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Report of the

**KNOWLEDGE EXCHANGE ON THE PROMOTION OF EFFICIENT
RICE FARMING PRACTICES, FARMER FIELD SCHOOL
CURRICULUM DEVELOPMENT AND VALUE CHAINS**

Yogyakarta, Indonesia, 26–29 September 2016

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PREPARATION OF THIS DOCUMENT

This report describes the activities and outputs of the workshop entitled “Knowledge exchange on the promotion of efficient rice farming practices, Farmer Field School curriculum development, and value chains”, which was held in Yogyakarta, Indonesia, from 26–29 September 2016 in support of the Regional Rice Initiative.

This report was prepared by Pham Du, Delivery Manager of the Regional Rice Initiative, Alma Linda Abubakar and Jan Willem Ketelaar, FAO Regional IPM Programme staff, and Austin Stankus, FAO consultant.

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ABSTRACT

A total of 33 participants (10 women) participated in the Regional Rice Initiative – Workshop *cum* Study Tour on knowledge exchange on Farmer Field School curriculum development for promotion of efficient rice farming practices and value chains. Field visits were made to Sleman (Rice-Fish farming and “jajar legowo”) and Boyalali (organic rice value chains) organized by FAO Indonesia in collaboration with the Ministry of Marine Affairs and Fisheries and the international civil society organization Vredeseilanden (VECO) and its local partner CSO Aliansi Petani Padi Organik Boyolali (APOLLI). Following the study tour, the regional workshop was held to: (1) facilitate the regional exchange of knowledge and experiences on sustainable intensification of rice production, including Rice-Fish farming systems and rice value chains; and (2) take stock of Farmer Field School curricula currently available, introduce the FFS Guidance Document and identify opportunities for strengthening of the FFS curricula. The participants included representatives from government and civil society organization implementing partners and principal investigators engaged in results assessment in pilot RRI-Phase 2 countries (Indonesia, Lao PDR and Philippines). Results of the assessment studies will be communicated to national and local government for informing policy and for mobilization of funding support for up-scaling of the RRI Farmers Field Schools on Save and Grow-Sustainable Intensification of Rice Production.

CONTENTS

	Page
PREPARATION OF THIS DOCUMENT	iii
ACKNOWLEDGEMENTS	iii
ABSTRACT	iv
ABBREVIATIONS AND ACRONYMS	vi
BACKGROUND	1
WORKSHOP PROGRAMME	3
FIELD VISITS	3
SESSION I: Opening session and keynote addresses	3
SESSION II: Sharing knowledge and experiences: On-going and planned RRI work relating to FFS Save and Grow, Sustainable Intensification of Rice Production, Rice-Fish systems, and results evaluation and assessment	4
SESSION III: Status of rice value chain and relevant issues of rice sector development in countries	4
SESSION IV: Curriculum review and update: FFS Save and Grow, Landscape IPM, Rice Fish farming systems and other multi-sectorial approaches	4
SUMMARY OF MAJOR LESSONS LEARNED AND FOLLOW UP ACTIONS	5
APPENDIX 1 Workshop agenda	7
APPENDIX 2 Country reports	9
Indonesia	9
Lao PDR	13
Philippines	19
APPENDIX 3 Detail of field trips	28
APPENDIX 4 List of participants	31
APPENDIX 5 Group photo	34
APPENDIX 6 Selected photos of the workshop	35
APPENDIX 7 Selected press releases and news clips	37

ABBREVIATIONS AND ACRONYMS

AEWs	Agricultural Extension Workers (Philippines)
APPOLI	Alyansa Petani Padi Organik Boyolali (Indonesia Farmer Organization)
ASEAN	Association of Southeast Asian Nations
CSA	Climate Smart Agriculture
DoA	Department of Agriculture (Lao PDR)
DLF	Department of Livestock and Fisheries (Lao PDR)
FAO	Food and Agriculture Organization
FFS	Farmer Field School
FIELD	Farmers Initiatives for Ecological Livelihoods and Democracy (Indonesia)
FO	Farmer Organization
GIAHS	Globally Important Agriculture Heritage Systems
GVA	Gross value added
IPM	Integrated Pest Management
IRRI	International Rice Research Institute
MAF	Ministry of Agriculture and Forestry (Lao PDR)
MASSCOTE	Mapping Systems and Services for Canal Operation Techniques
MMAF	Ministry of Marine Affairs and Fisheries (Indonesia)
MOA	Ministry of Agriculture (Indonesia)
NGO	Non-governmental organization
PhilRice	Philippine Rice Research Institute
RAP	Regional Office for Asia and Pacific
RRI	Regional Rice Initiative (Asia)
S&G	Save and Grow Paradigm
SIRP	Sustainable Intensification of Rice Production
SRI	System of Rice Intensification
SP2	Strategic Programme 2 of the FAO
TOF	Trees Outside Forests
TOT	Training of Trainers
VECO	Vredeseilanden (International NGO)

BACKGROUND

FAO's Regional Rice Initiative (RRI) includes as a focus the importance of goods and services produced by rice ecosystems, including identifying, documenting and communicating sustainable rice production practices to enhance resilience and increase efficiencies in rice production in order to improve food security and nutrition. This initiative works in tandem with and supports the implementation of Regional Rice Strategy for Sustainable Food Security in Asia and the Pacific that was endorsed by the FAO Member Countries during the "March 2014 Mongolia Asia and Pacific Regional Conference" in 2013. Phase I of the RRI kicked off in 2013 as a pilot project of FAO's New Strategic Objective 2 (SO2) "*Making agriculture, forestry and fisheries more productive and sustainable*". Since then, it has been assisting three pilot countries – Indonesia, Lao PDR and the Philippines – in the intensification of rice production with consideration of responsible management of the full complement of goods and services produced by and available from rice ecosystems and production landscapes. Specific focus areas of the RRI include sustainable rice farming practices, increased production and resource use efficiency, higher net returns and a better deal for farmers and ultimately, improved food security and nutrition.

Having RRI more effective and creating the best possible synergies while maximizing their impacts on target beneficiaries, the RRI-Phase II (RRI-2) in 2014–2015, integrated all the approaches promoted by the different components into the overarching Save and Grow paradigm (S&G). These approaches were predominately implemented through the Farmer Field School (FFS) approach. Also, the findings and results of the RRI were communicated and mainstreamed in national rice strategies or policies and other policy processes. As a result, the RRI-2 envisages three major thrusts or outcomes:

- Innovative and sustainable practices applied by farmers to rice ecosystems and landscapes, and improved through field implementation, e.g., Save and Grow Sustainable Intensification of Rice Production (S&G-SIRP), Integrated Pest Management (IPM), Rice-Fish, livestock and/or vegetable systems, Trees Outside Forests (TOF), Globally Important Agriculture Heritage Systems (GIAHS), Mapping Systems and Services for Canal Operation Techniques (MASSCOTE), and climate-smart agriculture (CSA);
- A knowledge base built on resource use/production efficiency, sustainability of rice ecosystems, improved livelihoods of rice-based communities, food and nutrition security, by using the innovative/improved approaches; and
- Formulation and implementation of national rice policies, strategies or programmes supported as a follow-up to the Asia-Pacific Regional Rice Strategy (officially adopted in March 2014), and contributions made to global and regional policy processes, e.g. the Conference of the Parties to the Convention on Biological Diversity.

In January 2016, FAO convened in Bangkok a regional workshop on RRI-2. This regional meeting brought together FAO's officers from FAO Headquarters, FAO Regional Office of the Asia and Pacific Region, and FAO Country Representatives as well as stakeholders from governments, institutions and civil society to better understand the programme of work, including the potential benefits, challenges and planned results of RRI for the next biennium (2016–2017). Achievements shared from the implementation of RRI in 2014–2015 and lessons learned from three countries (Indonesia, Lao PDR, and the Philippines) indicated that implementation of innovative technologies, such as Rice-Fish, integrated livestock and/or vegetable farming systems, TOF, and IPM through FFS S&G, could increase productivity and incomes of rice farmers in these countries.

There are major achievements reported from Indonesia:

- Sustainable organic rice value chain development in Boyolali, Central Java involves two main products and their marketing, branding and certification, "*healthy rice*" and "*organic rice*". This organic rice production system produced high income for the implementing farmers, particularly through a certified organic system which increased income 49–57 percent in each planting season.

- The innovative rice planting technique called “*jajar legowo 2:1*” which increased land productivity with high quality seed and it provided opportunities to employ Rice-Fish and Rice-Catfish-Duck farming systems. There is an upscaling potential of 4 000 000 ha.
- Rice SIRP-based fish farming through two organizations [Vredeseilanden (VECO) Indonesia and Farmers Initiatives for Ecological Livelihoods and Democracy (Field Foundation)] where results show that these techniques, as demonstrated in the areas of Tasikmalaya and Indramayu, West Java, and in Pasuruan, East Java, Indonesia, yield higher production than standard Rice-Fish, Save and Grow or farmer standard practices. There was a large amount of advanced technology implemented in Rice-Fish Save and Grow compared to standard Rice-Fish and farmer practices.

During the aforementioned workshop, the country representatives proposed to convene more regional/cross country exchange to share knowledge and experiences on implementation of innovative technologies and rice value chains in the biennium 2016–2017.

Moreover, FAO Country Representatives of the focus countries of the Regional Rice Initiative (Indonesia, Lao PDR and Philippines) identified opportunities for improved collaboration and requests for support to accelerate delivery of planned results at country level. The workshop outlined in this current report was in direct alignment with some of these planned priorities. Specifically, up-scaling Rice SIRP and Rice-Fish production through documenting and disseminating good practices such as IPM especially through the Farmer Field School approach was addressed by a multi-stakeholder workshop with participants from the three focus countries. Importantly, value chain and market connections were identified by the delegations from Indonesia, Laos and Philippines as priorities for future RRI work and sharing of experiences, which may include market access, certification and branding and these aspects were covered in the agenda for the study tour cum workshop.

A two day workshop and two day learning site visit served as a knowledge sharing event for participants of the three focus RRI countries. The objectives were to:

- Facilitate the regional exchange of knowledge and experiences on sustainable intensification of rice production, including Rice-Fish farming systems and rice value chains;
- Taking stock of Farmer Field School curricula currently available, introduction of the FFS Guidance Document and identification of opportunities for strengthening of the FFS curricula;
- Discuss priorities and plans for continued RRI work at country and at regional level.

The expected outputs were:

- Knowledge, experiences and good practices for sustainable intensification of rice production, including on Rice-Fish and rice value chains as applied in Indonesia, are shared and documented;
- Inventories of FFS-SIRP curricula and priorities identified for strengthening the curricula;
- Priorities and plans formulated and discussed for continued RRI work in countries and at regional level.

A total of 33 participants (10 women) participated in this workshop and site visit. A full list of participants and their affiliations is included as Appendix 4.

WORKSHOP PROGRAMME

The activities consisted of two days of field visits followed by two days of workshop. The workshop agenda is included as Appendix 1.

Field visits were made to Sleman (Rice-Fish farming and “*jajar legowo*”) and Boyolali (organic rice value chains) organized by FAO Indonesia in collaboration with the Ministry of Marine Affairs and Fisheries (MMAF) and the international civil society organization Vredeseilanden (VECO) and its local partner Aliansi Petani Padi Organik Boyolali (APOLLI).

Following the study tour, the workshop was held to: (1) facilitate the regional exchange of knowledge and experiences on sustainable intensification of rice production, including Rice-Fish farming systems and rice value chains; and (2) take stock of Farmer Field School curricula currently available, introduction of the FFS Guidance Document and identification of opportunities for strengthening of the FFS curricula. The participants included representatives from government and civil society organizations, implementing partners and principal investigators engaged in results assessment in RRI-Phase II countries (Indonesia, Lao PDR and Philippines). Photographs of the workshop and selected press releases are included in Appendixes 5–7.

Field visits

The first field visit was an innovative Rice-Fish farming area based on the cluster approach in the Sleman District of Yogyakarta where participants saw a demonstration site with intensive Rice-Fish farming.

The second field visit was to the APPOLI offices and field sites in Boyolali. APPOLI is a farmer group that focuses on the production of organic and healthy rice, some of which follows a set of standards for entry to markets such as the European Union and USA, among others. The branding of organic rice helps farmers achieve better income levels, as they are able to command higher prices than those without the organic certification.

The final field visit was a meeting with Komposera, a women’s group that advocates nutrition security and healthy lifestyles. This further underscored the importance of marketing and consumer awareness in the value chain approach.

Full details of the field visits are included in Appendix 3.

SESSION I: Opening session and keynote addresses

Opening remarks were delivered by the RRI Coordinator, Mr Pham Van Du. The remarks included the rationale, objectives, expected outputs of the Workshop cum Study Tour in support of the Regional Rice Initiative on “Knowledge exchange on the promotion of efficient rice farming practices, Farmer Field School curriculum development, and value chains”.

