Digital Green’s approach is based on collaboration. Digital Green considers videos as technical content to follow the process of farmer groups and provide feedback...** ”

of an incentive system for farmers, extension workers, researchers, and the general public. In addition, the support for digital extension, especially in higher education curricula that aid family farmers must be upscaled. The agroecology advocates and development agencies should push for that agenda. The government must provide financial support and encourage the IT industry to invest in digital innovations in agriculture, especially in supporting students who want to pursue agriculture.

Dr. Namita Singh (Digital Green, India) encouraged more partnerships between ARIs and the different fields, apart from agriculture, as this can contribute more value in the cause. The government, ARIs, and other stakeholders must lead the transition to a digital world. Policymakers should focus on investing in digital infrastructure, specifically on data privacy to ensure that

small-scale producers are not on the losing end since security and data privacy are sensitive data. The government should partner up with big tech corporations to provide device incentives to marginalized communities, as well as provide them stable connectivity.

For the second question, Dr. François Enten asked the panelist about the challenge of evaluating the efficiency and effectiveness of their initiatives on the ground.

Mr. Florante Villas said that the capacity of the organization to listen to members, especially women is important. The production of chocolate products was the idea of women farmers. It is important to reinforce women groups to put forward their ideas, advocacies, and agenda.

On the other hand, Dr. Epsi Euriga shared that developing digital tools

undergo many stages, so that the number of users, number of experts’ advisories, and the likes could enrich Juru Tani as a one-stop shop search engine using analytics. In addition, they ask students to train farmers in using Juru Tani and let them evaluate those experiences through case studies.

Mr. Zainal Arifin Fuad mentioned that in their organization, the women members have roles in every level. They push every member to create videos to exhibit their experiences and to document success stories in their areas as a result of the organization’s initiatives.

Dr. Namita Singh stated that there should be a balance between farmers as experts and scientists as experts. Digital Green’s approach is based on collaboration. Digital Green considers videos as technical content to follow the process of farmer groups and provide

feedback if the process is relevant and doable on the ground. These feedbacks are incorporated in promotional videos. This way of documentation is more responsive to farmers as they are the ones who are actually applying the practices on the ground. Farmers can genuinely promote these practices since they have experienced the benefits in their own farm.

Lastly, Dr. Jie-Hye Lee suggested to pursue a more sustainable and profitable production. The roles of respective ARIs, HEIs, and the government are to continue the development of technological programs and projects to incorporate the environmental principles and take into account the digital transformation in Asia.

A participant asked a question to Dr. Epsi Euriga through the chat box about the Juru Tani mobile application. The participant mentioned that the Juru Tani is a great development. However, one concern is about quality assurance. Many potential users do not speak Bahasa, but the goal of the app is to link experts to farmers. What are the criteria to be an “expert” who

can give advisories using the mobile app? An inconvenient truth is that everybody can become an instant expert by reading articles on the Internet, so how can the flow of information be managed? Dr. Epsi Euriga responded, “Yes, this is our problem at the moment, but we will have a team secretariat to make sure that the experts are indeed professionals in their expertise, who are mostly from universities. For next year, we have already formulated the decision letter about who is the expert. The Q&A section will be answered by the experts through their verified accounts, but if general questions are asked, then our students will ask the experts directly and post their answers as admins in the mobile app.” The participant who asked the question made follow-up remarks on the two provided answers of the presenters. The participant said that it is important to make information and advice available in an unbiased manner. This is an increasing challenge in the day and age of social media.

To conclude the panel discussion, another participant gave a closing question to Dr. Epsi Euriga.

The participant asked, “For digital agriculture, we see multiple constraints for the actual use of poorer farmers, not only related to phone/Internet/literacy, but also to the kind of phone used by farmers (i.e., recent study from Grow Asia), but also many apps may be topdown and not locally trusted. What is your experience on delivery channel and feedback system to the last mile? Which business model is to be used to incentivize local digital champions to help their fellow farmers use it in an empowered manner?” Dr. Epsi Euriga responded that the determining factor for the success of digital innovation is the leadership commitment and support from the Ministry of Agriculture. There are stakeholders supporting innovation, especially in Juru Tani, including the private sector. The government established policies to support digital extension through higher education, especially in agriculture and agroecological aspects and preparing educational curricula that support family farmers.

KEY MESSAGES

Dr. Melanie Blanchard of CIRAD provided the wrap up of the regional consultation's first day, as follows:

A. Food Systems

- Transforming our agri-food systems requires new thinking and approaches. Partnerships are central to this and critical to reaching the goals of the 2030 Agenda.
- The Global Forum on Agricultural Research and Innovation (GFAR) is well positioned and stands ready to work with smallholder / family farmers on the challenges they are facing with regard to food system transformation.
- The COVID-19 pandemic has underscored the connections between supply chains and our consumption patterns: urgent need to redefine agricultural systems as food systems.
- It has also underscored the role of universities to produce graduates with a transformative mindset who are adept in understanding the growing complex social concerns and are able to effect positive change, now and in the future.
- Agriculture is a major driver of biodiversity loss but making it sustainable through agricultural innovations promotes and enriches biodiversity to ensure high quantity and quality, and sustainability of environmental goods and services.
- Metrics to attain agricultural productivity and biodiversity conservation must include productivity, stability, sustainability, and equitability.
- Appreciating that human well-being is underpinned by biodiversity-rich agricultural food systems would be critical in wielding holistic agricultural innovations across the food supply chain.

B. Academia and Research Institutions

- Need for redefinition of roles of research and of extension agents in the context of co-experimentation settings with farmers (knowledge and innovation brokers)
- Upcoming collective actions on participatory research and family farming; curricular change and higher education transformation
- Transformative Partnership Platform (TPP): doing research differently to address knowledge gaps, working with policymakers and stakeholders in addressing implementation gaps, and addressing a large diversity of local contexts within a common approach
- Translating research into action

- Approaches toward scaling / bridging gaps across scales (adaptive scaling strategies, dialogue platforms, agroecology conducive policies, public private partnerships)
- Toward sustainability into higher education and extension services: Future needs for data, learning opportunities, dedicated extension services and M&E
- Need to capitalize on research for development and innovations potential of universities. The growing interest in agriculture needs to be sustained with more targeted capacity building activities of relevant government agencies and groups to specifically promote and generate more agri-entrepreneurs
- More studies to ensure the balance between trade priorities and food security goals particularly under the tenets of ASEAN Economic Cooperation as well as effective coordination mechanisms among countries to reduce trade and food insecurities both at the national and regional levels are also needed

C. Agroecology/Agroecological Innovations

- Small-scale producers have been, and will always be, innovators. They need to be empowered to be able to co-design, co-create and co-innovate.
- New global initiative from OneCGIAR to develop and scale agroecological innovations for small-scale farmers and other agricultural and food-system actors across different socioecological contexts
- Three key elements of agroecology considered when assessing projects—resource use efficiency, recycling, and integration of diversity. Agroecology-based projects have higher incorporation of the IFAD mainstreaming priorities—climate change, gender, nutrition, indigenous peoples, and youth.
- Women leaders of self-help groups are critical actors of change
- It is crucial to “respect farmers’ works and innovations”
- Economic, political, knowledge, and cultural lock-ins can limit the ability of farmers to shift to agroecology
- Constructing knowledge for food sovereignty, agroecology, and biocultural diversity entails reversing top-down research
- Need for a clear, systematic redirection of investment, funding, research, and policy focus on “Agroecology By, With, and For Small-Scale Farmers”
- Support for transition to agroecology through incentives, subsidies/grants, soft loans and blended finance, insurance

NOTE: PowerPoint presentations are available at the SEARCA website (www.searca.org). Links may be found on the consultation program in Appendix C.



2 Experience Sharing from the Region and Beyond

Date: December 9, 2021

Moderator: Mr. Pierre Ferrand, FAO-RAP

Overview of Day 2:

The parallel sessions provided insights on the ARIs' experiences in supporting rural transformation, mainstreaming of agroecology, and family farmers' organizations. The different topics are related to building back greener and more resilient food systems in the regions. The organized parallel sessions were divided into four major topics: enhancing rural communities' initiatives and transfer of technologies; regional/local policies and strategies to support family farmers and sustainability of rural livelihoods and communities; multi-stakeholder networks and platforms enabling co-creation of knowledge and participatory research; and innovation in higher education institutions (HEIs) curriculum to better address agroecology and family farming.

Session 2.1A Enhancing rural communities' initiatives and development, and transfer of technologies

Session Leads: Ms. Sasireka Rajendran (APAARI) and Ms. Myline Macabuhay (AFA)

A. Home gardens for resilient local food systems – Dr. Pepijn Schreinemachers (World Vegetable Center/Thailand)

The COVID-19 pandemic has made healthy food items such as fruit and vegetables less affordable and sometimes inaccessible for poor households in rural and urban areas, especially to those that lost sources of income. This is unfortunate and counterproductive as fresh fruit and vegetables are vital to good health and strengthening people's immune response.

During the COVID-19 pandemic, many people, in urban and rural areas alike, have taken up vegetable gardening to supply some of their own vegetable needs. Gardening is an important strategy to improve the resilience of households to maintain healthy diets under the COVID-19 pandemic or any other crises, be it poverty, armed conflict, or natural disaster.

Gardening in urban areas, on balconies, rooftops, vertically against walls, or in community gardens on vacant land contributes to the greening of urban environments, social interaction, environmental awareness in addition to being a source of personal joy and fresh food to eat.

Home gardens are an incredibly important source of fruit and vegetables that are often overlooked. Good statistics on the contribution of home gardens to food security are usually not available. In Indonesia, it has been estimated that about 20 percent of fruit and vegetables consumed come from home gardens.

Home gardens are often small-scale, have a high diversity of vegetables, fruits, herbs, spices (and sometimes ornamentals), and mostly managed by

women. Home gardens are also suitable to build people's understanding about agroecological production practices. The high diversity of plants grown in a home garden can be used to showcase the benefits of plant diversity and how it promotes beneficial organisms including pollinators.

The small scale of home gardens enables experimentation and learning, which can inform farmers about new practices. For instance, the use of compost can show relatively quick effects on plant performance, thereby demonstrating the importance of soil health to plant performance. Yet not all home gardens are terribly productive. Home gardeners face a range of constraints such as poor soils, water, pests and diseases, or generally poor plant performance.

Many of these challenges can be addressed through training. Home garden interventions are often targeted at women and typically combine training in nutrition to raise people's interest in eating more vegetables with training in agronomy to increase people's confidence and capacity in gardening.

The promotion or improvement of home gardens is a relatively complex type of intervention as it deals with many crops and many different constraints, and has agronomic, nutritional, educational, and institutional aspects, including an important gender dimension.

Interventions described in the literature range from simple seed kit distributions to intensive training programs spread over several years. Careful design and implementation of a home garden program is often overlooked, but is critical to the success and sustainability of the program. Not many organizations publicly share their training materials online.

The World Vegetable Center (WorldVeg) has been implementing home garden programs for nearly 40 years, but we did not have a particular strategy or a standard training approach. As a result, we found ourselves reinventing the wheel in each new home garden project.

The initiative of home gardens aims to develop high quality home garden training materials and share these publicly so that many organizations can incorporate these in their own intervention designs.

The guides are developed by Lauren Pincus with the help of Evan Clayburg, Elin Duby, Sheena Shah, and Archie Jarman from November 2020 to April 2021. The review of existing home garden materials of WorldVeg and other organizations was conducted, and each draft was reviewed by WorldVeg staff for accuracy and feasibility. The drafts were finalized and formatted with pictures representing diversity of people and landscapes served by WorldVeg.

The toolbox has eight facilitator guides and 10 crop guides. It also has training aids such as posters and instructional videos. Each facilitator guide has one or several modules. There are 21 separate modules in total, each requiring a time allocation of about 3–3.5 hours. Going through the whole training would therefore take about 21 days, but program designers can mix-and-match modules or elements within the modules to serve their own needs and fit their available time. The toolbox can be accessed here: <https://toolbox.avrdc.org/>.

The approach emphasizes participatory learning. Participatory training requires participants to work together with a facilitator toward a learning goal. Rather than a traditional lecture, where a teacher stands in front and presents new information, a participatory training constantly requires inputs from the participants themselves. As such, gardeners are asked to share their own knowledge, ask questions, and have frequent discussions about why certain things happen and what can be done about it.

Figure 9. Example lesson topics in the home garden toolbox



(Source: World Vegetable Center)

Gardeners first learn how to carefully observe the landscape around them to pick a gardening site. They progress through the seasons and learn the skills they need to build healthy soil, plant a garden bed, control pests and diseases, manage water, and save seeds. Each lesson builds gardeners' confidence and enthusiasm for using their home gardens to improve their household's access to healthy vegetables and fruits.

Each training session starts with an introduction and warm-up to engage participants. Learning objectives, materials required, and the estimate length of the training are defined upfront. The learning involves interactive discussion, experimentation, and exercises. The approach was developed with an adult audience in mind and is based on the understanding that adults learn best when they feel that the content of the training is relevant to their lives and they can see an immediate benefit of it. Gender is an important aspect of implementing the toolbox and the facilitator guide on participant engagement is meant to help facilitators consider gender dynamics.

For the future plans, since the guides are currently in English, some are being translated into French

language. There are rendered home garden videos as IEC materials. The organization is testing the guides in ongoing projects and we want to encourage other organizations to use the toolbox.

In conclusion, the importance of home gardens for fruit and vegetable supplies has increased during the COVID-19 pandemic. Home gardens contribute to food system resilience but also have many other benefits, including agroecology. The promotion of home gardening requires a carefully designed approach that is participatory in nature. The WorldVeg Home Garden Toolbox can benefit organizations operating in this area.

B. Investing in food safety, nutrition, and women empowerment can play a key role to accelerate agro-ecological transitions – Ms. Marie -Aude Even (IFAD), Ms. Shila Gnyawali (ASHA Project/Nepal), and Ms. Doina Popusoi (IFAD)

For this discussion, the topics were divided into three parts: an overview of the research paper and some IFAD examples, a discussion on Nepal Adaptation for Smallholders in Hilly Areas (ASHA) experience on gender in community driven adaptation, and a learning

from agroecological stock take and Brazil experience on seed and agroecological logbook.

Food safety and nutrition closely links the practices of agroecology and gender, specifically women empowerment. The four pillars of food security demonstrate some key components in linking agroecology practices and women empowerment together. Food safety refers to the chemical use (i.e., effects of chemical use in women's reproduction) and women-led post-harvest practice. For nutrition diversity, women receive education on diverse farm systems and tending of home gardens. The capacity of women to access livelihoods and sustainable food productions lies on the availability and accessibility of food. Resilient farms and strengthened women livelihood-asset ensure food stability. Food safety, nutrition, and health awareness played a key role to convince households to adopt such agroecological practices based on the field survey in India and Bangladesh.

In terms of women empowerment and adoption of agroecology, addressing gender gap is key to enable women influence household decisions and get engaged in agroecological value

chain. Women leaders and self-help groups are capable of spearheading extensions of agroecology. Some instances include: women agro-entrepreneurs (e.g., APDMP case), women farmer leaders in Nepal and India, and women networks that scale innovations (e.g., SHG networks in India transitions to natural farming).

Women's decision-making and leadership enable stronger participation in groups and households. To recognize women's contribution, there are established women agroecology log books and household approaches. Women are economically empowered by co-investing in household farming or home gardens. In addition, investments in access to land, landless options, and drudgery reduction enable participation.

The Nepal ASHA experience on gender in community-driven adaptation sees the Local Adaptation Plan for Action (LAPA) as a tool for scaling climate adaptation. The process of LAPA starts from the conduct of participatory sub-watershed assessments. This is followed by geographic information sensing (GIS) mapping to identify vulnerable wards and participatory scenario development. The next step is to identify potential investments. Climate-smart agriculture is tested using the adoption of climate-smart village and family farming system. These approaches will eventually create climate-resilient households and communities. The development of farmer diaries is one way of documenting the process. These are the lessons during the upscale period:

- LAPA, 200 wards, 114,000 HH, 50 percent women beneficiaries
- 316,679.54-ton CO₂e avoided
- Blending of local knowledge with scientific knowledge
- Local implementation: LF, groups
- Policy engagement and convergence

Figure 10. Nepali women farmers of the ASHA project



(Source: JILFAD)

The interlinkages of women, agroecological practices (e.g., CSA), food safety, and nutrition can be seen in the roles of women. There are strong links between nutrition, health, and agroecology. These links are evident in climate resilient, agri-livestock-forest-based farming practices that increase the resilience of the food system (food stability); improved use of bio-input and more diversified production (permaculture–agroforestry) that contribute in the nutrition diversity and food safety; and case study and field discussion that say that health and nutrition are an important argument to adopt agroecology. In ASHA, women are concerned with nutrition and food safety, so they have started the initiative of making homemade breads. ASHA aims to reduce child malnutrition by least 15 percent compared to the baseline.

Women empowerment also paves way for women to adopt agroecology. Less than 80 percent of agricultural workers are women. They face constraints such as lack/inadequate information access, no/low paid work and income, low productivity of farming system, and increased workload in both households and farms.

Despite these gaps, the project has empowered women. Nearly 48 percent of the project beneficiaries

are women involved in CSA, including kitchen gardening, using none to low chemical inputs, and efficient water use practices. So far, the investments of the project move toward mobilizing gender sensitivity in all activities where 29 percent (429) women lead farmers trained and capacitated. The project aims to increase water access and involvement in operation and management. There are developed women-friendly drudgery reduction and agritool kits. The establishment of permaculture as part of CSA and family farming system and demo farms are evident in the area. Cooked stoves and water mills are improved. Lastly, CGA-GESI network was established and strengthened.

Women who have adopted agroecology have experienced increased information access and knowledge. Targeted drudgery reduction activities have saved farming time. Quality of freshwater access has improved, which saves 2–3 hours of labor. Saved time would mean more time for hygiene, food preparation, and tending of home garden. They gained more than 15 percent production and income from CSA, and home garden adoption has increased.

Further, the impact on women empowerment

and dissemination of agroecology and nutrition include: women actively approaching government planning process to include more ASHA government investments in agroecological practices; women farmer leaders are dedicated, dignified, empowered, and have been change agent which are keys for sustainability; the project’s ambition to become gender transformative has already been felt; and further surveys and actions to connect gender, nutrition, and climate resilient practices are still needed. More information on ASHA initiatives can be accessed through www.ASHA.gov.np.

This discussion also explores the learnings from agroecological stock take and the Brazil experience on seed and agroecological logbook. The IFAD agroecological stock take envisions to develop holistic approaches to sustainable food systems that benefit small-scale producers, while promoting gender and nutrition.

There are 207 projects across the IFAD portfolio that have been screened along with an integrated agroecological framework. The production projects (77 percent) include agroecological practices. IFAD is an early adopter of gender empowerment. Nutrition is highly promoted

“ **... Home gardens are impressive and mostly practiced in rural communities despite rapid urbanization. Its applicability is high, and there is so much potential in that arena.** ”

in agroecology-related projects through the diversification and integration of sectors in croplivestock-fish systems; sustainable food processing and safe storage, enhancing access to differentiated markets and innovations organizing demand and supply; community seed systems and community gardens; and regulations on agrochemicals and animal drugs.

There are examples from the field showcasing the nexus between agroecology and biodiversity, and women and nutrition as seen on the Rural Sustainable Development Project in the Semi-arid Regions of Bahia.

The Agroecological Logbook is a participatory tool rendering women’s monetary and “nonmonetary” work in the household visible, and recording production in the backyard gardens, consumption, sale, exchange, and donation. The Agroecological Logbook is a contribution to conservation and sustainable use of biodiversity, healthy diets and women empowerment. Videos related to this initiative can be accessed here: <https://youtu.be/cFzvTRMu0Tw>.

For the Community Seed Systems, the Community Seed Banks conserve local species adapted to the semi-arid climate, preserving genetic diversity and traditional practices. Seed Guardians are composed mainly of women, who are custodians of genetic and cultural heritage. Due to this cause, there has been increased climate resilience and food security and nutrition.

In conclusion, IFAD prioritizes nutrition, climate change, biodiversity, and gender nexus. It is recommended that ARIs should further invest in analyzing such nexus and their implications on how to organize and implement extension activities (e.g., FAO-FFS and SDHs dedicated pages and webinar on such thematic). Lastly, it is encouraged to call for more contributions like joint papers and webinars.

C. Discussion Forum – Ms. Joanna Kane-Potaka, Director, Strategic Marketing and Communication (ICRISAT)

In the discussion forum, Ms. Joanna Kane-Potaka thanked the presenters and proceeded in asking her question on the presenters’ perception of the presented initiative and their replicability to other areas.

She emphasized that the initiatives allowed a good flow of discussion on the bigger picture of the roles of farmers, especially women, to push agroecology practices forward. The World Vegetable Center focused on more vegetable production and improved nutrition. The organization have successful approaches. However, what is needed to accelerate the scaling-up of these initiatives? Most countries are left behind, and it is critical in SDG-2 to accelerate such activities. The other groups talked about the application of women empowerment to lead agroecology in improving nutrition on a household level. Same question would be applied on how to accelerate the scaling since there are many experiences on agroecology.

According to Dr. Pepijn Schreinemachers, the acceleration of scaling up activities are not an easy task since there are limited enabling environment. Government spending prioritized subsidies on rice and livestock, while home gardening activities are often not prioritized in the budget allocation. If only 10 percent of the government funds will be allocated to home gardens, it would be very helpful in the acceleration process of scaling up. The biggest barrier is really the prioritization of government funding. Ms.

Joan na Kane-Potaka also shared that home gardens are impressive and mostly practiced in rural communities despite rapid urbanization. Its applicability is high, and there is so much potential in that arena. If this aspect could be moved into policy arena, we can scale up quicker.

For Ms. Marie -Aude Even, in the project, women activities are separated from the rest. Extension services are more male-oriented. To scale up quicker, there should be a holistic approach in doing farming activities to incorporate family farming and linkages of women. We should avoid putting things in silos. Instead, we should capacitate more by balancing gender-centered approaches to lift the burden of women in food preparation. In scaling community-driven approaches, the most powerful approach for agroecology should be community-led. However, this is not an easy fit since it requires sustained engagement with the government to follow up on the link and leverage digital innovation in a participatory way.

To add some examples in Nepal, Ms. Shila Gnyawali said that it is important to pioneer the country's local adaptation plan to address existing upscaling gaps. They are working

in MaLAPA, where 90 percent of the project areas' production system are women. Women are considered key food changers. Aside from livelihoods on livestock, forestry, and climate-smart villages (CSV), the government announced its climate change policy and LAPA framework in 2019. They are committed to apply the LAPA framework at the local level, hand-in-hand with the local government to produce and scale local plan. The government has been trying to implement policies that support IFAD initiatives. The involvement and support from ARIs and government partners are also needed. Federal government needs to strategize and formulate provincial local plan.

Another question was asked by the discussant about the importance of leveraging and collaboration to integrate components, for example, integrate home gardens with livestock. Are there opportunities to do something together collaboratively to scale? Do integration of practices bring different people together and create more partnerships?

Ms. Doina Popusoi mentioned that territorial approach, ownership regime, and ecologically sound approaches are key implementation strategies to overcome bottleneck issues.

Ms. Even added that further actions must articulate territorial approach to involve communities and reinvent the wheel. It is a good opportunity to look out for existing platforms, to make use of them and leverage knowledge through workshops or conferences.

Ms. Myline Macabuhay concluded the discussion forum by emphasizing the importance of engaging women groups, especially young women, and doing capacity building activities that use specific, long-term approaches. Sometimes, good programs or projects end due to budget and time constraints, so long-term approaches should be sustained.

D. Five livelihood asset: Guidelines for goat raising management of farmers in the Upper Northern Region of Thailand – Dr. Nathitakarn Phayakka (Chiang Mai University/ Thailand) and Mr. Kitisak Thongmeethip (Chiang Mai University/Thailand)

This paper discussed the sustainable livelihoods through the establishment of guidelines for human capital access of goat farmers in the upper northern region of Thailand and social capital approaches to support goat farming management of farmers in the upper northern region of Thailand.

In Thailand, agriculture has been associated with the way of life of Thai people for years. Goat farming is a relatively new and popular livestock activity, and in the recent years, the number of goat farmers has increased steadily. The government has implemented programs to promote goat farming for farmers over the past period. However, there are implementation issues that are considered major risks and obstacles in goat farming of farmers in the northern region of Thailand.

Regardless, there are benefits and elicited importance of enhancing Rural Communities' Initiatives and Development under Sustainable Livelihoods Approach Concept, which will become a master plan for sustainable living for goat farmers and a role model for farmers in other Thai communities.

The concept of Sustainable Livelihoods Approach is based on six key concepts (i.e., people-centered, holistic, dynamic, building on strength, macro-micro links, and sustainability) and the relationship between five elements in achieving the initiatives' goals (i.e., risk, weakness and uncertainty, five livelihood assets, structure and process, strategic way of living, and results of the activities).

Under the Livelihoods Asset and Sustainable Livelihoods Approach, factors that determine the vulnerability context are shocks, trends, seasonality, COVID-19 pandemic, among others. The Sustainable Livelihoods Asset include human capital, natural capital, physical capital, social capital, and financial capital.

To analyze the whole point of development toward sustainability, there was a field visit to explore the basic information of goat farming contexts, and a narrative research method was devised to acquire information from the locals along with non-participant observations. It was found out that the human capital development of goat farmers for sustainable livelihoods

is from the development of knowledge and specific professional skills that ensure sustainability by the operation of the farmer sector along with support from the government and different ARIs.

In terms of social capital, the findings revealed that the approach to support goat raising among farmers through social capital comes from the goat-farming help and support from various stakeholders such as the community, the academia, and the government. Moreover, social capital will be the foundation of goat-farming activities, and it requires a long time to connect individuals, as people will only work together if they can ensure they have a trust-based social network, trust among their companions, and the same working standards when they have to work as a team.

From the point of view of agricultural extension and rural development, it is clear that “Five Livelihood Asset” is very important. Therefore, balancing and ensuring the stability of the development of farmers in each period is considered very important to farmers’ livelihoods as well. The more farmers are aware of the risks in each aspect of the Livelihood Asset, the more they develop. Conversely, livelihoods and quality of

life of farmers will develop accordingly, whether it is the social aspect that creates a good relationship among the people in the community. They work together, which results in various good cultural practice. In addition, the government must be the center in the empowerment of farmers so they can develop quality farming practice. With their support and the fostered partnerships among the farmer sector, the community sector, and the ARIs, they will aid and lead Thai farmers to real development.

E. Smoked salted egg small industry with permaculture concept in Slorok Village, Doko District, Blitar Regency – Dr. Siti Azizah (Brawijaya University/ Indonesia)

In Indonesia, agriculture is a main sector. The main problems with the agribusiness system during the COVID-19 pandemic were the halted distribution process and the decline in people’s purchasing power due to the crisis. In Indonesia, duck farming is seen as a potential economic agricultural venture. The duck farming in Slorok Village, Doko, Blitar is one proper example. Almost 58,880 tons of duck eggs were recorded in 2020 (Blitar Regency BPS 2020). This capacity makes Doko District a potential producer

of processed duck egg products.

There have been on-going activities that empower rural communities to achieve food sufficiency and economic stimulation through the concept of permaculture. The great potential of Slorok Village that can be developed and become a source of community income is the development of laying duck farming through permaculture, which supports food self-sufficiency.

The basic principles of permaculture are: all elements in a system interact with each other, multifunctionality of all elements, usage of renewable energy is practical and efficient, usage of natural resources, practice of intensive systems in small areas, utilization and shaping of natural processes and cycles, support and usage of edge effects (creating highly productive small scale), and non-monocultural diversity (Holzer 2001).

The program is a much-needed effort to increase product durability during the distribution process and provide affordable processed food. It is intended to add value to salted eggs that are already familiar to the community. The method of processing duck eggs into smoked salted eggs

to increase shelf life solves logistical problems constrained by physical distancing. The applied permaculture aspects provide opportunities for optimal use of local natural resources and human resources.

The program has conducted community service activities, which were carried out by the Community and Livestock Studies Research Group from April to August 2021 in Slorok Village, Doko District, Blitar. The stakeholders involved in the program include: Institute for Research and Community Service; Brawijaya University; Community and Livestock Studies Research Group, Brawijaya University; Community Service Program Team of Brawijaya University chaired by Siti Azizah with four members: Irfan H. Djunaidi, and Achadiah Rachmawati (Faculty of Animal Science), Ema Yunita Titisari (Faculty of Architectural Engineering), and Mas Ayu Ambayoen (Faculty of Agriculture); Village government (village head); Blitar District Livestock and Fishery Service; and duck farmers and Slorok Village community members.

The first stage during the program implementation was a preliminary survey that was conducted via face-to-face and online modalities, since the team conducted an

extension on duck feeding in 2020. At this stage, many qualitative and quantitative data were collected to get to know community leaders, community components involved, and village potentials and problems. The data also includes the management of the Mojosari duck business carried out by farmers who are expected to adopt organic feed to increase the value of the eggs produced in the future. The permaculture concept was chosen to develop the area's potential in Slorok Village because all the materials used in production were available within. There was no need to bring in materials from outside the area. Based on the problem and the potential of the village data, a group of Smoked Salted Egg Small and Medium Industries (UKM) was formed. The salted egg business management group consists of several elements of the community, namely laying duck breeders, woman group members, youth, and village officials.

The second stage is coordinating the necessary extension materials with the village head, head of livestock group, core breeders, and community groups called the academic community that organizes non-formal farmer education. Based on the coordination results, it was agreed that there are three materials

from the extension: organic duck feed, understanding of organic salted egg centers, various ways of making salted eggs, analysis of salted egg business, and digital marketing. The extension's target is to build awareness of community component representatives about the importance of adding value to their livestock business products. After the group was formed, training was carried out in two ways: offline or face-to-face training following the COVID-19 health protocol and online training via Zoom. This training recording can be accessed via the CLSRG YouTube channel: <https://www.youtube.com/watch?v=VVWDGXQ1yFw>.

The third stage is filled with sending students to dig deeper into the technical aspects of the village as a supporter of this program. The data collected are community elements classified into innovator categories, zoning of village areas according to potential, locations of main points for processing, and marketing salted eggs. Information on community members included in the "helpless" category was also explored, such as youth dropping out of school, women, and the unemployed. It is hoped that this effort can benefit all levels of society, and there will be no more women who become women workforce abroad at this time.

The fourth stage is providing assistance to acquire tools and technology needed to develop a salted egg center. In permaculture, tools and technology must be obtained from the local area as much as possible, energy-efficient, and free of waste. All equipment and technology are selected carefully. The packaging also involves local bamboo artisans so that it is easy to recycle, reuse, and reduce. The use of bamboo basket containers aims to avoid generating waste. Another reason for choosing this bamboo container is because it is unique and revives bamboo crafts in Slorok Village, which undegradable plastic containers have replaced. This online marketing account is also made to promote and reach as many consumers as possible. This online promotion is expected to help sales during the COVID-19 pandemic. As a form of obeying the law, registration of Business Permit Number (BPN) is also carried out. Business Identification Number (BIN) is the identity of business actors in the context of business activities according to their business fields. BIN is important to provide guarantees for halal products to consumers. Manufacturers also get approval for the use of the Indonesian National Standard (INS) for their products.

The fifth stage is salted egg training, which involves all elements of society included in the list of innovators. This training involves women, youth, and informal community institutions. At the coordination before the program, it was agreed that the organic salted egg program would be carried out in stages according to the capabilities of natural resources and human resources but given an increase in value by smoking the salted eggs produced. Making salted eggs is done by curing salted eggs for 7–10 days with rubbing ash and salt. Smoking is done using a salted egg smoking machine using coconut shells as fuel. This process is carried out for 8–12 hours. Salted egg smoking has several advantages: smoke components are antiseptic and antibacterial substances.

Figure 11. Smoked duck eggs processing and packaging



(Source: Brawijaya University)

The sixth stage is the evaluation and monitoring process, which is continuously carried out to discover four changes from the KASA (knowledge, attitude, skills, and aspirations) aspect.

Conclusions drawn from the program are that the application of the permaculture program cannot be done quickly but takes time according to community conditions. The most important thing is the community's acceptance of social, economic, and environmental changes resulting from the program being delivered. So far, the team can sell 500 smoked salted eggs per week. This micro industry has been proven to increase farmers' and team members' income.

There are several lessons learned during the program implementation. Some challenges have not been fully resolved in this program. High shipping costs between cities and islands hinder the expansion of marketing even though demand is relatively high. Maintaining quality and standards is difficult because of the low level of awareness of the production team. The production team prioritizes quantity over quality. Currently, product quality improvement is being carried out to attract consumers again due to an error in the previous production process which

led to several complaints. Delivery between cities and islands is also experiencing problems due to poor handling of transportation services, which includes proper packaging. There is also emergence of internal disputes between the village head and community members who feel not involved in the smoked salted egg micro business program. Additional capital is needed to ensure the availability of products.

Despite these main challenges, there are also success stories that emerged from this venture. The smoked salted egg business has provided the following benefits: provided job opportunities for women and people with disabilities; absorbed the production of duck eggs, which are sold at fluctuating prices; provided an entrepreneurial mindset; attracted the attention of the government and banks (Bank Indonesia); and provided knowledge and skills to farmers and the community.

There are some critical points from this program, where there is a need for multi-stakeholders' cooperation to develop business centers in the region. There is need for a continuous monitoring and evaluation program, especially regarding quality control. Lastly, there is a need to increase social

capital that is caused by village government policies that are not acceptable to the community. More information on the initiative can be accessed here: <https://www.youtube.com/watch?v=q4xDs-uf41g>.

F. Discussion Forum – Dr. Ram Pratim Deka, Scientist cum Research Management Coordinator (ILRI)

At the end of the presentations, Dr. Ram Pratim Deka commended the presenters. He initially discussed about goat farming and its importance as a livestock activity in many parts of the world. Goat farming, however, is not globally popular as it is considered as poor man's livestock. The northern region of Thailand is a suitable place for goat farming. Human capital is essential in goat farming. Goat farmers who do not have sufficient knowledge and capacity to manage will experience difficulty in managing sustainable businesses. The research did not talk much on the experiences of goat farmers on goat farming. It is important to know the important factors that contribute or influence human capital in the region. There should be success stories and lessons learned that they generate from

goat farming. It is crucial to identify factors that contribute to development of human and social capital, but we did not understand much about that. Dr. Deka requested the speakers to shed light on that area. Dr. Nathitakarn said that they will employ interviews to capture the experiences of goat farmers on the ground.

Dr. Deka said that if the research would be published as peer-reviewed journal, it should include more references to justify the background of study. In the discussion, graphs and tables should be included to visualize and tell the story of goat farmers. In this way, the research can conclude farmers' experience in the adoption of goat farming in the region. In addition, the comparison of experiences and factors that prevent the upscaling of the business would be helpful to enrich the research.

For the smoked duck eggs program, Dr. Deka presumed that the outcome of the program will face challenges on high transportation cost, while working on a small volume of products. He recommended to employ focus group discussions to identify solutions to make the business profitable and reduce transportation cost. The program should also focus on strategies for the improvement of quality control of the products. This

is to boost the marketability of the smoked duck eggs if they were to pursue online platforms. He also suggested to sell the products in nearby areas to dispose it quickly especially if the program lacks post-harvest facilities. Beneficiaries involved in the smoked duck eggs venture should undergo social institutional building. Organize them in groups and train them to develop specific skills. It is also crucial to avoid conflict within the organization by improving communication channels. Basically, to appreciate the program more, the organization can modify the existing program based on the comments to accelerate the scale-up process. Dr. Deka gave his final comment. He said that the initiative is good, but there are loopholes that need to be rectified to improve the program and be replicated in other countries as well.

G. Higher educational challenges in promoting aqua-ecology in Thailand and Lao People's Democratic Republic – Dr. Alan D. Ziegler (Thailand), Dr. Khajornkiat Srinuansom (Thailand), Mr. Alounxay Pasithi (Lao People's Democratic Republic), and Mr. Decha Duangnamon (Thailand)

In this paper, higher education institutions included are the Northern Agriculture Forestry College

in Luang Prabang in Lao People's Democratic Republic, Andaman Coastal Center for Research and Development in Ranong, Thailand, and the Maejo University in Chiang Mai, Thailand.

The academic curricula focus on technology and innovation including programs on teaching, outreach, service, and research. Agriculture students are taught to manage farm lots; most of them are exposed to hands-on experiences. In Chiang Mai, students are taught sustainable fishing practices in theories and in application.

The farming principles should be green, sustainable, eco-friendly, ethical, practices fair trade, clean, and organic. Farming is interconnected with the biological system, economic system, and the social system; each component affects other components as well.

However, there is a challenge in the institution on making sense of agroecology from a fishery perspective, and on finding ways how to scale smallholder systems to make contributions at the national, regional, and global levels.

Based on these challenges, there are identified opportunities that have

potential to aid agroecology farmers and agriculture students alike. There are opportunities in new markets, establishment of competitive prices, production of branded products, and pursuit of economic activities with higher returns.

In Maejo University, agriculture program graduates pursue agribusiness (60–70 percent), are employed in private companies (20 percent), and pursue other ventures (10 percent). There should be a balance in the education system of future farmers. There should be modules applicable to small-scale operations and there should be modules teaching corporate practices. Modules need balancing of smart farming approaches with principles of agroecology. It is also important to emphasize the role of agribusiness in the direction of food production. Motivation lies on producing and establishing sustainable livelihoods.

For example, there are programs that support learnings on mud crab bank aquaculture—a management practice of wild-caught mud crab. This involves selective harvest and ecologybased community participation.

Regardless of the COVID-19 impacts like decreased tourism, diminished experts, labor shortages, and supply chain woes, there are still inherent resilient rural communities. ARIs can help and contribute through funding, partnerships, and extension services. They can also develop curricula leaning toward the enrichment of agriculture and sustainability of new generation of young farmers.

H. Reinvigorating the Philippine seaweed industry through the application of an improved drying technology – Dr. Ronel S. Pangan (University of the Philippines Los Baños)

In the seaweed production and market, seaweeds are the top aquaculture commodity in the Philippines followed by milkfish and tilapia (Philippine Statistics Authority). The Philippines is considered as the largest producer of carrageenan that provides 77 percent of global supply (USD 147M) (Source: Coloner, DTI/Business Mirror, 2021). In 2015, the Philippine export of seaweeds registered USD 250–270 million, almost the same in 2016 (Mr. Rico Hermoso, The Freeman, April 7, 2017). The seaweed farming situation in the Philippines has 60,000 hectares of farmed areas along coastlines involving >200,000 fisherfolk families. There are also available areas with 200,000 hectares (along coastlines) and 500,000 hectares (deep sea). The raw dried seaweed production (2015) are locally produced with 80,000–100,000 metric tons and 15,000–20,000 metric tons imports to satisfy the total requirement of 120,000–163,000 metric tons based on the Seaweed Industry Association of the Philippines (SIAP) Industry situationer.

For the existing practices, sun drying of seaweeds is the hauling and hanging outside households. This is only possible when the weather is in good condition until the seaweeds are dried. Sun drying is also done on platforms or ground level. The drying hitches are due to variable climatic condition, adulteration (addition of salt), and poor-quality products leading to lower buying price.

The Philippine National Standard for Raw Dried Seaweeds (RDS) suggests that the moisture content should be 40 percent in *Kappaphycus spp.* and 38 percent in *Euचेuma spp.* Drying usually takes about 3–4 days if the weather is favorable, and 5–7 days if the weather is not

favorable. It should be noted that prolonged drying can affect quality. Seaweeds are locally called “tambalang”.

Based on an article from the Manila Times, Agriculture Secretary Emmanuel Piñol said that the Philippine Department of Agriculture (DA) through the Bureau of Fisheries and Aquatic Research (BFAR) will establish a National Seaweed Program to prepare local farmers to meet the growing demand in the world market for locally grown seaweed. To accomplish this, Secretary Piñol said that the DA and BFAR will craft a roadmap to implement the program that

would pave way for a more aggressive seaweed farming in the country in the next five years. BFAR implemented three key programs for the seaweeds sector, namely: Mas Saganang Aniham (training for farmers and production of climate-resilient species), Mas Siglang Samahan (seaweed farmers were trained to be entrepreneurs), and Mas Saganang Sama-Sakang Kalakalan (promoting community-based product champions).

In addition to drying hitches, there are also inefficient drying structures and practices; lack of drying facilities that farmers

are hesitant to plant all year round; there is presence of sand, dirt, and other impurities on the dried products; and moisture content is still high. Moreover, smallholder farmers have limited purchasing power. Fluctuations in buying prices also affect the seaweed quality, source, and volume.

With these circumstances, a program has developed a modified and improved seaweed dryer: a floating-type dryer, and a permanent-type dryer. Seaweed dryer sites are established in the following areas in the Philippines:

Figure 12. Floating seaweed dryer



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- Magsaysay, Occidental Mindoro
- San Jose, Occidental Mindoro
- Puerto Princesa, Palawan
- Quezon, Palawan
- Calatagan, Batangas
- Perez, Quezon
- Looc, Roblon
- Talibon, Bohol
- Zamboanga
- Gasan, Marinduque

The developed technology has 22 units that were already constructed and used by farmers in different

seaweed growing areas, where funding is from government organizations and non-governmental organizations. It has created awareness among farmers and other agencies through techno-fora in different regions and exhibits. There are 27 units for construction through the Philippine Department of Science and Technology (DOST)-Region IX (GIA program), CRAs with Mindanao State University and Palawan State University. Farmers can now plant seaweeds all year round and can upscale production areas. They can now attain the required quality and volume, a prerequisite to achieving sustainable seaweed production.

To summarize, the developed drying system can hold two tons of fresh seaweeds. It can be used both for solar drying and air drying. Faster drying reduces losses due to molds. Farmers can plant all year round, providing them with a sustainable income source. Drying is accomplished in a hygienic and sanitary way, and the technology is profitable to use. The floating-type dryer can be towed near production areas to save on hauling cost and is simple and easy to use. In terms of Technology Readiness Level, the modified dryers are already in the commercialization stage.

Figure 13. Seaweed drying process using the developed floating dryer



**I. Discussion Forum –
Dr. Rishi Kumar Tyagi,
Coordinator (APAARI)**

In the last discussion forum, Dr. Rishi Kumar Tyagi directed his first question to Dr. Alan Ziegler about higher educational change. He said that it was amazing to see youth engagement in agriculture. Agroecology is a promising food system production, but it is not viewed as viable option. He clarified what was the ideal situation where it could be a viable one. He asked Dr. Ziegler, based on his presentation, who face problems on food scarcity as population increases in developing countries and if agroecology provides sustainable production to meet the demand of an increasing population in Lao People’s Democratic Republic, Thailand, and Cambodia.

Dr. Ziegler shared that he likes the idea behind agroecology being able to do this. There are innovations in the way food is grown vis-à-vis a very complex socioecological system. It is hard to see how it will happen and how it will implement scale-up activities that will feed many populations. On top of that, to be able to do things that they are supposed to do regardless of gender, social class, minimum input of chemicals, and protect the environment. In reality, it is quite hard to see that

they are eventually going to happen. The way food is produced now are controlled by people or institutions that are not leaning on sustainable production or agroecology. It all goes down to the lack of levelled cooperation between institutions and the local people.

Dr. Tyagi asked how students could be enticed to study agroecology and make it interesting to youth, since 70 percent are students who have pursued and majored in agribusiness, while 20–10 percent have returned to their respective villages. Besides teaching agroecology principles to attract students in doing farming business, Dr. Tyagi also asked how to attract and retain the youth in rural areas to have a sustainable production following the agroecology system.

Dr. Ziegler responded that there is a need to recruit more people in the community or villages, redirect the market strategy to young students, and make referrals and peer-to-peer marketing since most parents impose pressure to their children to do other things than farming. He added that there is a need to try to convey farming as a cool and important task to sustain food production, as well as involve students in farming and income-generating farming activities so they can survive.

Regarding the modified seaweed dryers, Dr. Tyagi commented that they are simple and easy to use and has less cost parameters on seaweed drying facility. He thought that the research done by Dr. Ronel Pangan is successful in terms of operation and commercialization. Dr. Tyagi asked about the cost production of the roll-out and maintenance. He asked Dr. Pangan if they have tried to experiment employing units by groups instead of individually installing them. This is to create bigger drying facilities to be used in cooperatives doing business and reduce production cost of many seaweed farmers.

Dr. Pangan responded that the target beneficiaries are the associations and not the individual seaweed farmers. It is cost-effective in a way the dryer is designed. It used basic, locally available materials that can also be used in constructing wooden house. The constructions are on site. It will be a burden for an individual person to maintain an individual unit, so the project targets to lobby cooperatives.

Dr. Tyagi suggested to include socioeconomic data to enrich the study. The documentation of success stories of seaweed farmers and their experience in using the technology would be useful in scaling up the project. Success stories should be laymanized

“ ***Entrepreneurial principles must have the context of social responsibility and sustainability of rural livelihood.*** ”

and translated to local languages to be able to communicate to farmers, researchers, and policymakers. This enables cross-learning, not just in the Philippines, but in the Asia Pacific Region as well.

Session 2.1B Policies and strategies (from regional to local levels) to support family farmers and sustainability of rural livelihoods/communities

Session Leads: Dr. Susan Vize (UNESCO) and Dr. Estelle Bienabe (CIRAD)

Dr. Susan Vize, from the UNESCO Regional Office in Bangkok, Thailand, opened the session and provided some guidelines for the audience to observe during the discussion. She also outlined how the session will proceed, being split into three sub-sessions with panelists presenting, the discussant/s reacting, and then opening the floor for Q&A with participants.

A. Localizing agroecology and fostering sustainability of rural livelihoods/communities through community entrepreneurship to support Family Farming: Framework, experiences, and lessons learned – Prof. Dr. Helmi (Andalas University/Indonesia)

Prof. Helmi opened his discussion by narrating his two-pronged insights. First is that their network helped develop a framework for helping farmers and rural communities. This was led by universities as “drivers”. But because of the onset of COVID-19, they transitioned the “drivers” from university-led initiatives to local champions. In this scenario, universities and other stakeholders provided support to the local champions in implementations at the community level. Second is the application of the concept of community entrepreneurship whereby they are providing solution to rural problems like those experienced by farmers, and creating financial value from the activities carried out at the community level. Prof. Helmi also tackled the use of the social learning approach in adapting their framework.

Prof. Helmi said that family-based small-scale farming is dominant in Asia, facing different problems and limitations in different aspects of farming from pre-production, production, post-harvest, and marketing to earn income. The challenge comes in determining how to support family-based farming, especially to transform agriculture systems to build inclusive, safe, sustainable, and resilient societies. There is a need to bring down to the grassroots the agroecological framework.

Sustainability and prosperity in family farming is determined by the solutions to the problems encountered and creating financial value out of farming activities. This is where the concept of community entrepreneurship comes in. Entrepreneurial principles must have the context of social responsibility and sustainability of rural livelihood.

University researchers adopted this context when the pandemic hit, making efforts to develop and adapt an agroecological framework within the context of community entrepreneurship. As mentioned, universities used to be the main drivers of activities that empower local farmers and rural communities. With the pandemic, they shifted to mobilizing local champions to carry out their initiatives at the field level. They included the media for this (social media, TV channels, and newspapers). They targeted activities that will create market for products of agro-ecotourism sites. They worked with five local champions on the following activities:

- Coffee farming, postharvest processing, and ecotourism that transformed a coffee plantation into an ecotourism site

- Organic agriculture activities on healthy drinks, and agro-ecotourism
- Site promotion for agritourism: tourists are given a chance to experience processing agriculture products as part of tourism development
- Creating added value to local food products and helping them enter the market
- Improving quality of agriproducts to help create demand

They used the social learning approach (SLA) to adopt the framework, by learning to be effective by gaining know-how, learning to be efficient by implementing with reasonable costs, and learning to expand coverage of implementation. To conclude the presentation, the following lessons learned were summarized as follows:

- Application of social community entrepreneurship principle provides basis for localizing agroecology such as coming up with innovative solutions and helping them create financial values.
- The role of local champions is important in fostering application of innovative solutions.

- The role of the academia to collaborate with other key stakeholders to backstop local champions and communities in improving their livelihoods is essential.
- SLA has helped in creating innovative solutions for addressing problems in communities where solutions are seemingly not available.

B. Establishment of the Association of Western Japan Agroecology: Based on reflection of the history of the ‘Teikei,’ direct partnership between producers and consumers, in Japan – Dr. Koichi Ikegami (Kindai University/ Japan)

Agroecology is a new concept with wide diffusion in the world, but not yet widely known in Japan. Japan is rich with long experiences of “Teikei” initiatives (close contact between farmers and consumers), but this is now losing interest and growing stagnant, at risk to disappear.

Dr. Ikegami helped in the establishment of the Association of Western Japan Agroecology (AWJA), the first active agroecology group in Japan with the following accomplishments and agenda:

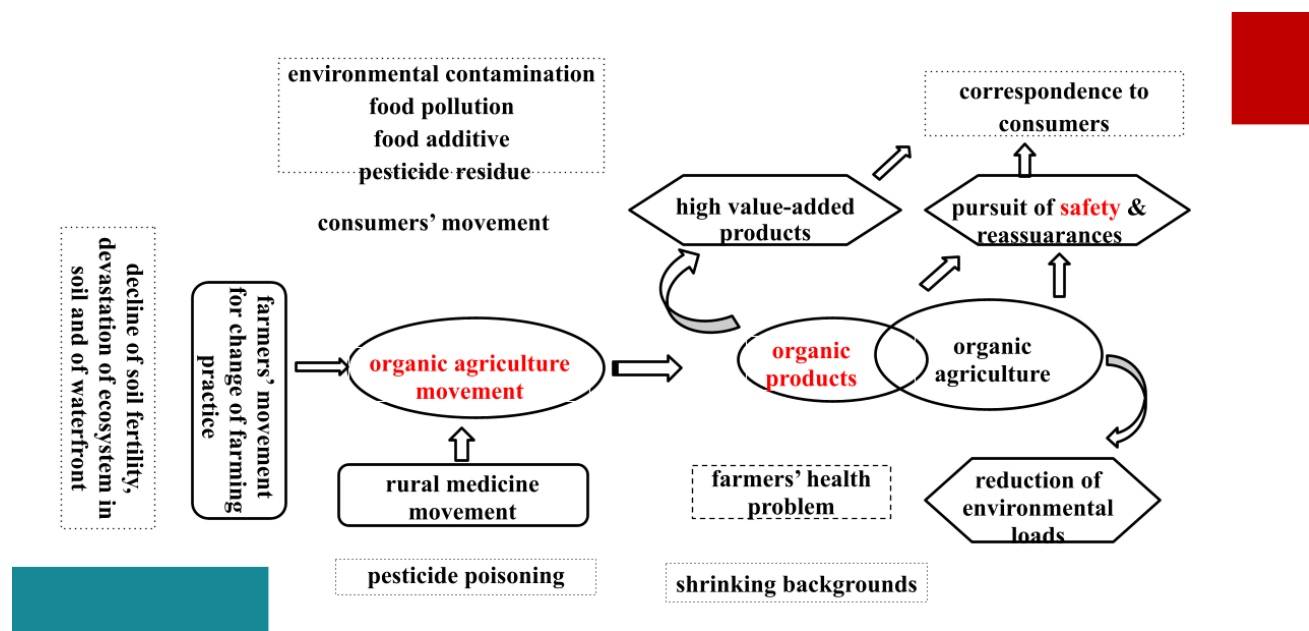
- Recently established in May 2021.
- Moved by the necessity to transform agro-industrial agri-food systems; AWJA aims to summarize the history of “Teikei” to determine lessons and challenges that caused the decline in dynamism of organic agriculture.
- Agroecology can help improve the slumping produce market; organic farmland in Japan is less than 1 percent.
- Practice to follow the ecosystems, sciences, and movement to have local innovation toward local social justice and sustainability.
- It is also essential to understand the technological aspect of agroecology while addressing the complexities of ecosystems.

AWJA’s origins started in 1974, during the start of the traditional “Teikei” relationship in Western Japan, to 2014 where farmer groups are divided into two based on differences in opinions, to 2022 where consumer groups are starting to dissolve because of the aging population, and up to May 2021, the birth of AWJA. AWJA is a group that combines farmers, consumers, cooperatives, logistic providers, food processors, and researchers. AWJA’s outlined activities include the following:

- Summarize the half-century history of “Teikei” and the half century of organic farming, natural farming, and alternative farming practices, and apply the lessons of agroecology.
- Analyze current agri-food systems by the Sustainability Assessment of Food and Agriculture Systems (SAFA).
- Develop database on knowledge and skills in agroecology to create a framework for Japanese-style agroecology.
- Create and support local agri-food systems (such as having most produces in seasonal harvesting for less energy use).

There is a review on the process of organic agriculture in Japan whose beginnings follow the basic philosophy to “return” and “search” for the ideal farming method by radically reflecting on the conventional farming method (Ichiraku 2009). The Japan Organic Agriculture Association (JOAA) identified the 10 principles of “Teikei”. In the 1980s, the organic market boomed and grew. In 1992, the Japan Ministry of Agriculture and Fisheries started to introduce institutionalization of guidelines and standards for organic products, up until 2006 (such as Organic JAS, Organic Agriculture Promotion Act or OAPA). Marketing circuits eventually diversified, from initially just the “Teikei” route to having different avenues for marketing variety of high-value added organic produce.

Figure 14. The process of organic agriculture movement in Japan



(Source: Dr. Koichi Ikegami, 2010. Changes in the Purpose of Organic Farming and the Roles of Newly Involved Farmers in Japan, Asian Rural Sociology, 4-2)

The simplification of viewpoints to either economy or environment is currently a weak point in Japanese organic agriculture. This led to the loss of social movements and intrinsic purpose of farmers and rural communities. So, can agroecology realize “Teikei”? The peak of “Teikei” was in the 1990s but it lost influence in the 21st century because of internal factors such as aging of farmers, few entries of new ones, and gaps on the “Teikei” principles. Externally, it is the establishment of varieties in the organic market, including imported produce, as well as the population having superficial understanding on organic agriculture.

The institutionalization, which resulted from organic agriculture movements, has its contradictory aspects that polarize farmers. The challenge today is on determining how to revitalize “Teikei,” and further promote intrinsic organic agriculture, including involving the youth and succeeding generations.

C. Discussion Forum – Mr. Daniel Hayward, Project Coordinator, Mekong Land Research Forum, Regional Center for Social Sciences and Sustainable Development (RCSD), Chiang Mai University, Thailand

Mr. Daniel Hayward shared his key takeaways from the panelists before proceeding with his response consisting of three main points. For his first point, he mentioned the notion of agroecology as a multi stakeholder endeavor, expressing the strong need for community action. Following Prof. Helmi’s presentation, he commented that it is great to see academics engaging with multilateral institutions like UNESCO to promote awareness of agroecology with farmers. There was clear stating of simple lessons through the SLA to help communities work with other

actors to improve their produce and hopefully gain a better return. Dr. Ikegami noted that both consumers and farmers were key figures in the call for organic principles. This leads to the question on how to sustain and maintain longevity in these endeavors.

Dr. Ikegami said that, with Japan's aging farmers, organic farming struggled to follow through. In Indonesia, it is great to see the emergence of local champions as instigators of agroecology. But how can the resulting practice become "institutionalized" at the community level, and outlast the energy of individual actors to keep them going?

Mr. Hayward said that what was not clear to him was who the private sector in these multi-stakeholder platforms is. In these cases, it seems that the agricultural models being looked at are where farmers maintain control of their land crop choices, and the private sector is perhaps the wider market chain linking farmers to consumers, hoping for a high value-added return. Or perhaps the aim was to link farmers directly to consumers and cut the corporate middleman altogether?

This, Mr. Hayward said, leads to the second point of his response: how does

agroecology engage with commercialized agriculture? In the Mekong region, there is currently a top-down, donor-led movement for responsible agriculture investment (RAI). Among others, there is a call to make investments inclusive and equitable for smallholders, in direct engagement with commercial agribusiness companies. And there are different types of investment models to engage with farmers and their land. However, the aim for environmental sustainability in RAI frequently becomes left out in discussions. This is a big advantage for agroecology, which places the soil and surrounding biodiversity center stage. It is a bottom-up movement. The examples from Prof. Helmi's presentation were good in how they demonstrated agroecology practices that have high added value for smallholder producers. This correlates with similar social entrepreneurship projects in northern Thailand, feeding a consumer interest in quality coffee, ethical tourism, and organic produce. Such products lend themselves well to local markets. But what happens when we start looking at the mass-produced industrial boom crops, such as maize, rubber, oil palm, cassava, and sugarcane. How do we retain the "local" when the focus is so multi-national? Where would agroecology place itself next to large commercial value chains

that dominate the trade of agricultural commodities? Is the aim to transform it, cancel it, and minimize it? In this sense, is agroecology to act as a form of activism or advocacy? There is such a strong contrast between agroecology and big food, where are the entry points to engage with industrialized farming actors? Or is it about working wholly apart within localized systems of production and consumption? This certainly reflects back to the notion of "Teikei" as personal forms of exchange in Japan. And this leads to the third and final part of Mr. Hayward's response: agroecology is looking both backwards and forward.

In relating to "Teikei," Dr. Ikegami places agroecology with a form of organic farming that is losing its appeal. As he rightly stated, understanding this diminished interest will be vital to ensure that agroecology gains popularity in Japan. It remains important, however, to highlight that agroecology places importance on the social relations in local agricultural communities and how they connect to their local ecosystems. Understanding these relationships is one key to the success of working with principles of agroecology, and perhaps there will be a context for some aspects of "Teikei" to re-emerge as

“ **... (We) need to disseminate agroecological knowledge and sharing of success stories of local case studies through the ARIs network, mass media, and policy dialogues.** ”

an important frame for sustainable agriculture. At the same time, agroecology is a progressive approach in its desire to address the current climate crisis and concerns over big food and farming. It is clear that a younger generation is motivated by these issues and are taking a critical and active stance against environmental injustices in the world. In this sense, agroecology has potential to connect time (past and future), space (biodiversity and worked landscape), and people (whether producer or consumer).

D. Initiatives for development of integrated coffee systems under market forces in the Central Highlands of Viet Nam – Dr. Hue Tran (Enveritas/Viet Nam)

Enveritas is a US-based NGO founded in 2016 with the main mission of ending poverty in the coffee sector by 2030. It addresses large-scale and real-time surveys on coffee farming in the central highlands of Viet Nam. Farmers change practices over the years. There is now more intercropping due to low price, low production efficiency, and newly emerging fruit market. Farmer's practices are market-driven. With the uncertain future for integrated coffee systems, there are no adequate initiatives taken. Farmers who intercrop achieve lower coffee yields, thus leading to lower income from coffee production. However, intercropping applies significantly less amounts of chemicals.

Enveritas promotes a data-driven approach for agroecological transition monitoring. This leads to farming practices to consider market drivers, climate change effects, and occurrence of pandemics.

FAO TAPE identifies local adaptation, farming efficiency, and farmers' resilience that uses agroecological measures. Enveritas also promotes participatory designing of locally suitable integrated systems (pivoted on biodiversity and circular farming). It is important to educate communities on their ecosystem roles that determine economic benefits and health impacts of the coffee industry. These include all stakeholders, including consumers.

Dr. Tran highlighted the need to disseminate agroecological knowledge and sharing of success stories of local case studies through the ARIs network, mass media, and policy dialogues.

Figure 15. Specific initiatives for ARIs



(Source: Dr. Hue Tran)

E. Discussion Forum – Mr. Do Trong Hoan, Research Officer, ICRAF (World Agroforestry Center), Viet Nam

Mr. Do Trong Hoan highlighted how both farmers and policymakers are now warming up to the changes in the market but there is little awareness on the role of ecosystem services. Farmers' practices in coffee plantations can help to deliver ecosystem services on the land plots.

It is noted that the study provides concrete evidence on the productivity of farmers in coffee plantations, and that more studies on this topic is needed to consolidate the role of agroforestry and agroecological farming practices to support policies in the future. From the presentation, it seemed that the only limiting factor of production is access to enough water and favorable climate conditions.

The strategy to achieve high yield is to employ a segregated land use strategy allowing farmers to focus on productivity in their farming plots. Despite all the concerns on forest and ecosystem, areas like water, soil, and biodiversity are often left out. The policy to support the coffee sector conflicts with other sectors. For instance, the coffee sector is often viewed as “evil,” with more than 100 thousand hectares are still considered illegal. Government pays forest rangers to protect the forests, but the coffee farmers are subsidized by many other government policies to keep working in the forests. Government says they want to promote intercropping with various fruit trees and timber, but they do not invest much in producing high quality seedlings of fruit trees. Efforts to market fruits is less than for coffee. Government says water is important but also farmers have free access to water and use as much as they can, without fees for irrigation.

Government emphasizes on climate change concerns, but they subsidize fertilizers to farmers, which eventually leads to pollution.

Some recommendations to move forward are more integration, and movements toward a climate-friendly future. On the policy side, there is a need for coordinated strategies to achieve multifunctionality for coffee farmers and plantations. It is recommended that policy has to focus not just on coffee but also on other crops and trees for forests; ensure connectivity and flow of ecosystem services; and allow people in sharing risks and opportunities, sharing costs of production, and environmental responsibilities.

F. Green transformation in agriculture for sustainability of rural livelihoods – Experiences from the coastal areas of Vietnamese Mekong Delta – Dr. Nguyen Thanh Binh (Can Tho University/ Viet Nam)

The Green Economy is an emerging trend contributing to ecosystems and alleviating poverty. The presentation highlighted agroecology and circular agriculture catalysts of sustainable food and rural

livelihoods. This is referred to as green growth. However, research on practical cases for green transformation in agriculture and rural livelihood sustainability remains underexplored.

The case of the Mekong Delta was presented. Mekong Delta is regarded as a most productive agriculture area although also most vulnerable to climate change effects such as sea level rise. The green transformation involved various stakeholders such as small farmers, established committees, Viet Nam Department of Natural Resources and Environment, Department of Agriculture and Rural Development, extension agencies, suppliers, and middlemen.

The green transformation has economic (income diversification), environmental (less use of agro-chemicals), ecological (promotes biodiversity), cultural (involving younger generation and the rural/local cultures), and community health (for both farmers and consumers) benefits. Green transformation also has its challenges such as unstable weather, unstable market prices, lack of investments for agribusiness, inability to repair or upgrade infrastructures such as irrigation systems, and limited research studies

on circular and low carbon agriculture. The lessons learned from the study are to promote sustainability of rural livelihoods and nature-based solutions, the ability to think globally (such as promoting green economy and having organic markets) yet act locally (use of circular agriculture). Stakeholders must also be well-engaged, and participatory practices are encouraged.

G. Delivering cross-cutting actions to the local food system in Viet Nam – Ms. Ysabel Anne C. Lee and Ms. Tuyen Huynh (CIAT/ Viet Nam)

The overarching challenge for agriculture and food systems is to meet the increasing and evolving dietary needs of a growing population in a sustainable way, in the context of climate change and increased pressure on natural resources, paying specific attention to the rights and needs of the more vulnerable groups.

The simplified HLPE Framework for Food Systems identifies five main categories of drivers of food system changes: biophysical and environmental; innovation, technology and infrastructure; political and economic; sociocultural; and demographic drivers.

The presentation focused on three core constituent elements of food systems as identified in the conceptual framework: food supply chains, food environments, and consumer behavior.

The Sustainable Food Systems Profile was presented. In rural areas where there are vast differences in access, opportunities, and infrastructure that involve food supply chains, food environments, consumer behavior, diets, nutrition and health outcomes, socioeconomic and environmental impacts, and food system drivers vary. The increase in agricultural production influenced by national and global demand is driving productivity in Moc Chau, however this increase does not trickle down to local consumption of various food groups. The land in Moc Chau is also suitable for various crops and livestock, driving the district's GHG emissions up.

Nutrition education is still lacking in the rural areas. However, there are opportunities to improve food systems. Seed system development addresses inadequate access to quality seeds of both exogenous and indigenous varieties.

This aims to promote farmer seed access and seed security to achieve food security and diversity. Food supply systems rely on good production, and this starts with reliable quality planting material. In Viet Nam where there are varying levels of access to nutritious and healthy foods, the alliance is working on interventions that start from the very beginning of production. The intervention used must conduct farmer capacity building on seed and vegetable production, emphasizing on the importance of diversity and nutrition. There should be an assessment of informal food flows to characterize and monitor food traders and retailers, and consumer food flows.

Food flows are largely informal. They partnered with the General Statistics Office and provided WIFI access to assess food flows in traditional markets. This also provided real-time database to track changes in food flows. This was a novel approach in collecting data to identify policy and planning options to improve food system transformation.

Promoting food and vegetable nutrition aimed to describe the general

trends surrounding fruit and vegetable consumption in households and characterize how retail affects fruit and vegetable sales. This focuses on addressing food safety concerns. They co-designed prototypes and methods with retailers to sell more fruits and vegetables. They developed outreach activities for raising awareness on fruit and vegetables consumption such as providing coupons, establishing modern food stalls, and use of social media.

The lessons learned from the initiative, including the understanding of the interaction of the districts and provinces in the Northern Viet Nam region, allowed for the local food system and food value chains to develop as they respond and recover from shocks. The support of important actors who are on management boards, authorities, service providers, and participants ensure smoother implementation of new approaches to explore food system issues. It is crucial to recognize that many food traders and sellers as well as consumers are also family farmers. Actions to enable the food distribution will help family farmers to have better access to food.

H. Discussion Forum – Dr. Anni Mitin, Advisor, Malaysian Agroecology Society (SRI-Mas) and Former Executive Director, Southeast Asian Council for Food Security and Fair Trade (SEACON)

Dr. Anni Mitin highlighted the policy relevance and areas of the two presentations. In the Green Transformation for Agriculture, because of climate change, farmers are moved to transform their food systems. It is noted that the transformation process took 30 years and various policy changes occurred in Viet Nam. The paper highlighted the difficulty to implement due to lack of supporting regulations. This is where convergence, divergence, and inconsistency of policies come into play.

Policies help move the integrative farming system forward, especially when clear conditions are set up and addressed. Dr. Mitin asked that if the local government should follow suit in the national initiatives to convert rice lands to integrated farming systems, then what will the trade-off be in the bigger and national levels? Policies that allowed the country to transition to agroecology is supported. However, how will it align to seed policy in Viet Nam?

In delivering cross-cutting action local food system in Viet Nam, the role of various stakeholders is important, especially when talking about consumption, consumer behavior, and looking at the drivers of the market, the seed system, and the diet and nutrition of the population. It is important to look at the effects in the rural, peri-urban, and rural areas.

From a consumer rights and farmers rights movements' perspective, the alliance should recognize that family members are also traders, sellers, and consumers. This is important as it is linked in the policy on food nutrition and consumer protection (consumer rights must always be considered). On action scanning, from a consumer protection perspective, it is crucial to provide consumer education, such as on digital literacy, in their responsibilities and actions in engaging with digital platforms. There should be prior and informed consent on how data will be used, and whether they are actively involved as players.

In summary, policies should move toward addressing nutrition sensitive food systems. It is important to see that nutrition education in rural areas is still lacking, and consumers have little motivation to consume nutritious food even when they have increased income. This suggests that even with higher income, it doesn't mean that family farmers and households are getting nutritious food. There is a gap to be filled in terms of nutrition education, and consumer education. Looking at the transformation of the food system, improved livelihood is anchored on improved dietary nutrition and food safety environment.

Session 2.2A. Multi-stakeholder networks and platforms enabling co-creation of knowledge and participatory research for supporting family farming and food system transformation

Session Leads: Mr. Pierre Ferrand (FAO) and Dr. Pedcris Orencio (SEARCA)

Dr. Pedris Orencio and Mr. Pierre Ferrand opened the session and provided some guidelines for the audience to follow during the discussion. They also discussed how the session will go

about, being split into three sub-sessions with panelists presenting, the discussant reacting, and then opening the floor for Q&A with participants.

A. The role of actor-networks in enabling agroecological innovation. Lessons from 15 years on-field applications in the Northern Uplands of Lao People's Democratic Republic – Dr. Jean-Christophe Castella (IRD/Lao People's Democratic Republic)

The Agroecological Innovation Systems (AeIS) is a network of organizations and individuals, together with the infrastructures and institutions, which mainstream agroecology principles and practices in supporting the transition toward agroecosystems' resilience, and family farming and food system transformations. These actor networks include farmers, experts, and organizations (e.g., cooperatives, rural development agencies, and teaching and research institutions). Actor networks play an important role in the sustainability of family farming, transformation of agri-food systems, and enabling agroecological innovations.

Several approaches have emerged over the last 40 years that would foster innovation. The AeIS dates

to the 1980s when it started as a Farming Systems Research (FSR), which is characterized by disciplinary and multi-disciplinary approaches, knowledge transfer using “transfer of technology model” in the form of technical packages, and actors include universities and research funding institutions. ARIs play the role of experts, and impact is measured by the adoption of the techniques.

In the 1990s, AeIS transitioned into Agricultural Knowledge and Information Systems (AKIS) which is more output-based compared to FSR, which is mostly activity-based. There is co-creation and co-production of knowledge and dissemination, while the actors include farmers, ARIs, extension services, and NGOs who have become partners that induce behavioral changes.

More recently, the Agricultural Innovation Systems (AIS) concept emerged. AIS recognizes innovation as an interactive process involving the interaction of multi-actor learning alliances; it is transdisciplinary; knowledge is based on experiential learning, thus, it is a problem-driven holistic approach; and the ARIs serve as facilitators. The approach promotes and enhances the capacity for innovation because of the interaction, coordination, and

collaboration of the different economic actors or value chain actors.

Actor networks that mainstream agroecology principles and practices in supporting the transition toward agroecosystems' resilience and family farming and food system transformations include not just the farmers but also extension agents, traders, input suppliers, processors, policymakers, researchers, and developers. In short, all stakeholders along the entire value chain, working together toward common objectives.

The 10 principles of agroecology, which UNFAO first described in 2018, are diversity, co-creation of knowledge, synergies, efficiency, recycling, resilience, human and social values, culture and food traditions, responsible governance, and circular and solidarity economy. FAO recognizes all 10 elements as potential entry points for transformative change toward sustainable food and agricultural systems.

