



The Field Alliance:

Collected case narratives on best practices
in ecological and sustainable agriculture in
Southeast Asia 2014-2015

Alexandra Perkinson and Marut Jatiket

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The Field Alliance MISSION

Farming families and rural communities have a crucial role to play in the future development of human and environmental systems. Farming is, and will remain, the way of life for more people on the planet than any other livelihood, and farmers will continue to be responsible for the management of a greater part of the planet than any other group of people.

The Field Alliance believes that each woman, man and child has the right to knowledge, has the responsibility to decide, and should have the freedom to act in ways which ensure the health and sustainability of human and environmental systems. Further, each woman, man, and child has the inherent ability to undertake these tasks, and that the role of governments, corporations and international organizations is to support the efforts of individuals and local communities. Finally, we believe that efforts to promote healthy and sustainable systems should be informed by a combination of ethical, spiritual, scientific and aesthetic values.



The Field Alliance



KEMI
Swedish Chemicals Agency



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Forward

Southeast Asia is a remarkably diverse region, both geographically and culturally. A vast and previously secure supply of natural resources has provided food, housing materials, medicine, and sources of income for centuries. In spite of modernization and increased urban migration, the majority of Southeast Asian people are still reliant on agriculture as their primary source of income, but significant shifts are predicted to occur in the coming years.

The appeal of higher paying and less physically demanding careers in the trade and technology fields are attracting younger generations and the struggles of many older farmers are becoming too much to bear. Thai Education Foundation estimates that within the next five years in Thailand alone, it is likely that around fifty percent of farmers will cease to engage in farming. Most people do not realize the severity of this situation and its potential impact on the food security, economy, and culture at large.

Within the agriculture sector, development has heightened production demands, put a significant strain on natural resources, and led many farmers to adopt industrialized farming methods such as monocropping and blanket use of chemical pesticides. These negative adaptations have already had devastating effects on human health and the environment.

The pesticide problem

In the past several decades, farmers have turned to pesticides more so than ever in an effort to increase yields and profits in order to salvage their livelihoods. Prolonged overuse of pesticides has led to unbalanced ecosystems, pest and weed resistances, and the evolution of GMO's- the full impacts of which are yet to be determined.

As long-term effects of chemical pesticides can now be observed and measured, increasing evidence of their damage to human health has emerged. Recent studies have shown that pesticide exposure through air, water, food, and direct contact can lead to birth defects, asthma and allergies, cancer and other diseases, autism, learning and behavioral disabilities, and death. Children in rural communities are particularly vulnerable and face potential exposure both at home and school.

The Field Alliance and partners believe that educating farmers and school children at the grassroots level is the most effective way to create real and sustainable change in agriculture, and protect future generations against the dangers of pesticides and the potential dissolution of a vital industry.

The Field Alliance

The Field Alliance (TFA) is an alliance of independent international organizations that all share a mission to provide quality, responsive education for rural communities. The Field Alliance and partners focus on issues of ecological agriculture, poverty reduction, and human rights through educational programs delivered via formal and non-formal educational systems. The Field Alliance supports participatory and action research approaches in order to provide communities in need with responsive and sustainable education that will improve farmer livelihoods, preserve culture, and support the global community by securing the future of agriculture.

The Field Alliance grew out of a long-standing involvement with the FAO Community Integrated Pest Management (IPM) program. Field experience demonstrated the vital importance of creating and maintaining relationships and networks among like-minded individuals and organization in order for educational programs to be beneficial and sustainable in the long-term.

Through the establishment of international networks, TFA supports farmers in a multifaceted capacity: through training and advocacy on crop production issues, economic, community health, and cultural issues, and farmer's rights. The Field Alliance also facilitates educational interventions with farmers through Farmer Field Schools (FFS), as well as with students in formal and non-formal education systems. Over the past ten years, TFA has formed partnerships in Cambodia, Lao PDR, Myanmar, Philippines, and Vietnam (see Partners).

REAL education

One of The Field Alliance's primary initiatives has been the development of REAL (Rural Ecology and Agricultural Livelihoods) Education. REAL Education is an integrated learning approach that allows school children to gain a first-hand understanding of ecological systems and develop critical thinking skills with respect to environmental, health, and social issues. The REAL curriculum aims to educate students, many of whose family members are rice or vegetable farmers, on safe farming practices and provide practical vocational training for students who may choose to participate in farming in the future.

Students participating in REAL programs spend at least one day per week in the fields- planting and harvesting rice or other vegetables and collecting soil and insect samples. Students also regularly interview local farmers and business owners and, under the guidance of instructors, conduct environmental and health surveys. Back in the classroom with the support of the teacher, collected data and community feedback is then evaluated and students can extract the most

significant and intriguing topics to investigate further. Students then work to develop specific projects and action plans relating to their chosen topic(s).

Program implementation and sustainability

The Field Alliance recognizes that effective and sustainable educational programs must involve the community every step of the way- from conception through to implementation. The Field Alliance relies on partner organizations to establish and maintain relationships with other governmental and non-governmental agencies in their respective counties in order to effectively implement into the foreseeable future.

Partners of The Field Alliance first must identify communities and schools in need of educational support. After these communities/schools have been identified by partners, a site visit is conducted and surveys are taken to document the status of the community as it pertains to pesticide usage, environmental status, resources available, economic stability, and expressed interest by community members. Once need is confirmed, meetings are held with representatives of TFA, partner organizations, and community leaders in order to determine what specific programs would be of most benefit (format and subject matter for example), where programs will take place (schools, Community Learning Centers, or Farmer Field Schools), and a proposed timeline.

The Field Alliance will then arrange for a Training of Trainers/Teachers (ToT) to be conducted by TFA representatives, usually on-site or at a nearby location convenient for participants of the training. The individuals participating in the ToT could be teachers or administrators for schools programs, representatives of the Department of Non-formal Education, or representatives of partner organizations who will act as Farmer Trainers during Farmer Field Schools.

The goal of these trainings is to provide participants with the knowledge and experience necessary to effectively organize and implement REAL programs. Once the ToT's have concluded (time frame varies dependent on training, availability, and budget), it is then largely the responsibility of the partner organization and individual sites to apply the curriculum and schedule programs for student and community participation. The Field Alliance continues to support program extension financially through allocations to partner organizations, as well as by providing continued theoretical guidance and technical support as needed.

Partners

Since its founding, The Field Alliance has established partnerships with many governmental and non-governmental organizations throughout Cambodia, China, Indonesia, Lao PDR, Myanmar, Philippines, Thailand, and Vietnam. These partners facilitate connections that allow our programs to be successful and sustainable. We sincerely thank all of our partners for their zealous dedication to our mission and below acknowledge the official member organizations of The Field Alliance that directly contributed to this publication.

Cambodia: Agriculture Technology Services Association (ATSA)

In 2007, The Field Alliance initiated a partnership with Cambodia in cooperation with Agriculture and Technology Services Association under the direction of Sodavy Pan. Serving as the primary contact for this program since the beginning, Ms. Pan has worked closely with TFA for the past eight years to identify recurrent and newly emerging environmental and agricultural concerns within Cambodia.

With the support of TFA, since 2007, thousands of present and future farmers have been trained using the REAL Education model. These individuals have been educated on the dangers of pesticides and their impact on the environment, the benefits of organic farming, the importance of crop diversity and composting, as well as being taught practical income management methods using sustainable and self-sufficient business models.

Lao PDR: Rural Development Sole Rds. (formerly Community Development and Environmental Conservation Foundation)

The Field Alliance piloted programs in Laos in 2003, coordinating with Bandith Keothongkham of Community Development and Environmental Conservation Foundation (CDECF) to launch programs focusing on Agrobiodiversity and Pesticide Impact Assessment. Furthermore, the Laos FAO Agrobiodiversity Programme (ABP) requested assistance from TFA to train sixty governmental officials and farmers during two-month courses the Phonexay District of Luang Prabang and the Phukout District of Xiengkhuang Province.

Initially piloted within three schools only, TFA now proudly supports sixty-six separate school and community programs in Lao PDR. In 2016, TFA formed an official partnership with Rural Development Sole Rds, an affiliate of the former CDECF and will continue all projects in coordination with this new organization.

Philippines: Davao del Norte School IPM Network

REAL programming in the Philippines was introduced after nearly ten years of IPM activity. The Field Alliance now supports both Farmer Field Schools and REAL school programs, reaching those in immediate need of practical, vocational education and also anticipating the needs of future generations.

Recently, The Field Alliance consulted on the formal integration of the subject of Organic Agriculture into the National Basic Education curriculum of the Philippines. These lesson plans have been further developed and are scheduled to launch in the upcoming school year by formal government mandate.

Thailand: Thai Education Foundation (TEF) and the Non-Formal Education Department, Department of Education (NFE)

Thai Education Foundation (TEF) is a non-profit organization working to improve education in Thailand. TEF has its origins in the work of World Education, an international NGO that was active in Thailand during the 1970's and 1980's. In the last decade, Thai Education Foundation has become an independent organization working closely with government agencies including the ministries of education, agriculture, environment, and health, as well as the international organizations FAO, Kemi, Unicef, and UNESCO. TEF maintains innovative field programs within schools, Community Learning Centers, and various other agencies while periodically undertaking scientific studies aimed at policy update and formulation. TEF is considered to be a predecessor to The Field Alliance and Director Marut Jatiket leads both organizations.

Vietnam: Initiatives on Community Empowerment for Rural Development (ICERD)

The Field Alliance began working with ICERD in 2003, and with support from TFA, ICERD has developed an agreement with the Continuing Education Department and Secondary Education Department within the Ministry of Education & Training to integrate agrobiodiversity and pesticide risk reduction into the national curriculum and as well as into the educational materials for the Continuing Learning Centers throughout Vietnam. Farmer programs on Home Vegetable Gardens, biomats/composting, and rice-fish farming have been particularly successful in Bac Giang allowing farmers to increase and diversify income.

In 2014-2015 Vietnam has had particular success with trainings on how to raise and profit from rice-fish as well as on making and using biomats to improve environmental conditions. Profits of these farmers increased by four times in comparison to the profits of farmers using conventional farming methods.

A message from The Field Alliance Director

It has been over twenty years since the School IPM Program was first developed in Thailand by the Thai Education Foundation. The REAL program that developed over many years and as the result of many trials from the School IPM Program has proven highly successful in addressing key issues confronting farming communities, including the basic right to safe food and environment. Farmers have also been able to increase food sources and income for communities through adverse affects from climate change while maintaining the diversity of traditions and cultures. Perhaps most importantly, these programs have helped support a future generation of young farmers with environmentally friendly minds to replace the aging chemical- based approaches currently in practice.

The Field Alliance and the REAL program have been very fortunate over the years to be recognized and supported by important educational policy makers, by FAO, and now by Keml/Sida. This support has enabled The Field Alliance to expand the program to neighboring countries and reach thousands of farmers, students, and community members.

The narratives included in this publication are stories of the successful applications of education and agriculture theories and practices supported by The Field Alliance and key implementing partners representing five different countries. While several projects have in fact contributed valuable scientific data to the field, it is important to note that the examples included in this publication are case narratives, not formal scientific studies. We hope that these case narratives will act as models for international replication and encourage others to actively investigate the benefits of an ecological agriculture and to act as change makers who will move agriculture towards a responsible and sustainable future.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Marut Jatiket', with a stylized flourish at the end.

Marut Jatiket
Director, The Field Alliance and Thai Education Foundation



Ground Up: Reducing pesticide use
one farm at a time

Kampong Chhnang Province, Cambodia

Country profile

Cambodia has always been rich in natural resources; unfortunately, within the past several decades, accelerated development has put a serious strain on these resources and led to widespread environmental and economic instability. It is currently estimated that 4.8 million Cambodians are poor and 90% of these poor people live in rural areas. Most depend on agriculture for their livelihoods, but at least 12% of them are landless.¹

Until recently, most Cambodian farmers practiced small-scale subsistence farming using traditional agricultural methods, but in recent years, an export driven economy supported by the Cambodian government has encouraged farmers to adopt more mechanized and 'modernized' practices to increase productivity, thus creating new and complex environmental, economic, and health issues. Small-scale food producers, especially women², are at risk of being harmed by food shortages as prices of food continue to rise and extreme climate events such as floods and droughts are increasing in intensity and frequency.

Cambodia's dependence on agricultural exports causes farmers to overuse chemical pesticides to ensure a 'higher quality' product for export. The overuse of pesticides has created fragile and unbalanced ecosystems, since in addition to killing pests, the agrochemicals used by Cambodian farmers also kill thousands of frogs, birds, fish, bees, and other natural enemies and beneficial wildlife. Pests also develop resistances to chemical pesticides leading to a destructive cycle that causes farmers to believe that they have no other choice than to continually increase and intensify their use of pesticides.

Of course, overuse of pesticides has also led to widespread public health concerns as well as threatening the safety of products on the international market. Lack of educational access and vocational training within the agriculture sector leaves farmers with limited opportunities to prevent or remedy these problems. Only recently have pesticide labels in local Khmer language began to emerge in response to persistent international legislative pressure, but as it stands, Cambodia pesticide labels are still written largely in foreign languages, so farmers are unable to read instructions and warnings, or to simply identify the contents.