The FAO Representative to Indonesia, Mr Mark Smulders, welcomed guests and participants. He highlighted the Government of Indonesia’s commitment to improving the lives of farmers. Rice-Fish farming has reduced the use of pesticides to zero or close to zero. Rice-Fish farming is a triple win as it improves nutrition, increases profitability and uses a sustainable approach to maintaining/increasing yields and increasing income. Success stories such as this are important to FAO, noting that FAO Indonesia’s job is to demonstrate good practices and urge the Government to scale up and redirect investments to where there is the biggest pay off. Also, FAO’s role is to provide backstopping and give advice and help agriculture to be profitable and attractive as a business. There is a need to address emerging challenges such as the “greying of agriculture” as youth move away from farming.

In his opening speech, the Director General of Aquaculture Directorate General, Ministry of Marine Affairs and Fisheries, Mr Slamet Soebjakto, expressed hope that knowledge gained from field trip (to Rice-Fish and value chains) would inspire the work in other countries (i.e., Lao PDR and Philippines). The need for food, especially animal protein, has increased owing to population increase. The role of aquaculture in addressing this need is important, and the integration with other farming sectors, such as rice, vegetables or livestock, offers opportunities for further development. These practices increase sustainability while providing nutrition. Rice-Fish farming has existed for a long time in Indonesia. However, the Ministry of Marine Affairs and Fisheries with FAO recently introduced the concept of “*jajar legowo*” and the cluster approach to management, both of which provide additional income and strengthen collaboration among farmers’ groups while at the same time intensifying production. The Indonesian government is committed to develop collaboration between the agriculture and fisheries sectors, as evidenced by increasing cooperation between separate Ministries and Agencies. MMAF has established a committee comprised of different national institutions and invites other countries to join the coalition in view of developing regional and international guidance to promote food security.

Following the opening speeches, a presentation was made on Rice-Fish systems, both around the world and specific to Indonesia. FAO RAP then presented an overview of the RRI activities and results to date as to set the stage for the country presentations.

SESSION II: Sharing knowledge and experiences: On-going and planned RRI work relating to FFS Save and Grow, Sustainable Intensification of Rice Production, Rice-Fish systems, and results evaluation and assessment

During this session each country delegation provided a presentation in regards to the on-going and planned work in their country that is related to the development and application of sustainable intensification of rice production. Most of the activities were included under the RRI, though associated activities were also presented. Information was also provided on FAO’s Save and Grow approach for sustainable intensification of rice production, Rice-Fish systems and relevant evaluation and assessment.

Details of this, and all other, presentations are reflected in the country reports and included as Appendix 2. These country reports were prepared by the country delegations in collaboration with FAO and were presented during the workshop.

SESSION III: Status of rice value chain and relevant issues of rice sector development in countries

During this session, each country delegation provided a presentation on the rice value chains in their country. This included national and district-level policy, information on the major flows of products, and the key actors along the value chain. There were many differences between the countries, but collectively it highlighted the importance of investigating and documenting the value chain ahead of designing interventions.

SESSION IV: Curriculum review and update: FFS Save and Grow, Landscape IPM, Rice Fish farming systems and other multi-sectorial approaches

This session was focused on Farmer Field Schools, and the country delegations presented the status of the FFS curriculum on Save and Grow. This was an opportunity to share, partly through country exhibitions how each country has adapted the FFS curricula to meet the needs of their socio-economic and geographic realities. FAO also introduced the FFS Guidance Document, the FFS Knowledge Platform and the Expert Roster. The country delegations expressed interest in sharing their adapted curricula and noted the utility of the FFS knowledge Platform and their willingness to contribute.

These resources can be found at the following website: www.fao.org/farmer-field-schools/en/, which was shared during the workshop.

SUMMARY OF MAJOR LESSONS LEARNED AND FOLLOW UP ACTIONS

Results of the assessment studies will be compiled and communicated to national and local government for informing policy and for mobilization of funding support for up-scaling of the RRI Farmers Field Schools on Save and Grow-Sustainable Intensification of Rice Production. It is important to develop concise and clear communication products based on empirical field evidence and intended for policy makers. These products will need to include a few clear and concise communications messages as to facilitate impact on policies and strategy formulation at local and national level. The FAO Representation in Jakarta is scheduled to convene a national RRI workshop in November or December 2016 and it would be important to have such communication products available for this meeting. Idem ditto, the Representation in Vientiane is planning for a similar national event in January 2017. The major lessons shared during this workshop are presented here below, as summarized from participant discussions, presentations and reports.

- Sustainable intensification of rice production requires smallholder farmers to understand and responsibly manage agroecosystems and landscapes. The ecosystem-literacy training offered in the Save and Grow-SIRP FFS interventions is essential for smallholder farmers to acquire the required agro-ecological knowledge and management skills for sustainable production intensification.
- RRI FFS S&G-SIRP approaches sustainable intensification of agriculture from an agroecology-based process perspective where farmers are empowered to be in control of their production systems while obtaining benefits from and enhancing goods and services of ecosystems and landscapes. The process enhances farming communities' resilience and increases efficiencies in rice production to improve food security and livelihoods. There is scope for RRI FFS S&G-SIRP to strengthen community approaches to landscape management by virtue of the connectivity of components of farming systems and landscapes.
- Improved management practices and enhanced agro-biodiversity (e.g., existing and introduced aquatic biodiversity like fish) brings significant increase in yields, benefits and net income that could provide incentives for the younger generation to take on a renewed interest in rice production.
- There is a need to scale-up existing efforts from individual farmers field to landscape management. This involves participatory planning processes involving various stakeholders. The FFS should not only address rice production, but also other dimensions of the rice value chain, especially post-harvest and production issues, as well as improved linkages/access to markets.
- Regional Rice Initiative implementation progress and results to date have provided evidence of high productivity and resource use/production efficiency, sustainability, improved livelihoods of rice-based communities and food and nutrition security resulting from farmer adoption of innovative/improved management practices and approaches. However, more work is needed along the development of communication materials to generate increased policy support for- and investments in- agroecology-literacy and climate-smart agriculture training involving smallholder farmers. Additionally, the value of aquatic animals in rice field environments is generally underestimated, and though for many small-scale farmers it exceeds the economic value and nutritional importance of their rice it is often poorly understood and thus could be part of a communication strategy.
- There is a need to raise awareness and develop capacities to enhance resilience and increase efficiencies in rice production as to improve food and nutrition security in other countries in

the region where farmers and farming communities are faced with similar challenges addressed by the RRI in Indonesia, Laos and the Philippines. For this reason, the geographical expansion of RRI should be considered particularly where governments have signified their interest and requested FAO to be included in the RRI.

- Investigating and documenting the rice value chain in countries, while developing information on the major flows of products and the key actors along the value chain are important elements to the sustainable intensification of rice production. Training of country officials for strengthening the value chain could be supported.
- Some of the general problems encountered is the targeting and determination of the beneficiary groups of farmers, compounded by the fact that the country's geographic and agricultural landscape is so different from one location to another that the activities need to be tailored to each specific location. Lack of coordination and other administrative problems both within and between ministries are exacerbated with poor local government buy-in and support. It will be important to place the S&G approaches within the local and district level agriculture development strategies. There is also an issue to ensure the availability of fish feed and seed in remote areas, to make sure that these inputs are available to farmers at an affordable price at the right times. Finally, the monitoring and evaluation to document and publicise the good results has been lacking.

APPENDIX 1

WORKSHOP AGENDA

Day 1: 26 September, 2016		
08:00 – 12:00	Arrival of participants in Yogyakarta	
FIELD VISIT (FAOIND)		
12:00 – 13:00	Lunch around Yogya airport	
13:00 – 17:00	Field visit to Seyegan sub district – Sleman, Yogyakarta	
	Presentation by Sleman District Officer and Farmer Group:	
	<ul style="list-style-type: none">• Innovative Rice-Fish farming system based on cluster approach• Rice planting system using <i>jajar legowo 2:1</i> technique	
	General discussion and summary	
17:00 – 19:00	Travel from Yogyakarta to hotel in Solo	
Day 2: 27 September, 2016		
FIELD VISIT (FAOIND)		
08:00 – 09:00	Travel from Solo to Boyolali	
09:00 – 17:30	Field visit in Boyolali on sustainable organic rice value chain implemented by APPOLI (farmer association) supported by VECO Indonesia	
	Farmer organization and strengthening	
	<ul style="list-style-type: none">• Sustainable organic rice value chain• Organic fertilizer production• Organic rice planting• Post harvest and marketing• Organic certification• Visit to organic rice consumer association	
	General discussion and summary	
17:30 – 18:30	Return to Solo	
evening	Country delegations group work: put up RRI country exhibits and review background paper; presentations to be delivered	
Day 3: 28 September, 2016		
Meeting venue: Royal Surakarta Hotel		
Time	Programme	Remark
08:00 – 09:30	Registration Welcome address Official opening Introduction of participants Group photo	- FAO IND - MOAF - FAO IND - FAO RAP - FAO IND
09:30 – 10:00	Tea/coffee break	
Session I: Opening session and keynote addresses		Chair: MOAF
10:00 – 10:30	Rice Fish systems and their implication for food security, nutrition and rural development	Stankus, Austin
10:30 – 11:00	Best practices applied for rice and Rice Fish systems in Indonesia through FFS Save and Grow; achievements and lessons learned	Indonesia
11:00 – 11:30	Toward Sustainable Intensification of Rice Production in Asia: A regional overview of RRI results to date and priorities for the future	Ketelaar, Jan Willem
11:30 – 12:00	Innovative technology adoption and best practices applied for rice in different countries in Asia	Pham, Du
12:00 – 12:30	General discussion	
12:30 – 13:30	Lunch	
Session II: Sharing knowledge and experiences: On-going and planned RRI work relating to FFS Save and Grow, Sustainable Intensification of rice production, Rice-Fish systems, and results evaluation and assessment		Chair: FAO RAP
13:30 – 14:15	Viewing and presentations of country exhibits	Country delegations
14:15 – 14:30	Summary of work planning for 2016–2017 – activities, milestones and planned results	Pham, Du
14:30 – 15:00	Indonesia	

15:00 – 15:30	Tea/coffee break	
15:30 – 16:00	Lao PDR	
16:00 – 16:30	Philippines	
16:30 – 17:30	General discussion	Chair: FAO RAP
18:30 – 20:00	Dinner	
Day 4: 29 September 2016		
Meeting venue: Royal Surakarta Hotel		
Time	Programme	Remark
Session III: Status of rice value chain and relevant issues of rice sector development in countries		Chair: FAO LAO
08:30 – 09:00	Rice value chains: concepts, principles and good practices	Shepherd, Andrew
09:00 – 09:30	Review experiences of the field visits (Sleman and Boyolali)	FAO IND
09:30 – 10:00	Status of rice value chain on organic rice and Rice Fish farming in Boyalali and Tasikmalaya	Bandung University
10:00 – 10:30	General discussion	Chair: FAO RAP
10:30 – 11:00	Tea/coffee break	
11:00 – 11:30	Lao PDR	TBD
11:30 – 12:00	Philippines	TBD
12:00 – 12:30	General discussion	Chair: FAO HQ
12:30 – 13:30	Lunch	
Session IV: Curriculum review and update: FFS Save and Grow, Landscape IPM, Rice Fish farming systems and other multi-sectorial approaches.		Chair: FAO PH
13:30 – 14:00	Development of communication products its importance/target audiences at countries/region	Stankus, Austin
14:00 – 14:30	Introduction of the FAO FFS Guidance document	Abubakar, AlmaLinda
14:30 – 16:30	Group discussion/presentation: FFS Curriculum Review/Update and Impact of WSCST to country level implementation and planning – next steps. Indonesia; Lao PDR; Philippines	Chair: FAO RAP
16:30 – 17:00	Tea/coffee break	
17:00 – 17:30	Indonesia	TBD
17:30 – 18:00	Philippines	TBD
18:00 – 18:30	Lao PDR	TBD
18:30 – 18:45	Closing remarks	MOAF-FAOIND-RAP
19:00	Dinner	
Day 5: 30 September 2016		
morning	Participants departure to their original country via Solo	

COUNTRY REPORTS

Indonesia

Rice is the main food for the more than 250 million people in Indonesia, and is recognized as one of the food security commodities. As such, there is Government pressure to maintain and sustain paddy field areas and intensify production for food security. At the same time, fish is one of the most important source of protein for a majority of the population. Therefore, the integration of fish and rice culture enhances the value of production, and by following the principles of S&G this integrated system can maintain rice production while reducing environmental and human health risks associated with overuse of chemical inputs. Moreover, the accelerated fish production increases the income and welfare of the farmers, and adds to the dietary diversity and contributes to nutritional security of the population. Rice fish culture is both important and well known in traditional rice producing communities, but until recently it has been underestimated and undervalued.