The agroecological knowledge is locally co-constructed and is therefore location specific. The performance and diffusion of agroecological innovations involve a dimension of adaptation to local contexts and depend on favorable socioeconomic and ecological conditions.

Agroecology scope from farmer fields to food systems and the society. Transformative approaches toward agroecology consequently evolved from agricultural extension and farmer adoption of “alternative” practices to redesigning the overall socioecological system.

The “scaling” questions or the adoption of agroecological innovations further lead to the issue of knowledge integration beyond fields and farms to consider the overall context of innovations (e.g., political economy, governance, infrastructures). The comparative analysis of seven case studies in the northern Lao uplands for approaching and characterizing the diversity of agroecological interventions through the lens of innovation systems showed that there is a need for a combination of push and pull interventions. Push interventions include the provision of incentives such as financial, technical, material, and/or organizational support to targeted actors allowing them to modify their practices (e.g., subsidies and farm extension work) or in support of the activities in the field.

On the other hand, “pull interventions” are the enablers that will support the mainstreaming of agroecological principles and practices. This means creating an enabling environment (i.e., economic, institutional, cultural, etc.) to agroecological transformations. Examples of “enablers” are as follows: promoting contract farming agreements; organizing awareness campaigns; drafting laws and regulations; and building roads and infrastructures.

In summary, AeIS are learning organizations, highly adaptive, and context specific. Umbrella programs of these learning organizations face organizational challenges because of bureaucratic and metabolism issues that restrict flexibility and creativity. There is a need to invest in the process of growth and maturation of individuals, communities, and organizations. Actionable knowledge is at the core of AeIS.

There is also a need for “push and pull” interventions through designing and nurturing alternative practices in innovation while creating an enabling environment for upscaling. There should also be knowledge sharing among AeIS to identify best practices. Bringing lessons from one AeIS to another requires mechanisms to store (memory) and share (education) knowledge. The innovation capacity of AeIS should always relate to networking capacity recognizing that there is a complex network of actors who should have the required soft and human skills, such as learning, cooperation, and care to advance collective intelligence.

Strengthening networks among multiple stakeholder groups improves resilience, which is a core principle of the agroecology transition. A pluralistic approach to AeIS is desirable, which would spread risk and promote innovation capacity; learning organizations accept that some interventions will succeed, and others may fail (depending on evaluation criteria). ARIs can play an important role in supporting bounding (within networks) and bridging (between networks) networking activities that are essential to scaling agroecology innovations.

B. Scaling community-driven agroecological transitions in collaboration with extension systems, research, and farmers organizations – Ms. Marie-Aude Even (IFAD), Ms. Suzanne Phillips (FAO), and Ms. Katuscia Fara (WFP)

A community-driven approach is essential to empower community and farmer-driven adaptation to drive locally relevant, owned, and agile climate change adaptation. A community-driven approach in agroecological transitions is effective but could be further improved when combined with additional attention to intra-communities' diversity; long-term capacity development effort for last-mile implementers; and dual approach with strong attention to KM and networks.

Community-driven approach is at the heart of IFAD activities. Agroecology is also included in 77 percent of IFAD projects. Agroecology projects are more holistic and perform better in gender, nutrition, youth, climate, and indigenous peoples. Community-driven approach is essential to landscape, market, and policy/services of agroecology projects. However, there is a need to invest in institutionalization and scaling of this approach.

There is a diversity of approaches that would empower community to identify locally relevant climate adaptation along four broad areas, as follows: tools that promote climate and ecological literacy (GIS and participatory mapping, local weather advisory, local climate plan, among others); diverse farm experiments (Farmer Field Schools and climate-smart villages, etc.); farm diaries and records, and farm analysis; and documentation and sharing of knowledge (videos and documentation).

Essentially, Farmer Field Schools (FFS) as an approach is about experimenting and learning in the field; building locally adapted solutions to farmers' challenges; working together with research and extension; and increasing the understanding of the agroecosystem to make better decision. It is about group empowerment

Figure 16. Farmer Field School in India



(Source: Marie-Aude Even-IFAD, Suzanne Phillips-FAO, and Katuscia Fara-WFP)

and building healthier communities. FFS support farmers in agroecological transition by serving as a platform of experimenting new ways of doing things, and creating different systems within the farms and in communities.

Groups are essential for change because farmers support each other when working in innovations that may not be supported by the rest of the community especially in the case of women who have less access to resources. The bottom line or the foundation is investing in facilitators who are trained to promote the process of change. They often come from extension or the farmers themselves who have undergone FFS. It is key to integrate the work with farmer organizations, collaborate with research in finding the right innovations that could be tested, complementing with (simple) digital technologies, documenting and sharing what works, and monitoring and evaluating together.

There are several constraints and factors in scaling community-driven agroecological innovations backed by farmer-led experimentations. These include the limited budget to implement knowledge intensive approach across and outreach which can be addressed in part through policies; local capacity

which can be addressed by investing in quality training, education, and community of practices for long-term capacity development as well as provision of incentives and remuneration; source of innovation which can be addressed by blending internal and external knowledge management, practices and sciences, peer exchange, and network; and quality analysis and targeting that require meaningful disaggregated engagement and investing in data collection and analytical framework.

To summarize, community-driven approach can be powerful to drive agroecological transitions but need to be accompanied by additional attention to intra-communities' diversity; long-term capacity development effort for last mile implementers; and dual approach with strong attention to knowledge management and networks. Tailored digital innovations can empower such community-driven approach as well as backstop last mile implementers. ARIs should accompany such process to facilitate the blending of local and scientific knowledge and tools to improve decision making of communities and help identify "what works where and for whom." The way forward includes more collaboration and partnerships among relevant agencies to have a pool of

knowledge that will facilitate and contribute to the scaling of community-driven approach.

C. Discussion Forum – Farmer-to-farmer: Scaling up peasant agroecology, Dr. Peter Rosset (ECOSUR/ Mexico)

Based on the two paper presentations, there are identified key factors in bringing agroecology to scale. First, the social organizations—the papers presented showed how community-driven projects were the most successful. Social movements that bind together communities and larger processes were also typical key to large scale successes. Successful scaling is based on horizontal, consciously designed social process methodology, and pedagogy. Success stories were based on peasant protagonism (processes were led by their organizations). Farming practices that work in a productive sense can scale up agroecology. To motivate discourse and framing, we should be living in harmony with nature. There should be an active pursuit of political opportunities for scaling up agroecology. We should also consider the importance of external allies and the importance of identifying charismatic leaders, local champions, favorable markets, favorable public

policies which are often rare, and foster leadership from peasant women and youth.

Farmer organization-led research and action processes like “peasant to peasant” or “campesino to campesino” (horizontal pedagogies) have shown to be very successful in scaling or multiplying peasant and small farm agroecology.

Researchers and research institutions can and should support these on-the-ground processes but must be careful to respect peasant organization leadership and protagonism in the process.

Most successful case studies from the ECOSUR global research project were led by peasant or community organizations. Success stories led by researchers were not found, yet researchers often played important roles in supporting the processes led by people’s own organizations.

The biggest success stories, in achieving huge scales, were driven more by “*potentia*” (internal process driven by the people themselves, self-driven by farmer organizations) than “*potesta*” (regulated by outside actors like government agencies, religious institutions, etc.).

A participant commented on the need to affirm analysis

that organized groups of farmers doing agroecology can surely scale it up.

D. Building partnerships in promoting agroecology and sustainable food systems: The experience of the MASIPAG Farmers’ Network and the Department of Community Development, University of the Philippines-Diliman – Prof. Ma. Corazon J. Tan (UP Diliman/Philippines)

The Magsasaka at Siyentipiko para sa Pagunlad ng Agrikultura (MASIPAG) is a farmer-led national network of small farmers’ organizations, NGOs, and scientists practicing agroecology. MASIPAG aims to help resource-poor farmers and the organization to attain farmers’ rights over land and production. MASIPAG believes that small farmers and rural women must play decisive roles in sustainable food systems that put local food security and sovereignty as the primary goal. MASIPAG also believes in putting people first over profit. Its approaches include bottom-up approach, farmer-NGO-scientist partnership, farmer-led research, and mode of transfer and advocacy on issues affecting farmers’ rights.

The organization implements various programs on the promotion of biodiversity

conservation, farmer-led breeding, developing sustainable agroecosystems, local marketing and processing support, documentation and dissemination of farmer-developed and adapted technologies (FDAT), among others. MASIPAG started as a collaborative effort to do research, protect, and collect indigenous rice varieties. Since 1986, a key contribution of MASIPAG network has been the collection, protection, and promotion of indigenous corn and rice varieties. It has more than 2,000 indigenous grain varieties which farmers keep in their in-situ lab or trial farms located all over the country.

MASIPAG has developed varieties that are adaptable to climate change: rice varieties that are resilient to drought, flood, and salt water; and varieties resistant to some local pests. Appropriate farming technologies developed by the farmers themselves are promoted by the FDAT program through the partnership of small farmers, NGOs, scientists, and universities. Through its FDAT program, the organization continues to assist small farmers develop farming technologies that can be easily used and replicated by other farmers and rural organizations.

Every year, MASIPAG holds its research forum called “The PRAXIS,” which is the synergy between theory and practice. In MASIPAG, praxis is key to promoting farmer-led development of appropriate science and technology. MASIPAG recognizes the importance of building partnerships with other sectors and other like-minded stakeholders in promoting agroecology and sustainable food systems. They have actively built and expanded farmer-scientist partnerships, multi-sectoral networks, and partnerships for their advocacies on food security, agroecology, farmers’ rights, women’s rights, and sustainable rural development.

The organization has formed partnerships with the local government units (LGUs), which enabled them to institute local ordinances that promote the practice of organic farming and the prohibition of the use of chemical agricultural inputs in some towns, cities, and provinces in the Philippines. Their collaboration with other farmers’ organizations, cooperatives, consumer groups, and LGUs have led to the formation of the Participatory Guarantee System-Pilipinas (PGSPilipinas). PGS-Pilipinas is a nationwide network promoting and practicing third party / participatory certification of organic produce and people-

led / participatory marketing of organic products.

MASIPAG is also an active member of international organizations like the International Federation of Organic Agriculture Movements (IFOAM). It has also joined forces with the Department of Community Development (DCD) of the College of Social Work and Community Development, University of the Philippines Diliman.

The DCD’s teaching, research, and extension work / service engagements promotes the following core principles and strategies: praxis; community engaged learning and service; and partnership and social solidarity building. The MASIPAGDCD partnership aimed to strengthen the capacities of farmers in participatory planning, implementation, monitoring and evaluation of their programs and activities, organizing and organizational development, participatory leadership, rural women and youth empowerment, networking, and advocacy work around concerns related to sustainable agriculture and sustainable food systems.

MASIPAG’s partnership with the local government also led to the passing of the Organic Agriculture Law in the Philippines in 2010. The Organic Law was

further strengthened through the continued advocacy of MASIPAG and other advocates of organic farming even during the pandemic. In 2020, the Organic Agriculture Law was amended recognizing the vital role of small-scale farmers and indigenous peoples in the development of organic agriculture. The Amended Organic Agriculture Law now also includes the participatory guarantee system where small farmers’ organizations actively engage in the process of organic produce certification and marketing.

The article titled “Seeds of hope in the midst of the health and food crisis: The MASIPAG’s response and contribution to social solidarity building during the pandemic,” published in Philippine Journal of Social Development, highlighted some of the major lessons from the MASIPAG response to the pandemic as follows:

- Agroecology goes hand-in-hand with the people’s call for food sovereignty. It gives priority to local economies to be able to respond to local needs and puts farmers first in the agenda.
- Agroecology places farmers and the people’s right to food at the center of policies, and the people as active participants in the attainment of their right to food.

- The centrality of women’s care work / reproductive work even in sustainable agriculture and sustainable food systems.
- The need to continue building multi-sectoral partnerships and social solidarity that will respond to people’s immediate needs and assert government’s responsibility for people’s welfare, wellbeing, and development; protect and assert people’s rights, including people’s right to benefit from and decisively participate in development; promote and advocate for people’s development agenda; and more sustainable and more people-centered development paradigms, policies, and programs.

E. Insights into supporting Vietnamese Family Farmers’ Cooperative and food system transformation through sustainable forest product-based enterprise approach and diversity – Ms. Thoan Ho (NVCARD/Viet Nam)

Most farmers in Northern Viet Nam where majority of the poorest ethnic minorities can be found have not received training in production, such that farm production is based on experience and practices handed down from generation to generation. Thus, access to agroecology

and improved farming methods is limited.

Cinnamon is a thriving forest product in Viet Nam. It was reported that cinnamon production has been increasing in Viet Nam by 10 percent annually since 2008. By 2015, the total area planted to cinnamon trees has reached 102,171 hectares, of which 39 percent is found in Yen Bai District.

The Viet Nam Cinnamon and Star Anise Cooperative (Dao Think commune, Tran Yen District, Yen Bai Province, Northern Viet Nam) started with four small farmer groups growing cinnamon (3–11 households per group). They sold their produce individually at low prices and mostly to middlemen in the commune. The group also did not have enough funds to invest in processing equipment, thus, the group has limited power in negotiating prices with buyers, resulting in a low profit.

Farmer leaders lack training, so they did not know how to organize and manage the group of farmers. They also had no orientation in developing and operating forest and farm producers’ organizations (FFPOs) more efficiently.

Unsustainable cultivation by farmers resulted in the depletion of resources

(i.e., declining biodiversity, degraded land and water resources, polluted environment, and food insecurity). Farm production has also been affected by extreme weather events, and pests and diseases have increased due to climate change.

There are many supportive policies on agriculture, but policy implementation is still weak due to lack of coordination mechanisms and limited resources. In 2014, the Forest and Farm Facility (FFF)-FAO started its intervention in Viet Nam. As the program’s implementing organization, the Viet Nam Farmer’s Union (VNFU) selected Yen Bai Province and the Cinnamon Grower Collective Group in Dao Think commune as one of the target beneficiaries.

The FFF Program is a partnership between FAO, International Institute for Environment and Development (IIED), International Union for the Conservation of Nature (IUCN), and Agricorn. FFF recognizes the important role of FFPOs in reaching producers at scale with expertise and technical knowledge, in helping spur innovation from producers to diversify forest and farm systems, and in their potential to scale up successful forest and land use practices.

In 2017–2019, the Viet Nam Cinnamon and Star Anise Cooperative was established with 23 members, and with funding from the Viet Nam Samex exporting company, a private investor which later became a member of the cooperative. The cooperative business model helped the farmers mobilize resources and enabled them to obtain bank loans for business expansion and build their own cinnamon factory.

The FFF business model through the Viet Nam Cinnamon and Star Anise Cooperative significantly raised the people’s awareness of the benefits of collective action in managing a business and established a sustainable forest-based enterprise. By pooling their resources, members of the cooperative benefitted from greater bargaining and purchasing power, and by working together, they were able to address the challenges they face while working their way out of poverty.

By bringing together relevant agencies, local governments, stakeholders, and partners such as FAO, VN FOREST, IUCN, IIED, North Viet Nam College of Agriculture and Rural Development (NVCARD), The Center for People and Forests (RECOFTC), the Cooperative was able to maintain and diversify sustainable

forest-farm livelihoods that contributed sustainable FFPOs and agroecological diversification.

The practice of organic farming also created opportunities for diversification of plants (and associated fauna) in the forest landscape. The prohibition of using chemical pesticides restored forest ecosystems; increased the number of soil organisms, alongside increasing carbon storage in soils (reduces greenhouse gases); increased the ability to retain soil and water; increased the number of economic options such as mulberry to raise silkworms, beekeeping, herbs, fruit trees, tea, bamboo shoots, etc. to diversify products under the forest canopy as well as to enhance biodiversity and forest ecosystems.

In conclusion, farmer groups and cooperatives must be empowered to think like potential entrepreneurs and be able to collectively address issues related to market/economy, including financial aspects; natural resources management; sociocultural; institutional and legal; and technology, product research, and development. The lessons learned from the initiative could potentially contribute to rural transformation, agroeconomic integration, and strengthening family farmer organizations.

F. Discussion Forum – Dr. Pedcris M. Orencio (SEARCA)

Agroecology is principle-based, and these principles have served as guideposts for countries in transforming their agri-food system, mainstreaming sustainable agriculture on large scale, and achieving multiple SDGs starting with zero hunger.

However, not only the principle-based approach to agroecology was highlighted in the presentations, but also the important properties and elements that have facilitated the operationalization of agroecology in the two countries. But before discussing them, we should note these took off from the pressing concerns regarding the sustainability of the agri-food system, which may include:

- lack of knowledge not only from the farmers’ level but also at the consumer level, and this perpetuates the disconnect between the producers and consumers on quality and quantity of locally grown agroecology products;
- the need to organize farmer groups and inform them about the standards and adherence to certification systems toward a resilient community, starting with collective responsibility;

- how to sustain productivity levels despite shifts in climate and the degradation of natural environment that impact land and water, and the system for insurance of goods which are important for developing resilient farming systems;
- the provision of access to technology and facilities as well as the agricultural enterprises to build and enhance the capacity of actors through enhancing education and information on localized production systems;
- lack of support systems particularly on technology for agroecological practices which is also the reason for low adoption rates from small-scale farming organizations; and
- lack of access to markets and premium price produced from the purview of policy development, and the wastage and the need to use environment-friendly distribution systems.

Despite these concerns, there were definitive capacitive development practices that underscored multi-stakeholder collaboration in the two countries through the application of participatory methods that were implemented alongside environment-friendly approaches, and the adoption of specific

technologies to deliver synergistic benefits and outputs at various scales.

Interestingly, while both are talking about the outcomes of their interventions, they were also describing the processes that helped achieve their institutional objectives. For the Department of Community Development of UP Diliman, it is about engaging communities in learning and building that life-long partnership with MASIPAG and social solidarity through the application of both practical and theoretical knowledge. NVCARD, as an agricultural college, on the other hand, extends support to the government by executing its important mission of training workers in rural areas on sustainable farming methods. In a nutshell, both institutions have capitalized on community partnerships and have highlighted the value of collaboration, in their various forms and conditions, toward the achievement of co-produced knowledge that can be used for designing and implementing sustainable and resilient food systems following the principle-based agroecological approaches, and this had led to empowered farmer organizations.

We heard the importance of academic institutions and their roles in the process of reforming and

initiating the transformative changes in the agri-food systems through research, extension, and capacity building. As described by our speakers, for this to grow, a considerable degree of recognizing the respective roles of these actor-networks in the deliberation process was needed, wherein transdisciplinary methods were placed highly, to support a consistent level of interaction that supported their advocacy. A case in point is the alignment of innovative adaptation toward agroecology by MASIPAG and UP-DCD wherein participatory action research and farmer-led models were implemented to support farmers. Since, by nature, agroecology is both ecological and agricultural (or agronomic in particular), a predominant approach grounded on transdisciplinary and participatory should be advocated. Developing the capacity of stakeholders and providing that enabling environment for partnerships and collaboration reverses the usual top-down participatory approach and goes beyond the linear framework of knowledge exchange. In the past, the decision-making process failed to include stakeholders resulting in “Type III errors” or solving the wrong problems.

Knowledge is an intellectual asset for organizations and communities that is found

important for all actors in the community. Participation, on the other hand, is a behavioral change that is nestled in knowledge systems and factors that include knowledge cocreation and co-production strategies, facilitation of mutual learning, and development of information-sharing tools that leverage the right technologies. As such, drawing attention to the kind of knowledge, attitudes, and practices (KAP) that farmers may have when engaging in decision making could uncover the diversity of thoughts, actions, and built-in capacities. Both farmer organizations and academic and research institutions have benefited from transdisciplinarity, which is a key feature of sustainable development because of the process of knowledge co-production, wherein the objective is to facilitate the knowledge exchange necessary for decision making. This was particularly evident in Viet Nam wherein diversification, marketability, economic resilience, and empowered organizations were developed to support the transformation process.

At this juncture, these are some salient points that academic and research institutions working with communities and farmers' organizations could consider in promoting agroecological practices:

1. Local people's empowerment is crucial to successful agri-food transformation toward inclusive and sustainable development. A general experience of countries from around the globe including those in the region, like Viet Nam and the Philippines, have shown the transformative impacts of empowering local people on developing adaptive and localized systems, resulting in substantial natural, social, and financial capital formation, which led to a series of household benefits and private capital gains, including improvements in livelihoods and food security. Environmental, economic, and political benefits were generated where individuals and organizations in communities are coherent and exercise control over their adopted systems.
2. There is a need to specifically target the poorest and most vulnerable. Improving the livelihoods of the general community, however, does not necessarily translate to the alleviation of poverty, which requires that poor people are identified, and benefits are specifically targeted toward them. In the Philippines, unless specific measures to empower the poorest and most vulnerable are designed into development interventions, benefits from community efforts will be captured and appropriated by the more powerful segments within these communities only.
3. There is a need to invest in building local institutions, including smallholder producers' organizations. Successful transformative changes are most likely where effective local-level institutions exist and when local people play a meaningful role in developing these institutions. Investing in the development and strengthening of networks and organizations such as Viet Nam's case of small-scale forest and farm producers provides the strategic and practical means of scaling up and ensuring the inclusion of small producers and enterprises and make up the majority of forest and farm producers. Strong organized groups enable them to represent their interest, negotiate for more favorable terms, and increase their opportunities to share in the benefits of sustainable development.
4. There is a need to foster enabling regulatory frameworks and conditions for transformative change.

Lessons from community engagements highlight the following critical factors for success: security of local rights and tenure over land and natural resources; balance between incentives/benefits and responsibilities/costs; strong, transparent, and accountable governance at different levels; access to productivity-enhancing technical skills and knowledge; knowledge of markets and access to markets for goods and services; and bureaucratic mandate and culture that support communities and smallholders to implement agri-food system interventions such as the certification systems.

5. There is also a need to facilitate integrated, cross-sectoral, polycentric approaches and to support platforms for cross-sectoral dialogue and coordination at different levels. Fragmented, sectoral-focused conceptual and regulatory frameworks and policies pose barriers to a holistic, integrated, and innovative approach that is necessary for promoting effective agroecological practices such as organic farming that embrace natural resources management and sustainable development. There is a need to adopt broader paradigms and operating

frameworks that enable sharing of knowledge, mutual learning, and joint action across sectors to address cross-cutting concerns, such as climate change, and to ensure inclusion and equity among social groups at different levels. It is especially important to support the development and operationalization of cross-sectoral platforms for policy dialogue, deep listening, and quick learning within and across countries in the region.

Further from these points, it can be observed that because of the interconnectivity between and among the three sustainability dimensions—the economy, the environment, and the society—agroecological practices should be able to manage certain potential tradeoffs:

- For instance, between the environment and society, the potential concerns arise on biodiversity loss due to the society-induced land-use changes.
- Between economy and society, the challenges for achieving a stable and equitable supply, marketing, processing, and retail of a diversity of nutrient-rich foods and the demand for accessible and affordable prices, in

the context of inequity and presence of continuous shocks and stresses such as the pandemic.

- Meanwhile, between economy and environment, some triggers fall within the bounds of manufacturing and production that may affect environmental depletion and degradation, hence, should be aligned with aspects such as the green economy.

ARIs could look further at the reforms as the source of solutions; academic and research institutions should support the coordination by providing legal prescriptions, integrated planning, evaluating the trade-offs through an assessment of ecosystem services to make interdependencies and trade-offs explicit, and creating that narrative for building a community of practice (COP). The flexibility to coordinate with boundary organizations and undertaking broad and inclusive deliberation are essential in this process and to be able to foresee development, through scenario planning, for instance.

The road to transformative change requires effective links between informal settings and formal policy processes, wherein polycentric structures with flexible mechanisms and

coordination play a significant role. The ARIs should determine internally the presence and the absence of specific knowledge and skills that could be a reference as to what type of capacity building activities are needed to support participation. Empowering farmers by training them to communicate, articulate, and confidently speak in public will help them better air and petition for their needs and connect with relevant agencies. External to the organizations, however, the type of governance, presence of legal frameworks and functional legal bodies, the commitment of higher-ups, adoption of the bottom-up approach, and the existence of development programs or projects to facilitate the innovation are key considerations. But above all, it is the continuity of these promising interventions that matter because change takes years or decades to happen. If reforms did not happen yesterday, the next best time to execute change is now. Following the concept of diffusion, as an institution, the institutions have created stimuli to spread the idea of agriculture innovation from its hearth to other areas for an imaginable emulation.

G. Bridging the gap between formal and informal seed systems through Community Seed Banks in Asia – Mr. Patrick Trail (ECHO Asia/Thailand)

Based in Chiang Mai, Thailand, ECHO Asia works with about 20,000 networkers and agricultural and community development workers and practitioners all over the world. ECHO Asia provides technical assistance, through research of low-cost, appropriate seed storage methods, seed storage infrastructure, and even getting into some of the organizational challenges of operating a small-scale seed bank or community seed bank. ECHO Asia works to train seed bank managers, offering some very practical assistance and guidance.

ECHO Asia has been working with a network of community seed banks. It provides technical assistance, through research of low-cost, appropriate seed storage methods, seed storage infrastructure, and even getting into some of the organizational challenges of operating a small-scale seed bank or community seed bank.

The formal seed system is associated with large-scale gene banks and plant breeders, crop breeders, producing varieties that are sold through seed companies. The seeds are often hybrids, or commercial cash crops (e.g., corn, soybean, etc.). The informal or the local seed system, on the other hand, involves many smallholder farmers where seeds are traded locally through local seed vendors and local seed exchanges. These are farmer-produced seeds, local pollinated seeds, seeds that are saved on farm, and often locally adapted seeds, indigenous seeds, and varieties that have been present for generations.

ECHO Asia operates a small community seed bank (CSB), which is a very informal system, or low-scale. Seeds are stored, sometimes, with no cauldrons but with appropriate technologies such as low-cost vacuum sealing and desiccants like zeolite drying beads etc. ECHO Asia also works in very remote areas, in places that often don't have access to the larger gene banks that can be found in some of the larger systems. It uses low-cost technologies, for drying seeds, in places where seed moisture meters and drying chambers, as well as germination chambers, are not available.

In October 2019, ECHO Asia Small Farm Resource Center and Seed Bank hosted the first “Regional Community Seed Bank Managers Forum.” Twenty-two Community Seed Bank managers from seven countries in Asia attended the three-day event—the culmination of a multi-year strategy to establish and coordinate a Network of Community Seed Banks in Asia. The Forum aimed to gather a group of CSB personnel for (1) professional development, (2) troubleshooting of common challenges, and (3) brainstorming of creative solutions.

Prior to this event, CSB managers were sent pre-event questionnaires, including questions related to seed bank size, scope of work, seed varieties stored and disseminated, and methodologies of in situ servicing of farmer seed needs in rural areas.

Results from the survey highlighted the critical role of CSBs in more remote and underserved communities, offering a diverse set of quality seeds to farmers and their communities. CSBs also offer various training events and extension/advisory services to the farming communities in which they serve, typically in the areas of agroecological production and transition.

Community seed banks play a vital role in the transition to agroecological production in places where smallholder farmers have minimal options for acquiring quality seeds. Studies have shown that CSBs serve multiple functions—conservation (repository for seeds and local genetic material that may no longer be saved), exchange (trading of seeds with community members), and crop improvement. CSBs have become an affordable source of a diverse set of quality seeds, seed production, and marketing. CSBs also serve as a platform for farmer empowerment. CSBs are instrumental in safeguarding agricultural biodiversity and sharing the benefits derived from its use.

Figure 17. Community see bank system: Managers of the Kahelu Small Farm Resource Center and Community Seed Bank, Pathein, Myanmar.



©ECHO Asia/Patrick Trail)

Through the CSBs, there is an increase in options made available to the average farmer, and overall resiliency in times of increasingly changing climates (Vernooy et al. 2017). With local CSBs and the local availability of seed, certain varieties can be stored while farmer can choose the rotations they see best fit to their systems, a fundamental empowerment of agroecological practice.

The seed bank initiative could help preserve and improve crop biodiversity, provide planting and planning options for crop rotation, allowing local access to farmers to ensure resilience during times of crisis, and empower farming communities in the region.

H. Advancing ways forward to transparent, responsible, and sustainable food system transitions through building agroecology pathways: Insights into research-based developments from a Vietnamese Academy of Agricultural Science (VAAS) led partnership – Dr. Pham Thi Hanh Tho (CASRAD/Viet Nam)

There are problems that occur in food systems such as soil erosion, unsafe food, simplification of the agricultural systems, and environmental pollution leading to biodiversity

loss, among others. These problems are linked to each other and lead to unsustainable development.

Agroecology is the pathway that can be explored and give chance to the state of food system that Viet Nam and other countries in the developing world are now facing, and move toward a more transparent, responsible, and sustainable food systems.

There are six emerging initiatives in agroecology in Viet Nam (Jean-Christophe Castella and Jean-François Kibler 2015), similar to other countries in the Mekong River. These initiatives are agroforestry, integrated crop management, organic agriculture (i.e., developed and applied by different agencies like JAS from Japan and USDA from the US), System of Rice Intensification (Viet Nam is now one of the leading exporters in the world), home gardens, VAC, permaculture, and conservation agriculture.

Agroecological system does not only change the way we do agriculture, but also our mindset. Sustainable development is the way to go and can be an opportunity for livelihood and development of the community. Many of the younger generation go back to their home country and start up their business, working on agroecology.

VAAS is implementing several R&D initiatives on the dissemination of agroecology assessment methods. They have conducted a variety of stakeholder training workshops based on the 10 elements of agroecology from FAO. They have trained producers, smallholder farmers, and entrepreneurs to enhance their understanding of agroecology and its applications. VAAS is also leading the Vietnamese team for implementing and fine tuning the agroecological performance assessment tool (TAPE) for researchers, lecturers, and enterprises promoted by FAO and participating in the editing and promoting the Agroecology Memento led by GRET in Viet Nam.

VAAS and partners are cooperating toward advancing ways forward to transparent, responsible, and sustainable food system transitions through building agroecology pathways, including policy actions. The Vietnamese government is now focusing on value chain upgrading and protection and effective exploitation of agricultural resources.

To promote a sustainable food system transition through agroecological pathways, Viet Nam has been implementing various national strategies and programs to (1) protect

“ There is a need for transdisciplinary participatory research networks. These networks are organic, they’re a little bit messy, but they’re free from a lot of the bureaucratic and administrative burdens that a lot of institutions have. ”

and effectively use agricultural resources; (2) restore and revitalize the quality of ecological services; (3) implement a territorial development approach; and (4) upgrade value chains.

To achieve this intended transition, appropriate strategies must be developed and focused on the environment, the economy, and sustainable development.

It is recommended to go back to the three elements of sustainable development which are equity, environment, and economy. They should be the appropriate strategies for different levels if we want to transition from conventional farming system to agroecology.

I. Discussion Forum – Dr. Abram Bicksler (FAO HQ)

The idea of transdisciplinary and networks were evident in the presentation as we look at agroecology. The 10 elements of agroecology have been used several times, which show entry points across the dimensions and the interconnectedness and interrelatedness of these elements.

The key takeaway is the idea of co-creation. However, there is a need for transdisciplinary participatory research networks. These networks are organic, they’re a little bit messy, but they’re free from a lot of the bureaucratic and administrative burdens that a lot of institutions have. There is an opportunity to connect the push-pull dimensions of change.

Another important thing that we have seen in this discussion is that many ARIs are focusing on production and moving beyond production into the sustainability of the entire food system. We need holistic co-creation approaches that consider all the dimensions of sustainability, where markets and access were a major component.

We also need integrated research, participatory research, co-creation on other dimensions as well, on processing, in market access on the socioeconomic components such as women and gender, youth and their employment. Keeping that in mind, as we look at academic and research institutions, that the transdisciplinarity to make change is going to be essential.

Complexity and systems approaches are messy, but they are essential for helping to understand or co-create in a contextually relevant way. Agroecology being a science of practice and a social movement which have been exemplified and find their home in cocreation networks of change; with farmers as drivers of co-creation, as drivers of research and innovation, with a social movement aspect to it, but also with the practical and practice-level experience. This has been exemplified in the presentation on community seed banks where farmer-driven and community seed banks can offer an important and often untapped potential to co-create with and support farmers and communities through research.

The presentations focused on co-creation within a very specific cultural and ecological context. That's one of the hallmarks of agroecology—that it's contextually relevant, it is from the ground up, it is knowledge intensive, and it is farmer-driven. It's people-centered where agents are not just farmers, but also there are processors and the consumers.

The essentiality of local knowledge or local wisdom needs to be considered as well. Humility is required to co-create, to come alongside, to be asked to enter into, and to support.

With that humility comes an understanding and an appreciation of multiple knowledge systems, the local knowledge, the wisdom knowledge, but also integrating that with science and the scientific method is also important.

There is a necessity of strengthening, supporting, coming alongside local institutions, and helping them to succeed. As part of the FAO's mandate, it's also important to see the linkage between a scaling-out, bottoms-up approach and the absolute essential need as well for policy that can enable a scaling-up of this. Research and academia are essential. The beauty lies between the policy and enabling environment, and the local experiences, the local wisdom, co-creating together, moving outward, but also upward.

In the discussion forum, the presenters acknowledge the need of a network that combines different partners in the way that these changes and to convert conventional food systems into more sustainable food systems. In Viet Nam, farmer organizations are somehow successful in advocacy and have a good orientation on processing government documents. However, farmers still face the challenges in bringing it into practice and to apply all the learnings. For example, the methods

from FAO were utilized to evaluate agroecology in the field. However, there is an urgent need to scale up to different local partners. Information disseminated is crucial in bringing farmers' minds together and identify site-specific approaches to be applied on the ground. After the dissemination that VAAS had done with different partners about the tool, farmer organizations already formed an informal network that combines researchers, interpreters, and farmers together to operate knowledge sharing. One very emergent demand is the need to build an agroecological brand that is legally registered under Viet Nam's law.

According to Mr. Ferrand, one of the biggest challenges of agroecology is the lack of certification mechanism. Premium is one of the incentives for farmers to engage fully in the transition. This is really something that is critical and should be thought through more. Mr. Trail added that agriculture, as we know, is such a context-specific practice—what works in one place may not work in the other. However, what does work in one place may work well in the other. Humility and networks can be effective in convincing farmers and upscaling practices. The combination of the two is impactful in assessing practice that may or may not work.

Session 2.2B. Innovation in HEIs curriculum to better address agroecology and family farming

Session Leads: Ms. Lucie Reynaud (GRET) and Dr. Melanie Blanchard (CIRAD)

A. When myths become fact: How misleading information can become a threat to food security – Dr. Gunnar Kirchhof (University of Queensland/Australia)

Even though there are many works that have been published in Southeast Asia and Africa, misleading information and terms related to agroecology are still apparent. The pursuit of agroecology started in a discussion forum in Mali. Since then, there has been a sharp increase in numbers of publications and citations in agroecology. In this practice, crop choices and rotation patterns matter since they have high potentials in agricultural practice. For example, in Australia, farmers practice crop rotations based on the potential income they can earn. In Australia, most farmers practice direct seedings that are covered in mulch. Lots of farmers would want to scale up organic fertilization.

The agribusiness revolution mostly revolved around cash and food crops. In traditional subsistence farming, food crops are grown for own consumption, and surplus are sold (cash crops). With the increasing emphasis on agribusiness, there has been a move toward transition to industrial type agriculture, where all crops are cash crops, even the crops that are consumed or eaten. The number of people to feed, as well as the increasing rural to urban migration, have made the transition to industrial agriculture swift. Organic farming has become popular in recent times.

Organic farming does not use agro-chemicals such as pesticides, fertilizers, herbicides, and growth hormones. It depends mostly on ecological processes and promotes fair relationship to all living things. However, organic farming requires certification and standardization. There is “common” knowledge about artificial/chemical/synthetic fertilizers based on farmers’ perception. Farmers believe that if synthetic fertilizers are applied, the food is unhealthy and it tastes bad. The use of chemical fertilizers can make women infertile. It also poisons the ground and makes it sour. Biological transmutation will occur. And lastly, the microbes will make the necessary nutrients needed by the crops.

But where do these “powerful” messages come from? These myths come from nonreviewed Internet sites that can be accessed anywhere, and by anyone. They also come from NGOs who lack technical expertise, predatory yellow journalism, and extremists who value faith over science-based evidence.

In the EU, on the other hand, organic farming has been successful due to its massive animal industry that produces tons of biowaste. It is proven that organic farming is effective in waste management. Since organic farming relies heavily on all-natural farming inputs, organic farmers can only generate half of the nitrogen they need. Manure from livestock can benefit soil structure, which can also increase yield. Twice the manure is needed than produced.

There is flux of nutrients from developing to developed countries. Rural areas are generally nutrient exporters and emitters, which go to urban areas. However, this depletes rural areas of nutrients, so they try to recycle as much as possible. A paradigm shift is needed in organic farming to make it more realistic.

For the recommendations, stakeholders should understand that organic farming is one of the many agroecological practices. Build on overlap between conventional and agroecological practice to accelerate practice change. Myths should be made clear by pursuing unbiased education and transparent information dissemination about mineral fertilizer. Most importantly, misinformation through proliferation of fake news on the Internet and social media should be countered with facts and science-based results.

Agroecological practices produce food that underpin those agroecological principles and elements. Information floating is outright wrong and can seriously undermine food security; this will become more important in the future and needs to be cross-checked. We have to be careful that the right information should go out to people who would use it.

B. Mainstreaming agroecology in higher education institutions for redesigning sustainable food systems in Asia – Dr. Abha Mishra (AIT/Thailand)

There are 500 million family farmers who produce 80 percent of the world's food. Majority of them are smallholders who work on <5 hectares of land. Almost 75 percent of their food products are sold to markets. However, there are still fragile linkages among the interdependency of food health, trade, and climate change. The COVID-19 and other crises have threatened progress toward achieving the SDG goals by 2030. Regardless, the redesigning of sustainable food systems with active engagement with farms and farming communities is gaining momentum, and HEIs are seen as crucial actors.

The program on Sustaining and Enhancing the Momentum for Innovation around the System of Rice Intensification in Lower Mekong River Basin (SRI-LMB) has been established in 33 districts in 11 provinces in the LMB region.

It aims to capture farmers' imagination by enabling them to get higher yield with reduced external inputs and fueling their capacity for innovation. It offers low-cost solution. It does not require external inputs. Its practices are amenable to farmers' experimentation and follows agroecological principles to strengthen livelihoods. An example is the system of rice intensification that employs a menu for innovation and transformation. This includes transplanting younger and fewer seedlings/hill or direct seeding with low seed rate, maintaining wider spacing, avoiding continuous soil saturation, and applying compost as much as possible.

The key processes of innovation involve multi-stakeholder networks and platforms (academics, researchers, farmers' organizations) who enable co-creation of knowledge and participatory research in supporting family farming and food system transformation. There is the enhancement of rural communities' initiatives and development, and transfer of technologies. Moreover, it also involves formulation of policies and strategies (from regional to local levels) to support family farmers and sustainability of rural livelihoods/communities. Lastly, it should support innovations in HEIs curriculum to better address agroecology and family farming through engagement.

Conventional departments receive more resources. However, there is an evolving interest to initiate dedicated programs through interdisciplinary knowledge (cross-departmental collaboration). The following areas could be explored:

- Joint research project for mapping out and identifying the gaps in agroecology and sustainable food systems (integrating TAPE in academic curriculum)
- Establishing regional network of HEIs
- Involving faculties in global and regional technical and policy consultation
- Internship and fellowship programs for masters and PhD students (engage students in FFS)
- Gathering consensus on innovations that have significant impact
- Developing curriculum that helps to understand the growing demand for healthy and nutritious food
- Linking CSO and community institutions with universities
- Galvanizing external funding support (international donor community should align their support to facilitate such transition)

The program was able to reduce 17 percent of GHG emission. It significantly reduced leaching and encouraged more soil fertilization and recovery. It facilitated the development of informal farmers group involving 15,000 farmers, where 56 percent FPAR farmers were women. Crops became more resilient to drought and flood, and less disease and pest are observed in SRI fields. Specifically, it resulted to 52 percent higher yields, 70 percent higher net profit, 64 percent higher labor productivity, 59 percent higher water productivity (kg/m³ of water), and 75 percent higher fertilizer use efficiency. In addition, there were 77 ministries staff, 16 researchers, 30 project staff, 10 students, and nine faculties employed in the program. There are also five training curricula, one professional master's degree course curriculum, and four national and one regional policy papers produced in the course of the implementation.

It is recommended to create more connecting environment where stakeholders can engage and evolve. ARIs should produce local and site-specific approaches. Collective action and cocreation are encouraged to be able to share, learn, reflect, and adjust, as learning is always a work in progress.

C. Discussion Forum

Q1 [Addressed to Dr. Abha]. You highlighted collaboration and identified needs in the curricula, what would be the most prioritized areas to focus in Southeast Asia to enable these changes?

A1 [Dr. Abha Mishra]. In HEIs perspective, we need to focus on three core activities: education, research, and outreach/extension, and these need mechanism. Knowledge in HEIs can be translated into action useful for communities in completely different regions. Agroecology addresses different kinds of food production system; this is the kind of transition we are looking for and requires new knowledge like engagement by bringing in development partners, farmers in the driver's seat, space available for co-creations at all levels so people will understand why we are expanding our boundary to have food systems using different approaches and to have equitable distribution. As an academic, I feel that it is our responsibility to make sure we are contributing to equitable food system; farmers cannot be always recipients, they should be seen as creators in this paradigm shift. We can only do this through long-term engagement by creating opportunities to involve them. The rice sectors in Viet Nam and Thailand are now

“ Listen to what people say and don’t dismiss if you don’t agree. Try to get to the bottom where it came from, get people to play around with it; turn farmers into researchers; and show them what they can and cannot do themselves ”

moving to quality production, using agroecology elements such as edible landscaping, ecosystem services, and addressing health and nutrition issues. This needs to be communicated; communication in one area to work together for everyone to see and know agroecology practices.

Q2 [Addressed to Dr. Ghunnar]. It is important to connect robust science-based information. However, there is a question on how to gather this consensus on innovations to avoid misleading information.

A2 [Dr. Ghunnar Kirchhof]. Listen to what people say and don’t dismiss if you don’t agree. Try to get to the bottom where it came from, get people to play around with it; turn farmers into researchers; and show them what they can and cannot do themselves is powerful. Let farmers try it out and let them make judgment by themselves. Listen to what they say. Quite often,

the consultants would say farmers should treat the whole farm, but even then, farmers would have nothing to compare it with. Listen and don’t dismiss what they say by understanding their perceptions and help empower them to make their own decisions. And most importantly, listen to understand the local contexts.

Q3 [Addressed to Dr. Abha]. The farmer groups that can be engaged in the activities that you and the researchers are doing, of course, have special requirements both in terms of organization and capacity. How do you select the group of farmers to be engaged in your activities? Thank you for sharing.

A3 [Dr. Abha Mishra]. We used the following criteria and process—farmers who have already gone through one cycle of FFS were selected through brainstorming session at community meeting, we came up with 2–3 common

challenges that they wanted to address. Farmers who had risk-taking capacity and were local champions were selected. We also galvanized support from local governments, and aligned and tuned our programs to hold their hands. Through regional training programs and central farmers’ participatory research, we trained farmers to lead the implementation at their own villages. These are few steps we used. In fact, there are many processed interventions involving the stakeholders. Identify protocol or entry point of intervention for specific community and find or identify local champions. Local government support is equally important. Not all agroecology can be addressed all at once. Different countries have their own set up. Lao People’s Democratic Republic is completely new but has lots of potentials—not using too much fertilizer, which is a good opportunity; and working in provinces where the government has policies.

Not all farmers will take part, but when they see others doing good, it creates a bandwagon effect, and it encourages farmers to own the process.

Q4 [Addressed to Dr. Abha] Stressing out that factors and cause of agroecology in agriculture, there are no courses yet in universities in Asia. In what way can we bring harmonized content to the curricula?

A4 [Dr. Abha Mishra]. There is some kind of confusion. If you look at agroecology, they are also part of conventional disciplines of agriculture. How to have these elements and veer away from silo approach? Getting technical support for lecturers from FAO, but just scraping those things. There is reservation; competitive environment in the region has changed a lot. Every institution has to compete; funding is very competitive. Agroecology is a new concept at the moment. Where do graduates of Agroecology go? There is no idea on which direction to go. Confusions are bound to happen with new concepts. AIT provides a much better ground in terms of supporting agroecology transitions. There is a venue, it all depends on how we use that opportunity.

A4 [Dr. Florent Okry]. I welcome the recommendation of Dr. Abha regarding connecting environment. There is a lot to learn when connecting the global south for example. This is an area Access Agriculture tries to cover, and this has started changing mindsets in the ARIs. In this post COVID-19 era, farmers need to be offered various options. When these come from expert farmers from another corner of the world, their chance to be put in experiment by other farmers is higher. ARIs from there can guide to develop context-specific innovations.

A4 [Dr. Abha Mishra]. That's a good suggestion. I would love to see "open space" at all levels to allow context-specific innovation. Doing so, the principles would remain the same, but practices might change.

Q5 [Addressed to Dr. Gunnar]. How could we differentiate between organic farming and agroecology?

A5 [Dr. Gunnar Kirchhof]. Organic farming is one of many agroecological production systems. Agroecology is a concept of farming based on the 13 principles and 10 elements FAO has published.

Q6 [Addressed to Dr. Abha]. From what I know, there are no stressing factors or courses on agroecology in agricultural universities in India.

A6 [Dr. Abha Mishra]. Organic is just the way we produce food—using organic source for nutrients; but agroecology is all about working on synergies, efficiency, conservation, recycling, equity, social integration, solidarity, governance, and circular economy. Indeed, we are addressing the SDGs.

Q7 [Addressed to Dr. Gunnar]. If N fertilizer is allowed in Organic Agriculture standard, what will happen to its CC mitigation? N fertilizer production have a high C footprint. And contributes N₂O, an important GHG.

A7 [Dr. Gunnar Kirchhof]. Yes, making nitrate or ammonium is very energy demanding and N-use efficiency is very low. We need to become better in utilizing the N we apply (split application etc.). Also remember that organic fertilizer needs to mineralize before nutrients can be taken up by plants, and that process releases CO₂.

Q8 [Addressed to Dr. Gunnar]. Namaskar all! Most of the youth after COVID-19 have become attracted to organic farming. However, the certification cost is very high and without organic certificate, sale in the international market is difficult. How do we promote organic agricultural practices?

A8 [Dr. Gunnar Kirchhof]. Organic produce is in strong demand worldwide. In terms of agroecology, an accreditation scheme similar to the Rainforest Alliance, Fair Trade, etc. would probably be an alternative option to speed up adoption. It would be a huge undertaking with lots of PR work, but I am sure it can be done if there is a will.

D. Enhancing capacities of the young generation in Cambodia for supporting rural transformation and agroecology mainstreaming through ESD teaching approaches – Dr. Isabelle Providoli (CDE/Cambodia) and Mr. Sophea Tim (RUA/Cambodia)

In embedding agroecology and sustainable land management (SLM) in higher education, the current curricula of agriculture higher-level education institutions in Cambodia do not explicitly teach agroecology, SLM, and sustainable development. A large part of students go to work for extension and need to build up the right competences. It is an important task to integrate agroecology and SLM as key topics in higher education. The future generation needs to be trained on climate-resilient agroecology and SLM solutions.

So how can we capacitate the young generation to become future change agents? What competences do students need to master to foster sustainable development in their future jobs? How are they able to address present and future challenges of food security, climate change, resource degradation, and poverty? How can we design effective teaching-learning arrangements at the Royal University of Agriculture (RUA) to build these competences? The graduates of RUA assume positions of responsibility in government, extension, research, teaching, private industry, and civil society, among others.

The pilot project aimed to develop a Sustainable Development and Sustainable Land Management, and Agroecology curriculum at RUA. The collaborative process entails the co-designing of curriculum for the RUA and other agriculture-focused higher education institutions in Cambodia. This should include a systemic perspective, tailored solutions for specific contexts, building on existing knowledge bases (e.g., Global WOCAT SLM Database), participatory processes between science and practice, and strong support from the Rector of RUA and the UNCCD focal point of the Ministry.

In the Education for Sustainable Development (ESD) approaches, the combinations of innovative didactics, new teaching-learning arrangements, and thematic issues of sustainable development, SLM, agroecology, climate change, and DRR are employed. At the end of the course, the students will be able to acquire academic knowledge, professional skills, and critical awareness. Which competences have to be built in students? Students should be able to:

- understand concepts and frameworks in land degradation (LD), SLM, agroecology, climate change adaptation and mitigation, and disaster risk reduction in the context of sustainable development, particularly the SDGs, and relate them to the context in Cambodia;
- understand the fundamental principles and functioning of (complex) nature-human interactions;
- master tools and methods to document, assess, and evaluate LD and SLM/ agroecology practices at farm and landscape levels;
- develop potential solutions for SD challenges jointly with farmers and other actors (i.e., multi-perspective knowledge);
- monitor impacts of implemented solutions;
- communicate adequately with a broad range of actors; and
- share results in writing (e.g., reports, posters) and orally (e.g., presentations).

The topics of the SD-SLM curriculum have six thematic chapters, which include: (1) Introduction to SD, LD, and SLM; (2) SLM technologies and approaches, and ecosystem services;

(3) SLM, climate change, and DRR; (4) Mapping land degradation and SLM by using different tools; (5) Decision-support tools for SLM and assessment of ecosystem services; and (6) Concluding session.

The high-level launch of SD-SLM curriculum was held in January 2020 in Phnom Penh where 64 participants composed of policy-level officials, donors, HEI lecturers, and researchers attended the event.

A series of Training of Trainers (ToT) was conducted for 4.5 days to 15 RUA lecturers and researchers, delivered by CDE senior research scientists. They presented innovative didactics, new teaching-learning arrangements, and thematic issues of SDSLM-agroecology. There are challenges due to the COVID-19 pandemic, but virtual classes via Zoom have been improved and have made group exercises possible, as well as adapting new learning modes.

The key takeaways from this initiative are: (1) include agroecology/SLM topics into higher education; (2) include systemic perspective of landscape; (3) tailor solutions for specific agroecological zones; (4) include ESD approaches into higher education; (5) build a broad range of competences

(academic knowledge, skills, and attitudes); (6) build on regional/global databases related to agroecology/SLM like Global WOCAT network (www.WOCAT.net) and others; and (7) link outputs of implementation projects (e.g., tools developed and evidence generated) with higher education curricula. For further readings, a new publication on the Transdisciplinary Learning for Sustainable Development: Sharing Experience in Course and Curriculum Design can be accessed at https://www.bne.unibe.ch/unibe/portal/microsites/BNE/content/e497824/e504014/e1131493/150dpi_online_E_tdlLearnSD_ger.pdf.

E. Implementation of e-learning activities at ITC Cambodia – Mr. Bou Channa (ITC/Cambodia)

The ASEAN Cyber University (ACU) project was proposed by the Republic of Korea in the ASEAN Summit of 2009. At the first stage, the project was designed to help the CLMV (Cambodia, Lao People's Democratic Republic, Myanmar, and Viet Nam). ITC was mandated by the Ministry of Education, Youth and Sport of Cambodia to implement the ACU Project. In 2011, ITC was selected by the selection committee from the Republic of Korea for setting up ACU. In June

2012, ITC's e-Learning Center was established with multimedia studio room, content development room, and operation room.

The journey of ACU started in 2012 (Stage 1). ITC was able to pilot the e-learning model with two courses for one Department and produced seven skilled persons. In 2013 (Growth Stage), ITC was able to produce five courses for two Departments and 14 skilled persons. In 2014, ITC expanded to other departments and created eight courses for three Departments and 20 skilled persons. By 2015, the e-learning model was expanded to the whole ITC. It developed 13 courses for eight Departments and produced 40+ skilled persons (including NIPTICT). The year 2016 was the start of Stage 2 where 18 courses were produced and expanded to two public universities (ITC-OER Starts). In 2017, ITC expanded to more universities and increased its capacity to 23 courses in three public universities. In 2018, more partnerships were made with ITC. ITC was able to produce 27 courses with three partners. On top of this, there were 11 courses developed for UNESCO, nine courses for CIRAD and RUA, and two courses for PIC. In 2019, ITC transitioned to sustainability as it continued to develop web books,

establish Digital Education Center, STEM (Science, Technology, Engineering, and Mathematics) Teacher Training Center, and implement the UNESCOBEEP (Basic Education Equivalency Program) Phase II.

The operation of e-learning at ITC is through dissemination of e-learning course sessions. In the course, the e-learning completion will be determined by attendance and score. A flipped classroom method is applied; theories, learning activities, and toolkits are available in the e-learning course. Final exams are given offline. Some computer lab is reserved for e-learning (e-learning can be self-administered and portable). A support service for students is provided in the e-learning course. The support service is composed of the instructor (responsible for the wrap-up sessions, learning activities, and online assignments), the teacher assistant (tutors in using e-learning, answers student queries, and gives consultations), and the Learning Management System (LMS) administrator for technical support (explains the usage of LMS and solves technical problems).

A policy set is a key success for driving e-learning model in higher education. This policy set is divided into school support policy,

policy from department, and support policy from e-learning center and ITC.

The School Support Policy supports flipped and blended learning and encourages online course operation. In the departmental policy, all department lecturers and professors are encouraged to develop online courses. The e-learning support policy advocate development and technical skills by giving incentives for course development and operation.

The LMS is based on Moodle (www.moodle.itc.edu.kh). There are three types of e-learning contents: SCORM content, HTML5 content, and video content. Local capacity building trainings on content development are conducted with participants from different institutions. The e-learning workshops and working group meetings (2015–2018) were able to promote e-learning in higher education in Cambodia. The objectives of these workshops were to share experiences of key organizations involved in the operation and development of e-learning and to identify challenges and possible solutions to the operation of e-learning. Some challenges identified in the operation of e-learning were digital infrastructure and e-learning facilities. There was also a challenge in terms of scaling and adoption of e-learning among instructors and students.

The UNESCO Basic Education Equivalency Program was also implemented from 2018 to 2019. There were 11 developed online contents for BEEP. There were established learning centers for out-of-school youth in BEEP. BEEP was able to support training to other 13 learning centers. It aims to transfer content operation to the Ministry of Education, Youth and Sport in the future. During the COVID-19 pandemic, BEEP was able to support the Ministry of Education, Youth and Sport by developing secondary school content for grade 12 students and by providing consultancy on e-learning development.

The way forward for ITC is to fulfill projects with World Bank for 2019–2023. All ITC courses will be converted to online content.

ITC will aim to improve T&L approach and improve its R&D. It will continue to support other HEIs to develop and apply e-learning. ITC will prepare for the conduct of the STEM Teacher Training Center for 2020–2022. It will work with EMCAST to develop STEM Teacher Training online learning material. It will also work with WBF to operate STEM Teacher Training Center. ITC strives to be a STEM Teacher Training Institute in the future. It will foster more collaborations with RUA and CIRAD to develop agriculture content in the curricula and to host regional content on agriculture.

F. Discussion Forum

Q1 [Addressed to Dr. Isabelle Providoli]. In terms of pilot phase, what is the effective strategy for the coming years?

A1 [Dr. Sophea Tim]. RUA is implementing the course in one faculty and planning to integrate in other faculties. Relevant ones are Agronomy, Agro-Engineering, Rural Development, and Land Administration and Management. We do not have a concrete plan because there is no budget yet. We want to cascade this to other universities in Cambodia as well. We are trying to apply for some funds to get ToTs for other university lecturers. RUA is in a good position to support expanding this to other universities.

A1 [Dr. Isabelle Providoli]. We are also looking into working further for education for sustainable development approaches. Knowledge is the basis but there are a lot of other competencies that students need like being critical, being reflective. We have few pending proposals. One tries to blend research practice and education.

Q2 [Addressed to Mr. Bou Channa]. Elaborate about the contents of e-learning courses. What is related to agroecology?

A2 [Mr. Bou Channa]. We develop courses for all engineering programs at ITC. We have different engineering departments. Some courses are related to agroecology like food processing and chemical programs. Departments may be related to agroecology, but in general these are for engineering programs.

Q3 [Addressed to Mr. Bou Channa]. What is the importance of linking concept with practical training, and students to learn from the field? How can e-learning be combined with training tools and how to engage and interact with people in the field using e-learning?

A3 [Mr. Bou Channa]. We post course contents online and allow access to students by creating accounts for them. We can grant access to the public, but this requires prior approval from the Director.

G. Sustainable agricultural and rural development in Thailand: The role of science, technology, and innovation at Kasetsart University – Dr. Orachos Napasintuwong (Kasetsart University/Thailand)

Kasetsart University (KU) was established in 1943 as a combination of agricultural primary school teaching center and experimental station. Since its establishment, there has been great success of coordination between research, experiment, and education. The university envisions to provide “Knowledge of the Land” to promote sustainable development in order to be internationally recognized. Its mission is to be a university in the leading research group of the world (global and frontier research) to carry

out various international academic and research initiatives, while reinventing the university system.

The first national long-term strategy in Thailand is 20 years in the making. The vision of this plan is to become a developed country with security, prosperity, and sustainability in accordance with the Sufficiency Economy Philosophy (SEP). The ultimate goal of this vision is to improve the happiness and well-being of Thai people.

Sufficiency Economy comes from the late King Bhumibol’s philosophy of development based on three principles: moderation, reasonableness, and self-immunity, as well as knowledge and integrity.

In one of the Thai policies, the national agenda is to drive the Thai economy in line with the SDGs through innovation-driven approach. In 2019, the Ministry of Higher Education, Science, Research, and Innovation (MHESI) was established. HEIs have the main roles to support human capital development, generate knowledge, conduct research, and generate innovation in line with national development goals to improve efficiency and competency of the nation, build national competitiveness, and promote economic growth.

The challenges in the HEIs are seen on the declining number of interested students in agriculture. It is also a challenge to develop human capacity in line with national sustainable development goals. However, it could be done by means of teaching, research, and outreach programs through the integration of science, technology, and innovation (STI).

There are also challenges in the innovative curriculum development. Most of the college students are not that interested in agriculture. The population structure in agriculture is changing toward an aging society. On top of this, older generations need to further develop their skills and relearn some skills in farming. There is a need to create linkages from knowledge to innovation and from theory to practice that are in line with the SDGs. An interdisciplinary approach can solve such issue, since not a single science can solve the problem alone.

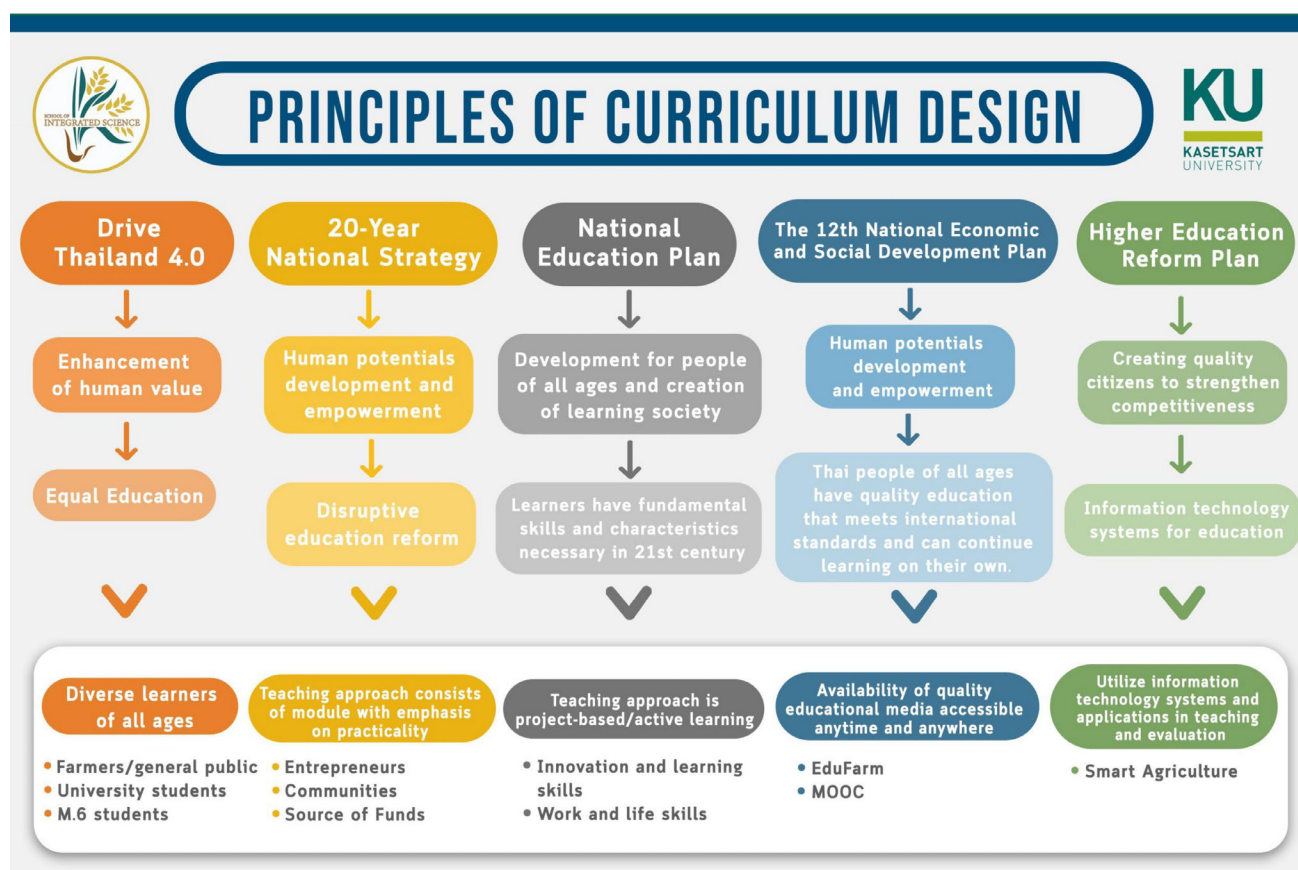
For example, in the integrated curriculum in Knowledge of the Land for Sustainable Development, students are required to plan and design projects with the communities to develop innovations that meet the community’s needs. In this curriculum, a Subject-Integrated Synchronization (SIS) model is employed. This model is an integration of Knowledge of the Land

with active and problem-based learning experience where students' performances are evaluated from the outcome of assignments.

The objectives of the SIS model are as follows: create a module plan that integrates many sciences and disciplines to be a complete curriculum that serves professions; promote life-long learning experience; promote knowledge and skills in entrepreneurship and smart farming where students can start-up a business or be agripreneurs; promote knowledge creation and innovation; and promote learning experience with communities or business companies through hands-on learning.

In the development of an innovative curriculum, there are lessons learned lifted from the process. Characteristics of model graduates should be set to capture the necessary knowledge and skills. The objectives of the curriculum should be in line with the vision and mission of the university. It is proven that a system analysis and holistic approach are efficient tools in addressing complex issues and problems like sustainable development. Multidisciplinary programs are practical and have increasingly gaining interests from students. The inputs and contributions from graduates, employers, and potential students help in identifying the needed knowledge and skills in the industries. Curriculum should be continuously updated (e.g., every five years). Internship brings students closer to the real world. Internship trains students to conduct field research and cooperative education.

Figure 18. Principles of curriculum design at KU



(Source: School of Integrated Science, Kasetsart University. <https://sis.ku.ac.th/en/>)

The university also advocates for participatory and cooperative approach as applied in the collaborative program at National Corn and Sorghum Research Center. The corn silage production process is made possible by accessing soft loans provided by the cooperatives (e.g., Agricultural Marketing Cooperative of BAAC Customers for corn silage collection and sales). There are available technology transfer activities to corn seed SMEs. The Material Transfer Agreement provides germplasm materials. There is an annual cooperative public and private hybrid corn yield trails since 1987.

Meanwhile, the Center for Agricultural Biotechnology is the core center of the research university in agricultural sciences and biotechnology. It brings experts from various institutes to work as a team and lend their expertise. The center is equipped with state-of-the-art equipment, high quality researchers, and sizeable research budget. It identifies problems, provides precision management tools, and create appropriate technologies to specific local problems. For example, the center conducted studies on the nutrient management and planting space to increase yield in Jasmine rice. The research centers were able to strengthen local communities through

transfer of non-degree trainings with specific knowledge needed for their practice. This provides good alternative options to degree programs that require more time and commitment. The research centers were able to understand the need of local communities and provide them with evidence-based programs to improve farmers' observability of relative advantage and enhance triability experience to increase the adoption rate of innovations. The research centers use efficient knowledge transfer tools and techniques such as short courses, integrated research, and teaching through community learning. There are also school-on-the-air programs in KU Radio Plus. There are already five stations nationwide that air local content and traditional knowledge to teach cooperative training courses.

H. Assessing training needs and higher education program on agroecology and safe food system at universities in Mekong subregion – Dr. Peany Hong (ITC/Cambodia)

Agroecological principles is related to the recycling, input reduction, soil health, animal health, biodiversity, synergy, economic diversification, cocreation of knowledge, social values and diets, fairness, connectivity, land and natural

resource governance, and participation of various stakeholders. Agroecology needs to be a part of training program. Teaching agroecology requires regular upgrading of training program to complete knowledge availability to sustain the capacity building of all relevant stakeholders.

ITC's research aimed to assess training needs at higher education program on agroecology and safe food system at universities and academia in Mekong subregion (i.e., Cambodia, Thailand, Lao People's Democratic Republic, and Viet Nam) to leverage the linkage between universities/ academia and various stakeholders. This five-year study (2021–2025) is supported by the Agroecology and Safe Food System Transitions (ASSET) project, which is financially supported by Agence Française de Développement (AFD) and the EU.

The methodology employed include the selection of universities and academia, designing questionnaire, conducting interview and survey, and analyzing data. For the participants, known universities/academia with training programs related to agroecology and safe food system are selected to assess the existing curriculum, vocational training, soft skills, and

e-learning in terms of challenges, needs, and perspective. Data was analyzed based on categories of training program (curriculum, soft skills, vocational, e-learning) and questions (challenges, needs, and perspective).

The expected sample size for university/academia/vocational center were: Cambodia (8), Lao People's Democratic Republic (3), Thailand (3), and Viet Nam (7). So far, only 10 universities/academia from Cambodia and Lao People's Democratic Republic have completed the survey and interview.

The results of the curriculum program show that agroecology has been integrated in the bachelor's degree program for most universities. The integration of soft skills (e.g., gender equality and youth in agriculture) is still less. Most curriculum programs are associated to cropping system, conservation agriculture, and sustainable resource management. The modalities of most curriculum programs are theoretical classroom, practical field work, practical work in classroom, and report and thesis. Most universities require students to have practical field work at least once a year.

In vocational training, no training has yet been integrated in the university regular program. Not many universities have vocational training. The current vocational training is organized periodically based on project needs, depending on collaboration with NGOs, farmer organizations, and private sectors. The modality of vocational training was mainly practical field work. Existing training topics are related to organic vegetable plantation and animal health management.

Cambodia has good e-learning program from the country's universities. E-learning courses existed in the curriculum of most universities (for bachelor's and master's degrees). Majority of the e-learning courses are linked to only theoretical organic agriculture, cropping systems, and food safety quality, among others. In terms of soft skills, a high percentage of soft skills courses existed in education programs of most universities (for bachelor's and master's degrees). Majority of soft skills courses are linked to project management, communication, and entrepreneurship. The modality of the soft skills courses is theoretical classroom.

To improve agroecology and sustainability of safe food system in Mekong subregion, it requires commitments from all relevant stakeholders, regular job market assessment to fill the gaps between job market needs and curriculum and training program.

To conclude, the online assessment of curriculum of higher education program on agroecology and safe food system transition at universities in the Mekong subregion was conducted in this study, but the assessment is still an on-going process. Agroecology and safe food system courses have been integrated in education programs. Capacity building of human resources in terms of technical and soft skills is the main need for improving education in agroecology. The engagement between various stakeholders such as university, academia, research institutions, NGOs, and private sector are considered as important initiation to improve education in agroecology and safe food system.

I. Discussion Forum – Dr. Florent Okry (Access Agriculture)

Q1 [Addressed to Dr. Orachos]. Only a few students are interested in agriculture. This is the same case with Mekong universities. How can we make agriculture more attractive to younger generation? Any suggestions to make it more palatable to youth? Which are the more popular subjects or majors for students in KU?

A1 [Dr. Orachos Napasintuwong]. The popular majors in KU are engineering, agro-industry, business administration, and economics. Although KU is an agriculture university, we offer many other majors in science, education, and humanities. In an aging society, we don't expect many people to go into agriculture. Maybe more for industries intended for value creation. It is not a bad idea to have fewer people in agriculture in terms of agriculture economics. But to have them to be more competitive will be a challenge. Curriculum should be revised every five years or sooner. In our department, we have merged programs to serve the market needs, what employers demand, and the students' interest.

Q2 [Addressed to Dr. Peany]. How do you assess the teaching and linking agroecology topics together and not in silos?

A2 [Dr. Peany Houng]. The study is still a work in progress. It is expected to have enough information to link perspective and holistic approach to different agroecology topics in the curriculum at the university level.

Conclusion

The two-day regional consultation highlighted the redefinition of the Academic and Research Institutions' (ARIs) roles to engage in participatory research and family farming based on local contexts in addressing knowledge and implementation gaps. The presentations of different representatives from the ARIs, family farmer organizations, nongovernment institutions, and partner government agencies, as well as the conducted parallel discussions provided in-depth insights on agroecology and the opportunities that arise from its adoption.

The transformation of the agri-food systems requires new thinking and approaches. Partnerships are central to this and critical to reaching the goals of the 2030 Agenda. The Global Forum on Agricultural Research and Innovation (GFAR) is well positioned and stands ready to work with smallholder and family farmers on the challenges they are facing with regard to food system transformation. The COVID-19 pandemic has underscored the connections between supply chains and our consumption patterns. This calls for an urgent need to redefine agricultural systems as food systems. It has also underscored the role of universities to produce graduates with a transformative mindset who are adept in understanding the growing complex social concerns and are able to effect positive change, now and in the future.