¹ <http://www.ruralpovertyportal.org/country/home/tags/cambodia>

² See "Focus on: women's roles in agriculture" section for more information.

Female farmers in particular are at a particular disadvantage in Cambodia as they do not have equal access to education or paid employment and are often legally denied land ownership and other property rights. Despite these inequalities, many women take active roles on farms and particularly involving the selection and purchase of chemical pesticides and therefore their involvement in decision making is vital to the success of educational programs.³

Pesticide risk reduction has been a long-term focus for TFA supported trainings and programs in Cambodia. IPM has a long history in the country, supported both nationally and internationally, but as of late, many IPM trainers have retired without securing replacements. Additionally, significant international support for IPM programing was recently withdrawn from Cambodia, therefore there is minimal funding to train new staff or even maintain current IPM activity. This leaves farmers at a great loss in terms of receiving vital pesticide related education that has the ability to save Cambodia from potential environmental and economic catastrophe.

The following case narrative focuses on individual farmers and small collectives who serve as role models and how the power of a few driven and informed individuals can transform communities and create sustainable networks.

³ <https://www.ifad.org/documents/10180/06716528-6118-4dfe-ae42-92a081580cdc>

“I have never seen such hazardous pesticides used in any country in such a hazardous fashion.”⁴

- Helen Murphy, UN medical epidemiologist



⁴ Television Trust for the Environment (TVE), Toxic Trail (TV documentary), 2001.

Pesticide use in Cambodia

Overuse of pesticides in Cambodia is a nationwide epidemic. To put it simply, in Cambodia pesticides are used at the wrong time, in the wrong strength, and against the wrong pests.⁵ According to data collected by TFA, Cambodia reports the highest use of pesticides in the ASEAN region (Figure 1) and given their extremely high use and frequency of spray days, farmers are ill-informed of or non-responsive to the safety and health concerns associated with chemical exposure.

A report published in 2011 in the *Journal of Toxicology*, confirms that the majority of farmers lack suitable protective clothing, even though about half the pesticides used by the farmers in that study are classified by the World Health Organization as Class I or Class II - which means they are moderately to extremely hazardous to human health.⁶ A separate 2010 study conducted by Pesticide Action Network Asia Pacific (PAN-AP) also found that a third of farmers used no protective gear when spraying pesticides and even among those who did use protective gear, none used a respirator.⁷ Both studies found that none of the 95 pesticides it assessed carried labels in Khmer, the language of Cambodia, despite a law requiring Khmer labeling.

Pesticide risk reduction has been a long-term focus for TFA supported trainings and programs in Cambodia. IPM has a long history in the country, supported both nationally and internationally. IPM training programs in the country have been successful in increasing awareness of the dangers of pesticides and subsequently reducing their use, but the future of these programs is uncertain. Keam Makarady, Director of Health and Environment of the Cambodian Center for Study and Development in Agriculture (CEDAC) says that typically 80% of the farmers surveyed at the start of an IPM training program use the most dangerous types of pesticides, but after training is complete, the percentage drops to around 10%.⁸

Recently also, many IPM trainers have retired without securing replacements. Additionally, significant international support for IPM programming was recently withdrawn from Cambodia, therefore there is minimal funding to train new staff or even maintain current IPM activity. This leaves farmers at a great loss in terms of receiving vital pesticide related education that has the ability to save Cambodia from potential environmental and economic catastrophe.

⁵ <http://www.pan-uk.org/pestnews/Issue/pn56/pn56p6.htm>

⁶ <http://www.hindawi.com/journals/jt/2011/639814/>

⁷ http://www.panap.net/panfiles/download/asrep_lowres.pdf

⁸ <http://www.voanews.com/content/pesticides-continue-to-harm-cambodias-farmers-114477019/166941.html>

Public health awareness campaigns spearheaded by NGO's have also done much to increase greater public health awareness of the hazards of pesticides. This has led to some market demand for organic produce options, but for most Cambodians buying organic is still not a sustainable option because produce grown without chemical pesticides or fertilizers is typically sold at higher prices. TFA and our partner organizations are working against this unbalanced model and try to educate farmers on how to create higher net profit by reducing input costs, not by increasing prices for consumers.

Given the high amount of pesticides used in the country, disposal of pesticide containers is a huge issue, particularly in rural areas. According to data collected by partner organizations, of the 173 farmers interviewed, 71% disposed of pesticide containers in the rice field and 42% burned the plastic containers. By allowing the containers to remain in the rice field, either above ground or buried below ground, the chemical residue seeps into the groundwater, spreading through the ecosystem and the community. Children playing in or living nearby fields and other animals are also directly exposed to the containers and can be harmed. Burning of the containers is also highly toxic as both the chemicals of the pesticides and the plastic are transmitted through the air.

The following section contains data collected by farmers, community members, and The Field Alliance staff members on pesticide usage at REAL program sites.



Data

Figure 1.) Amount of chemical pesticides sprayed, 2014

	Cambodia	Lao PDR	Thailand
Average liters/person/year	1,042	3,181	3,000-18,000
Average liters/hectare/year	335 for dry-season rice 2,798 for watermelon 11,900 for vegetables	996	2,294
Spray days/person/year	4–48 days based on the crop; average 12	20	12

As evidenced by Figure 1, pesticide use in Cambodia is extremely high for certain crops, particularly watermelon and vegetables. Some Cambodian farmers also report spraying up to forty-eight days per year. Figure 2 tells us that of the chemical pesticides being used, most farmers use WHO Class II (moderately hazardous) pesticides, while some continue to use Class I (highly or extremely hazardous)- many of these having been officially banned.

Figure 2.) WHO class of pesticides used by farmers, Kampong Chhnang, 2014

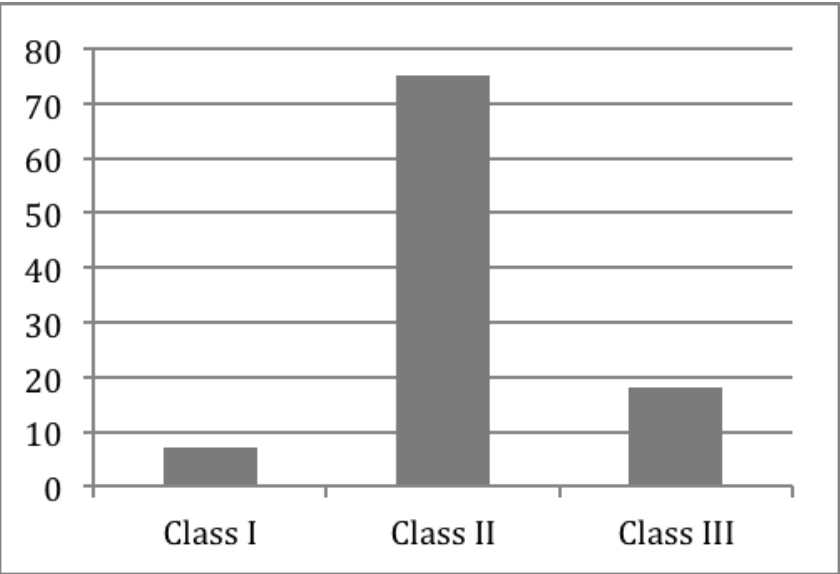


Figure 3.) Spraying behavior of farmers, Kampong Chhnang, 2014

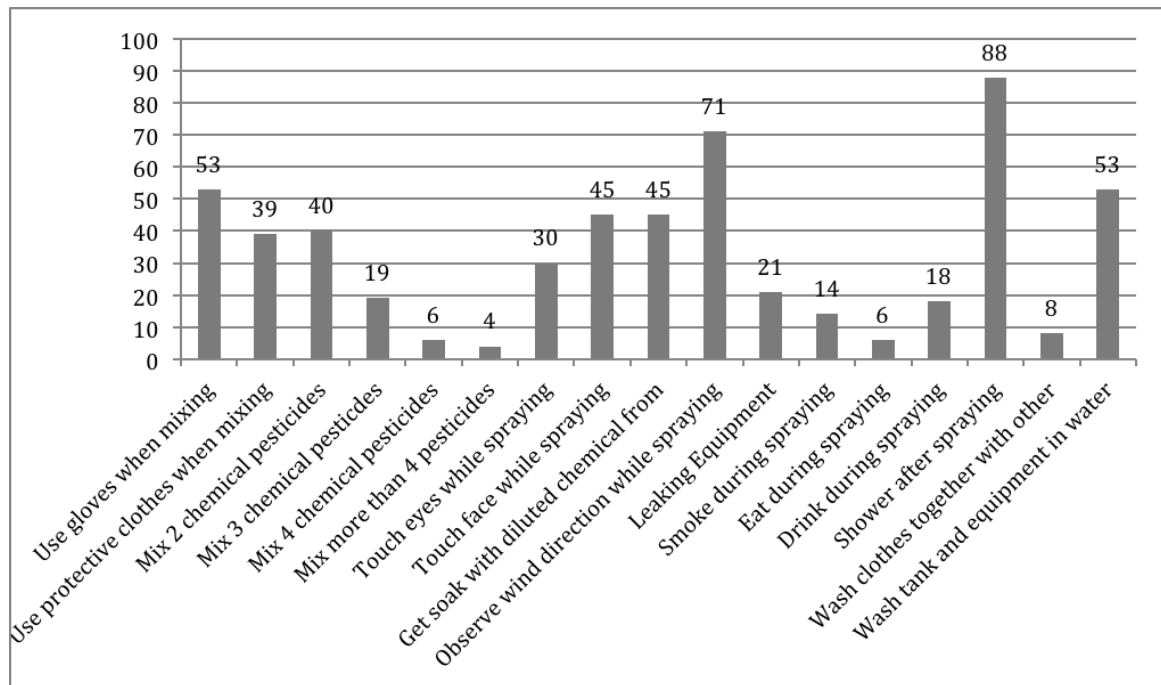
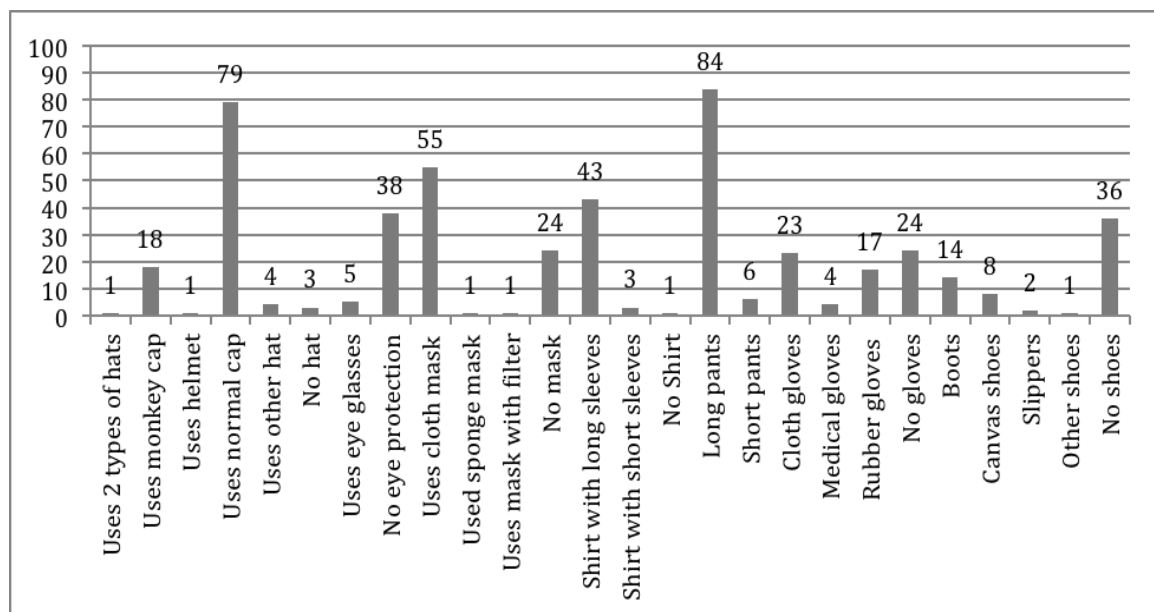
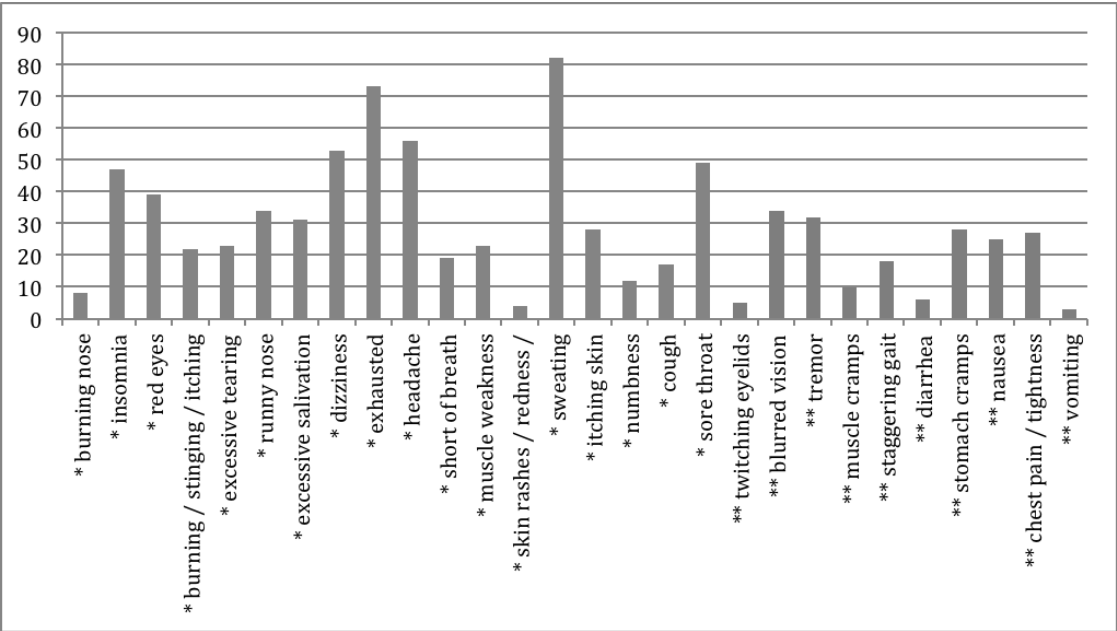


Figure 4.) Use of protective equipment, Kampong Chhnang, 2014



More than 75% of farmers wear long pants and normal cap while spraying. Around 35% of farmers did not wear shoes or eye protection and only one farmer reported using a mask with a filter.