Characteristics of rice culture in Indonesia show a fluctuating production that affects prices. During peak harvest, usually in March, there is a low price. Rice is planted between October and March during the rainy season. Java Island dominates production, contributing more than 50 percent to the total rice harvest, though this trend is decreasing over the last decade. However, production still relies heavily on small scale farmers, and 56 percent of farmers control land less than 0.5 ha. The year 2015 saw 75 million tonnes of rice production throughout the country, harvested from about 14 million ha, with an average yield of about 5 tonnes/ha. Each of these indicators has been growing over the past 5 years. Challenges are being faced with shifting weather patterns and rainfall owing to climate change. Additionally, depreciation of agricultural infrastructure especially the irrigation systems and an aging farming population call for a renewal at national level. Narrow land ownership leads to inefficiencies because there are limited opportunities for economy of scale. Insufficient agricultural extension has also led to decreasing soil fertility and increased pests and diseases because farmers do not have access to the best management practices. Rice ecosystems under conventional practices also show low biodiversity, and overall a low farmer income. At the same time, demographic changes of Indonesian population include increased population, urbanization, increased per capita income and declining poverty level. Trends show declining expenditures for rice but increasing expenditure on other foods, especially processed foods. There has been a structural change in the domestic food



Figure 1: Harvest ceremony in Sleman in 2015 with local government and FAO officers.
Courtesy of: Ministry of Marine Affairs and Fisheries (Indonesia).

demand. There is growing demand for better quality and food safety from the educated middle income group.

Within the framework of the RRI, there has been a host of activities. Case studies of the availability and use of aquatic biodiversity in the rice field ecosystems were carried out in West Java and Bali by the Research Institute for Fish

Breeding in Sukamandi. One of the key findings was that farmers use a wide variety of aquatic organisms as food, including fish, frogs, snails, reptiles and insects, and that using S&G approaches and limiting chemical inputs leads to an increase in biodiversity. Also, an assessment of Trees Outside Forests was undertaken, which recognized the multiple services provided by trees including

mitigating stressors such as climate change, water scarcity and land degradation while supporting a healthy water cycle. At the same time, land managers need to address the challenges of having trees in the landscape, namely as habitat for fish-eating birds and shade effects that reduce rice yield. Also, local non-governmental organizations (NGOs) have worked with farmers groups throughout the country on introducing better management practices and investigating the value chain. This was conducted as part of a national strategy with links to national policy and coordination with the RRI components. Planning was conducted to clarify the guiding principles, the choice of themes and the locations of interventions. FFS curricula were developed and adapted, followed by training of trainers, implementation of FFS and results and evaluation. In addition, there has been a coordinated programme of disseminating the Rice-Fish farming techniques throughout the country, a photograph of which can be seen in Figure 1. This has included the construction and support of demonstration farms showcasing the techniques, producing guidelines and holding workshops and media events. One important aspect of the S&G is the integration of vegetables grown on the dikes. Vegetable selection includes chili peppers, shallots and spring onions, Asian cabbages, water spinach, tomato and even maize. Revenue from the vegetables can be collected throughout the rice growing season, thereby creating a more stable cash flow while waiting for the rice harvest.

Two NGOs have been heavily involved in the implementation of the activities within the RRI, FIELD and VECO. FIELD has been engaged to evaluate the FFS S&G approaches, especially in Rice-Fish culture as well as the better management of aquatic biodiversity. VECO has been engaged to evaluate the value chain of the rice sector, especially the organic certification. Both groups are actively supporting awareness raising activities within the farming communities as well as policy makers on the importance of the S&G approaches.

Rice-Fish culture, known in Bahasa Indonesian as MinaPadi, is recognized by the highest levels of government as a valid and important activity. Indeed, on 3 May 2010 there was a launching ceremony in Karawang, West Java by both the Ministry of Marine Affairs and Fisheries and the Ministry of Agriculture (MOA). Following this launching, there was a decree by the Minister of Marine Affairs and Fisheries (No.Kep.01/Men/2011) regarding the integration of the various actors and stakeholders. A proclamation was made in 2011 announcing a target of 1 million hectares of Rice-Fish farming. To achieve this target, several Ministries will need to coordinate and collaborate, which was supported by a Memorandum of Understanding between Directorate General of Aquaculture of the MMAF and the Directorate General of Crops MOA (No.12/DPB/KKP/KB/III/2013). It is expected that this memorandum will be extended and expanded in 2017 and specify how each Ministry will support; for example, the MOA will provide assistance with rice seeds and fertilizer while the MMAF provides infrastructure and facility to create ponds, fish seed and fish feed. There are synergies with other Ministries as well, codified with MoUs and other instruments, including the Ministry of Maritime Resources, Ministry of National Development Planning and Ministry of Infrastructure.

Rice Fish culture area in Indonesia (2014)	
Island and District	Hectares
Sumatera Utara	8 182
Sumatera Selatan	17 539
Sumatera Barat Luas	3 132
Bengkulu Luas	5 311
Jawa Barat Luas	43 783
Jawa Tengah Luas	5 246
Jawa Timur Luas	26 877
Sulawesi Barat Luas	7 712
Sulawesi Utara Luas	5 038
Sulawesi Selatan Luas	12 433
Total	135 253

Table 1: Breakdown of rice fish production area in Indonesia. Source MMAF

According to the statistics of the Directorate General of Aquaculture of the MMAF, as of 2014 there were about 135 thousand hectares of Rice-Fish culture throughout Indonesia. Table 1 shows the breakdown across the various districts. Most of the Rice-Fish farming is conducted with either tilapia or carp, though Shrimp-Rice is increasingly important using freshwater species. Other important fish are the common carp, silver carp, bighead carp, catfish, barbs and eels. Interestingly, each variation has its own name made up of a conglomeration of the key components.

There are many styles of Rice-Fish culture seen throughout Indonesia. The intensive system, using artificial feed, specially produced fingerlings and modified ponds with fish refuges of about 10 percent of the total paddy, has shown extremely high production numbers. Indeed, rice production can increase by 10–20 percent up to 6–7.5 tonnes/ha each crop, with an additional 1–

2 tonnes of fish/ha. In this intensive version, there is careful preparation of the paddy field to increase the bund height, to create fish refuges (3 m perimeter with a depth of 0.8 m, though other refuge configurations are used) and to put in place fences and screens on the inlet/outlets.

The *jajar legowo* is one of country's rice best planting methods for sustainable intensification that is employed, where the rice seedlings are planted with only 2–3 seedlings per hill (7–10 days after germination), in a layout where each two rows of seedlings (spaced at 25 cm × 12.5 cm) is separated by a 50 cm empty row. A diagram and selected photographs are presented in Appendix 3. This empty row increases the rice production by enhancing the edge effects of higher air movement and sunlight, while also providing the fish with room to forage amongst the plants. The S&G technique of planting only 2–3 seedlings reduces the cost of seeds with no effect on production. In these systems hatchery produced fish seed are stocked at about 15 grams and harvested at about 150–250 grams to meet the market demand for smaller fish. Fish are stocked about 2 weeks after seedling transplanting. *Jajar legowo* is practiced both with and without fish. It has been shown to increase plant population by up to 33 percent, with experimental results showing up to 300 thousand stalks per hectare, significantly higher than the 160 thousand stalks per hectare seen in conventional systems. Specialized small machines such as tillers, weeders and transplanters have been adapted to this spacing method.

At the same time, there are also extensive Rice-Fish techniques and practices. Most of these are relics of the traditional system of Rice-Fish, practiced for at least 100 years in districts such as Tasikmalaya. In these systems, fish fry (0.5–1 grams) are stocked after seedling transplanting. There are no modifications made to the rice field, except simple screening on the inlets/outlets. The survivorship is very low, but it is a low-risk method to add a small amount of fish production while not increasing labour or initial investment. Another version of Rice-Fish was witnessed in Tasikmalaya where the rice field was attached to a concrete fish pond through bamboo reinforced channels. The fish pond is integrated with chicken and duck production, and the fish are able to forage throughout the channels and among the flooded rice plants, and can be recalled to the pond by lowering the water level.

The goals of the Rice-Fish culture are not only financial. True, it has been shown to increase the farmers' profit by 2–3 times compared to conventional rice culture, but at the same time it can prevent the transformation of rice fields, and to make farming more attractive to the younger generation and reduce the rampant urbanization. There have been social effects noticed, including improved youth education and improved household dynamics and family relations. Moreover, there are sound ecological and environmental benefits such as the reduced use of chemical pesticides and herbicides which lead to direct improvements to the surrounding environment as well as human health. Also, the cluster approach to field and irrigation management has been successful to implement Rice-Fish where groups of farmers that are geographically connected are sensitized together. This is required because chemical usage in one paddy can affect the aquatic biodiversity in adjacent and downstream paddies as well. An added benefit has been community empowerment and harmony within the clusters.

There are three major challenges with the Rice-Fish systems: 1) Rice-Fish requires increased labour which can be difficult to source considering urban migration 2) predation and poaching of the fish by otters, lizards, snakes and human neighbours and 3) irrigation support system to support adequate management and supply of good quality water. The predation and poaching can be addressed with trapping and night-time guards, but this increases the running costs of the operation.

	Conventional Rice	Rice-Fish
Cost (IDR/ha)	15 413 990	35 920 000
Revenue (IDR/ha)	24 365 330	60 850 000
Profit (IDR/ha)	8 951 340	24 930 000
Difference in profit		15 978 660

Table 2: Break down of cost, revenue and profit from examples of conventional rice cultivation compared to rice fish culture

A financial analysis of Rice-Fish was conducted with farmers that showed that profit increased by nearly 3 times when farmers used Rice-Fish (tilapia) versus the conventional rice practices, the data of which is presented in Table 2. It is worth noting however that the costs increase

significantly. In many of the government-sponsored interventions, the first season costs are borne by the implementing agency, but in subsequent seasons the farmers themselves are able to mobilize micro-financing or pooled resources to meet these higher production costs. Similar trends are seen with carp, gourami, shrimp and koi, the latter of which have even higher revenues and profits.

To further quantify the success of the RRI S&G activities, the NGO FIELD held an evaluation workshop in 2015 with participants from the local Farmers Organizations, MMAF, MOA, Padjadjaran University, the local Agricultural Services Office and VECO, and the results were presented during the regional RRI workshop in January. These goals were to synergize with the government programmes related to the RRI and assure alignment, as well as to become involved in the development and adaption of the S&G curriculum. Additionally, there was a marketing and value chain analysis conducted to understand how RRI activities affect farmers in a financial sense. In addition to the workshop, a series of refresher Training of Trainer (ToT) sessions was held in Pasuruan and Indramayu districts. During the ToT, trainers reviewed the previous S&G experiences including the logical framework and existing curricula, reviewed the general Agro-Ecosystem Analysis, reviewed the System of Rice Intensification (SRI), discussed technical aspects on Rice-Fish farming including feed and seed production, reviewed the indicators of successful FFS, and practiced their skills in facilitating and group dynamics. Using some of these indicators it was shown that farmers participating in FFS increased their knowledge, while at the same time increasing their yield and profit while reducing inputs. The FFS groups were further strengthened with cross-fertilization visits to other Rice-Fish growing areas, and a village-level seminar was held to both show-off the good results as well as to obtain input to the problems and garner wider support for the S&G approach. This type of seminar was also repeated at district level to build even wider and higher-level support based on the good results.

Similarly, VECO-Indonesia has recently conducted several activities within the RRI framework, specifically promoting Rice-Fish systems, and promoting adopting and practicing S&G FFS for Sustainable Intensification of Rice Production. Some of the key activities were the organization of Farmer Field Days in Tasikmalaya, the development and documentation of a value chain study in Rice-Fish farming implemented by Bandung University, results assessments of existing FFS interventions, regional and district level workshops to encourage local policy development and national level advocacy to include S&G in national planning. Further there were several ToT refresher courses, as well as developing models and demonstration plots in 3 villages with 3 farmer organizations (FO). There is ongoing work with the extensive Rice-Fish farmers in Tasikmalaya to encourage them to adopt a more intensive system using artificial feed and paddy modifications. VECO is also working with the SIMPATIK FO which is promoting organic rice. SIMPATIK runs its own certified rice mill with a capacity of 10 tonnes per day, which is integrated with their composting facilities that uses organic livestock manure, coconut husks and vegetable matter to create the organic fertilizer needed by the farmers. VECO has also supported the revision of the FFS curriculum for Rice-Fish farming systems. At the same time, VECO analysed the profit from Rice-Fish systems in the FFS, and had similar results noting a higher profit compared to conventional systems.