Agriculture is a major driver of biodiversity loss but making it sustainable through agricultural innovations promotes and enriches biodiversity to ensure high quantity and quality of environmental goods and services. Metrics to attain agricultural productivity and biodiversity conservation must include productivity, stability, sustainability, and equitability. Appreciating that human well-being is underpinned by biodiversity-rich agricultural food systems would be critical in wielding holistic agricultural innovations across the food supply chain.

ARIs should focus on the redefinition of roles of research and of extension agents in the context of co-experimentation settings with farmers who are knowledge and innovation brokers. ARIs should create more collective actions on participatory research and family farming, as well as curricular change and higher education transformation. The Transformative Partnership Platform (TPP) employs participatory research to address knowledge gaps. TPP works with policymakers and stakeholders in addressing implementation gaps and addressing a large diversity of local contexts within a common approach. Approaches identified to upscale and bridge gaps include employing of adaptive scaling strategies, conducting dialogue platforms, formulating agroecology conducive policies, and forming public-private partnerships. ARIs should invest on database establishment and knowledge management, learning opportunities, dedicated extension services, and monitoring and evaluation activities. Likewise, investments on research for the development and innovations potential of universities should be made. The growing interest in agriculture needs to be sustained with more targeted capacity

building activities of relevant government agencies and groups to specifically promote and generate more agri-entrepreneurs.

It is recommended to conduct more studies to ensure the balance between trade priorities and food security goals, particularly under the tenets of ASEAN Economic Cooperation, as well as effective coordination mechanisms among countries. This can reduce trade and food insecurities both at the national and regional levels.

In the principles of agroecology, small-scale producers have been, and will always be, innovators. They need to be empowered to be able to co-design, co-create and co-innovate. There is a new global initiative from OneCGIAR to develop and scale agroecological innovations for small-scale farmers and other agricultural and food system actors across different socioecological contexts.

In the assessment of sustainability projects, the three key elements of agroecology should be considered: resource use efficiency, recycling, and integration of diversity.

Agroecology-based projects have higher incorporation of the IFAD mainstreaming priorities like climate change, gender, nutrition, indigenous peoples, and youth.

The regional consultation also emphasized gender roles. In the Andhra Pradesh experience, women leaders of self-help groups are critical actors of change. Moreover, it is crucial to respect farmers' works and innovation. On the other hand, the economic, political, knowledge, and cultural lock-ins can limit the ability of farmers to shift to agroecology. Therefore, constructing knowledge for food sovereignty, agroecology, and biocultural diversity entails reversing top-down research. Still, there is a need for a clear, systematic redirection of investment, funding, research, and policy focus on agroecology by, with, and for small-scale farmers. By doing so, farmers' transition to agroecology is supported through incentives, subsidies, grants, soft loans, and blended finance mechanism.

In conclusion, the key strategies to support rural transformation, agroecology mainstreaming, and family farmers can be done

through: (1) customization of digital learning innovations to address the needs of communities and strengthen community-driven strategies in effective agroecological transitions and network support; (2) integration of technical knowledge, field evidence-based initiatives, and interpersonal skills with higher education curricula to capacitate the young generation; (3) conduct of regular job market assessment to match curriculum to professional sector; (4) localization of agroecology and supporting of family farms through social community entrepreneurship; (5) investment on R&D potential of universities to generate more agri-entrepreneurs; (6) employment of adaptive scaling strategies, dialogue platforms, agroecology conducive policies, blended financial mechanisms, and public-private partnerships; (7) designing and nurturing alternative practices in innovation while creating an enabling environment for upscaling; and (8) connecting gender, nutrition, and climate-resilient agricultural practices to agroecology.

Way Forward

The preparation and publication of the regional consultation proceedings aims to capture and present the highlights and discussion forums for each session. In line with this, three policy briefs have been prepared by Chulalongkorn University, courtesy of Dr. Wayne Nelles and FAO, to contribute to the discussion that was initiated by the regional consultation. The policy briefs are as follows: *Higher education for sustainable agriculture, and agri-food systems to meet the Sustainable Development Goals in Southeast Asia: Challenges, opportunities and policy options for the Association of Southeast Asian Nations*¹; *Being “Agricool”: supporting ASEAN youth and tertiary student futures for sustainable agri-food system learning and livelihoods to meet Sustainable Development Goals*²; and *Mainstreaming Agroecology in Southeast Asian higher education for Sustainable Development Goals: Challenges, opportunities, and policy options*³.

During the two-day regional consultation, many ongoing and upcoming initiatives that are implemented in grassroots and on a global level were presented. The intention of the regional consultation is to highlight the importance of fostering inclusive and respectful partnerships among stakeholders, transforming research approaches through transdisciplinary and participatory methods, capitalizing on R&D potential of different universities, and acknowledging the role of family farmers as innovators in co-design, cocreation, and co-innovation.

Thus, the regional consultation provided opportunities to synergize and build upon these initiatives. Participants, presenters, and organizers of this event are encouraged to engage and reach out to national and local leaders. Join them in forwarding their advocacies, may it be in a local, national, or regional scale. This stimulates the good flow of investment, funding, and formulation of research and policies on agroecology by, with, and for small-scale family farmers.

The documentation and assessment of how agroecology is prioritized, studied, supported, and applied in Higher Education Institutions (HEIs) and Technical and Vocational Education and Training (TVET) facilities in the region should be escalated to fully realize its potential in agri-food system transformation.

Hence, this regional consultation is an initial step of a longer-term process that aims to conduct participatory assessment of different regional institutions and development of ad hoc projects to support better inclusion of agroecology in the educational systems' curriculum and research programs.

¹ Link to the policy brief: <https://www.fao.org/publications/card/fr/c/CB2681EN/>

² Link to the policy brief: <https://www.fao.org/documents/card/en/c/cb8044en>

³ Link to the policy brief: <https://www.fao.org/documents/card/en/c/cb8046en>

Appendices

Bioprofiles of Speakers and Session Leads

PART 1: Challenges, Initiatives, and Role of Academia and Research Institutions (ARIs) in supporting the transition toward sustainable food system and Agroecology mainstreaming

I. Institutional Initiatives



Dr. Md. Baktear Hossain,
Director, SAARC
Agriculture Center

Md. Baktear Hossain is Director of the SAARC Agriculture Centre (SAC), an inter-governmental body of the South Asian Association for Regional Cooperation (SAARC). Dr. Hossain started his career as Scientific Officer at the Bangladesh Institute of Nuclear Agriculture (BINA) in 1994. He worked as a visiting scholar of the International Atomic Energy Agency (IAEA) during 2002–2003 at the Soil and Crop Sciences Department of Texas A&M University, USA. He accomplished his post-doctoral research at the Crops and Soil Sciences Department of Cornell University, USA in 2013–2014. He is a core scientist of the Bangladesh Agricultural Research Council (BARC) and was promoted to Director (Manpower & Training) at BARC in 2019. Dr. Hossain, who has published more than 50 scientific articles in reputed peer reviewed journals, is in Google Scholar with a total citation of 641.



Dr. Susan Vize, Regional Adviser for Social and Human Sciences, UNESCO Regional Office for Asia and the Pacific

Susan Vize is the UNESCO Regional Adviser for Social and Human Sciences in Asia and the Pacific based in Bangkok. She joined UNESCO in 2006 and spent eight years in Samoa as the Social and Human Sciences Program Officer working on a

range of projects with youth, social inclusion, bioethics, creative industries and education for sustainable development. In 2014, she transferred to the Regional Office in Bangkok and is working on youth and social inclusion projects across



Dr. Glenn B. Gregorio, Director, Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA)

Glenn B. Gregorio is Director of the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA), a non-profit organization established by the Southeast Asian Ministers of Education Organization (SEAMEO).

He is also a Professor at the Institute of Crop Science, College of Agriculture and Food Science, University of the Philippines Los Baños (UPLB). Dr. Gregorio was recently appointed as Chairman of the Technical Panel for Agriculture by the Philippine Commission of Higher Education (CHED), and steering committee member of the Philippine Department of Agriculture Biotechnology Program. He was also conferred the rank of Academician by the National Academy of Science and Technology (NAST)-Philippines. His career was developed at the International Rice Research Institute (IRRI) as Plant Breeder and Senior Scientist of IRRI's Plant Breeding Genetics and Biotechnology Division. He worked on rice breeding and genetics for tolerance to abiotic stresses and research management. He had three-year experience as a crop breeding manager in a private seed company.

He is an agri-entrepreneur, being co-founder of Binhi Inc., an agri-research start-up company on micropropagation and seed business. His numerous awards include the following: Ten Outstanding Youth Scientists of the Philippines (TOYS) during his high school time; Outstanding Young Scientist (OYS) in the field of Genetics; Honorary Foreign Scientist of the Rural Development Administration of Korea; The Outstanding Young Men (TOYM) Philippines; Ho Chi Minh Medal award for "Having Great Contribution to the cause of Agriculture and Rural Development of Viet Nam"; Crop Science Achievement Awards in Crop Research, R&D Management, and honorary fellow in various years. He is now one of the 2021 UN Food Systems Summit Champions. Dr. Gregorio has published more than 120 scientific journal articles, book chapters, policy papers, and manuals.

the region. Dr. Vize has acted as Officer in Charge for UNESCO in the Pacific and Ha Noi, Viet Nam. Prior to joining UNESCO, she was the Executive Officer of the Murray-Darling Basin Community Advisory Committee based

in Canberra, Australia. She has worked on a range of community natural resource management, capacity building, and community education projects in Australia, Papua New Guinea, and Fiji.

She is a qualified teacher and trainer, and founding Principal of FNQ Training, a community-based TVET organization working with aboriginal communities and the unemployed in north Queensland.



Dr. Hildegard Ling nau,
Executive Secretary, Global
Forum on Agricultural
Research and Innovation

Hildegard Ling nau is a development professional with more than 31 years of experience in research, policy development, and management positions in institutions and countries all over the world: with one of the top 10 sustainable development think tanks (German Development Institute, GDI), with governments in Africa (Rwanda, Kenya, Somalia), Asia (Cambodia) and the Arab World (Palestine), with German government and implementing organizations (BMZ, AA & GIZ) and with international organizations (WFP, OECD). Before joining the Global Forum on Agricultural Research and Innovation (GFAR) as Executive Secretary in 2021, Dr. Ling nau served as WFP Deputy / Acting Country Director in Palestine, as Head of German Development Cooperation for Kenya and Somalia and as A5 Manager with the Development Co-operation Directorate (DCD) of the OECD. She is qualified as a Professor at Siegen University (Habilitation). She holds a PhD (Dr.rer.pol.) in Development Economics and a Masters (Diplom) in Political Science from the Freie Universität (FU) Berlin. She also studied at the Institut d'Études Politiques (IEP) Paris, the German University of Administrative Sciences (HfV) Speyer, and completed postgraduate studies at the German Development Institute (DIE). She is a member of the Advisory Board of the UNU Institute for National Resources in Africa (UNU-INRA), the Multidimensional Poverty Peer Network (MPPN), and the German Association of University Professors (DHV).

Dr. Matthew McCart ney,
CGIAR, OneCGIAR initiative
on “Transformational
Agroecology across food,
land and water systems”



Matthew McCart ney is a principal researcher at the International Water Management Institute (IWMI), specializing in water resources and wetland and hydro-ecological studies. He is currently IWMI's Research Group leader on Sustainable Water Infrastructure and Ecosystems. His research focuses on nature-based solutions and ecosystem services across catchments and landscapes and the need to rapidly transform agriculture and food systems to ensure resilience and sustainability. He co-leads the one CG initiative on Agroecological Transformation.



Dr. Fergus Sinclair, CIFOR-ICRAF – Transformative Partnership Platform on Agroecology

Fergus Sinclair leads the Centre's research into the contribution that trees can make to the productivity of farming systems and the lives of rural communities. This theme has two main areas of focus: soil and water productivity; and factors affecting farmer decisions about which trees they incorporate on their farms and how they manage them. He also coordinates the Smallholder Production Systems and Markets component of the CGIAR Research Programme on Forests, Trees and Agroforestry involving CIFOR, Bioversity, and CIAT.

Sinclair also works with Bangor University, Wales, UK through a research partnership with the School of the Environment, Natural Resources and Geography, and is a visiting professor at the Latin American Centre for Tropical Agricultural Research and Higher Education (CATIE) in Costa Rica.

He is best known for his pioneering research on systematic acquisition and use of local knowledge and the development and application of systems methods in agricultural development, including measurement and modelling of complex systems at field, farm, livelihood, and landscape scales, encompassing both ecological and human dimensions.

Ms. Ilaria Firmian, Regional Specialist, Asia and the Pacific Division, IFAD

Ilaria Firmian is a Regional Specialist in the Asia and the Pacific Division, Program Management Department in IFAD HQ. She has 20 years of experience working in rural development, 15 of which have been with IFAD, in supporting the mainstreaming of climate, environmental, and social issues at policy/program/project levels. Prior to her experience with IFAD, she has been working both on Land Tenure and Socio-Economic and Gender Analysis with FAO, and as NGO Project Coordinator for an EU-funded project focusing on indigenous peoples' livelihoods in the tropical Central African rainforests.

Ms. Firmian has a degree in Anthropology and an MA in Cooperation and Development.



Dr. Wayne Nelles, Rural Homestead Farmer, and former Visiting Scholar, Chulalongkorn University in Thailand

Wayne Nelles is currently working on his small homestead farm in rural Canada. Previously, he was Canadian Visiting Scholar at Chulalongkorn University, Thailand 2013–2020 with the School of Agricultural Resources (CUSAR) and Center for Social Development Studies (CSDS), Faculty of Political Science. Based at CUSAR he was founder, and formerly Regional Coordinator of the Higher Education for Sustainable Agriculture (HESA) and Food Systems in Southeast Asia Experts Group Project (2015–2018) with small grant funding from the Swedish International Network Initiative (SIANI) supported by Sida partnering with the Stockholm Environment Institute. From 2008–2011, he was stationed in Peru as Head, Capacity Strengthening Department, International Potato Center (CIP), a member organization of the Consultative Group on Agricultural Research (CGIAR). While in Peru, he was Senior Social Scientist, Education Specialist at CIP-CGIAR with backstopping and oversight responsibilities for initiatives in Africa, Asia, and Latin America. He has a PhD in Social Foundations of Educational Policy from the University of British Columbia (UBC). He has worked in Academic Administration and was founding Program Director of UBC’s international sustainable development internship program 1995–2001. He has also lectured at Vancouver Island University (VIU) in Canada and at various universities abroad. Over the past 20 years, he has also consulted with international and regional agencies such as the ADB, APAARI, CIDA, CTA, IDRC, ITD, SEAMEO-SEARCA, UNESCO, and UNICEF. He has won various academic awards and research grants, and published over 40 articles, working papers, or edited books including various learning materials on agriculture and food systems.

II. Voices from the Ground

Vijay Kumar is Executive Vice Chairman, Rythu Sadhikara Samstha (a government corporation for farmers' empowerment), and Ex Officio Special Chief Secretary to Government (Natural Farming) Agriculture and Cooperation Department, Govt of A.P. He is also the Vice Chair (Production) of the Champions Network for the United Nations Food Systems Summit that was held in September 2021. In his 38 years of government service, more than 25 years were spent in large-scale community mobilization and promotion of livelihoods of rural women, tribal communities, and farmers. For the past six years, he has been leading the climate resilient, A.P. Community-managed Natural Farming, erstwhile Zero budget Natural farming. In 2020–2021, this programme has enrolled 750,000 farmers and farm workers in A.P. This work builds on the 20-year-old, large-scale mobilization of rural women in the state by SERP. By 2021, the Mission has succeeded in organizing 70 million rural women across the country. The aspiration and the vision is to transform by 2031 all the 8.0 million farmers and farm workers in A.P. and to make the whole state a natural farming state. He holds a BS degree in Physics (honors student) from St. Stephen's College, Delhi University, and an MBA from the Faculty of Management Studies, also in Delhi University.



Mr. Vijay Kumar, Advisor to Government of Andhra Pradesh for Agriculture & Cooperation, Andhra Pradesh Community Based Natural Farming Movement



Ms. Ma. Estrella Penunia, Secretary General, Asian Farmers' Association for Sustainable Rural Development

Ma. Estrella Penunia is Secretary General of the Asian Farmers' Association for Sustainable Rural Development (AFA), a regional alliance of national farmers organizations (FOs) in Asia. Established in 2002, AFA is currently composed of 22 national FOs in 16 countries, representing around 13 million small scale men and women farmers engaged in crops, livestock, fisheries, herding, and pastoralism. AFA promotes farmers' rights to lands, waters, forests, and seeds; sustainable, climate-resilient agroecological approaches in farms, fisheries and forests; strengthening farmers cooperatives and their enterprises; empowering women members, attracting the youth to agriculture and harnessing capacities for effective governance through an integrated program on organizing and movement building; policy advocacy; monitoring, evaluation, accountability, learning, and communications; business development servicing, capacity building and internal governance.



Ms. Lim Li Ching,
Third World Network - IPES-
FOOD, Researcher

Lim Li Ching is a Senior Researcher at Third World Network (TWN), an international NGO based in Malaysia, and coordinates its Sustainable Agriculture Programme. She is a member of the International Panel of Experts on Sustainable Food Systems (IPES-Food). Li Ching was a lead author of the East and South Asia and the Pacific sub-global report of the International Assessment on Agricultural Science, Technology and Knowledge for Development (IAASTD) and co-editor of *Climate Change and Food Systems Resilience in Sub-Saharan Africa* (FAO 2011). She holds a BS degree in Ecology and an M. Phil. in Development Studies.



Ms. Tammi Jonas, Australian Food Sovereignty Alliance (AFSA), President and Jonai Farms & Meatsmiths, Farmer

Tammi Jonas is an agroecologist in principle and in practice. Along with her husband Stuart, she raises heritage-breed Large Black pastured pigs, cattle, and garlic on the unceded lands of the Dja Dja Wurrung in the central highlands of Victoria, striving to care for country with grace, and with

respect for the Djaara and their elders past and present. Ms. Jonas has been president of the Australian Food Sovereignty Alliance (AFSA) since 2014. AFSA has worked for more than a decade as a collective of individuals and organizations to promote everyone's right to nutritious and culturally-appropriate food produced and distributed in ethical and ecologically-sound ways, and our right to democratically determine our own food and agriculture systems. AFSA is actively engaged in the global fight for food sovereignty with comrades in La Via Campesina and the International Planning Committee for Food Sovereignty (IPC), advocating across multiple UN agencies for the rights of indigenous peoples and peasants and their communities. She is an editor and co-author of *Farming Democracy: Radically transforming the food system from the ground up* (2019). Ms. Jonas is undertaking a PhD at the University of Western Australia on the biodiverse and decolonizing practices of agroecological farmers, and the technical, social, and legislative enabling conditions for an agroecological transition in Australia.

Chukki Nanjundaswamy is the coordinator of the Amrita Bhoomi Centre, a peasants' agroecology training school that was created by the farmers movement of Karnataka— Karnataka Rajya Raitha Sangha (KRRS). Amrita Bhoomi is also linked to the international small farmers' movement called La Via Campesina. Ms. Chukki is one of the key women farmer leaders of KRRS and is involved in various national networks of farmers' organizations in India. She also served on the International Coordination Committee of La Via Campesina from 2004 to 2008. Chukki has provided leadership to many farmers' struggles, especially in the areas of agroecology, women, and youth.



**Ms. Chukki Nanjundaswamy,
Coordinator, Amrita Bhoomi Centre**



**Moderator:
Mr. Pierre Ferrand, Agriculture
Officer and Regional focal point
for Agroecology and the UN
Decade of Family Farming, FAO
Regional Office for Asia and the
Pacific, Bangkok, Thailand**

Pierre Ferrand holds a Master of Science in Agriculture, Environmental and Food sciences from ISARA in Lyon, France and a Master of Science in Tropical Agriculture Development from CNEARC in Montpellier, France.

As an agronomist specializing in tropical agronomy and rural development, he has been working for over 15 years in implementing food and livelihood security projects in developing countries, with a strong focus on Southeast Asia. He started his career with the French Research Institute for Development (IRD) in Morocco in 2004-2005 and then joined the French Non-Governmental Organization GRET, from 2006 to 2018. With GRET, he spent nearly six years working in the rural areas of Myanmar, then joined GRET Headquarters in Paris as Project Officer in agriculture and value chains development. Between 2015 and 2018, he coordinated at regional level the Agroecology Learning Alliance for South Asia (ALiSEA, <https://ali-sea.org>) bringing together all relevant stakeholders active in the field of Agroecology (Civil Society Organizations (CSOs), research centers, government officials, private sector).

He has been working with the FAO Regional Office for Asia and the Pacific in Bangkok, Thailand, as an Agriculture Officer and Regional focal point for Agroecology and the UN Decade of Family Farming since December 2018.

III. Panel Discussion



Mr. Florante Villas,
AsiaDHRRA, Philippines

Florante Villas is currently the Senior Program Manager for Farmers Fighting Poverty of AsiaDHRRA since 2008 working with farmer organizations and agricultural cooperatives in eight countries in Southeast Asia.



Dr. Epsi Euriga,
Ministry of Agriculture,
Indonesia

**Dr. Jie-Hye (Alicia) Lee, Korea University
International Law Research Center**

Jie-Hye Lee is currently the Chief Director at the International Law Research Center, Korea University Law School (<https://www.ilrckr.org/>) mainly doing research works on the human rights of women and environment. She is a research scholar at University of California Berkeley School of Law currently researching as to the topic of “Sex Trafficking of Minors” with Berkeley Law School Professor Laurent Mayali. Ms. Lee is currently the International Division Director of Stand Up Against Sex-Trafficking of Minors (Teen-Up Korea) researching as to the current issue related to international sex trafficking issues (<http://www.teen-up.com/>). She is the founder of Preventing Bullying Community & Women Rights Community (PBC & WRC) which deals with and takes action against bullying related to women, environment, and nature, etc. (<https://www.preventingb.org>).

Epsi Euriga is a lecturer in sustainable agricultural extension program in Yogyakarta Magelang Polytechnic in Agricultural Development (Polbangtan Yoma), Agency of Agricultural Extension and Human Resource Development, Ministry of Agriculture of Republic Indonesia (MoA). She is program specialist in Rural Advisory Services in Southeast Asia (RASSEA) secretariat. She has a doctoral degree from Institut Pertanian Bogor (IPB), with a dissertation on the extension of horticulture sustainability based on needs, opportunities, and abilities in 2018. She is a representative member from Indonesia at Maize Youth Task Force (MYTF) Young Professionals for Agricultural Development (YPARD). She is also head of the innovation unit in Polbangtan Yoma for Juru Tani Apps that reached the top 10 innovators in the Ministry of Agriculture in 2021. She is also PIC for Youth Empowerment and Support Services (YESS) Program in Sleman Regency, Yogyakarta, Indonesia. She is highly motivated to support agricultural sustainability through digital government extension education to achieve food self-sufficiency with agroecology consideration.



Dr. Namita Singh, Digital Green, India

Namita Singh is an international development sector professional and research scholar with 14 years of experience in participatory technologies, rural development, and gender. Currently at Digital Green, she leads Strategy, Knowledge, and MEL in Asia, designing programs using low-cost, contextually relevant technologies. She has a PhD in Participatory Technologies from The Open University, UK and a Master of Arts in Social Work from Tata Institute of Social Sciences. She is a published author with several peer-reviewed journal articles, book chapters, and guides.



**Moderator:
Dr. Francois Enten, GRET**

François Enten has been GRET's scientific director since 2014. He specializes in supporting the capitalization of experiences and in scientific facilitation between aid practitioners and researchers. This activity combines skills in facilitation, translation and synthesis of experiences and writing. He also supervises and accompanies teams in the development and implementation of applied research. He holds a PhD in socio-anthropology.

PART TWO: EXPERIENCE SHARING FROM THE REGION AND BEYOND

I. Session 2.1A: Enhancing rural communities' initiatives and development, and transfer of technologies

Speakers



Dr. Pepijn Schreinemachers,
World Vegetable Center,
Thailand

Pepijn Schreinemachers is an agricultural economist with the World Vegetable Center based in Bangkok, Thailand. His work focuses on enabling vegetable innovations to contribute to higher incomes and better nutrition in developing countries. He has particularly studied the impact of home and school gardens, vegetable varieties, and safe vegetable production methods. Before joining the World Vegetable Center in 2012, he was with the University of Hohenheim (Germany) from 2006 to 2012. He holds a PhD in Agricultural Economics from the University of Bonn and an MSc in Development Studies from Wageningen University.

Dr. Nathitakarn Phayakka,
Chiang Mai University, Thailand

Nathitakarn Phayakka is an Assistant Professor at Chiang Mai University (CMU) in Thailand. She holds a PhD in Agricultural Extension and Rural Development from CMU, with specialization in Geographical Indication Control and Inspection System, Agricultural Community Welfare, and promotion of community-based economy.





Mr. Kitisak Thongmeethip,
Chiang Mai University, Thailand

Kitisak Thongmeethip is a PhD Candidate in Agricultural Extension and Rural Development in Chiang Mai University, Thailand. He is specializing in Agricultural Communities Development, Agricultural Community Welfare, and Sustainable Livelihoods Approach.

Ms. Marie-Aude Even,
Senior Regional
Technical Specialist in
Agronomy, Asia Pacific
Division, International
Fund for Agricultural
Development (IFAD)



Marie-Aude Even joined IFAD in 2019 and has been providing technical assistance to the design and implementation of IFAD investment projects in several countries including Bangladesh, Nepal, India, Viet Nam, Lao People's Democratic Republic, and Indonesia. In addition, she has been leading knowledge capitalization and collaborations to strengthen agricultural extension systems, with specific attention to reach the last mile, improve business models, and strengthen adoption of sustainable and climate resilience agricultural practices. Prior to working in IFAD, she had 15 years of experience in agricultural development in FAO, the French center for studies and foresight and in managing a rice development project in Ghana. Ms. Even is an agronomist with two masters around development economics, agrarian system studies, and agricultural policies.

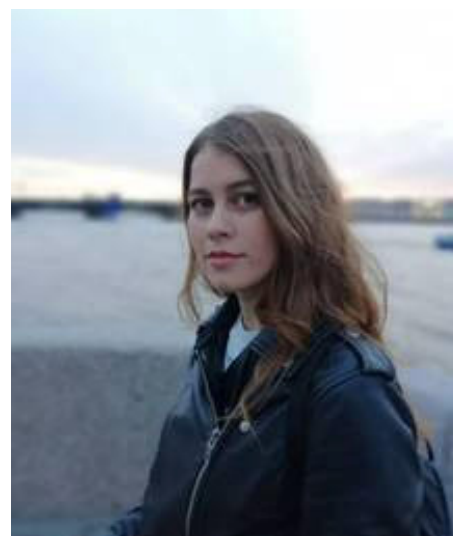
Ms. Shila Gnyawali, Planning Officer
ASHA Project, IFAD

Shila Gnyawali is a Forest Officer under the Government of Nepal. She has more than 27 years of experience in community-based forest management, climate change adaptation planning, and gender responsive budgeting focusing on improvement of livelihoods of rural vulnerable and women issues. Currently, she is working as a Planning Officer and Gender Focal Person in ASHA Project (www.ASHA.gov.np), supported by IFAD and ASAP.



**Ms. Doina Popusoi,
Agroecology-Natural Resources
Management Consultant, International Fund
for Agricultural Development (IFAD)**

Doina Popusoi is Agroecology-Natural Resources Management (NRM) Consultant at IFAD working on issues related to agroecology in small-scale production and commercialization systems and NRM. She has previously worked at FAO on issues linked to family farming knowledge and support. She obtained her master's degree in International Relations at the Central China Normal University, researching China's policy on agroecology and green agriculture.



**Dr. Siti Azizah,
Brawijaya University,
Indonesia**

Siti Azizah is an Associate Professor at the Socio-Economic Department, Animal Science Faculty, Brawijaya University (BU), Indonesia since 1998. She holds a PhD in Communication and Agricultural Extension from Brawijaya University, a Master's degree from the Development Sociology Rural Agriculture Faculty of BU and Rural and Regional Development Communication, University of Queensland, Australia. She teaches several subjects: Rural Sociology, Agribusiness Communication, Basic Management, Agricultural Extension, Research Methodology, and Entrepreneurship. She currently serves as chairman of the Community and Livestock Studies Research Group at Brawijaya University and chairman of the Association of Indonesian Socio-Economic Animal Husbandry Graduates (PERSEPSI), East Java Commissariat. She is editor-in-chief of the Indonesian Journal of Animal Science, published by BU. She has experience in community empowerment through sustainable farming, for example, in Baluran National Park, to start a beef cattle farming with an intensive system to reduce wild grazing in conservation areas. She assists small-scale farmers in increasing the value of their processed livestock products by initiating Micro and Small-Scale Businesses in Blitar and Malang District, also doing some Islamic Boarding School Empowerment Programs.

Dr. Alan D. Ziegler, Maejo University, Thailand

Alan D. Ziegler is a volunteer Professor at Maejo University in Chiang Mai, Thailand. He graduated from the University of Hawaii in 2000 and he was a professor in the Geography Department at the National University of Singapore from 2009 to 2019 when he retired. Since 1995, he has worked on various issues related to water resources and land-cover change science in SE Asia.



Dr. Ronel S. Pangan, University of the Philippines Los Baños

Ronel S. Pangan is the Director of the Center for Agri-Fisheries and Biosystems Mechanization (BIOMECH), College of Engineering and Agro-Industrial Technology, University of the Philippines Los Baños. He is a Professional Agricultural and Biosystems Engineer working as a Research and Extension Engineer for the last 35 years. He has implemented numerous research projects on agricultural mechanization. He has published a number of papers in refereed journals and Technology Patents under his name.

Discussants

Joanna Kane-Potaka is Executive Director and Co-Founder. Strategic marketing is her core discipline. She began her career as an agricultural economist over 30 years ago, later moving into market research in agribusiness and senior management positions leading strategic marketing, communications, fundraising, knowledge management, and uptake of scientific research. She has worked in four CGIAR research for development centers in five countries. She has conceptualized and led the creation of the ICRISAT Development Center and multi-stakeholder initiatives like the Smart Food global movement, which was recognized by the Australian and USA governments in 2017 in the top 10 global food innovations. She has a bachelor's degree in Economics, Graduate Diploma of Management, and Professional Post Graduate Diploma in Marketing and Master of Science (Global Marketing).



Ms. Joanna Kane-Potaka,
FOOD2030



Dr. Rishi Kumar Tyagi,
Asia-Pacific Consortium on
Agricultural Biotechnology and
Bioresources

Rishi Kumar Tyagi is Coordinator of the Asia-Pacific Consortium on Agricultural Biotechnology and Bioresources (APCoAB), APAARI, Bangkok, Thailand. Dr. Tyagi holds a PhD in Botany from University of Delhi, India and Post-Graduate Diploma in Intellectual Property Rights laws from Indian Law Institute (Deemed University), New Delhi, India. He was a Post-Doctoral Research Associate at the University of Illinois, USA, working on wide hybridization of soybean employing biotechnological methods. He has more than 34 years of experience in managing plant genetic resources (PGR) and he was the Head, Division of Germplasm Conservation at the ICAR-National Bureau of Plant Genetic Resources, New Delhi, India, managing its National Genebank. His current areas of interest are promoting biotechnology and bioresources for sustainable agricultural development in the Asia-Pacific region.

Ram Pratim Deka is a Scientist at the International Livestock Research Institute (ILRI), a global research institute for livestock sector research for development, headquartered in Nairobi, Kenya. He has been working with ILRI for the past 15 years and has been managing several complex multi-disciplinary and multi-institutional projects related to informal dairy and pork value chains, foodborne and zoonotic diseases, One Health, breeds and breeding, animal health, animal nutrition, and livestock policy in India and beyond. He has extensively traveled to South and Southeast Asia, East Africa, and Europe to learn about the livestock system that prevails in those countries to have a good understanding of the same. Dr. Deka has represented various high-level committees constituted by the government of Assam, Nagaland, etc. He also enjoys excellent working relationship with the World Bank, Food and Agricultural Organization (FAO), and International Fund for Agricultural Development (IFAD). Prior to joining in ILRI, he briefly worked with the International Finance Corporation (IFC), North Eastern Development Finance Corporation (NEDFi), and Dairy Development Department of Govt. of Assam from 2001 to 2005. Dr. Deka has a Master's degree in Veterinary Science, Master's degree in Business Administration, and PhD in Veterinary Epidemiology from Swedish University of Agricultural Sciences (SLU), Sweden. He has several publications in the form of research papers, study reports, training manuals, protocol, extension text, and policy briefs, among others.



**Dr. Ram Pratim Deka,
International Livestock
Research Institute**

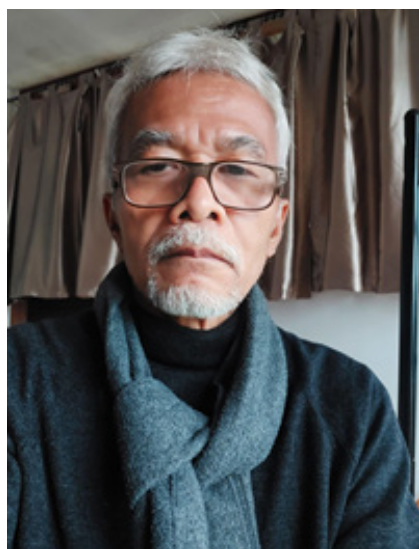
II. Session 2.1B: Policies and strategies (from regional to local levels) to support family farmers and sustainability of rural livelihoods/communities

Speakers

Hue Tran is currently working at Enveritas, an NGO based in New York, USA, as an Asia regional expert and Viet Nam country representative. In her role, she focuses on sustainability assessment in Viet Nam coffee production. She is also responsible for sharing insights and recommendations for making improvements in this field and helping other coffee producing countries in Asia in topics related to agronomy and sustainability. She had been working as a coffee researcher in the Western Highlands Agriculture and Forestry Science Institute (WASI) for almost 20 years. Her major areas of expertise include plant breeding, genetics, and genomics. Dr. Hue also has experience in coffee sustainability topics gained from her consultant work for Dakman, a joint venture Switzerland and Viet Nam coffee exporting company. She completed her MSc in Plant Science from Southern Cross University, Australia in 2006 and PhD in Biotechnology applied in agriculture from University of Queensland, Australia in 2018.



Dr. Hue Tran,
Enveritas, Viet Nam



Prof. Dr. Helmi,
Andalas University,
Indonesia

Helmi is a Professor in Agriculture Development at Andalas University, Indonesia. He holds a master's degree in Social Development Studies from Ateneo de Manila University, the Philippines and PhD in Agrarian Development from the University of London (Wye College of Agriculture). His areas of research and teaching include integrated natural resources management and governance; social entrepreneurship and local economic development; agro-ecotourism; sustainable development and public policy; and innovation management and agriculture extension. He has been involved in collaborative activities, among others, with International Water Management Institute (IWMI), The Ford Foundation, World Bank Indonesia Office, ASEAN Secretariat, and UNESCO Asia Pacific. He also worked with some Indonesian ministries such as National Development Planning Body, Ministry of Public Works, Ministry of Agriculture and Ministry of Home Affairs. He has jointly edited a book published by Elsevier and contributing chapters (books titled *Sustainable Natural Resources Management in Dynamic Asia*; and *Natural Resource Governance in Dynamic Asia: From Collective Action to Resilience*). He also has published a number of journal articles related to his area of research, one of which is related to community entrepreneurship.

Nguyen Thanh Binh is currently working as a lecturer and Secretary of the Council for Science and Education at the Mekong Delta Development Research Institute, Can Tho University, Viet Nam. He has experience in qualitative and quantitative research approaches to sustainable agricultural transformation, rural livelihood analysis, water resource management, vulnerability assessment, and climate change adaptation. He has been working as National Consultant for United Nations University in Bonn, UNDP-Viet Nam and FAO-Viet Nam. He holds a bachelor's degree in Agronomy from Can Tho University, Viet Nam; a master's degree in Rural Development—a joint academic degree of Ghent University (Belgium) with European Universities; and a PhD in Agricultural Sciences from Bonn University, Germany.



Dr. Nguyen Thanh Binh,
Mekong Delta Development
Research Institute, Can Tho
University



Ms. Tuyen Thi Thanh Huynh,
Senior Research Associate, Alliance
of Bioversity International and CIAT

Tuyen Thi Thanh Huynh is a senior research associate working on Food Environment and Consumer Behavior lever at the Alliance of Bioversity International and CIAT, and works as a Country Coordinator of CGIAR Research Program on Agriculture for Nutrition and Health (A4NH) based in Viet Nam, where she leads activities of the cross-center A4NH program in its support of the national government and international agencies and movements in building sustainable food systems by ensuring the production, delivery, and use of healthy food that ultimately provides economic, social, and nutritional benefits to all consumers. Her research interests are nutrition sensitive food systems, food environment, and consumer behavior.



Ms. Ysabel Anne C. Lee, Communications Officer in Asia for the
Alliance of Bioversity International and International Center for
Tropical Agriculture

Ysabel Anne Lee is currently the Communications Officer in Asia for the Alliance of Bioversity International and International Center for Tropical Agriculture (CIAT) where she leads both internal and external communication initiatives to support research levers in Asia. She is a graduate of a Master in Disaster Risk and Resilience program at the Ateneo de Manila University and has over five years of experience in development and science communication.

Koichi Ikegami is currently an Emeritus Professor at Kindai University, Japan. He served as the President of the Asian Rural Sociology Association and has been the President of the International Rural Sociology since 2016. He holds a PhD from Kyoto University (Agricultural Sciences). His major interest is the North-South problem and its mitigation from global and local perspectives. Dr. Ikegami concentrates on study about integration of re-peasantization, food sovereignty, and agroecology. His recent research fields are South Africa, Tanzania, Mozambique, Lao People's Democratic Republic, and Japan. In Japan, he continues to research and be involved in revitalization activities in the depopulated areas through creating strong ties between rural and urban people. He has just founded the Association of Western Japan Agroecology (AWJA) in 2021. The AWJA intends to build a close network with Asian countries, in particular.



**Dr. Koichi Ikegami,
Association of Western
Japan Agroecology**

Discussants



Mr. Daniel Hayward, Project Coordinator, Mekong Land Research Forum, Regional Center for Social Sciences and Sustainable Development (RCSD), Chiang Mai University, Thailand

Daniel Hayward works as an international development researcher, focused on land relations, agricultural value chains, and an energy transition. He is based at Chiang Mai University as project coordinator of the Mekong Land Research Forum. He is also a Country Research and Engagement Consultant for Land Portal, as well as consultant for a variety of local and international NGOs and research institutes.

Anni Mitin is an Advisor to various civil society and non-government organizations including the Malaysian Agroecology Society (SRI-Mas) and the Malaysian Association of Standards Users.

Anni has been involved in various food and agriculture standard development committees for more than 10 years, as a member of the National Standard Committee on Agriculture, on Food Safety, and various Technical Committees under the Department of Standards, Malaysia.

She led the development of the ASEAN Roadmap on Capacity Building in Consumer Protection and was engaged as a Long-term Expert in the development of the Sustainable Consumption and Production Blueprint of Malaysia under the Economic Planning Unit of the Prime Minister's Department. She was previously engaged as the Executive Director of the Southeast Asian Council for Food Security and Fair Trade.



Dr. Anni Mitin,
Advisor, Malaysian
Agroecology Society (SRI-Mas)
and Former Executive Director,
Southeast Asian Council for
Food Security and Fair Trade
(SEACON)



Mr. Do Trong Hoan,
Research Officer, World
Agroforestry Center
(ICRAF), Viet Nam

Do Trong Hoan is a researcher at the World Agroforestry Centre (ICRAF) based in Viet Nam. He obtained his Master of Science degree from Pohang University of Science and Technology in South Korea. He has been involved in climate change mitigation and forest ecosystem services researches since 2004. His research interests are concentrated in natural resources management including incentive-based forest conservation, climate change mitigation through REDD+ and carbon trade schemes, forest land tenure, benefit sharing mechanism for small holders, economic analysis of forest, and agroforestry land use systems.

III. Session 2.2A: Multi-stakeholder networks and platforms enabling co-creation of knowledge and participatory research for supporting family farming and food system transformation

Speakers

Jean-Christophe Castella is a senior scientist with the French Institute of Research for Development (IRD), who is specialized in agricultural and livelihood systems analysis. Over the past 25 years, he has been involved in numerous international research programs that documented the impacts of the agrarian transition and supported the actors of agroecological transition in Southeast Asia. Through co-production of knowledge with local communities, he investigates the impact of agroecological and socioeconomic changes on farmers' practices. He mobilizes participatory approaches based on role-playing games to engage farming communities in transformative landscape approaches to agroecology



Dr. Jean-Christophe Castella, French Institute of Research for Development



Ms. Katuscia Fara, Senior Climate Services and DRR Advisor in Asia Pacific, World Food Program (WFP)

Katuscia Fara is a Senior Climate and Disaster Risk Reduction Advisor with the World Food Program in the Asia Pacific region. With over 20 years of experience, her work has focused on climate and disaster risk management, sustainable development, poverty reduction, and community-based adaptation. She has co-authored the recently launched Blueprint on Climate Informed Digital Services, where she focused on the importance of ensuring equity, co-production, and inclusiveness.

Suzanne Phillips joined FAO in 2013, first working on pesticide risk reduction programs and then joining the Farmer Field School team.

Since then, she has been providing technical support to projects implementing Farmer Field Schools and other participatory advisory service approaches across a range of thematic: climate change adaptation, agroforestry, agroecological transitions, local empowerment, and collective action. In 2017, she led the development of the Global FFS platform which connects FFS practitioners and organizations globally. She also carries out research and assessments to understand the climate resilience of small farmers. Before joining the FAO, she worked at the European Commission, at the CTA and as a freelance evaluation consultant. Throughout her work path, she has moved at the intersection of agriculture and environment, striving to build bridges for more sustainable use of natural resources and better livelihoods. She has a BA in Biological Sciences and an MSc in Environment and Development.



**Ms. Suzanne Phillips,
Consultant, Farmer Field School
and Community Adaptation
Specialist, Plant Protection and
Production Division, FAO**



Prof. Ma. Corazon J. Tan, UP Diliman, Philippines

Ma. Corazon Jimenez-Tan is an Associate Professor at the Department of Community Development, College of Social Work and Community Development, University of the Philippines Diliman. She is an active Board Member of the MASIPAG, a national network of farmers, NGOs and scientists promoting sustainable agriculture, and of the Center for Women's Resources (CWR), an NGO that undertakes research, education and advocacy work for and by grassroots women. For almost 30 years, she has been involved with various local and international development agencies such as the United Nations Development Program (UNDP) and the International Institute for Rural Reconstruction (IIRR).

Ms. Ho Thi Thoan, Training Expert, NVCARD, Viet Nam

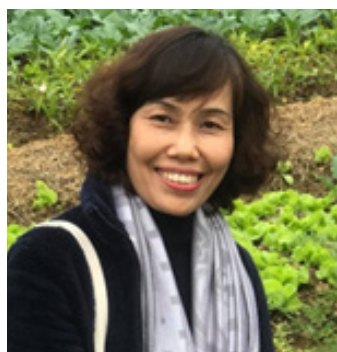
Ho Thi Thoan has worked as a lecturer on environment and rural development at the North Viet Nam College of Agriculture and Rural Development (NVCARD) for 15 years.

She has also served as consultant on community capacity building; supply chain development, livelihood development to support farmer interest groups, cooperative groups, agricultural cooperatives. She received her master's degree in climate change from the National University of Hanoi and has been engaged in research on sustainable agroforestry development in the context of climate change since 2015.



Dr. Hai, Senior Advisor, Forest and Farm Facility-Viet Nam National Farmers' Union (FFF-VNFU), Viet Nam

Hai has around 30 years of experience in capacity building for rural communities; develop solutions for sustainable livelihood development; collective economic development; value chains in agriculture; agricultural policy research. He has paid attention to the connection between technical solutions combined with policy solutions and enabling environment that is favorable for replication in rural areas. He holds a PhD in agricultural systems from a university in Viet Nam, a master's degree in educational management from the Dresden University in the Federal Republic of Germany, and bachelor's degrees in agriculture, laws, and politics.



Ms. Vu Le Y Voan, Senior Adviser, FFF-VNFU, Viet Nam

Vu Le Y Voan has worked for the VNFU for more than 30 years and was the former Deputy Director of the International Cooperation Department of VNFU. From 2005 to 2010, she worked as the Deputy Director of the project "Organic Agriculture" supported by the Danish-Asian Agricultural Development Organization (ADDA) for VNFU. She is a member the Executive Committee of the Viet Nam Organic Agriculture Association (VOAA). From 2014-2018, she worked as a National Facilitator of the Forest and Farm Facility (FFF) in Viet Nam. Starting 2019, she serves as a Senior Advisor of the FFF-VFNU.

Mr. Le Trung Hung, Senior Executive, NVCARD, Viet Nam

Le Trung Hung is the Senior Executive of NVCARD. He has nearly 20 years of experience working with communities, ethnic minority communities in the field of community development, participatory planning, and capacity building for agricultural and forestry extension workers on solutions for sustainable agro-forestry development. He had been a national organic lecturer since 2008 and a trainer for the international training of trainers (ToT) class of the ADDA project on organic agriculture and more trees.



**Mr. Pham Tai Thang,
National Facilitator, FFF-FAO, Viet Nam**

Pham Tai Thang is the national facilitator of the FFF-FAO. He finished his master's degree in 2010, major in economic development, from the Viet Nam National University of Agriculture (VNUA). He has been involved in agroforestry extension work, climate resilience, livelihood development, and community development since 2005.

**Dr. Tran Thi Thanh Binh, Director, Center for
Organic Agriculture, Viet Nam Forestry University**

Tran Thi Thanh Binh is the Director of the Center for Organic Agriculture (COA), under the Viet Nam Forestry University (VFU). She holds a PhD in plant protection from the Viet Nam National University of Agriculture. For the past 15 years, she has been one of Viet Nam's leading trainers in organic farming.



Patrick Trail is the Research and Extension Coordinator at the ECHO Asia Impact Center in Chiang Mai, Thailand. With a background in agronomy, his recent research and extension efforts have focused on Informal Seed Systems and Appropriate Technologies for Community Seed Banks. He is also an International Certified Crop Advisor and has worked with partners onsite at 150+ farm operations in the Asia region. He completed his graduate work in Agronomy at Virginia Tech University, working on Conservation Agriculture projects in West Africa.



**Mr. Patrick Trail,
ECHO Asia, Thailand**

Ms. Pham Thi Hanh Tho, CASRAD, Viet Nam

Pham Thi Hanh Tho is an agricultural economist at the Centre for Agrarian Systems Research and Development (CASRAD) in Viet Nam. Her main areas of interest are food safety and standards, smallholder access to high end markets and value chain development.

Discussants



Dr. Peter Rosset, ECOSUR, Mexico

Peter Rosset is a professor and researcher on agroecology at El Colegio de la Frontera Sur (ECOSUR), a federal interdisciplinary research and graduate studies institute in Chiapas, Mexico. He is also professor at the UECE and UNESP universities in Brazil and visiting professor in the Social Research Institute (CUSRI) of Chulalongkorn University in Bangkok, Thailand. He recently retired as technical support staff of the global secretariat of La Via Campesina. He is the author of numerous scientific papers and books, most recently *Agroecology: Science and Politics* (Fernwood and Practical Action 2017).



Dr. Pedcris M. Orencio, Program Head, Research and Thought Leadership Department, Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA)

Pedcris M. Orencio is currently the Head of Research and Thought Leadership Department at the Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA). He leads the Department in assisting the ASEAN and the countries in the Southeast Asian region to rationalize programs on agricultural and rural development through research, policy, program advisory, and knowledge platforms. Dr. Orencio served as Post-Doctoral Researcher at the Research Institute for Humanity and Nature in Kyoto, Japan on coastal risk and vulnerability, the nexus of water-energy-food, and climate change adaptation, and has published numerous papers on these topics. He received the International Environmental Leadership Award for his contribution to the Program for Sustainability Leaders and Meisters supported by the Special Coordination Fund for Promoting Science and Technology of the Japan Ministry of Education Culture, Sports, Science, and Technology. He is a member of the Editorial Board of the Journal of Fisheries Technology and Aquatic Sciences and currently serves as part-time faculty for Ateneo de Manila University and San Beda University's Environmental Science Departments. He holds PhD and MS degrees in Environmental Science from Hokkaido University, Japan, an MA degree in Urban and Regional Planning from the University of the Philippines Diliman, and a bachelor's degree in Fisheries from the University of the Philippines in the Visayas.

Abram J. Bicksler is an Agricultural Officer with the Food and Agriculture Organization of the United Nations (FAO) based in Rome. He works with the Agroecology Team within the Plant Production and Protection Division (NSP) on various initiatives related to the scaling-up of Agroecology, ecosystem services, and is also the focal point for pollinators within the division. He is co-leader of the multi-dimensional assessment tool, TAPE (Tool for Agroecology Performance Evaluation). Prior to joining FAO, he was the director of the ECHO Asia Impact Center in Chiang Mai, Thailand, from 2013 to 2018, where he led an international team to gather, verify, and disseminate innovations and ideas related to sustainable agricultural and community development best practices to intermediaries working with smallholder farmers throughout Asia. He holds an MS and PhD degrees in Natural Resources and Environmental Science from the University of Illinois at Urbana-Champaign (USA).



Dr. Abram J. Bicksler, Food and Agriculture Organization of the United Nations

IV. Session 2.2B: Innovation in HEIs curriculum to better address agroecology and family farming

Speakers

Gunnar Kirchhof is Research Academic for Land Resource Management, School of Agriculture and Food Sciences, University of Queensland (UQ), Brisbane, Australia. He is also the Director of Think Soils, an international advisory and capacity building consortium for land management and a member of the Steering Committee, initially CANSEA, which now evolved into ASEA. His special interest is in the management of tropical soils, mainly in emerging economy countries. He has also been involved in research and capacity building activities throughout the Asia-Pacific region and Africa, more recently in Papua New Guinea and Viet Nam. Dr. Kirchhof has been teaching agriculture and environmental science students at UQ for the past more than 10 years, and has served as course leader and course designer for many courses funded under the Australia Award Program for Africa and Indonesia, on themes relating to soil and water management and soil fertility. This also links to research that focuses on the adoption and sustainability of agroecological systems, in particular conservation agriculture. The main concern is how the Internet, social media, and even some NGOs can propagate misinformation about soil management that can undermine food security.



Dr. Gunnar Kirchhof
(University of Queensland/
Australia)



**Dr. Abha Mishra, Asian Institute of Technology,
Thailand**

Abha Mishra is an internationally acclaimed professional possessing impressive record of career advancement along with over 15 years of experience in managing multi-institutional regional programs and multi-disciplinary staff and projects focusing on sustainable agroecosystems, conservation agriculture, smallholder farmers empowerment with experience of working with CGIAR centers, UN and international organizations, academic institutions, NGOs, and government ministries.

Isabelle Providoli is a geographer and environmental scientist working as a Senior Research Scientist at the Centre for Development and Environment (CDE), University of Bern, Switzerland. She is specialized in natural resources management and governance and is coordinating several implementation and research projects in Asia and Africa. She has extensive working experience at the science-policy-society interface related to natural resource management and governance. She engages in transformative research, social learning, and co-production of knowledge, and facilitates knowledge management and knowledge exchanges between heterogeneous actors at all levels. She has experience in Education for Sustainable Development (ESD)-oriented teaching approaches, capacity building, knowledge sharing, and networking.



**Dr. Isabelle Providoli,
Senior Research Scientist,
Centre for Development
and Environment**



**Mr. Sophea Tim, Royal University
of Agriculture, Cambodia**

Sophea Tim is Deputy Director of the Center for Agricultural and Environmental Studies, Royal University of Agriculture (RUA), Phnom Penh, Cambodia. He is the project manager for WOCAT-IFAD activities in the Scaling Up Climate Resilient Agriculture (SUCRA) project and an agronomist and climate scientist from RUA. He is also a lecturer at RUA, teaching sustainable development and sustainable land management courses, among others. He holds a Graduate Diploma of Environment and Development and a Master of Climate Change from the Australian National University, and an MSc in Natural Resource Management and Rural Development from RUA. His research interests include climate change adaptation, land degradation neutrality, resilient landscape, and applications of state-of-the-art geospatial science skills.



Dr. Orachos Napisintuwong
(Kasetsart University/Thailand)

Orachos Napisintuwong has been working at Kasetsart University, Thailand since 2005. She attained her PhD from the University of Florida in Food and Resource Economics and an MBA from the Louisiana State University, both in the USA. As an agricultural economist, she served as Executive Committee Member of the Agricultural Economic Society of Thailand under Royal Patronage; Member of Board of Directors, Asia Pacific Agricultural Policy Forum; Country Contract Partner, Food and Fertilizer Technology Centre for the Asian and Pacific Region; and Director of Feed the Future Innovation Lab for Food Security Policy Research, Capacity, and Influence (PRCI) in Southeast Asia. She is also Editor of Applied Economics Journal and Book Review Editor of Asian Journal of Agriculture and Development. She published several research papers and book chapters in the areas of agricultural biotechnology, agricultural technology adoption, seed industry, and rice economy in Southeast Asia. Her teaching is in agricultural technology policy, economics of biotechnology and agricultural innovation, and agricultural production economics. Her research focus on economic analysis of varietal adoption and dissemination, seed business innovation and competition, economic impact analysis of agricultural technology, and rice economy in Southeast Asia.

Peany Huong joined ITC in November 2020, where she handles the university-industry linkage office and in-charge of the overall policy development plan.

She is also a lecturer/researcher at the Faculty of Food and Chemical Engineering, specializing in separation and extraction of biological compounds from plants. Under the ASSET project, she serves as general coordinator for ITC-ASSET and leads SC1.3d on training needs assessment and capacity building program at the regional level. She also serves as Co-leader for SC1.3 ASSET Project, being the Deputy Head of University-Industrial Linkage Office.

She holds a PhD degree in Chemical Science and Engineering.



Dr. Peany Huong,
Institute of Technology of Cambodia

**Mr. Bou Channa,
Institute of Technology of Cambodia**

Bou Channa is an IT lecturer at the Department of Information and Communication Engineering and a staff at eLearning center, Institute of Technology of Cambodia (ITC). He received his master's degree in Engineering and Technology in 2018 from the Sirindhorn International Institute of Technology (SIIT), Thammasat University in Thailand. He has been working as a full-time lecturer at ITC since 2018.



Communications

Home Gardens for Resilient Local Food Systems

Pepijn Schreinemachers, Somchit Pruangwitayakun, Delphine Larrousse
World Vegetable Center, East and Southeast Asia, Bangkok, Thailand

ABSTRACT

The growing of vegetables, fruits, herbs, and spices in a home garden can bring many benefits in terms of healthy eating, learning experience, personal joy, social interaction, biodiversity conservation, and resilience. The promotion of gardening requires training so that people learn gardening skills and gain confidence to overcome basic challenges. The World Vegetable Center (WorldVeg) developed a Home Garden Toolbox to support home garden training programs in low- and middle-income countries. The approach is based on participatory adult learning methods that are suitable for people with low literacy skills. The toolbox is organized in 11 Facilitator Guides (subdivided into 21 modules, each about 3 hours long), 10 Crop Growing Guides, and an increasing number of short instructional videos. All materials are publicly available. Gardening methods are based on principles of agroecology. The toolbox is available in English and can be used or adapted to any location, context, and language. Because home gardening is directly linked with nutrition, the toolbox also includes a module on healthy eating, with the aim to promote the consumption of a wide range of nutritious local vegetables, fruits, and herbs, thereby contributing to transforming food habits and increasing the use of plant biodiversity.

Keywords: agroecology, vegetable, fruit, training, nutrition

BACKGROUND

The COVID-19 pandemic has made healthy food items such as fruits and vegetables less affordable and sometimes inaccessible for poor households in rural and urban areas, especially to those who lost sources of income. This is unfortunate and counterproductive, as fresh fruits and vegetables are vital to good health and strengthening people's immune response. Unhealthy eating is a key driver of noncommunicable diseases such as overweight and obesity, and people affected by these have a much higher mortality from COVID-19.

It is therefore of great importance to improve the resilience of rural and urban households to maintain healthy diets under the COVID-19 pandemic or any other crises. One immediate way of doing this is to help people grow their own fruits and vegetables, which is a response observed in other crisis situations, be it poverty, armed conflict, or natural disaster. A WorldVeg study in India showed that households with home gardens were better able to maintain a diverse diet than households without a home garden (Kumar et al., forthcoming). The sale of home garden seed kits in Asia also increased during the pandemic.¹

Gardening can be taken up by rich and poor people alike, in rural or urban areas, by young people or the elderly. Gardening in urban areas, on balconies, rooftops, vertically against walls, or in community gardens on vacant land contributes to the greening of urban environments, social interaction, environmental awareness in addition to being a source of personal joy and fresh food to eat (Lal 2020).

In addition, home gardens are suitable to build people's understanding about agroecological production practices. The high diversity of vegetables, fruits, herbs, spices, and ornamentals grown in a home garden can be used to showcase the benefits of plant diversity and how it promotes beneficial organisms including pollinators. The small scale of home gardens enables experimentation and learning, which can inform farmers about new practices. For instance, the use of compost can show relatively quick effects on plant performance, thereby demonstrating the importance of soil health to plant performance.

Home garden interventions typically combine training in gardening methods with training in nutrition and are often targeted at women as guardians of family health and nutrition. There is increasing evidence that home garden interventions contribute to increased household production and consumption of vegetables (Baliki et al. 2019; Bushamuka et al. 2005; Depenbusch et al. 2021; Schreinemachers et al. 2020; Schreinemachers, Patalagsa, and Uddin 2016), but also to women's empowerment (Hillenbrand 2010; Kumar et al. 2018; Patalagsa et al. 2015; van den Bold et al. 2015) and nutritional status (Olney et al. 2015; Olney et al. 2009).

The promotion or improvement of home gardens is a relatively complex type of intervention as it deals with many crops and many different constraints, and has agronomic, nutritional, educational, and institutional aspects including an important gender dimension. Interventions described in the literature range from simple seed kit distributions to intensive training programs spread over several years. Careful design and implementation of a home garden program is often overlooked, but is critical to the success and sustainability of the program. Not many organizations publicly share their training materials online.

¹ <https://web.apsaseed.org/asia-pacific-seed-trade-slowly-emerges-from-covid-19-lockdowns>

THE INITIATIVE

Our initiative aimed to develop high quality home garden training materials and share these publicly so that many organizations can incorporate these in their own intervention designs. The training materials are organized as a Home Gardens Toolbox that currently includes 11 Facilitator Guides, 10 Crop Growing Guides, and instructional videos. All materials are publicly available and downloadable.

The guides are suitable for any geography with minor adaptations to tailor them to locally preferred crops and local agroecological conditions. All guides can be used with low literacy and illiterate populations, and encourage gardeners to learn from each other as they work toward building more productive gardens. The guides are in English, but could be translated into other languages as needed. Here is the list of Facilitator Guides:

- Engaging participants
- Garden design & establishment
- Healthy soils
- Production planning
- Compost making
- Seeds and seed saving
- Pests and diseases
- Managing water
- Healthy eating
- Building gardening support groups

Each Facilitator Guide has one or several modules. Annex 1 shows the structure of the toolbox, including hyperlinks to download the materials. There are 21 separate modules with each module requiring a time allocation of about 3–3.5 hours. Going through the whole training would therefore take about 21 days, but program designers can mix and match modules or elements within the modules to serve their own needs and fit their available time.

Gardeners first learn how to carefully observe the landscape around them to pick a gardening site. They progress through the seasons and learn the skills they need to build healthy soil, plant a garden bed, control pests and diseases, manage water, and save seeds. Each lesson builds gardeners' confidence and enthusiasm for using their home gardens to improve their household's access to healthy vegetables and fruits.

The approach emphasizes participatory learning. Participatory training requires gardeners to work together with a facilitator toward a learning goal. Rather than a traditional lecture, where a teacher stands in front and presents new information, a participatory training constantly requires inputs from the participants themselves. As such, gardeners are asked to share their own knowledge, ask questions, and have frequent discussions about why certain things happen and what can be done about it.

Each training session starts with an introduction and warm-up to engage participants. Learning objectives, materials required, and the estimated length of training are defined upfront. The learning involves interactive discussion, experimentation, and exercises. The approach was developed with an adult audience in mind and is based on the understanding that adults learn best when they feel that the content of the training is relevant to their lives and they can see

an immediate benefit of it. Gender is an important aspect of implementing the toolbox and the facilitator guide on participant engagement is meant to help facilitators consider gender dynamics.

Crop Growing Guides are currently available for amaranth, cowpea, eggplant, kang kong, Malabar spinach, moringa, okra, pumpkin, sweet potato, and tomato. This is not a complete list of garden crops, but additional guides can be developed using the same format. Crop guides provide basic information about growing conditions (e.g., temperature requirements and tolerance to heat, drought, and flooding), plant spacing and management, and photos to help identify common pests and diseases.

Instructional videos are available through a YouTube link in the Toolbox. New videos become regularly available. The videos are largely self-explanatory, have no spoken text, but have some instructions in English.

All the training modules were developed on the principles of agroecology. For instance, the guide on pests and diseases asks gardeners to collect insects from their garden and group them into insect pests and beneficials. Insect pests are then separated into “piercing/sucking pests”, “defoliators/chewing pests”, and “borers”, and the facilitator explains how to prevent or control each category of insect pest. Gardeners also learn about the role of beneficial insects (natural enemies, pollinators) and flowering plants that can attract them. This knowledge is not just useful for pest management in gardens, but could equally be applied to farmers’ fields.

CURRENT STATUS AND FUTURE PLANS

The Home Garden Toolbox was launched in June 2021. We plan to add more instructional videos and to develop new modules for home gardening in urban areas and school gardens, as well as translate modules in French and other languages. The toolbox is currently being used in WorldVeg projects, but it is too early to draw lessons from this. World Vegetable Center has implemented home garden projects for several decades, but the intervention designs were not standardized and there was a tendency to design new programs each time. The use of a more systematic training approach as well as an implementation strategy (World Vegetable Center 2016) is expected to improve the effectiveness and impact of our home garden projects and will hopefully benefit other organizations working in this space. We also believe it will foster knowledge sharing on agroecological practices more widely, and can promote healthy eating at a large scale.

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Annex 1: Structure of the Home Garden Toolbox

Facilitator's Guide to Engaging Participants

Module 1: Garden Design and Establishment

Facilitator Guides:

1. Identifying Resources
2. Site Evaluation
3. Establishing Your Garden
4. Fence Making

Specialized Garden Designs:

- 5.1 Gardening on steep slopes
- 5.2 Arid and drought-prone environments
- 5.3 Garden designs for heavy rains and flood-prone environments
- 5.4 Gardening on steep slopes
- 5.5 Keyhole gardens

Training Aids:

- 5 Resources
- Soil compaction
- Elements of a well-prepared garden bed

Module 2: Healthy Soils

Facilitator Guides:

1. Understanding and Identifying Healthy Soils
2. Building Healthy Soils

Module 3: Production Planning

Facilitator Guides:

1. Planting Your Garden
2. Planting Your Nursery

Training Aids:

- Grow more with triangle spacing
- Space plants so they do not compete for sunlight or root space

Module 4: Compost Making

Facilitator Guides:

1. Understanding and Making Compost

Module 5: Seeds and Saving Seeds

Facilitator Guides:

1. Seed Saving for Home Gardeners

Module 6: Pests and Diseases

Facilitator Guides:

1. Identifying Pests and Diseases
2. Managing Pests and Diseases

Training Aids:

- Insect Life Cycles
- Crop Rotation

Module 7: Managing Water

Facilitator Guides:

1. Water for Home Gardening
2. Building a Productive Mulch Pit for Recycling Wastewater

Module 8: Healthy Eating

Facilitator Guides:

1. Healthy Diets for a Healthy Life
2. Cooking Demonstrations to Encourage Healthy Eating

Encouraging Peer-to-Peer Learning through Gardening Support Groups

Investing in Food Safety, Nutrition and Women Empowerment can Play a Key Role to Accelerate Agroecological Transitions

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Food safety issues¹ and nutrition challenges are particularly acute in emerging countries and rising higher in the agenda, including along the COVID-19 crisis. Food cannot be considered nutritious if it is not safe, and poor food safety hinders the adoption of healthy diets. Food safety touches upon all parts of the food systems and is critical to prevent food-borne pathogens, hazards and illness, as well as transmission or contamination of naturally occurring toxins, pesticides, antibiotics, and heavy metals (CFS Voluntary Guidelines on Food Systems and Nutrition). Many of the nutritious foods produced by small-scale producers such as meat, fish, and eggs may also carry infections from animals and pass them to people handling these foods at any point in the food supply chain. Low- and middle-income countries in Asia account for USD 63.1 billion of the estimated USD 110 billion cost of food safety issues in lost productivity and medical expenses each year (WB 2018). Such data does not account for lost marketing opportunity as some consumers shift to safer products, notably imported. In larger and densely populated countries such as China, India, and Bangladesh, as “exposure of populations to hazards is increasing, consumer food safety confidence is waning, and neither decentralized food safety regulatory capacity nor the governance arrangements of the formal private sector food industry are sufficient.” In addition, while the overall food security situation may improve, many Asian countries still face important issues in terms of quality and diversity of food consumed, with deficiency on some side and rising obesity on the other side. Therefore, the International Fund for Agricultural Development (IFAD) also promotes nutrition diversity as a core commitment. Nutrition and food safety issues are closely linked to specific production practices along the value chain and are well mainstreamed in agroecological practices. Furthermore, gender matters considerably for food safety.² Women tend to suffer more negatively than men from the impacts of foodborne illnesses, and pregnant and lactating women are especially vulnerable. In addition, some foodborne diseases cause fetal abnormalities, miscarriage, and stillbirths, and some chemical and biological hazards can be transmitted to newborns through breast milk. Women are also often key risk managers when it comes to food consumption, preparation, processing, selling, and, to a lesser extent, production. However, women are often disadvantaged by less access to resources, support, and services, such as education and extension. Because of these links, gender analysis is important in assessing and designing interventions to improve food environments by enhancing food safety.³ This paper will review lessons learnt from projects in India, Bangladesh, Nepal, and Brazil showing the important role of nutrition and women empowerment as a catalyst to the adoption of agroecological practices. It will then show how convinced women can play a crucial role to scale such transitions when they are empowered within their households and organizations. To achieve such pathways, there is an urgent need for agricultural research institutions to further invest in such nexus and collaborations across disciplines (e.g., agronomy, nutrition, gender) to further document and backstop such trend.

¹ “Food safety is the absence, or safe, acceptable levels, of hazards in food that may harm the health of consumers. Food borne hazards can be microbiological, chemical or physical in nature and are often invisible to the plain eye; bacteria, viruses or pesticide residues are some examples.” (FAO food safety website). The food products for which food safety challenges are most prominent are cereals and nuts susceptible to aflatoxin contamination, and high-value fresh products such as fresh fruit and vegetables, meat and dairy (IFAD 2017).

² See CGIAR 2015. *Don't risk your health for nutrition: Why gender matters for food safety*.

³ Feed the Future 2021. *The Integral Role of Food Safety in Strengthening Food Systems*.

Nutrition, Health and Safety Awareness Played a Key Role in Convincing Women to Shift to More Agroecological Practices

Nutrition and food safety closely articulate to improved agroecological and bio diverse practices. Indeed, in crop production, food safety partly relates to good agricultural practices alongside the quality and management of chemical inputs, seed quality, and post-harvest contaminations. In India, Bangladesh, and several other Asian countries, many farmers tend to overuse or misuse chemical inputs leading not only to environmental issues, but also higher chemical residues on food and various food safety and health hazards. In addition to harming the environment, such practices tend to lead to high expenditures within a context of uncertain returns due to climate and market risks, putting many small-scale producers into debt traps. Stability of food supply also requires investment in more resilient practices as well as attention to ensure production throughout the year and quality conservation of food. Nutrition diversity also closely articulates to the diversity of food produced, notably for semi-subsistence farmers, relying on their own food production for most of their food consumption. Therefore, many IFAD projects promote transitions to more sustainable and nutritious sensitive practices, from optimizing, reducing, and eliminating the use of chemical input, wearing protective equipment, managing waste, to shifting to biodiverse, agroecological and organic practices. A recent stock-take even showed that about 77 percent of IFAD projects on primary production promote agroecological principles, and such projects most often also seek to mainstream nutrition and enhance healthy and diversified diets (IFAD 2021).

We could see in various projects that food safety, nutrition and health awareness played a key role to convince rural households to adopt such agroecological practices, notably women. Indeed, women are often the custodians of food handling and household health and appear particularly sensitive to health and nutrition questions. In Nepal, the Adaptation for Smallholders in Hilly Areas Project (ASHA) recognized that 100 percent of women are bread makers and concerned by nutrition and food safety. Upland areas and rural households are particularly vulnerable to climate change, with prevalence of drought, erratic rainfall, soil nutrient loss, increased temperature, and low productivity as major challenges. Accordingly, the project invests in climate resilient and diversified agri-livestock-forest-based profitable production. Reduction of chemical input use, improved use of bio-input and more diversified production (permaculture – agro-forestry) contribute in the nutrition diversity and food safety. In the case study and field discussion described in Box 1, women say that health and nutrition are an important argument to adopt agroecological practices.

Box 1. Insights from women interviews along field visits in India and Bangladesh.

In Maharashtra State, India, the government had asked IFAD to support the Convergence of Agricultural Interventions in Maharashtra's Distressed Districts Programme (CAIM) project to enhance resilience of farming practices through research, extension and investments in lower input production systems and water investments to help addressing agricultural distress and rising farmers' suicides, partly connected to high agricultural debts along risky intensive agricultural practices. During the project final completion report mission in May 2019, women were among the first to talk about the high risks related to chemical input handling, with cases of people losing eye sight or developing skin problems. Women appreciated the reduction of chemical inputs and said their skin was less itchy. In addition, women said that the Low External Input Sustainable Agriculture (LEISA) technologies have had general positive impacts on their work load through reduced application of input, increased access to mechanization services and easier manual weeding as soil structure improved.