Figure 5.) Signs and symptoms of pesticide exposure, Kampong Chhnang, 2014



TFA collects first-person data based on interviews with farmers conducted by representatives of our in-country partner organizations or students involved in REAL programming in schools. We believe that this method not only yields valuable data, but also provides as an opportunity to connect with the community and forge trusting relationships that pave the wave for more sustainable programs in the future.

This being said, these reports are inherently subjective and often, incident reports are not made at the time of incidence, if at all. Farmers often do not seek medical help unless the incident is acute or incapacitating, and long-term effects of pesticides are easily confused with other health or age-related issues. Improving the pesticide poisoning reporting system is one of TFA’s primary goals, but until we receive the necessary governmental and policy-level support to do this, we continue to educate farmers on how to properly identify signs and symptoms of pesticide poisoning in order to ensure that they receive appropriate medical attention and prevent future incidents.

Interventions

Installation of pesticide container disposal tanks

Since the Cambodian diet relies highly on fish for a source of protein, the issue of pesticide seepage into groundwater is critical. Approximately sixty per cent of Cambodia's commercial fish come from Tonle Sap, the largest lake in South East Asia and it was estimated that in 2000 that 1.3 million liters of pesticides were used in the Tonle Sap region and more recently ten tons of DDT and methyl-parathion have entered the Tonle Sap as run-off from nearby crops.⁹

Much of the reason that people elect to dispose of pesticide containers in unsafe ways is because there are simply no other safe disposal methods available to them in their communities, and they are unaware of the dangers of improper disposal. In response to this, in TFA and ATSA embarked on a specific project to install safe disposal tanks in communities. In 2014, all six communities implementing REAL program integrated the installation of safe pesticide container disposal receptacles into their Community Action Plans.

These receptacles prevent ground seepage of chemicals. They are made entirely of concrete and completely sealed in order to prevent chemical seepage into the ground beneath. The containers are intended to remain as permanent fixtures in the community and containers are emptied, transported, and properly disposed of when they are full.

After installation of the safe disposal tanks, in 2014, 6430 containers were properly disposed of and taken to regional waste management facilities as opposed to making their way into fields, being burned, or worse yet, into the hands of unknowing children.



⁹ Koma YS, et. al., The Situation of Pesticide Use in the Tonle Sap Catchment, CEDAC, Phnom Penh, Cambodia, 2001.

Installation of aquatic rings in rice fields

Another initiative spearheaded by ATSA was the installation of aquatic habitats in rice fields. The benefits of creating these habitats are multi-fold in that:

1. Aquatic species are conserved in protected areas
2. Aquatic species offer alternate sources of food and income for farmers
3. Habitats created support agrobiodiversity and contribute to sustainable living systems.

In 2014, five of the seven villages where REAL programs were implemented decided to incorporate installation of aquatic habitats in rice fields as part of their Community Action Plan.



As a result, **153** habitats were installed using approximately **23.9** ha of field area.¹⁰

¹⁰ Refer to The Field Alliance Annual Report 2015 from ATSA included in the Appendix

Individualized outreach

A large part of the success of TFA supported programs in Cambodia is due to the extensive outreach efforts on the part of ATSA staff and trainers. In Kraing Khmer village, Kampong Chhang Province, trainer Ly Yan began spreading the word of IPM and ABD methods by personally visiting individual farms and speaking directly with farmers about their current farming practices, needs, and fears. If the farmers showed interest in learning more about ecological agriculture alternatives, she offered to come back and give them condensed tutorials on topics like composting and how to make organic fertilizers and pesticides.

On a recent visit to Krang Khmer Village, TFA representatives visited three families who were transitioning to reduced pesticide or organic farming methods after receiving training and support from Yan. One female farmer (pictured below) converted her crop of long beans to fully organic and given her success thus far in reducing input cost and producing a higher quality yield, she shared future plans to convert all of her crops. An older couple from a farm nearby had just begun integrating Pesticide Risk Reduction methods and using organic pesticides, demonstrating that it is truly never too late to begin the transition to more sustainable farming methods and that this process does not have to be costly or complicated.

Thus far, this personalized outreach approach has been highly effective in ATSA project areas. Through word of mouth, other farmers have become aware of the actions of their fellow farmers. Although we continue to encourage farmers to attend full Farmer Field Schools trainings so that they may receive the maximum benefit and full range of knowledge, we also understand that certain financial or time constraints exist and embrace the creative transmission of this valuable information via modified channels.

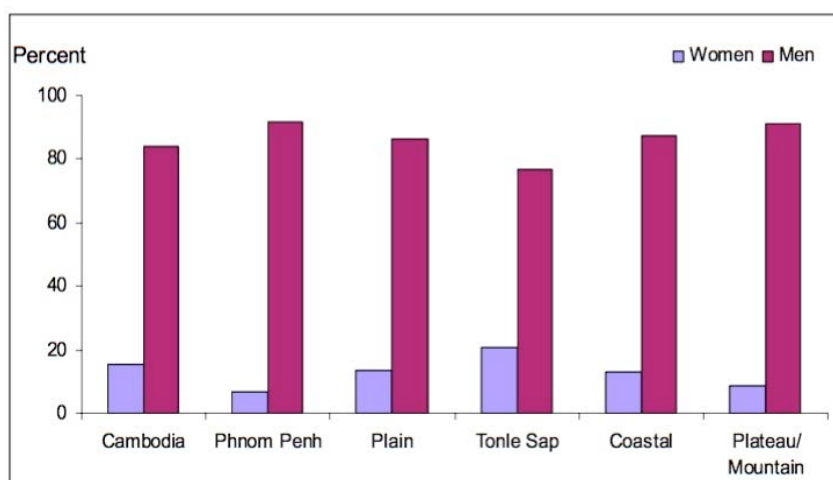


Focus on: women in agriculture

Gender inequalities in Cambodia

According to the World Bank¹¹, as of 2015, women represented approximately 51.2% of the total population of Cambodia. In spite of the almost even gender split of the population, women still face significant inequalities when it comes to education, land ownership, employment opportunities, healthcare rights, and legislative representation. The Cambodian Ministry of Women's Affairs reports that 21% more women than men are illiterate and only 12% of women over the age of twenty-five have received above a primary level education. The gender gap continues to grow as the level of education increases.¹² Men also control (own, rent, or lease) significantly more land than women, as illustrated in the graph below, released by the National Institute of Statistics, Cambodia Socio-Economic Survey (NIS, CSES).

Figure 6.) Land ownership in Cambodia, 2010 (NIS, CSES)



These inequalities are the result of Cambodian cultural standards and legislative history, among other factors. Cambodian culture has defined behavior norms for women- known as the Chba'p- that have played a large role in limiting their opportunities in the past. Cultural and parental favoritism towards men also means that men are typically given preference to receive education, since it was assumed that one didn't need a formal education to be a farmer or housewife.

¹¹ <http://data.worldbank.org/indicator/SP.POP.TOTL.FE.ZS?locations=KH>

¹² http://unstats.un.org/unsd/gender/Jordan_Mar2012/Presentations/Panel%201.a/Panel%201.a_3_Cambodia.pdf

Despite Cambodia's history of gender inequality, recent developments have shown efforts towards correcting this imbalance. The Ministry of Women's Affairs was established in 1998 and has made marked improvements in documenting and reporting gender inequalities. Other working groups and committees aimed solely at increasing gender awareness and advancing the rights of women have also been established, in addition to a number of NGO's supporting this cause. The production of publications on gender has improved the awareness of women's situation in Cambodia and a gender mainstreaming strategy and action plan is in place, including a goal for maintaining at least 20% women appointed to upper-level governmental positions. While proportionately this percentage is still quite low, it is viewed as a step in the right direction and a positive sign of policy-level support.

Throughout history, agriculture has remained overtly dependent on women's participation. As of 2015, approximately 75% of Cambodian women were employed in the agriculture sector. Since more and more men are leaving villages to seek employment in other sectors, namely trade, women are essentially left with no other choice than to stay behind to care for their farms and families.¹³

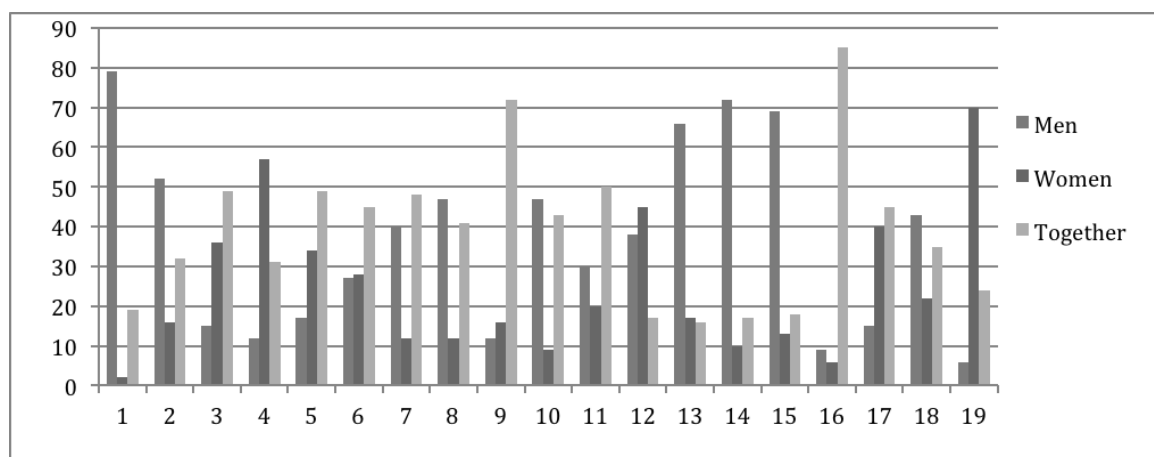
Contrary to what has been thought to be true in the past however, farmers need education just as much as other professionals, particularly given new and complex challenges such as overuse of pesticides, land degradation, and climate change. If educational opportunities aren't made available to female farmers, this will have a detrimental impact on the future of farming in Cambodia. In support of this notion, the national government in cooperation with several NGOs, recently organized the first National Champion Woman Farmer forum. One hundred female farmers from twenty-four cities and provinces were selected to attend this event and during the forum, female farmers had the opportunity to participate in discussions about the issues affecting women in rural areas and propose solutions.

This above-mentioned forum and governmental initiatives to support women in agriculture are a solid first step towards achieving greater gender equality in the agriculture sector and in society at large, but follow-through and monitoring is needed before equality becomes the norm. This past term, The Field Alliance and partner ATSA have focused on collecting detailed gender aggregated data in order to determine contemporary gender roles and gain insight as to who is responsible for making household decision. This data will allow us to target future programming and ensure greater gender equality. During 2014-2015, ATSA already provided targeted trainings on financial management for members of village Women's Unions who expressed an interest in forming community savings groups.

¹³ <http://www.voanews.com/a/cambodian-women-empowered-in-farming-sector/3233210.html>

A survey was conducted in Kampong Chhang Province on the roles of men and women in agriculture. The survey was based on interviews with 173 farmers. ATSA staff also organized group meetings and informal discussions revolving around the topic of gender roles in agriculture, asking participants not only to report on current roles and responsibilities, but why these roles are assigned as so and if there is need or potential for change in the future. Some results can be seen below.