In alignment with these RRI activities, the Padjadjaran University has conducted an evaluation of the value chain of rice, especially to focus on the organic rice value chains in the areas of Tasikmalaya, Pasuruan, Boyolali and Indramayu. A generalized value chain is presented in Figure 2, adapted from Natawidjaja *et al.*, 2009.

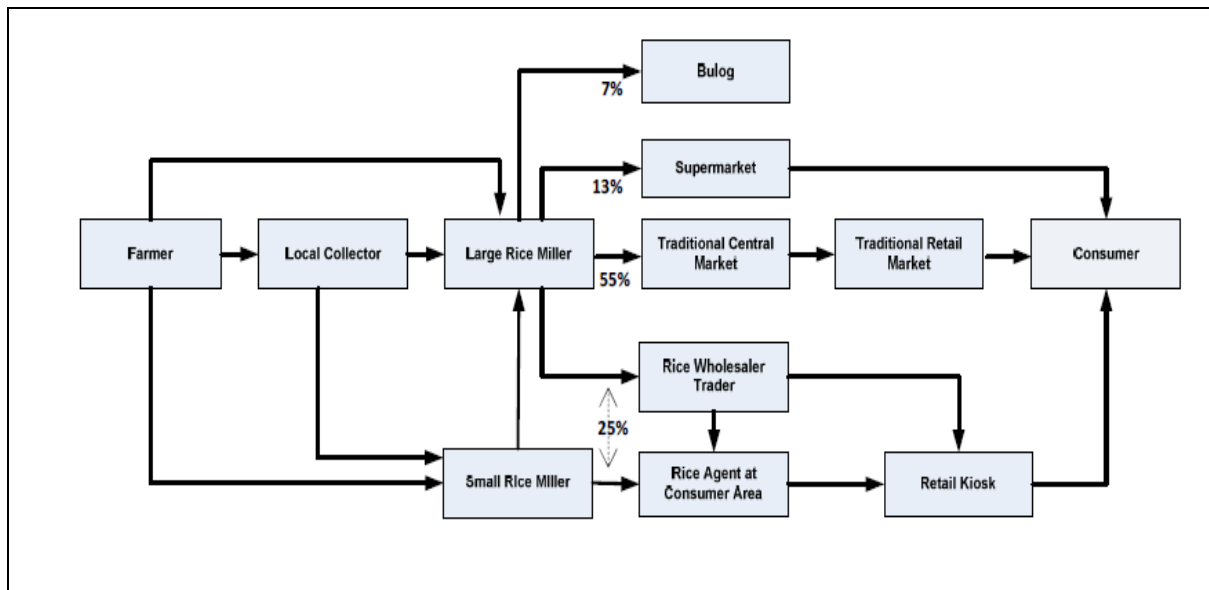


Figure 2: Example value chain showing actors in the production and distribution of rice in Indonesia

The organic rice value chain is much more simplified, moving from farmer to miller to exporter. In most cases, as with APPOLI, the mill is owned and operated by a cooperative of farmers thereby keeping more value with the farmers. The second reason is to ensure that every step of the production chain abides by the organic standards. Even so, a majority of the profits (74 percent) are made by the exporter, with the remaining 26 percent divided equally between the individual farmer and the FO. Healthy rice (which is internally certified organic rice but without the final step of certification process) is also sold to local supermarkets, restaurants and hotels, usually through an intermediary trader. The farmer and FO keep a larger percent of the overall proceeds, but the final selling price is lower and therefore they take home less money. Fish value chains are simpler than rice value chains, with farmers selling 60 percent of the fish directly to the end consumer. The remaining 40 percent is sold to local retailers, either with (11 percent) or without (29 percent) going through a local collector intermediary.

The planned MMAF activities Rice-Fish for 2016–2017 include conducting further analysis on market availability for the Rice-Fish farming products. This includes, naturally, the rice and fish, but also the other valuable plants and aquatic animals. Also, new areas will be targeted for extension of Rice-Fish. In addition, the MOA is supporting activities to increase rice production, including extending the *jajar legowo* technique, organic methods, Rice-Fish and hybrid rice varieties.

Some of the general problems encountered is the targeting and determination of the beneficiary groups of farmers, compounded by the fact that the country's geographic and agricultural landscape is so different from one location to another that the activities need to be tailored to each specific location. Lack of coordination and other administrative problems both within and between ministries are exacerbated with poor local government buy-in and support. It will be important to place the S&G approaches within the local and district level agriculture development strategies. There is also an issue to ensure the availability of fish feed and seed in remote areas, to make sure that these inputs are available to farmers at an affordable price at the right times. Finally, the monitoring and evaluation to document and publicise the good results has been lacking.

Lao PDR

Rice is a staple food for Lao farmers/consumers and important for food security. The National Policy of Lao Government promotes rice production intensification. Lao farmers increasingly make use of modern improved high-yielding varieties and other production inputs, such as chemical fertilizers and pesticides. Recent surveys show that Lao farmers use production inputs inefficiently and that they can

and should make better informed decisions about rational use of production inputs. Hence, the need identified by FAO and the Ministry of Agriculture and Forestry (MAF) to support Farmers Field Schools to provide education opportunities for farmers to acquire knowledge and skills for *sustainable* intensification of rice production.

The objective is to implement Farmers Field School on Save and Grow-Sustainable Intensification of Rice Production for the purpose of educating Lao rice farmers through field testing of sustainable rice intensification practices, making optimal use of the multiple good and services of paddy-based farming systems aiming at resource-use efficiency, growing healthy crops, getting higher yield and in a sustainable manner. Important partners include: Department Of Agriculture (DOA)-The National IPM Programme, Ministry of Agriculture and Forestry (MAF), Department of Livestock and Fisheries (DLF) as well as Agriculture and Extension staff and small holder farmers.

A summary of activities, which were implemented since April 2015:

- Inception cum Curriculum Development and Refresher Training Workshop for FFS on Save and Grow Sustainable Intensification Rice Production was jointly organized by FAO and DOA in Thalath, Vientiane from 1–7 April 2015. FFS trainers received training on practical implementation of the Save and Grow concepts and good practices for sustainable intensification of rice production. Based on prior implemented baseline surveys on current location-specific rice production practices, a curriculum was developed for pilot testing in the Save and Grow-SIRP Farmers Field Schools which was implemented with RRI support during the main production season (wet season, 2015);
- Thirty one (31) season-long FFSs were implemented between 2015–2016 during the wet seasons (April–November) by both experienced and new FFS trainers, spread throughout 12 districts of 4 provinces (Savannakhet, Champasack, Xiengkhouang and Saiyabouly). Field experiments on S&G-SIRP concept/good practices were set up at FFS sites and a 17 week curriculum was field-tested during weekly FFS sessions throughout the production season. The curriculum included learning modules on the integration of Rice-Fish and Trees Outside Forests. Some 634 farmers (including 224 women) participated in the FFSs and learned about growing healthy and high-yielding rice crops while making more efficient use of production inputs;
- Field days were organized at each FFS site when crops were at the ripening stage to allow farmers in nearby villages and local authorities concerned to learn about FFS field results obtained. Visitors observed crops standing in the fields, discussed field results in terms of yield and net returns, and identified challenges of field implementation practiced under S&G concept and conventional practices. Discussions with farmers also revealed interest among farmers to test/continue learning with their fellow FFS graduates after the FFS. Most of farmers expressed their satisfaction with higher yield received as well as the reduced inputs. Farmers saved on seed inputs in particular compared to traditional planting practice. Farmers committed to adopt S&G practices in their own fields;
- All FFSs were technically backstopped by FAO staff, S&G SIRP FFS national consultants and representatives of the DOA/Plant Protection Centre, including staff based at the National IPM Programme during 2015/16. Both strengths and challenges were observed by a monitoring and evaluation mission. The mission recommended that both technical and facilitation skills of FFS trainers need to be strengthened in order to implement better quality FFS during the next biennium 2016/17;
- A trainer exchange visit to on-going FFSs and innovative IPM activities was organized in Savannakhet and Champasack provinces from 31 October–04 November 2015. Twenty seven (27) trainers and RRI implementation support staff participated in the visit;
- An FFS Evaluation, Results Assessment and Refresher Workshop was organized during 8–12 December 2015 in Kaisone district, Savannakhet province. The purpose of the workshop

was to evaluate FFS implementation experiences, assess results, identify implementation challenges and provide refresher training to extension workers involved in the RRI FFS S&G SIRP. All FFS trainers participated in the workshop. Results of the S&G-SIRP FFS work were presented at a national RRI workshop held in Vientiane on 15 December 2015;

- A Curriculum Revision and Refresher Training of Trainers for FFS on S&G-SIRP was conducted in Phaxay District of Xieng Khuang Province from 18–23 July 2016. The aims of the workshop were (i) to share and update each other on 2015 wet season FFS results and discuss plan for 2016 and curriculum priorities; (ii) discuss field experiment design vs baseline data; (iii) refresh trainers with knowledge and skills; and (iv) to review existing FFS curriculum linked to other RRI components, including Rice-Fish and Trees Outside Forest.

Rice Fish System

Lao PDR enjoys rich aquatic biodiversity and the rice fields are a sanctuary for a diverse set of aquatic organisms. The aquatic resources from rice-based ecosystems have become vital to the Lao people, especially those living in rural rice production areas. An earlier study¹ examined the role and nutritional value of aquatic resources in the diet and livelihoods of rural people. It revealed that the aquatic organisms are a substantial part of the food supply of Lao rural people and provide animal protein and micronutrient resources for consumption in rural households.

In Phase II of RRI engagement, MAF/DLF worked closely with staff from the District and Provincial Agriculture and Forestry Offices in two provinces (Savannakhet and Xieng Khouang). The aim was to explore the importance and economic valuation of aquatic animals and plants in rice-field environments and support implementation of the dry season promotion trials in two provinces. The experience and lessons learned from these trials provide the DLF with practical, poverty-focused recommendations on extensive aquaculture and aquatic animal enhancement/conservation which will strengthen MAF/DLF's contributions towards the development of multi-sectorial strategies to improve food and nutrition.

Summary of the progress:

- The consumption of aquatic animals and plants during the dry season from two provinces was collated and summarized by DLF. Ten families from two villages of Savannakhet province and 10 families from one village in Xieng Khouang province collected this data with support and assistance provided by district and provincial extension staff.
- In Xieng Khouang, 10 farming families recorded consuming 10 different species of fish, six different species of other aquatic animals, including frogs, eels, snails, crabs and insects, seven aquatic plants and six types of aquatic forest products (in areas of natural forest next to the rice fields).
- The average total consumption of these resources per person was about 280 g/day (recorded over a 10 day period) with an economic value of about US\$1. This is a significant contribution to rural food security and represents approximately double the monetary value of average daily rice consumption (about 550 g/day/person). The survey highlights the importance of these resources during the 6 month dry season and the essential contribution they make to dietary intakes of protein and fat. However, the consumption of these resources during the dry season is less than half the weight (and value) recorded by a similar survey conducted (with the same farmers), during the rainy season in 2015. The results are summarized in Figures 3 and 4.
- Working in partnership with rural communities, FAO and DLF are currently (October 2016) finalizing Promotion Trials with 30 farming families in some of the poorest areas of the country. These Trials are testing recommendations aimed at improving the food and nutrition security of farmers dependent on rice-based livelihoods through micro-scale Rice-Fish culture.

¹ FAO. 2013. Aquatic biodiversity in rice-based ecosystems. Studies and reports from Indonesia, Lao PDR and the Philippines. Food and Agriculture Organization of the United Nations. Rome 2014.

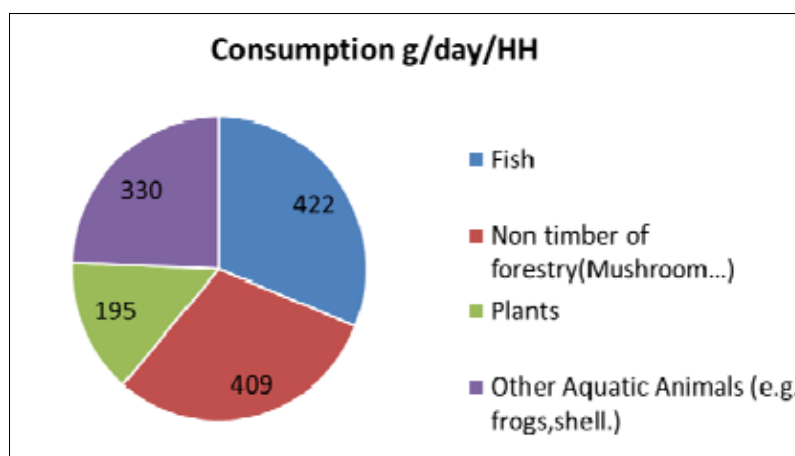


Figure 3: Pie chart showing the average daily consumption per household (HH) of fish, plants, forestry products and other aquatic animals based on the 2013 FAO study during the dry season.