Similarly, in Andhra Pradesh, the Drought Mitigation Project (APDMP) promotes partnership with various local agricultural and extension institutions to identify and promote agroecological practices to enhance farmers' resilience. During the field mission interviews, women emphasized that nutrition and health were key drivers in their interest to diversify cropping through integrated home gardens and shift to pest and drought resilient crops (various millets and sorghum) with a higher nutrient content. The adoption of these crops would also reduce the use of chemical inputs. A very dynamic woman leader explained that her child got sick a few years back and she then decided to adopt organic agriculture and an integrated natural home garden, providing diverse and nutritious organic

food for household consumption all year long. This was coupled with other food hygiene and feeding practices, which improved the health and nutrition of the child. Similarly, in the WB-IFAD NATP2 project in Bangladesh, food safety and health trainings contributed to convince several producers to convert to organic agriculture and the production of compost and bio-inputs for sale. All of them highlighted that one of the decisive factor was that they wanted to produce safer and more natural food.

Women Empowerment and Access to Resources are Key to Translate Women Interest into Successful Adoption of Agroecological Practices within Households

According to FAO, “women’s participation is essential for agroecology and women are frequently the leaders of agroecological practices”. While women may be more easily convinced to adopt healthier food systems, they also face multiple gender-specific barriers to succeed in doing so. They may not often have a strong voice in farm investment decisions in predominant male-headed households, or they may lack resources of secured land tenure to adopt proposed practices. Therefore, parallel investment in empowering women is crucial to translate such interest into changed practices within households and communities. In addition, evidence show that integrating gender transformative approaches in agricultural extension demultiply impacts on income and nutrition (CARE 2020, Box 2).

Box 2. Gender transformative agricultural extension de-multiply value creation and return on investments.

Since 2016, CARE Burundi has implemented the EKATA approach — Empowerment through Knowledge And Transformative Action— integrated into an agriculture program to test its effectiveness against a typical gender mainstreaming approach (Gender Light) and a Control (with agriculture interventions only) in a modified randomized control trial, funded by the Bill and Melinda Gates Foundation. The EKATA groups had the highest increase in rice production as well as largest increase of rice sold, with a 166.5 percent increase, followed by the Gender Light group, who increased the amount of rice sold by 110 percent, and the Control group by 104.5 percent. The women diet diversity score also used by IFAD increased by 3 percent in EKATA, and decreased by 6 percent and 1 percent in Control and Gender Light treatment, respectively. Women also increased their assets, their decision making in households and reduce gender-based violence, but it also generated significantly higher values. Analysis of benefit-cost ratio found that the gender transformative approach was only 16 percent more expansive (USD 303 per participant instead of USD 263 for gender neutral approach) but created twice the value of Gender Light and almost 8.5 times more than the Control. Consequently, EKATA had the highest return on investments at 410 percent, compared with 270 percent for Gender Light and 30 percent for Control.

Box 3. The use of household methodologies to eliminate intra-household poverty or food and nutrition insecurity.⁴

Household methodologies (HHM) are innovative approaches used to promote gender equality and livelihoods development. IFAD is one of the leading development organizations innovating with HHM as a key strategy to advance its gender and broader development agenda. Currently, there are over 50 IFAD projects that make provision for the use of HHM. Intra-household dynamics are crucial to the productive and long-term success of family farming and rural livelihoods. What happens inside the family has substantial implications not only for individual motivation and well-being, but also for the productivity and investments in agriculture and rural development. HHM are a transformative approach which deepen project impact in many different contexts. Using HHM enables members of households, groups, and communities to dig deeper than the traditional approaches to gender mainstreaming by identifying and addressing some of the principal underlying causes of gender inequality and exclusion. This not only improves gender equality outcomes, but also removes gender-based barriers, which would hinder the achievement of other development outcomes. The overall benefits of HHM on participating households are reflected in a range of interlinked improvements, both quantitative (increases in productivity, income, and food security) and qualitative (decision making, intergenerational, and well-being). Household mentoring has a particular focus on addressing the needs of the poorest households and promoting social inclusion.

Empowering women decision-making capacities

The first entry point is to combine technical interventions with interventions that can raise women's decision-making skills and power, including influence in the type of investments to be made on the farm or influencing community governance. In CAIM, the main project component was dedicated to women empowerment through self-help group, training, and access to finance and income-generating opportunities. The end survey found out that 64.4 percent of women had greater household decision-making power, including in farming. This recognition of women's role also led to their greater participation in the community, with more women being elected to village council and having a say in community decisions. In addition, it is core to empower women economically to consolidate their capacity to influence household financial decisions. For instance, in CAIM, women obtained more formal loans than men in all districts and most households reported higher household income as a result of women's economic activities. During field interviews with women self-help groups, they reported being more involved in farm investments and input purchases as they directly finance such investments through their own income and their access to crop loans in SHG. In one of the APDMP support missions, interviews with women self-help groups also revealed that credit was often used to purchase inputs or irrigation equipment, reinforcing the evidence that economic empowerment can help increase decision-making power in input choices. In contexts with prevailing conservative gender roles and values, and resulting high illiteracy rates among women, IFAD effectively addressed functional skills gender gaps. Literacy courses can effectively address drivers of discrimination against women and unequal power relations by giving women access to other avenues of information and education, allowing informed decision making and creating opportunities for income generation and socializing.⁵

Secondly, demonstrating and valorizing women's contributions can be key in raising their voices and influencing agroecological transitions, as well as helping in bringing their own knowledge into the innovation process. In Brazil, the Rural Sustainable Development Project in the Semi-arid Region of Bahia (PSA) promotes the use of the Agroecological Logbook as a participatory tool rendering women's monetary and "non-monetary" work in the household visible — recording what they produced in the agroecological backyard gardens based on a variety of crops combined with native and adapted trees adopting agroecological cultivation practices. In addition, information on their consumption, sales, exchanges, and donations are also collected by the logbooks, highlighting their contribution to the conservation and sustainable use of biodiversity, healthy diets, and women empowerment. (In Brazil, a "quiet revolution" for rural women makes the invisible visible (ifad.org).) The Agroecological Logbooks empower women and rethink the methodologies of rural extension with a gender perspective, harnessing their contribution to diversified production, nutrition, and healthy diets. Their commitment in the commercialization of the surplus agroecological produce ensures food security, food safety, and nutrition to their communities within their territories, as consumers trust the quality and safety of what they buy.

Box 3. A case study in Bangladesh (full story developed in a separate blog).

Nasreen is a successful businesswoman. From her home in rural Bangladesh, she runs a thriving ecological farm — one that supports the local ecosystem and uses no chemical fertilizers or pesticides. Her chemical-free vegetables reach customers in urban areas — thanks to the e-platforms she is active on. Before 2019, she only had a small subsistence home garden, and her husband was working as a laborer. When Pace project came in the area, she became interested in ecological farming and its environment and nutrition appeal. Thanks to training and credit received, she increased the scale of her farming activities with a diverse variety of crops, use of local bio-input and engaged in e-marketing. She also harvested year-round and now has access to diverse nutritious and safe food for her family. Her business is so profitable that her husband no longer works as a laborer and has begun helping Nasreen in the fields instead. She is now able to fully participate in making household decisions, too. Importantly, her hard work is being recognized and she is starting to notice her success inspiring others, too. "As I am the one who is guaranteeing a sustainable livelihood for my family, I see people around me acknowledging me and valuing my opinions," she

⁵ See IFAD 2017. *What works for gender equality and women's empowerment – a review of practices and results. Evaluation Synthesis.*

says. *“I love to see that my relatives and neighbors are also getting interested in taking the risk of starting businesses of their own.”*

Adopting gender sensitive approach that acknowledge women specific constrains and motivations

To be successful, interventions shall ensure that engagement of women in agroecology is feasible and motivating for women, considering their specific constrains and interests in production.

A first entry point is to alleviate land constrains, giving better access to land for women or building on homegarden land. In IFAD’s CAIM project, specific activities were dedicated to improving co-ownership of household assets and land which is also crucial for women to be incentivized to invest in sustainable land management. Projects can build on women’s existing engagement in home gardening as a starting point to develop diversified income generation along the value chain, including in producing bio-inputs, processing food, collecting non-forest timber products or high value crops/seeds that may not require too much land (bio-inputs, seeds, etc.). In the WB-IFAD NATP2 project in Bangladesh, several male and female groups had converted to organic agriculture and production of compost and bio-inputs for sale. All of them highlighted that one of the decisive factors in this choice was that they wanted to produce safer and more natural food. Backyard gardens are an effective way to enhance women’s role in household food production and income generation. Successful cases can be found in IFAD-supported projects in Brazil, where backyard gardens have contributed to income generation and improved household nutrition. In addition, water tanks are provided enabling the production of vegetables throughout the year. The involvement of women in these activities is also linked to improving the participation, voice, and influence of women in society, especially through the recognition of their role as economic agents.⁶ In these gardens, women are adopting agroecological practices.

A second entry point is to pay specific attention to labor constrain and invest in labor-saving approaches. For instance, in Bangladesh NATP2, a strong enabler of agroecological transition was to help the female groups to invest in composting and packaging equipment, thereby reducing labor requirement and alleviating women’s constrains to engage in such activities. In the Nepal ASHA project, recognizing strong labor constrains of women, the project invested in tools to reduce labor drudgery as well as in access to fresh water. Women did not have to collect water far away and saved around two hours daily that they invested in improved food preparation, homegarden, and food production. In Farmer Field School (FFS) programs, labor requirements are often one of the criteria used by farmers to evaluate the performance of the practices tested in groups’ experimental plots. FFS programs supporting the agroecological transition at farm level are putting particular emphasis on identifying and testing innovations that reduce labour intensity of practices, especially to facilitate women involvement (Teatske 2021).

In addition, it is important to consider the interests of women in engaging in agriculture, for instance recognizing the importance that women give to the nutritious content of food and their knowledge of household nutritional needs.

⁶ See IFAD 2017. What works for gender equality and women’s empowerment – A review of practices and results. Evaluation Synthesis.

Box 4. Case study of FFS approach to integrate women specific needs.

Farmer Field Schools (FFS) have shown to be especially appropriate in involving women, as they do not lead to exclusion of low literacy individuals, rely on practical experiments that are adapted to meet actual needs of participants, and build social capital, a key aspect in facilitating learning and behavior change for women with little access to resources. Building on identification of women's specific needs, FFS often include taste and other qualitative food consideration as criteria for the identification of preferred agricultural practices.⁷ Women are often the ones having the lowest access to advisory services and knowledge. Even when the advisors reach them, few advisors are women, creating further barriers in exchanges. Given the knowledge-intensive nature of agroecology, specific attention to reaching out to women in ways that are appropriate to them is key to making sure they can fully contribute to agroecological transitions. For instance, FFS may pay attention to include women facilitators that can address gender barriers and to identify FFS timing adapted to women time constraints.

Figure 1. Women farmers' FFS participant learning about soil health in AP program.



Women and their Networks can play an Active Role to Disseminate Agroecological Practices within Formal or Informal Extension Channels

The projects reviewed illustrate how women leaders and women entrepreneurs can take a leading role in spreading agroecological transitions by investing in agroecological entrepreneurship and seeds. For instance, in India the APDMP project supported young men and women to develop local bioresource centers to produce diverse bio-inputs and engage in demonstrations. One of the project's supervision missions could meet passionate women entrepreneurs who used such opportunities to engage in such activities or support their husbands. For instance, the spouse of a bioresource entrepreneur adopted the organic integrated homegarden and went further to promote it through her network, sharing seeds and practices. She also went to build awareness within the school so that children can convince their parents to shift to organic and integrated farming to improve the intake of healthy and diversified diets. In Brazil, the PSA project is promoting the "Seed Guardians" through community seed systems, the majority of which are women, considered as custodians of genetic and cultural heritage. (Seed Guardians — How families in Brazil are increasing biodiversity with help from the past (YouTube)). Through community seed banks conserving local species adapted to the semi-arid climate, preserving genetic diversity and traditional practices, women contribute to climate resilience, food security, and nutrition. Community seed systems help women to enhance income generation by fetching higher prices in local markets, guarantee seed autonomy hence independence from expensive external inputs in the support of agroecological production, and promote social bonds that recognize women's role within their communities.

Secondly, most IFAD projects actively support women self-help groups, which have proved to be strong vehicle to promote adoption of agroecological and locally adapted practices. Building the social capital of women along project interventions is also key to empower women and facilitate behavioral change. Evidence shows that having peer support from other members of the FFS in Kenya made it easier for participating farmers to change their practices, even when those practices challenged cultural norms in their communities (e.g., on what women can and cannot do in the farm) (Friis-Hansen et al. 2012). By using group dynamics and creating social cohesiveness amongst members, FFS create platforms for joint acquisition of inputs and resources, solidarity and mutual help, especially useful for groups of women seeking to change their livelihoods. For instance, in the Latin America and the Caribbean (LAC)

⁷ For more information on integrating nutrition into FFS, please see <https://www.fao.org/farmer-field-schools/ffs-overview/nutrition/en/>

region, the homegardens, additionally to support the diversification of women’s diet, have shown an increase in women’s resilience, in the sense that women are more connected within the community, construct networks in which they exchange knowledge on agroecological practices leading to their empowerment. This type of social technologies adapted to semi-arid region improve human and environmental health.

In projects in India and Bangladesh, women self-help groups or common interest groups played a key role to facilitate such transitions. In the CAIM and APDMP projects, even if self-help groups (SHG) were not really working on agriculture, several interviews revealed that women leaders and FFS women trainees used SHG network to disseminate agricultural information to women members. In India, the natural farming initiative⁸ in the Andhra Pradesh State had a key focus on women and SHG and was able to reach 750,000 farmers and farm workers and around 216,000 ha in five years (see box).

Box 5. Roles of women in Andhra Pradesh massive transitions to natural farming.

The Andhra Pradesh Community Managed Natural Farming (APCNF) initiative uses a decentralized cluster model to identify, mobilize, and train “master farmers” to institute a unique community-based dissemination of zero chemical input natural farming.

The model relies on equal number of males and females at the cluster leadership and master trainer level to promote women decision making and encourage further engagement in agriculture. Women are also supported to set up village shops to produce and sell bio-inputs and to develop custom rental centres for small machinery to meet labor needs. Women are also involved in disseminating videos, raising their visibility and status in the program (Tripathi, Nagbhushan, and Shahidi 2018). The APCNF model built upon on pre-existing women self-help groups, as 123,122 groups and their 4,740 federations existed in AP state when the initiative was launched. The SHG contribute to manage the natural farming program, undertake collective action to lift local barriers to uptake of agroecological practices, facilitate peer learning, farming and consumption plans, and play a key role in insuring the poorest are included. Such linkage has been crucial in disseminating the model, facilitating women outreach, and facilitating their access to subsidized credit with banks (Ashlesha Khadse and Peter M. Rosset).



⁸ ZBNF is a farming practice that believes in natural growth of crops without adding any fertilizers and pesticides or any other external input. The inputs used for seed treatments and other inoculations are locally available in the form of cow dung and cow urine.

Conclusion: Toward Holistic Gender Transformative and Nutrition/Health Integrated Projects to Facilitate Transitions to More Sustainable Agricultural Practices

These examples confirm the powerful role of leveraging women's interest in nutrition and food safety to promote greener agriculture for improved health and nutrition. This process is particularly more impactful if accompanied by the strong buy-in of women, since they are often the custodians of food handling and household health. In addition, these examples show that women can be core agents of change once they understand and leverage their specific gender roles, intra-household and social dynamics, and rely on their traditional inherited knowledge (i.e., Brazil PSA case). To translate such interest into action, parallel attention is required to reinforce women's capacity to influence household and community decisions, through social network promotion, access to production and income, improved co-ownership of assets/land tenure and improved decision making and social status. Finally, further reinforcing inclusion of women in extension delivery and leveraging women networks and schools also appear as strong vehicles to disseminate faster such transitions. It is therefore urgent for ARI to further invest in such nexus and help backstop such dynamics. Several IFAD projects are currently being formulated around this topic and lessons learned can help disseminate these practices in partnership with ARIs.

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Five Livelihood Asset: Guidelines for Goat Raising Management of Farmers in the Upper Northern Region of Thailand

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ABSTRACT

Livelihood asset and sustainable livelihood express the potential to fight or cope with tension or its effects by maintaining economic efficiency, ecological stability, natural resources, and social equality. The use of life opportunities for a group of people is the human ability to live and improve the quality of life without causing trouble for others both now and in the future. “Sustainable livelihood approach” is the heart of moving forward for goat herders and farmers. This will balance the five aspects of livelihood capital, along with awareness of the problems, risks, and vulnerabilities of all forms that interfere with farmers’ livelihoods.

Keywords: guidelines for management, goat-herder, livelihood asset, promotion and per northern region

INTRODUCTION

Thailand has long been known as an agricultural county because of its geographic location, which is ideal for farming. The majority of the population has always been involved in agriculture. Despite efforts to become an industrialized country, it still depends on agriculture, as do many developed countries (Noppakhun 1993), where agricultural progress demonstrates different farming opportunities and lifestyles. It can be said that farmers spend at least one-third of their lives on agricultural or livestock activities. Farmers, who are considered to be the largest group of people in the Thai population structure, are an important force in driving the country’s economy (Institute for the Promotion of Safety, Occupational Health and Working Environment) (Public Organization 2019). Although Thailand has achieved satisfactory economic growth, the non-agricultural economy is growing at a very encouraging rate, and has received positive feedback from all sectors in driving empirical development.

However, the development of the agricultural sector is in a slow progression. The future of agricultural development is worrisome, despite the vast majority of the population of 13.48 million (National Statistical Office, Ministry of Digital Economy and Society 2020) are still active in agriculture.

The same is true for the upper northern area, which is the top region of Thailand. Currently, there are still many occupations in this area in agriculture and livestock. A popular and new

career in agriculture and livestock is goat raising, for the reason that in the upper northern area, climate is mostly humid and dry (Agricultural Extension and Development Office 2017). Although there are only 10 percent of the total goat farming in the country (Thosaphon 2020), the advantages of goat raising are obvious. They are easy to keep and their production costs are low. This is an advantage for farmers who are starting to raise low income. And, as in the past, there are guidelines for implementing the policy of the Ministry of Agriculture and Cooperatives in 2022, promoting it to stimulate the construction of the foundation economy, and this, together with the information on the demand for the goat market that is increasing every year (Goat Strategy, The Department of Livestock Development (2018–2022)), has resulted in farmers in all regions to become interested in raising goats. Therefore, goats have become an important economic animal.

The amount of goat raising has steadily increased over the past three years (2017–2020) (Information and Communication Technology Center, Department of Livestock Development 2020). It is popular and has continued to increase in number. Livestock activities are carried out in accordance with different forms and farming characteristics of different lifestyles and contexts of the area. Along with the level of lifestyle capital of each goat farmer, those are not the same. The consumption of goats is not popular with the local residents. Farmers in the area still do not understand the principles of goat raising and management, including correct risk management for each context. Moreover, government agencies have not yet recognized the importance of promoting good goat farming and do not have a clear policy in place for each context. This will be a development guideline in various dimensions for goat farmers.

The researcher realized the benefits and importance of goat farming as a potential activity in various fields in the upper northern area. However, goat farmers do not have a single goat farming activity. It is often done in conjunction with other agricultural activities that follow the way of life of local farmers. These made the researcher interested in studying farmers' lifestyles and goats farming styles and patterns. Research results can be used as guidelines for the development and promotion of goat farming in accordance with the local physical, economic, social, and cultural environment. It can also be a master plan for the sustainable livelihood of goat farmers and should serve as a model for farmers in other communities.

RELATED CONCEPTS AND THEORIES

The main challenge and success of the proposed initiatives is the implementation of "Concepts related to livelihoods asset and sustainable livelihoods approach". The Department for International Development (1997) discusses the concept of sustainable living, which is rooted in the following key concepts:

1. People centered: Sustainable living concept focuses on people and treats people as the center of development.
2. Holistic: Sustainable living concepts look at all relevant aspects from local to international levels in geographic areas and social groups.
3. Dynamics: Sustainable living concepts must understand change.
4. Building on strength: Sustainable living concepts analyze strengths over needs.
5. Connecting macro and micro: The sustainable living concept seeks to bridge the gap between macro and micro.

Sustainability: Sustainable living concept emphasizes sustainability — which sustainability will not be neglected.

Scoones (1998) and Fouracre (2001) say that the Rural Sustainable Livelihood Framework is a conceptual framework that describes the elements and contexts involved in the livelihoods of rural people within the local context where they live and make a living. What and how to make livelihoods sustainable depends on the relevant government and institutional policies that play a role that aligns with the nature of the elements involved and contributes to the implementation of these elements. How dynamic is it to meet the needs and desires of the local people? Relevant elements can be classified into five different asset classes: physical, financial, natural, human, and social. Some of these properties are in the possession of a household, while others may be common property that a household can access and have the right to utilize and manage.

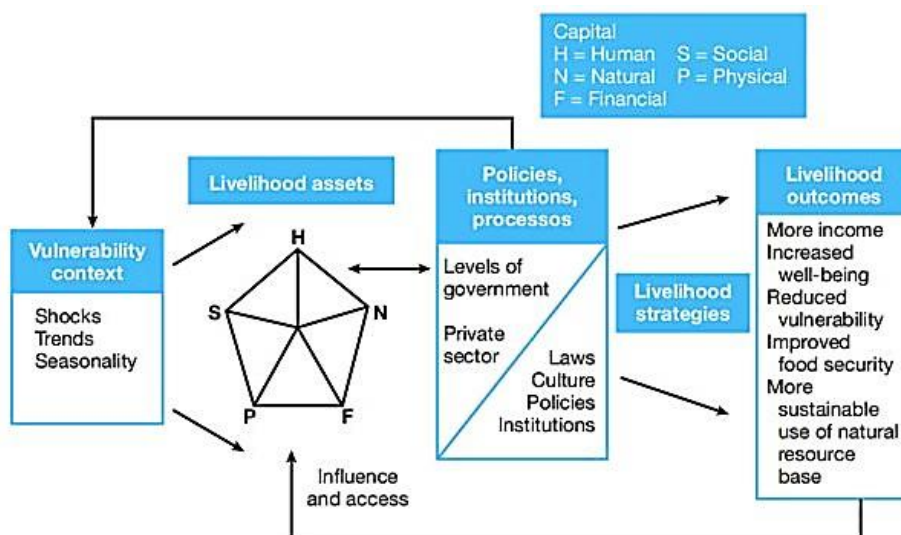


Figure 1. Sustainable livelihoods analytical framework

Source: Robin Marsh, University of California, Berkeley, USA (2003)

DEVELOPMENT CASE STUDIES

This case study is part of the research at the doctoral level. The title of Guidelines for Goat Raising Management of Farmers under Risk in the Upper Northern Region aims to answer the research questions as follows: (1) what is the farmer's way of life and what are the goat raising characteristics and patterns in the northern region; (2) what are the results of goat farming management for farmers in the upper northern region; and (3) what is the potential of farmers in goat farming in the upper northern region. In addition, farmers have to deal with the problems and risks of raising goats in each area context.

Issue 1 is a case study related to "human capital" that would like to explain and present guidelines for human capital development of goat farmers in the upper northern region of Thailand. In order to analyze the whole point of development toward sustainability, there was a field visit to explore the basic information of goat farming contexts, and a narrative research method was devised to acquire information from the locals along with non-participant observations. It was found that the human capital development of goat farmers for sustainable livelihoods is from the development of knowledge and specific professional skills that ensure sustainability by the operation of the farmer sector along with support from the government and academic departments.

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Sustainable Livelihood: Guidelines for Human Capital Access of Goat Farmers In the Upper Northern Region of Thailand¹

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Abstract
This article would like to explain and present guidelines for human capital development of goat farmers in the upper northern region of Thailand. To analyze the whole point of development towards sustainability there was a field visit to explore the basic information of goat farming context. Through narrative research of goat farmers and then convey the story. Along with non-participant observations.




Social Capital: Approaches to Support Goat Farming Management of Farmers in the Upper Northern Region of Thailand

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Abstract
As far as agricultural extension and rural development are concerned, the term "social capital" is based on the idea of Sustainable Livelihood Approach, which acts as a key mechanism to drive and support farmers to carry out various activities effectively. This study explains and presents the ways that could contribute to goat raising among the goatherds, in the upper northern region of Thailand, through the aspect of social capital. It also aims to determine the sustainability development of the farmers' potential. The researcher went to the field to learn the fundamental information such as the context and the promotion of goat farming. The data were accumulated through narratives of goatherds (Narrative Research) along with non-participant observation.

The findings revealed that the approach to support goat raising among farmers in the upper northern region of Thailand through social capital comes from the goat-farming help and support from various departments such as the community, the academia and the government. Moreover, it was identified that social capital requires many factors, not just an individual, to accomplish its goal. In fact, it must be considered holistically because social capital is all about the relationships between various roles in society, and it only works when cooperation and networks are forged. Finally, social capital will be the foundation of goat-farming activities, and it requires a long time to connect individuals, as people will only work together if they can ensure they have a trust-based social network, trust who their companions, and do the same working standards when they have to work as a team.


Keywords: Social capital, Sustainable Livelihood Approach, Goatherds, Upper Northern Region

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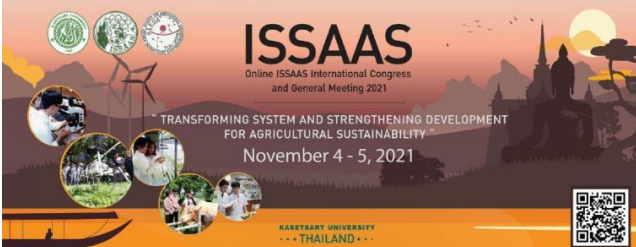
This article is part of the dissertation titled Guidelines for Goat Raising Management of Farmers Under Risk in the Upper Northern Region.

VIRTUAL GLOBAL CONGRESS ON SUSTAINABLE GROWTH & DEVELOPMENT 2021 – HEALTH AND LIFE SCIENCES (GCSGD2021-HLS)

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Issue 2 is a case study related to “Social Capital”. As far as agricultural extension and rural development are concerned, the term “social capital” is based on the idea of sustainable livelihood approach, which acts as a key mechanism to drive and support farmers to carry out various activities effectively. This study explains and presents the ways that could contribute to goat raising among the goat herds in the upper northern region of Thailand, through the aspect of social capital. It also aims to determine the sustainability development of the farmers’ potential. The researcher went to the field to learn the fundamental information such as the context and promotion of goat farming. The data were accumulated through narratives of goat herds (Narrative Research) along with non-participant observation. The findings revealed that the approach to support goat raising among farmers in the upper northern region of Thailand through social capital comes from the goat-farming help and support from various departments, such as the community, academia, and the government. Moreover, it was identified that social capital requires many factors, not just an individual, to accomplish its goals. In fact, it must be considered holistically because social capital is all about the relationships between various roles in society, and it only works when cooperation and networks are forged. Finally, social capital will be the foundation of goat-farming activities, and it requires a long time to connect individuals, as people will only work together if they can ensure they have a trust-based social network, trust among their companions, and the same working standards when they have to work as a team.

CONCLUSION

From the view of agricultural extension and rural development, it is clear that “Five Livelihood Asset” is very important. Therefore, balancing and ensuring the stability of the development of farmers in each period is considered very important to farmers’ livelihoods as well. That is to say, the more farmers are aware of the risks to each aspect of the livelihood asset, the more they develop. Livelihoods and the quality of life of farmers will develop accordingly. Whether it is the social aspect that creates a good relationship among the people in the community, they work together, resulting in various good cultures that follow. Moreover, the government must be the center for empowering farmers.

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Smoked Salted Egg Small Industry with Permaculture Concept in Slorok Village, Doko District, Blitar-Indonesia

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ABSTRACT

During the COVID-19 pandemic, the community's economy weakened due to an economic recession, even changing people's behavior in meeting food needs. The crisis, gradually over a long period, causes people to experience food insecurity, resulting in decreased nutrition. Disease outbreaks are increasingly widespread because nutritional needs have not been met. One of the efforts made is a self-sufficiency strategy by assessing the area's potential. Carrying the theme of the application of permaculture concepts in the development of organic salted egg industrial centers as an effort to be self-sufficient in food in Slorok Village, Doko District, Blitar, East Java, the Community Service Program Team of Brawijaya University is trying to empower human resources from Slorok Village. The activity process is designed according to the community's potential, problems, needs, and desires while adhering to the six aspects of permaculture. The smoked salted eggs program was chosen to process duck eggs, which experience fluctuating prices, and as a micro business product for the community. The challenges faced in the production and marketing processes require the cooperation of stakeholders, continuous monitoring and evaluation, and social capital improvement.

Keywords: Permaculture, smoked salted egg, micro business

BACKGROUND

The main problem with the agribusiness system during the Covid-19 pandemic was the hindered distribution process and the decline in people's purchasing power due to the crisis. Thus, an effort is needed to increase product durability during the distribution process and provide affordable processed food at affordable prices. The program is intended to add value to salted eggs already familiar to the community. The objective of processing duck eggs into smoked salted eggs to increase shelf life solves logistical problems constrained by physical distancing. The permaculture aspects applied were to optimize the use of local natural resources and human resources of the target area.

The permaculture concept has been known since the 1970s, which was popularized by Bill Mollison and David Holmgren in Tasmania. Since then, there have been many definitions of permaculture because the viewpoints and applications are very diverse. However, the point is that the concept is closely related to community empowerment that is sustainable and environmentally friendly. There are six aspects related to ethics and a thorough consideration of the permaculture approach in its application. Aspects that must exist are land and nature management, built environment, tools and technology, culture and education, health and spiritual well-being, and finance and economy. These six aspects are very comprehensive, require a much more micro approach, and cannot be rushed. Many stakeholders must be involved in the local wisdom context, not globally.

The great potential of Slorok Village as a laying duck farming center can become a source of community income through the concept of permaculture, which supports self-sufficiency. The basic principles of permaculture are:

1. All elements in a system interact with each other
2. Multifunction: each element fulfills many functions, and several elements perform each function
3. Uses energy practically and efficiently with renewable energy
4. Utilizes natural resources
5. Uses intensive systems in small areas
6. Utilizes and shapes natural processes and cycles
7. Supports and uses edge effects (creating highly productive small-scale structures)
8. Values non-monocultural diversity (Holzer 2001)

This program tries to apply principles 1–7 while the last one cannot be done because it does not involve plants in the process.

PROGRAM DESCRIPTION

Location and Duration

The Community Service activity was carried out by Community and Livestock Studies Research Group from April and still running today (December 2022) in Slorok Village, Doko District, Blitar. The objective of the activity was to empower rural communities through food sufficiency and economic stimulation using the concept of permaculture.

The laying duck farming in Slorok Village, Doko, Blitar has high potential, with as many as 58,880 tons of duck eggs recorded in 2020 (Blitar Regency BPS 2020). This condition makes Doko District chosen as a center of processed duck egg products.

Stakeholders

Stakeholders involved:

1. Institute for Research and Community Service, Brawijaya University
2. Community and Livestock Studies Research Group, Brawijaya University
3. Community Service Program Team of Brawijaya University chaired by Siti Azizah with members from Faculty of Animal Science, Faculty of Architectural Engineering, Faculty of Agriculture, and Faculty of Mechanical Engineering
4. Slorok Village government (village head)
5. Blitar District Livestock and Fishery Service
6. Duck farmers and Slorok Village community members

Program Implementation

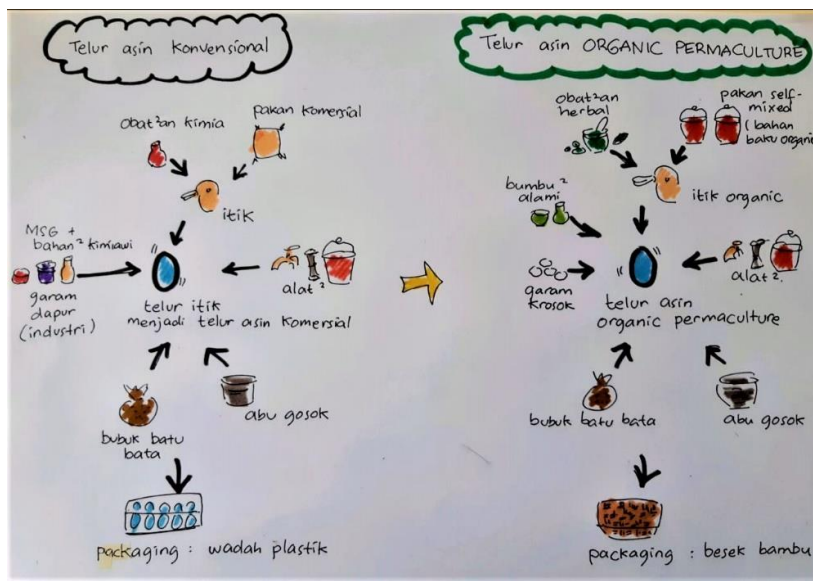
The project started in December 2020. The team conducted an initial survey to collect qualitative and quantitative data from community leaders, duck farmers, and community components about natural and human resources data. The results then showed village potentials and problems, the management of the Mojosari duck business carried out by farmers, and the most suitable strategy to undertake the program.

The permaculture concept was chosen to increase the value of duck eggs produced in the area, and all input materials are available in Slorok Village. Before carrying out community empowerment activities, a focus group discussion (FGD) was conducted, attended by the village head, farmers, women, and youth representatives. Information from community members about excluded group categories was also explored, such as out-of-school youths, women, and the unemployed. This group was to be involved in the smoked salted egg program.

Figure 1. Focus group discussion with village representatives.



Based on the problem and the potential of the village human resources, a group of smoked salted egg small and medium industries was formed. The program can benefit all levels of society, mainly by reducing the number of females who leave the village to work overseas, as well as increasing the value of duck eggs due to price fluctuations and decreased purchasing power during a pandemic. Fatimah, Adriana, and Artika (2019) and Putri (2019) stated that smoking is an additional method to extend the shelf life of salted eggs. The smoking process can reduce the water content in eggs, allowing them to last longer. Figure 2 shows early planning to change conventional salted egg material to organic permaculture salted egg.



(Source: Siti Azizah, Brawijaya University, 2021)

Figure 2. Permaculture diagram for smoke salted egg.

The salted egg business production group consists of several elements of the community: laying duck breeders, woman group members, youth, and village officials. The importance of stakeholder involvement from these various elements is highlighted by Agustina's (2014) statement that the concept of community empowerment in the economic development of a region means an empowerment program must involve stakeholders. It was also to realize "All elements in a system interact with each other," especially in the socioeconomic aspect in permaculture. A location is chosen to be a production center to make the production process more manageable. The production center was considered the most suitable location since it is close to other production input points (duck laying egg farmers, bamboo artisan, wood waste from furniture industry) to apply intensive systems in small areas principle in permaculture. The production group members proposed an extension program to increase stakeholders' knowledge and skills. Needed were organic duck feed, smoked salted eggs processing methods, salted egg business analysis, and digital marketing.

The extension was carried out in offline (face-to-face) training and online training via Zoom. In the offline training, production team members were introduced to organic feed and smoked salted eggs processing methods (Figure 3). Salted eggs are covered for 7–10 days with rubbing ash and salt, then smoked with a machine using coconut shells as fuel. This process is carried out for 8–12 hours. The purpose is to get some advantages to forming smoke components which are antiseptic and antibacterial (Arifianto et al. 2018).



Figure 3. Offline training.

Online training using Zoom-based meetings was carried out. The topics for discussion were the importance of Business Permit Numbers (NIB), financial calculations/business analysis, digital marketing, and a Q&A session about smoking machine procedures.

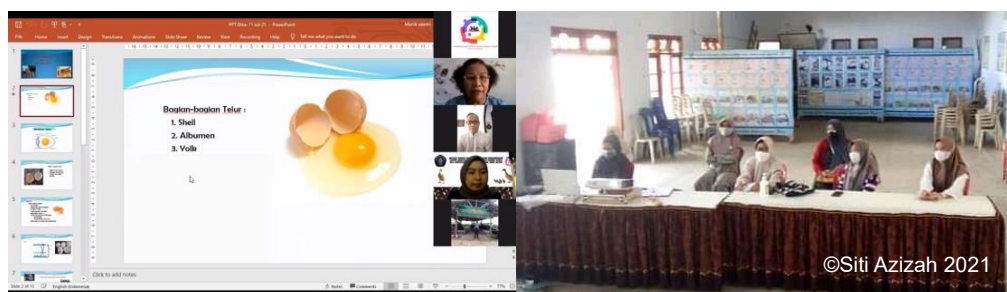


Figure 4. Online training and discussion.

The online training was attended by several community members, such as farmers, homemakers, and teenagers. Training recording can be accessed via the CLSRG YouTube channel at <https://www.youtube.com/watch?v=VVWDGXQ1yFw>.

In June 2021, the production team started conducting experiments to find the processing method that produces the most desirable result. It took three experiments before a smoked salted egg was ready to sell (Figure 5).



Figure 5. Experiment by the production team.

Unfortunately, there was an internal conflict among the production team members during the production period, which caused some of them to build a separate business. The academician team then gets students to do the research and dig deeper into this program’s social aspects. It was found that internal conflict was caused by the previous problem between the village government and community members. The conflict showed that social capital is essential in community business. However, there was a positive side to the conflict, it could motivate other community members to produce similar products, and today there are three developing businesses with different target customers.

In the concept of permaculture, tools and technology must be obtained from the local area as much as possible, be energy-efficient, and be free of waste. Thus, the smoked salted egg production uses bamboo basket as a product container (Figure 6).



Figure 6. Smoked salted egg and bamboo basket.

The bamboo basket making involves local bamboo artisans, unemployed community members, and disabled people. Bamboo basket materials come from the toothpick waste industry, and the advantage is that they are easy to recycle, reuse, and reduce. This idea is inspired by the concept of permaculture to make waste a useful input in the system. Recycling, composting, and waste reduction are essential points of permaculture (Brain 2013). Bamboo basket containers were also aimed at avoiding generating undegradable waste. Another reason for choosing this bamboo container is that it is unique and revives bamboo crafts in Slorok Village, which undegradable plastic containers have replaced.

Marketing was also one of the critical things to address. The online marketing account is made to promote and reach as many consumers as possible (Figure 7). This online promotion is expected to help sales during the COVID-19 pandemic. Some deals were made, but the production team still has difficulty selling out of the island because of high transportation costs and safe packaging.

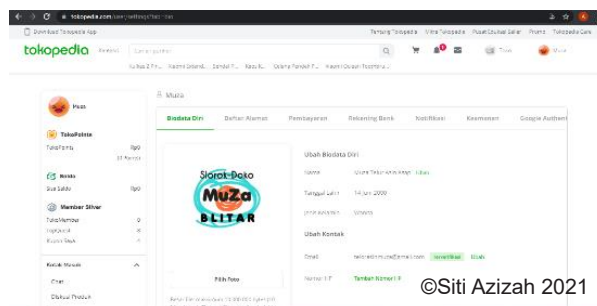


Figure 7. Online marketing.

As a form of obeying the law, registration of NIB was also carried out. The NIB is the identity of business actors in the context of business activities according to their business fields. The NIB is important so the producer can provide the halal Indonesian National Standard (SNI) logo to consumers (Figure 8). A home industry product certificate for Muza smoked salted egg has already been issued by Blitar Mayor through the Health Office to ensure that the product is free to be marketed widely, is fit for circulation, the safety and quality of the product are guaranteed, and the product can be sold by supermarkets.



Figure 8. Smoked salted egg NIB with the trade name Muza.

The evaluation and monitoring process is continuously carried out to discover four changes from the KASA (knowledge, attitude, skill, and aspiration) aspect of production team members. This is important to find out which aspect potentially deters the program and improve the team's performance. So far, the team can sell approximately 500 smoked salted eggs per week.



Figure 9. Production team.

Conclusions drawn from the program are that the application of the permaculture program cannot be done quickly but takes time according to community conditions. The most important thing is the community's acceptance of social, economic, and environmental changes resulting from the program being delivered. This micro industry has been proven to increase farmers' and team members' income.

LESSONS LEARNED

Challenges

Main problems have not been fully resolved in this program:

1. **High transportation cost.** High shipping costs between cities and islands hinder marketing expansion even though demand is relatively high.
2. **Quality Control.** Maintaining quality and standards is difficult because of the low level of awareness of the production team. The production team prioritizes quantity over quality. Currently, product quality improvement is being carried out to attract consumers again due to an error in the previous production process which led to several complaints.
3. **Packaging.** Delivery between cities and islands is also challenging due to poor handling of transportation services.
4. **The internal social conflict.** Internal disputes between the village government and community members emerge.
5. **Financial problem.** Additional capital is needed to ensure the availability of products.

Successes

The smoked salted egg business has provided the following benefits:

1. Providing job opportunities for women and people with disabilities
2. Absorbing the production of duck eggs, which are sold at fluctuating prices
3. Increasing an entrepreneurial mindset
4. Attracting the attention of the government and financial institutions (Bank Indonesia)
5. Giving new knowledge and skills to farmers and the community

Key messages

There are some critical points from this program:

1. Need multi-stakeholders cooperation in developing business centers in the region
2. Need continuous monitoring and evaluation program, especially regarding quality control
3. Need social capital improvement to increase trust and networking between community members

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Higher Educational Challenges in Promoting Aqua-Ecology in Thailand and Lao People's Democratic Republic

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ABSTRACT

In this perspective, we share our experiences in promoting aqua-ecology practices in higher education teaching and through extension activities in rural communities in Thailand and Lao People's Democratic Republic. We observe that while agroecology approaches are potentially promising in the long-term as an alternative means of food production, they are not generally viewed as viable options by rural community members who are reluctant to change from familiar practices without evidence of proof of concept. Further, because agroecology principles are taught through the lens of sustainability science in our faculties, the concept is still largely unfamiliar to the general population, as well as future farmers. From a practical standpoint, given the strength of the current agribusiness model at work in Thailand and Lao People's Democratic Republic, a balance in higher education training is needed to prepare future farmers to both work in the established food production industry, and meanwhile, to explore a shift toward more sustainable forms of food production.

Keywords: Sustainability, Fisheries, Aquaculture, Montane Mainland SE Asia, Agroecology

INTRODUCTION

Aqua-ecology is embodied within the practice of agroecology, which refers to producing agricultural products using technologies/approaches that are rooted fundamentally in ecology, and without heavy reliance on agrochemical inputs and mass production strategies that have largely evolved since the Green Revolution (Altieri 1983; Gleismann 2007; Wezel et al. 2009; Wezel, Herren, and Kerr 2020). Agroecology approaches recognize the value of holistic, nature-based strategies to not only produce food but sustain livelihoods in harmony with the local landscape, climate, biology, culture, and economy (FAO 2021). Importantly, agroecology approaches apply to the entire food production and consumption cycles, and are inclusive with respect to gender and social class (Oteros-Rozas, Ravera, and Garcia Llorente 2019). While the scientific/academic foundation of agroecology dates to the first part of the last century in the developed world, examples that are considered to be early cases of the practice are centuries old and found throughout the developing world (Hecht 2018).

Many aspects of agroecology inherently have roots in traditional ways of life for Thai and Lao farmers and fishers (Siamwalla 1987). Much of the early farming was subsistence-based and adaptive to local and natural situations (Tanaka 1993). Eventually, in the second half of the 21st Century, the demands for high yields of plant and animal products were achieved through the "tampering of nature and industrialization of agriculture," for example through contract farming led by large corporations that controlled the industry (Thanukid 2014; cf. Fulvey 2000).

Yet, neither the Green Revolution nor the more recent Organic Revolution have brought about equality and sustainability throughout the agriculture sector (Smuthkochorn 2016). Estimates suggest that 40 percent of Thai farming households have annual incomes below the poverty line, 30 percent are in debt, and most face challenges related to market uncertainties, limited access to lands, and an aging workforce (Udomkerdmongkol and Chalernpao 2020). In Lao People's Democratic Republic, where subsistence farming is still prevalent, traditional production methods do not produce enough to meet market demand; and many rural families struggle to even meet their own household food requirements (Thomas 2019). About 80 percent of the population in 2012/13 still lived on less than USD 2.5 per day (World Bank 2015).

Farmer economic strife and land degradation have led to much discussion regarding the sustainability of the food production industry worldwide (Buch-Hansen 2001; Amekawa 2010, Sampantamit et al. 2020). A potential shining light in Thailand has been the improved education of the younger generation of farmers, particularly with respect to modern technological advances aimed largely at improving productivity (Udomkerdmongkol and Chalernpao 2020). The widespread teaching of the fundamentals of the relatively new agroecology "movement" has been growing since the turn of the century (Francis et al. 2001; Francis et al. 2003), yet it is rare to find explicit examples of the formal teaching of these approaches in Southeast Asia in higher education and the academic literature (Nelles and Ferrand 2020), but this dearth is now being addressed through the Agroecology in Southeast Asia partnership (ASEA; <https://www.asea-network.org/>).

In this paper, we relay our experience in promoting agroecology principles through the lens of sustainability in aquaculture and fishery endeavors to boost livelihoods in rural areas of Thailand and Lao People's Democratic Republic. We hope to contribute to the body of growing knowledge of how best to implement these ideals within university curriculums and extension activities in agronomy-based communities of the developing world.

BACKGROUND

Mae Jo University, which was the first agriculture university in Thailand (established in 1934 under a different name), has an overarching goal to develop graduates who possess wisdom, persistence, perseverance, and moral integrity for the prosperity of all people in an agriculture-based society. Many of the agriculture-based faculties have developed curricula, outreach initiatives, and research agendas to promote sustainability science, ethical practices, ecological conservation, green/clean/organic technologies, and preservation of local culture and traditions.

Established in 1989, the Northern Agriculture and Forestry College (NAFC) is located in Pakseuang, 25 km north of Luang Prabang, Lao People's Democratic Republic. The college focuses on hands-on (learning by doing) training geared toward educating students in agrarian-related fields such as agronomy, livestock production, fishery science, forestry, and agribusiness. The education approach is student-oriented with the goal of developing practical knowledge and skills that are useful for livelihood generation. This endeavor is part of the vision of the Ministry of Agriculture and Forestry to modernize agricultural college education, to contribute to achieving food security and better livelihoods for all Lao people.

Formerly the Ranong Coastal Resources Research Station (established in 1981), the Andaman Coastal Research Station for Development (ACRSD) was rebuilt following the 2004 Indian Ocean Tsunami that greatly impacted the lives of the local community. As an entity of Kasetsart University, ACRSD staff work with farmers, fishers, and other people to develop agriculture and aquaculture systems that allow them to increase annual revenues, improve diets, and increase the general livelihoods in the area. Situated on the Andaman Coast of the

Indian Ocean, the community is involved in commercial activities related to ocean fishing, shrimp aquaculture, oil palm product production, and fruit orchards.

Collectively our research, teaching, and extension work is directed toward providing the skills needed to establish and manage aquaculture/fishery systems at a variety of scales. In the following sections we provide an overview of our teaching, research, and extension work that aligns with aqua-ecology and livelihood improvements.

SUSTAINABILITY SCIENCE EDUCATION

Agroecology has slowly become a point of focus in some university curricula worldwide (Lieblein et al. 2007; Altieri 2010; Ostegaard, Lieblein, and Francis 2010). In our universities, sustainability is an established concept. In the Thai case, sustainability aligns with the late King Bhumipol's philosophy/theory regarding sufficiency economy (Jitsuchon 2019). This "vision" is, in part, aimed at improving livelihoods of small-holder farms by ensuring that one produces food (namely rice, but also protein, vegetables, and fruits) for consumption, meanwhile responsibly using external inputs (e.g., agrochemicals) and staying in tune with the local setting and available natural resources, with respect to climate, water availability, erosion, etc. Much of this sufficiency economy philosophy overlaps with agroecology, and is the basis of the key sustainability themes we teach (Table 1).

Table 1. Framework of foundational agroecology principles taught (*cf.* Tirado 2015; Wezel et al. 2020)

<ol style="list-style-type: none"> 1. Design systems with the understanding of the <i>in situ</i> geographical setting (all physical and human aspects); 2. Protect the environment from contamination (pollution, energy consumption); 3. Manage pests, diseases, and nutrition naturally when possible; 4. Preserve biodiversity and ecological integrity (all life forms); 5. Produce higher yields through sound ecological principles rather than (over)reliance on external inputs; 6. Strive to produce high-value products that increase local livelihoods, including by allowing producers and consumers more control of the supply chain; 7. Develop systems that are resilient to global change phenomena (climate, economics); 8. Think of agriculture/aquaculture as a complex, yet holistic, system whereby sound understanding of all processes and their interactions is important; and 9. Promote social equality and inclusiveness in all forms (gender, race, class, social status, wealth).
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In addition to formal classroom learning, our students participate in "learning-by-doing" exercises including on-site extension work with villagers. These activities are essential for agricultural education and provide a means of seeing the practicality and applicability of what they learn in the classroom (Francis et al. 2011; Code 2017). In concert with the current socioeconomic landscape, our teachings also align with the evolving visions of our host universities, which are to some extent guided by the national policies and development trajectories. In the MJU case, 60–70 percent of the students seek employment in agribusiness, with only about 10–20 percent returning to villages to work in the private aquaculture industry. The remainder tend to enter the government sector or take up unrelated careers.

Currently, substantial training and education caters to the needs of large food production companies. For example, a new focus area is "smart farming" systems that leverage E-technology to manage large-scale operations efficiently, for example through use of the

Internet of Things, GPS, AI, expert systems, data analytics, robotics, drones, and other automated technology (Wolfert et al. 2017; Bacco et al. 2019). Some influential actors see this type of technological advance as a means of improving farm operational efficiency, boosting product competitiveness, offsetting environmental impacts, and reducing labor demands for an aging farming population (Jansuwan and Zander 2021). Those seeking employment in agribusiness will receive additional specific and advanced training once hired.

For those choosing an entrepreneurial route in the private sector, the journey is more organic, requiring experimentation with crops and production methods, as well as developing value-chain infrastructure when it does not exist. Much of the business and marketing skills needed are not taught explicitly in our faculty curricula. Through follow-on extension work we can provide additional assistance, but care is needed not to alienate farmers by promoting methods that seem idealistic and potentially increase financial risk. Effective knowledge transfer relies on building trust and proof of concept. A nuance of this process is communication in vernacular languages when necessary.

SELECTED RESEARCH FOCI

Our research supports small-scale aquaculture/fishery implementation in rural communities, but also addresses wider issues related to the fishery industry. Below we discuss a few ecology-based research foci that are geared toward developing resilient growing conditions and leveraging natural processes to supplement feed sources and improve survival rates naturally.

Drought-Tolerant Aquaculture

Climbing perch (*Anabas testudineus*) are air-breathing fish that tolerate a wide range of temperatures (22–30°C), high turbidity, and low-oxygen environments in fresh and brackish water. In line with drought resilience, climbing perch have an additional respiratory organ which, if kept moist, can help it to survive for several days without water. Climbing perch are a newer aquaculture alternative to hybrid walking catfish (e.g., *Clarias batrachus*) that have been raised in Lao People's Democratic Republic and Thailand for a few decades (Yuan, Yang, and Diana 2006). Air breathing fish can be raised at high stocking densities, but care is needed because waste feed and metabolites can cause poor water conditions that represent an environmental risk if discharged indiscriminately into local water resources. Friendly uses of wastewater include inputs to cropping systems or as fertilizers to stimulate natural food production for other fishery species. Increasingly we are promoting integrated systems in water stress areas that involve culturing frogs, crabs, and eels, which are products of higher marketability than that of common carp, for example, which has been promoted in the past in drought-risk areas of Lao People's Democratic Republic (FAO, n.d.).

Biofloc Technology

Production of tilapia generally requires the use of intensive production systems, but biofloc technology can reduce investment and operating costs when based on pond management using minimal water exchange and management of microbes by adjustment of the carbon:nitrogen (C:N) ratio to control inorganic nitrogen concentrations in the water (Tongsiri et al. 2020). The bacteria that form bioflocs assimilate total ammonia nitrogen (TAN), produce microbial proteins and enable recycling of unused feed protein (Avnimelech 2011). At high stocking rates where much waste is produced daily, two microbial mediated processes act in biofloc systems to control harmful TAN concentrations: (1) assimilation of TAN by heterotrophic bacteria into microbial protein, and (2) nitrification that converts the ammonia and nitrite to nitrate. Proper microbial consortia in sufficient water volumes must be maintained for both processes to occur. Further, the protein stored in bioflocs can be a substantial source

of food for fish, replacing purchased protein pellets, and providing a constant food source that reduces competition between fish over different sizes, allowing uniform growth.

Biorefinery Approaches

Biorefinery approaches produce multiple bio-products from organic solid waste, including food inputs to aquaculture systems. One species of focus is the giant freshwater prawn (*Macrobrachium lanchesteri*) raised in earthen ponds (Whangchai et al. 2007). Prawn production is potentially hindered by failure to provide a growing environment that reduces stress, afford protection of predation from natural enemies, and prevents cannibalism when stocking densities are high, food is insufficient, and growth rates vary. With respect to cannibalism, non-shedding individuals will prey on those shedding their skin. One natural solution is creating “green ponds” by promoting the growth of phytoplankton that reduces visibility of clear water. Initial work indicates that the addition of moderate inputs of chicken manure increased the prawn productivity via protection, but also had an added value of being a viable application of a common agricultural waste product (Tongmee, Tongsiri, et al. 2021).

Natural Feed Supplements

Feed developed from low-cost crops such as rice bran, fava beans, soy beans, fish wort, and livestock manures are beneficial in reducing fishery production costs by reducing reliance on commercial feed (Whangchai et al. 2020; Tongmee, Mukdajaturaphak, et al. 2021). For example, pig and chicken manure contains vital elements such as nitrogen, phosphorus, and potassium, which can be exploited and used as a fish feed element, particularly if fermented to remove potentially harmful microorganisms (Srinuansom et al. 2008; Srinuansom and Montein-Art 2011). Also, to combat food input expenses and aquatic pollution, we have been exploring raising fly maggots (and making maggot flour) as an ecologically friendly food source. Fly maggots, including those of the black soldier fly (*Hermetia illucens*) can grow on various organic wastes such as dung, blood, offal, wheat bran, decaying fruit (Tippayadara et al. 2021). As a food source they contain substantial protein, fat, and micronutrients that can supplement fish meal as food in a variety of aquaculture systems. Further, natural products such as rice straw and gypsum have been shown to be beneficial in reducing foul earthy odor in tilapia grown in stocked ponds (Suwanpakdee et al. 2015).

EXTENSION AND KNOWLEDGE TRANSFER TO RURAL COMMUNITIES

Our outreach efforts involve interacting with villagers to introduce appropriate technologies and provide guidance in initiating and maintaining viable fishery/aquaculture systems. This work is often initiated through a “gatekeeper” who is the liaison to the wider community. This person may be a former student who returns to a village to begin a new venture or joins an established enterprise. Alternatively, we are approached by an individual of power wishing to establish a “resource center” where knowledge and expertise on fisheries/aquaculture can be centralized and shared. This model includes aquaculture systems that have been developed by rural schools to produce protein for student lunches with small initial investment, limited maintenance, and reasonable operating costs (Figures 1C, D). With a core group of participants (roughly 20), village centers can apply for startup capital from the sub-district government to support community-based activities. Similarly, the university staff can seek money to assist programs that are focused on knowledge transfer and livelihood improvement. Monetary resources to support such work in Lao People's Democratic Republic are limited.

Individuals and groups are increasingly attempting to develop products to sell locally, or in some instances, to a larger market, including through the internet. Even with limited cash flow, a variety of products can be raised cheaply in small concrete or plastic vessels including catfish, eels, frogs, and crabs (Montien-Art et al. 2012). These systems can be situated in strategic locations that are convenient to access and don't interfere with other land use

activities. In integrated farm settings, aquaculture/fishery systems of any size can be situated near food supply sources; and wastewater outputs can be used as irrigation inputs to crop systems. Appropriate site selection is crucial to avoid runoff from agriculture areas where pesticides and inorganic fertilizers are used.

In some cases, the “site” may be a shared water resource that requires appropriate management. Villagers without access to lands, for example, may choose to develop fish cage systems on water bodies such as rivers that flow year round (Lebel et al. 2014; Figure 1A). River cage systems in Thailand are used to raise market fish including hybrid red and black Nile tilapia (*Oreochromis niloticus* L), catfish sp., and carp sp. during periods of ample water flow (LARReC 2001; Lebel et al. 2013). In nutrient-rich water, algae and zooplankton can be utilized as natural food sources. While the flowing nature of river water reduces the need to monitor basic water quality variables frequently and precisely, there is concern about water quality degradation from agricultural runoff containing agro-chemicals in the wet season and low oxygen in periods of low flow (Ingthamjitr et al. 2017). A primary concern of farmers using this system, after initial investment costs, is water availability during dry spells, which are inherent with the dry savanna monsoon climate of montane mainland Southeast Asia (Lebel et al. 2015; Lebel et al. 2018). As rivers are a shared resource, attention is needed to avoid negative impacts such as restricting water flow and passage, introducing contaminants, disease, and unwanted alien species into the environment, and poor aesthetics. Also with shared resources, appropriate management is needed to maintain viable populations (see case study description in Figure 2).



Figure 1. Extension activities related to livelihood development in rural Thailand and Lao People's Democratic Republic

(A) Raising of red hybrid tilapia in cages on the Ping River near Chiang Mai, Thailand. (B) Consultation with local gatekeeper at community fishery at Saraphi (Chiang Mai province). (C) Students at an elementary school in Mai Ai (Chiang Mai) participate in building a fish cage that will be used to raise protein for the school. (D) A fish pond at the primary school in Bo Keao (Chiang Mai), where agricultural runoff is a source of contamination to the pond. (E). Community members in Luang Prabang, Lao People's Democratic Republic, maintaining a fish pond. (F) In one community in Chiang Dao district, villagers catch fingerlings of hybrid tilapia from a breeding pond to distribute to other members of the community group. The university provides adult breeding males and females to produce the stock. In the past, the fish stocks were made available entirely by the university, but now the villagers have the expertise to raise them alone.

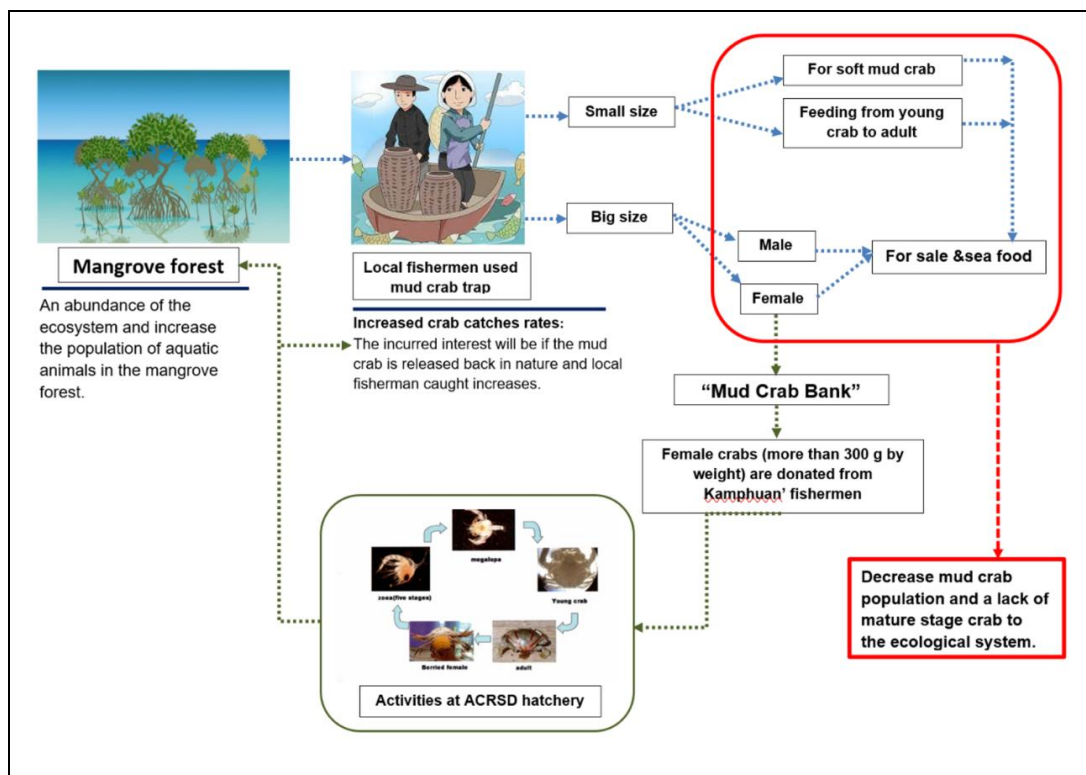


Figure 2. Schematic of ACRSD activities involving the management of wild mud crab harvesting. In 2020 the station implemented the “Mud Crab Bank” with members of the local fisheries group whereby female crabs (*Scylla olivacea*) are donated by fishers to the bank hatchery at the station where newborns are raised, then allowed to reproduce before released back into the mangroves. The heart of the issue is that over-collection of crabs has reduced the population drastically because young females are harvested indiscriminately before producing their first cohort. The goal of the crab bank project extends beyond increasing the population of mud crabs to promoting the awareness within the community of the need for habitat conservation and of the dangers of over-harvesting, particularly of young females. Further, the inclusiveness of the project allows for building trust with a core group of local fishers who inevitably will determine the success of the project through direct participation and spreading the word to others who are not directly involved.

PROSPECTS AND CHALLENGES IN PROMOTING AGROECOLOGY

Many farmers/fishers in the region follow successful practices they see others doing or that have been promoted by various organizations (including contract farming). New ideas are accepted if they are profitable and convenient. Many people tend to resist making drastic changes to practices that have uncertain outcomes. Although agroecology is increasingly heralded as a means of obtaining greater food security in the long term, it is difficult to convey this possibility to people who have limited economic means, particularly if it means reducing yields and increasing the time investment. Rarely are people willing to wait long periods of time for return on investment; however, rubber is a counterexample for risk avoidance that has had variable success in improving livelihoods in montane mainland Southeast Asia (Fox et al. 2014; Ahrends et al. 2015). Relevant here is that rubber was promoted heavily by both the government and large corporations, whereas agroecology has not been encouraged.

These villager understandings were also apparent in a recent study in remote Nan Province, Thailand (Promya 2021). None of the households interviewed were knowingly attempting agroecological practices *per se*. Most people engaged in farming were constrained by high operating costs, insufficient water, and problematic supply chains. Although open to new crops and/or cropping methods, most were concerned about lacking the knowledge and income to make a transition. Many of the villagers who were amenable for new ventures were older with limited lands; therefore, they recognized the need to cooperate to share resources and reduce expenses in order to maximize profits in the future. Further, most were concerned about the impending effects of climate change, in particular, drought impacts. The Nan project further revealed that the interest of young people in agriculture/aquaculture is mostly as a secondary income source to supplement more stable revenue streams such as from work in banking, government positions, sales, engineering, and information technology (*cf.* Filloux, Faysse, and Pintobtang 2019; Salvago et al. 2019).

The COVID-19 pandemic of 2020–2021 provided an opportunity to consider the current state of resilience of agriculture in the developing regions of Asia (Waibel et al. 2020; Duguma et al. 2021). Initial evidence suggests the pandemic affected the productivity of many fishery/aquaculture operators in the Southeast Asian region because of higher prices of materials, disruption of labor, and reduced accessibility to markets for selling products and obtaining feed and stocks (*cf.* Lebel et al. 2021). The negative effect of the pandemic on our teaching and village knowledge transfer activities was largely logistical, manifesting as reduced opportunity to meet in person with large groups. With the collapse of the tourist trade, particularly in Thailand, many people returned to villages to work on farms and/or as laborers. We also experienced that while the operation of local markets was frequently disrupted (e.g., because of physical distancing restrictions), some individuals were still able to sell some products locally; and government financial support in purchasing necessities was greatly beneficial to many rural folks and the rural businesses they frequented. Although we did not research this issue directly, we observed that many villagers displayed a certain degree of resilience to the economic hardships caused by the pandemic, unless they were in substantial debt or experienced other family crises. In Lao People's Democratic Republic, however, the situation was more dire, especially for marginalized groups, including the extremely poor, those dependent on remittances, subsistence farmers, women, the elderly, and the handicapped.

Again, while we have yet to assess the impact of the pandemic through appropriate research methods, we can envision how agroecology principles that give individuals more control of various phases of the production cycle could provide additional resilience in times of crisis. Moreover, they should be beneficial in reducing environmental degradation and bracing for the potential impacts associated with climate change.

OUTLOOK AND CONCLUSION

As the manner in which food is now generally produced worldwide is increasingly viewed as unsustainable, some believe it is time for an agroecological revolution to ensure food security in the future (*cf.* Foley et al. 2011; Telesetsky 2015; Holden et al. 2018). As demonstrated in the educational examples above from Thailand and Lao People's Democratic Republic, we as educators share the view that the incorporation of agroecology principles more widely into fishery/aquaculture systems could contribute to the sustainable production of food and meanwhile improve livelihood resilience in the future. However, doing so is difficult because this particular movement still lacks local framing. Importantly, agroecology is often reduced to, or mis-associated with, nature-based restoration, organic farming, and agrotourism. Although

there are overlaps, few villagers understand the complexity and full extent of the concept. Further, at the most basic level of implementation, most villagers are not willing to take risks on new methods without seeing proven examples at work. Admittedly, we as educators in fishery/aquaculture facilities also do not have the expertise in all phases of implementation of this transdisciplinary concept. We also struggle to envision how agroecology can be scaled to become a competitive alternative food system in the immediate future (Dalgaard, Hutchings, and Porter 2003; Castella and Kibler 2015; Bernard and Lux 2017; de Molina 2020).

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Reinvigorating the Philippine Seaweed Industry through the Application of an Improved Drying Technology

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ABSTRACT

Seaweed farming is one of the major sources of livelihood for many of the Philippines' fisherfolks living in coastal areas primarily due to its short gestation period. However, farmers must partially dry their harvest before selling to the traders or buyers. The inherent problem in the traditional drying practice is that dried products are usually of poor quality. Moreover, farmers are hesitant to plant all year round or expand their production areas due to the variable weather conditions that sun drying is not possible. To answer the need for a faster and more efficient seaweed drying operation, a seaweed dryer was designed and developed. With the introduction of the seaweed dryer, farmers can dry their harvest even during cloudy or rainy days since the dryer is fully covered, and it can be used either for solar or air drying. Geographical factors, natural hazard vulnerability, and farmers' preference gave way for the development of two types of dryers: permanent and floating type. Both dryers were found to have positive effects with regard to drying time, product quality, streamlined operation, and overall economic benefits.

Keywords: seaweeds, floating-type seaweed dryer, permanent-type seaweed dryer, drying

INTRODUCTION

The Philippines, being rich in marine resources, is one of the largest global exporters of seaweeds. Contributing to almost 50 percent of the country's total aquaculture assets, the seaweed sector provides substantial livelihood to 200,000 fisherfolk families and 30,000 market traders (Pedrosa 2017). In 2018, seaweed production reached 1.478 million metric tons which is 4.45 percent higher than the previous year (Philippine Statistics Authority 2018). However, despite the growing prospects in seaweed production, the sector still lags behind in terms of market value (Ferdouse et al. 2018). Existing challenges and constraints in pollution control, disease proliferation, natural hazards, post-production losses, inconsistent quality, and quantity of dried seaweeds and financial constraints have taken a heavy toll on the sustainability of the seaweed industry (Southeast Asian Fisheries Development Center 2018). This signifies the need for further technological intervention programs and beneficial economic policies to improve the seaweeds market industry. An existing problem in the seaweed post-production value chain can be pointed to the underdeveloped drying system. The drying system that dominantly utilizes direct sun drying is easily hampered if there are unfavorable changes in the weather condition such as sudden precipitation. In addition, the lack of sturdy and viable drying cover has significantly increased the risk of contamination that compromise the quality, which in turn lowers the trading price of the dried seaweeds. To address this problem, an efficient, effective, and suitable seaweed drying system was designed and developed. Through the national adoption of the developed seaweed drying technology, it would not only provide sustainable livelihood to Filipino seaweed cultivators but also reinvigorate the country's seaweed industry in the global competitive scene. The study included the brief discussion on the development, the current state of the technology, and the recommendations for the successful national implementation and adoption of the drying technology.

METHODOLOGY

In the development of the drying technology, several activities were conducted specially during the initial design phase. Activities conducted include (1) field visits and surveys to identify the farmers' existing drying practices and current seaweed production system including the marketing of the dried products, (2) design and fabrication of the seaweed dryer, (3) field testing of the developed drying technology including the conduct of optimization study to determine the operating parameters of the dryer, (4) finalization of the dryer design by incorporating the necessary modifications, and (5) assess the financial viability of using the developed drying technology.

Technology promotions were done through the conduct of technology forums, collaborative research with government and nongovernment agencies, trainings of manufacturers on the fabrication of the dryer, and trainings of farmers on the proper operation of the drying technology.

RESULTS AND DISCUSSIONS

An efficient and suitable village-level seaweed dryer was developed to address the urgent need for a reliable and efficient drying technology. Through extensive baseline community surveys and field test experiments, the dryer was more than capable of rendering high grade raw dried seaweeds in a short amount of time compared to traditional sun drying practice. Accordingly, two seaweed dryer types were fabricated: a permanent-type (Figure 1) and floating-type (Figure 2). Considerations on which type of dryer was suitable for the chosen seaweed production sites were primarily affected by the natural geography and farmers' preference. Permanent-type dryer features a sturdy and fixed concrete foundation, making it more durable against strong waves and storm surges specially if constructed near shores. On the other hand, the floating-type dryer's distinct feature comes from its fitted drum floatation device, which in turn allows flexibility in towing the dryer directly to the seaweed farms to save on hauling cost. Drying activities revealed that the initially developed dryer effectively reduced the drying time from five to three days and rendered the dried seaweeds with highly desirable qualities. Despite the success of the initial fabrication, the dryer was still required to incorporate design improvements and optimized setup in order to improve its performance, structural soundness, and ease of use.