Figure 7.) Self-reported gender roles in agriculture, Cambodia, 2014



1	Plowing the field	11	Selection of chemicals
2	Water management	12	Buy chemical pesticides
3	Selection varieties for growing	13	Reading label when prepare for spraying
4	Procurement in buying seeds	14	Mixing/ Dilute chemicals in spray session
5	Germination of vegetables seeds and soaking rice seedling	15	Sprayer of chemical pesticides
6	Rice seed-sowing	16	Harvesting and threshing rice
7	Maintain nursery	17	Selling products
8	Weeding, insects and disease control in nursery	18	Storage/maintenance of tools and equipment
9	Transplanting	19	Farm accounting
10	Insects and disease control		



Women's Savings Group, Kampong Chhnang Province

TFA and ATSA currently support two Women's Savings Groups in Kampong Chhnang Province, one in Krang Khmer village and another one in Knong village. ATSA has assisted in the initial formation of the groups, helped to determine roles within the groups, and advised on rules for membership and lending.

Members of the group all contribute a minimum amount to form a community pool. In order to be eligible for a loan from the group, applicants must be an active member of the community and demonstrate the capacity to repay the loan within a reasonable time frame. Groups also meet on a regular basis to discuss business strategies and development and review loan requests.

The Women's Savings Groups project has primarily assisted women who grow vegetables in their home gardens for sale, or produce liquid compost and botanical pesticides. These savings groups empower women to improve their personal financial situation and also contribute to the self-sustaining capacity of the village.

Conclusions

According to some experts, Cambodia has huge potential for development within small-scale agriculture in the coming years. At present, Cambodia's rice yield is around 2.7 tons per hectare, about 50% less than rice yields of neighboring Thailand and Vietnam¹⁴. By improving access to land; assisting in solidifying market connections; and increasing farmer's knowledge, ability, and willingness to adopt innovative farming techniques, Cambodia could ensure better national food security as well as increase national income through the export of rice in higher volume. However, in order for these benefits to carry the country into the future, development must be approached sustainably, meaning that chemical pesticide use needs to be dramatically reduced.

Cambodia has in fact officially banned the most dangerous chemicals (WHO Class I) and encouraged alternative practices in agriculture through national IPM programs, but it is presently unable to effectively enforce this legislation or continue the expansion of IPM programs to address current needs. The enforcement of bans on illegal cross-border trade of banned pesticides is also needed.

At present, the Cambodian Health Department has limited reliable data regarding the number of incidents of pesticide poisoning or the extent of the poisoning. TFA and partners have contributed some data, but assigning ownership and responsibility for this project at the national government level has proven to be a challenge. In order to appeal to policy-makers, attract international donors, and involve the greater public, ongoing pesticide residue monitoring, blood sampling, poisoning incident reporting, and other data collection methods demonstrating the dangers of pesticides must continue and results must be disseminated via the appropriate channels.

In early 2015, ATSA extended REAL activities into Battambang Province- one of the highest production areas in Cambodia and located very close to the Thai border. In 2015 REAL programs were active in 18 schools in two provinces and reached 1404 students. ATSA staff has had several meeting with the Provincial Department of Education, Youth and Sport (PDEYS) as well as with school directors to seek their continued cooperation. This year, ATSA staff, together with teachers and school directors, discussed with village leaders how to select farmers to participate in the formulation of community action plans as well as overseeing their implementation and management.

¹⁴ <http://www.oxfamblogs.org/asia/greater-investment-in-small-scale-food-producers-key-to-ensuring-food-security-in-cambodia/>



Community-based learning: Conservation of species and traditions

Lao PDR

The agricultural community

Facts and figures

Lao PDR is a small, landlocked country of about 236,800 km² and a population of around five million. It is one of the world's poorest nations and remains on the United Nation's list of least developed countries as of May 2015. Approximately 83% of Lao's population is rural, and the agricultural sector accounts for approximately 52% of the GDP.¹ The 2005 national census identifies forty-nine different ethnic groups and over 240 subgroups² resulting in a wide array of languages, cultures, and farming practices. This has made national policies and initiatives that aim to make changes or improvements within the agricultural sector difficult to standardize and effectively implement.

While Lao PDR may be economically diminished, the land is some of the richest in the world in terms of biodiversity. Landowners in Lao PDR have always been dependent on the fertility of the land and are highly skilled at extracting all they can from these natural resources. Unlike other countries like Thailand, farmers in Lao PDR use the land first and foremost to provide food and other resources for themselves, their families, and their local communities. Any additional yield is then sold for profit, but these profits are minimal as basic food security is considered the priority. Most farmers in Lao PDR also keep their own seed and are highly concerned with the preservation of local species, particularly herbs used for health and healing.

Until recently, environmental laws in Lao PDR have been non-invasive and generally unneeded since the demand and use of resources did not exceed the capacity of the land. Recently however, regulations have needed to be established in order to protect against overproduction and overuse as the result of increased international exports. China has been a primary consumer of herbal plants in recent years, and the once lush agrobiodiversity of Lao PDR has suffered as a result of pressures to produce more and more.

Recently, the Lao government has reprioritized policies on environmental protection and sustainable utilization of agrobiodiversity, receiving generous support from donors in order to pilot additional programs aimed at improving Agrobiodiversity in both Luangprabang and Xiengkhuang provinces. Continued efforts on the part of government and non-governmental organizations will be needed to prevent further damage to the rich biodiversity of Lao PDR while still allowing the country to grow and prosper.

¹ Ducourtieux, O., Laffort, J., & Sacklokham, S. (2005.). Land Policy and Farming Practices in Laos. *Development and Change* 36, 499-526.

² <http://www.ifad.org/english/indigenous/pub/documents/tnotes/laos.pdf>

The rural village

Given the economic and environmental vulnerability in rural areas of Lao PDR, the structure and support that the village provides is vital to instilling a sense of security and stability for community members. Villages are formed on the basis of geographical proximity, shared cultural heritage, and community attachment. Most Lao villages have a long history of providing each other with mutual aid during the rice growing cycle and cooperating on community projects.

Since 2002, contract farming has become widespread in Lao PDR. While it is true that many families have profited from contract farming and develop some additional farm management skills, according to a 2013 study (reference included below), contract farming has also caused many households to acquire high debt as a result of increased input costs. Contract farming has also resulted in greater exposure to chemicals since more chemical fertilizers and pesticides are required of contract farmers to ensure “quality” products.

Lastly and perhaps most importantly, the shift to contract farming has resulted in impaired social relations among traditional farmers and contract farmers as a result of conflicting land use strategies. Relationships among farmers and other community members have also been impaired by more demanding schedules and pressure to produce high yields. Sugarcane contract farming specifically requires a lot of time and labor during peak season therefore, “the households are unable to do other activities during that time which causes them to miss out on some activities in their village such as village meetings and festivals as they have to concentrate only on farm work.”³

Sense of community

Sense of community helps people feel that they are a part of something larger than themselves. In most cases, sense of community is a naturally occurring feeling among individuals who live together, share resources and participate in mutual experiences.

Sense of community can enable individuals to willingly contribute to a greater good, often at the cost of personal sacrifice or intermittent periods of struggle. This is particularly important in rural Lao PDR, where unpredictable weather, an insecure food supply, lack of educational access, shifting migratory patterns, and poverty all pose great challenges. From a community development perspective, sense of community is vital to the sustained success of a community and fosters a sense of interdependence based on shared culture and values.

³ <http://www.fao.org/uploads/media/Role%20of%20contract%20farming%20in%20rural%20farm%20Laos.pdf>

In the face of much change within the agricultural sector that has occurred in Lao, up to this point, local culture has been seems to have been largely preserved, but this might soon change without recognition and intervention.



“Those who live in rural communities face continuing tensions between preserving a community’s heritage and adapting to circumstances shaped by global forces; between exploiting resources in a way that treats the community as disposable or regulating them in a manner that supports and sustains the community; and between open and inclusive processes or closed and discriminatory practices.”

- Cornelia Flora, expert on community and development, Iowa State University

Conserving community

Impact of modernization and the urban rural relationship

Modernization and globalization have brought both positive and negative changes within the agricultural sector. On the negative side, there is the introduction of chemical pesticides, dissolution of traditional farming methods and traditions, emergence of genetic modification with yet unseen outcomes, and forced abandonment of family farms and businesses for the sake of agricultural monopolies. On the positive side, there has been a reduction in physical labor for farmers due to mechanized farming apparatuses, new and expanding income opportunities, access to modern marketing resources, and a growing demand for organic food. Focusing on the positive potentialities, “modernization, far from elbowing these people [farmers] out of the countryside and displacing them into urban areas as a disenfranchised proletariat, has allowed them [farmers] to persist and in some cases to prosper.”⁴

Modernization is largely defined by a changing urban-rural relationship, an aspect of which is demonstrated by the migration of young Lao people from rural to urban areas. This redistribution of people and resources has had a profound impact on agricultural livelihoods. In terms of labor, older people now have to bear more physical burden, working in the fields and the home into their old age. Also, oftentimes when young adults leave home to pursue employment opportunities in cities, they leave their young children behind for the grandparents to care for, so in addition to farm labor, this means increased work within the home as well. This is particularly relevant to our studies of pesticide impact on health, since children and older adults are more vulnerable to the effects of toxic pesticides.

On the other hand however, when family members relocate to cities, this also diversifies income opportunities and creates multiple incomes per household. During low-yielding seasons or in the event of natural disaster, drought, etc. families are still able to receive income from urban industries. Additionally, narrowing the physical and social gap between rural and urban people provides increased market opportunities and larger networks of support for Asian farmers. It has been observed in Lao PDR, Vietnam, and other Southeast Asian countries, that after working in urban industries for some time, middle-aged adults often return to the farm and resume agricultural endeavors, although generally lacking in knowledge and experience in the field.

⁴ Rigg, J. (1998). Rural–urban interactions, agriculture and wealth: A southeast Asian perspective. *Progress in Human Geography*, (22), 497-522. doi:10.1191/030913298667432980

Fostering resilience

Farmers are naturally resilient, constantly having had to find solutions and face unexpected events and fluctuating markets. While these challenges have always existed to some extent, in recent years, they seem to have compounded, largely due to climate change, overuse of pesticides, increasing price volatility, complex agricultural policy and environmental regulations, and poverty. The fact that these issues are chronic and their impacts degenerative, the continued resilience of farming communities, both physically and psychologically, is becoming increasingly difficult.

Sociologist James Coleman calls the personal relationships that exist within a community, especially those that are fostered over time, as "social capital." Social capital refers to the connections among people in a given place that encourages and enables them to care for and about one another. He further notes that rural areas seem to develop comparatively greater social capital than other areas, which may help to strengthen the community as a whole and arm children and families against factors that might put them at risk.⁵ In Lao PDR, this has proven to be the case and dependence on community structure and systems have contributed to the stability of the country as a whole.

How REAL programs support communities

The Field Alliance recognizes that effective and sustainable educational programs must involve the community every step of the way- from conception through to implementation. REAL education is based on participatory and action research approaches, which have proven to have the greatest long-term impact in rural communities specifically.

The Field Alliance was the first organization to support the integration of IPM principles into basic education via the REAL (Rural Education for Agricultural Livelihoods) approach. This model integrates principles of Integrated Pest Management (IPM), while including additional opportunities for learning exchanges to take place between farmers, students, and other community members.



⁵ Coleman, J. (1988). Social capital in the creation of human capital. *American Journal of Sociology*, 94, 95-120.

Conversation practices in Laos PDR

Conservation of culture and traditions

Modernization also poses potential threats to the conversation of culture and tradition for farming communities. If modernization occurs too rapidly there is greater negative potential to form a chasm between process and product, leading to a detached understanding of the responsibilities and implications involved with agricultural production. Extinction of culturally significant species, such as herbal and medicinal plants, or flowers used in local ceremonies, can also result in the dissipation of cultural identity.

Conservation of plants and animals

As previously described in detail, Lao PDR is rich in agrobiodiversity and this quality is highly important for the livelihoods of rural people as well as local and national food security, especially in the face of climate change. Compared to other Southeast Asian countries, Lao PDR is perhaps most aware of the importance of ABD, and therefore, farmers are quick to accept and understand the extreme value of ecological agriculture practices.

Conserving plant and animal species restores biodiversity, improves ecosystems, provides increased opportunities for income, and further contributes to the conversation of culture and tradition. In initial surveys, REAL program participants consider and rate the value of plants and animals based on five categories: food, income, medicine, culture, and environmental pleasantness. When interviewed, farmers in Lao PDR noted a vast difference in the number of species now visible and thriving on their farmland compared to the biodiversity that existed twenty years ago. Most notably, there was a dramatic decrease in the number of fish and frogs. Concern over these species, particularly their impact on food and income, is reflected in the community actions plans that follow.





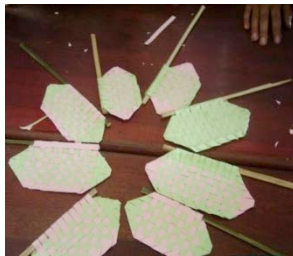
School as centerpiece

Throughout Lao PDR, the school building itself often serves as the centerpiece of the village. REAL programming in Lao schools directly address the needs of the community by providing valuable information on topics that are relevant to specific community needs and concerns. REAL school programs empower students to share information they learn about agriculture, the environment, human health, and sustainability with their families, thus improving the lives of individual students, their families, and contributing to the greater community.