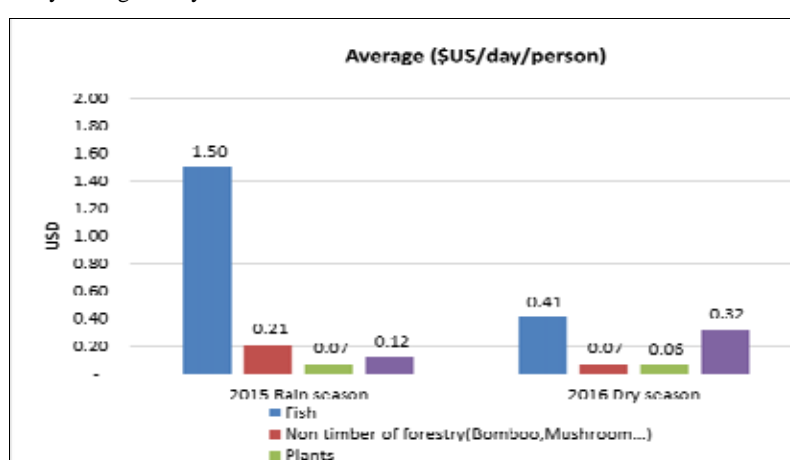


Figure 4: Bar graph chart showing the economic value of the utilized aquatic biodiversity, separated by fish, plants, forestry products and other aquatic animals based on two studies, one in the wet season and one in the dry season.

Farmers have dug ponds on the margins of rice fields and they are mostly integrated into the family's vegetable production system. Before being released into the rice fields, waste vegetables are fed to the fish and small amounts of manure from free-range chickens are used to fertilize the water. Pond construction exploits the availability of cheap plastic sheets which in the last few years have been increasingly used in commercial agriculture. The Promotion Trials have been highly successful and this is demonstrated by other development projects and neighbouring farmers already showing considerable interest in replicating the strategy. By promoting it more widely, there is the potential to not only significantly increase Rice-Fish production in the wet season, but also provide a "safety-net" of a highly nutritious food during the dry season.

Lessons learned

- It is important to build on earlier RRI work in Laos which highlighted the economic and cultural importance of Rice-Fish systems, and the value of indigenous knowledge in developing rice-field fisheries.
- The value of aquatic animals in rice field environments is generally underestimated, and for many small-scale farmers it exceeds the economic value and nutritional importance of their rice.

- Incorporating the importance of these resources into government policy can only be achieved with local understanding and participation.
- Intensification of aquatic animal production in traditional Rice-Fish systems is difficult to achieve. The risks and costs of paddy field modification are too high for many small-scale farmers.
- Small ponds dug by hand are not big enough to grow substantial quantities of fish, but can effectively augment and intensify traditional Rice-Fish systems.

Results assessment for Farmers Field Schools (FFS) for Save and Grow (S&G)-based Sustainable Intensification of Crop Production (SIRP) in Laos

The Farmers Field School development approach using the “Save and Grow” paradigm has been used to promote sustainable intensification of rice production in Lao PDR. Whereas all FFS interventions promoted the use of Integrated Pest Management (IPM), other targets, curriculum, content and learning modules varied from province to province depending on their geographic, social and economic conditions for rice cultivation and other types of agriculture productions. Targets in Xieng Khouang and Savannakhet provinces were to increase yields while using fewer seed inputs, more organic fertilizer and less chemical fertilizer, and reduce the labour cost. In Champasack province, the focus was on the promotion of environmental-friendly production practices and the increase of productivity by balancing the use of organic and chemical fertilizers. In Xayaboury, extravagant use of seeds and the increase of labour costs are major issues. Thus, this province targeted reducing the amount of seed used and the labour costs through shifting from transplanted to direct-seeded crops.

FFS field results show that rice yields have increased compared to the baseline. In Xieng Khouang province rice yields increased by 15 percent compared to a 5.2 tonne/ha harvest in the control plot while Save and Grow practices integrated Rice-Fish increased rice yield by 26 percent compared to the control. The yields in Xayaboury slightly declined by 5 percent from a 4.9 tonne/ha rice yield in the control plot. The rice yields in Savannakhet were 41 percent higher compared to the 4.1 tonne/ha yield in the control plot while Save and Grow plot using Rice-Fish had increased 38 percent from the control. Champasack province FFS Save and Grow-SIRP fields produced a 36 percent higher yield compared to the 3.5 tonne/ha control plot.

The Save and Grow-SIRP FFS experimental plots also significantly demonstrated that FFS farmers can “produce more with less”. The FFS S&G-SIRP showed lower input costs compared to the traditional control plot, especially the reduced amount of seed and labour in Xieng Khouang and Xayaboury provinces. However, with this success, some schools have increased the cost for chemical fertilizers and manure compared to the control. The economic performance assessment showed that these higher inputs, in fact, made good economic sense in terms of higher net returns achieved.

In conclusion, the FFS approach for Save and Grow has demonstrated good success in 2015, and all indications suggest that results from FFS interventions in 2016 will show similar results. The result obtained from the FFS field experiments provide clear evidence of the success and imply that knowledge and skills of farmers have improved dramatically after the introduction of FFS. Another lesson learnt was that farmers were mainly interested in special topics that related to their location-specific problems on pests and rice growing techniques rather than general topics identified for them as part of a standard FFS curriculum. This means that it is important for trainers to understand local field situations and farmer needs prior to designing a locally and situation specific FFS curriculum and that weekly adaptations of the curriculum and associated learning modules is necessary for ensuring relevant training and good farmers interest and participation in the FFS sessions.

Other projects

A project titled “The System of Rice Intensification (SRI) in the Lower Mekong River Basin in Laos SRI-LMB (www.sri-lmb.ait.asia)”, is an Asian Institute of Technology-led, FAO and Oxfam partnered, and European Union-financed project that aims to contribute towards enhancing the resilience of rainfed rice farmers confronting climate change in the Lower Mekong River Basin region. The action is being implemented in four countries in the lower Mekong delta: Cambodia, Laos, Vietnam and Thailand. The total period for implementation is 60 months (2013–2017) with a total cost of approximately EUR 3.4 million.

In Lao PDR, the Department of Agriculture Extension and Cooperatives under MAF with assistance from the FAO Country IPM Program, AIT and Oxfam implements the GCP/RAS/288/AIT: Project, entitled “*Sustaining and enhancing the Momentum for Innovation and Learning around the System of Rice Intensification (SRI) in the Lower Mekong River Basin*”. In the Lao PDR, SRI action research and farmer training activities are implemented in three selected provinces: Vientiane, Khammouan and Savannakhet. Each province selected three districts with rainfed rice based farming systems such as Vientiane province (Meun, Vang Vieng and Feuang); Khammouan province (Nakay, Yommalath and Mahaxay); Savannaketh (Champhone, Songkhone and Xayboury).

In 2015, Central Farmer Participatory Action Research was conducted in all 3 provinces to train the trainers with total 90 people (40 percent women). In 2016, Farmer Participatory Action Research was conducted in the 9 districts within three provinces involving 1 150 farmers (40 percent women).

Rice production and Rice Value Chain in Lao PDR

Rice is one of the most important crops, and annual production targets for the whole country are set by the government of Lao PDR. Lao farmers produce sufficient rice, with a surplus, to ensure national food security. However, rice production is still not optimized in terms of productivity and quality. In 2015, there were a total of 984 932 ha of rice cultivated, of which 957 836 ha was harvested. Total production was 4 102 000 tonnes, and the average yield is about 3.90 tonnes/ha (DOA 2015).

Contract farming between farmers and millers appeared since 2009 when the project “Enhancing Milled Rice in Laos” project was implemented. Contract farming involves agricultural production being carried out on the basis of an agreement between the buyer and farm producers. Sometimes it involves the buyer specifying the quality required and the price, with the farmer agreeing to deliver at a future date. The overall objective of that project was to rapidly increase the quantity and stability of supplies of good quality milled rice for domestic consumption and trade. One of the two specific objectives was improved market stability for rice producers and millers in target areas.

Accordingly, the rice value chain in Khammouane can be distinguished into two main sub-chains: the contract farming value chain and local consumption value chain (without contracts).

Contract farming value chain

In this value chain, domestic rice miller groups are involved in contract farming with farmer groups. The millers act as both input providers as well as paddy buyers to get the rice milled and then sold to Government, foreign traders, big rice millers in the capital area or food and drink companies. The rice then can be either exported or sold to other provinces for domestic use. The farmer groups sometimes sell rice to collectors to sell to other small rice millers in the province when they still have extra rice after selling quota to rice millers in the contract.

Local consumption value chain

In this chain, individual farmers do not enter into contracts with millers. They buy inputs from input suppliers through stores in the province. Most input providers in rural areas sell at least two types of input, including fertilizer and pesticide; some also provide herbicide or seed. They also help farmers with some simple technical issues, such as introducing new types of fertilizer, pesticides or seed. Most of the trading activities are done directly at the providers' stores. However, sometimes, these providers sell their inputs to farmers on credit, especially fertilizers. Farmers will pay back the money when they harvest their crop. In this case, the input suppliers face the risk of farmers' insolvency in the case of disease outbreaks or other unexpected crop losses. The farmers mainly sell paddy to collectors who then sell to provincial small rice millers. Sometimes, the collectors sell some paddy to the rice miller groups in the province. Some come from other districts or provinces. Collectors often do not have a stable purchasing area, they move through the villages to purchase paddy rice from various farmers.

Wholesalers/retailers distribute processed rice from the small millers to the local consumer markets. They mainly distribute in the central area of the province and district. Most customers will pay directly when they buy rice from these wholesalers and retailers. However, there are still some exceptions with large customers e.g. hotel, restaurant, factory, where they pay a few weeks later after buying rice.

There is considerable interest in Lao PDR for support to value chain development activities, particularly in the context of organic value chain development. More generally, officials in Lao PDR indicated a poor knowledge of the value chain concept and training could be supported.

Philippines

Rice is the Philippines' most important food staple, influencing the livelihood and economies of several million Filipinos. It is the major contributor to the country's annual agricultural output, contributing around 20 percent of the gross value added (GVA) of agriculture and employing some 2.5 million households.

As a major food staple, rice accounts for 25 percent of food expenditures of the poorest 30 percent of the population. It provides the largest single source of calories and protein in the Filipino diet, especially among low-income households. Studies, however, have shown that farming households are food insecure, and their net farm incomes are not enough to cover their poverty thresholds. Total household food intakes are lower than the recommended daily allowance of 1 000 kcal for rice and 2 000 kcal for total food.

Over the past decades, the country's rice production systems have become progressively susceptible to a number of threats. While some noteworthy advances in rice production have been made over the past few decades, public investments in the modernization of the rice sector continue to fall behind the ever-increasing demand for more farm-to-market roads, irrigation systems, better post-harvest facilities, higher-yielding seed varieties and modern farming technologies. As a result, overall productivity growth has been relatively low since the boom years of the Green Revolution.

Economic development and rapid urbanization has exacted a serious toll on the country's rice production systems. Together with urbanization, the diversification of agricultural systems triggered by economic growth has intensified the competition for space, resulting in decreasing rice areas and farm size.

Increasing costs of agricultural inputs and farm labour has significantly decreased farm incomes, despite high domestic rice prices, the highest among the Association of Southeast Asian Nations (ASEAN) countries. Domestic rice production has to be globally competitive as the Philippine economy gradually integrates with ASEAN and world markets. With the impending lifting of quantitative restrictions of rice imports by 2017, domestic rice prices need to be competitive with the landed cost of imported rice, yet at price levels that continue to give rice farmers reasonable mark-ups on their costs of production and fair returns on investments.

Climate change has been predicted to disrupt rice production systems across the Philippines and Southeast Asia, destroying harvests, impeding the efforts to increase yields, and threatening the livelihood of millions of farm families. Existing climate change models point to two universal trends: increased temperatures, which will result in more heat stress and rising sea levels; and more frequent and extreme weather disturbances. When these conditions are met in any locality, they are likely to produce environmental changes that will make rice production more difficult, more vulnerable, and ultimately less profitable.

The combined extent of these threats at decreasing yield growths and increasing demand for rice due to increasing population has been reflected in the escalating volumes of imported rice to address domestic consumption requirements. The unprecedented rice price crisis of 2007–2008 compelled the Philippines to attach high priorities to food security, signalling a major policy shift from self-reliance to self-sufficiency through the implementation of the rice production intensification program: the Philippine Food Staple Sufficiency Program, the banner programme that aims for rice-sufficiency by 2016.