Further field tests and user feedback were mainly considered in the design improvements and modifications for the succeeding construction of the seaweed drying system. The structural integrity of the two dryer types was improved and the drying performance was enhanced through the installation of solar-powered exhaust fans. In connection to this, a lighting system was fitted inside the drying chamber to allow nighttime operation and to add security measures. The drying chamber was also reconfigured to maximize the space utilization by installing layered drying trays. Subsequently, an optimization study was carried out to determine the ideal adjustment of the foldable greenhouse siding and the use of exhaust fans under sunny and rainy conditions (Pangan, Ampo, and Barredo 2020). A following field validation test later confirmed that the determined optimal setting effectively hastened the drying time with a range of 2.5–3 days, signifying the positive drying effect exhibited in the dryer. Additionally, the validation test verified that the dryer was capable of drying up to two tons of fresh seaweeds. The resulting improvements consequently marked the readiness of the developed seaweed drying system for the nationwide commercialization.



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Figure 1. The permanent-type seaweed dryer constructed in Perez, Quezon.



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Figure 2. The floating-type seaweed dryer constructed in Looc, Romblon.

As a result of vigorous technology promotion, different coastal areas all throughout the Philippines had already adopted the drying technology and consequent construction plans are on the way, suggesting the positive socioeconomic impacts and general acceptability of the technology. Importantly, financial assistance and loan programs through dynamic collaboration with government and non-governmental organizations are integral part in supporting the national implementation and adoption of the developed seaweed drying technology. Through the national application of the developed technology, it will create more career opportunities for Filipino seafolks while robusting the status of the seaweed industry as a strong global market competitor.

With the proven advantage and versatility of the developed drying technology, several government and nongovernment agencies adopted the technology and funded the construction of seaweed dryer units for their seaweed farmers' associations. Up to this date, a total of 22 dryer units were already constructed in different seaweed growing areas of the Philippines and around 20 units more for construction. Furthermore, results from the profitability analysis showed that the technology will definitely increase the income of seaweed farmers due to the improvement of the quality of their dried products. With the availability of drying technology, farmers can now plant all year round thus increasing their coping intensity or increase their planting or production areas making seaweed farming a sustainable and dependable source of income for our marginalized fishery sectors.

Seaweed production being the number one aquaculture commodity of the country must be therefore revitalized. With the assistance of government as well as nongovernment institutions in terms of policy formulations and implementation and funding support, will be the key in alleviating coastal rural poverty and in strengthening the industry's national and international competitiveness. One of the main factors in making all this possible will be to implement a nationwide application and adoption of the improved drying technology.

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Initiatives for Development of Integrated Coffee System under Market Forces in the Central Highlands of Viet Nam

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ABSTRACT

Enveritas is a US-based non-governmental organization founded in 2016 to overcome systemic barriers that prevent the application of proven solutions for ending poverty among smallholder coffee growers. Enveritas first initiated activity in the coffee bowl of Viet Nam — the Central Highlands, in collaboration with CARES and Dalat University in Lam Dong Province, targeted on assessing criteria for sustainable coffee production. Through the collaboration, large-scale coffee farm surveys were implemented with rigorous survey approach and quality control applied in recent years. This paper relies on a small part of the survey data conducted in two coffee harvesting seasons of 2019/20 and 2020/21 to visualize some differences in performance of the two coffee farmer's groups: one adopting integrated coffee system (G1) and the other mono-coffee farms (G2). Though there was a large variation among provinces regarding density and types of shade tree adopted, the Wilcoxon rank sum test between G1 and G2 showed that G1 had lower coffee yield and thus lower income from coffee compared to those of G2. However, the overall income of G1 farmers was significantly higher as they had additional income from intercropped trees. In addition, data analyses reflect a less dependence over chemical fertilizers and more resilience of G1 farmers under climate changes and coffee market risks. However, since the farm transition was driven by markets characterized by up-and-down price, it is uncertain that farmers will continue their integrated system or turn back to mono-coffee system as they did in the 1900s and 2000s. Some initiatives proposed for different stakeholders in the forms of joint-efforts, will be discussed to keep the existing coffee farming transition toward integration moving on.

Keywords: Integrated coffee system, farming efficiency, resilience, ecosystem services, Central Highlands

INTRODUCTION

Coffee plays an important role to Viet Nam's economy with annual turnover of around USD 3 billion and providing jobs for more than 600,000 households (ICO 2019). Coffee was originally grown under shade trees or forest canopy (Muschler 2004). However, in the 1990s and 2000s worldwide coffee demand increased sharply along with the rise of coffee prices which led to a dramatic expansion of coffee growing areas coupled with a devastating cut-off of shade trees in the existing shade grown coffee systems to maximize coffee yield (Long et al. 2015). The practices of having no shade trees, together with increasing chemical uses have been posing huge challenges for farmer's sovereignty, farming efficiency, and sustainability in coffee sector. In recent years, decrease of coffee prices coupled with low farming efficiency caused by increased chemical uses and cost have made coffee production challenges to many coffee farmers (Anh et al. 2019). In parallel, the emerging market for other agricultural products such as fruits has created an opportunity for farmers to restructure their coffee farms toward more diversification.

This paper is based on part of the data gathered from 7,310 farmers by Enveritas through its local partners CARES and Dalat University. The surveys were conducted over two coffee harvest seasons of 2019 and 2020, with a rigorous survey and quality control approaches. For the survey conduction, a technical handbook on sustainable coffee production, in color, with

relevant illustrative pictures, i.e., on symptoms of pests, diseases, nutrient deficiency, and roles of shade trees playing on coffee performance, was given to each participating farmer in return for their provision of information. The handbook is expected to have some value in getting farmers on a better track toward sustainable coffee production.

As described in the following section, the research outcomes add to the existing rich literature on advantages of the integrated coffee system which does not only guarantee farmers better income, but also reduce risks especially in the time of increasing pandemic and market risks, and increasing demands for sustainable and more resilient food systems under climate changes. However, without taking up initiatives to keep farmers in favor of the integrated system, the market that pushed farmers toward mono-coffee in the 1990s, and then back to more coffee integrated system in the 2010s, could influence farmers' decisions on transitioning back to mono-coffee again.

RESEARCH METHODOLOGY

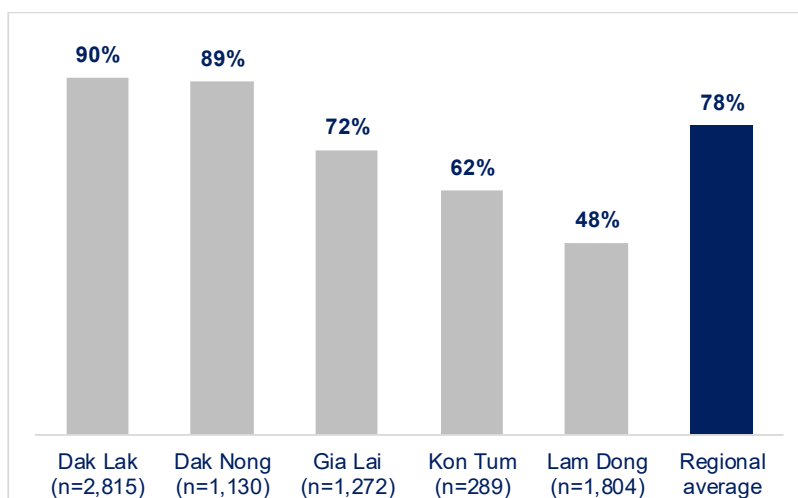
The study uses a part of data from the Enveritas Coffee Survey conducted in coffee harvest seasons in 2019 and 2020. The survey includes information about farming practices, productivity, coffee pricing, access to training and finance, relationship with workers, health and safety aspects, biodiversity, soil and water conservation, and chemicals uses. For sample randomization, Enveritas applies machine learning algorithms to high-resolution satellite imagery to detect coffee growing households. Through this advanced data collection methods, representative samples of coffee farms were obtained, reaching out to even the most remote villages in five provinces in Central Highlands which accounts for 92 percent of the country's coffee production. The geo-randomization tool provides random drop pins across defined geographical units. On each of the selected farms, a farmer was interviewed by the enumerator in-person and on-site through a mobile application. The sampling plan ensures the margin of error at the defined geographical unit level to be not higher than 10 percent. Survey results and field observations undergo rigorous quality control and outlier detection process before being accepted. Backchecks on a sample size of around 8 percent was performed to ensure data integrity. In total, 7,310 farms across these five provinces were visited and interviewed.

For the purpose of this paper, the interviewed farmers were divided into two groups: those following integrated coffee system (G1, $n = 5,714$) and those following mono-coffee system (G2, $n = 1,596$). The Wilcoxon rank sum test and z-test at the confidence level of 95 percent were therefore used in the analysis to test significances of differences between two farmer groups in some selected variables.

CHARACTERISTICS OF EXISTING COFFEE SYSTEMS

Driven by market potential on fruit crops in the recent decade, a vast majority of farmers in Central Highlands (around 78%) integrated new crops into their coffee systems. However, there is a huge variation in adoption of integrated coffee systems among provinces — from 48 percent of coffee farmers in Lam Dong to 90 percent in Dak Lak and Dak Nong (see Figure 1). The differences may be due to climate (higher rainfall, lower temperature), topography (higher altitude, more water resources), cultivation practices (i.e., multi-stem), and larger farm sizes of Lam Dong farmers. However, these explanations need to be confirmed by further analysis.

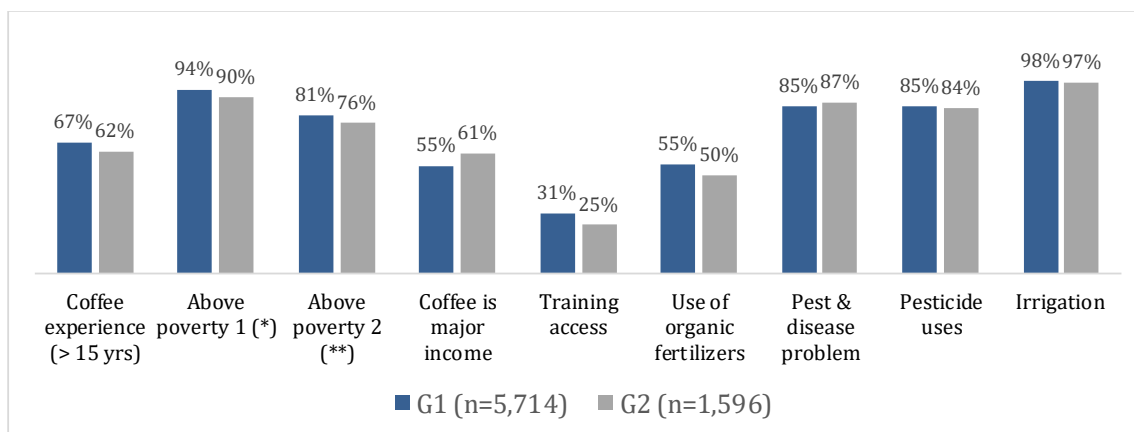
The most commonly intercropped trees are avocado, durian, and pepper. However, the popularity of each type of tree varies. Other trees such as *Senna siamea*, *Acacia*, *Ceiba pentandra* and *Litsea glutinosa* are also grown by farmers for shade purposes.



(Source: Enveritas data collected in Vietnam in 2019/20 and 2020/21 harvest seasons)

Figure 1. Share of households adopting integrated coffee system by provinces.

Analysis of survey data reveals that compared to G2, G1 farmers are significantly more experienced in growing coffee and more of them attended technical trainings in the last two years. Additionally for smaller share of G1 farmers, coffee is the main source of income and there is also less poverty observed in this group. In terms of farming practices, G1 farmers use organic fertilizers on their coffee plots more often. They also reported having less issues with pests and diseases on coffee. However, in fact, more G1 farmers tend to rely on pesticides. This could be explained by the fact that for G1 farmers high value of fruit crops integrated in the system drove them toward being more cautious and thus protecting the crops from pest and disease attacks that may harm both coffee and the integrated crops (i.e., phytophthora, soil-borne diseases, nematode or mirids). This tendency applies also to irrigation investments and practices — for example, 32 percent of G1 farmers invest in sprinkler irrigation, whereas for G2 farmers it is only 20 percent (see Figure 2).



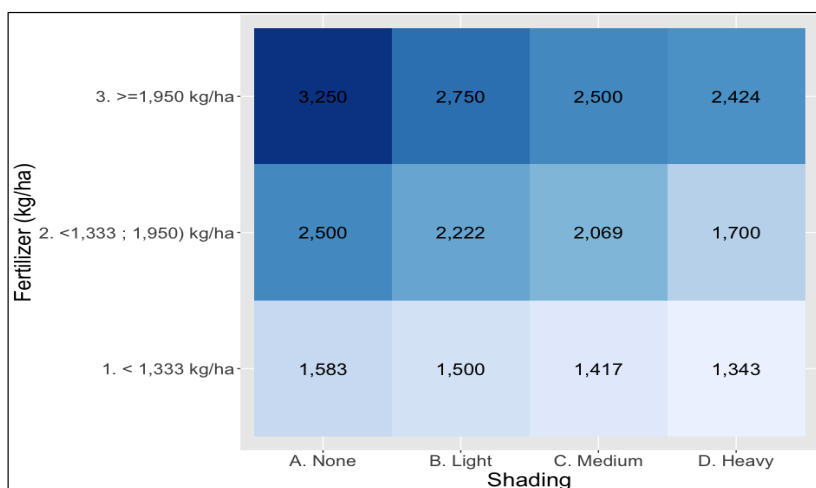
(Source: Enveritas data collected in Vietnam in 2019/20 and 2020/21 harvest seasons)

Figure 2. Major differences of G1 and G2 farmers.

(Remark: all differences statistically significant at 95% of confidence; (*) (**) Above poverty 1/Above poverty 2: above the extreme poverty line (\$1.90) and poverty line (\$3.10) respectively - based on the Poverty Probability Index).

ECONOMIC PERFORMANCE OF COFFEE SYSTEMS

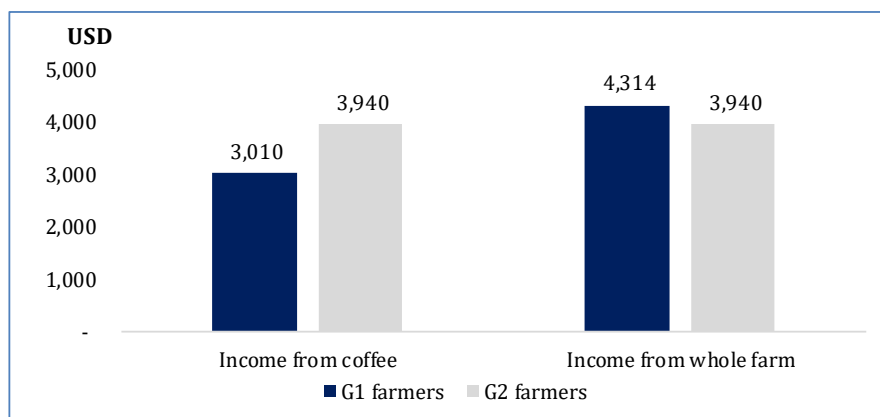
In the integrated system, lower coffee density and lower light intensity may be the explanation for lower coffee yields. Worldwide, shade trees usually decrease coffee yields of about 18–50 percent depending on a country (Long et al. 2015). In this study, for farmers using the same quantity of fertilizer, G1 farmers with shade trees achieve lower coffee yields, ranging from 15–25 percent in comparison to G2 farmers (see Figure 3). It is worth investigating if the biannual pattern is more evident for the G2.



(Source: Enveritas data collected in Vietnam in 2019/20 and 2020/21 harvest seasons)

Figure 3. Coffee yields by chemical fertilizers application and shade levels.

In regard to coffee production, G1 farmers apply significantly less chemical fertilizers than G2 farmers which potentially contributes to farming sovereignty, soil, water, and biodiversity conservation and greenhouse gas (GHG) emission reduction (Kuit & Tjndink 2020). In addition, the total household income of G1 farmers is significantly higher than of G2 farmers because of the additional income generated from the integrated crops. Farmers following integrated coffee systems earn on average USD 4,314 per hectare and those following mono-coffee system earn USD 3,940 per hectare (see Figure 4). These figures mean that G1 farmers are more likely to be resilient, enjoying higher farming efficiency, as compared to G2 farmers. Production costs were not deducted from total income here which assumed costs are comparable.



(Source: Enveritas data collected in Vietnam in 2019/20 and 2020/21 harvest seasons)

Figure 4. Comparison of farming income of G1 and G2 farmers.

MARKET DRIVING FORCES: CHANGES WITH UNCERTAINTY

In the last three decades, Vietnamese agriculture has not only provided livelihoods for millions of small farmers, but also generated billions of dollars from exports. These directed governments toward efforts of promoting commercial and often, mono-based agriculture. In this direction, no attention and support have been proposed for synchronized systems — like the case of integrated coffee presented in this paper (see the Circular 27/TT-BNNPTNT in 2013 and the Decision 49/2016/QD-TTg in 2016).

That government targets the development of so called “crops of good cash return” with less awareness of efficiency of integrated farming systems and roles of biodiversity in sustaining ecosystem services resulted in a strong restructure of agriculture toward fruit crops at the expense of other food crops. For instance, in the period of 2010–2019 for the entire Viet Nam, the area for fruit crops increased by almost 30 percent at the expense of other crops such as maize, soybean, peanuts, etc. (GSO 2020) since these crops have been considered low profitable by governments and farmers. Reduction of these crops has made overall Vietnamese agricultural systems less sustainable — animal sector largely dependent on imported feeds whilst increased fruit crops have badly hit many farmers. As had happened to coffee, pepper, and other crops in the past, market price for present fruit crops has dramatically reduced in the recent two years. For example, in 2015, the farmgate price for avocado was VND 30,000–50,000/kg, and it dramatically declined to VND 5,000–7,000/kg in 2020. Similarly, the farmgate price for durian has dropped by 30–40 percent in 2021 compared to the previous year. There are signals that many farmers start to restructure their crops again. Some farmers decided even to cut down avocado trees integrated in coffee farms, as reported by the local newspapers (Huyen 2021). These are not good signals for the national agriculture in pursuing sustainability, and medium- and long-term efficiency.

In the absence of government policies driving agricultural systems toward more synchronized integration, the shift from mono-coffee system toward integrated systems with fruit and/or other crops in the last decade have been mainly driven by low coffee market and high market potential for other crops in the Central Highlands. This means that if farmers remain highly responsive to market forces, there could be uncertainties for agricultural systems in the Central Highlands: either farmers will continue to follow the integrated coffee system and further transit toward integration, or they will return to mono-coffee system as it was widely observed in the 1990s and 2000s. Interventions to raise awareness of farmers on the roles of shade trees on coffee performance efficiency and sustainability as well as overall farm system economic benefits have been taken by the collaboration of Enveritas–CARES–Dalat University, to some extent (i.e., by delivering technical handbooks to farmers). However, a lot more needs to be done by different stakeholders for a sustainable coffee sector in Viet Nam.

The local experience with crops such as coffee, pepper, and avocado revealed that the lucrative crops, in the mid- and long-run, could have negative impacts on the local economy, society, and environment since farmers often increase chemical use to protect the intercropped crops without adequate technical and environmental concerns. The issue is more serious when peak time for pests and diseases of some existing fruit crops is coincident with coffee harvest time. This also causes anxiety among consumers about food safety which again narrows domestic market demands and export opportunities. The existing chemical practices on good-cash-returning crops such as durian, avocado, and sweet potato in the Central Highlands in the recent years strongly reflect this trend. Thus, poor existing awareness of stakeholders at all levels (policymakers, technical staff, and farmers) on multiple roles the ecosystem services on the farming efficiency, sustaining economic benefits, and farmer's resilience under climate change and market risks is a major constraint in Vietnamese agricultural development toward more effective and sustainable forms.

INITIATIVES FOR CONTINUATION OF COFFEE SYSTEM TRANSITION TOWARD INTEGRATION

Driven by uncertain markets will trap most farmers into trouble with increased chemical uses for crops of good markets and risks caused by up-and-down market, which is largely embedded with risks of climate changes at the landscape, regional, or global level. Overall intervention efforts thus need to focus on “mitigation” of (short-term) market influences over farmer’s farming decisions by promoting/supporting measurements to sustain the farming systems, instead of getting in line with market signals for (short-term) direct economic returns.

At the present, integrated farming systems for farmers just mean an expectation on more economic return with less risks of market price drops. Due to the lack of awareness on ecosystems, no efforts on improving them have been valued and/or taken by farmers. For this, chemical uses remain to be driven by market signals on the crops, not by technical appropriates (CDC 2020). A transformation of stakeholder’s awareness on the roles of ecosystem services on farming efficiency and farmer’s resilient capacity under definitely increasing climate and market risks should be first prioritized for a more efficient and sustainable farming. For this, a national communication program and/or training on ecosystem services and their roles is of extreme need in Viet Nam. These not only help raise awareness but also reach a common understanding of stakeholders on ecosystem services: what are they, why, and how do they help sustain farming economic benefits and environment in the time of increasing pandemic, and climate and market risks. With this, policies shall be designed with more integrated, circular and sustainable perspectives, and farmers shall value their crops beyond (short-term) direct economic interests.

The promotion of integrated coffee systems in regard to sustainability and diversity would also need contribution from other stakeholders. For instance, NGOs (such as Enveritas, GCP, IDH) can provide the overview and insights of the issue by data-driven approaches. Universities and research institutes (i.e., VNUA and those in the Central Highlands or WASI) can play the role of disseminating knowledge to farmers and local technical staff, especially regarding agroecology approaches. Other coffee actors like local buyers and suppliers will support with buying mechanism for high quality and sustainable coffee under integrated systems as well as seedlings promotion and delivery. In addition, these institutions can support in designing the most suitable models in specific localities. In parallel, governments at different levels (i.e., district, province) can help with programs or policies supporting and sustaining integrated coffee systems that have been largely adopted by farmers in recent decade.

In addition, international roasters and development organizations can be the big players in directing not only coffee farmers but also consumers toward more environmental behaviors and actions. They could consider to take steps in providing support for different Vietnamese stakeholders in raising their awareness on ecosystem services that sustain coffee production from which they could more effectively play their roles in promoting sustainable coffee sector for Viet Nam in the coming future.

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Localizing Agroecology and Fostering Sustainability of Rural Livelihoods/ Communities through Community Entrepreneurship to Support Family Farming: Framework, Experiences and Lessons Learned

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INTRODUCTION

Small-scale farming is a dominant feature of agriculture in developing and low-income countries. Farming activities are mostly family-based and those families face limitations in different aspects of farming, from pre-production, production, post-harvest, and marketing, to earn income.

This situation poses challenges on how to support these family-based farming, as they are facing problems and challenges along value chains of farming (Helmi et al. 2019). In this context, agroecology approach is very relevant to addressing those challenges and transforming agriculture systems to build an inclusive, safe, sustainable, and resilient society. Toward this goal, there is a need to localize and develop a down-to-earth framework to apply agroecology approach.

In order to achieve sustainability and prosperity of rural agriculture-based communities, there is a need to create financial values based on families, local institutions, and resources with collaborative support from universities, government, and private and media institutions. In this relation, the concept of community entrepreneurship comes in (Silfia et al. 2021). The basic principles of community entrepreneurship are to provide support to family-based farming in dealing with problems and challenges, while at the same time creating financial value for the prosperity of those families.

We, as university researchers, have made efforts to develop and adapt a framework in an evolutionary manner in the last decade related to localize agroecology and support the development of community entrepreneurship (which is the application of entrepreneurial principles in the context of social responsibility and sustainability of rural livelihoods). In the following sections, the evolution of the framework and experiences, the community entrepreneurship aspect, and lessons learned are presented.

EVOLUTION OF FRAMEWORK AND EXPERIENCES: THE COVID-19 PANDEMIC FACTOR

Initially, we as university researchers, started the work in collaboration with UNESCO Indonesia, developing a framework for a Community Learning and Action Center (CLAC). This CLAC's focus is to strengthen community livelihood capacity and function as a hub connecting rural agriculture communities with university, government, and the private sector (Quadruple Helix/QH Model of Collaboration) (Helmi, forthcoming). Therefore, it is

the CLAC as the prime mover. The learning activities are mainly conducted at the CLAC facilities and are complemented with some visits, wherever possible, to participant sites. The relevant parties (stakeholders) involved in the QH Model of collaboration came to CLAC to contribute to the learning process and networking development, and in some cases, to join the field visits by CLAC instructors. Initially, the location of our activities was in three districts in Indonesia: one district each in West Sumatra, Yogyakarta Special Region, and West Nusa Tenggara. In the later period, we focus more on the District of Solok and Padang City, West Sumatra Province.

When the COVID-19 pandemic started, there was a restriction on holding gatherings and organizing capacity building, which could possibly cause close contact among participants. Given this situation, the framework was later adapted and evolved by putting in the role of local champions (local enablers) and relying more on their roles to facilitate learning, capacity building, and action at the community level. The local champions work with existing informal bonding or farmers' groups. Their main roles are to facilitate capacity building and play roles to connect the community to different partners in the collaborative framework. Hence, the prime mover is now a local champion, and the instructors from academia (affiliated with CLAC) function to provide backstopping to the local champion in order for them to work with the community and enhance their initiative by assisting in connecting them with relevant collaborative partners. Figure 1 provides an illustration of framework adaptation.

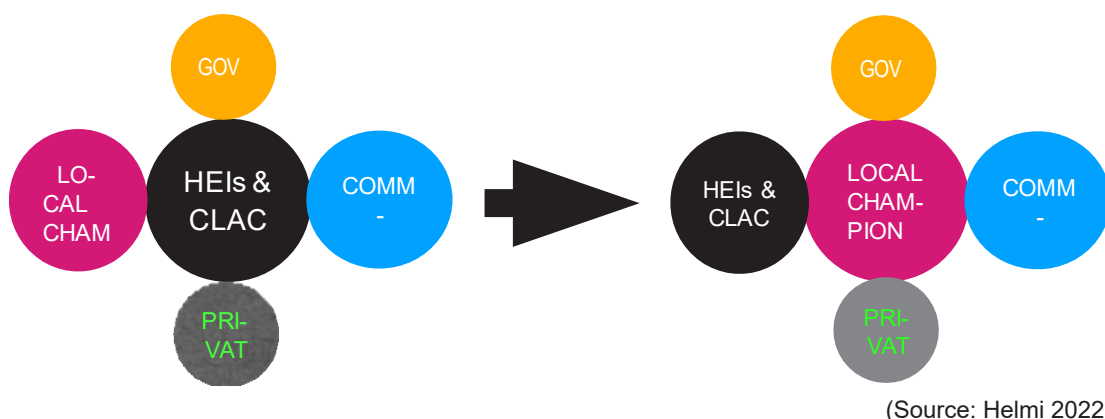


Figure 1. Framework adaptation.

There are currently five local champions involved with the adapted framework. The *first* is working with coffee farmers to improve their livelihood through improving the quality of coffee seedlings planted by farmers, post-harvest processing, and marketing of coffee green bean. The local champions consisted of young entrepreneurs who set up a coffee cooperative called Solok Radjo to run a social business based on social entrepreneurship principles. The role of academia was in providing entrepreneurship training and guidance, whenever necessary, related to start-up and accelerating their social business, linking them with government agencies and the private sector, and promoting their coffee products and the eco-tourism site they developed. The development of eco-tourism site came at a later stage, which provide coffee edu-tourism experiences as well as specialty coffee drinks and food products.

when they started buying coffee fruits, and in five years, the price went up to IDR 8,000/kg before the COVID-19 pandemic (a 400%). The price went down to IDR 6,000/kg during the pandemic because the demand for coffee green beans was also declining, but it is still three times the price when they started the social business.

They did post-harvest processing of the red-cherry coffee fruits to become green beans and get a profit margin when selling the green beans. Part of the profit margin was returned to the farmers in the form of capacity building in managing coffee farming and distributing coffeeseedlings free of charge to those farmers who would like to expand their planting area.

The **second** local champion is focusing his work on organic agriculture, helping build farmers' capacity, marketing of organic agriculture products (vegetables), and developing agri-ecotourism site. The role of academia are garnering support from government agencies, mobilizing donation to buy the organic products and supply it to an orphanage house, conducting activities at the agri-ecotourism site, which created demand for local foods and beverages. The academia also assisted in creating herbal tea products useful to enhance immunity against viruses (including the COVID-19 virus). This creative herbal tea product has drawn the attention of Indonesia's Minister of Tourism and the Padang City Mayor, who helped in endorsing and promoting the product.

The organic agriculture activities have also drawn attention from young people who are interested in learning and started farming activities. As the types of agriculture and food products increased, an academia expert in electronics and his students assisted in applying smart agriculture technology.

The **third** focuses on developing their village as a "village with beautiful flowers," attracting visitors to come, which creates demand for food and agriculture products as well as other rural cultural creativity. The role of academia is to provide advice to develop tourism experiences, help promote the destination, and provide training to produce granule brown sugar from palm tree and sugarcane. The training package included small-scale equipment to produce the brown sugar.

The **fourth** is focused on her initiative in post-harvest processing of local variety of pumpkin to create added value. Pumpkin is available abundantly and fresh pumpkin fruits are sold at a cheaper price. The role of academia was to train the farmer group members to process the fresh pumpkin fruits into noodles, stick snacks, breads, and jams, and help promote the product to prospective buyers.

The **fifth** is focused on post-harvest processing of red onions to also create added value. The academia assisted in improving the quality of the product, helped in registering the product to industrial agency so that it can get better recognition in the market, and helped promote the product to prospective buyers.

The initiatives of the five local champions, their interaction with academia, and support for family farmers and food systems are summarized in Table 1.

Table 1. Summary of five local champion initiatives and interactions with academia.

Local Champion Focus of Activity		Interaction with Academia	Support to Family Farmers and Food System
LC 1	Coffee farming, post-harvest processing, and ecotourism	Entrepreneurship training, start-up, and acceleration of social business, linking with government agencies and private sector, promotion of product and ecotourism site	Market certainty, increasing income, job opportunities (related to coffee processing and activities at the tourism destination site)
LC 2	Organic agriculture, healthy drinks (herbal and vegetable fresh juice) and agri-ecotourism	Production, demand creation, and promotion of organic products and healthy drinks; development of agri-ecotourism site and promotion of events and visits to the site; linkage with government agencies, private sector, and media	Demand creation, increasing income, promotion of agri-ecotourism site, multistakeholders networking
LC 3	Agri-tourism destination promotion, training, and promotion of agriculture and food products	Organizing events to promote tourism destination, training, and demand creation of agriculture products	Demand creation, increasing income, and capacity building
LC 4	Added value creation of local food products	Training and equipment as well as promotion (demand creation) of food products	Production capacity building and demand creation; increasing income; opening market opportunity for local agriculture/food products
LC 5	Improving product quality, and demand creation.	Training and consultation, product promotion and demand creation.	Scaling-up and increasing income.

THE COMMUNITY ENTREPRENEURSHIP ASPECT

In the process, the aspect of community entrepreneurship became part and parcel of the initiative. Basically, community entrepreneurship is about applying social entrepreneurship principles to deal with and create innovative solutions to the problems faced by farmers or the rural community. So, it is problem-driven and innovation-based solutions oriented with the basic concern of how to improve or make livelihood better.

The answer to the problems faced by the farmers or rural community, in some instances, are not readily available. We applied social learning approach in implementing and adapting the framework. Social learning approach has three components: learning to be effective (acquire the know-how), learning to be efficient (implementing with reasonable costs), and learning to expand (expanding coverage of implementation). Experiences from the initiative have given lessons on which components of the frameworks are working and which are not, and need to be adapted and evolved.

LESSONS LEARNED

A number of key lessons learned from the development and evolution of the framework applied have emerged. First, application of social-community entrepreneurship principles in the framework could provide basis for localizing agroecology to support family farmers and food systems. It is combining two important aspects together at the same time: providing innovative solutions to the problems faced by farmers and creating financial value to improve their livelihood. Second, the role of local champions in implementing the framework are important to fostering the application of innovative solutions and creating financial value. Third, the role of academia in collaboration with other key stakeholders to backstop local champions and community in improving livelihood of family farmers is essential. Lastly, social learning approach has helped in creating innovative solutions where answers to the problems faced are not readily available.

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Green Transformation in Agriculture for Sustainability of Rural Livelihoods – Experiences from the Coastal Areas of Vietnamese Mekong Delta

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ABSTRACT

Green transformation in agriculture can contribute to green economy. In fact, agriculture, farmers, and rural areas are the most vulnerable to climate, environmental, and social changes. Research on agricultural transformation from intensive rice monoculture to rice-shrimp integrated farming in the coastal area of Vietnamese Mekong Delta shows that this is a suitable way to promote green economy. The rice-shrimp model brings many ecological and social benefits to the community such as income enhancement, livelihood improvement, pollution reduction, clean and safe products, natural ecological restoration, and good adaptation to uncertainties. Such agroecological farming proves a good case study for future sustainable food systems and rural livelihood sustainability. However, it may be challenged by a lack of technical research, agribusiness approach, transformative resource ability, and government readiness. In order to scale out the agroecological model, it is necessary to have a better connection among related stakeholders, especially farmers, scientists, businesses, and authorities at all levels.

Keywords: agroecology, change, farmer, livelihood, rice-shrimp

INTRODUCTION

Green economy has become a key concept for scientific and policy debates in recent years. The concept promises a new economic growth paradigm that is friendly to the earth's ecosystems and can also contribute to poverty alleviation (UN-DESA 2011). In agriculture, research on agroecology and circular agriculture not only contribute to transformative change toward sustainable food systems and rural livelihood sustainability but also to the green growth of economy, especially under contexts of biodiversity loss, freshwater overuse, disrupted nutrient cycle, soil degradation, water pollution, and climate change today (Nguyen et al. 2019; Aguilera et al. 2020; Vanhamaki et al. 2020; Binh et al. 2021; Grumbine, Xu, and Ma 2021). Transforming adaptation to climate change approach is a suitable way to help overcome adaptation challenges because it can help to reframe human-nature relationships, deal with uncertainty, engender empowerment and agency, and address conflicting values and interests (Colloff et al. 2021). However, research on practical cases for green transformation in agriculture and rural livelihood sustainability remains underexplored (Vanhamaki et al. 2020; Colloff et al. 2021).

Viet Nam is a country located in Southeast Asia. Its economic structure has shifted toward reducing the proportion of agriculture and increasing the proportion of industry, construction, and services. Nevertheless, agriculture and rural areas play an important position in the economy. Still 65 percent of the total population (98 million inhabitants) lives in rural areas and relies on agriculture. Currently, the agricultural sector contributes about 15 percent of the national GDP and 35 percent of the labor force (GSO 2021). The Vietnamese Mekong

Delta (VMD) is the most agricultural productivity in the country. Covering about 12 percent of total national land and 20 percent of total population, the VMD contributes over 50 percent of rice production and 70 percent of aquaculture production annually (GSO 2021). These achievements mainly come from intensive farming practices such as big irrigation investment to control flood and salinity intrusion, high level uses of chemical fertilizers and pesticides (Ut and Kajisa 2006; World Bank 2019; Binh et al. 2021). As a result, its natural ecological system is degraded, which can lead to social conflict between different groups, for example, the fishermen and rice farmers. In addition, climate change and Mekong flow alteration put the current intensive food production system at higher risk, especially drought and sea level rise (Smajgl et al. 2015; Government of Viet Nam 2017). Such challenges require a transformation toward sustainable agriculture and livelihood resilience in rural areas. Recently, local farmers in the coastal VMD have adapted to the “new context” by shifting from mono-rice cultivation (MR) to integrated rice-shrimp farming (RS). This paper will present lessons learned from a green transformation in agriculture for sustainability of rural livelihoods by sharing experiences from the RS model in the coastal areas of VMD.

METHODOLOGY

Both secondary and primary data are used in this study. The secondary data were mainly obtained at the Statistics Offices and Department of Agriculture and Rural Development. Two coastal provinces were selected for primary data collection, namely: Kien Giang and Ca Mau, because these provinces own large areas of RS model in the delta. In fact, the total areas of RS in the VMD was about 206,845 ha; while Kien Giang and Ca Mau accounted for 120,488 ha, equivalent to 58 percent of total RS areas in the delta (MARD 2015). Some basic data at the research sites are presented in Table 1.

Table 1. Basic information at the research sites, data as 2020

	Kien Giang	Ca Mau	Two provinces	Whole VMD	Two provinces over the VMD (%)
Population (1000 persons)	1,729	1,194	2,923	17,319	16.9
Total land areas (km ²)	6,349	5,221	11,570	40,816	28.3
Rice planted areas (1000 ha)	726	112	838	3,964	21.1
Rice production (1000 tons)	4,529	447	4,976	23,819	20.9
Forest areas (1000 ha)	76	96	172	250	68.8
Aquaculture areas (1000 ha)	172	286	458	806	56.8
Aquaculture production (1000 tons)	251	348	599	3,215	18.6
Shrimp production (1000 tấn)	93	196	289	785	36.8
Poverty rate (%)	4.1	5.9	---	4.2	---

(Data collection at the research sites, 2020-2021)

The primary data were collected by Participatory Rural Appraisal (PRA) tools such as timeline analysis, seasonal calendar, mapping exercise, key informant interviews, and focus group discussions with local farmers who have experience during the transformation process (FAO 2011). A total of 12 key informants participated in the research and four focus group

discussions were carried out in Tay Yen A commune (An Bien District, Kien Giang Province), and Tri Luc and Tri Phai communes (Thoi Binh District, Ca Mau Province).

RESULTS AND DISCUSSION

Context and Transformation Process

The timeline analysis in Figure 1 shows that since the Doi Moi policy (renovation) of the Vietnamese Communist Party in 1986, many large irrigation projects have been invested in the coastal areas to prevent salinity for rice production to ensure domestic food security and export. Farmers have changed farming systems from a traditional rice production (1 crop per year) to intensive cultivation (2–3 rice crops per year), leading to a rapid increase in rice production. Total rice production in the two provinces of Kien Giang and Ca Mau continuously increased over the years from 0.9 million tons in 1980 to 4.0 million tons in 2010 and 5.1 million tons in 2015 but slightly decreased to 5.0 million tons in 2020 (Figure 2A).

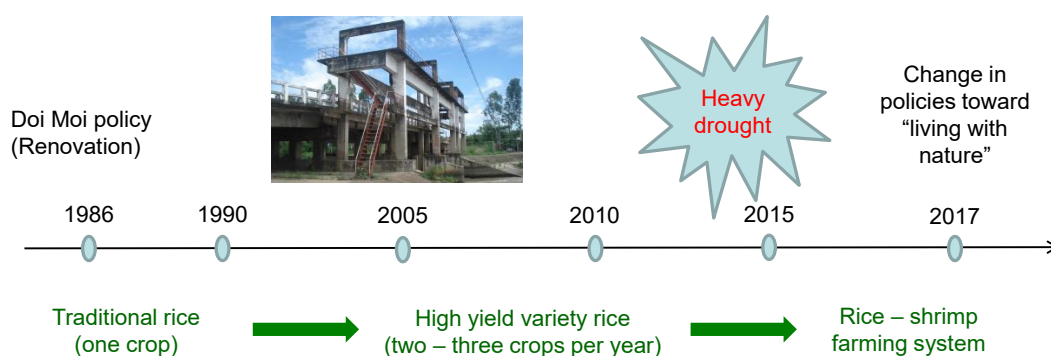
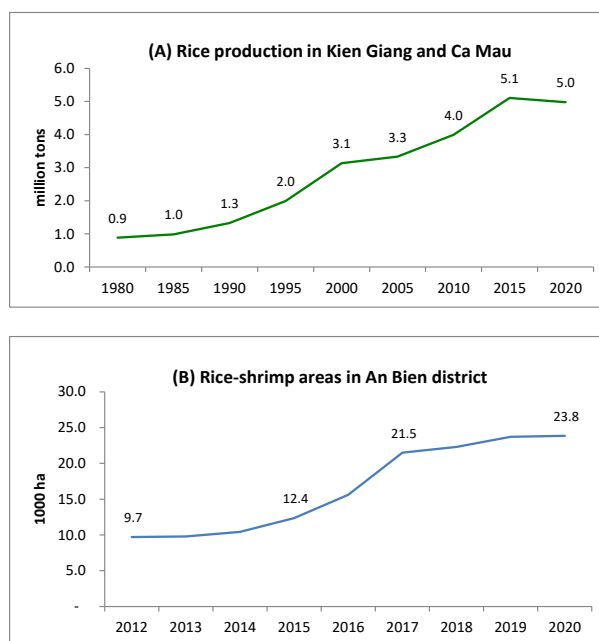


Figure 1. Timeline analysis showing transformation process in the research sites.

Increased rice production contributes to income improvement for rice farmers, but leads to environmental pollution, degradation of land resources, surface water resources and a loss of biodiversity. The poor who rely on natural aquatic resources have been affected. In recent years, the amount of freshwater from the Mekong River has decreased, combined with the effects of climate change and sea level rise, hence, saltwater intrusion into the fields, making rice production increasingly risky. Meanwhile, brackish water aquaculture brings high economic benefits. This motivates farmers to switch to a more appropriate model, which is called the RS model. The historical drought and salinity intrusion that occurred in 2015 made faster transformation process. Figure 2B clearly shows that the areas of rice-shrimp in An Bien District increased from 9,700 ha in 2012 to 12,400 ha in 2015 then grew rapidly to 21,500 ha in 2017 and reached 23,800 ha in 2020.



(Data collection at the research sites, 2020-2021)

Figure 2. Development of rice production and rice-shrimp areas in the research sites

The transformation process was initially spontaneous from farmers because the economic benefits of shrimp cultivation were higher than rice farming. Then the local government allowed the conversion. For example, after the heavy drought in 2015–2016, the People’s Committee in An Bien District (Kien Giang Province) enacted the Decision 1418/QD-UBND in 2017 which provides a legal framework for farmers to convert rice land to rice-shrimp. The Decision clearly states the conditions for the conversion (i.e., inefficient rice cultivation, low yield, consent of the people) and the steps for conversion, so it is very convenient for local implementation. At a higher level, the Government of Viet Nam also issued the Resolution No 120/NQ-CP, dated 17 November 2017 on sustainable and climate-resilient development of the VMD. Its viewpoints emphasize on turning challenges into opportunities, shifting the way of thinking in agricultural development from chemical-based to organic and high-tech practices, respecting natural laws and avoiding violent interference with nature, adapting to natural conditions with the motto “living with floods, brackish water, and salt water.” Therefore, this Resolution is well-known as living with nature policy or nature-based solutions. A combination of central and local policies enables farmers to design a new farming system, which will be presented below.

Agroecological System Design (for a New System)

The survey shows that the average area of the rice-shrimp model is about 2 ha per farm. The rice field when converted to RS is designed into three main parts: the embankment, accounting for about 15 percent, the surrounding water surface area (15%), and the remaining rice field (70%) (Figure 3). The surrounding ditch is dug about 1.2 m deep. When raising shrimp, the water level in the field can be up to 30–40 cm so that the shrimp can find natural food in the field.

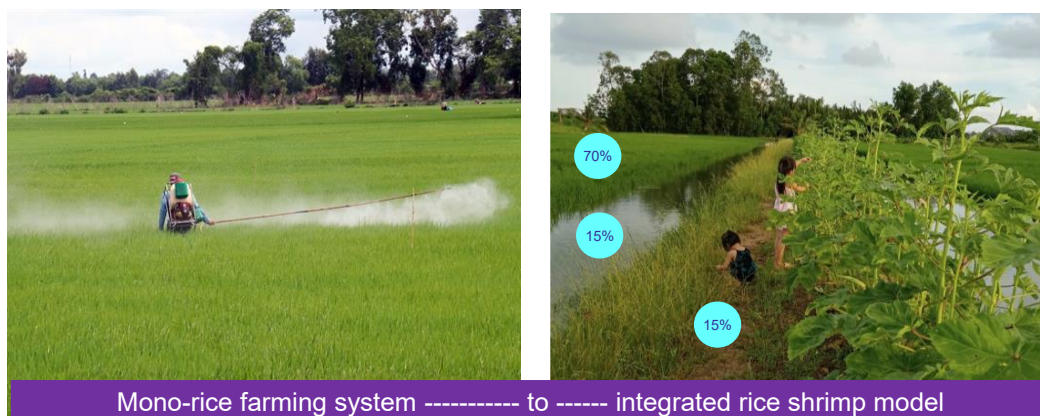


Figure 3. Converting from mono-rice farming to integrated rice-shrimp model.

Seasonal calendar of the RS model is presented in Figure 4. In December, when rainy season ends and salt water enters, farmers begin to prepare ponds and release shrimps. They can stock black tiger shrimp (*Penaeus monodon*) or white-leg shrimp (*Litopenaeus vannamei*) depending on water conditions and family resources. In the year with high salinity concentration, farmers stock white-leg shrimp (more suitable than black tiger shrimp). The white-leg shrimp has a short farming cycle, but the investment is higher than that of black tiger shrimp and the risk is also higher. Farmers can stock 2–3 shrimp crops in the dry season. In August, farmers start sowing rice. Special rice variety such as ST24 is considered suitable for the RS model and is recognized as the best quality rice in the world. In the rice season, farmers also release mud crabs (*Scylla paramamosain*) and giant freshwater prawns (*Macrobrachium rosenbergii*) to take advantage of the water surface. At the end of November, farmers harvest rice and start a new cycle in December. Thus, in the field farmers have many sources of income such as rice, black tiger shrimp, white-leg shrimp, giant freshwater prawn, and mud crab. Besides, farmers also have more income from wild shrimp and fish and upland crops on the embankment.

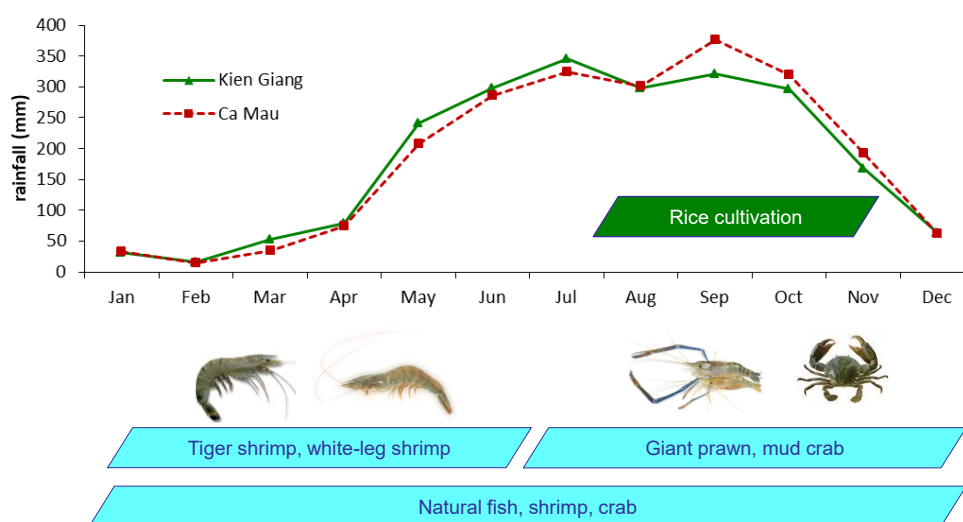


Figure 4. Seasonal calendar of integrated rice-shrimp model in the coastal areas.

Key Benefits and Challenges

Key benefits

The case study of transforming from mono cultivating rice to multiple integrated cultivation of rice and shrimp revealed benefits from various aspects such as economic, environmental, social, and cultural. Economically, farmers involved in rice-shrimp farming have not only gained better incomes but also diversified income sources more responsive and less vulnerable to the market changes. In addition, the integrated farming also contribute to better management of local resources associated with this new integrated farming through circulating them toward minimizing wastes (by reducing, reusing, and recycling). It is very imperative in the context of the ongoing overexploitation and ineffective utilization of natural resources (land and water) as well as increasing use of fertilizer and pesticide in the agricultural sector. Environmentally/ecologically, this new integrated farming help to reduce the pollution generated from its various activities, thereby improving the quality of living environment of farmers and end-users especially the access to the clean water and air. Furthermore, it also contributes to reduce the greenhouse gas emission from rice cultivation and shrimp farming. The approach applied in this farming is based on the inter-related links between societal, natural, and cultural dimensions so-called human ecology that ensures the biodiversity which has been recently degraded tremendously by human intervention especially from the ongoing mono cultivation and input-intensive agriculture in Viet Nam. Last but not least are the social and cultural benefits from this integrated farming. These benefits include the public health of the community, including farmers and end-users, which could be improved through green agriculture with low carbon and circularities of resources involved in the agricultural activities, and entertainment of children, such as swimming and playing in canals and ponds in the natural environment. The economic, social, environmental and cultural dimensions usually co-evolved¹ and reinforce each other in the development course, if one gets lost such as economic will lead to the lost of the ecological and cultural ones. In the case of this agricultural transformation if the living environment as water is getting more polluted from the input intensive agriculture the children usually can play and swim in clean ponds can no longer continue to exercise in those polluted ponds.

Key challenges

Climate change response - climate change adaptation and mitigation

Viet Nam is most vulnerable to climate change, with resettlement and economic activities such as rice and aquaculture production, especially in the Mekong Delta, at increasing climate change related risk with high uncertainties. In this context, the key challenge for sustainable agriculture is climate change impacts. Viet Nam's agriculture is potentially vulnerable to climate change related risks such as shifting rainfall patterns, flood regimes, temperature as well as sea level. In the short run, the balance of rice for export in Viet Nam is still important despite losing the rice harvest from salinity. In the winter-spring crop 2015–2016, more than 339,000 ha of rice in coastal Mekong Delta provinces are prone to saltwater intrusion and drought, accounting for 35.5 percent of those localities' rice area and 21.9 percent of the region's total rice area. Of these, 104,000 ha have been severely impacted. The drought continued until September 2016, threading to 600,000 ha of rice in Viet Nam and paddy farmers has lost over 70 percent of yield. Nationwide, Viet Nam has lost USD 1.5

¹ The concept of co-evolution could be further studied and elaborated in great details comes from Richard B. Norgaard (1994).

billion due to the consequences of drought and salinization. The complex effect of climate change with drought and flood in the Mekong in 2016 had an impact on the total export quantity of rice from Viet Nam with a cut of eight-year low (FAO 2016).

The case study shows some parts of the rice cultivation can be changed to aquaculture, and the rest will continue with rice because farmers are lacking a solution to shift to other crops, and even for rice, the technical solution for supporting farmers with salinity-tolerant rice varieties is still needed. The phenomena of salinity intrusion in the Mekong Delta appears to be more serious. In the spring of 2020, the year most vulnerable to salinity and drought, farmers were advised to shift the seeding one month earlier, combining with salinity-tolerant varieties use, thereby reducing the damage of rice harvesting (MARD 2020).

Apart from adaptation, the mitigation of climate change from agriculture in Viet Nam becomes more imperative due to its increased emission. The Government has committed to reduce greenhouse gas (GHG) to 20 percent up to 2020 from forest loss, annual crops, and mostly irrigated rice and livestock. The System of Rice Intensification (SRI) includes intermittent flooding, transplanting of young (8–10 days old) single rice seeding, intermittent irrigation, and drainage to maintain soil aeration. Model of rice farming technique to reduce GHG emission by technical package based on SRI were tested. It results in increasing rice production effectiveness up to 20 percent because of lower costs and increased productivity. Furthermore, SRI could contribute to the reduction of 25–30 percent GHG, in which reduction of CH₄, NO₂, and CO₂ is 14–21 percent, 15–22 percent, and 22–27 percent, respectively (Dao The Anh 2016). Despite the benefits gained from the SRI model of rice farming, the procedures on how to implement it in reality at various levels still remain unclear.

Need to replace the ongoing irrigation system for rice with the one for rice-shrimp

The current irrigation system for rice is no longer suitable for rice-shrimp farming. Therefore, there is an urgent need to develop a new irrigation system or to redesign the existing one dealing with wastewater treatment and management of shrimp diseases.

Lack of investment for agri-business

For the whole agricultural life cycle, the main agricultural products such as rice, shrimp, and crab are considered clean coming from this integrated rice-shrimp farming. However, the other dimensions/elements of this cycle, such as consumption, promotion, traceability, and branding, still remain rather weak.

Limited studies on nature of the circular green and low carbon agriculture

There has not been an in-depth study on the circularity in the rice-shrimp model, the interaction between the key stakeholders involved especially among those cultivating rice and shrimp varieties, indicators for evaluation and monitoring the performance of the model.

Lessons Learned

Learning from the past good practice in dealing with the relation between human, socioeconomic, and environmental development is still needed

Viet Nam's agriculture currently develops based on overexploitation and overuse of resources, especially land and water resources, reducing biodiversity, causing greenhouse gas emissions, and causing serious damage to the environment. The time has come to transform traditional agriculture, characterized by linear interactions between the environment and development with negative environmental impacts (brown agriculture), to agriculture with dynamic interactions between the environment and development, environment-friendly (green agriculture), in the sense of minimizing the waste of the agricultural system through the method of recycling the resources used in the agricultural system. It is interesting to note that the model of conducting one traditional rice crop combined with natural shrimp harvest has existed in Viet Nam for a long time and is consistent with the rule of six months with freshwater and six months with brackish water. Investment in rice intensive farming is actually not effective and farmers return to natural rice-shrimp appears to be the best.

Think global act local and the need of the full participation of key stakeholders in the transformation

That transformational mode is reflected in local initiatives (such as the rice-shrimp model) in the agricultural transformation toward green and circular agriculture that adapts to the increasing impact of risks related to climate change such as floods and droughts with the philosophy of "living with floods" and "favoring the weather". The model of changing farming methods based only on rice to a combination of rice and shrimp farming in some of the coastal Mekong provinces shows that this transformation has helped farmers who are vulnerable to climate change, strengthen resilience to climate change-related risks, thereby enhancing their resilience to shocks, including shocks related to water resources (floods and drought). The conversion of the second crop, which was previously rice, to shrimp farming, has helped farmers reduce their exposure to the hazards associated with converting surface water from freshwater for rice to brackish for aquaculture. In the process of changing agricultural farming methods, stakeholders such as the Department of Agriculture and Rural Development, the Center for Agricultural Extension, the Sub-Department of Fisheries, and farmers have to face the following difficulties: (i) methods of integrating climate change adaptation into socioeconomic development planning at all levels (province and district); and (ii) lack of weather and climate information (the time when flood water levels appear in the year, the salinity of surface water according to seasons) helps people to be proactive in determining the time of cultivating.

Although the Ministry of Planning and Investment has provided guidance on climate change integration in Decision 1485/QĐ-BKHĐT dated 17 October 2013 on "Promulgating a framework for selecting priorities to adapt to climate change in Socio-Economic Development Planning (SEDP)" (abbreviated as the Guidelines of the Ministry of Planning and Investment). However, the implementation of this Decision encountered some difficulties at the planning agencies due to the lack of detailed guiding regulations.

CONCLUSION

Under the impact of climate change, sea level rise and the development of upstream Mekong River, farmers in the coastal areas of Mekong Delta have transformed their food production systems from rice intensification to integrated aquaculture based on rice fields such as rice-shrimp model. The transformation shows that the rice-shrimp production model has more advantages from economic, ecological, and social perspectives. From an economic point of view, it has improved income, thanks to the circularity of farmed species and reduced risks through diversification of income sources. In terms of ecology, the model minimizes the use of chemical fertilizers and pesticides, so the ecosystem is restored, and agricultural products are ecological and good for producers and consumers. Socially, the community's health is better and the model also creates more jobs for rural workers. The lesson learned from the transition is that closer engagement between stakeholders is needed to enhance the ecological and social benefits of the model. Last but not least, living with nature is a good strategy for sustainable transformation.

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Delivering Cross-Cutting Actions to the Local Food System in Viet Nam

Alliance of Bioversity International and CIAT

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ABSTRACT

Food supply systems are easily affected by shocks and uncertainties brought by anthropogenic and natural hazards. In Viet Nam, the Alliance of Bioversity International and CIAT has been working on food system transformation to secure food production, retail, and consumption to support government and partner initiatives on eliminating hunger and improving overall nutrition. Positive outcomes in food and nutrition contribute to improved livelihoods and ecosystem services across the rural, peri-urban, and urban transect.

Keywords: Food system, drivers, markets, seed system, diets and nutrition

Urbanization and globalization are two of the main drivers of food system transformation. This has influenced changes in food production where the rapid migration to urban areas is pushing diverse smallholder farms to monocultures to cater to the demand. The Alliance of Bioversity International and CIAT looked at various drivers of food system supply systems, the food environment, consumer behavior and how these translate to positive outcomes in policy, food security, socioeconomic and welfare, and environmental developments.

How does food systems diverge along the rural-urban transect in the Northern Viet Nam?

In the past year, the Alliance, part of the CGIAR, published food system profiles¹ characterizing diets, nutrition status, consumer behavior, and food flows along a rural to urban transect in Northern Viet Nam. A bottom-up approach to identify key food system issues in Moc Chau, Dong Anh, and Cau Giay districts in Northern Viet Nam was used to get input from a wide range of relevant members in the policy making process before and after the profiles' publication. The goal of these profiles is to provide an in-depth description of contrasting realities and possible rural to urban linkages at the sub-national level in the country and serve as a knowledge tool for a better food systems issues' identification and decision-making process.

This farm-to-market scope enables the Alliance to describe how different actors and stakeholders in the value chain can help improve livelihoods, diets and nutrition, and food safety in rural, peri-urban, and urban areas in Viet Nam.

¹ Capturing fine diet data in Viet Nam to guide action on food systems transformation

What are the factors that affect the food system in a rural area in Viet Nam?

Zooming in at the rural benchmark site, the Moc Chau² District of the Son La Province is found to be suitable for year-long agriculture and livestock production. While this is good news to smallholder farms managed by minority ethnic groups, they are still facing socioeconomic challenges like poverty and malnutrition.

By dissecting the average diet of children under five and adult men and women in Moc Chau tied to its relative contribution of greenhouse gas emissions from food production, it was found that a large portion of their diets come from animal sources which contributes to the overall greenhouse gas emissions in the country. From an environmental and nutrition lens, diversifying diets and increasing fruit and vegetables intake will help improve diets and minimize the environmental footprint.

The Alliance was able to pinpoint key issues in areas of the food system, including in the food supply chains, food environment, consumer behavior, diets, nutrition and health outcomes, and social, economic, and environmental impacts and drivers. For example, in Northern Viet Nam, natural conditions of the environment can affect the availability of food products and supply, and even non-food outputs. These areas also experience the impacts of climate change at different scales changing the way they grow and process their food.

Mechanization and improved infrastructure also improve the way food is being produced, processed, stored, and sold. The improvements in production and infrastructure are also being supported by holistic programs and policies to meet national goals in the country.

Besides tangible drivers, migration can also change the pattern in food consumption and practices. Any movements in the rural to urban transect also affect culture and traditional practices.

What are current challenges in food systems in Viet Nam?

In rural areas, where there are vast differences in access, opportunities, and infrastructure that involve food supply chains, food environments, consumer behavior, diets, nutrition and health outcomes, socioeconomic and environmental impacts, and food system drivers.

The increase in agricultural production influenced by national and global demand is driving productivity in Moc Chau, however this increase does not trickle down to local consumption of various food groups. The land in Moc Chau is also suitable for various crops and livestock, driving the district's greenhouse gas emissions up.

In rural areas, nutrition education is still lacking, there is a sizable proportion of the population who do not meet dietary requirements and have a very little motivation to consume nutritious food in the case of increase in income. Besides motivations, the available markets and food outlets in Moc Chau are fairly homogenous and few and far apart.

Besides the enabling environment, climate change is not making things easier for rural farmers and communities. Seasonal variations are affecting the production of high value crops and are hampering the access to much-needed fruits and vegetables.

² Moc Chau Food Systems Profile

These gaps in the food system in rural areas reflect how it can easily be impacted by the changes influenced by the developments in surrounding districts, and in return, also impacts how food is supplied and consumed in other districts, provinces, and even nationally.

What are the opportunities that can help to improve food systems in Viet Nam?

From food production to consumption for better nutrition

Food supply systems rely on good production, and this starts with reliable quality planting material. In Viet Nam where there are varying levels of access to nutritious and healthy foods, the Alliance is working on interventions that start from the very beginning of production.

In the Northern highlands of Viet Nam,³ vegetables remain to be a main source of livelihood and nutrition among ethnic minority farmers. Growing fresh produce and participating in seed markets offer inclusive developments particularly among women and youth. However, the current state of smallholder seed systems has a lot of challenges before it becomes profitable.

Inadequate access to quality seeds of both exogenous and indigenous varieties with desirable characteristics, lack of access to relevant information, and limited participation in seed value chains widen the gap in meeting farmer seed access and seed security to achieve food security and diversity.

A lot of current interventions involve farmer capacity building on seed and vegetable production, importance of diversity and nutrition, participatory experiments to understand and identify suitable farmer practices to improve seed quality, development of value chain arrangements, and exploration of impact pathways from seeds to nutrition.

Select groups in Mai Son and Sa Pa districts participated in capacity building activities following a Farmer Business School approach to produce and market quality seeds and vegetables. Since then, the farming communities in Sa Pa have formalized this initiative through a partnership with a seed distribution company that will support its sustainability.

In addition, the work on seed systems development involved the creation of Diet Health Clubs to serve as a model and platform where ethnic minority women and share their learnings, exchange seeds, and support one another in vegetable production and navigating markets. However, there is no straightforward approach in getting the stakeholders on board despite knowing that there are inadequate diets and insufficient access to quality seeds — needing to use behavior change approaches to encourage better participation.

Food distribution and food environment

One of the main infrastructure drivers are markets, which play a huge role in bringing food from smallholder farmers to rural, peri-urban, and rural consumers. The work on assessing informal food flows⁴ in markets makes use of providing free Wi-Fi service to those who visit these places to sell or buy food. This initiative worked by looking for active scanning requests on phones to allow the registration of all devices present on the market to connect to the internet after requiring them to answer a short survey related to food flows.

For almost two years, the Alliance partnered with the General Statistics Office in Viet Nam to install and use free Wi-Fi systems in traditional markets in urban and peri-urban districts in Hanoi to be able to characterize and monitor food traders and retailers, and consumer food

³ Bringing better seeds to indigenous farmers in Viet Nam's Northern highlands

⁴ Revealing informal food flows through free WiFi

flows. Part of the data collected for this work include food origin, price and quality, distribution distance, seasonality and socioeconomic markers, and strengths and weaknesses in markets.

Besides data collected digitally, weekly information on food flows and loss were supplemented by the sellers. This initiative was also able to provide real-time database to track changes in food flows.

Food flows in traditional markets are largely informal. This work recognized that these interactions are the main vehicles for food access to low-income households and are usual sources of food safety hazards. This novel approach in collecting data was able to contribute to identifying policy and planning options to improve food distribution and transform food systems.

On top of understanding food flows through digital platforms, the Alliance has been involved in Food and Vegetable Nutrition (FVN)⁵ project that's being implemented in Viet Nam and in Nigeria to describe the general trends surrounding fruit and vegetable consumption in households and characterize how retail affects fruit and vegetable sales.

The retail component of the FVN project engaged closely in co-designing prototypes and methods with retailers to sell more fruits and vegetables to low-income consumers. These prototypes include improving the display of fruits and vegetables and providing more nutrition information on these products. Traditional markets often have fruits and vegetable sellers put their produce near the ground because modern stalls are scarce. Another prototype that was tested was providing consumers with coupons where they get a reward after purchasing specific amounts of fruits and vegetables.

What are steps taken to address uncertainties?

Understanding local food systems, including drivers, is especially important in the context of the COVID-19 pandemic. This pandemic showed how limited accessibility can impair the value chain affecting producers and consumers. The analysis of the rural, peri-urban, and urban benchmark sites can provide information on locating gaps and emerging issues, including possible solutions to minimize interruptions in food supply by rural-urban linkages in food provision for urban consumption.

Initial country-wide lockdowns revealed the fragility of food security especially in low- and middle-income countries. Food hoarding especially in urban areas were observed early in the pandemic. When lockdowns shifted to more localized lockdowns, it introduced complications transporting goods from different parts of the country. In the case of the benchmark sites in Viet Nam, the production of food in Northern Viet Nam largely fell into the shoulders of rural and peri-urban districts like Moc Chau and Dong Anh while urban districts typically provide efficient distribution opportunities through various kinds of markets.

The interaction of the districts and provinces in the Northern Viet Nam region allowed for the local food system and diversified and shorter food value chains to develop as they played a huge role in responding to ensure that the food system thrives during and even after the COVID-19 pandemic.

⁵ Increasing fruit and vegetable intake on low-income population in Viet Nam and Nigeria through food systems innovations

Understanding consumer behavior in times of uncertainties help shape interventions on providing support in marketing nutritious food and tracking its impact to both consumers and sellers.

The ever-evolving work on food system transformation requires multi-stakeholder participation at all levels. In its endeavors, the Alliance strives to work closely not just with governments on the national and local levels but also with the private and public sectors, and stakeholders.

The support of important actors who are on management boards, authorities, service providers, and participants ensure smoother implementation of new approaches to explore food system issues. In fact, building participation platforms among local officials, partners like farmer groups, women's unions, and project teams keeps all relevant actors and stakeholders updated with strategic plans for implementation.

Contextualizing approaches at various levels and with different groups opens opportunities to better adapt approaches to existing practices and approaches, including risk management, in communities. Finding influential members within groups also broaden the reach of information outside those who are initially targeted in workshops and trainings.

Participatory approaches, not only in the context of dissemination and validation of research results, but in experimentation and evaluation of practices makes adoption and co-ownership of the initiative more likely to happen. This generates better understanding of practices that can also support further research and production of appropriate training materials.

With the intersecting work in Viet Nam, the Alliance also recognizes that many food traders and sellers as well as consumers are also family farmers. Actions to enable the food distribution will help family farmers to have better access to food.

To address weaknesses of food flows and poor infrastructure of traditional markets in Hanoi that have influenced food sellers in their business and consumers in access to safe food, the governance necessarily puts more efforts on close management of food safety and minimize food loss in traditional markets. In tackling food production, smallholders and formal seed sector need to be supported in ensuring proper certifications and seed quality and market access to increase accessibility and availability of diverse seeds that support nutrition, climate change, multiplication, and conservation actions.

What's next for food system transformation?

In the context of the role of food systems in nutrition and health, the Alliance has been working with the Food and Agriculture Organization of the United Nations in building the capacity of small and medium enterprises (SMEs)⁶ in Hanoi (including SMEs in Dong Anh). This expands earlier and on-going work on connecting the role of the whole value chain in delivering nutrition-sensitive diets in the country. By working with SMEs, the opportunity of bringing nutrition rich foods to consumers can become more attainable.

The results of years-long work in Viet Nam, including the food system profiles, are now being used as a basis in policy planning for overall food system transformation in the country. In fact,

⁶ Building capacities of small and medium enterprises for nutrition-sensitive food systems in Viet Nam

the profiles have served as one of the main references in the discussion for the Northern Viet Nam sub-national United Nations food system dialogues organized in preparation for the UN Food System Summit.^{7,8}

The work of the Alliance has been instrumental in drafting the Zero Hunger Program in Viet Nam that aims to eradicate hunger and promote better nutrition in all levels. This also encourages the conservation of agrobiodiversity that is resilient to a changing climate. The engagement with the government for food systems transformation goes beyond production and consumption but also tackles food safety and security especially in remote areas in Viet Nam where they also face greater environmental challenges.

Moving ahead, the Alliance is engaging more and more with international partners and stakeholders on investing for healthier and sustainable diets.

⁷ Sub-National Dialogue on Developing Sustainable Food Systems in the Northern Viet Nam

⁸ Alliance joins action on Food Systems dialogues in Viet Nam

Establishment of the Association of Western Japan Agroecology: Based on Reflection of the History of 'Teikei', Direct Partnership between Producers and Consumers, in Japan

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Keywords: agroecology, 'Teikei' initiative, organic farming, Japan

INTRODUCTION

Agroecology is expected to resolve not only the food problem but also the climate crisis and biodiversity loss worldwide. The Food and Agriculture Organization of the United Nations started promoting agroecology since 2010 and held an international symposium on agroecology in 2014 and regional symposia in five sub-regions from 2015 to 2017. In addition, France enforced the law, *LOI d'Avenir pour l'agriculture, l'alimentation et la forêt*, which adopted the principles of agroecology as the direction of food and agricultural policies in 2014.¹

Agroecology is a relatively new concept in Japan, and only a few Japanese scientists and practitioners acknowledge its significance. Till now, no policies in Japan are based on the concept of agroecology. Recently, the Ministry of Agriculture, Forestry, and Fishery decided the "Mea-dri of Strategy for Sustainable Food Systems," in which the goal is to practice organic farming in 25 percent of farmland, approximately one million hectares, by 2050. However, even this policy does not refer to agroecology.

In recent years, people are gradually becoming interested in agroecology. Agriculture-related magazines, *Nogyo to Keizai*, Agriculture and Economy, did a feature on agroecology in 2019, and *Chijo*, Good Earth, featured articles on agroecology in 2020 and 2021. In addition, *Agroecology: Science and Politics* by Roset and Altieri was translated into Japanese in 2020, and it serves as the first Japanese textbook of agroecology.

In 2021, my colleagues and I founded the Association of Western Japan Agroecology (AWJA), which is the first active group to promote agroecology. Although agroecology is new, Japan has a long experience of *Teikei* initiative, i.e., close contact between organic farmers and consumers, for almost half a century. Unfortunately, *Teikei* is losing its influence gradually. Thus, it is worth analyzing the reasons for its decline and the potential applications of such reflection to agroecology.

Accordingly, this communication includes two topics. First is to explain the mission and action plan of the AWJA. Second is to look back at the history of Japanese organic agriculture and consider what we can learn from the experiences of *Teikei*.

¹ Tsujimura Hideyuki. 2019. "Agroecology promoted by French Law of Future of Agriculture, Food, and Forest." *Agriculture and Economy (Nogyo to Keizai)* 85 (2): 69–79.

ESTABLISHMENT OF THE ASSOCIATION OF WESTERN JAPAN AGROECOLOGY

Backgrounds of Establishing the Association of Western Japan Agroecology

We are standing on the edge of whether mankind and the Earth can survive the current threatening scenario. In this regard, the conventional and industrial agri-food systems are vulnerable because of climate crisis and biodiversity loss, as well as pandemics such as COVID-19. The necessity of transforming industrial agri-food systems is already accepted widely. A few countries and regions are shifting agricultural policies from prioritizing large-scale agriculture focusing on economic efficiency to the promotion of small-scale and community-based farming that is sustainable in terms of environment and society.