All school programs begin by students surveying local agrobiodiversity and pesticide impacts. In Lao PDR, students have expressed a particular interest in herbal and medicinal plants. They collect, identify, and study these plants, and also interview local elders on their history and use. Through this valuable intergenerational exchange, they are able to return to school and apply this knowledge to experiment making herbal pesticides and medicines, promoting indigenous knowledge and preserving culture and tradition.

Mostly all of the schools in Lao PDR that have incorporated the REAL curriculum also have a school garden that students use as a learning space, and sometimes for school income generation. Many students have also applied the knowledge that they gained from the REAL program to create gardens at home and after harvesting, they are encouraged to bring the vegetables and herbs back to school to sell for profit. School directors have estimated that students can earn approximately 120.00 USD collectively per season through the sale of vegetables to local markets. Some schools also use student-produced vegetables in school lunches ensuring a higher quality, safer school lunch.

Integration of the REAL curriculum into Lao schools has been generously supported by the national government. The Lao national government promotes the decentralization of the curriculum and allows time and space for students, teachers, and community members to develop a localized curriculum in response to the specific needs of the community.



REAL programming has been active in Laos PDR for 8 years.

44 primary-level schools from 25 villages in 5 districts have adopted the REAL curriculum.

2,075,000 m² of land was designated as conservation area in Gnomalat and Xaythany districts.

From 2007 to 2010, the number of plant species documented during ABD surveys in Lao grew from 416 to 1,287.

An estimated 40% reduction in use of pesticides has been reported in Nongno Village, Xaythany District; 27 types used down to 7.

An additional 1,000-1,200 USD may be earned per household per year through traditional Lao weaving.

A 2014 survey indicated that 38% of people in one Lao village believed plant and animal species to be most valuable as a source of food, while 37% considered them to be most useful as a source of income.

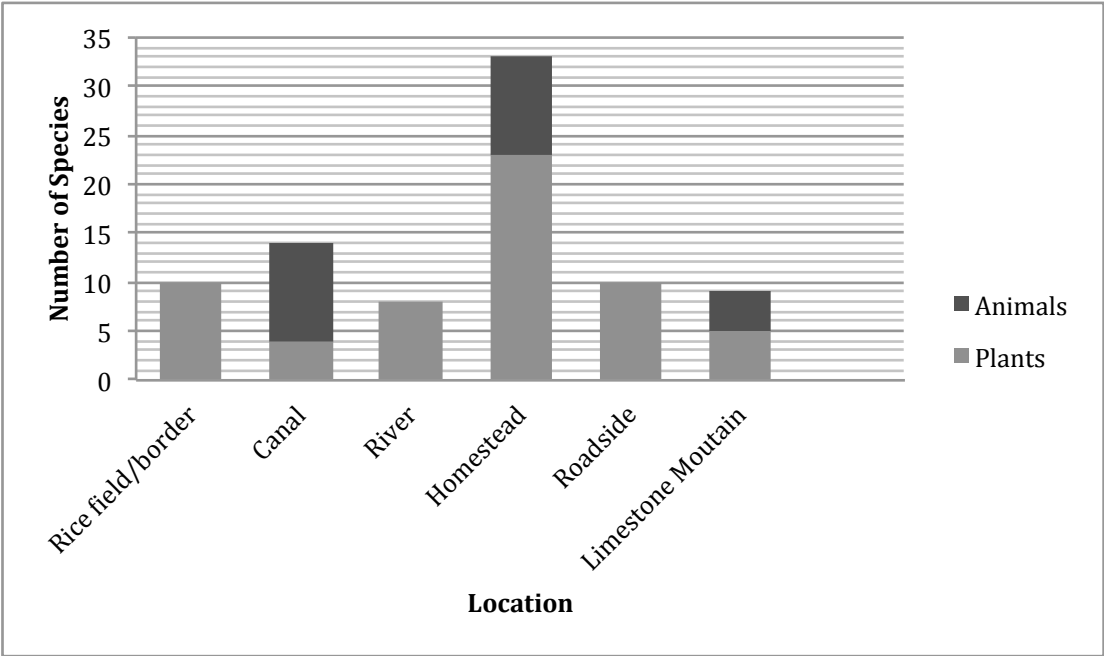
Preliminary survey data

Agrobiodiversity

A Training of Trainers on Agrobiodiversity (ABD) was conducted in Gnomalat District, Khammouane Province August 20-23, 2015. Forty-four individuals from seven schools and seven communities participated in this training including: ECDEF staff, district rural development staff, district environmental staff, district education staff, district home affair office staff, farmers, and community members. Forty-nine percent of participants were women.

During the training, participant-learners gained valuable information on species, habitats, and agrobiodiversity by creating visual maps of their surrounding community; surveying field areas; collecting samples; and discussing findings.

Figure 1.1.) Status of Agrobiodiversity, Gnomalat District, Khammouane Province, 2014



Participating farmers and community members noticed an obvious decrease in number and diversity of species found in the area, specifically animal and fish species. They attributed this decrease to overharvesting of fish, use of modern fishing equipment, lack of habitat, and over-spraying of pesticides that kill fish and damage their habitat.

Pesticide Impact Assessment

A thorough understanding of ABD is a necessary predecessor to understanding the impacts of chemical pesticides on species diversity, environmental balance, and human health. During a Pesticide Impact Assessment (PIA) training, participant-learners receive information on chemical types, ingredients, and environmental and health impacts. They also survey

A Training of Trainers on Pesticide Impact Assessment to Health and Environment (PIA) was conducted at the Nongno Village Office December 25-28 2015. Thirty-two individuals from eight schools and eight communities participated in this training including: ECDEF staff, district education staff, provincial education staff, and farmers and community members. Sixty-three percent of these participants were women. They survey a representative sample of twenty-six farmers/households to document: name and type of chemicals used, amount of chemicals used, mixing and spraying behaviors, storage and disposal methods, and signs and symptoms of chemical pesticide exposure.

Figure 1.4.) Types of pesticides used, Nongno Village, 2014

Trade Name	Common Name	Type of chemical	Chemical Family	Toxicity Level*
Paraquat	Paraquat dichloride	Herbicide	P	II
Posedonmax 10	Cypermethrin	Insecticide	PY	II
Erzole	Cypermethrin	Insecticide	PY	II
Nutel	2.4 D dimethyl ammonium	Herbicide	PAA	II
Atrazine 80	Atrazine	Herbicide	T	IV
Glyfosate 48	Glyfosate	Herbicide	-	IV
Antracol 70 WP	Propineb	Fungicide	-	IV
	Chlorothalonil		-	IV

*Toxicity levels are defined as follows:

1a- extremely hazardous

1b- highly hazardous

II- moderately hazardous

III- slightly hazardous

IV- unlikely if used safely

Figure 1.6.) Signs and symptoms of pesticide exposure

Signs/Symptoms	Number	Percentage
Burning nose	18	69%
Insomnia	10	38%
Red eyes	8	31%
Burning / stinging / itching eyes	20	77%
Excessive tearing	4	15%
Runny nose	3	12%
Excessive salivation	5	19%
Dizziness	22	85%
Exhaustion	12	46%
Headache	23	88%
Shortness of breath	12	46%
Muscle weakness	6	23%
Skin irritation	8	31%
Sweating	11	42%
Itching skin	17	65%
Numbness	6	23%
Cough	6	23%
Sore throat	8	31%
Twitching eyelids	3	12%
Blurred vision	8	31%
Tremor	3	12%
Muscle cramps	2	8%
Staggering gait	3	12%
Diarrhea	5	19%
Stomach cramps	5	19%
Nausea	9	35%
Chest pain / tightness burning	10	38%
Vomiting	5	19%
Seizure	1	4%
Loss of consciousness	0	0%
Coma	0	0%

Of the 26 farmers surveyed, 73% reported **moderate** symptoms, 19% experienced **mild** symptoms, and 8% reported **severe** symptoms of pesticide exposure.

Results: conserved species status (2014)

Species conversation in Xaythany District

The plot sizes in Xaythany District are significantly smaller than those in Gnomalat District; therefore, there is limited space to dedicate to conversation. Regardless of this challenge, the ten villages involved in this project continue to meet annually to develop community conservation action plans. Select villages have been able to conserve and restore up to nine different plant and animal species over a seven-year period.

Village	Target Species
Dongbeng	Local catfish, Sauropus androgynous (pak wan)
Doungbudy	frog, Centella asiatica (pak nork)
Dongkhaouy	cricket, bamboo, local fish species, Nothalphoebe umbellifiora (bong tree)
Dounaine	local catfish, bamboo
Haouxieng	Local fish species, Nothalphoebe umbellifiora (bong tree), cricket, Calameae (wia shoot)
Nasala	frog, Orthosipon stamineus benth (tohnchinaikorm)
Nongkheng	local catfish, Bambusoideae (pal phai)
Nongno	trout, Moriga oleifera (pak ehum)
Paksapkao	frog, Livistona chinensis (tao shoot), local fish species, Nothalphoebe umbellifiora (bong tree), Dipterocarps (yang or rubber tree), Calameae (wia shoot), Cratoxylum formosum (mai tew), Pterocarpus macrocarpus kurz (mai du), Afzelia xlocarpa burl (mai taeka)
Sanghaubor	local catfish, Pterocarpus macrocarpus kurz, Afzelia xlocarpa burl

Species conversation in Gnomalat District

Based on the findings of the Agrobiodiversity surveys and first-hand experience, farmers and community members decided on what species they would like to conserve. These decisions were based on a variety of factors including: economic benefit, food supply/security, creation of a pleasant environment, restoration and protection of diminishing species, and cultural significance/preservation. Village committees also decided on monetary penalties for the crime of stealing species or disturbing the conservation area, increasing dependent on the number of violations.

Ban Donepuay

Target Species: Local catfish
Conservation Area: .32 ha

Ban Naxok

Target Species: Local catfish
Conservation Area: .4 ha

Ban Naphaymai

Target Species: Carp
Conservation Area: .32 ha

Ban Natherd

Target Species: Local Catfish
Conservation Area: .08 ha

Ban Mueng

Target Species: Local catfish
Conservation Area: .08 ha

Revised Community Habitat Action Plans, Gnomalat District (2014-2015)

+increase of .68 ha

Ban Donepuay

Target Species: Local catfish
Conservation Area: .32 ha

+Increase of 99.6 ha

Ban Naxok

Target Species: Local catfish
Conservation Area: 100 ha

+increase of 2.92 ha

Ban Naphaymai

Target Species: Carp, Pheasant
Conservation Area: 4 ha

Ban Natherd

Target Species: Local catfish
Conservation Area: .08 ha

+Increase of 3.68 ha; plus one species

Ban Mueng

Target Species: Local catfish
Conservation Area: 8 ha

+increase of 7.92 ha

Barriers and success factors

Gender and generation gaps

Although Lao farmers report that the retention rate for farmers is high and that about 90% of youth remain in the agriculture sector, this is likely to shift in the coming years with enhanced environmental vulnerability and the influence of modernization. Therefore, it is important to facilitate opportunities for young students to learn about the vital role agriculture has in supporting themselves, their communities, and the world at large in order to encourage continued involvement. REAL programs in schools support intergenerational exchange by encouraging students to interview parents and community elders to collect data about indigenous species, local traditions, and past and present farming practices.

Farmers in Lao PDR report that a higher percentage of farmers are now women (approx. 70%) largely attributed to fact that men and younger family members pursue more non-farm work. Students involved in REAL programs in Lao PDR frequently volunteer to assist local farmers (mostly older female farmers) with manual labor, filling in gaps when younger family members migrate outside of the village to pursue outside employment.

Conservation challenges

Major challenges to conversation sites are largely a result of lack of awareness and include theft, sabotage, and non-cooperation of adjacent or adjoining properties that impact the conservation site. In Lao PDR, participating villages have combated these challenges by establishing community rules and punishments for those who violate rules. The standard progression of punishment is: 1.) Verbal warning; 2.) Monetary fee, and finally; 3.) Eviction from the community. These rules are voted decided upon by the community members themselves, guided by the appointed village leader. Since the establishment of these rules and punishments, none have been implemented beyond verbal warning.

Additionally, availability of land in Lao PDR is severely limited and much of it has been sold to wealthy owners who now rent out small plots to local farmers. This means that communities do not have much land to dedicate to species conservation or experimentation. As demonstrated in the revised action plans of 2015 however, after seeing the positive effects of conservation, many communities have still managed to find more area to assign as conversation sites. Between five villages, there was an additional 155 ha assigned as conservation area ranging from .68 ha- 99.6 ha per community (see Revised Community Habitat Action Plans).

Community involvement and multi-level engagement and support

Neither social nor economic development is possible without a strong community that maintains a network of support between individuals, local, regional, national, and international organizations.

The village system provides a strong community infrastructure in Lao PDR, but modern development may jeopardize this system and loosen the ties between individuals and their communities. Activities organized by REAL project participants such as the annual Community Fishing Day in Nongno Village, Xaythany District help to preserve a sense of community. On this day, the larger surrounding villages are invited to come to the conversation pond in Nongno Village and for a flat rate they are able to catch as many fish as they can to sell for profit. Many people come together for this event, helping to raise awareness of pertinent conservation issues while also fostering connections among community members.