Achieving rice self-sufficiency must be pursued by increasing labour and land productivities and production cost efficiencies – making the Filipino rice farmer profitable, climate-resilient and globally competitive. Small rice farmers need to engage in sustainable rice production intensification efforts to produce more rice with less agricultural and labour inputs. They must learn to save in order to grow.

To be effective, sustainable crop intensification as it relates to rice self-sufficiency, food security and climate change requires action on a comprehensive scale: (1) agricultural practices to improve soil fertility and pest management; (2) agricultural water management for efficient water use and conservation; (3) farming system diversification towards increased farm incomes, improved family nutrition and enhanced climate resilience; (4) development of agricultural science and technologies with greater farmers' access through efficient agricultural advisory services and information systems; (5) risk management and crop insurance; and (6) market efficiency through post-harvest facilities and farm-level and value chain infrastructure.

Regional Rice Initiative – Phase I (2013)

Beginning 2013, the FAO Regional Rice Initiative Pilot Project was implemented to raise awareness among farming communities and policy makers of the contribution of ecosystem services to production and sustainability of rice systems in the Philippines. The Project covered four components: (1) water and rice/fish systems; (2) biodiversity, landscape and ecosystem services; (3) management practices, and (4) social, economic and policy – cross-cutting issues.

FAO's new Save and Grow Sustainable Intensification of Crop Production strategy promotes ecosystem-based practices with a focus on small producers to increase production efficiencies. The strategy also calls for more rational use of agro-chemicals within the context of sustainable rice intensification efforts. In tandem with regulatory reform and development of better input governance

systems, various practical Save and Grow production practices can help rice farmers grow high-yielding rice crops while making farming systems more profitable and resilient. These practices include: Integrated Nutrient and Water Management and Integrated Pest Management; integrated crop-livestock systems combined with biogas technologies, allowing farmers to reduce fertilizer and pesticide inputs; savings on water and seed inputs, as promoted in System of Rice Intensification; integrated Rice-Fish production systems; climate-smart mitigation and adaptation practices such as alternate wet and dry methods and re-use of rice straw for better soil fertility and reduced greenhouse gas (GHG) emissions; use of flood and drought resistant varieties; and application of smart post-harvest practices such as storage of rice and seeds in small silos.

Regional Rice Initiative – Phase II (2014–2015)

In the Philippines, the Regional Rice Initiative Pilot Project was designed to support the overarching goals of the agriculture sector under the Philippine Development Plan (PDP) 2011–2016, which are food security and raising incomes. More specifically, the Pilot Project was in line with the Department of Agriculture’s Food Staples Sufficiency Programme under the *Agri Pinoy* framework and its four guiding principles of (i) food security and self-sufficiency; (ii) sustainable agriculture and fisheries; (iii) natural resource management, and (iv) local development. While the overall goal is self-sufficiency in food staples, the main focus of the Food Staples Sufficiency Programme is self-sufficiency in rice, the country’s main staple. Considering the initiatives and progress made by the country towards this goal, the Project provided additional support but also generated lessons and experiences as valuable contributions to the preparation of the Road Map for the Rice Industry of the Philippines.

Under the second phase of the Regional Rice Initiative, the Philippines aimed to further gather evidence on sustainable rice production intensification through Farmer Field Schools in *Save and Grow* addressing the following concerns:

Objective 1: Increase rice productivity by at least 10 percent

Farmer training through season-long Farmer Field Schools on good agricultural (best) practices, i.e., Save and Grow crop production strategies with International Rice Research Institute (IRRI) and Philippine Rice Research Institute (PhilRice) rice production technologies (PalayCheck), including System of Rice Intensification; local seed purification and plant breeding, Integrated Nutrient and Water Management; Integrated Pest Management; climate-smart mitigation and adaptation practices such as alternate wet and dry methods and re-use of rice straw for better soil fertility and reduced greenhouse gas emissions; use of location-specific, flood and drought resistant varieties; and application of post-harvest practices and sustainable natural resource management through Trees Outside Forests.

Objective 2: Increase cost efficiencies by reducing costs of production by at least 15 percent

Farmer training through season-long Farmer Field Schools on cost reducing technologies, i.e., Save and Grow crop production strategies and IRRI with PhilRice rice production (PalayCheck) technologies, including SRI; local seed purification and plant breeding, Integrated Nutrient and Water Management and Integrated Pest Management, including appropriate post-harvest technologies and sustainable natural resource management through TOF.

Objective 3: Increase farm incomes by at least 15 percent

Farmer training through season-long Farmer Field Schools on integrated crop-livestock systems combined with biogas technologies, integrated Rice-Fish production systems; and multi-cropping (vegetables and soybeans) systems and *Palayamanan*, with special focus on food nutrition through the conservation and use of aquatic biodiversity in rice-based ecosystems.

PILOT PROJECT SITES

RRI Phase II was implemented in fourteen (14) provinces and two (2) cities in nine (9) regions in the country. The provinces were selected based on the participation in RRI Phase I, with the inclusion of additional provinces with strong provincial IPM programmes: The details are outlined in Table 3:

Region	Province/s and # of FFS
Cordillera Administrative Region	Ifugao (2)
Ilocos Region	Pangasinan (2)
Bicol Region	Albay (2)
Eastern Visayas	Leyte (2)
Northern Mindanao	Lanao Norte (2); Misamis Occidental (2); Misamis Oriental (2)
Davao	Davao City (2); Davao Norte (2)
Central Mindanao	South Cotabato (2); Sultan Kudarat (2)
CARAGA Region	Agusan Norte (2); Agusan Sur (2); Butuan City (2); Surigao Sur (2)
Autonomous Region of Muslim Mindanao	Maguindanao (2)

Table 3: Distribution of Farmer Field Schools following Save and Grow principles under the Regional Rice Initiative – Phase II

Under the RRI Phase II, thirty-two (32) FFS Save and Grow were implemented. Farmers were trained on sustainable rice production intensification technologies using non-formal education (IPM FFS) methodologies, i.e., participatory, experiential and discovery-based learning processes. The season-long FFS were either 1st level (new FFS), addressing Objectives 1 and 2 or 2nd level FFS (follow-up FFS), addressing Objectives 1, 2 and 3. Special topics in the FFS-S&G were on (1) Aquatic Biodiversity; (2) Trees Outside Forests; (3) Climate Change Resiliency; and (4) Livelihood and Nutrition – depending on the interests of FFS participants. The FFS S&G were funded by the regional FFS budget of the *Agri Pinoy* Rice Program of the respective participating regions, with FAO support going to regional and provincial monitoring activities and partnerships with agricultural schools and colleges for documentation support to the FFS S&G – including baseline surveys and, where appropriate, the conduct of rice field-associated aquatic biodiversity assessments. Support activities under Phase II included a three-day Curriculum Development Workshop cum Refresher Training for Facilitators of FFS S&G and the development of a Save and Grow Field Guide for FFS S&G.

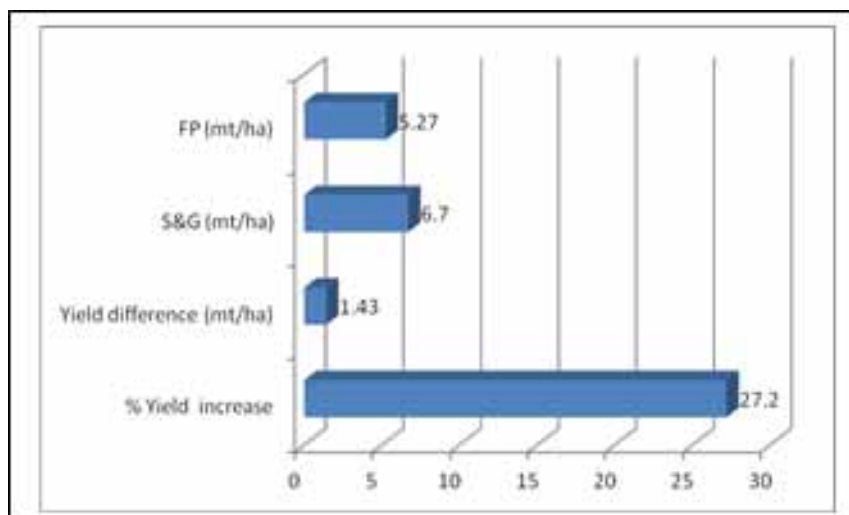


Figure 5: Yield comparison of conventional and S&G practices, showing the difference in yield. Data from: 8 S&G FFS in Mindanao in 2013.

Results from Phase II are still being summarized at time of this publication. The implementation of activities was delayed because of drought. However, results from Phase I showed that the average rice yield in Save and Grow plots were 6.7 tonnes/ha, compared with 5.27 tonnes/ha in Farmers' Practice plots (Figure 5). This translates into a difference of 1.43 tonnes/ha (about

28.6 sacks of rice at 50 kg/sack), an average yield increase of 27.2 percent. This well exceeded the targeted value of 10 percent increase in productivity set under Objective 1.

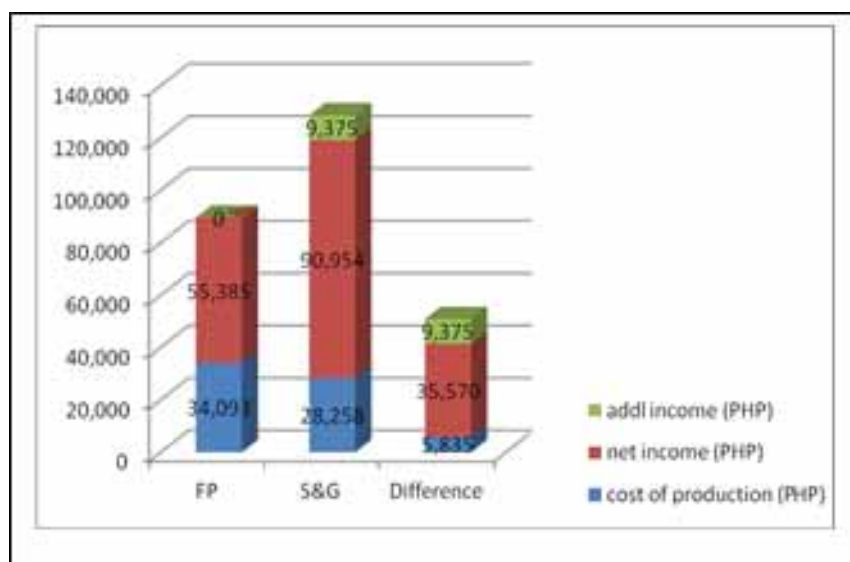


Figure 6: Comparison of conventional and S&G practices, showing indicators of Cost of Production, Net Income and Additional Income

and Grow plots it was only PHP 28 258 (US\$638). The reduction in the cost of production was attributed to the application of improved management practices mentioned in Table 1. In addition, informed management decision making based on agro-ecosystem analysis, the use of ecosystem services such as natural pest control to avoid unnecessary use of chemical pesticides and the use of biological control agents also contributed to effective and sustainable pest management.

The 72 percent increase in net income generated by the application of Save and Grow practices was 57 percent higher than the targeted value of 15 percent increase under Objective 3. The increase could be attributed to higher yields, benefits derived from smart use of enhanced agro-biodiversity through multiple cropping as well as introducing ducks in rice production, and utilizing existing aquatic biodiversity. Savings from reduced cost of production resulting from improved management practices (e.g. reduced number of seedlings per hill) also contributed to the increased net income.

Planting vegetables on the bunds maximizes utilization of the production area and at the same time provides habitat for natural enemies enhancing natural biological control. In Valencia, Bukidnon where ducks were introduced in the rice fields these provided additional services by eating the insect pests, including golden snails found at the stem and base of rice plants. The value of these ecosystem services are not reflected in this case study.

Enhancing aquatic biodiversity in rice based cropping systems provided an average additional income of PHP 9 375 (US\$209) per hectare (Table 4). For example, duck egg production alone became a source of additional income and nutrition. Information on existing aquatic biodiversity was not available until local agricultural schools – as part of the project – carried out assessments to determine existing species of inland fish (e.g., catfish and mud fish) and molluscs (e.g. *kuhol* and another local snail species known as *ponngok*). Prior to the start of implementation of IPM-FFS under the IPM-KASAKALIKASAN Programme in 1994, these aquatic inland species had been lost as a result of high chemical use in rice production and their return is a result of reduced chemical use by farmers trained in IPM-FFS.