Industrial agri-food systems have contributed significantly to the above-mentioned crises. This system produces a quarter of greenhouse gases and 78 percent of nutritive salts, which cause eutrophication in rivers and lakes and are the biggest risk factor for most endangered species.² Agriculture itself is facing difficulties in economy, environment, and society in terms of decline in productivities of capital and energy, increase in environmental footprints by sourcing food from around the world, dependence on low-wage foreign labor, etc.

We cannot confront the “climate crisis” and the “era of great extinction” without making fundamental changes to the above situation. I believe agroecology can be a powerful solution to these crises. Agroecology is deeply related with organic agriculture. Japanese organic agriculture is currently stagnant and surrounded by a feeling of hopefulness. Thus, the AWJA considers agroecology to be a catalyst to break through such difficulty.

Mission of the Association of Western Japan Agroecology

Agroecology is a framework that integrates the practices of sustainable agriculture, sciences, and social movement. The goal is to release food sovereignty of small-scale farmers and the rights to the food of consumers from the yoke of industrial agri-food systems and to realize the society to cherish life by employing the right approaches. For this purpose, it is very important to put the priorities on diversities of environment, ecosystems, economy, society, and culture.

Practicing sustainable agriculture refers to changing the industrial agriculture to an intrinsic one to follow the principles of the ecosystem. Sciences in agroecology should include not only biology and ecology as the core subjects but also soil science, sociology, economics, cultural studies, and political science. It should design concrete images of sustainable agriculture, taking diversities of each region into account through re-evaluation of interconnections, relationships, and functions among individual sciences. Similarly, social movement means to transform agri-food systems at the grassroots level, promoting local innovation, and seeking for social justice and sustainability.

As for the technological aspect of agroecology, it is essential to draw out the power of creatures in the interdependent relationship between plants and animals, based on the principles of ecosystems, especially land ecosystems. For example, by following mixed cropping and intercropping instead of monoculture and by practicing animal husbandry, the stability of production and management can be enhanced. Moreover, the dependence on external resources can be reduced by increasing material and economic circulations within farms and communities, and through multiple use of regional resources. Such practices have a strong affinity with the

² Hannah Ritchie and Max Rose. 2020. Environmental impacts of food production, *Published online at OurWorldInData.org*. Retrieved from: <https://ourworldindata.org/environmental-impacts-of-food> [Online Resource].

farming methods practiced by organic and natural farmers. The AWJA aims to become a platform for a movement of food and agriculture based on the philosophy of agroecology.

The major tentative actions of AWJA are as follows:

1. To summarize the half-century of the *Teikei*, organic farming, natural farming, and alternative farming methods and apply the lessons learnt to agroecology.
2. To analyze the current agri-food systems with respect to each product, focusing on what components of agri-food systems cause problems in terms of environment and social justice, and to what agent we work on to modify agri-food systems. It is useful to evaluate sustainability of each agri-food system via the Sustainability Assessment of Food and Agriculture systems of FAO.
3. To collect and list knowledge and skills related to agroecology and then use them as a database or inventory. Also, it aimed to combine individual knowledge and technologies to create a framework for Japanese-style agroecology.
4. To create local agri-food systems such as farmers market, direct sale system, in-shop sale of local products, etc. Most products should be seasonal with less energy use.

REVIEWING THE PROCESS OF ORGANIC FARMING IN JAPAN

The Japan Organic Agriculture Association (JOAA), which was founded in 1971, intended to change modernized agriculture into an intrinsic one that depended on the natural force of life. Among some principles adopted by the JOAA, *Teikei* was the most important principle. The core of *Teikei* includes mutual aids and reciprocities, which are based on the trust gained through face-to-face relationships.

Figure 1 illustrates the process of organic agriculture in Japan. At the initial stage, the driving forces of organic agriculture included consumers' movements demanding for food safety, farmers' movements transforming conventional farming methods, and rural medicine movements for improving the health of farmers. It is noteworthy that organic agriculture movement was organized by the cooperation of wide stakeholders.

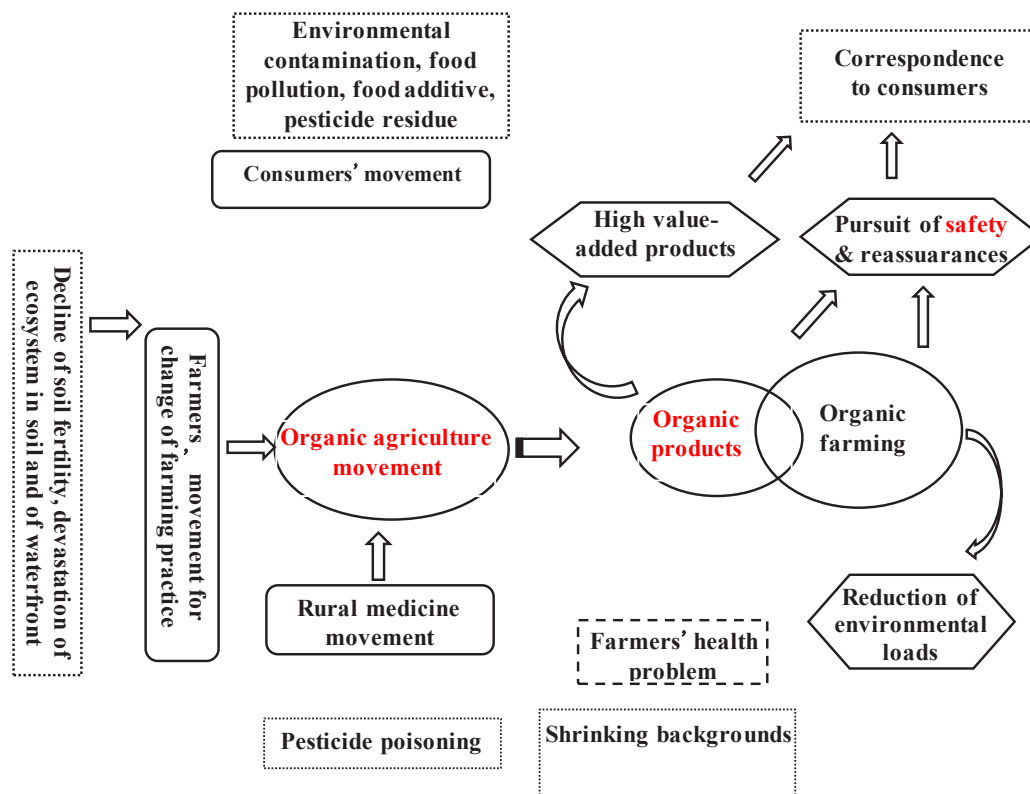


Figure 1. The process of organic agriculture in Japan.

The driving force of modern organic agriculture has converged to the high added-value commodity or to the produce with low environmental loads. The former is required by the retail sector to sell organic farm products, and the latter reflects the government's position on organic agriculture.

Briefly, the momentum of organic agriculture in the early days could be seen as the joint force of three aspects of consumer movements, farmers' will to change farming methods, and the rural medicine movement. However, it was later simplified to either economy or environment.

In this process, *Teikei* lost its influential power. One of the main internal reasons is aging of both organic farmers and consumers, without entries of new members. Another internal reason is gaps between Ten Principles of the JOAA³ and actual situation, based on "Housewife Model", which is meant *Teikei* depends on housewives staying home for distribution of organic produce and settlement. External reason is the establishment of a variety of "organic markets", through which willing-to-buy consumers can buy any organic foods whenever and wherever they want to. However, the most crucial reason is the loss of

³ Ten Principles include: (1) mutual assistance, (2) intended production, (3) accepting all the produce, (4) mutual concession in the price decision, (5) deepening friendly relationships, (6) self-distribution, (7) democratic management, (8) learning among each group, (9) maintaining the appropriate group's scale, and (10) steady development.

social movement aspect in organic agriculture and polarization, i.e., separation between business-oriented organic farmers and intrinsic organic farmers in case of both small- and medium-sized farmers.

Although the Japan Agricultural Standard for Organic Products (Organic JAS) in 2000 and the Organic Agriculture Promotion Act (OAPA) enacted in 2006 were the results of organic agriculture movements, they caused a contradiction. These legal systems accelerated the understanding of organic agriculture as a mere farming method that does not use pesticides or chemical fertilizers. With the loss of the significance of intrinsic organic agriculture, the “monoculture of organic agriculture” spread, depending on external organic materials.

The Organic JAS just regulates the standard of certification and labeling system to harmonize the CODEX standards. On the other hand, the OAPA defines organic agriculture as “farming that does not use chemically synthesized fertilizers and pesticides, does not use genetic engineering technology, and uses agricultural production methods that reduce the burden on the environment derived from agricultural production as much as possible.” The legal system clearly prioritizes reduction of environmental loads and lacks concern for the functioning of ecosystems and the conservation of biodiversity.

Accordingly, we are facing the severe question what are the meanings of organic agriculture. It is necessary to address the fundamental review this question, not only in terms of business sense or environmental loads, but also from the viewpoints of social relationships and reciprocity between producers and consumers.

CONCLUSION

This communication includes two topics, namely: establishment of the AWJA and reflection of Japanese organic agriculture, with a focus on *Teikei*. The main mission of the AWJA is to transform industrial agri-food systems to a sustainable and local system by agroecology. We are also looking forward to new horizons in organic agriculture in Japan, especially based on the experience of *Teikei*. The involvement of the younger generation is essential for revitalization of *Teikei* and further promotion of intrinsic organic agriculture because the number of young people entering the movement decreased as the social aspect of the organic agriculture movement became smaller. Currently, the younger generation is more interested in environmental issues, such as the climate crisis, and social issues such as inequality and human rights. As agroecology encompasses such issues, we can approach the larger issues from the perspective of agroecology.

**The Role of Actor-Networks in Enabling Agroecological Innovation:
Lessons from 15 years of Field Applications in the Northern Uplands of Lao People's
Democratic Republic.**

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ABSTRACT

Actor-networks involving a diversity of individuals (e.g., farmers, experts) and organizations (e.g., cooperatives, rural development agencies, teaching and research institutions) play a major role in the sustainability of family farming, and more generally in the transformation of agrifood systems. They are instrumental in collective action for the sustainable use of shared resources. Their composition and structure affect the way different agents of change interact, how they access, exchange and use knowledge as they manage agricultural systems. Actor-networks that mainstream agroecology principles and practices in supporting the transition toward agroecosystems' resilience are also known as Agroecological Innovation Systems (AeIS). In this paper, we document seven AeIS that have been active between 2005 and 2019 in the northern uplands of Lao People's Democratic Republic. Within the framework of these initiatives, action research was conducted for understanding the processes underpinning the resilience of agroecosystems at multiple scales, diverse technical and organizational innovations were experimented and supported, and novel stakeholders' coordination mechanisms were explored to identify which levers could be mobilized to adapt or transform in the face of new constraints and opportunities.

The AeIS case studies assessed in this paper are:

1. The PRONAE-PASS projects on Conservation Agriculture in Sayabury and Xieng Khuang provinces from 2005 to 2009
2. The Catch-up program on participatory land use planning and production cooperatives in the northern Lao uplands from 2008 to 2011
3. The Conservation Agriculture Development Fund in Sayabury Province from 2008 to 2014
4. Northern Uplands Development Programme support to Technical Service Centers from 2011 to 2015
5. The EFICAS project in Luang Prabang, Huaphan, and Phongsaly provinces on landscape approaches to agroecology from 2014 to 2019
6. The Land Regeneration Initiative in Kham District conducted by the PAFO of Xieng Khuang Province from 2015 to 2017
7. The Lao Uplands Initiative for policy enabling environment from 2017 to 2018

Based on our assessment, improving and scaling-up agroecological knowledge, skills, and policies requires a new generation of AeIS directed toward enhancing the capacity of actors and actor-networks to think and act in complexity. What counts is the networking process itself, the process through which all actors of the AeIS interact and exchange: (i) to understand and model the situation in which they operate by taking into account their vision and intentions, (ii) to co-produce knowledge and deliberate in an intelligible way in order to elaborate possible means of action, and (iii) to transform and continually adjust to evolving

contexts through reflexive learning loops. This change in the networking processes comes with a changing conception of knowledge in AelS. Knowledge is no longer understood as a “product” of science or experience, which can be taken as given and transferred to others. In line with the action research paradigm, knowledge becomes a “process” of meaning making through interpretation and appropriation done by each actor. Moving from knowledge to knowing (i.e., knowledge in the making), AelS no longer promote products or technologies, but processes, procedures, and collective intelligence. At the heart of AelS is learning, cooperation, and care.

INTRODUCTION

Agroecology and Sustainable Agrifood Systems

The concept of agroecology dates back from the 1930s, when it was integrated into the scientific vocabulary as a reference to research on ecological processes applied to agricultural production. Starting from the 1960s, the concept of agroecology became politicized, referring first to an environmental movement and later on to a specific approach towards sustainable agriculture (Wezel et al. 2011). In recent years, agroecology has gained significant momentum with its endorsement and promotion by mainstream development actors such as the Human Rights Council (De Schutter 2011) and the Food and Agriculture Organization (FAO) of the United Nations (Barrios et al. 2020). Agroecology has long been associated with debates on scaling (Altieri 1989; Dalgaard et al. 2003), which constitutes a problem for agroecological practices which are inherently context-specific. Agroecological research and resulting evidence on what makes the application of agroecological principles successful are typically generated at small spatial scales (Dalgaard et al. 2003). The significant gap between the scales of agroecological research and application (i.e., plot, farm, landscape level) and the scales of decision- and policymaking in relation to agrifood systems (i.e., regional, national, global levels) raises questions regarding the potential for scaling up successful local applications. Responding to these concerns, the research community promotes an application of the agroecology principles at the food system scale, with policies and economic mechanisms that would create enabling conditions for scaling up local agroecological innovations (Sanderson Bellamy and Ioris 2017; Wezel et al. 2020; Wezel and David 2012).

Agroecology Innovation Systems

The agroecological transition called for by multiple stakeholder groups, including the research community, involves profound changes in agricultural innovation systems (AIS), defined as a network of organizations and individuals, together with the infrastructures and institutions that affect the way different agents interact, access, exchange, and use agricultural knowledge. Firstly, these changes pertain to the very nature of the actionable knowledge (Antonacopoulou 2013; Argyris 2005) that is generated and shared within the AIS. The agroecological knowledge is locally co-constructed and is therefore location specific. The performance and diffusion of agroecological innovations therefore involve a dimension of adaptation to local contexts and depend on favorable socioeconomic and ecological conditions. In any case, agroecological innovations are never “one-size-fits-all” solutions. Secondly, the changes over time in the operational definition of agroecology (Loconto and Fouilleux 2019) were associated with an enlargement of its scope from farmer

fields to food systems and the society as a whole (HLPE 2019; Wezel et al. 2020). Transformative approaches toward agroecology consequently evolved from agricultural extension and farmer adoption of “alternative” practices to redesigning the overall socioecological system (Duru, Therond, and Fares 2015; Pretty 2018; Therond et al. 2017). These scaling questions further lead to the issue of knowledge integration beyond fields and farms to consider the overall context of innovations, e.g., political economy, governance, infrastructures.

Push and Pull Levers of Societal Transformations

In Lao People’s Democratic Republic, for example, the Ministry of Agriculture and Forestry has explained the rapid transition of rural livelihoods and farming systems by referring to two main drivers: the push of government policy and the pull of the market (Bartlett 2012; Fullbrook 2010). It is certainly the case that public investment in infrastructure in addition to the policy of land concessions “turning land into capital” has brought about massive changes in the ownership and utilization of land (Baird 2011; Kenney-Lazar, Dwyer, and Hett 2018; Messerli et al. 2014). It is also true that the shift from subsistence to commercial production has been made possible by the demands of the regional and global economy. However, the push and pull analysis does not provide a sufficient understanding of how the agrarian transition is taking place (Cramb et al. 2015; Ingalls et al. 2018; Lestrelin et al., 2019). Today, agroecological alternatives to the current unsustainable sociotechnical regime are actively sought at the interface between the same push and pull forces that gave rise to the agrarian transition (Totin, van Mierlo, and Klerkx 2020). The agroecological transition called for by multiple stakeholder groups concerned by agricultural sustainability is therefore an intentional regime shift, taking place in an unfavorable environment. Here, we distinguish push interventions — where financial, technical, material and/or organizational support is provided to targeted actors allowing them to modify their practices (e.g., subsidies and farm extension work) — and pull interventions that target the broader social and economic conditions in which actors make decisions in order to favor desired practices (e.g., sensitization and price premiums, regulations on agricultural practices such as pesticide use). At the interface between push and pull forces of change, we consider Agroecological Innovation Systems (AeIS) as a network of organizations and individuals that contributes to sustain more ecologically-sound practices, processes, and forms of organization in agrifood systems, together with the infrastructures and institutions that affect the way different agents interact, access, exchange and use knowledge.

We have conducted a comparative analysis of seven case studies in the northern Lao uplands for approaching and characterizing the diversity of agroecological interventions through the lens of innovation systems. In the next section, we introduce the case studies as successive attempts to bring agroecology to scale over a period of 15 years from 2005 to 2019, then we present the framework used to analyze the individual AeIS stories and to draw lessons from their comparison. Finally, we mobilize the lessons learnt from empirical evidence of successes and failures of past interventions to guide further agroecology scaling interventions and beyond, to redefine the place of AeIS in changing sociotechnical regimes.

METHODS

Case Studies

Since the early 2000s, traditional shifting cultivation in mosaic landscapes have given way to single crops with no fallow expanding along pioneering agricultural fronts on marginal lands, and with gradual decline in forest cover. While these developments have led to significant productivity gains in the short term, they have also led to significant environmental impacts, e.g. soil erosion, loss of biodiversity, more exacerbated drought and flood risks, pollution by pesticides, leading to levelling-off or decrease of yields and increased vulnerability of farmers to climate change. In the face of severe landscapes and livelihoods degradations (Castella et al. 2012), the Lao Ministry of Agriculture and Forestry (MAF) has led successive development programs dedicated to designing and scaling agroecological practices as alternatives to unsustainable practices. The agricultural practices pointed as unsustainable were both shifting cultivation under shortening fallows not sufficient to regenerate soil fertility and intensive monocropping including soil tillage of still slopes and/or systematic use of chemical inputs (fertilizer, herbicide, and other pesticides) that was initially considered by government agencies as an alternative to the former. The agroecology practices promoted by MAF with the support of international donors, non-governmental organizations (NGOs), and research and development agencies were mainly based on conservation agriculture and agroforestry principles (Castella and Kibler 2015; Castella et al. 2018). Beyond the agronomic dimensions of agroecological innovations, the development programs promoted land management and planning, local governance and support to farmer organizations, strengthening agricultural extension services, policymaking and knowledge capitalization.

From 2005 to 2010, the Capitalization Program for Agriculture and Rural Development (PCADR by its French acronym, funded by the French Agency for Development AFD) supported conservation agriculture alternatives to intensive maize-based monocropping systems in Sayaburi and Xiengkhuang provinces (Figure 1). From 2010 to 2019, the Northern Uplands Development Program (NUDP) worked as an overarching framework to streamline activities on rural development in the northern Lao uplands. The rationale behind NUDP launching out of PCADR was MAF dissatisfaction with a large number of projects that acted without any central coordination mechanism, leading to redundancies and inefficient use of donor funding. As a multi-donor initiative, the NUDP received the support of four donors: AFD, EU (European Union), SDC (Swiss Agency for Development and Cooperation), and GIZ (German Agency for International Cooperation). Then, since 2014, AFD has supported the scaling of agroecology to the regional level through the ACTAE program that supported ALiSEA (Agroecology Learning Alliance in Southeast Asia, ali-sea.org) networking and learning activities across sites in Lao People's Democratic Republic, Cambodia, Myanmar, and Viet Nam (Lienhard et al. 2019). The activities supported by the successive development programs covered a large range of themes from experimenting new practices with farmers to supporting extension services and policy makers in creating an enabling environment for agroecology. Monitoring and evaluation systems embarked in the programs and independent studies were commissioned by the donors to assess the impacts of these programs along a 15 years period from 2005 to 2019 (Figure 2). The seven case studies included in the comparative analysis (Appendix 1) are analyzed here as successive learning loops along a scaling process from villages to national and regional levels (Figure 3).

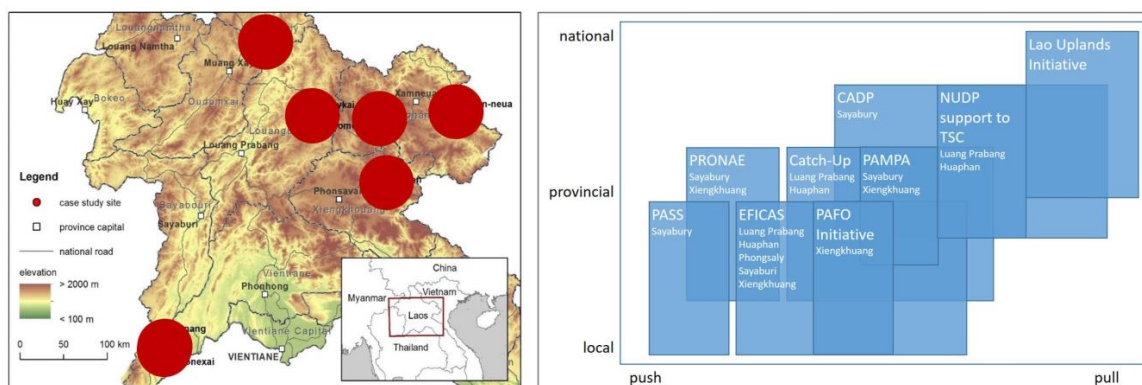


Figure 1. Case study sites in the northern uplands of Lao People’s Democratic Republic (1a. location, 1b. scales).

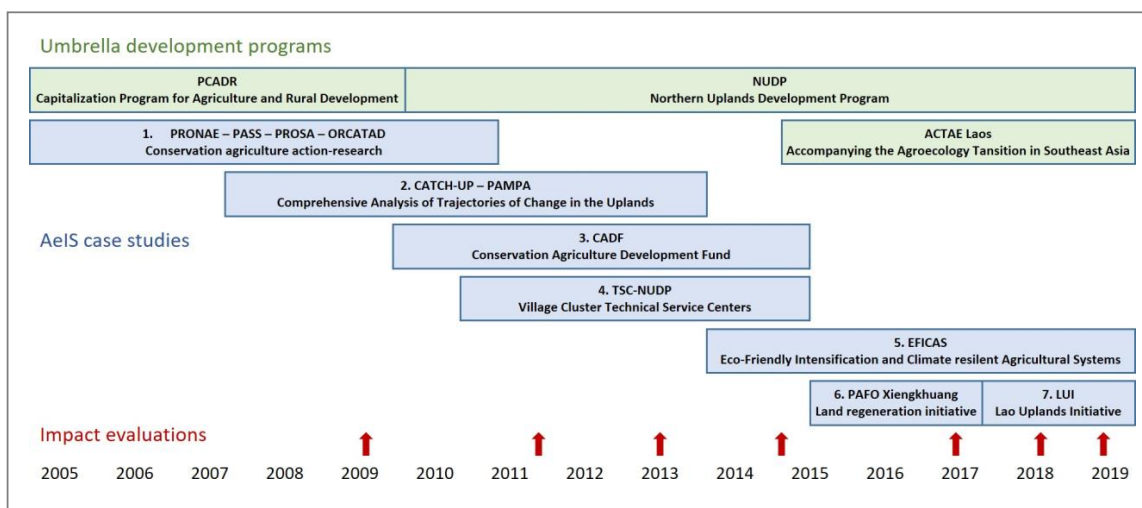


Figure 2. Agroecology support programs and case studies in the northern uplands of Lao People’s Democratic Republic.

Analytical Framework for Comparative Analysis of AeiS

Our proposed analytical framework builds on work related to agricultural innovation systems (Klein Woolthuis, Lankhuizen, and Gilsing 2005; Klerkx, van Mierlo, and Leeuwis 2012). Indeed, the systemic, cross-sectoral perspective put forward in this literature constitutes a strong ally when attempting to gain a comprehensive view on the actors and factors that co-determine agricultural change and innovation, including in the context of development interventions. From there, we looked at the different elements of the innovation systems and assessed how specific agroecological interventions addressed issues of scaling, integration and, more generally, to what extent they reflected key principles of agroecology — such as the positioning of smallholders at the center of the innovation process. The literature on agricultural innovation systems puts forward a useful typology of system components to explain the performance of innovation systems (Klerkx, van Mierlo, and Leeuwis 2012; Pigford, Hickey, and Klerkx 2018; Schut et al. 2015; Wieczorek and Hekkert 2012; Wigboldus

et al. 2016). This literature looks for instance at the physical infrastructure (e.g., presence or absence of roads or telecommunication network for disseminating information, technical innovations and their by-products), networks of interaction and collaboration (e.g., quality and nature of actors’ relationships and their influence on knowledge and acceptance of new outside developments), or actors’ capabilities (e.g., education levels influencing the potential for dissemination of complex innovations). These different components were turned into a descriptive index of sectors and types of intervention (Table 1).

Table 1. Sectors and types of agroecological intervention

Sectors	Examples of intervention	Push-pull
Financial and material assets	<i>Providing subsidies, equipment, establishing village funds, credit schemes</i>	Push Incentives
Organizational capacities	<i>Structuring farmer groups, strengthening village organizations, entrepreneurship</i>	
Technical capacities	<i>Providing technical training, advice</i>	
Network configuration	<i>Organizing farmer-to-farmer, producer-to-buyer exchanges</i>	Pull Enablers
Market structure	<i>Promoting contract farming agreements</i>	
Soft institutions	<i>Organizing awareness raising campaigns</i>	
Hard institutions	<i>Drafting laws, regulations</i>	
Physical infrastructure	<i>Building roads, schools, banks, telecom network</i>	

Data Collection and Analysis

Relying on publications, grey literature and expert knowledge from a pool of scientists having conducted research on these case studies; we built a series of diagrams representing the main actor groups targeted by the different interventions (Figure 3). “Actor x intervention” matrixes were completed and discussed, highlighting the different sectors and types of agroecological interventions cross tabulated against key actor groups targeted (Figure 4). The matrix combines the two ideas of innovation systems as a network of actors, infrastructures and institutions and agroecological interventions having specific push or pull characteristics depending on the sectors that are targeted. In turn, interventions can be classified as push or pull depending on their target sector, with basically all interventions dealing with actors’ material and financial assets, technical and organizational capacities being push interventions and other interventions pertaining to market structure, institutions, and infrastructures — what Hall et al. (2006) refer to as the support structures of agricultural innovation systems — being pull interventions. Building on secondary data available, we also reflected on the participation of target populations and the specific challenges that have affected the success of the different initiatives. The overall approach involved a series of bilateral meetings between scientists involved in the research and a collective workshop.

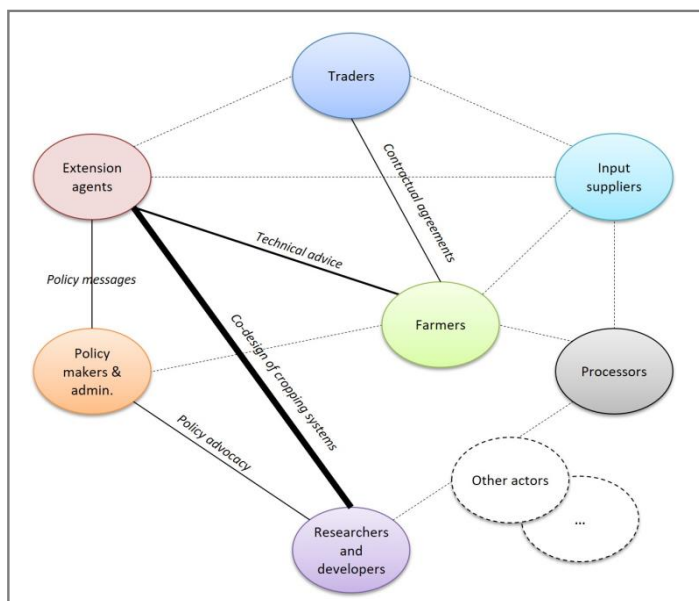


Figure 3. AelS actor-networks.

Sectors		Financial & material assets	Organizational capacities	Technical capacities	Network configuration	Market structure	Soft institutions	Hard institutions	Infra-structures
Actors	Individual farmers								
	Farmer organizations								
	Agri-input suppliers								
	Processors	PUSH interventions				PULL interventions			
	Traders								
	Extension agents								
	R&D actors								
	Policy makers and administration								
	Civil society								

Figure 4. The “actor x intervention” matrix captures the multiple dimensions of innovation.

RESULTS AND DISCUSSION

Actor-Networks in Agroecological Innovations

The “actor x intervention” matrixes in Figure 5 reveal the similarities and dissimilarities in actor-networks structures giving thus a relative weight to project interventions in different sectors. They reflect the specific challenges associated with different modalities of intervention and the gradual scaling of interventions (Figure 1b). From an initial emphasis on understanding local contexts through on-farm diagnostic surveys and developing alternative

cropping systems with individual farmers, then farmer groups and extension services, the scope of the interventions as gradually evolved toward increased involvement of policymakers, private sector, and civil society. While maintaining initial push activities related to technical innovations and capacity building of R&D actors and extension agents the focus has shifted toward pull activities through the inclusion of a larger range of product processors, service providers along the value chains as well as members of the civil society (e.g., national and international NGOs) and policymakers. This shift took place over 15 years, with each step building on the knowledge and experience acquired during the previous ones. Doing so, the AelS enlarged the scope of agroecology by incorporating additional practices: from conservation agriculture to systems of rice intensification and agroforestry, and principles of agroecology starting from managing diversity, synergies and recycling through co-creating of knowledge and then moving to human and cultural values, responsible governance and circular economy in sustainable agrifood systems (Wezel et al. 2020).

Some partners who were involved in the successive stages gradually enlarged their fields of expertise (e.g., from technical to organizational innovations) and opened to new issues, actors, postures, which was often challenging. From such a long time perspective, the evolution from one AelS to the next can be analyzed as a learning process. Through successive loops of reflexive learning, the projects were adding, e.g., a territorial perspective, more value chain, more participation of local actors, private sector, policymakers in concerted attempts to better balance push and pull dimensions and to better integrate multiple scales. When overlapping the actor-networks represented in the bottom line of Figure 5, one may notice that all actor groups and relations between actors have been addressed, whilst not at the same time. This incompleteness of actor-networks remains a key challenge. Each AelS learnt lessons from their time bounded experiences that were carried over to the next ones thanks to the multiple impact assessment studies.

While the umbrella programs, such as PCADR or NUDP, aimed to cover all dimensions and scales, they faced organizational challenges turning them into mega projects trapped into bureaucratic impediments and constrained by their huge metabolism that was consuming a large share of their human and financial resources. However, learning organizations should reflect the process of growth and maturation of individuals, communities and organizations by fostering attentiveness, alertness, awareness, appreciation, anticipation, alignment, activation, and agility as integral to agroecological interventions whose consequences cannot be fully predicted nor controlled (Antonacopoulou et al. 2019). From the comparison of the seven cases, we found that maintaining flexibility and agility in AelS is therefore a key element of success and impact in the context of uncertainty inherent to innovation. Such qualities were not compatible with the constraints of higher-level management, which in many cases led to underachievement. Strengthening the capacities of all actors: (i) to effectively manage processes of knowledge coproduction within diverse communities of actors, from civil society, and the private and public sectors; and (ii) to enable a networking environment supportive to agroecology, is an important lever for innovation.

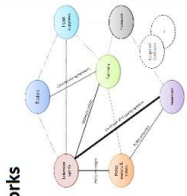
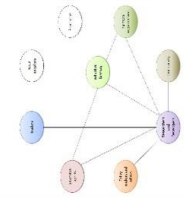
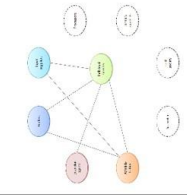
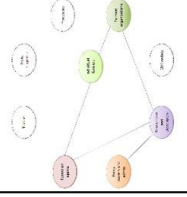
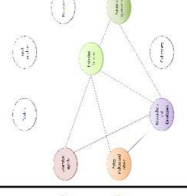
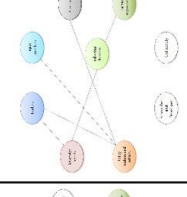
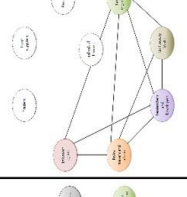
Projects	PRONAE-PASS	Catch-Up	CADP	TSC-NUDP	EFICAS	PAFO Initiative	LUI
Individual farmers	XXX	XX	X	X	XX	XX	
Farmer organizat.		X		XX	XX	XX	X
Input suppliers	XX		XX			X	
Processors			X			X	
Traders		X	XX			XX	
Extension agents	XX	X	XX	XXX	XX	XXX	X
R&D actors	XX	XXX		XX	XXX		XXX
Policy and admin.	X	XX	XXX	X	XX	XXX	XXX
Civil society		X					XX
Actors							
Networks							

Figure 5. Actor-networks of the seven AeiS.

Actionable Knowledge in Agroecology Organizations

Navigating through the successive AeIS, it became clear that actionable knowledge at the core of AeIS is not limited to design and nurture alternative practices in an innovation niche such as experiments conducted by dedicated projects, but to create an enabling environment for the agroecology practice to find its way beyond their initial niche to become mainstream within the prevalent sociotechnical regime (de Haan and Rotmans 2018; Geels and Schot 2007; Lienhard et al., 2020; Loorbach, Frantzeskaki, and Avelino 2017). Indeed, combining push and pull levers of change is essential for agroecology to become the norm, fully supported at political, cultural or institutional levels, instead of being a challenge to the system in place. As shown in the “actor x intervention” matrixes specific to each AeIS case (Appendix 2), they alternated in time between a clear emphasis on push activities (PRONAE-PASS, TSC-NUDP, PAFO Initiative) or pull activities (CADP, LUI), and a mix of both push and pull (Catch-Up, EFICAS). This succession corresponded to a reflexive process whereas the lessons learnt from one AeIS were brought to the next, gradually building up a knowledgebase about what works in different contexts. The conceptual framework proposed in this paper builds on a reflexive, systemic approach involving researchers, practitioners, donors and policymakers involved in the AeIS. Taking into consideration a time perspective longer than each individual project, it may provide guidance to the multiple stakeholder groups to develop a common vision of an agroecology transition and to co-design context specific pathways bringing from the current situation to a more desirable one. It can help taking some distance from the inevitable small scale and/or technical issues faced by practitioners engaged in promoting particular innovations, identifying enabling factors for higher performance and broader diffusion of specific innovations, monitoring and adjusting R&D and extension processes and impacts, etc. In accordance with the principles of agroecology (Wezel et al. 2020), these interventions are expected to put smallholders at the center of the innovation system.

Beyond the capacity to develop innovative agricultural systems with farming communities, AeIS should be directed toward enhancing the capacity of actors and actor-networks to think and act in complexity. What counts is the networking process itself, the process through which all actors of the AeIS interact and exchange: (i) to understand and model the situation in which they operate by taking into account their vision and intentions, (ii) to coproduce knowledge and deliberate in an intelligible way in order to elaborate possible means of action, and (iii) to transform and continually adjust to evolving contexts through reflexive learning loops. This change in the networking processes comes with a changing conception of knowledge in AeIS. Knowledge is no longer understood as a “product” of science or experience, which can be taken as given and transferred to others, but as a “process” of meaning making through interpretation and appropriation done by each actor. Moving from knowledge to knowing (i.e., knowledge in the making), AeIS no longer promote products or technologies, but processes, procedures, and collective intelligence. At the heart of AeIS is learning, cooperation, and care; qualities that contrast sharply with the prevailing sociotechnical environment conducive to competition, compartmentation, and individualistic behaviors. Deeply rooted in new values and beliefs, AeIS should become instruments of a cultural evolution of the same span as the Green Revolution (Harwood 2019).

Values and Beliefs in Agroecology Transformations

Lessons from pull interventions such as CADP and LUI pointed to the limits of project driven AelS. Their mitigated success revealed that efforts to sustain push and pull activities beyond the time span of projects are facing many organizational challenges such as rapid turnover of competent staff, competition for resources between government agencies, etc. Governance issues related to leadership, power and agency came to the fore. Efforts to include more actors, creating new connections within actor-networks tended to change the power balances and relations within and between networks as they grew up. AelS are constantly reinventing themselves as projects come and go, people turnover, struggling to keep the memory of previous successes and failures to maintain adaptive and learning capacity of the organization (Loorbach, Frantzeskaki, and Avelino 2017). The stability and long-term investment necessary to support the agroecology transition should therefore be anchored in a profound transformation of values and beliefs shared by network members, which requires to better understand the mechanisms at play in transition processes.

As shown by our comparative analysis of AelS, transformative approaches to agroecology initially relied on developing and nurturing innovation niches (push) that were expected to influence policies and institutions (pull) toward larger shifts in sociotechnical regime, rooted in new values and beliefs (El Bilali 2019; Pigford, Hickey, and Klerkx 2018). Many policies in Lao People's Democratic Republic appear to have started as a localized experiment that was subsequently adopted as a national strategy, such as the turning land to capital policy (Baird, 2011; Kenney-Lazar, Dwyer, and Hett 2018). While policy makers are expected to take part in the co-production of actionable knowledge, and then influence policies, it is not so clear from our analyses, whether the civil servants from the ministries are actual agents of change who can trigger policy enabling (pull) levers. In many instances during the successive AelS described in this paper, we found out that government officers used projects to develop expert-based recommendations, rendering technical key political issues about societal transformation (Li, 2016), such as the power given to farmer groups, associations and cooperatives, or the role of civil society in the agroecology transition. As a result, projects tend to create a diversity in niches that do not challenge the sociotechnical regime but pain to translate local successes into enabling conditions for change (pull effect). They are often stopped in their scaling process as soon as they stress or challenge the sociopolitical system in place.

Partners maintain continuity and consistency in development interventions through multi-stakeholder platforms, such as the roundtable meetings involving international donors, development practitioners, and government agencies. While supporting incremental changes and capacity building through development projects, the government rhetoric of societal transformation uses, e.g., Gross Domestic Product (GDP) growth and Least Development Countries (LDC) graduation as indicators of success. Partnerships with foreign investors allow them to greatly accelerate the process of transformation described by Fullbrook (2010) as the "big push" for large investment projects. The rationale for this "other push" is deeply rooted in modernization belief of the economy despite the obvious negative impacts on the environment, indebtedness, etc., more than the idea of sustainable development (Baird 2011). The dominant political culture may not be conducive to some the changes the donor community wishes to support, as Chinese and Viet Nameese investment projects for example bring more funds into the agricultural sector than development projects funded by institutional donor. At the same time, regulations and policies are systematically

reinterpreted between national, provincial and district levels of the state and adjusted to local contexts, to produce complex networking patterns across scales (Barney 2009; Castella et al. 2013). Consequently, we do not deal with strategic choices made by a single rational entity, but with the outcome of complex interactions among many actor-networks over a long period of time.

CONCLUSION

In view of the context and trends that we described above, a pluralistic approach is desirable, which would spread risk and promote innovation. The umbrella programs should remain manageable in size to avoid high transaction costs for programs implementation, and provide flexibility for adaptive management and boost creativity instead of constantly reproducing the same organizational schemes, often locked-in by the same actor groups. Such enabling environment should provide support to multiple groups and associations, making use of diverse channels and approaches, while accepting that some interventions will succeed and others may fail.

Power and vulnerability are usually associated with different positions in actor-networks. As networks become more connected, some actors are consolidating their power while others continue to be excluded. AeiS should provide opportunities for helping vulnerable groups to make connections and build alliances that enable them solve their own problems. The design and management of these interventions requires inputs from educators and social scientists, not just technical and marketing experts. They can play an important role in supporting bounding (within networks) and bridging (between networks) networking activities that are essential to scaling innovations. Strengthening networks among multiple stakeholder groups improves resilience, which is a core principle of the agroecology transition.

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Appendix 1. The seven case studies included in the comparative analysis

After an initial diagnosis of agricultural dynamics and their environmental impacts in the two provinces of Sayabouri (at the border with Thailand) and Xieng Khouang (at the border with Viet Nam), the PRONAE Project [1] in Figure 2 “Programme National Agro-Ecologie” developed and tested conservation agriculture (CA) practices with farmers for sustainable intensification of their farming systems (Husson et al. 2016; Lestrelin, Quoc et al. 2012). Among other technical innovations, the action research promoted direct seeding in crop residues or mulch from cover crops as alternative to soil eroding tillage-based maize monocropping. On-farm testing, demonstration plots and exchange visits were organized to support the dissemination of the research results among farmers of the four southern districts of Sayabouri Province under the dedicated PASS component of the PCADR [Point d'Application du Sud de la province de Sayabouri] that started in 2006. In 2008, PASS had set up CA farmer groups in 44 villages, involving about 1,100 households and 1,500 ha of land cultivated with direct seeding mulch-based cropping systems. Networking activities were encouraged within and between CA farmer groups. Agricultural fairs were organized to inform a large public about existing CA practices and policy makers were regularly invited to visit the experimental and demonstration sites conducted by local farmers with the support of extension agents from the provincial and district line agencies of MAF (PAFO and DAFO), and national and international researchers from NAFRI and CIRAD respectively. A monitoring-evaluation system embedded in the project conducted regular surveys of a large farm sample in target villages of the two provinces (Lestrelin, Quoc et al. 2012; Lestrelin, Nanthavong et al. 2012) and fed a knowledge capitalization system funded by EU (ORCATAD – Open Resource on Conservation Agriculture for Trade and Development (Lie and Tivet 2010)). From 2008 to 2011, the Catch-Up Project [2] analyzed the drivers and impacts of the agrarian transition that deeply transformed the landscapes and livelihoods of the northern Lao uplands through the shift from subsistence to commercial agriculture. It collaborated with local institutions and international NGOs in developing participatory land use planning approaches adapted to the on-going transformation and to the capacity of the multiple stakeholder groups involved. It also contributed in Lao People’s Democratic Republic to an independent multi-country evaluation system funded by AFD (PAMPA – Multi-country Action Programme in Agroecology).

Some key successes of these projects were pointed by the successive impact evaluations (Lestrelin, Quoc, et al., 2012; Lestrelin, Nanthavong et al. 2012; Lienhard et al. 2014) in terms of: (i) reduction of soil erosion permitted by the no-till system while maintaining the economic profitability, (ii) number of farmers who adopted CA practices, and (iii) interest of the MAF to promote CA techniques throughout the country. Agroecology scaling policy translated into a dedicated CA research center created under NAFRI in 2009 and a call for agroecology to be included in the curricula of agricultural university and vocational schools. A sub-component of the AFD support to MAF entitled Sector-based Agroecology Program (PROSA), worked from 2007 to 2011 on co-designing and implementing with a large range of stakeholders a national agroecology action plans aligned with MAF’s agriculture development policy. This project promoted the Conservation Agriculture Development Fund [3 – CADF] that was developed in Sayabouri Province as a financial mechanism to sustain the CA-related extension activities beyond the end of the PASS project. It consisted in collecting a provincial tax on maize export across the province border with Thailand to support the district agricultural services (DAFO) in scaling conservation agriculture across the whole province. It

financially supported traders and farmers associations, built capacity of farmers and district staffs in the field of CA, and promoted contract-farming systems for maize-based agri-input supply. The MAF local network of technical service centers supported by the NUDP Program [4 TSC-NUDP] at the village cluster and district levels was strengthened by the successive projects through specific trainings on CA and financial support to agroecology demonstration activities. Some of the centers later specialized in agroecology such as Ban Poa in Xiengkhuang Province or Muangmuay in Luang Prabang.

In 2014 and 2015, the EFICAS project [5] conducted an evaluation of the CA extension and CADF governance to guide the scaling process to three more provinces. Co-funded by AFD and EU, EFICAS activities were geographically split, with the EU funding activities in Phongsali, Luangprabang, and Huaphanh, while AFD funded activities in Sayaburi and Xiengkhuang were being carried over from the previous projects, ensuring continuity. The project was building on the one hand on the lessons learnt from the succession of CA projects in Sayaburi and Xiengkhuang provinces and on the other hand on participatory land use planning activities conducted under the Catch-up project and a GIZ funded component of NUDP. Action research was conducted in 12 intervention villages and the monitoring and evaluation system included a control village for each intervention village. A participatory innovation network engaged village communities and development stakeholders in co-designing and testing agroecological practices adapted to local contexts. A project's attempt to hand over extension activities to local institutions took the form of the Land regeneration initiative [6]. It supported capacity building of the Xiengkhuang PAFO in implementing autonomously the a range of agroecology practices initially promoted by a portfolio of projects active in the province, e.g. land use planning, organic farming, pesticide use awareness campaign, soil restoration. Finally, in 2017 and 2018 the project supported a national multi-stakeholder communication platform named the Lao Uplands Initiative [LUI – 7] that aimed at creating an enabling environment to broad scale dissemination of agroecology all over the Lao uplands through knowledge sharing among multiple stakeholder groups and formulation of evidence-based policies.

Appendix 2. Actor x intervention matrixes for three AeIS cases

PRONAE-PASS case study on Conservation Agriculture

Sectors Actors	Financial assets	Organizational capacities	Technical capacities	Network configuration	Market structure	Soft institutions	Hard institutions	Infra-structures
Individual farmers	F1	O1	T1	N1, N2			S1	
Farmer organizations								
Agri-input suppliers				N2				
Processors								
Traders								
Extension agents	F2, F3	O2	T2	N1				
R&D actors	F4							
Policy and administrat.				N1				
Civil society								

Conservation Agriculture Development Fund (CADF) case study

Sectors Actors	Financial assets	Organizational capacities	Technical capacities	Network configuration	Market structure	Soft institutions	Hard institutions	Infra-structures
Individual farmers	F5	O1		N1	M1, M2	S1		
Farmer organizations								
Agri-input suppliers					M2			
Processors								I1
Traders		O2, O3			N1, M1, M3			
Extension agents	F3, O2							
R&D actors								
Policy and administrat.		O2		N1			H1	I1
Civil society								

“Land Regeneration Initiative” in Kham District by Xiengkhuang PAFO

Sectors Actors	Material assets	Organizational capacities	Technical capacities	Network configuration	Market structure	Soft institutions	Hard institutions	Infra-structures
Individual farmers	F2, F3	O1	T2			S1, S2		
Farmer organizations	F3, F5	O1, O4	T3	N2	M1	S1, S2	H2	
Agri-input suppliers				N2				
Processors				N2				
Traders				N2	M2			
Extension agents	F2	O1	T4	N1				
R&D actors								
Policy and administrat.	F3, F5	O2		N3		S3		
Civil society								

Financial and material assets

- F1. Free leasing of mechanical planters, distribution of equipment
- F2. Funding of extension work
- F3. Funding of demonstration activities
- F4. Funding of field experiments
- F5. Credit schemes for mechanization, seeds and fertilizers

Organizational capacities

- O1. Structuring of production groups
- O2. Support for programming and budgeting
- O3. Structuring of associations
- O4. Support to village land management committees

Technical capacities

- T1. Technical advice and coaching on CA
- T2. Trainings on CA techniques
- T3. Support to farmer-to-farmer exchanges and field visits
- T4. Trainings on participatory land use planning

Network configuration

- N1. Funding of meetings and peer exchanges
- N2. Facilitation of exchanges between farmers and private sector
- N3. Roundtables and workshops involving multiple development projects

Market structure

- M1. Promotion of contract-farming systems
- M2. Direct exchanges between farmers and agri-input suppliers
- M3. Facilitation of cross-border trade

Soft institutions

- S1. Sensitization on tillage risk and land degradation
- S2. Sensitization on safe use of pesticides
- S3. Media communication and radio broadcast

Hard institutions

- H1. Provincial decrees establishing the CA development Fund
- H2. Village land use planning and land allocation

Infrastructures

- I1. Tax collection system and provincial fund

Upscaling Community-Driven Agroecological Transitions in Collaboration with Extension Systems, Research and Small-Scale Producers Organizations

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The agricultural sector is remarkably heterogeneous, with substantial variations in agroecological conditions and vulnerability to climate change. Different small-scale producers will be impacted differently when it comes to global warming. They will require tailored adaptation pathways depending on the ecosystem they live in, their resources, the productions they are engaged in, and their socioeconomic characteristics such as gender, age, household incomes, and landholding size income, ethnic group, religious and cultural beliefs. Addressing this diversity is key to the design and scaling-up of adaptation pathways that meet the diversity of needs faced by small-scale producers and rural households. In addition, nature-based solutions (NbS) and agroecology (AE) can play a crucial role in facilitating locally relevant sustainable transitions to agri-food systems that are resilient to climate change (IFAD 2021 a and b). However, NbS and AE approaches need to build more upon and reinforce local ecosystem services rather than just scaling one recipe across small-scale producers and areas. These approaches need to “ensure that small-scale producers, their communities and their local knowledge are fully integrated into improving agricultural sustainability” (Sulaiman 2021).

Community-driven approach backed by quality experiential learning can provide a key entry point to develop tailored solutions building on local knowledge and ecosystem specificities, empowering communities to balance societal, economic, and environmental challenges, and to own and sustain such solutions (IFAD 2021a; IFAD 2021b). Community empowerment is at the heart of the International Fund for Agricultural Development (IFAD) strategic frameworks and represents over 28 percent of IFAD investments in Asia-Pacific. Similarly, the World Food Programme (WFP) and the Food and Agriculture Organization of the United Nations (FAO) also highlight the importance of putting people at the center of any local adaptation strategy to ensure effectiveness and long-term sustainability. Community-driven approaches are also crucial to FAO adaptation strategies (Mwenge Kahinda et al. 2021). The COVID-19 crisis further demonstrated the crucial role that empowered communities could play to address unexpected and diversified challenges (such as sudden mobility constraints, difficulties accessing seeds, lack of local masks and hygiene products) and innovate (i.e., early procurement of seeds, adoption of digital tools, women groups getting engaged in the production of soap and masks). Such local innovations were best initiated and disseminated when accompanied by local outreach systems, knowledge networks, and digital innovations to maintain services during COVID-19 time.

Community-driven approaches often remain considered costly and complex to implement at scale. However, a recent evaluation of community-driven development (CDD) in IFAD-supported projects conducted by the Independent Office of Evaluation (IOE) of IFAD showed that community-driven projects are being more effective than non-CDD projects in strengthening nutrition, gender equality, climate change adaptation, and empowerment, especially in fragile and remote areas (IFAD 2020a). Meanwhile, they may be more complex and require more time to implement, and the evaluation showed they demonstrated similar

efficiency at completion. Establishing quality partnerships with research and technical institutions is pivotal for the efficiency and effectiveness of these approaches. In this paper, building on various project experiences and insights from recent events at Adaptation Futures 2021,¹ On-Farm Experimentation 2021,² COP26,³ and the ASSET ASEAN Workshop,⁴ we first reflect on experiences from projects that collaborated with research to promote community-driven agroecological transitions. Secondly, we discuss the challenges and opportunities for research, education, and networks to help scale such knowledge-intensive community-driven processes.

1. Diversity of Approaches Articulating Community-Driven Processes with Science-Informed Experimental Learning

IFAD's recent stock-take on the uptake of agroecology in IFAD investments project⁵ highlights the need to further work on locally adapted research and participatory-based extension approaches. We could identify several examples of successful approaches to empower communities and small-scale producers to identify and drive locally relevant agroecological transitions that meet the diversity of rural needs. We notably here review several cases engaging partnership with research.

1.1 Investing in context-specific participatory action research and localized planning

The first set of projects invests in climate-adapted local planning and participatory consultations to conduct participatory research and identify a set of practices adapted to locally relevant agroecological zones.

The Adaptation in the Mekong Delta (AMD) project⁶ has promoted intensive participatory action research along the salinity gradient, documenting and testing existing and new innovative practices in Viet Nam. This resulted in the identification of 130 models of locally relevant innovations for three agroecological zones and was adopted by over 52,000 households within and outside project zones (IFAD 2021b). Proposed innovations were linked to access to climate adaptation finance to facilitate uptake. In addition, it was found that salinity zones change from season to season and because of climate change. Therefore, it was crucial to train local extension officers to adapt advisory for each season and adopt salinity early warning systems to identify flood risks and adapt practices.

The Jharkhand Tribal Empowerment and Livelihoods Project (JTELP)⁷ in India blended weather data, documentation of existing practices and research innovations, and community-driven consultations to support communities identifying a set of climate-adapted agricultural practices that could optimize their returns. Using those data, innovations and processes, communities identified localized crop planning with risk mitigation strategies such as intercropping, relay cropping, and mixed cropping, which also contribute to diversified food

¹ <http://adaptationfutures2020.in/>

² <https://ofe2021.com/>

³ <https://ukcop26.org/cop26-goals/>

⁴ <https://www.asset-project.org/activities/policy-dialogue/agro-ecological-and-safe-food-transitions-for-green-resilient-and-inclusive-recovery-in-the-asean-region>

⁵ <https://www.ifad.org/it/web/knowledge/-/stock-take-report-on-agroecology>

⁶ <https://www.ifad.org/en/-/document/adaptation-to-climate-change-in-the-mekong-delta-in-ben-tre-and-tra-vinh-provinces>

⁷ <https://www.ifad.org/it/web/operations/-/project/1100001649>

production throughout the year, contributing to diversified nutrition. Several locally adapted packages of practices were identified, and lead farmers were trained to pilot such options.

Blending local knowledge and science was crucial to delineate context-specific relevant innovations. Investing in small-scale producers’ capacities to delineate small plots to measure yields of different practices was key for the adoption, as small-scale producers could see for themselves the impacts of the practices and the meanings of improved productivity. Results of the approach were impressive, leading to increase cultivated land (restoring more degraded ones), tripling paddy and maize yields, and doubling household incomes.

Indicator	Baseline	2020 (AOS)
HH owning land	66%	99%
Avg cultivable land	< 2 acres	2.94 acres
HH taking land on lease	2%	43%
Avg sown area paddy	1.48 acres	2.15 acres
Paddy yield	5.82 q/acre	15.46 q/ acre
Avg sown area maize	0.8 acre	0.45 acre
Maize yield	2.35 q/ acre	9.47 q/acre
Avg HH income	36,000 Rs/ year	67,000 Rs/ year
Food security	68%	83%

In Nepal, the Adaptation for Smallholders in Hilly Areas (ASHA) Project⁸ promotes Local Adaptation Plans of Action (LAPA) to support communities to identify locally relevant climate adaptation pathways.

The approach follows various steps starting with GIS-based climate watershed assessments combined with participatory scenario development to help communities envision the future. This forms the basis to identify priority investments and practices to reduce poverty and build resilience to climate change.

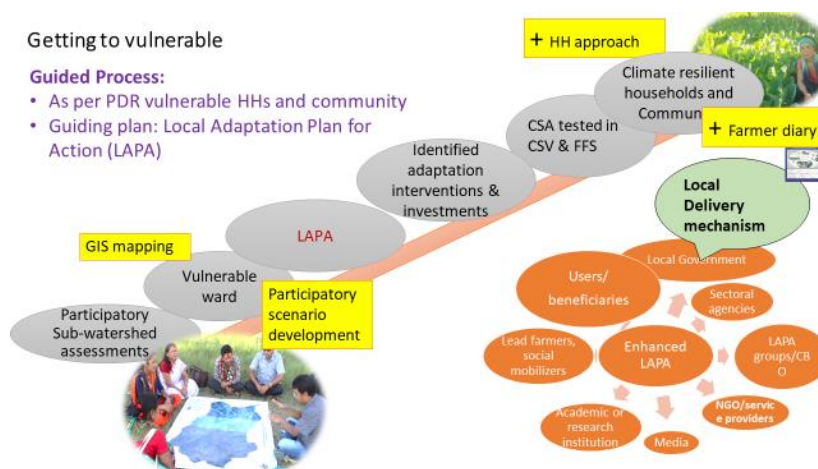


Figure 1. Asha project, 2019; presented at COP26 event.

Once priority innovations were identified in various areas, the project invested in climate-resilient small-scale community infrastructures, such as irrigation canal/pond with source protection, drinking water supply with source protection and excess water use, and agriculture and forest-based climate-adaptive profitable productions using no/low chemical inputs, including the establishment of demonstration (permaculture) farms, farmer field schools,

⁸ <https://www.ifad.org/en/web/operations/-/project/1100001723>

nurseries, development of Lead Farmers (LFs), and “small-scale producers” promotion. The outcomes of the project revealed that the integration of scientific techniques could have synergic effects of increasing ownerships of local communities toward development projects and maintaining their sustainability to develop climate-resilient communities. In addition, integration of the GIS-based watershed assessment with the community-based participatory scenario is also helpful in strengthening the existing capacity of the local community for sustainable management and development of environmental resources and improving their livelihoods.

1.2 Enhancing collective capacities of small-scale producers’ groups for experimentation and learning

A set of complementary approaches promotes collective experiential learning processes associated with experimentation and farm records, sometimes backstopped by researchers.

The FAO developed the Farmer Field School (FFS) approach to strengthen small-scale producers’ critical observation skills and ecological literacy (understood as the understanding of their agroecosystem and how to manage it), improve their decision-making skills and facilitate group collaboration and action to find locally-adapted solutions to improve their livelihoods. Entomologists and adult education experts first worked together to develop this approach in 1989, ultimately seeking to enable small-scale producers to become “experts in their fields.” FFS groups set on-farm and between-farm comparisons to assess and select the practices that work best for them, experimenting with practices from local innovative small-scale producers, government agents, and researchers. The groups function as local innovation platforms working on crucial community challenges. At the beginning of the FFS, small-scale producers work with trained facilitators to identify relevant performance indicators that need to be monitored across (e.g., taste, diversity, labor intensity) and potentially interesting practices to test in the field. FAO and many other organizations have adapted FFS to work on various technical topics, including climate change adaptation (see FAO 2021 for an overview). For instance, researchers in Indonesia adapted the FFS methodology to develop the Science Field Shops (SFS). In SFS, each farmer measures and records daily rainfall, observes the implications on fields and plants directly in his/her plot and then discusses data as a group. In the long-term, small-scale producers better understand the effects of rainfall on their fields and how to interpret seasonal climate scenarios and adapt accordingly (Winarto et al. 2018). In Andhra Pradesh, India, FAO and ICRAF work closely to use FFS to support evidence-based agroecological transitions at the farm and village level. The programme uses FFS to develop the capacities of local agroecological champions, as to facilitate farmer field schools and conduct evidence-based experimentation, thereby enabling the adoption of locally adapted agroecological innovations. Researchers support FFS programs in many ways. They support the identification of potentially useful agroecological innovations to small-scale producers’ challenges. They work with FFS programs and facilitators to translate complex ecological concepts (such as soil health, plant-microorganism interactions, climate change) into interactive experiments and discovery-learning exercises that build small-scale producers’ literacy. They support the identification of appropriate indicators to monitor the performance of practices across social, environmental, and economic domains, both during and following FFS. In turn, FFS enable researchers to collect disaggregated data on and deeper understanding of adoption barriers and the potential of different agroecological technologies and practices.

In several countries, IFAD and FAO-FFS support community-driven seed production with the critical role of research to help strengthen seed production and evaluation. For instance, IFAD has partnered with Biodiversity International to promote evolutionary breeding for community-driven selection and multiplication of relevant crop species. Another example is in Brazil, along with the Creole Seeds Programme that supports community seed systems by promoting “seed guardians,” mainly women, responsible for community seed banks conserving traditional creole seeds adapted to the semi-arid climate of north-eastern Brazil. Seed production is backstopped through a partnership with EMBRAPA (a Brazilian public agricultural research agency), which also helps screen the various attributes of the indigenous seeds conserved and produced, for instance, reviewing their climate resilience and nutrition values. Such activities increase climate resilience and enhance households’ income. By adopting a range of strategic actions, the program intends to contribute to families’ nutrition and food security while increasing the agrobiodiversity of their territories (IFAD 2021). The supported interventions are based on promoting biodiverse and resilient production systems in agroecological backyard gardens and collective fields of communities, and Agricultural Family Schools (EFA) that provide youth with agrobiodiversity capacity-building and hands-on training through rural schools. As spaces of collective learning and exchanges, the EFAs promote the expansion of diversified and integrated farming systems that incorporate native and adapted trees and crops and the multiplication of species and varieties.

1.3 Addressing diversity of rural households: meaningful participation and enhancing individual monitoring capacities and differentiated analysis

In addition to diversity between communities, it is important to address diversity within communities and households to ensure different categories of households can adapt pathways.

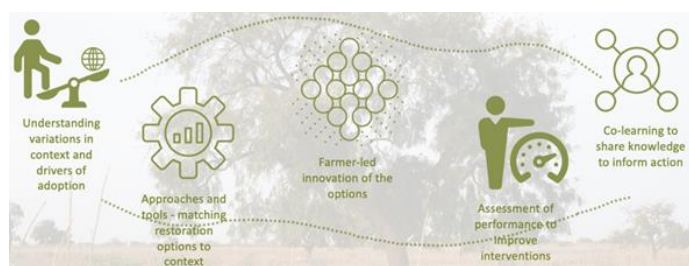
The first essential element is knowing and understanding such diversity and integrating it into the community engagement process. For instance, an important step in the Nepal ASHA Project is the vulnerability assessment and gender assessment conducted within the communities. This mapping enables us to better understand the differentiated vulnerabilities of households and address them when discussing potential investments. In addition, the crucial point was to ensure meaningful, differentiated engagement of households, ensuring that women, youth, ethnic minority, and vulnerable households are proactively supported to engage meaningfully in the community process. For instance, women were provided specific leadership training, and quota encouraged their participation. As a result, 51 percent of LAPA participants engaged in the preparation of climate change planning were women. In addition, the project supported a gender-sensitive network at the municipal level and climate change adaptation planning and sensitized local government representatives in gender-responsive budgeting and gender-sensitive auditing.

The second important element is to ensure that the different constraints and aspirations of different target groups are considered when planning and reviewing proposed innovations. For instance, the FFS planning is done in a participatory way, trying to identify and meet various needs. Building on identifying women’s labor constraints, many FFS may work further on labor-saving innovations. FFS often includes taste and other qualitative food considerations as criteria for identifying preferred agricultural practices.⁹ In addition, attention is paid to addressing barriers to access to knowledge and services, promoting women master trainers,

⁹ For more information on integrating nutrition into FFS, please see <https://www.fao.org/farmer-field-schools/ffs-overview/nutrition/en/>

and adapting training to literacy levels and available timing. In the Viet Nam AMD project,¹⁰ an important lesson emerged from screening carefully proposed climate-smart models against environmental and social criteria, adopted by farmers through support against financial, land, and labor needs.

Finally, several projects promote the use of farmer diary and innovative monitoring and evaluation (M&E) solutions in Nepal, Cambodia, Indonesia, and Brazil, which inform M&E and empower small-scale producers to review and analyze their practices and innovations. Partnership with research becomes key to bringing relevant analytical tools, training local service providers, and helping with the differentiated analysis emerging from individual data. For instance, IFAD partners with ICRAF in East Africa to implement the concept of “*Research in Development Approach*” that embeds co-learning within the development process to accelerate impact on the ground of farmer-driven land restoration initiatives. Key in the process is implementing on-farm planned comparisons to test various options across different conditions and locations to identify what works best and for whom. This facilitates co-learning and sharing of knowledge across multiple stakeholder groups or communities of practice. In Kenya, over 2,200 small-scale producers were supported to test various restoration options and compare results within farms, between farms and communities, blending participatory design with scientific knowledge. Such an approach helped small-scale producers select adaptation solutions best suited for their specific contexts to build their resilience to climate while improving food security. Building small-scale producers’ capacity to monitor and compare can lead to increased restoration approaches and help deliver to the last mile.



Farmer showing improved maize yield in 2*2 ft planting basins (left).

Figure 2. Overview of the “on farm planned comparison approach.”

All these approaches have some elements in common: active participation of small-scale producers’, farmer-led monitoring of performance, documentation of existing practices, and partnerships with research and extension to backstop farmer-driven experimentations. While there is a greater recognition that such approaches can help address the complexity of locally driven agroecological solutions, there is very little agreement on how to implement and scale up such knowledge-intensive approaches to millions of small-scale producers. The following sections review lessons learnt from these cases and other partnerships on approaches to help scale such a community-driven process.

¹⁰ <https://www.ifad.org/en/-/document/adaptation-to-climate-change-in-the-mekong-delta-in-ben-tre-and-tra-vinh-provinces>

2. Common Factors and Lessons Learnt to Scale up Community-Driven Process

2.1 Designing and investing in cost-effective, sustainable, and scalable local implementation

As the processes supporting agroecological innovations and community-level experimentations are knowledge-intensive, their success requires strong technical support and human capacity development.

Consequently, one common approach is implementing experiential learning and participatory research initiatives in a more limited number of representative communities and groups that become leaders and disseminate innovations. For instance, in Bhutan, the IFAD’s Commercial Agriculture and Resilient Livelihoods Enhancement Programme (CARLEP)¹¹ intensively supports climate-smart villages in agroecological representative areas to identify the best climate change adaptation options. Such climate-smart villages may be used and training centers for lead small-scale producers and common demonstrations.

In the Cambodia Scaling Up Climate Resilient Agriculture (SUCRA) sub-project of the ASHA project, IFAD is promoting a new approach in collaboration with the World Overview of Conservation Approaches and Technologies (WOCAT) to support a representative network of Integrated Farm Systems (IFS) that will implement more intensive on-farm experimentations and farm records. A participatory analytical framework and assessment of IFS-based farms (SUCRA methodology) have been developed to assess the impact of the IFS implementation concerning biophysical and socioeconomic factors (five parts) and to identify the suitability of IFS practices for different landscapes. The added value of the approach is to combine participatory implementation and monitoring of farms with farmers and integrate capacity development for both researchers and farmers to integrate a systemic perspective in the implementation of IFS. Such an approach is implemented in the representative landscape to draw lessons applicable to other farmers in similar landscapes.



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Mapping of Integrated Farming System (IFS) on a farm in Kampong Chhnang Province, Cambodia (SUCRA Project, IFAD) using Google Maps (Source: Royal university of Agriculture (RUA) / WOCAT)

A crucial complementary approach is to build the capacities of local facilitators and grassroots institutions to drive such processes more effectively and sustainably (IFAD 2021). For the India JTELP project presented in the first section, scalability and sustainability of the approach rely on the capacity development of local facilitators, the 2465 Krishi Mitra, who supported 211,000 beneficiaries, driving local implementation, and progressively getting remunerated by the communities or engaged in seed or input production. As a way forward, the project is moving from project-based arrangements to services by youth seed organizations, local agri-preneur and “Krishi Mitra” who may be incentivized and remunerated by the communities as such process contributed to double agricultural incomes. Similarly, FFS are organized to form cohesive small-scale producers’ groups and rely on trained local facilitators (i.e., government

¹¹ <https://www.ifad.org/en/web/operations/-/project/1100001739>

staff, NGOs, producer groups, or lead small-scale producers). In Andhra Pradesh (India), FFS is part of the advisory system approach to support small-scale producers using natural farming practices. Local resource small-scale producers are trained through FFS to understand the ecological mechanisms underlying natural farming and experiment with different practices that might be adapted locally. In addition to strengthening individual capacities, this approach builds the group capacities to work collectively and enhance peer-to-peer learning and collective action. In Brazil, a local non-governmental organization, and gender and social inclusion experts provide training to networks of women to use the agroecological logbooks to account for the proper economic contribution of women in the production and marketing process.

Finally, it is key to embed a community-driven process within local policy planning and support systems to ensure scaling and sustainability. For instance, in the Viet Nam AMD project and across the portfolio, climate-sensitive community planning was mainstreamed in local planning to upscale such a process. Several innovations were mainstreamed through value chain partnerships, for instance, with organic coconut value chain actors. Similarly, the Nepal ASHA project managed to develop 200 ward level LAPAs led by the local government and implemented through a locally driven approach with local mobilizers, lead farmers, and grassroots institutions. Strong attention to policy engagement and convergence ensured that the main results of LAPA were mainstreamed in 753 local adaptation plans of government and climate change policy. The project is trying to strengthen further linkages between local government and trained lead farmers used in other IFAD projects. A total of 115,514 households, adopted climate-smart practices; 87,183 beneficiaries' households (HHs) adopted at least one climate-resilient agriculture; 26,686 HHs applied efficient water use technique; 7,134 HHs used renewable energy for domestic purposes; 23,222 HHs adopted livestock stall feeding with adapted forage and fodder trees; 429 lead small-scale producers contracted by LAPA beneficiaries' groups; and 21,742 ha of land managed under climate-resilient micro-watershed management practices. The project investments for community-based climate-smart agroforestry and livestock, permaculture, community-based forest management are helpful interventions for scaling up the existing capacity of the smallholders for climate change adaptation and climate resilience. For scalability, empowering local facilitation, quality guidelines, and mainstreaming process in policy planning were considered crucial.

2.2 Investing in quality training, education, and community of practices for long-term capacity development

While approaches relying on local facilitators and organizations are less costly in the long run, they require an important initial investment in training of trainers, quality support, and backstopping. Most often, they require a behavioral change in facilitators to shift from top-down and sectoral thinking (this crop package is the best to increase yields for everyone) to bottom-up and systemic thinking (farmers need to manage different constraints and objectives, so there is often no one size fits all). Therefore, it is often needed to build functional capacities of facilitators in meaningful participatory approach, ecological, digital, and social literacy, and to access different sources of knowledge from both communities and research. In addition, it is often important to build their understanding of new farming system context (climate change, nutrition, water scarcity, and uncertainty), understand better diversity of households' capacities and be able to initiate and monitor farm experimentations along various social, economic, and environmental criteria.

To achieve scale in training, it is often required to adopt a gradual cascading process to build larger and larger cohorts of trained facilitators backstopped by technical officers. For instance, in FAO's FFS programs, a large upfront investment in quality training of facilitators by

experienced master trainers is needed. The training follows a similar organization and method as the FFS subsequently set up in the field by facilitators. The capacity of facilitators emerges as the most important determinant of the outcomes of FFS projects. It is important to document the community-driven process and produce quality guidelines that can facilitate the scaling and replication of such approaches. For instance, the ASHA Nepal project emphasized that the initial implementation of LAPA was time consuming and complex as the project was testing new tools and approaches. It was crucial for them to learn from initial implementation to develop packaged guidelines that facilitate training of facilitators and scaling of such approaches.