Community Fishing Day and other community-organized activities supported by the REAL project are just some examples of how to increase community involvement. To ensure the ongoing existence of programs however, upper-policy level support is required in order to ensure the financial sanctity of said programs and maintain momentum and initiative among farmers.





Moving forward, not forgetting to look back

REAL programming in Lao PDR serves as an example of best practices within the field of Agrobiodiversity. This is as result of the long-standing reliance of Lao people on the biodiversity of natural resources for both food and income. Acceleration of environmental degradation due to the overuse of pesticides and climate change will need to be addressed via policy mandates and more educational programs aimed at addressing these issues in safe and sustainable ways will need to be implemented.

In 2016, REAL programming in Lao PDR will expand their programming to include more schools and communities. Thematic emphasis will be on the preservation of local wisdom and cultivation of herbal and ceremonial plant varieties. Within schools, student will practice cricket rearing, raising of local chicken species, indigenous catfish, and learn about the importance of seasonal cropping and poly-cropping or poly-culture in response to the updated 2016 REAL Ecological Agriculture Curriculum Framework.



Meeting in the middle:
Why policy-level support is crucial for
sustainable educational programs

Davao del Norte, Philippines

Country profile

The Philippines is a complex nation that consists of over 7,000 islands. By choice or necessity, many Filipino people live dangerously close to active volcanoes, on top of earthquake fault lines, or very near to coastlines. This hugely variant geography causes extreme and often unpredictable weather conditions and natural disasters such as drought, typhoons, and floods. On the other hand, the country is also home to vast areas of lush rainforests and fertile fields that have provided sources of income and employment for Filipino people for centuries.

Agriculture has always been the biggest production sector with employment accounting for as much as 12.03 million or 35% of the country's total employment in 2008 and contributing 18% of the Gross Domestic Product (GDP).¹ The country yields a wide variety of crops; including sugarcane, coconut, rice, and bananas. The Philippines is the second largest exporter of bananas in the world and millions of citizens are employed by the banana industry.

Although the Philippines is considered to be a developed country, as an island nation, they are still highly reliant on imports. Dependency on imports has left the country in a vulnerable position and also means that there are fewer jobs available within the country. As a result of joblessness and low educational enrollment, poverty is a major issue that continues to worsen. In 2014, the poverty percentage rose 1.2% to an overall 25.8% in the country. In recent years there has also been a significance decrease in crop production, which has had a minimal effect on the nation's *exports*, but has greatly affected the domestic market. Increases in the cost of rice for domestic sale have compounded the hunger and malnutrition issues in the country and a review of the government's rice self-sufficiency policy was recently called for.²

Issues like climate change, industrialization, and degradation of ecosystems due to overuse of chemical pesticides are making life extremely difficult for rural farmers. As explained by Carating et al, "Rural poor are most affected by environmental degradation because they are dependent on fragile ecosystems. This creates a vicious cycle of poor income and poverty that precipitates further exploitation and consequent depletion of natural resources. Unless this cycle is broken, it is difficult for the country to attain the aggregate gains on sustainable development."¹

¹ [http://www.afaci.org/file/anboard2/PHILIPPINES\(word\).pdf](http://www.afaci.org/file/anboard2/PHILIPPINES(word).pdf)

² <http://www.philstar.com/headlines/2015/03/07/1430889/poverty-incidence-1.2-first-half-2014>

In 2008, Agriculture accounted for 35% of the country's total employment and accounted for 18% of the GDP.

IPM programming has been active in the Philippines for over 25 years.

More than 50% of students ages 7-15 live in rural areas.

As of 2005, "Promotion and Development of Organic Agriculture in the Philippines" is a part of an official government policy.

In 2007, it was estimated that 19% of families suffered from malnutrition or poverty compared to 2014 when it was estimated that 25.8% of the country was in poverty.

Fortunately, the national government in the Philippines has made significant interventions to aid the problems the country faces, particularly relating to agriculture. Long-time support of Integrated Pest Management, and recent public health awareness campaigns and policies have renewed and sense of hope and possibility for farmers across the country.

Development of the organic agriculture movement in the Philippines

The national government and an increasing number of Filipino citizens believe that organic agriculture could offer a sustainable solution to the poverty and malnutrition epidemic in the Philippines. Organic agriculture has the capacity to reduce input costs and provide a sustainable agriculture system that will repair damaged ecosystems, respond effectively to climate change, provide food security, and carry the Philippines into the future.

As defined by International Federation of Organic Agriculture Movements (IFOAM), organic agriculture is “a production system that sustains the health of soils, ecosystems and people. It relies on ecological processes, biodiversity and cycles adapted to local conditions, rather than the use of inputs with adverse effects. Organic agriculture combines tradition, innovation and science to benefit the shared environment and promote fair relationships and a good quality of life for all involved.”³ Although many of the principles of organic agriculture require a reversion to more traditional methods where the environment itself is the primary determinant of output, in an agricultural system that has been corrupted and complicated by money, science, and technology, the concept of organic agriculture is considered novel.

In the Philippines, the movement towards organic agriculture began development in the 1980's with the establishment of MASIPAG (Farmers and Scientists Partnership for Development, Inc.) and The Philippine Development Assistance Programme, Inc. (PDAP), both of which are networks of NGO's, farmers, scientists, and other stakeholders concerned with the promotion of agrobiodiversity, sustainability, and reducing dependency on chemical and other modern technologies in agriculture. In the 1990's, IPM laid a foundation for the sustainable development and was adopted by the national government. IPM programming remains strong in the country, IPM principles have been integrated into national policy and helped to instill a sense of agricultural strength and solidarity.

Various educational and non-government organizations continued to form during the 1990's, and in 1999 some 400 delegates from Asia, Europe, the Pacific, and the Philippines gathered at the 4th International Federation of Organic Agriculture Movement (IFOAM) AsiaScientific Conference and General Assembly in Tagatay City. This conference provided a real opportunity for the Philippine organic movement to consolidate.⁴

³ <http://infohub.ifoam.bio/en/what-organic/definition-organic-agriculture>

⁴ [http://www.afaci.org/file/anboard2/PHILIPPINES\(word\).pdf](http://www.afaci.org/file/anboard2/PHILIPPINES(word).pdf)

OA in the Philippines, 2000-2010

February 2000

CITEM institutes an organic certification and inspection program and established the Organic Technical Working Committee (OTWC).

2000

The Field Alliance establishes formal partnership with Davao del Norte School IPM Network

July 2003

The Philippine National Standards Specifications (PNS) for Organic Agriculture is adopted by the Department of Agriculture through the Bureau of Agriculture and Fisheries Product Standards (BAFPS).

January 2005

The Philippine National Organic Agriculture Board is established.

December 2005

Former President Gloria Macapagal Arroyo issues Executive Order 481 on the "Promotion and Development of Organic Agriculture in the Philippines", recognizing the potential of organic agriculture in the country and providing government support to the development of the sector through market development, farmer education, and extension assistance.

2008

Go Organic! formed. Go Organic! is a group of NGOs, farmers' organizations, local government representatives and other organic agriculture advocates dedicated to promoting organic farming.

2010

The Organic Agriculture Act (R.A. 10068) is passed. This act mandates multi-departmental collaboration towards the development and promotion of organic agriculture in the Philippines.

REAL approach to sustainable programming

The Field Alliance embraces a multi-faceted and multi-directional approach to educational programming. By setting goals and standards together, “top-level” stakeholders and community participants can experience mutual benefits. It is only by creating networks and trusting relationships between all those involved in program implementation that programs can sustain themselves in the long-term.

Government

Policy-makers/advocates

School staff

Community boards



SUSTAINABILITY



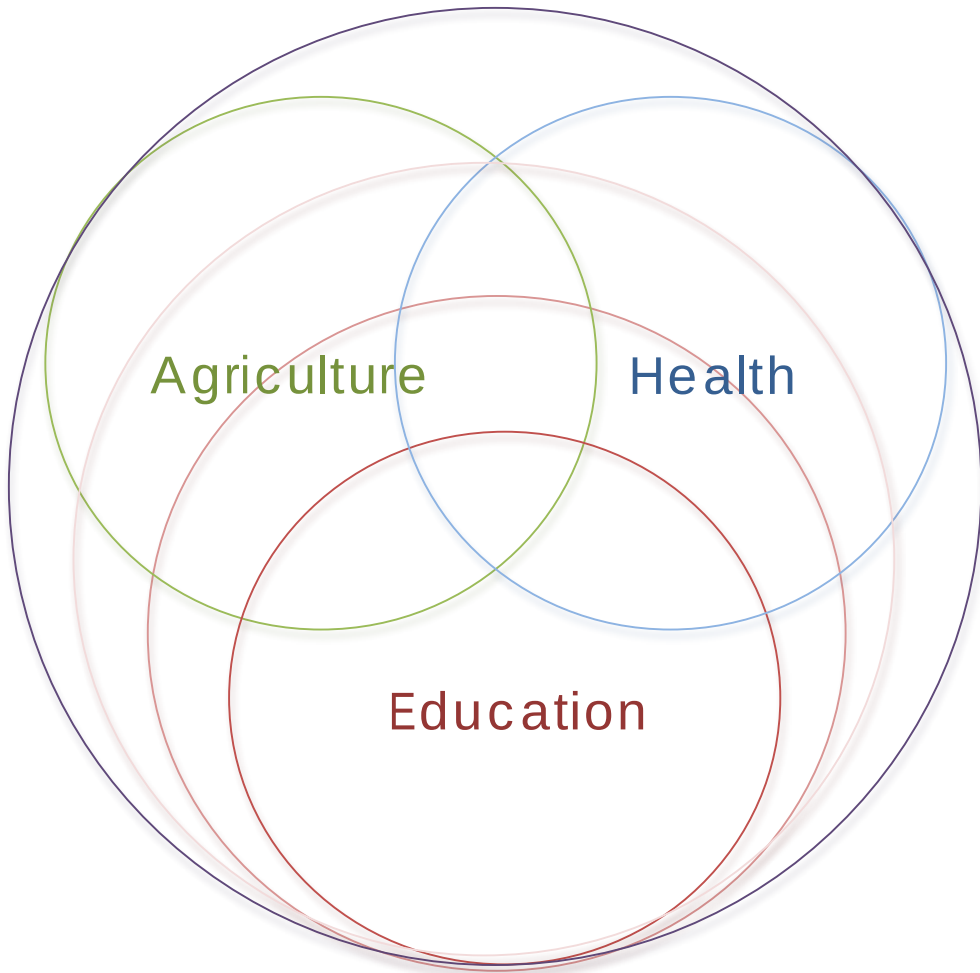
Students

Farmers

Community members

Integrated programming with a cohesive agenda

REAL Programming is reliant on collaboration between three major sectors: Agriculture, Health, and Education. Communication between these sectors is imperative in order to set common goals create sustainable programming for lasting impact.



TFA considers education to be the most effective inlet to achieving long-term change within other sectors. By integrating organic agriculture principles at the basic- education level, students adopt morality-based perspectives on global issues and understand the importance of sustainable agriculture in ensuring their future livelihoods.

Getting and staying REAL in the Philippines

REAL programming in the Philippines was introduced after nearly ten years of IPM activity. Incorporation of REAL programming was initially inspired by a visit by Philippines representatives to The Field Alliance's Regional Workshop. Following this workshop, The Field Alliance established a formal partnership in the Philippines and began providing technical support to train local educators and facilitators on IPM, PIA, and ABD. During the late 2000's the program was able to expand greatly after receiving significant attention and funding from local and national governments of the Philippines.

As explained in the 2010 Status Report for the Philippines, "strong local government support ensures successful implementation of the project. The Provincial Government through its Provincial Agriculture Office has over the years developed and nurtured strong partnerships with DepED, LGUs, DA, PTCAs, farmers, and NGOs in the sustained implementation of its Provincial IPM program. Local DENR staff also participated in advocacy meetings and expressed interest in supporting and helping upscale the efforts. The presence of such structure provided the institutional network and this support facilitated the implementation of a community development initiative like the Agro-BD conservation and PIA project."⁵

The expansion of REAL programming in the Philippines directly correlates with governmental efforts to promote organic farming, namely the Executive Order 481 in 2005, the formation of the Go Organic! Initiative in 2008, and the Organic Agriculture Act of 2010. This serves as a prime example of why coordinated efforts between non-governmental organizations and government organizations are vital to establishing and sustaining affective educational programming.



⁵ Provincial Agriculture Office.(2010). "Status Report: *Harnessing Local Partnerships and Strengthening Environmental Education through Conservation and Sustainable Utilization of Agro-Biodiversity*". Davao del Norte, Philippines: Egmedio E. Samillano et al.