The average Return on Investment from the application of Save and Grow practices was 4.45 compared to only 2.32 when conventional farmer practices were used (Table 4). This presents an increase of 2.13 per peso invested by the farmers who applied Save and Grow practices. In Bukidnon, Misamis Oriental and Misamis Occidental, the increase in ROI came largely from the enhancement of agro and aquatic biodiversity. In Lanao del Norte where rice was mono-cropped, the ROI was a result

² May 2015 currency exchange rate US\$1= PHP44.32

In Save and Grow FFS plots, the average reduction in cost of production was 17 percent (Figure 6), slightly exceeding the 15 percent target reduction set by Objective 2. This corresponded to an actual money value saved of PHP 5 835 (US\$132)² per ha. Savings resulted into increases in net income of PHP 35 570 (US\$803). The average production cost using Farmers Practices was PHP 34 093 (US\$769) while in Save

Location	ROI		Difference
	FP	IPM	
Bukidnon	5.82	10.65	4.83
Misamis Oriental	1.31	3.26	1.95
Misamis Occidental	1.38	1.55	0.17
Lanao del Norte	0.75	2.35	1.6
Average	2.32	4.45	2.13
Table 4: Return on Investment from 8 Farmer Field Schools comparing conventional practices to those using Integrated Pest Management			

of the use of hybrid seeds (i.e., Bigante) that are resistant to Bacterial Leaf Blight. Although the use of mono-culture and hybrid seeds can bring about a significant increase in rate of return on investment, the practice does not build much on the multiple goods and services produced by and available from natural rice ecosystems and landscapes. Associated more intense use of chemical fertilizers

and pesticides could negatively impact on prospects of bringing about sustainable rice production intensification. Therefore, hybrid rice based farming system integrated with pulses, vegetables, duck and/or fish is recommended rather than hybrid rice monocrop system.

Save and Grow FFS field data provides evidence on how the Philippines achieved its objectives of increasing productivity, reducing costs and increasing farm incomes. The 27.2 percent yield increase well exceeded the targeted value of 10 percent increase in productivity. Based on the evidence produced by RRI pilot activities, the Philippine Department of Agriculture is expanding the FFS S&G for SIRP to 15 provinces in 2015–2016 with funding support from the National Rice Programme.

As to contribute to policy processes, especially the formulation and implementation of national rice strategies building on the strategic options laid out by the Regional Rice Strategy (published by FAO and endorsed by member countries at the 2014 Asia Pacific Regional Conference, the formulation of the Rice Industry Road Map and implementation of key strategies in SIRP will help the country realize food-secure, better nourished and prosperous rice farmers and consumers nation-wide. As a key strategy in operationalizing the rice road map, the government is committed to further development of the RRI work – and the curriculum development for- and up-scaling of- the Farmers Field School work on Save and Grow for Sustainable Intensification of Rice Production in particular – during the next biennium (2016–17). FAO assistance is needed to develop the Rice Industry Road Map consistent with the Regional Rice Strategy framework. The Philippine government requires FAO assistance for technical support, knowledge development, capacity building and financial resources to facilitate all of these. Figure 7 includes selected photos of FFS in the Philippines.



Figure 7: Collection of photos from implementation of Farmer Field Schools in the Philippines as part of the Regional Rice Initiative. *Courtesy of:* Department of Agriculture (Philippines) – Regional Field Unit X

Status of rice value chain(s) related with the RRI and relevant issues of rice sector development

Value Chain for Aromatic and Pigmented Rice has five (5) major steps or stages, the input provision, farming, trading, milling and distribution (Figure 8). Various actors and stakeholders are involved both as operators and enablers.

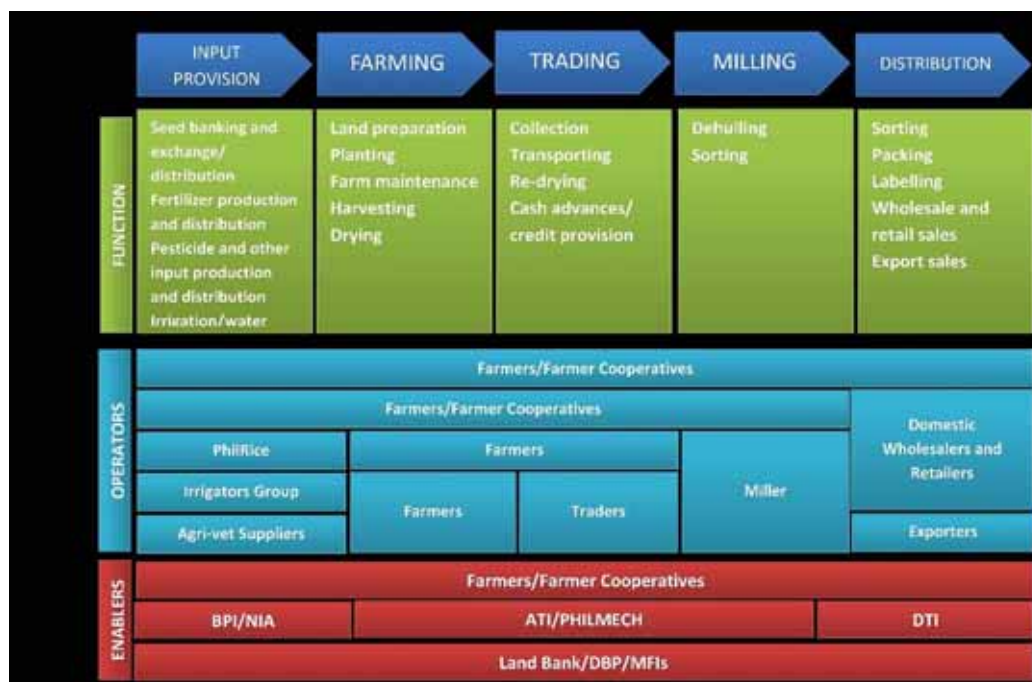


Figure 8 Value chain map for aromatic and pigmented rice in the Philippines showing the key actors and their function.

As shown in Figure 9, 26 percent of production of the small holder farmers is consumed by the household, while only 9 percent is sold to local markets. Of this 9 percent sold in the local market, after having the rice milled, farmers either sell directly to local retailers or to known (friends and family) households. With the high cost of transportation due to poor road conditions, farmers prefer direct sales to end consumers to get the highest possible price. Twenty percent is sold to intermediaries or outside the given province, but this rice is usually collectively produced by members of Cooperatives. In Nueva Ecija for example, the Kooperatibang Likas ng Nueva Ecija (Kool-NE), which produce about 250 to 300 thousand tonnes of unpolished rice annually, sell about 95 percent of their production to Upland Marketing Foundation Incorporated and other intermediaries. The rice is then distributed by the intermediaries to key cities like Metro Manila and Quezon City supermarkets. Country Community Corporation, which sources rice from its own farm and farmer suppliers, sells unpolished rice directly to consumers in Metro Manila through weekly deliveries.



Figure 9. Trade/marketing flow of aromatic and pigmented rice

Trial exports were made also by a known trader (SL Agritech and Vegetable Importers, Exporters and Vendors Association Philippines Inc. – Vieva). The Magtutumana ng Sta. Rosa Multi-purpose Cooperative in Nueva Ecija is among the suppliers of the aromatic and pigmented rice exported by the VIEVA under the brand name “Golden Vieva”.

The government is currently implementing several projects that utilize the value chain approach. These include:

- **Philippine Rural Development Program** – a flagship project of the Department of Agriculture, is aligned with the Agri-Pinoy strategy. It is a six-year program (2013–2019) designed to establish the government’s platform for a modern, climate-smart and market-oriented agri-fishery sector. Externally, it will focus on expanding market access and improving competitiveness. Internally, it will introduce reforms in operating the Department’s bureaucracy.
- **Inclusive Partnerships for Agricultural Competitiveness** – this is a project of the Department of Agrarian Reform, which gives emphasis to market-oriented and value chain-based agribusiness enterprise development that would enable farmers’ organizations and individual farmers to gain greater benefits by aggressively participating in the market either on their own or through sustainable productive partnerships with the private business sector through a system of matching grants.

From the analysis of the markets and the dynamics within the subsector, the greatest end market opportunity for the aromatic and pigmented rice subsector lies in supplying the export market. The short- to medium-term vision for the aromatic and pigmented rice subsector in Luzon A is to evolve into an industry where smallholders consistently produce enough rice to fulfil household needs and commercial/surplus production is substantially increased. Within the next five years, the industry hopes to develop a commercially driven production, milling, processing, and marketing capacity that can deliver sufficient volume of rice for export marketing that is cost and quality competitive relative to competitors and without compromising local food security.

In the Philippines, the main scope for support within the context of value chains could be to assist with the planned preparation of a rice industry road map. Through the FAO Country office, some limited resources have been allocated for this year, but a proper examination of the complex rice chains of the Philippines, together with the many interrelated policy questions, may be beyond these resources and require a more robust project.

Detail of field trips

Day 1 – Field visit

The first field visit was an innovative Rice Fish farming area based on cluster approach in the Sleman District of Yogyakarta. Here, a 25 hectare farm is being managed by the farmer group Gerbang Murakabi Cibuk and was initiated in 2011 with support from FAO Indonesia and the local government. The environment exhibited the successful cohabitation and symbiotic relationship of paddy rice and tilapia. This is because the paddy rice benefits from the natural pest control it gets from the tilapia, which feeds on rice pests and diseases and some weeds. The tilapia also uses the paddy rice as shade. Additionally the waste of tilapia serves as natural fertilizer for paddy rice. As an additional protection mechanism to the farm, nets are installed to prevent birds from feeding on both the rice and fish. Relatedly, the farms apply the “*jajar legowo*” technique, where in a 2:1 spacing is maintained. The fish refuge consisted of a perimeter trench around the outside of the pond, 3 metres wide and 0.8 metres deep, which reduces the rice growing area by about 10 percent, though rice yield is not reduced.

The Rice-Fish farming system in Sleman District can be considered as a success story, as the combined returns from rice and tilapia sales was able to help farmers achieve better income levels, as compared to farmers who planted rice alone. In particular, the Rice-Fish farmers had higher production level, at an average of 9–10 tonnes per hectare using high yielding rice varieties, whereas the traditional rice farmers only get an average of 6.5–7 tonnes per hectare. Translating this into income, Rice-Fish farmers expect about IDR 56 million per hectare, while traditional rice farmers are only at IDR 10 million per hectare, when the fish revenue is added in. After considering the higher operating costs, including the inputs of fish feed and seed, the overall profit from the Rice-Fish farmers is about double that of traditional rice.

One sustainability feature of the Rice-Fish farming system in Sleman is that the farmers were capacitated to produce their own seedlings. At the same time, they also have their own fish hatchery in the area being managed by the KPI Mina Murakabi farmer group. The members of this farming group are primarily the rice farmers in the Sleman district, where about 52 are male and the remaining 7 people are females. Of the 59 members, only 10 are directly involved in the fish production. This group supplies the fish being integrated in the rice farms in Sleman district.

After a tour in the fish hatchery facility, the participants gave some comments and recommendations for the farmer groups on how they can transform such activities/study tours into agri-ecotourism. Suggestions included putting proper labels, determining target clients, integrating with schools and charging appropriate fees, among others.

Day 2 – Field visit

The first activity was a briefing from the Alyansa Petani Padi Organik Boyolali (APPOLI), which is a farmer group that focuses on the production of organic and healthy rice. In their context, the difference between “organic” and “healthy” rice is that the former requires certain processes, documentations and follows a set of standards for entry to markets such as EU and USA, among others. On the other hand, healthy rice is also grown the same way as organic rice, but does not follow the certification process and thus cannot be branded officially as organic. The branding of organic rice helps farmers achieve better income levels, as they are able to command higher prices than those without the organic certification.

The participants were also briefed on the operations of APPOLI, which also involved capacity building of members for enhancing their participation in the whole organic rice value chain. Among others, this also involved the production of their own organic fertilizer, which is compost made from

cow manure. The representative of APPOLI discussed some of the challenges being encountered by the farmer, such as among others the difficulty in encouraging youth to gain interest in agriculture and farming; unstable markets; tendency of some farmers to depend on aid; and lack of investment for capital.

A sample of the compost making facility was shown, which utilizes portions of cow manure, leaves and water hyacinths. The main market of this farmer group are the member farmers of APPOLI, but in case of excess supply, they also sell to other farmers. After this briefing, the group was shown a sample of an organic rice field.

Following this, the participants were shown the storage and processing facility for organic rice. This included manual sorting of paddy by women members of the community, as well as sifting and packaging.

The final stop was a meeting with Komposera, a women's group that advocates nutrition security and healthy lifestyles. The members of the Komposera are women from the different sub-districts of the Pajang area. As strong advocates of health and nutrition, one of their key activities is the conduct of "car free" days, where they sell healthy food for the communities living in Pajang on food trucks. One of their best sellers is red rice, which is said to be a healthier alternative to white rice.