Second, it is equally important to ensure that such knowledge and training contribute to longer-term education and curriculum efforts. Indeed, projects always come to an end but in practice, implementing capacities often decrease as local staff rotate to new opportunities and new staff require training. In addition, given the increasing impacts of climate change, small-scale producers need to be supported to continue such farmer-led experimentation process while facilitators may need refresher training and backstopping to adapt to changing climatic conditions. For instance, in the Viet Nam AMD project, the climate-smart agriculture (C-SA) models were scaled out to over 20,000 households in nearby districts as local government agencies produced and adopted replication guidelines. To remediate that, in Cambodia and Uganda, IFAD-WOCAT grant guidelines and documentation were scaled in extension network and training curriculum of extension officers, thereby providing an entry point for long term improvement of capacities of local facilitators and addressing rotation challenges beyond project time. In Indonesia, a mid-term review of the IFAD project recommended scaling much training into an online training course to facilitate regular initial and refresher training to cohorts of local facilitators and government staff facing high turnover.

Finally, as people learn best from their peers, and knowledge and guidelines change, the community of practices can play a key role in helping facilitators and extension agencies improve their capacities and help identify and retain knowledgeable experts. WOCAT provides a network for SLM practitioners and experts to come together, share knowledge, and learn from each other. This sharing of lessons learned can also spark innovations for a particular context and aid in scaling practices across landscapes. FAO facilitates the Global FFS Platform that strives to connect FFS practitioners globally, providing collective learning and innovation opportunities. Local practitioners can directly share their experience or ask very practical questions when they have issues. They can also access a shared online platform with several guidelines and resources and regular webinars among the networks. Similarly, the Global Forum for Rural Advisory Services (GFRAS) and its regional network, Agricultural Extension in South Asia (AESAs), play a crucial role in identifying and sharing good extension practices and guidelines among extension professionals.

2.3 Increasing outreach and peer-to-peer learning through dissemination tools and networks

As community-driven approaches and farmer-driven experimentations cannot be replicated in all communities and may be implemented in only representative landscapes (i.e., the dual approach of 2.1), these intensive approaches need to be complemented with capitalization and dissemination activities facilitating peer-to-peer learning.

First, it is important to ensure that knowledge generated through community-driven processes is well documented to facilitate further scaling process. Small-scale producers need to trust the knowledge and understand whether it makes sense for their farms and contexts. Tools and methods need to be harmonized and standardized based on quality data generated at several scales starting from the local level to address these issues. The key steps in this process include:

1. developing participatory inventory and selecting priority SLM practices among local, national, and global options;
2. promoting local collaborative documentation in the SLM database — providing free online access to over 2,000 good SLM practices, which are also compiled nationally; and
3. using the data, mapping land, and assessing impacts to facilitate evidence-based SLM decision making.

Over the last 25 years, WOCAT, together with over 50 institutions worldwide, has developed standardized tools and methods to document good SLM practices, to map land degradation and SLM, and to assess the impacts of SLM interventions, thereby contributing to improve resilience to climate change (Harari, Gavilano, and Liniger 2017).

Second, it is important to invest in peer-to-peer learning and dissemination modalities. For instance, in the previous example of the FFS conducted in India, the results of experiments are shared through videos produced by small-scale producers. For the small-scale producers who were not involved in FFS, the challenge is to understand the principles of discovery-learning and experimentation using less knowledge-intensive approaches without diluting the core principles too much, so that more people can improve their ecological literacy. Similarly, in most IFAD projects, intensive training approaches are often associated with investments in field days, video, radio programs, and lighter training for small-scale producers. In addition, most projects organize study tours and facilitate exchanges between the different farmer groups and practitioners across regions to stimulate the exchange of knowledge and innovation further. Producers' organizations and knowledge networks can play a key role to systematize and sustain peer learning. In Brazil, training and capacity building processes for technicians, technical assistance, and extensions services for smallholder small-scale producers, including women and young people, and learning routes, fairs, and workshops, as well as the adoption of a territorial approach to local food systems, are determinants to disseminate and systematize experiences and contribute to the sustainability of the program.

Finally, farmers' networks and federations can play a key role in facilitating continuous peer-to-peer learning. For instance, in Viet Nam AMD, trained lead farmers were incorporated in farmer unions to strengthen the capacities of farmer unions to deliver adapted climate-smart practices and acknowledge lead farmers' capacities. In the India and Bangladesh project, women self-help groups or common interest groups played a key role in facilitating such transitions. In CAIM¹² and APDMP¹³ projects, even if self-help groups (SHG) were not working on agriculture, several interviews revealed that women leaders and farmer field school women trainees used the SHG network to disseminate agricultural information to women members. In India, the natural farming initiative¹⁴ in AP state had a key focus on women and SHG and reached 750,000 farmers and farm workers, and around 216,000 ha in five years.

¹² <https://www.ifad.org/en/web/operations/-/project/1100001470>

¹³ <https://www.ifad.org/it/web/operations/-/project/2000001420>

¹⁴ ZBNF is a farming practice that believes in the natural growth of crops without adding any fertilizers, pesticides, or any other external input. The inputs used for seed treatments and other inoculations are locally available in cow dung and cow urine.

2.4 Investing in people-centered digital innovations to empower community-driven process

Finally, digital innovations hold much promise to reach a wider number of small-scale producers, complement and strengthen in-person training of small-scale producers and facilitators (FAO 2020), and share and upscale practices and good experiences. They may also play a role in strengthening the overall quality of piloting innovation and learning in community-driven programs.

IFAD has recently undertaken a review of ICT4D solutions in its portfolio of loans and grants in the Asia and the Pacific region which shows that most of the identified solutions (49.4%) aim to improve access to information. Mobile apps, decision support systems, and geospatial technologies are those most represented in the portfolio and the most advanced implementation.



Digital innovations and remote sensing can help map and cluster similar agroecological and socioeconomic zones presenting different constraints and needs to identify where to invest in selected community-driven experimentations. They may also help cluster communities together against similar proposed innovations. For instance, in the Lesotho project on Restoration of Landscapes and Livelihoods (ROLL),¹⁵ at design, used remote sensing to assess land degradation, soil erosion, and wetland loss to generate data for precision geographic targeting based on evidence. In addition, they combined the above biophysical data with socioeconomic data on poverty, productivity, and nutrition to identify priority districts and interventions for investment based on the analysis.









Digital innovations can help communities access tailored climate-sensitive advisory that can guide their community-driven process. For instance, digital climate advisory can empower communities in better understanding what the season will look like or expected precipitation patterns, thus allowing them to make informed decisions on what strategies to adopt by having access to previously unavailable information. For example, through pilots in Sri Lanka and India, WFP is strengthening access to tailored weather forecasts coupled with advisories for small-scale producers and fishing communities delivered through various means, including through the use of ICTs such as dedicated apps. In Viet Nam Mekong Delta, the frequency and severity of saline intrusion increased because of sea-level rise and other factors such as upstream dam construction, riverbed mining, and groundwater over-

¹⁵ <https://www.ifad.org/it/web/operations/-/project/2000002340>

extraction. Within the AMD project, IFAD initiated a Digitalized Water Salinity Monitoring System developed by PPP between the AMD project and Rynan Technologies Group Ltd. to protect local communities from severe losses in aquaculture, perennial crops, and livestock production. In Malawi, the Sustainable Agriculture Production Programme (SAPP)¹⁶ and partners conducted soil nutrient analysis, which enabled the identification of five areas with comparable fertility needs and suggested specific fertilizer blends based on nutrient requirements in each district, hence avoiding blanket fertilizer recommendations. Such zoning could also conduct tailored participatory action research to identify adapted integrated nutrient management.

If well designed, climate-informed digital advisory services (DCAS) can provide tailored advisories to communities, help communities record and analyze their innovations, and provide a feedback loop to ensure better capitalization and learning throughout the initiative (by using, for example, digital M&E and online databases). For instance, in Cambodia, the aspiring project has digitalized farm business plans and bookkeeping, helping farmers monitor and track farming performances and innovations. In Kenya, the IFAD-EU-ICRAF project on “research for development” supported live records by the 2,000 farmers testing the different agroecological practices. Access to a real-time online dashboard and feedback analysis on the performance of practices was very important to engage farmers and extension agents, and facilitate scaling. In India, WTOR developed a tailored digital advisory solution — farm precise — which has interactive features for co-creation of solutions:

- Advisories tailored to farm-specific conditions and the weather data available at the highest granularity from multiple sources.
- Interactive – the farmer inputs specific data, identifies the problem, and co-evolves solutions that can be shared.
- Offers solutions that are nature friendly, increase productivity, reduce losses, and lower costs.

 Weather Forecasts for 5 days	 Crop & Farm specific Advisories	Farmer-crop-phenology specific advisories which integrate the following: <ul style="list-style-type: none"> • Crops, varieties and cropping pattern • Cultural practices • Irrigation management • Nutrient management • Pest and diseases management
 Fertilizer Calculator	 Crop Specific Pest & Disease Library	 Farmer Interaction <ul style="list-style-type: none"> • Community forum • Support Chat • Phone Call
 Farm Diary (Expense/ Income)	 Mandi Commodity Prices	 Agriculture – News / Events /Govt. Schemes

(Source: WOTR Centre for Resilience Studies (W-CReS), Watershed Organization Trust (WOTR), Pune, India. 2019)

Figure 3. Farm precise app from WTOR.

However, the adoption of digital innovations at scale also presents challenges for unconnected areas, and poorer small-scale producers often cannot afford or use such tools. In addition, small-scale producers first trust their peers, and even connected small-scale producers most often use social media instead of more complex digital tools (Voutier 2019). Most projects

¹⁶ <https://www.ifad.org/en/web/operations/-/project/1100001534>

have developed thematic WhatsApp groups and Facebook groups, which have been key to promoting sharing of knowledge and issues, and promoting peer-to-peer learning for local facilitators. In India, the COVID crisis forced the project to innovate and adopt digital tools that further empower Krishi Mitra/local facilitators who use videos to facilitate local training and can easily reach out to extension officers via WhatsApp. Hence, digital tools can support rather than replace quality local facilitators (see <https://www.ifad.org/en/web/latest/-/blog/maintaining-critical-extension-services-for-smallholders-during-covid-1>). To achieve that, such tools need to be developed with partners, building on the careful identification of small-scale producers and extension agents' needs. Using such farmer-centred approach, WOCAT has been developing the farm better app (<https://farmbetter.io/>), which draws on the WOCAT Global SLM database through a matching of small-scale producers. The Blueprint on Climate-Informed Digital Advisories (DCAS) also offers important insights on the building blocks of effective and sustainable DCAS as it builds upon the collective experience in the field of over 30 organizations, capitalizing on lessons learnt from several pilots and initiatives and with a focus on using DCAS to support climate adaptation at a scale (Ferdinand et al. 2021).

Conclusion

In conclusion, the paper shows that several successful approaches exist to implement and scale up community-driven agroecological innovations backed by farmer-led experimentations. Scalable programs need to be designed that embed a clear exit and scaling up strategy from the start. This means investing in local capacities and cost-effective but well-structured grassroots institutions and processes owned by the public and private institutions. Collaboration with research and education is key to producing quality training programs and guidelines, scaling up to build capacities and transforming the curriculum. Digital innovations can greatly empower communities to drive such processes further and facilitate articulation with research and education through online courses, hotlines, and tools to collect and analyze data. The paper also shows the importance of investing in quality networks to scale such approaches through peer-to-peer learning and continuous capacity development. The sustainability and scaling process often requires time beyond the individual project duration. Therefore, programmatic phased approach is useful, seeking to scale up innovations that work in new projects and further build pathways to sustainability. To be successful, such interventions also require a strong focus on country-level ownership, both at the local level and at the policy level, and greater coherence amongst different stakeholders and partners that might have similar, complementary interventions, such as IFAD, FAO, and WFP. Strengthening common engagement, building on, and bringing about greater coherence would allow achieving adaptation outcomes at a scale and would certainly allow the layering of interventions and multi-year funding, thus strengthening longer-term sustainability.

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Experience of the MASIPAG Farmers' Network and the Dept. of Community Development, University of the Philippines

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ABSTRACT

This is about the partnership between MASIPAG, a national network of small farmers' organizations, non-governmental organizations (NGOs), scientists, and the Department of Community Development, University of the Philippines Diliman, in promoting agroecology, sustainable local food systems, community development, and farmers' empowerment.

MASIPAG is a national network of small farmers' organizations, scientists, and NGOs in the Philippines that is promoting agroecological farming and farmers' rights to development. During the pandemic, MASIPAG showed how farmer-led, multisectoral partnerships helped in providing food, health, and nutrition educational activities to help communities cope with the COVID-19 pandemic. They were also able to continue their education and advocacy campaigns for food security and sustainable food systems.

As a farmer-led network, the strength of MASIPAG's efforts to promote agroecology and sustainable food systems lies in the strength of its farmers' organizations. Toward this end, the UP Dept. of Community Development has been a partner of MASIPAG in building the capacity of farmers' organizations for organizing, organizational development, participatory development program management, community development, alliance, and network building.

Keywords: agroecology, community development, multi-stakeholder networking, participatory research, community-engaged learning and service

*“Top-down, short term, single sector approaches generally cannot deliver long-lasting impact —the system is too complex. The 2030 agenda, through **engaging and working with all societal sectors in a bottom-up approach**, is a way of being far more deliberate and targeted in accelerating a society’s natural organic development process towards sustainability.” (The SDGPartnership Guidebook. 2020. Stibb, Prescoot, UNDESA & TPI)*

This is about the partnership between MASIPAG, a national network of small farmers’ organizations, NGOs and scientists, and the Department of Community Development, University of the Philippines Diliman, in promoting agroecology, sustainable local food systems, community development and farmers’ empowerment.

MASIPAG is a national network of small farmers’ organizations, scientists, and NGOs in the Philippines that is promoting agroecological farming and farmers’ rights to development. The network is currently composed of 518 organizations of small farmers, 60 NGOs and 18 scientists from various parts of the Philippines.

For almost four decades, MASIPAG farmers have been practicing and promoting organic agriculture, diversified, and integrated farming systems. Through its CIMME Program — collection, identification, maintenance, multiplication, evaluation of indigenous seeds — MASIPAG has been able to collect, preserve, and share more than 1,000 indigenous rice varieties. More than 1,000 MASIPAG varieties have been bred and developed by MASIPAG “farmer-scientists”, through the assistance of NGOs and scientists. Many of the MASIPAG seeds are drought tolerant, saltwater tolerant, pest/disease resistant, and adaptable to climate change.

The network also developed the MASIPAG farmers’ guarantee system (MFGS) wherein farmers engage in a participatory process of evaluating and certifying their organic products, and in collective processing and marketing of their produce. Through its farmer-developed appropriate technology (FDAT) program, they continue to assist small farmers in developing farming technologies that can be easily used and replicated by other farmers and rural organizations.

While it is a farmer-led network, MASIPAG recognizes the importance of building partnerships with other sectors and other like-minded stakeholders in promoting agroecology and sustainable food systems. They have actively built and expanded farmer-scientist partnerships, multi- sectoral networks and partnerships for their advocacies on food security, agroecology, farmers’ rights, women’s rights and sustainable rural development. Partnerships with local governments have enabled them to institute local ordinances that promote the practice of organic farming and the prohibition of the use of chemical agricultural inputs in some towns, cities, and provinces in the Philippines. Their collaboration with other farmers’ organizations, cooperatives, consumer groups, and local government units have led to the formation of the PGS-Pilipinas or Participatory Guarantee System-Pilipinas, a nationwide network promoting and practicing thirdparty/participatory certification of organic produce and people-led/participatory marketing of organic products. MASIPAG is also an active member of international organizations like the International Federation of Organic Agriculture Movements (IFOAM). Many of its farmer-scientists have been invited to speak or be resource persons on organic farming and agroecology in various local and international seminars.

learning, etc. In the past decade, MASIPAG has intensified efforts for organizing, organizational development, and strengthening of small farmers' organizations, as well as the development of women and youth leaders. For this, MASIPAG has had partners with various universities and schools, one of which is the Department of Community Development (DCD) of the College of Social Work and Community Development, University of the Philippines Diliman.

The DCD has undergraduate and graduate programs that aim to develop Community Development professionals and practitioners committed help empower marginalized and disadvantaged sectors and communities and be in solidarity with their efforts to advocate for people's development agenda. The DCD's teaching, research, and extension work/service engagements promotes the following core principles and strategies:

1. Praxis – learning from theory building and actual practice/engagement in community development
2. Community-engaged learning and service – processes wherein students and faculty learn about the various issues of poor and marginalized sectors and communities by living with them, by engaging in their productive and reproductive work in their homes and communities, and by supporting their community organizing and community development processes which will help them address their immediate socioeconomic needs and work toward their strategic development aspirations and goals. Community integration is key to community-engaged learning and service.
3. Partnership and social solidarity building. As a result of our community-engaged learning and service principles and practice, we enable our students to gain a deeper and more comprehensive analysis of development issues, of more sustainable and people-centered development paradigms and programs, and hopefully inspire them to forge genuine partnership and solidarity with poor sectors and communities which hopefully they will sustain even after they graduate.
4. These principles and strategies also ensure that our undergraduate and graduate curricula, research and publications, and discourses in Community Development remain current, dynamic and deeply contextualized in the actual development issues and evolving development paradigms that are more sustainable and people-centered.

For the past 10 years, fieldwork teams composed of faculty, undergraduate, and graduate students of the DCD worked with MASIPAG to strengthen the capacities of farmers in participatory planning, implementation, monitoring, and evaluation of their programs and activities; organizing and organizational development; participatory leadership; rural women and youth empowerment; networking; and advocacy work around concerns related to sustainable agriculture and sustainable food systems. In 2019, our fieldwork team, together with MASIPAG farmers, collaborated with two public high schools in Quezon Province, Southern Tagalog, to teach teachers and senior high school students about organic farming. The team conducted the MASIPAG Orientation on Sustainable Agriculture (MOSA) for junior and senior high school students and teachers, after which the schools committed to institutionalize organic backyard gardening as an extracurricular activity for their high school students and teachers.

In 2020, in the midst of the pandemic, we continued to do our fieldwork with MASIPAG albeit via online platforms. As requested by MASIPAG, our online fieldwork documented the good practices in agroecology of MASIPAG farmers' organizations in various parts of the country, even in the midst of the pandemic. Focus group discussions and key informant interviews were conducted online with members of farmers' organizations, farmer-scientists, partner NGOs, partner scientists. Our fieldwork team also participated in various MASIPAG online training seminars, fora, and advocacy activities. By the end of semester, the fieldwork team was able write inspiring stories on:

- how the MASIPAG farmers' "bayanihan" — an indigenous practice of cooperation, sharing, labor and resources exchange — enabled MASIPAG farmers to maintain their trial farms, communal farms, and communal vegetable gardens, even in the midst of the pandemic;
- farmers sharing their organic rice, vegetables, and indigenous seeds to communities that had no access to food and had difficulty sustaining their farms;
- MASIPAG farmers partnering with NGOs and local government offices in promoting urban gardening, herbal gardening, and feeding programs conducted alongside seminars on health and nutrition;
- MASIPAG farmers forging social solidarities with local organizations of fisherfolk and urban poor communities in order to provide food and other services to rural and urban poor communities most in need;
- farmers continuing their advocacy campaign — online or, whenever possible, face-to-face — for better policies on community-based public health, sustainable food systems, and protection of human rights.
- women's care work/reproductive work and service to the community – women collectively tending to their backyard vegetable and herbal gardens, doing food processing and preparation of herbal medicines which they shared with frontline healthcare workers in their villages.

Because of the continuing surges of COVID-19 cases in 2021, the DCD had to continue doing fieldwork "online". But this situation actually compelled MASIPAG, as well as our fieldwork team, to craft creative, innovative, yet simple ways for farmers to continue their communication, education, and advocacy campaigns. For the second half of 2021, our fieldwork team is focusing on building capacities in community/participatory research, and in local advocacy, lobbying, and networking of small farmers' organizations, using both online and face-to-face methods and platforms. The team aims to create the designs and modules for these capacity building activities in a participatory process, involving the farmers in the design, actual conduct/piloting of these activities, and in finalization of the modules. It is our hope that by the end of the semester, we will have been able to build the capacities of the farmers in conducting participatory community research, community lobbying and networking, as well as create training modules that will enable the farmers to conduct echo seminars on these two topics on their own.

Through these trainings, we hope to help sustain MASIPAG's advocacy work, lobbying, and networking, through which they have been successful in instituting local ordinances to promote organic agriculture in some towns and provinces in various parts of the country. For

A recent success of MASIPAG's partnership with local government is the passing of the Organic Agriculture Law in the Philippines in 2010. The Organic Law was further strengthened through the continued advocacy of MASIPAG and other advocates of organic farming even in the midst of the pandemic. In 2020, the Organic Agriculture Law was amended so that central role of small-scale farmers and indigenous peoples in the development of organic agriculture is recognized. The Amended Organic Agriculture Law now also includes the participatory guarantee system where small farmers' organizations actively engage in the process of organic produce certification and marketing.

As part of ongoing efforts to document and share the good practices of MASIPAG to other universities, schools, other stakeholders, I did a mini research on how this farmer-led network creatively responded to the pandemic and contributed to the social solidarity that emerged during the pandemic. Titled, "Seeds of hope in the midst of the health and food crisis: The MASIPAG's response and contribution to social solidarity building during the pandemic," this research was published in the Philippine Journal of Social Development, which will be shared in a research forum this November.

Some of the major lessons from the MASIPAG response to the pandemic which were highlighted in the journal article are the following:

1. *Agroecology goes hand-in-hand with the people's call for food sovereignty; it gives priority to local economies to be able to respond to local needs and (it) puts farmers first in the agenda. Agroecology places farmers and the people's right to food at the center of policies, and the people as active participants in the attainment of their right to food. (MASIPAG statement for Earth Day, April 2020)*
2. The centrality of women's care work/reproductive work even in sustainable agriculture and sustainable food systems
3. The need to continue building multi-sectoral partnerships and social solidarity that will:
 - a. respond to people's immediate needs and assert government's responsibility for people's welfare, well-being, and development;
 - b. protect and assert people's rights, including people's right to benefit from and decisively participate in development; and
 - c. promote and advocate for people's development agenda, and more sustainable, more people-centered development paradigms, policies, and programs.

Organizations' Experiences in Supporting Rural Transformation, Agroecology Mainstreaming and Family Farmers with the View to Building Back Greener and More Resilient

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CONTEXT

The government defines Viet Nam as an agricultural country. The percentage of labor in agriculture accounts for 77.9 percent, while the contribution of the agricultural sector in 2020 only accounts for about 14.95 percent of the country's GDP.¹ In the context of the COVID-19 pandemic, the agricultural sector has contributed to sociopolitical stability and played the role of a "safety belt" for the entire economy in times of crisis, help stabilize consumer prices, help offer alternative jobs, and generate export revenue. Even so, 89 percent of households are smallholder farmers.² The average size of a smallholder farm is 0.32 hectares.³ Small farms are often rendered less efficient by the fragmented nature of their landholdings.⁴

In the north of Viet Nam, where most of the poorest ethnic minorities live, monoculture cultivation without protection measures has led to soil degradation, reducing crop yields and increasing investment costs in crop production. For instance, small family farms spend almost 40 percent of their value of production for agricultural inputs.⁵ Moreover, the area of land use for the majority of households is narrowing due to natural population growth, and deforestation to expand the cultivation area is increasing, which has a strong impact on the local living environment.

Most farmers have not received training in production, but only practice production according to experience of generations in their families. Therefore, access to agroecology and improvement of farming methods to suit production practices in the context of climate change is limited. Particularly, out of a total of 21 million agricultural workers (corresponding to about 10 million households), about 97.1 percent of laborers are not trained in occupations. Only about 1.5 percent of the agricultural laborers have trained at the elementary level, about 1.2 percent of farmers have trained at the intermediate level, and approximately 0.2 percent of agricultural producers have agricultural college and university degrees.⁶

To overcome this situation, there are different types of agroforestry systems that are applied in practice, but most of them are spontaneous, small, scattered, with low yields and poor agricultural product quality.

Due to the great importance of the Northern Uplands in terms of the environment, economy, and society in Viet Nam, many agroforestry projects and programs funded locally and internationally have been conducted in the region. However, there are no studies to evaluate the impact and effectiveness of this system of agronomic initiatives/methods. Agricultural labor productivity has not been systematically analyzed as well as the lack of connection and replication in technology transfer/suitable farming techniques on sloping land for agricultural workforce and extension workers. The government recognizes the solutions to these problems as:

1. It needs to be devoted to promote good practices in agriculture, such as ecological agriculture, organic agriculture, agroforestry, and sustainable agriculture in general.

¹ According to the press release on labor and employment situation in the third quarter and nine months of 2020.

² Small Family Farms Country Fact Sheet. FAO.

³ The economic lives of smallholder farmers: An analysis based on household data from nine countries. FAO 2015.

⁴ Transforming Vietnamese Agriculture: Gaining More from Less. Viet Nam Development Report 2016. World Bank.

⁵ Small Family Farms Country Fact Sheet. FAO.

⁶ According to statistics of the Ministry of Planning and Investment. 2019.

2. It is necessary to promote the development of forms of linkage in agriculture such as cooperatives, inter-cooperatives, and so on. From there, it is possible to link the economic strength of farmer households.
3. Land consolidation will be critical for upgrading production systems and product quality, reducing transaction costs within value chains.⁷
4. Future growth can rely primarily on increased efficiency, innovation, diversification, and value addition.⁸
5. Vocational training in agriculture and rural areas.

However, there are still gaps in:

1. training rural human resources including training content and training methods;
2. connection and harmonization of policies;
3. application and replication of initiatives in the fields of agriculture and forestry; and
4. the time when the cooperatives are formed at an early stage to when they can mature and stand firm.

Realizing these, the Viet Nam Farmers' Union, as a collective and representative agency for farmers, along with partners such as the North Viet Nam College of Agriculture and Rural Development (NVCARD) and the Center for Organic Agriculture – Viet Nam Forestry University, has worked with farmers to gradually fill those gaps and apply them to the implementation of activities to promote and support cooperatives, cooperative groups, and farmer groups within the framework of the Forest and Farm Facility (FFF) program and achieve successful results.

INCENTIVE DESCRIPTION

Features of the Project Area

Location

Yen Bai Province is in the northern mountainous region of Viet Nam. It is one of the most vulnerable areas to climate change because mountainous communities have their income mainly based on agricultural production. The equipment used in the agricultural sector is still very rudimentary, and this is also where the poorest regions of the country.

In Yen Bai Province, the annual average annual temperature has increased over recent years, while the average annual rainfall has decreased. Extreme events have included landslides, droughts, floods, cold spells, and hailstorms that have increased crop damage, increased disease incidence, reduced yields as well as significant human and property losses. Extreme weather events combined with the sloping terrain of Yen Bai have made the damage even more severe.

Despite such threats, an approach for establishing sustainable forest product-based enterprises has strengthened the resilience of local farmers through a structured process of market analysis and development built initially around the cinnamon value chain. They have then started to diversify products and add value to products within their core value chain. They have also started to diversify into additional and alternative value chains to gain further resilience. The Viet Nam Cinnamon and Star Anise Cooperative in Dao Thinh Commune,

⁷ Transforming Vietnamese Agriculture: Gaining More from Less. Viet Nam Development Report 2016. World Bank.

⁸ The government's approved Agricultural Restructuring Plan (ARP).

recognized for its remarkable achievements. This development process over the past three years has drawn heavily on the determination of its cooperative members; support from the Viet Nam Farmers Union, North Viet Nam College of Agriculture and Rural Development (NVCARD), and Center for Organic Agriculture – Viet Nam Forestry University; and financial and technical advice from the FFF.

Viet Nam Que Hoi cooperative that the project supports



(Source: Thoan, H. T., Voan, V. L., Binh, T. T. T., Hai, P. T., et al. 2021)

Stakeholders

Board of advisory

The advisory board, including representatives and experts from the following organizations are as follows:

- Viet Nam Farmers' Union
- Viet Nam Ethnic Committee
- Viet Nam Women's Union
- Department of Climate Change
- Local Department of Industry and Trade
- Department of Science and Technology
- Food and Agriculture Organization in Hanoi
- Forest development department under the General Department of Forestry
- North Viet Nam College of Agriculture and Rural Development
- Institute for Cooperative Economic Development- Viet Nam Cooperative Alliance
- Forest Science Institute
- Center for People and Forests
- IKEA Service Co., Ltd
- International Center for Agroforestry Research
- Presidents of farmers' associations of provinces implementing Yen Bai project; Bac Kan; HoaBinh; Son La
- Management experts in several areas, including organic production, sustainable forest management

Key Supporters

- Viet Nam Farmers' Union (VNFU) is the unit implementing the project and connecting the participants. This is a very important role contributing to the success of the project. Two main reasons are: (i) VNFU has an organizational system of farmers from the central level to the grassroots level and trained facilitators, so the support is very timely and close; and (ii) VNFU has selected a team to implement the project with enthusiasm, and strategic vision for the sustainable forestry, agriculture, and rural development in linkage with capacity building for FFPOs on business incubation and climate resilience.
- The North Viet Nam College of Agriculture and Rural Development (NVCARD). The role of NVCARD is to advise FFF and provide technical assistance in training, such as organizational development for agroforestry groups and cooperatives; market analysis and development; organic production; business incubation and risk management; and project proposal writing. NVCARD is also the first school in Viet Nam to conduct training on organic agriculture sponsored by the Agricultural Development Denmark Asia (ADDA).
- Center for Organic Agriculture – Viet Nam Forestry University conducts training on organic agriculture on vegetables, rice, nontimber forest products, and certifies participatory organic production according to Vietnamese standards TCVN 11041-2017.
- Center for People and Forests (RECOFTC): technical consultancy and provides training on facilitation skills for the project
- International Union for Conservation of Nature and Natural Resources in Viet Nam: provides technical advice for the project
- Experts from forest product research institutes and centers: provide advice on processing techniques and technology.

KEY CHALLENGES AND SUCCESSES OF THE INITIATIVE

In the past, farmers, especially small farmers, often produced whatever products they could sell but did not produce according to market orientation. Therefore, in Viet Nam, the phenomenon of “good season - fall in price” occurs often.

Vietnamese farmers face many obstacles: farmers lack market information; lack of resources to invest in science and technology in production; farmers are often pressured by traders; unsustainable cultivation by farmers leads to depletion of resources (declining biodiversity, degraded land and water resources, polluted environment, food insecurity); and the effects caused by climate change become more severe. There are many supportive policies on agriculture, but policy implementation is still weak due to coordination mechanisms and limited resources.

With the support of the FFF program and the VNFU, partners from agriculture colleges,⁹ agricultural universities, as well as research institutes, farmers become self-aware of their situation. Then, together, they promote the community's internal resources and connect with external resources to develop production and business based on five groups of sustainable factors.

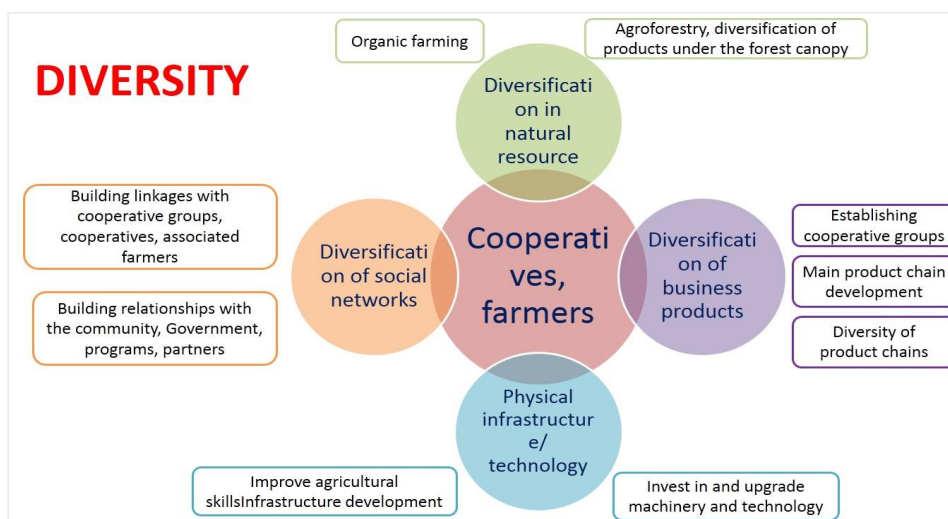
⁹ Agricultural colleges in Viet Nam (e.g., NVCARD) have the important mission of training rural labor, and developing sustainable farming methods in rural areas.

LESSONS LEARNED FROM THE INITIATIVE CAN CONTRIBUTE TO SUPPORTING RURAL TRANSFORMATION, INTEGRATING AGRONOMY, AND FAMILY FARMER ORGANIZATIONS

Practical Proof of Supporting Farmers Groups

Diversity

The most visible change is strengthening capacity to diversify farmer business models: (i) diversification in natural resources (biodiversity through integrated farming systems: organic production, agroforestry on sloping land); (ii) diversification of business products; (iii) diversification of social networks (coordination of authorities at all levels, professional agencies at all levels, research institutes, agricultural training schools, programs/projects); (iv) diversification of physical infrastructure/technology based on five five groups of sustainability factors (economy/market; nature/environment; culture/society; policy/legal; technology/technical) and facilitate farmers' capacity building in agroforestry development and their resilience to climate change.



(Source: Thoan, H. T., Voan, V. L., Binh, T. T. T., Hai, P. T., et al. 2021)

Diversification methods of Viet Nam Que Hoi cooperative model

Developing forms of economic cooperation

Diversity in production and business is very important to farmers, especially small-scale farmers. However, achieving this diversity is difficult if it is not possible to organize well groups, cooperative groups, and cooperatives in the management of production and business activities. Therefore, training content on cooperative development, teamwork and operation management, and financial management of cooperatives need to be included in the program.

In addition, to effectively mobilize resources from Vietnamese government programs, forms of cooperation that are voluntary and desired by each farmer must be used.

In this cooperative, the forms of cooperation include:

- Farmers with the same products will form cooperative groups within the cooperative according to Decree 151 (before), presently Decree 77 of the Government.
- The cooperative associate with about 500 small farmer households outside the cooperative.

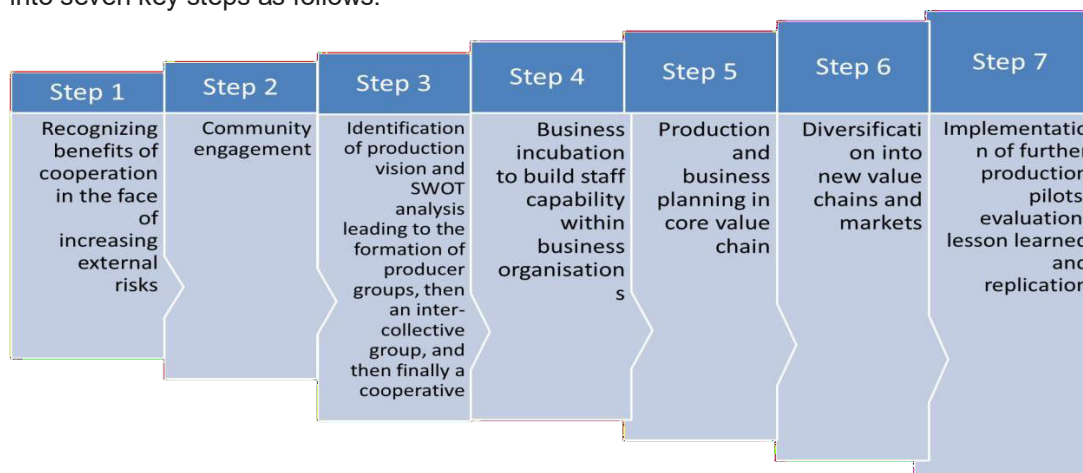
- A company exporting cinnamon and star anise have participated as a member of the board of directors of the cooperative.

Policy dialogue and advocacy

The roundtable in policy dialogue and advocacy is considered as one of the brightest points in the implementation of the FFF program in Viet Nam. From roundtables at commune, district, provincial, and central levels, a number of resources were mobilized and many difficulties faced by famers were removed or solved, as well as many opportunities seized by cooperatives.

Capacity building

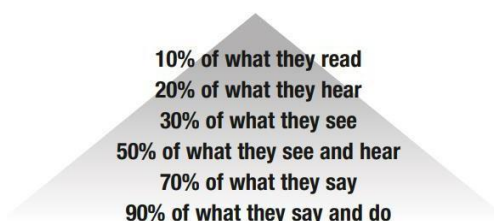
The capacity building process needs to follow steady, unhurried steps that help farmers’ organizations autonomically make decisions and stand on their own, step by step of development. This capacity building process goes hand in hand with the organizational maturity of the cooperative. The process of cooperative development can be systematized into seven key steps as follows:



Methods of capacity building

One will be surprised to hear a cooperative group leader present a forest and farm business plan with the help of a slide show; a farmer’s union officer who led a successful forest development policy dialogue with the government; or a member of a cooperative group fluently introduce their wood processing and production cooperative group. Through simple words, these farmers exude confidence, professionalism, and clarity that they did not have just over two years ago. So what makes this difference? The program has applied a very effective capacity building method.

- Farmers need to be able to improve their capacity with a learner-centered approach: learning through the experiential circle and focusing on older learners with different ethnic backgrounds.



- Technical training to pay attention using farmer field school (FFS) methodology and peer-to-peer learning
- At the follow up stage, there needs to be an organization representing farmers strong enough to connect the cooperation of the parties.
- Trained core farmers become farmer trainers and they instruct other farmers.
- Coaching activities follow-up are very important in capacity building method: Farmers are given the opportunity to carry out their production and business activities and they have trainers to coach them; motivate/facilitate them to discuss their own problems and find solutions to their problems.

Capacity building content

Capacity building content focuses on making production and business sustainable as:

- Improving the organizational management capacity of agroforestry producers will help to apply knowledge in production practice with order and discipline.
- Market analysis and development (MA&D), and business incubation and risk management. MA&D is a framework for planning support to tree and forest product-based enterprises. Training on the basis of five groups of sustainable factors closely following the market chain. With a market-oriented production approach and value chain development, farmers have become more efficient in their production and business. However, to ensure sustainable production and business activities, it must access resources in a sustainable way using a filter of five factors.

In MA&D the “*screening the five areas of enterprise development*” method is designed to ensure the sustainability of the enterprise by considering five types of factors which influence the success of an enterprise:

- Market/economy, including financial aspects
- Natural resource management/environment
- Social/cultural
- Institutional/legal
- Technology, product research, and development

MA&D has tools to help entrepreneurs choose the ownership and management structure of their enterprise, for example, tools to:

- understand the benefits of working together (collaboration);
 - be able to decide whether registration is needed;
 - understand the characteristics of the different kinds of ownership; and
 - understand the characteristics of a well-managed enterprise.
- Applying organic production techniques on vegetables, fruit trees, rice, and medicinal herbs; focusing on solutions to diversify gardens and forests; improving the health of the soil and the ecosystem.
 - Techniques for making herbal pesticides and organic fertilizer for organic production.
 - Technical processing of agroforestry products: The on-site processing and preliminary processing of agricultural products is always focused, and the processing must pay attention to protecting the environment and consumers’ health. This can be done if farmers always adhere to MA&D’s five groups of sustainability factors.
 - Cultivation techniques on sloping land and development of forest-gardens, etc.

Access to product certifications

Access to product certifications needs to be flexible. Participatory Guarantee System (PGS) certification is a typical example. It is important to make sure it's real, to do it right, and to help farmers adhere to good agricultural practices.

- The cooperative has access to PGS certification for organic products.
- This PGS certification of Viet Nam has been recognized by the International Federation of Organic Agriculture Movements (IFOAM) and has been applied in Viet Nam for more than 10 years, however, this certificate has not been recognized fully by the government but is encouraged to use.
- However, because of good monitoring and cross-checking system, the PGS system has been of great help in assisting farmers in complying with practices according to international certifications. Second, PGS certification with costs is suitable for small-scale farmers and suitable with local market, so farmers will have better access.

Bridging the Gap between Formal and Informal Seed Systems through Community Seed Banks in Asia

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ABSTRACT

In October of 2019, the first “Regional Community Seed Bank Managers Forum” was hosted at the ECHO Asia Impact Center in Chiang Mai, Thailand. Twenty-two Community Seed Bank managers from seven countries in Asia joined the three-day event, with the aims of: (1) receiving further technical training, (2) troubleshooting common challenges, and (3) brainstorming creative solutions. Through the use of strengths, weaknesses, opportunities, and threats (SWOT) analysis and related participatory engagement activities, seed bank managers highlighted shared opportunities and threats encountered across regional contexts. In addition, seed bank managers were sent pre-event questionnaires, including questions related to seed bank size, scope of work, seed varieties stored and disseminated, and methodologies of *in situ* servicing of farmer seed needs in rural areas. This paper summarizes these findings and explores the role of community seed banks as neither formal seed sector actors, nor informal seed sector actors, but rather as a bridge between the two; particularly in rural areas across Asia. This study offers further insights into potential strategies aimed at building capacity of community seed banks in Asia, both technical and organizational, and ultimately the resiliency of the rural farming families that these entities serve.

Keywords: seed saving, community seed bank, agrobiodiversity, neglected and underutilized species

A GROWING NETWORK OF COMMUNITY SEED BANKS IN ASIA

In many parts of the world, farmers continue to source significant portions of their crop seeds through the “informal” seed sector, with as little as 10 percent of what farmers actually plant coming from the commercial or “formal” seed sector (Coomes et al. 2015). In some places, these informal seed sources, including individual farmer-saved seed, seed traders, and local seed markets, are the sole source of seeds in remote communities, and a critical component of food systems in places with limited access to commercially purchased seed (Bicksler et al. 2018; Gill et al. 2013).

Through the adoption of the “Community Seed Bank” model in the Asia region, there has been a recent bridging of the gap between these two seed systems: the formal and the informal. While formal in regard to a more cooperative/institutional format, CSB remain informal in regard to the management of their operations and the smaller markets in which they serve.

Existing CSBs have proven to service otherwise underserved communities with a diverse set of seed options, including indigenous and locally adapted varieties. Having to contend with difficult seed-saving conditions, including high temperatures, high relative humidity, and uninterrupted pest pressures, smallholder farmers traditionally rely on the field as the safest option for preserving seeds year after year. If a particular seed variety is not planted, it is possibly lost — leaving smallholder farmers with little choice but to plant the same varieties year after year with little incentive for improved crop rotations. If seeds are available, options are available, including options for diverse and agroecological cropping systems. In this way, Community Seed Banks can play a vital role in the resiliency of smallholder farming families and the diversification of cropping systems in these communities.

STAKEHOLDER BACKGROUND

Since 2009, and the establishment of the ECHO Asia Regional Seed Bank, strategic efforts have been placed on the research of appropriate, low-cost seed storage techniques, and the operational needs of Community Seed Bank entities within the Asia region (Croft et al. 2012; Gill et al. 2013; Lawrence et al. 2017; Trail 2019). During that time, ECHO Asia has trained prospective Community Seed Bank managers and has assisted in the establishment of multiple CSBs in theregion, through technical resourcing and consultation.

In October 2019, the first “Regional Community Seed Bank Managers Forum” was hosted at the ECHO Asia Small Farm Resource Center & Seed Bank in Chiang Mai, Thailand (Trail 2020). Twenty-two Community Seed Bank managers from seven countries in Asia were present for the three-day event — the culmination of a multi-year strategy to establish and coordinate a network of Community Seed Banks in Asia. While other CSBs are known to exist in the region, this was the first attempt to bring together a group of CSB personnel for a time of: (1) professional development, (2) troubleshooting of common challenges, and (3) brainstorming of creative solutions.

Prior to this event, managers were sent pre-event questionnaires, including questions related to seed bank size, scope of work, seed varieties stored and disseminated, and methodologies of *in situ* servicing of farmer seed needs in rural areas. An overview of organizational structure and scope of the nine Community Seed Bank manager respondents is summarized in Table 1. Participating respondents in this study represent five countries in Southeast Asia.

Table 1. Organizational overview of nine Community Seed Banks within the ECHO Asia Network of Community Seed Banks.

Seed Bank	Location	Years in Operation	Outside Funding	Primary Funding Source	Paid Employees	Unpaid Employees (Volunteers)
Baan Na Thung Kula	Thailand	10	No	Sale of Seeds	0	10 *group members & students
Bos Knor	Cambodia	10	Yes	Government Grants	3	5-8 *seasonal workers
Doku	Malaysia	5	No	Self-Supported	1	3
ECHO Asia	Thailand	10	Yes	Donor Funded	5	2-3
Kahelu Center	Myanmar	1	Yes	Donor Funded	1	1
Ntuk Nti	Cambodia	5	Yes	Donor Funded	1	0
Phattalung	Thailand	4	No	Sale of seeds	0	9 *group members & students
Sanam Chai Khet	Thailand	7	No	Sale of Seeds	0	10 *group members & students
SEED Project	Philippines	4	Yes	Donor Funded	1	1

Information was also compiled on the size and scope of individual Community Seed Banks. In order to serve these seed banks in the future, be it technically, organizationally, financially, or otherwise, it was important to understand the current status of these institutions. Results are summarized in Table 2 for nine of the participating CSBs. While small in size, these participating seed banks house on average 184 individual varieties of seed, and disseminated

on average 52 varieties. It was also evident that participating CSBs operate a very rudimentary level in terms of infrastructure and seed storage facilities, with nearly half of the institutions operating off-grid in their remote locales.

Table 2. Number, variety, and propagation method of nine Community Seed Banks with the ECHO Asia Network of Community Seed Banks.

Seed Bank	Varieties Stored	Varieties Distributed	Source of Seed	Storage Method(s)	Seeds of Highest Demand
Baan Na Thung Kula	100	65	†GOBM	Plastic Bottles in the Refrigerator	Roselle; Okra; Pumpkin; Yard Long Bean; Bush Bean
Bos Knor	323	26	††ROS	Airtight plastic bottles, Vacuum Sealed Bags	Sunnhemp; Sorghum; Stylosanthes; Centrocema; Millet
Doku	50	30	ROS; ^α Trd; ^β Dntd	Airtight Containers in the Freezer	-
ECHO Asia	850	175	ROS; Trd: Dntd	Vacuum Sealed Bags in Insulated Cold Storage Room	Cover Crops; Eggplant; Tomato; Legumes
Kahelu Center	50	10	ROS; Dntd	Vacuum Sealed with Bicycle Pump in Glass Jars	Eggplant; Tomato; Chili
Ntuk Nti	<50	10	ROS; Trd: Dntd	Glass jars inside of an earthbag room	Cucumber; Eggplant; Winged Bean; Papaya
Phattalung	55	55	GOBM	Plastic Bottles in the Refrigerator	Chili; Eggplant; Lablab Bean; Kale; Yard Long Bean
Sanam Chai Khet	100	50	ROS; Trd: Dntd	Plastic Bags in the Refrigerator	Okra; Winged bean; Yard Long bean
SEED Project	80	45	ROS; Trd: Dntd	Plastic Bas Inside of an Insulated Storage Room	Corn; rice; herbs

†GOBM; ††ROS; ^αTrd; ^βDntd

LESSONS LEARNED

Much information was gleaned during this event, information related to the operation and infrastructure of individual institutions, the seed genetics stored and disseminated, as well as the constituents served by these institutions. While there was considerable variability between individual institutions, it was evident that all are directly servicing farmers directly, as well as the actors including nongovernment organizations and development workers (Table 3). On average, CSBs were found to have distributed seed (in varying amounts) to an average of 260 individual recipients in 2019.

Table 3. Seed beneficiary background of nine Community Seed Banks with the ECHO Asia Network of Community Seed Banks.

Seed Bank	Recipients of Seed	Primary Beneficiary Background	Compensation Method
Baan Na ThungKula	1000 Individuals	Farmers & Gardeners	60% Paid 40% Given
Bos Knor	150 Households 15 Organizations 10 Public Institutes	Diverse (Public & Private)	Free & Paid
Doku	20 Individuals	Farmers & Gardeners	Given & Traded
ECHO Asia	257 Organizations & Individuals	Farmers & Development Workers	Free & Paid
Kahelu Center	5 Individuals	Farmers	Given
Ntuk Nti	25 Individuals	Farmers	Given & Traded
Phattalung	500 Individuals	Farmers & Gardeners	60% Paid 40% Given
Sanam ChaiKhet	-	NGO Network	60% Paid 40% Given
SEED Project	100 Individuals	Farmers & Gardeners	Given & Traded

In addition to the questionnaires sent out to individual Community Seed Bank managers, all participants of the 3-day forum were involved in various brainstorming and assessment activities. These activities were aimed at better understanding the roles and challenges of managers from the various institutions represented. Participation in a group-wide SWOT analysis was particularly informative in better understanding these roles and challenges.

All participants had the opportunity to contribute to each category, while results were compiled in group settings. Individuals then had the opportunity to anonymously rank their top five responses for each category, resulting in a summarized SWOT chart with the top results only (Figure 1). Results illustrate critical findings in each category, and are a first step in better serving these institutions. Results indicated a few key findings: (1) a majority of Community Seed banks offer training opportunities in addition to seed dissemination, (2) most fear lack of government seed policies as an area of concern, (3) Community Seed Bank managers desire a low-cost/affordable method for tracking seed inventory, and (4) managers understand the potential for leveraging their seed banks as organic/agroecological proponents and change agents, especially in the prevention of crop biodiversity loss.

THE ROLE OF COMMUNITY SEED BANKS IN AGROECOLOGICAL TRANSITION

Community Seed Banks play a potentially vital role in the transition to agroecological production in places where smallholder farmers have minimal options for acquiring quality seeds. In areas where farmers are still largely reliant on the informal seed sector, through the trading of seeds with community members and self-saving, Community Seed Banks offer an affordable source of a diverse set of quality seeds (Gill et al. 2013). In areas where smallholder farmers have become reliant on the formal seed sector (i.e., seed companies), Community Seed Banks offer a repository for seeds and local genetic material that may be no longer being saved.

In both cases, there is an increase in *options* made available to the average farmer, and overall resiliency in times of increasingly changing climates (Vernooy et al. 2017). While seeds have traditionally been saved on short annual cycles, from harvest to the following planting, the only option for maintaining diverse annual cropping systems and seasonal crop rotations is through

the planting of all varieties within the same timeframe. With local Community Seed Banks and the local availability of seed, certain varieties can be stored while farmers can choose the rotations they see best fit for their systems — a fundamental empowerment of agroecological practice.

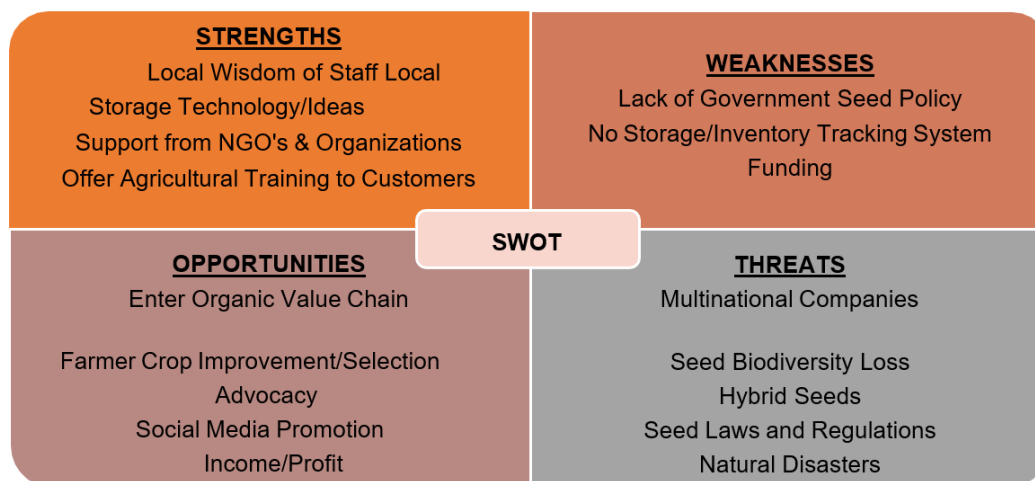


Figure 1. Ranked summary of SWOT analysis provided by managers participating in the 2019 ECHO Asia Regional Community Seed Banks Managers Forum (Male n=11; Female n=11).

CONCLUSIONS

Evidence from nine existing Community Seed Banks in Southeast Asia suggests that these institutions belong neither to the formal seed sector nor the informal seed sector exclusively, but rather offer a bridge linking the two. Results gleaned from a growing network of these institutions indicate an especially critical role in more remote and underserved communities, offering a diverse set of quality seeds to farmers and their communities. In addition to the diverse seeds that they store and disseminate, these Community Seed Banks all offer various training events and extension/advisory services to the farming communities in which they serve, typically in the areas of agroecological production and transition.

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Advancing Ways Forward to Transparent, Responsible and Sustainable Food System Transitions through Building Agroecology Pathways: Insights into Research-Based Developments from a Vietnamese Academy of Agricultural Science (VAAS) Led Partnership

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INTRODUCTION

Humans historically used more than 10,000 plant species for food, however, today only 150 cultivated species are for consumption due to biodiversity loss worldwide.¹ Vegetation diversity is also important for livestock production as feed and forages as well as for other ecosystem services such as carbon sequestration and erosion control, pollination, wildlife feeding. Simplification of agricultural systems is a major driver of such agrobiodiversity loss. Monoculture value chains are still expanding for global consumption, firstly in modern production systems of developed countries and increasingly, in the developing countries. Viet Nam has achieved remarkable economic growth, income improvement, and poverty reduction, especially for the rural people.² The effective role of different methods in intensification, increasing land use coefficient, and chemical application cannot be denied. However, that intensification leads to unsustainable impacts such as soil erosion, biodiversity loss, environmental pollution, lower resilience, and autonomy.

In addition, the strategy of focusing on increasing productivity and income in agriculture development also causes unsafe foods, which are difficult to control in contexts in which most producers are producing on a small scale and are scattered. Therefore, in an overview report on Viet Nam's development direction toward prosperity by scientists and policymakers, strategic advisors of the World Bank and the Ministry of Planning and Investment (2016) recognized that rapid growth can only be sustained based on rapid increases in productivity combined with tackling concerns for the environment, based on creativity and technological innovations.

¹ Facts and figures: About plant genetic resources.
http://www.fao.org/english/newsroom/action/facts_ag_treaty.htm

² In the conclusion on continuing to implement the Resolution of the 7th Party Central Committee, term X on agriculture, farmers, and rural areas dated 7 August 2019, the rural people's income increased by 3.8 times during 2008–2018.

Ensuring food quality management has been a critical point during the COVID-19 pandemic as the controlling activities have been difficult to conduct due to lockdown and physical distancing rules (FAO and WHO 2020). In Viet Nam, the transition to more sustainable value chains manifests through several emerging combinations of alternative production and marketing systems, with the development of sustainable standards (Organics, VietGAP) and a variety of certification schemes, including participatory guarantee systems and third-party certifications as well as a much broader range of labelling approaches. A wide range of agroecological systems are developing, some of which have no formal certification mechanisms to support their differentiation and value-adding in markets. However, this transition is developing in parallel with the traditional system, which is uncontrolled by the value chain stakeholders and competent bodies. Therefore, the task of food quality control in Viet Nam during and post COVID-19 pandemic requires more effort.

With one of the most important incentives of this transition, especially for smallholder farmers, getting higher income and improving livelihoods, high-end market accessibility is most often the focus to support the transition. However, high-end market share is still quite small in Viet Nam compared with traditional markets. It is, therefore, necessary to consider both traditional and high-end markets when approaching ways to support the transition.

Digital technology's potential to be successfully applied in agroecology and trigger or contribute to agroecological innovations during production and marketing stages also needs to be explored. During the COVID-19 pandemic, online marketing via social networks (livestreaming) or websites has proven to be an effective means used by producers and traders who can thereby convey detailed information on the product's origin when selling their products (with or without formal certification). Local authorities, like in Hanoi, have also organized support for producers to sell their products, such as livestreaming to sell agricultural products.³ Interestingly, the emergence in Viet Nam of innovative ways of promoting and labelling good practices (including agroecological practices) without entailing formal certification has been boosted by the development of online sales. In the Vietnamese context, where current formal certification schemes and standards have not so far delivered on their promises, exploring the variety of value chain approaches to reconnecting producers and consumers is particularly relevant.

The Viet Nam Academy of Agricultural Sciences (VAAS), together with other partners, including local and international organizations, have been implementing diverse researches and interventions with smallholders to understand the current situation of the agroecological transitions considering both production and marketing levels. These consider in particular the policy gaps and how to tackle them, how to bring the food system approach into use during R&D processes, and how to take advantage of digital transformations. Currently, VAAS is a coordinating partner in Viet Nam for different research-development projects such as

³ Hanoi promotes livestream to sell agricultural products, OCOP to avoid disease transmission.
<https://nongnghiep.vn/ha-noi-day-manh-livestream-ban-hang-nong-san-ocop-de-tranh-lay-dich-benh-d299390.html>

“Agroecology and Safe Food Systems Transitions in Southeast Asia (ASSET)” led by Group for Research and Technology Exchanges (GRET) – Agricultural Research Centre for International Development (CIRAD), and “Smart Agro-ecological Transformation of Farming Systems towards Resilience and Sustainability in Middle and Coastal Zones of the Viet Nam Mekong Delta (STAR- FARM)” led by the Food and Agriculture Organization (FAO). VAAS is also leading the Vietnamese team for implementing and fine-tuning the Tool for Agroecological Performance Evaluation (TAPE) promoted by FAO and participating in the editing and promoting of the agroecology Memento led by GRET in Viet Nam. More generally, VAAS and partners are cooperating toward advancing ways forward to transparent, responsible, and sustainable food system transitions through building agroecology pathways, including policy actions.

COMMUNICATION CONTENTS

Building on the above, the communication that VAAS and its partners would like to bring will focus on the following key points:

- Emerging initiatives of agroecological practices: achievements and lessons for the transitions (building upon studied cases and typologies to understand how agroecology system elements are ensured)
- Dissemination of agroecology assessment methods for researchers, lecturers, and enterprises in Viet Nam
- How to account for sustainable biodiversity protection from the global agenda to local policies and initiatives to make it a more important incentive during the transition, besides economic and food safety ones
- Enhancing value chain coordination solutions in agroecological food systems, including digital technology application, to minimize environmental degradation, climate change, food safety, and disease pandemic risks
- Policy gaps and ways forward in promoting the transition (e.g., gaps in proper certification regulations for products produced in the agroecological systems, gaps regional planning for agro-ecological areas)

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When Myths Become Fact: How Misleading Information can become a Threat to Food Security

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ABSTRACT

A worldwide push toward organic farming promotes the replacement of mineral fertilizers with organic fertilizers. Whilst in essence this is a positive development as it reduces overuse of mineral fertilizer, it can potentially also undermine food security due to the simple fact that there is not enough organic fertilizer to meet world food demand. Agroecological farming systems tend to embrace organic farming, sometimes to the point that agroecological farming is synonymous with organic farming. This may then lead to an exclusion of mineral fertilizer from agroecological systems. In situations where sufficient organic fertilizer is available, organic farming as one of the many agroecological methods should be practiced, but in regions where not enough organic fertilizer is available, mineral fertilizer-supported organic farming should be encouraged.

Keywords: Agroecology, organic farming, mineral artificial synthetic fertilizer, food security

INTRODUCTION

Teaching and learning activities, capacity building, and empowerment by providing knowledge are crucial for sustainable and fair development. Unbiased education and information sharing are the foundation for our future. Food systems are no different from any other systems but are of particular importance as they underpin our very existence. Our ability to share information has virtually exploded during the past decade. An ever-increasing internet presence, the ability to be heard through social media, and fast-track publication have led to a wealth of new information that is accessible by everybody. This is indeed a “good thing”, but there are downsides. Consuming information allows everybody to become an instant expert on just about anything. And this is where we can run into problems. This short paper is a narrative of some experiences I had working in many developing countries over the last couple of decades. It is not something we can read in peer-reviewed journal articles, it is about what rural communities know, think they know, and how they interpret information. It is not meant to censor information, but it is meant to raise a red flag about information that can potentially undermine sustainable development goals.

Let's start with agroecology. The concept is not new and has been used for several decades. There are several definitions, but in essence, they all refer to as practicing agriculture using ecological approaches. Many principles conform to agroecological practices. For example, crop rotations, reduced tillage, nutrient recycling, integrated pest and disease management, species diversities, and of course, organic farming. The problem arises when agroecology and organic farming are considered synonymous. This would exclude practices, such as conservation agriculture from being included as an agroecological principle due to its reliance on herbicides. Using mineral fertilizer would also be excluded from agroecology. There is no doubt that agriculture uses excessive amounts of mineral fertilizer in some regions, but not enough in others, and can then be a contributing factor for insufficient yield or even

malnutrition and hunger. The inconvenient truth is that, at this stage, planet Earth cannot produce enough food for humans without mineral fertilizer.

There is nothing wrong with encouraging farmers to use less mineral fertilizer, but only if they use too much or inefficiently. Sometimes this can become a simple matter of semantics. Using the more scientific term “mineral fertilizer” sounds rather benign, using “chemical”, “synthetic”, “artificial” or “man-made” fertilizer sounds progressively less appealing or even dangerous to those who fancy natural fertilizers. After all, following Paracelsus: *Dosis sola facit venenum*.

Although there is no scientific proof that unambiguously says that food is grown using mineral fertilizer always tastes bad and is unhealthy, such a statement becomes much more compelling if the orators use the term “artificial” fertilizer in the context of health and taste. The same applies to the perceived impact of mineral fertilizer use on soils. Throughout my work in the Papua New Guinea Highlands, I hear farmers saying that artificial fertilizer makes the ground sour and sweetpotato taste bad. Our research has shown that both of these observations are incorrect, but farmers’ perception prevails irrespectively. In this region, not using mineral fertilizer can potentially become a major factor undermining food security. Other examples are from West Papua, where local farmers “know” that using artificial fertilizer will attract the Suanggi, an evil spirit that kills people by bringing pests and disease. I observed the most compelling argument against the use of mineral fertilizer in an Amhara village in Ethiopia: maize growth in their fields was extremely poor and plants showed classic signs of phosphorous and mitogen deficiency. We observed bags of mineral fertilizer in one of the village storage sheds. They were leftovers of a fertilizer subsidy program. When asked why farmers do not use the mineral fertilizer, the answer was astonishing and outright frightening: they were told that using mineral fertilizer will make their woman infertile! No doubt, such messages will stop peasant farmers from using mineral fertilizer.

Interest in soil microbiology has skyrocketed during the past decade. Even many of my University students “believe” that microbes can make “soil nutrients”. Fortunately, our soils courses are sufficiently effective and the understanding is revised that microbes can make nutrients available, but certainly not “make” them. However, less scientifically inclined audiences may not be willing to listen. After all, the only difference between elements in the periodic table is the number of protons in the atomic core. So, to change one element to another is only a matter of injecting an electron into the core to neutralize a proton and voilà, we can overcome potassium deficiency by converting calcium. This process is also referred to as biological transmutations and it is quite easy to convince non-scientist that microbes can do this; after all, the soil contains an abundance of microbes and we admit that we do not fully understand their function or what they do.

The observations I gave are some examples that worry me, how information is propagated and interpreted. As educators, it is not only our duty to provide unbiased training activities, but we increasingly have to debunk myths that can undermine sustainable development goals.

CONVENTIONAL AND AGROECOLOGICAL PRODUCTION SYSTEMS

Agriculture started about 12,000 years ago and the ancient practice were what we would call agroecology today. The term itself has been used for almost 100 years (Wezel et al. 2009). Its definition today, however, is rather vague. The OECD (2001) simply states that, “Agroecology is the study of the relation of agricultural crops and environment.” This excludes livestock which is part of the agroecological systems today. Miguel A. Altieri and Stephen R.

Gliessman are arguably the founders of the current agroecological movement that started in the 1980s. In simple terms, agroecology today addresses the triple-bottom-line of agriculture, food security, and food sovereignty. Agroecological practices are generally contrasted to industrial agricultural practices (Gliessman 2014). These include intensive tillage, monoculture, use of synthetic fertilizer, irrigation, chemical pest and weed control, genetically modified organisms (GMO), and factory farming of animals. Industrial-type production systems however also use conservation agriculture to minimize the detrimental impact of intensive tillage. Crop rotation is part of many industrial-type agricultural practices, simply in recognition of soil fertility and pest management requirements. Whether or not GMO and agroecology are compatible is still subject to debate with strong views for (Lotz et al. 2020) and against (Altieri 2001). One of the most controversial issues is the use of mineral fertilizer. This then leads to the assumption that agroecology is synonymous with organic farming (Migliorini and Wezel 2017). The problem however is that there is not sufficient organic fertilizer to completely replace all mineral with organic fertilizer to meet the demand for a growing population (Seufert et al. 2012; Timsina 2018). Similar to the use of mineral fertilizer, overuse of organic fertilizer can equally cause eutrophication and harm the environment. The take-home message here is that the differences between current conventional or call it industrial type agriculture, and agroecological practices are not black and white. There is overlap and we need to build on this overlap to transition to agroecology as the mainstream method to produce food. An important entry point is how to manage crop nutrition. It is the main yield-limiting as well as degradation factor in many South-East Asian countries.

ORGANIC VERSUS MINERAL FERTILIZER

The argument about crop nutrition via mineral or organic fertilizer needs to consider principles of plant nutrition, how roots take up nutrients, and soil-water nutrient dynamics. There is not much new science and these processes have been described in many textbooks, for example, Mengel and Kirkby (2012), Finck (1982), and Barker and Pilbeam (2006).

In short, plant nutrients must be in mineral form before they can be taken up by plant roots. Using mineral fertilizer, the nutrients are already in plant-available form. Using organic fertilizer, the organic material need to be mineralized before the nutrients are available for root uptake. Mineralization is the process where organic matter is decomposed through oxidization. This process releases carbon dioxide into the atmosphere and releases cations or anions that can then be taken up by plant roots. The important part here is that the vast majority of nutrients are taken up in their mineral and not in their organic form. This also means that for the plant it doesn't matter if, for example, nitrogen is supplied as a synthetic fertilizer or using manure. The main difference is that mineral or synthetic fertilizer supplies nutrients in plant-available form while organic fertilizer supplies nutrients in a form that must be mineralized before they can be taken up. This generally also makes them slow-release fertilizer and they may not be able to meet plant requirements at times of high demand. At the same time, mineral fertilizer may be too available at times of low demand and leach causing eutrophication. In a balanced system, the type of fertilizer has no impact on plant growth. The benefit of using organic fertilizer is often largely secondary through the impact of soil structure improvement.

These are well-established principles of crop nutrition, plant physiology, and soil-water nutrient dynamics. However, enthusiastic promoters like to ignore these well-established facts. Edaphic processes that relate the application of mineral fertilizer, for example, phosphate based fertilizer or urea, to soil acidification are also well known. In contrast to common belief,

acidification is not due to the application of fertilizer *per se*. It is more due to the untimely application of fertilizer where the release of protons during nitrification is not balanced by nitrate uptake of plants. If legume growth and nodulation is promoted through phosphorous fertilization, acidification can be enhanced if nodules decompose and the ammonium mineralized to nitrate and is then not taken up by plant roots. This process is independent of supplying fertilizer in its mineral or organic form.

To ensure food security as well as food sovereignty it is important to equip advisory services that are not necessarily experts in crop nutrition with an understanding of these principles of plant nutrition.

The debate about crop nutrition in regard to fertilizer type does not address the even larger enigma of human health. Although there is no clear scientific evidence that food produced using organic fertilizer is healthier than food produced using mineral fertilizer, any negative impact on human health are generally attributed to contaminants or toxins that can be present in both types of fertilizers and secondary environmental pollution may be the more important factor for human health; for example, Brandt et al. (2011), Brantsaeter et al. (2017), Gonzalez et al. (2019), Hurtado-Barroso et al. (2019), and Ramakrishnan et al. (2021). Yet, the public and consumer perceptions are the opposite, and this is driving the push toward organic farming. In principle, this is not a negative movement. However, it must be seen in the context of food security. A pragmatic solution would be the mineral fertilizer supplemented organic farming.

STAKEHOLDER ALIGNED INFORMATION

The endpoint stakeholders are food producers, i.e., the farmers. The entry point stakeholders are the educators. Where possible, organic farming should be practiced to satisfy consumer demand. In most cases this would occur in locations where waste products are available; after all, this is also how organic farming started in many European countries: as a farming method that recycles organic materials, mainly animal waste. The use of mineral fertilizer should not be discouraged in agroecological settings and myths about the negative effect of mineral fertilizers should be debunked through unbiased information and not wishful thinking. At the same time, however, overuse of mineral fertilizer should be discouraged. An organic farming system boosted by the application of mineral fertilizer during periods of high crop demand would address the triple bottom line of agroecological farming. Implementation requires collaborative capacity building where extension workers develop training materials together with social scientists, agricultural economists, agronomists, environmental scientists, and food health experts.

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Mainstreaming Agroecology in Higher Education Institutions (HEIs) for Redesigning Sustainable Food Systems in Asia

Dr. Abha Mishra

SUMMARY

Agroecology is seen a way forward in transforming food and agriculture systems to build an inclusive, safe, sustainable, and resilient society. The role of higher education institutions (HEIs) are seen as crucial actors in this transition. The findings reported here are based on the engagement that Asian Center of Innovation for Sustainable Agriculture Intensification (ACISAI), Asian Institute of Technology (AIT), Thailand had in the Lower Mekong River (LMB) basin countries (Cambodia, Lao People's Democratic Republic, Thailand, and Viet Nam) through its three core activities — outreach, research, and education — using a regional program commonly known as “SRI-LMB” (<http://www.sri-lmb.ait.asia/>).