Education as the primary vehicle

School programs in the Philippines

The Field Alliance supports both Farmer Field Schools and REAL school programs, reaching those in immediate need of practical, vocational education and also anticipating the needs of future generations. Within schools, the national government provides significant support for agriculture related programs and curriculum addendums, specifically pertaining to organic agriculture. As outlined in Section 23 of the Organic Agriculture Act of 2010, “The National Government, through the DepED and in coordination with concerned government agencies, NGOs and private institutions, shall strengthen the integration of organic agriculture concerns in school curricula at all levels.”⁶ REAL programming complements already existing initiatives supported by the Department of Education and in this sense, REAL programs are more directly complementary than supplementary meaning, ultimately leading to a greater potential for long-term sustainability. .

One of these projects proposed and supported by the national government is the *Gulayan sa Paaralan*, or ‘school garden,’ project. In partial response to the Organic Agriculture Act, *Gulayan sa Paaralan* was launched in 2010 in selected districts through partnership between the Department of Education and the Department of Agriculture. Following the success of these first programs, more schools were encouraged to participate and the program expanded from what was primarily a nutrition and food-security based program to include Bio-intensive Gardening Technology (BIG), including education on agro-biodiversity; soil, water, and species conservation practices; natural fertilizers and pesticides; and crop museums⁷. In 2014 *Gulayan sa Paaralan* and complementary School-based Feeding Program were introduced in public schools throughout the country.

In regards to REAL school programming, TFA programs operate on the elementary and secondary levels, and aim to instill the importance of agriculture as a basic educational subject for Filipino students, as valuable and as necessary as English, Math, or Science. Although the Philippines school system already has extensive experience in the subject of agriculture, the REAL approach offers teachers valuable and unique methods by which to disperse information to students- through experiential, action-based learning.

⁶ http://www.lawphil.net/statutes/repacts/ra2010/ra_10068_2010.html

⁷ <https://schoolnutritionphils.wordpress.com/>

Integration of Organic Agriculture into basic national curriculum

Recently, TFA was invited by Davao del Norte school district representatives to consult on the formal integration of the subject of Organic Agriculture into the national school curriculum. Considered to be a direct response to the Organic Agriculture Act initially proposed six years ago and supported by Go Organic!, the formal integration of this subject into basic education curriculum marks a huge step forward for the future of organic agriculture in the Philippines and also poses new challenges for TFA and partners.

In contrast to REAL school program format in other partner countries as well as those already in existence in the Philippines, the government of the Philippines has mandated a full *integration* of organic agriculture concepts into the existing basic curriculum. This means that Organic Agriculture will not be taught as a separate subject, but instead integrated into all basic subjects and lesson plans. The interdisciplinary integration of Organic Agriculture is a powerful opportunity to reframe agriculture as a key element of basic education in rural areas and not merely a supplementary subject. By presenting information in multiple forms and through the guise of diverse subjects, it is also possible that this information will appeal to a wider range of students with varying interests.

However, integration also provides several challenges, the primary challenge being time. A key success factor of REAL programming to this point has been that the concepts and information presented to students are communicated via a slow and deliberate learning process. Field experience is vital to the student's learning process and engagement with the local community allows for the sharing of indigenous knowledge as well as showing students that the school and community are not separate entities, and exist to support each other. Practically, in order to be most effective, REAL programming should go with the flow of the crop production system in the area so there is a stronger sense of real life connection and the experience is not fragmented for the students.

At present, TFA is working in close collaboration with teachers and administrators in the Philippines to further improve their lesson plans and negotiate more time for teachers and students to focus on ecological and organic agriculture concepts. Since this type of integration of REAL concepts and approaches is unique to the Philippines, a period of adjustment and experimentation will be required but initial evaluation of the proposed lesson plans for the Integration of Organic Agriculture in the Basic Education Curriculum of the Primary and Secondary Schools reflected a step in the right direction that has the potential to set new international standards in curriculum development.

Cultivating agents of change

One major positive outcome of REAL programming in the Philippines has been the development of *agents of change* among the participating teachers, trainers, and within our partner organizations. In Davao del Norte, teachers refer to the group as their “OA family” and regularly attend meetings and retreats to continue to mold and shape their approaches in the classroom and to brainstorm and develop new lesson plans. These opportunities for teacher development are integrated into the overall budget and are vital to the sustainability of the programs. Without the enthusiasm and commitment of the teachers and staff involved in TFA supported programs, the national expansion and integration of organic agriculture curriculum-rooted in IPM and REAL approaches- would not be possible.



Conclusion

The importance of receiving and maintaining policy-level support

Receiving and maintaining policy-level support is vital for sustainable educational programming. In this case study of the Philippines, timing of policy issue and launching of IPM and TFA supported programs was imperative and worked towards mutual benefit. The fact that IPM and Farmer Field Schools have been active in the Philippines since the 1990's provided an inlet for REAL programs in schools and once the official mandate for integration of organic agriculture into the national school curriculum was declared in 2010, these programs gained greater potential to reach even more students in more areas.

Furthermore, the fact that the act clearly stated that the methods of implementation were left to be determined by the existent network of NGO's and Department of Education representatives has provided a valuable opportunity for The Field Alliance and our in-country partners to orchestrate this process fully from conceptualization to implementation, resulting in the most cohesive and effective programming possible.

The national government of the Philippines has always been highly supportive of IPM and other REAL programming, but moving forward, continued financial and policy support will of course be needed.



Agricultural education via formal and non-formal systems

Ban Nong Tao School, Nong Tao District, Chiang Mai, Thailand

Department of Non-formal Education (DNFE),
Kham Ta Kla District, Sakon Nakhon, Thailand

A chemical culture

Like many other countries in Southeast Asia, Thailand has experienced rapid industrial growth over the past fifty years. Despite urban migration and vocational diversification, agriculture remains central to Thailand's economy and culture. According to the World Health Organization (WHO), 65% of Thai people are currently employed in agriculture.¹

In order to boost agricultural production and efficiency, there has been a marked increase in the use of powerful agrochemicals in Thailand, beginning in the 1960's. During this time, the country was both externally influenced by the international Green Revolution and internally influenced by new national development goals aimed at developing agriculture infrastructure. In order to meet these new goals, from the late 1960's-1970's the use of agrochemicals was strongly promoted by the government. The government also influenced the types of crops being produced and monocropping of 'cash crops' was promoted.

In the past, Thai farmers practiced subsistence farming and utilized a wide variety of plants and animals for food and income. To increase soil fertility and control pests, farmers depended on natural ecosystems. The crops and farming methods supported by the government during the 1960's-1970's however, came with a necessary reliance on agrochemical fertilizers in order to produce higher yields and more 'marketable' products (larger, more colorful, uniform in appearance). New varieties of crops were also more susceptible to insect pests and diseases, and monocropping disturbed the natural balance of ecosystems- meaning that stronger insecticides and fungicides had to be applied to combat pests.

Overdependence on a single crop also created an environment of fear among farmers. In the past, an infestation might have caused one crop to fail, but farmers were secure in the fact that they could still receive income from other crops. Now that farmers were only growing a single crop, infestations were detrimental, potentially stripping them of all income for that growing season.

This fear often caused farmers to apply *even higher* concentration of pesticides than required or to mix multiple types together without fully understanding the impacts. Evidence collected by The Field Alliance and partner organizations indicates high incidence of agrochemical misuse and occupational, largely due to an inadequate understanding of the acute toxicity and long-term health hazards associated with improper pesticide use. Marketing strategies with the sole aim of maximizing pesticide sales exacerbate these problems and provide farmers with inaccurate information and limited choices.

¹ <http://www.who.int/heli/pilots/thailand/en/>

The REAL education model

What is REAL education?

Overuse and misuse of pesticides can be largely attributed to lack of education among both farmers and the general public. The Field Alliance and Thai partner organization, Thai Education Foundation, has acknowledged this deficit and views education as both a tool and a medium through which to ensure and improve the future of farming.

The Rural Ecology and Agricultural Livelihoods (REAL) education model was piloted over two decades ago. Thai Education Foundation was the first to adapt this model for application in primary and secondary level schools in Thailand. This model is largely based on the Integrated Pest Management (IPM) program supported by the United Nations Food and Agriculture Organization (FAO). While the FAO program focuses solely on crop production however, REAL education explores the physical, economic, social, and cultural impacts of pesticides and uses a holistic approach to support communities in developing practical and sustainable solutions.

REAL education is an integrated learning approach through which school children actively investigate agriculture. They interview family and community members, explore local farms and school grounds, and formulate questions and solutions that are relevant to their own lives. In doing so, students gain a rich understanding of ecology while developing necessary critical thinking skills with respect to environmental, health and social problems.

The role of REAL teachers is to facilitate the learning process, not solely to deliver information or 'answers' from the front of a classroom. Teachers provide resources, introduce novel study techniques, propose problems, and most importantly, continue to ask questions. REAL school programs must be preceded by teacher training courses during which teachers can develop the skills and knowledge required to organize and conduct REAL style sessions in the field and classroom. Parents and other community members also play an important role in the REAL learning process through their willing participation in surveys and discussions organized by students, and also by providing plots of land for the students to experiment on, tools for students to use, and indigenous knowledge.

While the REAL model is currently be implemented by The Field Alliance partners in six countries and dozens of schools, Thailand is considered to be true pioneers for their willingness and ability to integrate the REAL model into both formal and non-formal education systems.



One of the key factors in integration of REAL programs into schools in Thailand is the fact that the National Government of Thailand has mandated specific time and curriculum allotments for the integration of “localized” topics, officially referred to as “Special Experiences.” Special experiences are determined by the teachers, students, and community members in each school individually and allow students to actively engage with the community to confront and solve pertinent issues or interests.²

Thailand also has a well-developed non-formal education sector, overseen by the Department of Non-Formal Education (DNFE). Non-formal education in Thailand got its start in the 1940’s when an Adult Education department was established. Adult Education later expanded in 1979 to the DNFE, to provide education not only for adults, but for various groups and individuals that either elect not to or are unable to participate in the formal education system.³

² <http://www.ibe.unesco.org/curriculum/Asia%20Networkpdf/ndrepth.pdf>

³ http://asemllhub.org/fileadmin/www.dpu.dk/asemeducationandresearchhubforlifelonglearning/conferences/rigapresentations/resources_2593.pdf

Non-formal and informal education

Non-formal and informal education are critical components of the Thai education system, ensuring learning opportunities for all Thai people regardless of age, income, or location. As of 2011, an average of 3,500,000 learners are involved in non-formal and informal education each year⁴. Major areas of focus of the Office of the Non-Formal and Informal Education (ONIE) have been: providing citizens with functional literacy skills; providing education for those who were unable to complete formal schooling for various reasons; and vocational and technical training for practical skill development.

The Department of Non-formal Education (DNFE) has been implementing the IPM course for farmers since 1998 under support from TEF and FAO. Hundreds of teachers have been trained and thousands of farmers have attended Farmer Field Schools in the past two decades. Although governmental support remains strong, shifts in the workforce have proven challenging for contouring to operate programs. Many teachers have been promoted into administrative positions and many others have retired, meaning that there are significantly fewer people to implement programs. This issue has been recognized however, and prompted ONIE to fund three additional season-long Trainings of Trainers in 2014.

Major challenges facing the non-formal and informal education sub-sectors are reaching those in the most remote areas and those of minority backgrounds who lack access to formal education and schooling. Partnering with various NGO's and external organizations, such as Thai Education Foundation, allow for government programs to reach a greater number of individuals. This partnership is also highly beneficial to The Field Alliance and Thai Education Foundation as well, as government supported programs are more practical and sustainable in the long-term.

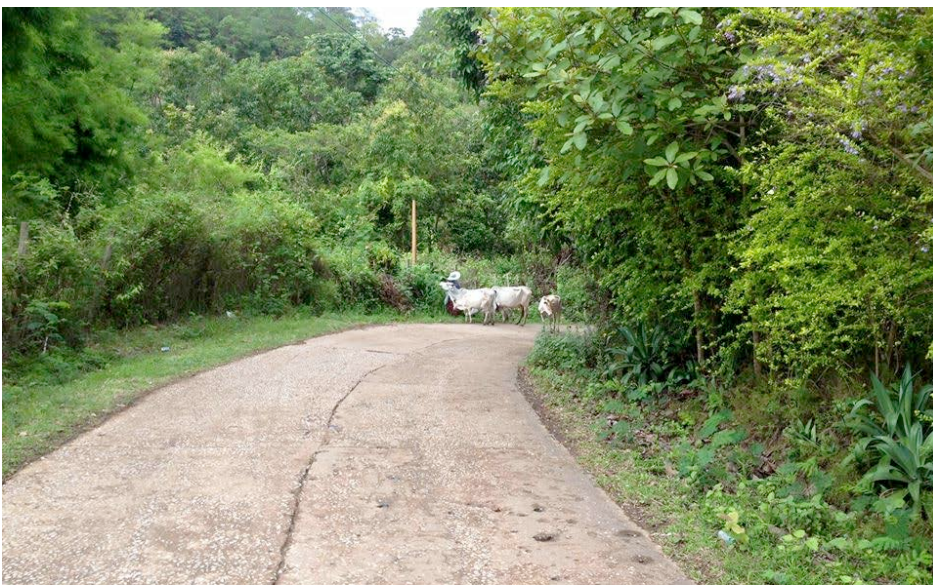
Following are two selected case narratives. The first focuses on the implementation of agriculture-based curriculums in the formal education system while the second provides an example of programming currently being implemented via the Department of Non-formal Education.