Diagram and photos of jajar legowo rice planting system

The *jajar legowo* 2:1 rice planting system is arranged with seedlings planted in a grid pattern with 25 cm of space between rows and 12.5 cm of space along the row. Each two rows are separated by an “empty row” of 50 cm. The planting density is higher than most systems, which is compensated from the wide empty row that allows for increased air flow, sunlight and importantly allows space for fish or ducks to forage between the rows. Figures 10 and 11 show a schematic diagram and a few photographs.

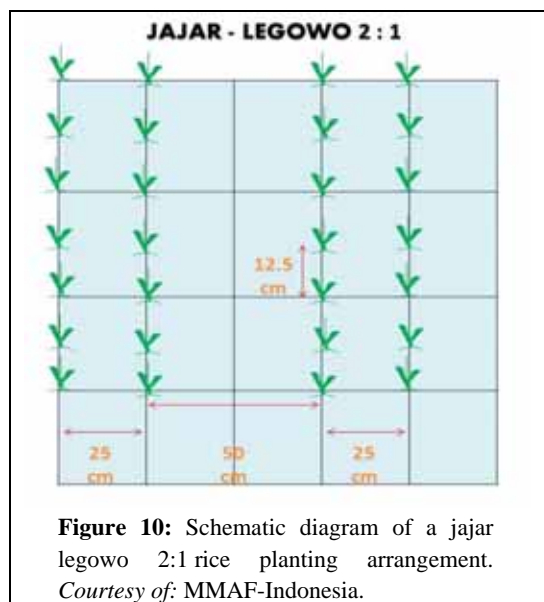


Figure 11: Several photos showing rice planted in the jajar legowo planting system. Note that the top right photograph is in the 3:1 arrangement while the other photos follow the 2:1. The bottom right picture shows newly stocked tilapia fingerlings in the deeper fish refuge that surrounds the rice area. *Courtesy of: Ministry of Agriculture (Indonesia).*

APPENDIX 4

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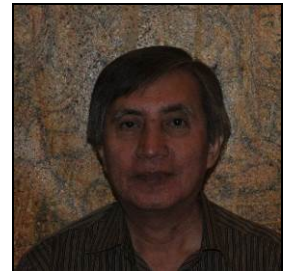
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GROUP PHOTO



Group photo of the “Knowledge exchange on the promotion of efficient rice farming practices, Farmer Field School curriculum development, and value chains”, which was held in Yogyakarta, Indonesia, from 26–29 September 2016 in support of the REGIONAL RICE INITIATIVE. *Standing row (left to right):* Avakat PHASOUYSAINGAM (Lao PDR), Diana RAKHMAWATI (Indonesia), Jan Willem KETELAAR (FAO), Lamngeun SHIPADITH (Lao PDR), Chanthalath PONGMALA (Lao PDR), Phannxay INGXAY (Lao PDR), Andrew SHEPHERD (FAO), Wasitohadi (Indonesia), Heru SETYOKO (Indonesia), Setiawan (Indonesia), Ronnie NATAWIDJAJA (Indonesia), Rocelio TABAY (Philippines), Phoukaothong SIKAISONE (Lao PDR), Carmela O. PAGULONG (Philippines), Austin STANKUS (FAO), Yani (Indonesia), Iuminado OCAMPO (Philippines), Viengxay PHOTAKOUN (Lao PDR), Nana SUHARTANA (Indonesia), Tamara PALIS-DURAN (Philippines). *Seated row (left to right):* Alma Linda Dada ABUBAKAR (FAO), Ounheune NGAOSAVATH (Lao PDR), Mark SMULDERS (FAO), Slamet SOEBAKTO (Indonesia), Pham DU (FAO), Maria Cristina NEWINGHAM (Philippines). *Courtesy of: Juniati/FAO*

SELECTED PHOTOS OF THE WORKSHOP

All photos are courtesy of: Austin Stankus/FAO



Field visit to Sleman District showing the intensive Rice-Fish farming system



Participants line the bund to view the implementation of Rice-Fish



Presentation by the farmer organization APPOLI on organic certification



Participants discussing organic composting techniques



Women members of the farmer organization sorting rice by hand



Delegation of Lao PDR presenting their policy communication briefs on micro-scale rice fish farming



Participants in a group exercise during the workshop



Participants discussing key communication messages



Old man and young children fishing in irrigation canals



Man working to turn over organic compost made of manure, rice hulls and coconut coir.

Selected Press releases and news clips

Marta M. Fajar. (28 September 2016). **Sistem Mina Padi Indonesia Ditiru Negara Lain.** Kompas.

Retrieved from:

<http://bisniskeuangan.kompas.com/read/2016/09/28/150259426/sistem.mina.padi.indonesia.ditiru.negara.lain>


This online article, in Bahasa Indonesian, briefly discusses the technology of Rice-Fish (MinaPadi), presents the goals of the workshop, and quotes Dr Slamet Soebjako, the Director General of Aquaculture, and Mark Smulders, FAO Representative to Indonesia, on their views on how Rice Fish can contribute to food security and sustainable livelihood development in Indonesia and around the world.

Ekonomi / Makro

Sistem Mina Padi Indonesia Ditiru Negara Lain

Rabu, 28 September 2016 | 15:02 WIB

14 Shares



Dirjen Perikanan Budidaya KKP Slamet Soebjako dan Perwakilan FAO Indonesia Mark Smulders dalam lokakarya pengembangan mina padi

Terkait

- Investasi Perikanan Budidaya Lebih Menjanjikan Dibandingkan Ikan Tangkap
- Menteri Susi Temukan Tiga Modus Kejahatan Perikanan di Pelabuhan Benoa
- Susi Tegaskan Tidak Ada Usaha Perikanan yang Dipersulit
- Kapal Pengawas KKP Tangkap Delapan Kapal Perikanan Ilegal

SOLO, KOMPAS.com – Sistem budidaya padi dan ikan sekaligus dalam satu lahan atau mina padi semakin berkembang di Indonesia.

Salah satu faktornya karena sistem ini bisa menambah penghasilan petani. Pada saat panen, petani tidak hanya mendapatkan padi, tetapi juga ikan siap jual.

Agar lebih efisien dan menguntungkan, pada 2015, Ditjen Perikanan Budidaya Kementerian Kelautan dan Perikanan bekerja sama dengan organisasi pangan dunia FAO (Food and Agriculture Organization of the United Nation) mengembangkan mina padi pada sistem kluster dengan pola tanam padi jajar legowo.

Sistem ini ternyata bisa menambah penghasilan petani hingga 1.700 dollar atau setara Rp 22 juta (kurs Rp 13.000 per dollar AS) per hektar per musim tanam.

“Manfaat dari inovasi mina padi berbasis kluster antara lain resiko serangan hama sangat rendah, nol pestisida, penggunaan pupuk kimia berkurang signifikan, pendapatan yang lebih tinggi,” kata Dirjen Perikanan Budidaya Slamet Soebjako saat dihubungi di Solo, Jawa Tengah, Rabu (28/9/2016).

Di cosa hai voglia oggi?

Editor. (28 September 2016). **Mina Padi, Hasilkan Pendapatan Petani Hingga 1.700 Dolar AS.** KKP News.

Retrieved from:

<http://news.kkp.go.id/index.php/mina-padi-hasilkan-pendapatan-petani-hingga-1-700-dolar-as/>

This online article, in Bahasa Indonesian, briefly discusses the economic benefits of Rice-Fish (MinaPadi), with quotes from Dr Slamet Soebjakto, the Director General of Aquaculture. The article further highlights the ecological importance of integrated systems that use fewer chemical inputs.

Mina Padi, Hasilkan Pendapatan Petani Hingga 1.700 Dolar AS

September 28, 2016

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KKPNews, Solo – Sistem minapadi semakin berkembang di Indonesia. Salah satu faktornya karena sistem ini bisa menambah penghasilan petani. Pada saat panen, petani tidak hanya mendapatkan padi, tetapi juga ikan siap jual.

Direktur Perikanan Budidaya Slamet Soebjakto mengungkapkan, sistem ini mampu menambah penghasilan petani hingga 1.700 dollar AS atau setara Rp 22 juta (kurs Rp 13.000 per dollar AS) per hektar per musim tanam.

“Manfaat dari inovasi mina padi berbasis kluster antara lain resiko serangan hama sangat rendah, nol pestisida, penggunaan pupuk kimia berkurang signifikan, pendapatan yang lebih tinggi,” ungkap Slamet, Rabu (28/9/2016) saat dihubungi di Solo, Jawa Tengah.

Keberhasilan mina padi di Indonesia pun mengundang minat negara lain untuk mencontoh, antara lain stakeholder pertanian dan perikanan dari Laos dan Filipina. Untuk menularkan ilmu mina padi Indonesia ke negara lain, KKP dan FAO kemudian menggelar lokakarya dan tinjau lapangan mina padi di Jawa Tengah dan Yogyakarta pada 26 – 28 September 2016.

Slamet mengatakan, prospek mina padi di Indonesia masih sangat besar. Sebab, dari sekitar 14 juta hektar lahan tanaman padi di Indonesia, yang menggunakan sistem mina padi baru hanya 142.122 hektar atau hanya sekitar 1 persen.

Padaahal, kata Slamet, sistem mina padi merupakan cara yang efektif untuk keberlanjutan usaha pertanian dan perikanan, meningkatkan kesejahteraan dan mewujudkan kedaulatan pangan.

Editor. (28 September 2016). **Mina Padi Menguntungkan Petani Solo.** Suaradesa.

Retrieved from:

www.suaradesa.com/berita/2016/09/28/mina-padi-menguntungkan-petani-solo

This online article, in Bahasa Indonesian, briefly discusses the economic benefits of Rice-Fish (MinaPadi), with quotes from Dr Slamet Soebjakto, the Director General of Aquaculture. The article further highlights the ecological importance of integrated systems that use fewer chemical inputs.



Mengenal sistem mina padi untuk menambah penghasilan. (Foto: unik6.blogspot.com)

MINA PADI MENGUNTUNGKAN PETANI SOLO

Republika, 28-09-16 13:04 WIB BERITA

SUARADESA, SOLO – Salah satu faktor sistem yang bisa menambah penghasilan petani adalah mina padi. Pada saat panen, petani tidak hanya mendapatkan padi, tetapi juga ikan yang siap jual.

Direktur Perikanan Budidaya, Slamet Soebjakto mengungkapkan, sistem ini mampu menambah penghasilan petani hingga 1.700 dollar AS atau setara Rp 22 juta (kurs Rp 13.000 per dollar AS) per hektar per musim tanam.

"Manfaat dari inovasi mina padi berbasis kluster antara lain resiko serangan hama sangat rendah, nol pestisida, penggunaan pupuk kimia berkurang signifikan, pendapatan yang lebih tinggi," ujarnya, Rabu (28/9).

Untuk menularkan ilmu mina padi Indonesia ke negara lain, KKP dan FAO kemudian menggelar lokakarya dan tinjau lapangan mina padi di Jawa Tengah dan Yogyakarta pada 26 – 28 September 2016.

Sistem mina padi merupakan cara yang efektif untuk keberlanjutan usaha pertanian dan perikanan, meningkatkan kesejahteraan dan mewujudkan kedaulatan pangan.

Tanaman padi yang dihasilkan pun lebih berkualitas karena mina padi memungkinkan terciptanya pertanian organik yang ramah lingkungan dan produknya lebih sehat untuk dikonsumsi.

"Ikan air tawar seperti gurame, nila, lele, dan udang galah, bahkan ikan hias jenis Koi sangat cocok dibudidayakan pada sistem mina padi," ujar Slamet.

Meningkatnya produksi ikan, lanjut Slamet, pada akhirnya akan mendukung kebutuhan gizi masyarakat. (KKPnews)

A total of 33 participants (10 women) participated in the Regional Rice Initiative – Workshop *cum* Study Tour on knowledge exchange on Farmer Field School curriculum development for promotion of efficient rice farming practices and value chains. Field visits were made to Sleman (Rice-Fish farming and “jajar legowo”) and Boyolali (organic rice value chains) organized by FAO Indonesia in collaboration with the Ministry of Marine Affairs and Fisheries and the international civil society organization Vredeseilanden (VECO) and its local partner CSO Aliansi Petani Padi Organik Boyolali (APOLLI). Following the study tour, the regional workshop was held to: (1) facilitate the regional exchange of knowledge and experiences on sustainable intensification of rice production, including Rice-Fish farming systems and rice value chains; and (2) take stock of Farmer Field School curricula currently available, introduce the FFS Guidance Document and identify opportunities for strengthening of the FFS curricula. The participants included representatives from government and civil society organization implementing partners and principal investigators engaged in results assessment in pilot RRI-Phase 2 countries (Indonesia, Lao PDR and Philippines). Results of the assessment studies will be communicated to national and local government for informing policy and for mobilization of funding support for up-scaling of the RRI Farmers Field Schools on Save and Grow-Sustainable Intensification of Rice Production.