Using a local, national, and regional innovation platform which was designed to systematize engagement and strengthen communication for fueling innovation, more than 15 institutions (academic, research, and development) were involved in the six-year-long farmers participatory action research (FPAR) trial located in the 33 rainfed districts of 11 provinces in the LMB countries (Cambodia, Lao People's Democratic Republic, Thailand, and Viet Nam). The System of Rice Intensification (SRI) agronomic principle was used as an “entry point” for such engagement-led transition. Average yield, along with factor productivity, increased by more than 50 percent with significant reduction in cultivation costs, energy use, and greenhouse gas emission. The purpose of this paper is to detail four key processes that led to innovations in different areas: (1) the multi-stakeholder platforms used for action, (2) the farmers participatory action research (FPAR) that led to community development, (3) the evidence-based policy and strategies that can support family farming and sustainability of rural livelihoods, and (4) the innovation in HEI curricula that can support such transition.

Keywords: System of Rice Intensification (SRI), ACISAI, SRI-LMB, Innovation

INTRODUCTION

Globally, there are some 500 million family farmers who produce more than 80 percent of the world's food contributing to national and even global food security. Particularly in Asia, majority of farmers are smallholders who own and operate the majority of farmland but have less than 5 hectares per farm. Most of what they produce, or 75 percent, is sold to markets, while the remainder is consumed by household members. FAO explained that food, health, trade, and climate change are interdependent and the pandemic has revealed the fragility of these linkages. The crisis has threatened progress toward achieving the Sustainable Development Goals (SDGs), which promise to bring about a better world for all people by 2030. Redesigning sustainable food systems with active engagement with farms and farming communities is one of the offered solutions, which is gaining momentum in Asia and beyond.

Redesigning sustainable food systems demand integration of political and social dimensions along with ecological and economical dimensions. In this context, the role of agroecology (AE) is evolving and gaining momentum. Agroecology is seen a way forward in transforming food and agriculture systems to build an inclusive, safe, sustainable, and resilient society.

Higher education institutions are seen as crucial actors in providing youth and students with core knowledge (AE literacy) and technical or professional skills needed to support the transition toward a sustainable food system (SFS). The HEIs are also seen as important

stakeholders who can help analyze agroecology alternatives, essentially systematically documenting and building the multi-disciplinary scientific evidence-base for policymakers and farmer decision making.

Keeping this in mind, ACISAI AIT, Thailand implemented an EU-funded regional initiative in the LMB basin countries (Cambodia, Lao People's Democratic Republic, Thailand, and Viet Nam) through its three core activities — outreach, research, and education — using a regional program commonly known as “SRI-LMB” (<http://www.sri-lmb.ait.asia/>). This six-year-long program engaged more than 15 institutions (academic, research, and development), 30,000 farmers (58% women), 78 ministries staff, 40 researchers, 15 faculties, 25 students, and 12 development professionals in a farmers’ participatory action research trial located in the 33 rainfed districts of 11 provinces in the LMB.

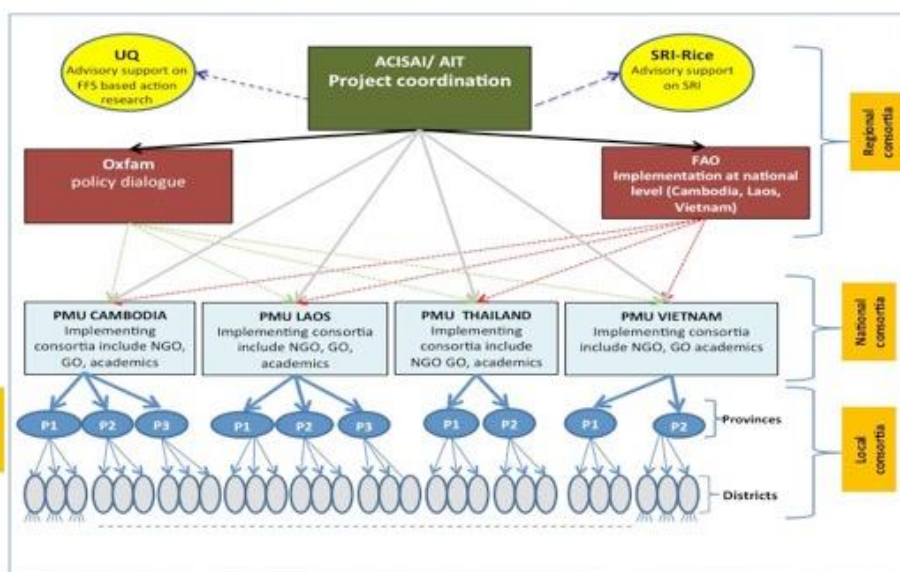
The SRI principle was used as an “entry point” for such engagement-led transition. Average yield, along with factor productivity, increased by more than 50 percent with significant reduction in cultivation costs, energy use, and greenhouse gas emission (Mishra et al. 2021 <https://www.tandfonline.com/doi/full/10.1080/14735903.2020.1866852>).

This paper outlines some of the key innovations that were used to fuel agroecological transition at farmer’s field along with some initiatives towards restructuring HEI curricula to support such transition. They are categorized under four groups:

1. Multi-stakeholder networks and platforms (academics, researchers, farmers’ organizations) enabling co-creation of knowledge and participatory research for supporting family farming and food system transformation
2. Enhancing rural communities’ initiatives and development, and transfer of technologies
3. Policies and strategies (from regional to local levels) to support family farmers and sustainability of rural livelihoods/communities
4. Innovation in HEIs curriculum to better address agroecology and family farming

Multi-stakeholder Networks and Platforms (Academics, Researchers, Farmers’ Organizations) Enabling Co-creation of Knowledge and Participatory Research for Supporting Family Farming and Food System Transformation

To achieve the program objective through better collaboration at all levels, the SRI-LMB established local, national, and regional project management units (LMU, PMU, and PCU, respectively) that led to the development of innovation platforms at all levels for implementation, knowledge sharing, and dissemination (Figure 1). These processes of network building and strengthening that were initiated by the project were expected to continue as a common meeting point at all levels, serving as platforms for facilitating policy dialogue on food security, research for development, marketing improvements, and extension capacity for the rainfed LMB region. During the tenure of the program, the individuals and organizations that worked with these LMUs, PMUs, and PCU got first-hand opportunity to engage in knowledge management and dissemination. Particularly at local levels, farmers, farmer-trainers, and district trainers, along with NGOs and GO staff, were facilitated to articulate local needs and aspirations of farmers into the conduct of the Farmers Participatory Action Research (FPAR) via their respective LMUs. Similarly, LMUs supported the development of ways and means to educate more farmers in their respective communities on the results and outcomes of their participatory action research (PAR). They also facilitated wider diffusion of knowledge through various means. In addition, these local groups through their experiences of working with the project acquired greater skills of management, bookkeeping, and various tools and techniques of extension, as well as the art of analysis and interpretation of their own experimentation process and results.



(Source: Mishra, A. (2019). Boosting yields, raising incomes, and offering climate-smart options: The system of rice intensification paves the way for farmers to become more successful 'agripreneurs'. SRI-LMB project report, 115 pp.)

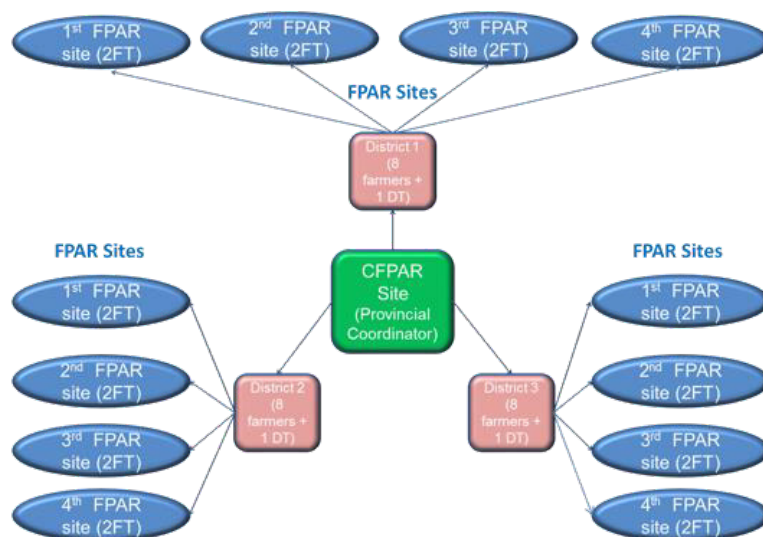
Figure 1. Program implementing consortia (ACISAI – Asian Center of Innovation for Sustainable Agriculture Intensification; AIT – Asian Institute of Technology; CFPAR – Central Farmers’ Participatory Action Research; FAO-IPM – Food and Agriculture Organization – Integrated Pest Management; FPAR – Farmers’ Participatory Action Research; GOs – Government Organizations; LIP – Local Innovation platform (possible outcome of the proposed processes); LMU* – Local Project Management Unit; NGOs – Non-Government Organizations; NIP – National Innovation Platform (possible outcome of the proposed processes); P1, P2, P3 – Province 1, Province 2, Province 3 PCU – Project Coordination Unit (coordinated by AIT); PMU – Project Management Unit (coordinated by country offices of FAO-IPM in Cambodia, Lao People’s Democratic Republic, and Viet Nam, and in Thailand by AIT); RIP – Regional Innovation Platform (possible outcome of the proposed processes); SRI-Rice – SRI International Network and Resources Center, Cornell University, USA; UQ – University of Queensland, Australia).

Enhancing Rural Communities’ Initiatives and Development, and Transfer of Technologies

Using Farmers Field School approach, below structure was established (Figure 2) but at some places, the structure was adapted based on the existing local government extension departments’ program implementation structure and also according to the farmer’s needs and requirements. The design involved 50 percent women (at least) and 10 percent landless to have an inclusive intervention.

This structure facilitated the systematic introduction of SRI/FFS approaches for the development of knowledge-intensive and location-specific technologies by bringing farmers, researchers, trainers, and other stakeholders together, and by fueling their innovative capacity. Apart from these tangible and quantifiable direct benefits to the target groups of farmers, locally-developed technologies for rice and other crops could take a horizontal spread pathway and reached to other farmers in proximate communities (approximately 50,000 farmers, based on past FFS experience in the region) through field day. Through this learning-centered approach, we also refined the curricula options for women and landless in order to

capitalize on the opportunity that the action presented for furthering the leadership of women, especially in household decision making and economic accomplishment. The process of engagement led to the development of informal farmers' groups and network in all four countries.



(Source: Mishra, A. (2019). Boosting yields, raising incomes, and offering climate-smart options: The system of rice intensification paves the way for farmers to become more successful 'agripreneurs'. SRI-LMB project report, 115 pp.)

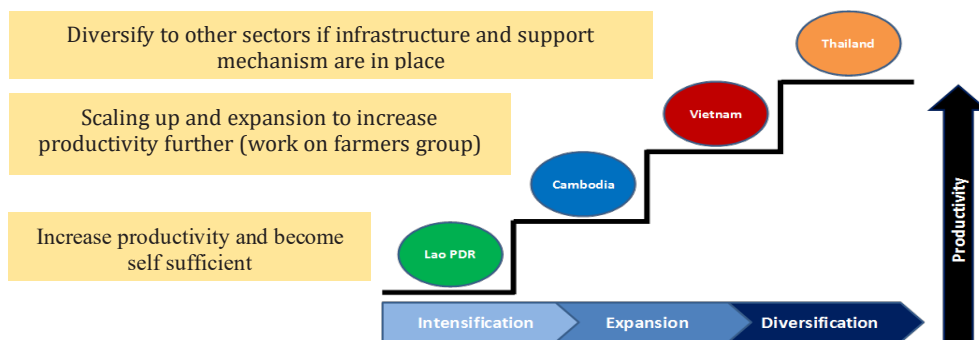
Figure 2. Structural diagram of CFPAR and FPAR in one province (CFPAR = Central Farmers' Participatory Action Research (at provincial level); DT = District Trainer; FT = Farmers' Trainer; FPAR = Farmers' Participatory Action Research (at village level, 4 sites/district); One FFS site = run by two FT, set up two experiments involving 60 farmers (30 farmers in each experiment)).

It was perceived that such community-led engagement should enable the small farm producers to diversify their market-driven activities "creating" more opportunities for women, including in input-output services and value-chains (through FO-managed collective action), with proper policy and institutional support. These measures, if promoted along with provision of performance-based incentives, such as credit, infrastructure like storage/processing, would help attract the rural youth and thus reversing the rural-urban migration and supporting sustainable transition.

Policies and Strategies (from Regional to Local Levels) to Support Family Farmers & Sustainability of Rural Livelihoods/Communities

As a part of key policy recommendations, the outcome of this program was seen as a foundation for "green growth" and a way forward for participatory policy and program development for ensuring better market access, price, and returns, as well as a step toward NDCs contribution under the Paris Agreement along with achieving SDGs. The program further noted that the ASEAN Food Security Policy (2015–2020) recommended SRI and CA integrated agroecological practices to benefit smallholders under climate-smart initiative, however, there has not yet been much visible action taken on the ground. The research done on the policy environment and the institutional responses to adaptation revealed that the adaptation and adoption of agroecological practices like SRI in the region needs to be further strengthened, realizing that the macroeconomic situation across the LMB countries is at different stages of development and yet evolving (Figure 3).

For example, where self-sufficiency is still a concern, an intensification strategy can be applied to help small-scale farmers become more self-sufficient. At some point, scaling up and expansion strategies may become relevant and can help the farmers to expand and increase productivity further. As farming develops and the macroeconomic situation improves, some farmers may diversify into other industries and/or link to markets (initially local and then international), provided infrastructure and other support mechanisms are in place.



(Source: Mishra, A. (2019). Boosting yields, raising incomes, and offering climate-smart options: The system of rice intensification paves the way for farmers to become more successful 'agripreneurs'. SRI-LMB project report, 115 pp.)

Figure 3. Macroeconomic situation of all four LMB countries and possible next steps toward economically efficient Green Growth and sustainable intensification in agriculture.

Innovation in HEIs Curriculum to Better Address Agroecology and Family Farming

A transition to sustainable food systems requires interdisciplinary knowledge and cross-departmental collaboration drawing from social sciences rural development, agronomy, extension, biology, botany, artificial intelligence, etc. It is well perceived that such integrated academic courses and formal training programs on agroecology could be useful for government staff, policymakers, and other development professionals who take lead in implementing the development programs in these areas. No doubt that conventional disciplines receive more policy support and resources at academic institutions, yet there is interest evolving to initiate dedicated program in this direction. Following areas could be explored for joint research, education, and trainings: (1) joint research project for mapping out and identifying the gaps in the area of agroecology and sustainable food systems (integrating the tool for agroecology performance evaluation (TAPE) in academic curriculum as a practical tool to engage students); (2) establishing regional network of HEI; (3) involvement of faculties in global and regional technical and policy consultation process; (4) internship/fellowship program for Master and PhD students (engage students in FFS); (5) gathering consensus on innovations that have significant impact among various stakeholders in the region and disseminate the selected innovations for wider implementation; (6) developing curriculum that helps to understand the growing demand for healthy and nutritious foods (market demand, consumer percepts); (7) linking CSO/community institutions with university education; and (8) creating programs that prepare rural youth to be a professional manager of land, water, and other resources to support the transition and reverse the migration.

With some external funding support, such curriculum reforms for mainstreaming agroecology is possible. The international donor community should align their support to facilitate such transition sooner than later.

Enhancing Capacities of the Young Generation in Cambodia for Supporting Rural Transformation and Agroecology Mainstreaming through Education for Sustainable Development (ESD)

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ABSTRACT

Small-scale farms predominate in the Southeast Asian agricultural system and make an important contribution to food production, ecosystem health, and rural livelihoods. But small-scale farms are under increasing threat by factors such as unsustainable land use, landscape transformation, and floods/droughts/pests amplified by climate change. Countering such threats calls for context-specific knowledge and more sustainable development pathways toward more climate-resilient agricultural systems. Education is considered to play a key role in this process of transformation toward a sustainable society, however, the topic of sustainable development is so far not embedded in the spectrum of curricula.

The better inclusion of sustainability topics, such as the holistic approach of agroecology and integrated farming systems, in university curricula is key to tackling sustainability challenges. Higher education students and future extension advisors need to be empowered to become change agents to develop more resilient farming systems. Teaching approaches and university curricula need to be adapted toward competence orientation — building academic knowledge, professional skills, and critical awareness (attitude, values) simultaneously.

The Royal University of Agriculture (RUA) Cambodia and the Centre for Development and Environment (CDE) of the University of Bern co-developed a pilot course on Sustainable Development (SD) and Sustainable Land Management (SLM) in 2019/20 for BSc and/or MSc students building on the International Fund for Agricultural Development (IFAD) project “Scaling-up SLM by smallholder farmers.” The course aims to build inter- and transdisciplinary competences among young researchers who will, in close cooperation with land users and family farmers, engage in more sustainable agricultural production through appropriate natural resource management. The pilot course has been taught during two semesters in 2020/21 and first hands-on experiences have been made. The goal of the course is to educate Cambodian students — of whom a great part will be engaged in supporting development of agriculture and ensuring food security in the future — on sustainability issues and therewith capacitate the young generation to address today’s challenges of food security, climate change, resource degradation, and poverty.

Keywords: Sustainable land management, agroecology, small-scale farming, education for sustainable development (ESD), sustainable development, Cambodia

integrated farming systems, in university curricula is key to tackling sustainability challenges. Higher education students and future extension advisors need to be empowered to become change agents to develop more resilient farming systems. Education is considered to play a key role in the process of transformation toward a sustainable society. Higher Education Institutions (HEI), in particular, contribute to this by educating future agriculture extension advisors and decision makers in politics, business, and society.

Teaching approaches and university curricula need to be adapted toward competence orientation — building academic knowledge, professional skills, and critical awareness (attitude, values) simultaneously. Within the framework of the UN Sustainable Development Goals (SDGs), SDGs 4, 13, and 15 provide an opportunity for Cambodia to address quality issues in education in combination with addressing the unsustainable use of natural resources and the impact of climate change. The unsustainable use of natural resources, particularly land resources, impacts the livelihoods of both rural and urban populations.

The Royal University of Agriculture (RUA) Cambodia and the Centre for Development and Environment (CDE) of the University of Bern co-developed a pilot course in 2019/20 on Sustainable Development (SD) and Sustainable Land Management (SLM) for BSc and/or MSc students building on the International Fund for Agricultural Development (IFAD) project “Scaling-up SLM by smallholder farmers.”¹ The course was designed by blending knowledge from research, education, and practice. The course includes results from implementation projects (e.g., tools developed and evidence generated), as well as links to regional/global knowledge bases related to agroecology/sustainable land management such as the global World Overview of Conservation Approaches and Technologies (WOCAT) network/database.² The course aims to build inter- and transdisciplinary competences among young researchers who will, in close cooperation with land users and family farmers, engage in more sustainable agricultural production through appropriate natural resource management.

RUA is the leading university for agriculture and practice in Cambodia, and is capacitating and supporting Cambodian agricultural extension services, which are part of the Ministry of Agriculture, Fisheries and Forestry (MAFF). Through this, young professionals are able to assess, implement, and scale up SLM with smallholder farmers, addressing issues of food insecurity, land degradation, climate change, and disaster risk. RUA identified the need to offer insights into sustainability issues to RUA researchers and students, and apply Education for Sustainable Development (ESD) approaches to enhance learning and transformation for sustainable development.

CDE is one of Switzerland’s leading research institutions in the field of sustainable development and global change, hosting since 25 years the global network on SLM, WOCAT. CDE takes a holistic and collaborative perspective and engages in knowledge development and sharing, as well as in policy dialogue to promote concrete pathways towards sustainable development. CDE is specialized in promoting ESD approaches at the University of Bern in Switzerland and globally, particularly with universities in the Global South.

¹ IFAD project, “Scaling-up SLM by smallholder farmers - Cambodia, Lao People’s Democratic Republic, and Uganda”

² WOCAT network, www.wocat.net

Overview of the Course Sustainable Development and Sustainable Land Management

Aim: To provide students in higher education with necessary knowledge, skills, and attitude related to resilient farming systems to support rural transformation and agroecology mainstreaming. Curriculum development is not just about selecting the right contents and methods to be taught. Indeed, in addition to thematic and methodological skills, students should develop a number of other competences that will enable them to become agents of change, as well as to move from knowledge to action.

Target Group: BSc and/or MSc students of RUA, BSc students of other Agriculture-Focused Higher Education Institutions

Purpose:

- To provide students relevant definitions, concepts, and frameworks in land degradation, SLM (including agroecology), climate change adaptation, and mitigation and disaster risk reduction in the context of sustainable development, particularly the SDGs.
- To provide students with tools and methods to document, assess, and evaluate SLM practices at farm and landscape levels.
- To enable students to support farmers/implementation projects (government, NGOs, etc.) in the adoption and adaptation of SLM practices and integrated farming systems.
- To provide students with the necessary competences (knowledge, professional skills, attitude) for the future job market connected with the agenda 2030.

Chapters of the Course:

The course is divided into six chapters and encompasses 64 hours in total, divided into 32 lectures and 32 hours practice.

- Chapter 1: Introduction to Sustainable Development, Land Degradation, and Sustainable Land Management
- Chapter 2: SLM Technologies and Approaches, and Ecosystem Services (including agroecology)
- Chapter 3: SLM and Climate Change
- Chapter 4: Mapping land degradation and SLM by using different tools
- Chapter 5: Decision-support tools for SLM and assessment of ecosystem services
- Chapter 6: Closing of lecture series

The project produced a teaching manual and teaching-learning materials in English and in Khmer for the course, making it easier for lecturers to implement. The materials include input lectures (PowerPoint presentations), student exercises (instructions/guiding questions for group work and individual work), student handouts, as well as guidelines and exercises for field visits and fieldwork.

Training of Trainers and Launch of Curriculum

Training of lecturers of the RUA and other institutions in Cambodia took place through the Training of Trainers (ToT) model. The ToT focused on sustainable development and ESD-oriented teaching and learning, an approach that is new to almost all Cambodian lecturers. Lecturers were exposed to innovative ways of teaching and learning. In the ToT, participants were put purposely in a situation where there is no “best” way of solving a problem. Through group work and field exercises, they had to identify solutions to existing real-world problems. Simultaneously, they realized that, as lecturers, they are no longer the “specialists” who gradually transfer responsibility and decision making to students. Their main task in the future will be coaching and advising their students to become more confident in their work. This new approach, which challenges both lecturers and students to become more open to new learning methods and settings, makes it possible to experience many individual moments of transformative learning.

The curriculum was officially launched on 13 January 2020 at the “High-level Launch Event of the Sustainable Development and Sustainable Land Management Curriculum for the Royal University of Agriculture and Agriculture-Focused Higher Education Institutions Cambodia” in Phnom Penh. The launching event was attended by 64 people, including high-ranking people from relevant ministries, IFAD, RUA, as well as lecturers from agriculture-focused higher education institutions.

MAIN CHALLENGES AND SUCCESS OF THE INITIATIVE

The concept of sustainable development and the systemic view of IFS within a larger landscape was new for most lecturers and is currently underrepresented in university courses. Further, the ESD-oriented teaching was also new, compared to the conventional teaching methods widely used in Cambodia. Currently, students seek to accumulate knowledge through learning by heart, but with little critical reflection on what they are learning. Moving from knowledge to action in the course already helps students build competences — in addition to their thematic and methodological skills. Nevertheless, the lecturers were eager to learn and apply it in their teachings. The developed course was taught in 2020/21 during two semesters to BSc students at the Faculty of Forestry Science at RUA. Due to the COVID-19 pandemic, the course had to be taught online, which presented additional technical challenges besides the concept of sustainability being quite abstract for the students. Establishing new teaching-learning arrangements in a curriculum will take some time, and requires a close evaluation of the whole process to assess its effectiveness.

The elaborated curriculum will educate Cambodian students — of whom a great part will be engaged in supporting development of agriculture and ensuring food security in the future — on sustainability issues. It will therewith capacitate the young generation to address today’s challenges of food security, climate change, resource degradation, and poverty. The RUA is in a unique position to contribute to a sustainable transformation in Cambodia by providing quality education and preparing students through ESD for shaping a sustainable future. RUA is highly interested to continue this process through enhancing competences of both lecturers and students and work toward integration of ESD.

LESSONS LEARNT FROM THE INITIATIVE THAT CAN CONTRIBUTE TO THE INNOVATION IN HEIs CURRICULUM TO BETTER ADDRESS AGROECOLOGY AND FAMILY FARMING (TOPIC 4)

The project contributes to improved development pathways in the agricultural sector in Southeast Asia through the better inclusion of sustainability topics, such as the holistic approach of agroecology and integrated farming systems in university curricula. This is done by combining research, education, and practice through the collaboration in implementation projects. Through this transdisciplinary set-up, innovative, climate-resilient farming systems for context-specific agroecological zones/landscapes are co-developed and made available in university curricula. The focus lies on the systemic perspective of integrated farming systems and on tailored solutions for specific agroecological zones. Further, the link to existing regional/global databases related to agroecology/SLM is made, e.g., the global WOCAT network (www.wocat.net) and others. Combining this knowledge with capacity building components of agricultural extension and advisory services will improve knowledge-based decision making on the farm, as well as project implementation, planning, and policymaking at various levels. It will enable decision makers and practitioners (e.g., extension workers) to transfer knowledge about integrated farming systems and their impacts at the farm and landscape levels.

Further, the focus on ESD is key. Teaching approaches and university curricula need to be adapted toward competence orientation — building academic knowledge, professional skills, and critical awareness (attitude, values) simultaneously. For students, it is important to understand the basic concepts and frameworks related to agroecology and integrated farming systems; to understand the fundamental principles and functioning of complex nature-human interactions; and to master specific tools and methods to document, assess, and evaluate land degradation SLM/agroecology practices at farm and landscape levels. Based on this foundation, potential solutions for sustainable development challenges can be developed jointly with farmers and other actors (transdisciplinary set-up, interacting beyond academia). Through group work and field exercises, solutions for existing real-world problems can be developed by students jointly with different actors, simulating their future fields of work. Besides, students also learn how to monitor impacts of implemented solutions. In addition to professional competences, students also have to learn social competences, such as the ability to communicate appropriately with a wide range of stakeholders through different channels, as well as personal competences, such as optimizing self-management.

**Sustainable Agricultural and Rural Development in Thailand:
The Role of Science, Technology, and Innovation at Kasetsart University**
Orachos Napasintuwong

ABSTRACT

Kasetsart University is the largest agricultural university in Thailand. Formerly operated as a public university, it became autonomous and government regulated in 2015. With the vision, to provide knowledge of the land to promote sustainable development for the country, it is committed to teaching, research, and innovation leading to sustainable development. This communication highlights the university's role in using science, technology, and innovation in agriculture and related fields to promote sustainable development, focusing on rural and agricultural communities through education and outreach programs.

Keywords: agricultural university, agricultural research, multidisciplinary curriculum, integrated system approach, outreach program

About Kasetsart University

Kasetsart (literally translated to agricultural science) University (KU) is the largest and oldest agricultural university in Thailand. Founded in 1943 from a system of agricultural research and agricultural education, KU has gone through several transformations over the years to provide higher education, training, research, and academic services with the focus on agricultural and rural development. Its vision is to provide “**Knowledge of the Land**”¹ to promote sustainable development in order to be internationally recognized. Despite its core activities that focus on Thai agriculture and rural communities, KU also offers degree and non-degree programs not only in agriculture, forestry, fishery, veterinary, agricultural extension, agroindustry, agricultural economics, environmental science, agricultural engineering, and other related agricultural sciences, but also in social sciences.

What makes KU distinguished compared to other agricultural universities in Thailand is its dissemination of knowledge and integration with local communities nationwide. Recognizing the diversity of rural and agricultural development issues and problems across the nation, and because of its core competency in agriculture, fishery, forestry, food industry, and bio-based economy, KU has established community-based training and education in five campuses — Bangkok (main campus), Nakhon Pathom and Suphan Buri in central, Sakon Nakhon in northeast, and Sriracha in the eastern region. Furthermore, KU has four training stations: two in the north, one in the northeast, and one in the south; four radio stations broadcasted from main cities including Bangkok, Chiangmai, Khon Kaen, and Songkhla; and 16 research stations nationwide. As of 2019, KU offers 182, 203, and 94 bachelor's, master's, and Ph.D. programs, respectively, plus one graduate diploma in Thai languages. It also offers 15, 13, and 14 international programs at the bachelor's, master's and Ph.D. levels, respectively. Furthermore, KU offers short courses and professional trainings for specific groups of interests. In 2020, there were over 68,099 students: undergraduate (88%), master's (9.8%), and Ph.D. (1.8%). The university received a research budget of about USD 51.40 million in 2019; 18 percent of which was from the government, 78 percent from other national agencies, and the rest from international agencies. It also has numerous international academic partnerships with leading institutes worldwide to generate knowledge and innovations for the international communities. Given its long establishment in academic services and research excellence, KU is ranked first in Thailand and 11th in Asia among top universities in agriculture and forestry by the 2021 QS world university ranking.

Challenges from System Transformation

In 2015, the Thai government has set the 20-year National Strategy (2018–2037), the country's first national long-term strategy aiming to achieve the vision of becoming “a developed country with security, prosperity, and sustainability in accordance with the Sufficiency Economy Philosophy (SEP)”ⁱⁱⁱ with the ultimate goal of happiness and well-being of Thai people. The main roles of higher education institutes under this national strategy are to support human capital development and to generate knowledge and innovation needed to build national competitiveness and promote economic growth.

Furthermore, the Thai government has set the Thailand 4.0 policy as a national agenda to drive the Thai economy in line with the sustainable development goals (SDGs) through innovation-driven economy by integrated science, research, and innovation to improve efficiency and competency of the nation. As a result, the structure of higher education system in Thailand was reformed in 2019 by merging the Ministry of Science and Technology, Office of Higher Education, Office of the National Research Council, and Thailand Research Fund. The new Ministry of Higher Education, Science, Research and Innovation (MHESI) has the main role to develop manpower, conduct research, and generate innovation in line with national development goals by integrating the higher education with science, research, and innovation. Today, KU is committed to teaching, research, and innovation leading to the sustainable development by: (1) building a broad base of knowledge to innovation, transferring technology to promote social and economic development and enhancing the competitiveness of the country; (2) strengthening technical skills and improving the competencies of people at all ages to create quality human resources to meet the evolving needs of Thai society and the world; and (3) creating models of learning that improve the quality of life for Thai communities.

With missions to bring in updated agricultural technologies and innovations for the sustainability of Thai agriculture and to promote spatial development and inequality reduction in the rural areas, KU focuses on delivering appropriate knowledge to the agricultural sector through various approaches, which will be discussed in the next section.

KU's Strategic Programs for Sustainable Agricultural and Rural Development

Due to vast activities and university's programs, only highlighted innovative curriculum development and outreach programs to farmers and rural communities are presented.

Community-engaged curriculums and academic activities

Recognizing the demand for skilled labor and the country's needs in meeting national development goals, KU has developed many curriculums at graduate and non-graduate levels, and degree and non-degree programs which incorporate internships, special problems, projects and/or theses that require the analysis of issues and problems of local communities in coping with challenges in agricultural production and food system. The development of the curriculums requires insight information from relevant stakeholders to ensure that the programs provide graduates with needed knowledge and skills to strengthen human capacity development. Given this fact, programs such as Agricultural Extension and Communication aims to bring innovation, e.g., new products, knowledge, methods, or any other technologies to the communities by trainings and seminars rooted in the communities. Some programs go beyond Thai communities such as those provided by collaborative University Network on Agricultural Extension and Development for CLMV countries. Another example is the Integrated Curriculum in Knowledge of the Land for Sustainable Development which requires students to plan and design projects with the communities to develop innovations that meet community's needs. This program employs a Subjects-Integrated-Synchronization (SIS) model which integrates Knowledge of the Land with active and problem-based learning experience where students' performance is evaluated from the outcome of assignments. It

also employs online learning tools and digital and information technology for teaching and evaluation. Students at all ages and backgrounds can also take non-degree modules from the curriculum and obtain credit banks for selected courses that meet their interests. The program has successfully generated smart farmers who return to the communities and continue disseminating their experience and knowledge learned from the program.

Some other programs such as graduate degree programs in Sustainable Land Use and Natural Resource Management (SLUSE) emphasize on applying the knowledge to address community's problems and issues by student internship, field studies, and field-based, problem-based research. Key element of the SLUSE program is the interdisciplinary approach that involve multi-faceted techniques taught by experts from several fields from agriculture, forestry, sociology, and economics to natural resource and environment management. Interdisciplinary techniques of land use investigation and natural resource quality assessment course that requires practical field observation and community participatory research is the core requirement of the programs. Agricultural and Resource Economics and Agribusiness curriculums provide students with opportunities to create research and business entrepreneurship projects based on their interests. Students learned knowledge and tools in business and economic analysis and applied them to their senior projects. One of the degree requirements of the BSc program in Agricultural and Resource Economics is the internship that trains students to conduct field research using primary data collection and analysis to address local problems. Furthermore, both programs give students opportunities to spend one semester on cooperative education at selected business corporation, research institute or public institutes to work on real world assignments. Students who chose this track tend to get employed easier as they learned to adjust to real world problems and situations. The success of these programs are graduates who become small business entrepreneurs who generate jobs and income in their communities. Nearly all agricultural science programs, including agriculture, fishery, and forestry, require students' training. With established research and training stations at a wide range of territory and ecology throughout the country, students can apply the knowledge learned from the classroom in practice.

Lesson learned

- Each curriculum needs to set a clear model of graduates with specific characteristics so that the necessary knowledge and skills provided by the curriculum can be designed. The objective of curriculum development should be in line with the vision and mission of the university. A public university or government-regulated university such as KU has set its mission and vision to support human capacity development toward the country's development goal.
- A system analysis and holistic approach is efficient in addressing complex issues and problems such as sustainable development. Multidisciplinary programs are practical and increasingly gain more interests from students. It is important to design the curriculum with necessary knowledge and tools that students can be apply in different agroecological areas. Given a diversity of issues in different agroecological areas, campuses and student training stations provide a great opportunity for students to learn in the context they are interested in.
- In designing the curriculums, inputs from graduates, employers, and potential students help in identifying knowledge and skills needed to fulfil the demand of each party. Although evaluation of the student's performance from the output is more straightforward, a follow-up outcome and impact evaluation will add more to the success of the program.
- Curriculum should be dynamic. Monitoring contextual changes in the social, economic, and environment issues and challenges is important to have the curriculums that are modern and needed. New courses, teaching tools, and program plans, i.e., modules, degree, short course, should be updated regularly.

Centers of Excellence in agricultural research and non-degree trainings

For decades now, Thailand is facing agricultural production roadblocks with the majority of farmers having to depend heavily on traditional know-hows and old cultural practices. The government agricultural extension programs give rudimentary services covering all crops in all agroecological areas of the country. However, the production technologies are mostly one-size-fits-all, which are non-site-specific and inadequate to farmers' need. On the other hand, local agricultural research institutes and universities are more apt to identify and provide solutions to area-based problems, but they are not mandated nor equipped to provide extensive assistance. Given its excellence in agricultural sciences research, KU has established centers of excellence aiming to bring modern agricultural technologies for the sustainability of Thai agriculture.

Center for Agricultural Biotechnology (CAB), for example, is the Inter-University Consortium (IUC) with KU as leader agency, focusing on delivering proven science to agricultural sector. By pooling resources from its seven university consortium members and integrating knowledge from several disciplines, CAB has fostered several task forces and network of researchers which have successfully tackled many obstacles at country scale. CAB offers graduate degree programs in agricultural biotechnology, and also has many activities transferring the knowledge to the local communities. Success stories include:

- 1) *Nutrient management and planting space for yield increase in Jasmine rice.* The prime area of Jasmine rice cultivation is the Northeast region — the poorest part of the nation. The agroecological zone is one growing season depending heavily on rainfall with no network of irrigation compounded with the presence of salty soils. The average productivity is very low with dismal average yield of 2 tons/ha. A team of CAB researchers, together with a local rice mill who started the idea of employing modern technology, worked with small groups of pioneer farmers. New practices were launched using wider planting spaces and new fertilizer regime. The researchers provided trainings, followed by several field visits to answer farmers' questions, especially to give scientific assurance that their fields looked different for the better. The result is yield as high as 3.8 tons/ha. The trainings are made available on YouTube, and within a year, there were more than 800,000 views. Farmers could significantly earn more revenue from this program, and the number of adopted farmers has been increasing.
- 2) *Nutrient management and pruning help ensure the yield and quality of mangosteen.* Mangosteen is native to the south of Thailand. The export of mangosteen is prone to embargo if the incidence of gamboge (internal oozing of yellow latex) exceeds 20 percent. The agroecological zone is tropical with high humidity and extended period of rainy season. During 2014–2018, the frequent floods in the south caused no fruit set and the despair growers became more receptive to new mindset in changing the cultural practices. A team of CAB researchers introduced the new fertilizer formula with dolomite and trace elements as per tree requirement, together with tree pruning, to allow enough critical sunlight and transpiration. Fruit set is now on a regular basis, and the fruit size increases, with a sweeter taste, and a significant reduction in fruit disorder (gamboge and translucent flesh) from its previous 35–60 percent to export grade. The new practices are now widespread in the south.

The National Corn and Sorghum Research Center (NCSRC) was established in early 1960s by the Rockefeller's support for a regional collaborative research program involving the exchange of germplasm, conferences, and training of experts in Asia. The NCSRC was established at KU's research station known as "Suwan Farm" which is an experimental station with irrigation facilities that enable year-round experiments, a laboratory, a dormitory, staff housing, and offices. NCSRC serves as national *in vitro* conservation of maize germplasm and provide genetic materials used for many breeding programs by public and private sectors.

The NCSRC plays a significant role in bridging the partnership of academic institutes, public, and private sectors by conducting Cooperative Multi-location Public-Private Yield Trial (MPPYT) program which is multiple geographical location field trials of pre-commercial and commercial elite hybrids voluntarily submitted by private seed companies. Jointly, without bias, MPPYT evaluates and compares product characteristics of maize hybrids, and the results have been trusted by the industry since 1987. NCSRC also transferred integrated farming system technology to local sweet corn farmers using contract farming to produce the center's developed "Insee" variety. The center offered good price of quality sweet corn products compared to the local market, and the success is observed by persistent contracted growers following recommendations for sweet corn farm management over a decade. It has generated more stable and improved income for farmers. Furthermore, NCSRC trained local seed SMEs and agricultural cooperatives in maize breeding and offer benefit sharing opportunities for the use of genetic materials through material transfer agreement. Although this approach is not directly for smallholding farmers, it has strengthened the capacity of local seed businesses.

Lesson learned

- Strengthening local communities by transferring non-degree trainings with specific knowledge needed for their practice can provide good alternative to degree programs that require more time and commitment.
- Understanding the local needs and provide them with evidenced-based programs to improve farmers' observability of relative advantage and enhance triability experience will increase the adoption of innovation.

Collaborative, inclusive, and participatory approach

Given the diversity of crops and agroecology across regions, KU outreach programs and research programs are collaborative, inclusive, and participatory. By engaging community in the research process, the real area-based problems are identified. The participatory approach not only addresses the right issues and problems but also brings the awareness to relevant stakeholders in the community. The recognition of problems by the locals and recommended innovation and technology provided by the university are key factors toward successful inclusive business. The collaboration does not limit to local communities but also multi-stakeholders. NCSRC's collaboration with the Bank of Agriculture and Agricultural Cooperatives (BAAC) to provide soft loans, with the Department of Agricultural Extension (Ministry of Ag and Coop) to create network of farmers, and with private companies for smart farming technology is a good example of partnership with the local communities to remove constraints such as access to credits and poor communication between university experts and local farmers. KU radio broadcast, which brings research outputs and transfers the knowledge to the rural communities nationwide is another good example. KU Radio Plus initiated on-air cooperative training courses with several partners, including: (1) BAAC for on-air agricultural school training of quality beef cattle husbandry, (2) Rice and Rice Farmers School (under the Rice Department), and (3) True Corporation (mobile phone network) for training on online learning of the agricultural produce market using smartphone applications. KU Radio Plus also creates a learning network and provides problem-solving consultation on agricultural production via mobile phone application. It is estimated that the broadcast reaches over several thousand rural households every day.

Lesson learned

- Understanding the limitations to learning and adoption of knowledge is the key to successful education. It is important to include the local community and create partnerships with stakeholders who can understand and provide tools to address these limitations. This will result in effective education.

ⁱ Knowledge of the Land is the university's motto referring to the three strands of sciences including the late King Bhumibol's knowledge in sufficiency economy, community knowledge, and international knowledge.

ⁱⁱ Sufficiency economy refers to the late King Bhumibol's philosophy based on the fundamental principle of Thai culture. It consists of three principles: moderation or satisfaction, reasonableness or being aware, and self-immunity or down-sizing risk; and two conditions, including knowledge and integrity. It is a method of development that uses knowledge and virtue as guidelines in living. Significantly, there must be intelligence and perseverance, which will lead to real happiness in leading one's life.

Assessing Training Needs and Higher Education Program on Agroecology and Safe Food System at Universities in Mekong Subregion

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ABSTRACT

Higher education programs on agroecology play an important role to the agroecology and safe food system transition. This study focuses on the assessment of training needs at higher education program on agroecology and safe food system at universities and academia in Mekong Subregion including Cambodia, Thailand, Lao People's Democratic Republic, and Viet Nam. It aims to provide mapping of existing curriculum, vocational training, soft skill, and E-learning at universities and academia, and provide gaps findings of training needs programs for capacity building of all relevant stakeholders. The assessment was conducted through online interviews with key informants identified at the universities and filling out an online questionnaire. Based on the assessment data, agroecological-related courses have been integrated in curriculum, vocational, and E-learning programs for most universities and academia. However, results indicated that education program such as training course syllabus, training contents and materials, and human resources at the universities and academia need to be improved to reach the requirements for market and sustainability of safe food system in the Mekong Subregion. To improve the agroecology and safe food system, it is suggested to enhance and strengthen the collaboration and engagement between all relevant stakeholders.

Keywords: Training needs, University, Agroecology, Safe food, Mekong Subregion

INTRODUCTION

Having inclusive, sustainable, and resilient agriculture systems to ensure environmental protection, quality and quantity food production, decent income for rural populations, and a sustainable society are global concerns recently. Agroecological approaches suggesting diverse pathways for agricultural and food system transition toward more sustainable farming and safe food system. Agroecology is a scientific movement, a set of practices, a social movement, and a political mobilization. The consolidated agroecological principles are related to recycling; input reduction; soil health; animal health; biodiversity; synergy; economic diversification; co-creation of knowledge; social values and diets; fairness; connectivity; land and natural resource governance; and participation of various stakeholders (Wezel et al. 2020).

Agroecology needs to be a part of the training program, which covers both research and education. Research and education can help society overcome the agroecological and safe food system problems because researchers and lecturers can help to promote grassroots initiatives in learning that will explore a wide possible solution (Francis 2020). This is because of education in agroecology can be an appropriate approach of learning for students to solve world's challenges of food systems including complexities of farming, high technology, and strategy to link theory to real life situation to achieve sustainable development on the safe food system (Lieblein et al. 2004). However, popular education should positively support relations

young agroecological farmers have with their parents, nature, and youth from conventional farms (Goris et al. 2021). Up to date, the agroecological education already existed in various training programs such as curricula, MOOC and E-learning, international partnership, peer learning, farm, and so on. These teaching methodologies can engage students more accessible knowledge on theory, practice, and improve engagement of student-teacher-stakeholder, then helping to support agroecological transition (de Tourdonnet 2017). However, teaching agroecology needs regular upgrading of the training programs. Therefore, it is necessary to conduct regular assessment to complete the knowledge availability in order to sustain the capacity building in agroecology and safe food system transition.

It is known that agriculture in Southeast Asia is subject to the same global challenges which are expressed in an intense way such as high population density, high level of production, high expectations on product quality and environmental protection, and so on. One of the regions where the global challenges of agri-food systems are most exacerbated is Mekong Subregion. Therefore, this study attempts to document and provide a mapping of existing curriculum and needs on training program in the Greater Mekong Subregion for improving the education program to support agroecological and safe food transitions in the region.

METHODOLOGY

Conceptual Approach

The training needs assessment was targeted at the agricultural universities of the Mekong Subregion, including Cambodia, Thailand, Lao People's Democratic Republic, and Viet Nam. The questionnaire for assessing the training needs is designed using Kobo Toolbox, and includes the existing university curriculum, their needs for improvement, and challenges in terms of technical and soft skill training courses, vocational training courses, and E-learning courses related to agroecology, agriculture, and safe food system. The assessment addresses the diversity of contents covered the training modalities, academic program, collaboration of the universities with external stakeholders linking to the curriculum development and training, challenges of curriculum and course development on the agroecology and safe food system, and needs from university and each faculty to improve academia program. The universities and academia, which are well known to have training programs related to agriculture, agroecology, and food system were selected for the training needs assessment in this study. Key actors selected for the interview and survey were eight for Cambodia, three for Lao People's Democratic Republic, three for Thailand, and seven for Viet Nam.

Data Collection and Analysis

Data collection for the training needs assessment was carried out in two steps — conducting online interview and filling out online questionnaire through Kobo Toolbox. Briefly, each key person was interviewed by discussing about the open questions, for instance, challenges, needs, and perspectives relating to the curriculum, vocational training, soft skills, and E-learning. For the second step, each key person was requested to fill out the online questionnaire designed through Kobo Toolbox.

The information gathered from interviews and surveys of key persons from each university, academia, and faculty was simply compiled and analyzed using the concepts given in Figure 2. Based on the conceptual framework, the information of challenges, needs, and perspective was classified according to the category of training (e.g., curriculum, vocational training, soft skills, and E-learning) and category of questions. The analyzed data included open-ended questions with text variables for the description of the survey topic and closed-ended questions with multiple choice categorical variables to characterize the survey topic.

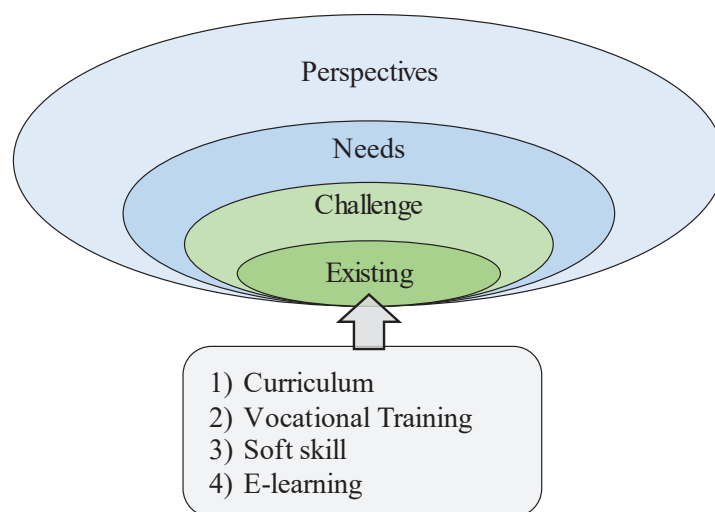


Figure 1. Category of survey information.

RESULTS

Curriculum Programs

According to the results, curriculum programs which integrate aspects on agroecology and safe food system have been integrated in the interviewed university for bachelor's program at the Mekong Subregion about 10 years ago. Moreover, for some universities, master's program also includes courses related to agroecological and safe food system. However, the courses of these curriculum programs are associated with the cropping system, conservation agriculture, and sustainable resource management, and they are associated, in some programs, to agroecological practices (agroforestry, crop livestock integration, and agroecological crop protection). Courses on value chains and markets should be developed to facilitate the consideration of market and consumer demand. In addition, the attractiveness of agronomy studies is significant in the region. Young people do not choose the agricultural sector, and this choice is often made by default. The low level of knowledge and recognition of agroecology among students does not help to reverse this lack of interest.

Vocational Training

Vocational training mostly existed in universities/academia in Cambodia. However, the existing vocational training is not integrated into the university program yet. Vocational trainings are organized periodically based on project needs, depending on collaboration with non-governmental organizations, farmer organizations, and private sectors. The modality of the vocational training was mainly practical field work, and the objectives were to meet partner demand, enhance the capacity building of the trainees, and improve their careers. Even though vocational training is helpful for capacity building, it requires good training content, access to field space, experienced trainer, and enough training materials. In addition, the results suggested that the vocational training should also cover soft skills and incorporate innovative topics (such as business start-up) in order to change the mindset of trainees and improve the value of the vocational training in agroecology.

E-learning

The curriculum of most universities includes E-learning courses, however, the majority of courses linked to only theoretical organic agriculture. There are not many E-learning courses for agroecology and safe food system due to the limited budget and lack of human resources

or experts in the field. In terms of E-learning courses, the universities still have limited courses on food safety quality, food supply chain, and processing of agricultural products. E-learning is considered a helpful learning platform for all relevant stakeholders (e.g., students, farmers, farmer organizations, etc.) to improve agricultural products, food business, and sustainability of safe food. However, E-learning is an online study, which makes it difficult to distribute the learning education to the countryside due to lack of internet connection, server, and learning materials (e.g., smart phones, computers).

Soft Skills

Many universities have included soft skills in their education program such as project management, communication, and marketing, through the theoretical classroom. However, those courses are not enough for students to fulfill market demands. Most universities suggested to have more soft skills on critical thinking, product development, innovation, and creativity in order to change ways of considering agronomy and producing knowledge.

According to the results from both interviews and surveys of key persons, almost all the selected universities/academia in the Mekong Subregion are facing similar challenges for all the types of training programs. In addition, they also have similar needs and perspectives to strengthen the education on agroecology and safe food system in the region. The main information is summarized and given in Table 1.

Table 1. Summary of information on challenges, needs, and perspective for all the categories of training program

Category	Information
Challenges	Course syllabus is not completed yet, lack of human resources in specific fields relating to agroecology and safe food system, lack of budget for upgrading training program and producing training materials as well as enlarging field space, lack of partnerships especially NGOs and private sectors, no clear procedure for curriculum development, less scholarship
Needs	Funding for development of training program, course syllabus improvement, need experts on agroecology and safe food system to help on training program development, training materials and laboratory equipment, new partnerships
Perspectives	To improve agroecology and sustainability of safe food system in Mekong Subregion, it requires commitments from all relevant stakeholders, regular market assessment to fill the gaps between market needs and curriculum and training program

CONCLUSION

This study conducted the online assessment of the curriculum of higher education program on agroecology and safe food system transition at universities in the Mekong Subregion. Capacity building of researchers and lecturers in terms of technical and soft skills is the main need, for them to be able to develop good course contents for teaching students at various levels. Gaps between needs of university and broad of audiences should be clearly identified in order to design an effective training program with a combination of theoretical, practical, technical, soft skill training adapted to contribute to a development of agroecological practices, and safe food transitions to develop agroecological practices for the sustainable safe food

system in the Mekong Subregion. In addition, the engagement between various stakeholders such as universities, academia, research institutions, non-governmental organizations, and private sector is considered as an important step toward improving agroecology and safe food system.

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Regional Consultation Program

Virtual Regional Consultation on Engaging with Academia and Research Institutions (ARIs) to support Family Farmers and Food System Transformation During and Post COVID-19 Pandemic in Asia

PROGRAMME OUTLINE

DAY 1: 8 December 2021 Time Zone: Bangkok Standard Time (GMT+7)

Session Recording: <https://www.youtube.com/watch?v=mBvwxA9hld4>

TIME	ACTIVITY
1.20 PM	Preliminaries (10 min)
	SESSION 1: SETTING THE SCENE <i>Moderator: Mr. Pierre Ferrand (FAO)</i>
1.30 – 1.40 PM	Welcome remarks – Ms. Ismahane Elouafi, Chief Scientist, FAO HQ
1.40 – 3 PM (1h20)	Challenges, Initiatives, and Role of Academia and Research Institutions (ARIs) in supporting transition toward sustainable food system and Agroecology mainstreaming <i>Moderator: Pierre Ferrand (FAO)</i> 1. Institutional initiatives <ul style="list-style-type: none"> • SAARC Agriculture Center – Dr. Md. Baktear Hossain, Director (video message) • Southeast Asian Regional Center for Graduate Study and Research in Agriculture – Dr. Glenn Gregorio, Director (video message) • UNESCO Regional Office for Asia and the Pacific- Dr. Susan Vize, Regional Adviser for Social and Human Sciences (PPT: https://bit.ly/ARIs_UNESCO_SVize) • Global Forum on Agricultural Research and Innovation – Dr. Hildegard Lingnau, Executive Secretary (PPT: https://bit.ly/ARIs_GFAR_HLingnau)

	<ul style="list-style-type: none"> • CGIAR, OneCGIAR initiative on “Transformational Agroecology across food, land and water systems” – Dr. Matthew McCartney (PPT: https://bit.ly/ARIs_CGIAR_MMcCartney) • Transformative Partnership Platform on Agroecology – Dr. Fergus Sinclair, CIFOR-ICRAF (PPT: https://bit.ly/ARIs_CIFOR-ICRAF_FSinclair) • International Fund for Agricultural Development (IFAD) – Ms. Ilaria Firmian, Regional Specialist, Asia and the Pacific Division (PPT: https://bit.ly/ARIs_IFAD_IFirmian) • Dr. Wayne Nelles, Rural Homestead Farmer and former Visiting Scholar Chulalongkorn University, Thailand (PPT: https://bit.ly/ARIs_Chula_WNelles)
<p>3 – 4.05 PM (1h05)</p>	<p>2. Voices from the ground (FO / CSOs) (10 mins each)</p> <p><i>Moderator: Mr. Pierre Ferrand (FAO)</i></p> <ul style="list-style-type: none"> • Andhra Pradesh Community Based Natural Farming Movement – Mr. Vijay Kumar, Advisor to Government of Andhra Pradesh for Agriculture & Cooperation • Asian Farmers Association for Sustainable Rural Development (AFA) – Ms. Ma. Estrella Penunia, Secretary-General (PPT: https://bit.ly/ARIs_AFA_MEPenunia) • Third World Network - IPES-FOOD – Ms. Lim Li Ching, Researcher (PPT: https://bit.ly/ARIs_IPES-FOOD_LChing) • Amrita Bhoomi Centre – Ms. Chukki Nanjundaswamy, Coordinator • Australian Food Sovereignty Alliance (AFSA) – Ms. Tammi Jonas, President and Farmer (PPT: https://bit.ly/ARIs_AFSA_TJonas) • Q&A
<p>4.05 - 4.15 PM</p>	<p>Group photo & break (10 min)</p>
<p>4.15 – 5.15 PM</p>	<p>3. Panel discussion: “what would be needed to foster collaboration between ARIs & FF and their organizations” toward sustainable and green rural transformation?</p> <p><i>Moderator: Dr. Francois Enten (GRET)</i></p>

	<p>The panel discussion will touch upon the following issues</p> <ul style="list-style-type: none"> • Existing challenges for education and extension to reach out to smallholders (and their organizations), • Digital transformation, how far can it go and what barriers can it address? • What recommendations to bridge the gap between ARIs and FFOs? <p>Speakers</p> <ul style="list-style-type: none"> • Mr. Florante Villas, AsiaDHRRA, Philippines • Dr. Jie-Hye (Alicia) Lee, Korea University International Law Research Center • Dr. Epsi Euriga, Ministry of Agriculture, Indonesia • Dr. Namita Singh, Digital Green, India • Mr Zainal Arifin Fuad, Serikat Petani Indonesia (SPI) & La Via Campesina, Indonesia • Q&A
5.15 – 5.30 PM	4. Wrap up and overview of Day 2

DAY 2: 9 December 2021 Time Zone: Bangkok Standard Time (GMT+7)

TIME	ACTIVITY
PARALLEL SESSIONS	<p>SESSION 2: EXPERIENCE SHARING FROM THE REGION AND BEYOND</p> <p>Focus on ARIs’ experiences in supporting rural transformation, Agroecology mainstreaming and Family Farmers Organizations. This is organized around communications received prior to the conference through an open call for communication. The different topics are related to building back greener and more resilient (mainstreaming climate resilience and Agroecology)</p>

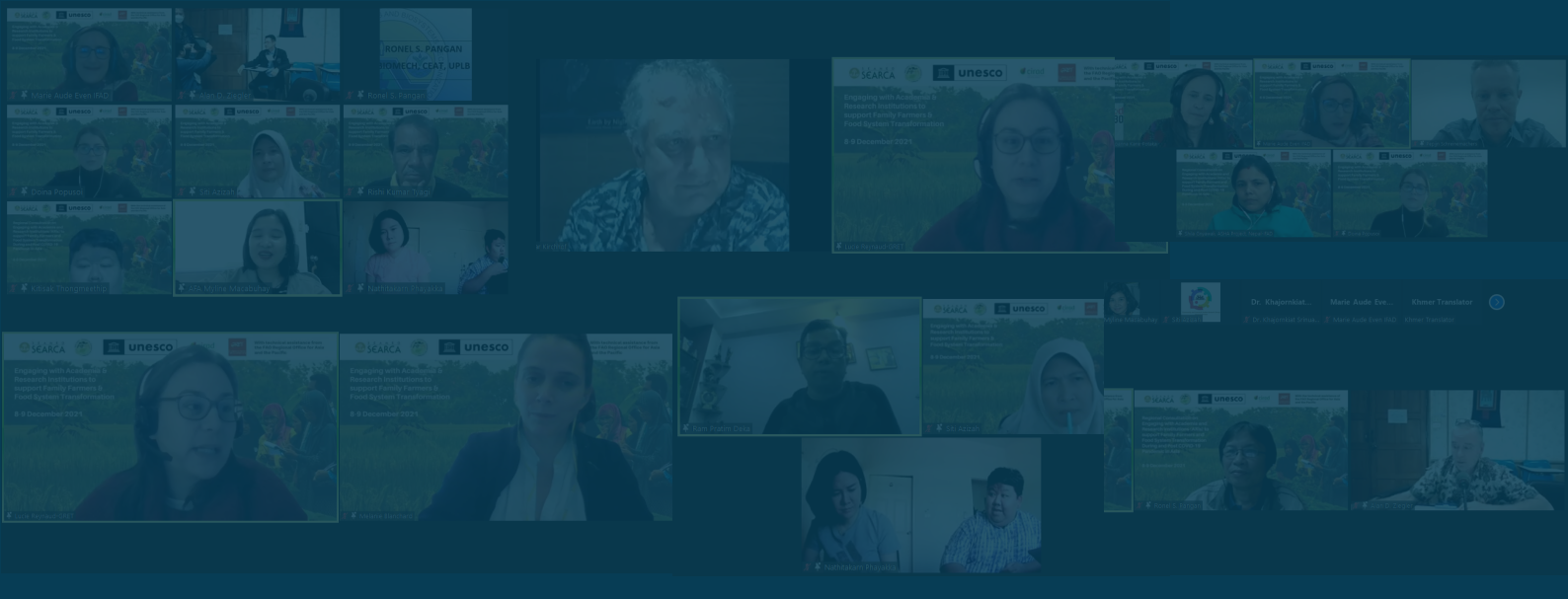
TIME	ACTIVITY	
9.00 – 12.00 NOON	<p>Session 2.1A Enhancing rural communities' initiatives and development, and transfer of technologies</p> <p>Session Leads: Ms. Sasireka Rajendran (APAARI) and Ms. Myline Macabuhay (AFA)</p> <p>Session Recording: https://www.facebook.com/AsianFarmers/videos/936748510558654/</p>	<p>Session 2.1B Policies and strategies (from regional to local levels) to support family farmers and sustainability of rural livelihoods/communities</p> <p>Session Leads: Dr. Susan Vize (UNESCO) and Dr. Estelle Bienabe (CIRAD)</p> <p>Session Recording: https://www.youtube.com/watch?v=F1dVH6WIMec</p>
	<p>Presentations</p> <ul style="list-style-type: none"> • Home gardens for resilient local food systems – <i>Dr. Pepijn Schreinemachers, World Vegetable Center (Thailand)</i> (PPT: https://bit.ly/ARIs_21A_PSchreinemachers-WorldVeg) • Investing in food safety, nutrition, and women empowerment can play a key role to accelerate agro-ecological transitions – <i>Ms. Marie-Aude Even (IFAD); Ms. Shila Gnyawali (ASHA Project/ Nepal) and Ms. Doina Popusoi (IFAD)</i> (PPT: https://bit.ly/ARIs_21A_MEven_IFAD) <p>Discussant: <i>Ms. Joanna Kane-Potaka</i>, Director, Strategic Marketing and Communication, ICRISAT</p>	<p>Presentations</p> <ul style="list-style-type: none"> • Initiatives for development of integrated coffee systems under market forces in the Central Highlands of Viet Nam – <i>Dr. Hue Tran (Enveritas/Viet Nam)</i> (PPT: https://bit.ly/ARIs_21B_HTran-Enveritas) • Localizing agroecology and fostering sustainability of rural livelihoods/communities through community entrepreneurship to support Family Farming: Framework, experiences, and lessons learned – <i>Dr. Helmi (Andalas University/Indonesia)</i> (PPT: https://bit.ly/ARIs_21B_Helmi-AndalasUniv) • Green transformation in agriculture for sustainability of rural livelihoods – Experiences from the coastal Areas of Vietnamese Mekong Delta – <i>Dr. Nguyen Thanh Binh (Can Tho University/Viet Nam)</i> (PPT: https://bit.ly/ARIs_21B_NTBinHCTU)

<ul style="list-style-type: none"> • Five Livelihood Asset: Guidelines for Goat Raising Management of Farmers in the Upper Northern Region of Thailand – <i>Dr. Nathitakan Phayakka</i> (Chiang Mai University/Thailand) and <i>Mr. Kitisak Thongmeethip</i> (Chiang Mai University/Thailand) (PPT: https://bit.ly/ARIs_21A_NPhayakkaKThongmeethip_CMU) • Smoked salted egg small industry with permaculture concept in Slorok village, Doko district, Blitar regency – <i>Dr. Siti Azizah</i> (Brawijaya University/Indonesia) (PPT: https://bit.ly/ARIs_21A_SAzizah_BU) <p>Discussant: <i>Dr. Ram Pratim Deka</i>, Scientist cum Research Management Coordinator, ILRI</p> <ul style="list-style-type: none"> • Higher Educational Challenges in Promoting Aqua-ecology in Thailand and Lao People's Democratic Republic – <i>Dr. Alan D. Ziegler</i> (Thailand), <i>Dr. Khajornkiat Srinuansom</i> (Thailand), <i>Mr. Alounxay Pasithi</i> (Lao People's Democratic Republic), and <i>Mr. Decha Duangnamon</i> (Thailand) (PPT: https://bit.ly/ARIs_21A_AZiegler_etal) • Reinvigorating the Philippine Seaweed Industry through the Application of an Improved Drying Technology – <i>Dr. Ronel S. Pangan</i> (Philippines) (PPT: https://bit.ly/ARIs_21A_RPangan_UPLB) <p>Discussant: <i>Dr. Rishi Kumar Tyagi</i>, Coordinator, APAARI</p>	<ul style="list-style-type: none"> • Delivering cross-cutting actions to the local food system in Viet Nam – <i>Ms. Ysabel Anne C. Lee</i> and <i>Ms. Tuyen Huynh</i> (CIAT/Viet Nam) (PPT: https://bit.ly/ARIs_21B_YLeeTHuynh_CIAT) • Establishment of the Association of Western Japan Agroecology: Based on reflection of the history of the 'Teikei,' Direct Partnership between Producers and Consumers, in Japan – <i>Dr. Koichi Ikegami</i> (Kindai University/Japan) (PPT: https://bit.ly/ARIs_21B_KIkegami-KindaiUniv) <p>Discussants</p> <ul style="list-style-type: none"> • <i>Dr. Daniel Hayward</i> - Project Coordinator - Mekong Land Research Forum, Regional Center for Social Sciences and Sustainable Development (RCSD), Chiang Mai University • <i>Dr. Anni Mitin</i> - Advisor, Malaysian Agroecological Society (SRI-MAS) and Former Executive Director Southeast Asian Council for Food Security and Fair Trade (SEACON) • <i>Mr. Do Trong Hoan</i> – Research Officer, World Agroforestry Center (ICRAF), Viet Nam
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<p>1.30 – 4.30 PM</p>	<p>Session 2.2A Multi-stakeholder networks and platforms enabling co-creation of knowledge and participatory research for supporting FF and food system transformation</p> <p>Session Leads: Mr. Pierre Ferrand (FAO) and Dr. Pedcris Orencio (SEARCA)</p> <p>Session Recording: https://www.youtube.com/watch?v=3ImjUpSmbCM</p>	<p>Session 2.2B Innovation in HEIs curriculum to better address agroecology and family farming</p> <p>Session Leads: Lucie Reynaud (GRET) and Melanie Blanchard (CIRAD)</p> <p>Session Recording: https://www.facebook.com/AsianFarmers/videos/1601812750171165/</p>
	<p>Presentations</p> <ul style="list-style-type: none"> • The role of actor-networks in enabling agroecological innovation: Lessons from 15 years on-field applications in the northern uplands of Lao People's Democratic Republic – <i>Dr. Jean-Christophe Castella (IRD/Lao People's Democratic Republic)</i> (PPT: https://bit.ly/ARIs_22A_JCastella_IRD) • Empowering communities to drive experimentations to support agro-ecological transitions in collaboration with extension systems and farmers organizations – <i>Ms. Marie-Aude Even (IFAD), Ms. Suzanne Phillips (FAO), and Ms. Katuscia Fara (WFP)</i> (PPT: https://bit.ly/ARIs_22A_MEven_IFAD) <p>Discussant: Dr. Peter Rosset, ECOSUR, Mexico</p>	<p>Presentations</p> <ul style="list-style-type: none"> • When myths become fact: how misleading information can become a threat to food security – <i>Dr. Gunnar Kirchof (University of Queensland/Australia)</i> (PPT: https://bit.ly/ARIs_22B_GKirchof_UQ) • Mainstreaming agroecology in higher education institutions for redesigning sustainable food systems in Asia – <i>Dr. Abha Mishra (AIT/Thailand)</i> (PPT: https://bit.ly/ARIs_22B_AMishra_AIT) • Enhancing capacities of the young generation in Cambodia for supporting rural transformation and agroecology mainstreaming through ESD teaching approaches – <i>Dr. Isabelle Providoli (CDE/Cambodia) and Mr. Sophea Tim (RUA/Cambodia)</i> (PPT: https://bit.ly/ARIs_22B_IProvidoli-CDESTim_RUA)

	<ul style="list-style-type: none"> • Building partnerships in promoting Agroecology and sustainable food systems: The experience of the MASIPAG farmers’ network and the Department of Community Development, University of the Philippines – <i>Prof. Ma. Corazon J. Tan (UP Diliman/ Philippines)</i> (PPT: https://bit.ly/ARIs_22A_MCTan_UPD) • Organizations’ experiences in supporting rural transformation, Agroecology mainstreaming and Family Farmers with the view to building back greener and more resilient – <i>Mr. Thoan Ho (NVCARD/Viet Nam)</i> (PPT: https://bit.ly/ARIs_22A_THo_NVCARD) <p>Discussant: Dr. Pedcris Orencio, SEARCA</p> <ul style="list-style-type: none"> • Bridging the Gap between Formal and Informal Seed Systems through Community Seed Banks in Asia – <i>Mr. Patrick Trail (ECHO Asia/Thailand)</i> (PPT: https://bit.ly/ARIs_22A_PTrail_ECHOAsia) • Advancing ways forward to Transparent, Responsible and Sustainable Food system transitions through building Agroecology pathways: insights into research-based developments from a Vietnamese • Academy of Agricultural Science (VAAS) led partnership – <i>Dr. Pham Thi Hanh Tho (CASRAD/ Viet Nam)</i> (PPT: https://bit.ly/ARIs_22A_PTHTHo_CASRAD) <p>Discussant: Dr. Abram Bicksler, FAO Headquarters</p>	<ul style="list-style-type: none"> • Implementation of e-learning activities at ITC, Cambodia – <i>Mr. Bou Channa (ITC/Cambodia)</i> (PPT: https://bit.ly/ARIs_22B_BChanna_ITC) • Sustainable Agricultural and Rural Development in Thailand: The Role of Science, Technology and Innovation at Kasetsart University – <i>Dr. Orachos Napasintuwong (Kasetsart University/Thailand)</i> (PPT: https://bit.ly/ARIs_22B_ONapasintuwong_KU) • Assessing Training Needs and Higher Education Program on Agroecology and Safe Food System at Universities in Mekong Subregion – <i>Dr. Peany Houng (ITC/Cambodia)</i> (PPT: https://bit.ly/ARIs_22B_PHoung_ITC)
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	SESSION 3: WRAP UP AND WAY FORWARD Session Recording: https://www.facebook.com/AsianFarmers/videos/209887724638069
4.30 – 5.00 PM	Wrap up of Day 2 (session leads) The way forward: Pierre Ferrand (FAO)



Family farmers have been struggling to cope with the evolving food systems in the region due to rapid globalization, increasing population and demographic shifts, urbanization, changing food consumption behavior, and climate change. On top of this, the COVID-19 pandemic greatly affected the agricultural productivity in the region, most particularly of family farmers. Agroecology is a potential holistic approach to address these challenges faced by family farmers in building an inclusive, safe, sustainable, and resilient food and agriculture systems.

There are over 6,000 higher education institutions (HEIs) in the ASEAN region that can provide the necessary knowledge, tools, and opportunities in capacitating a new generation of farmers, extensionists, and policy makers. Initiating collaboration and forming partnership with HEIs could help in supporting family farmers and agrifood systems in Asia.

However, Agroecology has not been adequately researched and documented among HEIs, and more broadly, among Academia Research Institutions (ARIs) in the region. Indeed, it is crucial for ARIs to prioritize the assessment of policy, budgetary, political, and curriculum reform for improving and scaling-up agroecological knowledge, policies, curricula, skills development, decent green agri-food jobs for student graduates, and field applications in achieving a sustainable Food System.

Thus, this regional consultation aimed to convene representatives of universities, family farmers' organizations, agricultural research institutions, government agencies and development partners to discuss the key strategies and identify opportunities for Academia and Research Institutions (ARIs) in Asia to further contribute research and initiatives on Agroecology that will enhance the livelihoods of family farmers and develop their capacities to cope with the increasing uncertainty caused by the COVID-19 pandemic.

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