⁴ <http://www.unescobkk.org/education/resources/resources/education-system-profiles/thailand/references/>

In practice: Ban Nong Tao School, using the formal education system to reach students and communities

In early 2016, Thai Education Foundation partnered with Ban Nong Tao School in Nong Tao District, Chiang Mai, Thailand. Ban Nong Tao School is located in a moderately remote mountainous region of Chiang Mai. The school property occupies approximately 2.4 acres and is located in a valley, making it highly susceptible to the impacts of airborne and waterborne agrochemical contamination. Furthermore, for the majority of farmers in this area, growing flowers is the primary source of income, and this typically requires a high amount of pesticide usage to preserve the appearance of the flowers for sale. For these reasons, the school is particularly concerned about the impacts of agrochemicals on human health and the environment and therefore has sought support from Thai Education Foundation as well as the Royal Project Foundation and Chiang Mai University to use action-based learning approaches in order to educate students and community members on these issues.

Many students of Ban Nong Tao School travel far distances to attend class and stay in the nearby village during the week in lieu of trekking back up the mountains everyday to return to their homes. Since the parents of these students are often inaccessible due to their location, language barriers, and demanding work schedules, the children serve as primary vehicles of communication, allowing critical information regarding pesticide use and health and environmental impacts to be passed along to parents.



Ban Nong Tao School Pledge

1. To create a safe school environment where students can grow and prosper.
2. To create a fertile and diverse agro-ecosystem at our school and in the surrounding areas.
3. To refrain from using chemicals on school property and advocate for decreased use of chemicals in the larger community in order to protect human health and the environment.
4. To be actively involved in community health advocacy and programs.
5. To establish sustainable school cooperatives including a financial cooperative and an agricultural cooperative.

Our agricultural cooperative will involve cultivation of organic, pesticide-free vegetables on school grounds for to be utilized for school lunch program and to provide students and their families with proper nutrition and increased food security within the community.

6. To implement an action-based research approach at our school in order to enhance student experience and demonstrate direct integration of learning concepts into everyday life.
7. To create action plans for the conservation of local and indigenous species.

Structure of REAL programs at Ban Nong Tao School

Ban Nong Tao School currently provides education to 164 students in grades 1-6. All students have the opportunity to participate in REAL programming. Regarding staff, there are eleven teachers and nine volunteers. At this time, nine teachers have been trained via the Integrated Pest Management (IPM), Pesticide Impacts Assessment (PIA) and Agrobiodiversity curriculums. A group of approximately twenty parents of students at Ban Nong Tao are involved in REAL programming and have received training on home vegetable gardens.

Ban Nong Tao School has established formal policies regarding ecological agriculture, including the exclusive use of ecological and sustainable farming methods on school grounds. Students are also encouraged to regularly engage with the community, both as part of the REAL program and as part of their school mission. This involves the students working with local monks, farmers, and village elders in order to increase knowledge and preserve local wisdom.



REAL school programs take place every day from 14:30-15:30. Ban Nong Tao School has reserved two experimental plots of farmland for their students to use as a part of REAL programs in addition to a medicinal herb garden. Students also rear frogs and fish and cultivate mushrooms on property donated by community members. The yields from these activities primarily support the school lunch program, while students can sell surplus at local markets. The school has also provided each student's family with one-three chickens to raise at home in order to support community food security and enable students to put into practice ecological farming methods learned at school.

Student interviews

The Field Alliance considers students of all ages to be valuable social contributors. On a recent visit to Ban Nong Tao School, TFA staff interviewed several students on their perceptions and experiences relating to agriculture and REAL programming.

Interviewer: What do you want to be when you grow up?

Students: Soldier, racecar driver, teacher, teacher.

Interviewer: Really? So no one wants to be a farmer when they grow up?

Students: (laughing) Maybe we will do some farming after they are done with our other jobs, if we have time.

Interviewer: Why is agriculture (farming) important?

Students: For our livelihoods, but also, if you buy from the some place each the food might have poisons or be of bad quality. When we eat infected foods we may get stomachaches or vomit. We can even die in the future or be weak and sick all the time.

It is also so bad with the burning. The air quality is very bad during this time and it is hard to breath. People need to know this is bad and stop for the future.

Community health advocacy

Residue testing of produce and other food products purchased at the local market is regularly conducted in Nong Tao. The most recent test found residues on both cabbage and onion bought from the market demonstrating that there is still some pesticide use in the area.

Knowledge about the impacts of chemical pesticides on farmers and children is still greatly lacking, and as part of a recent initiative to increase public knowledge and advocate for improved public health on the policy-level, The Field Alliance's Thai partner, Thai Education Foundation, launched a regional study to investigate the impact of chemical pesticides on human health.

Ban Nong Tao School was one of the four schools in Thailand invited to participate in this study and was selected due to their known issues with overuse of pesticides. Parents and students were invited to come to the school for blood tests.

At Ban Nong Tao School thirteen teachers/administrators and 125 students were tested via reactive paper blood tests with technical support provided by the local hospital. Results indicated that two people were 'unsafe' (very high levels of pesticides), twenty-two people were 'at risk' (high levels), seventy-two people were 'safe' (acceptable levels as determined by international standards), and forty-two people were 'normal' (no residue detected). Results were then shared with parents and community members. Although only two people were determined to be at immediate risk, the results were still shocking to many and provoked discussion regarding short and long-term health impacts and next steps in order to reduce pesticide exposure, particularly inadvertent exposure to children.



Human rights perspective

The REAL program model takes into account both UNESCO's Goals for Sustainable Development (Figure 4.2.) as well as the articles of Unicef's The Convention on the Rights of the Child⁵.

This term, TFA has launched several initiatives to ensure safe, chemical-free environments for children-both at school and at home. The Field Alliance provides programmatic support and policy advocacy in order to reduce/cease spraying of pesticides near schools; advocating for the use of biological cleaning products and herbicides, pesticides, and insecticides on school grounds; and via the recently piloted Safe School Lunch initiative in partnership with Thailand's Ministry of Education, Education for Sustainable Development. While currently active in only a few schools, a national expansion of the Safe School Lunch program has been proposed for launch in late 2016.



⁵ http://www.unicef.org/crc/files/Rights_overview.pdf

Training farmers with special needs and disabilities via non-formal education (DNFE)

Another example of the diverse application of the REAL education model is being implemented in Sakon Nakhon Province of Thailand. In this region, Thai Education Foundation has initiated a partnership with the Department of Non-formal Education (DNFE) to work with a group of farmers with special needs and disabilities. The program has the dual purposes of providing these individuals with practical vocational skills that can be used as a source of independent income, while also teaching ecological agriculture approaches and educating these individuals on biological fertilizers and pesticides as the primary means of pest control.



While this partnership has only just begun, TEF staff had the opportunity to interview the facilitator of this group in order to gain valuable information on her experience and content relevance. Below is an excerpt from this interview.

Interviewer: What is your name and age?

Facilitator: I am Ms. Gree GaenSarn, age fifty-six.

Interviewer: How has this group been involved with DNFE in the past?

Facilitator: This disabled group has been a target group of DNFE Kham Ta Kla District. We have provided them with classes on life skills and vocational training via the IPM curriculum, so they will be able to take care of themselves in the future.

Myself, I also participated in the Continuing Education Program through DNFE under the life skills development curriculum and IPM. Now I am able to apply the knowledge and skills in growing vegetables with IPM practice to make a daily living. I will transfer this knowledge to the members of this group of Kham Ta Kla District in order to encourage them to learn the practice and know how to do farming without using chemical pesticides. Moreover I want to help them to build up more capacity for independent income generation.

Interviewer: What types of disabilities are among members of the group?

Facilitator: Deficiency in hearing mainly and some developmental/learning disabilities.

Interviewer: What are your main goals with this group?

Facilitator: These students have already finished their fundamental compulsory education and now our aim is to prepare them to work on their own to support their families.

Interviewer: Why is an agricultural-based curriculum appropriate for this group especially?

Answer: The students will be able to produce food for their own consumption and to create income to support them by using IPM practice. It promotes self-reliance and builds capacity among individuals who may have been previously dependent on families or caregivers. With this education, they can actively contribute to their family's well being.

Interviewer: What is the next step for these students? Do you think group members will go on to work in agricultural jobs, assist on farms, etc?

Answer: The students will be able to assist their families in different kinds of

agricultural endeavors because they can firstly help themselves to make a living as other people without disabilities would.

Interviewer: Do the students seem to enjoy the program? What is the feedback that you have received so far?

Answer: The students are very proud of themselves for seeking out and receiving the opportunity for education because they previously lacked opportunity and access.

Interviewer: Have there been any parts of the curriculum or program that have been difficult for group members to access or understand due to their disabilities?

Answer: Communication has proven to be a challenge for the students due to their deficiency in hearing. Sometimes we will need to move more slowly through material in order to ensure comprehension.

Interviewer: How do you see this group developing in the future? Will more topics be covered? Will you reach out to work with other disabled individuals?

Answer: I would like to see examples of successful disabled individuals who have emerged from this program/training to serve as core leaders or 'master trainers' in order to expand and disseminate the results of this work to other disabled individuals and further develop or improve self-reliance and efficacy.





In summary

These two case narratives serve as unique examples of how REAL programming can be executed via formal or non-formal education systems. In both examples, it is made clear that official support by national and local governmental organizations (the National Government of Thailand, Ministry of Education, and Department of Non-formal Education) ensure the long-term stability of programs.

Within Thailand, it has been proven to be particularly easy to insert the REAL curriculum through a special allotment of time for the exploration of localized content. Direct links to pre-existent vocational and life-skills curriculums put in place by the Department of Non-formal Education also facilitate a smooth integration of REAL educational material into non-formal education curriculums. However, as evidenced in the included case narrative “Meeting in the middle: Why policy-level support is crucial for sustainable educational programs,” this method of integration is not the only approach possible. In all cases, the needs of the local population must be balanced with pre-existent (or potentially future) governmental initiatives and mandates in order to deliver the most relevant programming possible and build capacity among implementers.

Each country, each school, and each community has a specialized set of educational needs that must be determined before the start of any effective education program can be initiated.



Applied Integrated Farming

Yen Dung District, Bac Giang Province,
Vietnam

Statement of need

Farmers in Vietnam face serious environmental and economic hardship. Restricted by small farming plot sizes and with limited access to opportunities for educational and vocational advancement, Vietnamese farmers demonstrate a great tendency towards environmental mismanagement and overuse of chemical pesticides. The damage resulting from this behavior has caused widespread and detrimental problems such as depletion of resources, endangerment of indigenous species, environmental decay, and pesticide contamination and poisoning.

In the past two decades, significant strides have been made to provide outreach and support for Vietnamese farmers. Partnerships with both international organizations (Food and Agriculture Organization of the United Nations, Danish International Development Agency, Oxfam America, International Cooperation for Development and Solidarity, and National Cereals Research Institute) as well as the national Plant Protection Department, Ministry of Agriculture and Rural Development, and the Centre for Sustainable Rural Development of Vietnam have rendered new models for the sustainable intensification of rice and vegetables based on principles of Integrated Pest Management (IPM) and System Rice Intensification (SRI). These models have been applied quite effectively throughout the country and continue to be developed by their implementers. Additionally, Continuing Education Centers (CEC's) now exist in 63 provinces and over 10,000 Community Learning Centers (CLC's) have been established nationwide.

Although these advancements have played important roles in assisting farmers in reducing pesticide *risk*, pesticides are still used extensively and principles of Integrated Farming such as Agrobiodiversity (ABD), Pesticide Impact Assessment (PIA), Pesticide Risk Reduction (PRR), and Conservation are still underexplored and underutilized. Within Vietnam, the REAL project, "Towards a Non-toxic Environment in Southeast Asia," aims at building linkages between the non-formal education system and Plant Protection Departments, and later with the national health-care system, in order to educate farmers, children, and students of all ages thus empowering them to contribute actively and beneficially to their livelihoods and development by implementing safe, sustainable, and economically sound farming practices.

"It is an injustice that millions of farmer households continue to live a precarious existence, despite their role as the very drivers of agricultural growth, ensuring Viet Nam's place amongst the top agricultural crop exporters."

-Bert Maerten and Le Nguyet Minh, Oxfam

Integrated Farming in Yen Dung, Bac Giang, Vietnam

Integrated Farming (IF) is a holistic approach to farming that creates and relies on a synergistic relationship between all elements of the agricultural system: crops, livestock, aquatic life, and humans. IF requires a knowledge of the impacts of each element on each other and mandates thorough and recurring assessments of the local agrobiodiversity and the larger ecosystem. Integrated Farming combines modern techniques with traditional farming methodologies and is a core component of Ecological Agriculture.

For the farmers of Yen Dung, IF has the potential to provide sustainable environmental and economic benefits by improving environmental conditions, reducing input costs, increasing yields and profits, and opening doors to new markets (see Figure 5.1).

This particular case study of Yen Dung District, Bac Giang Province outside of Hanoi, Vietnam explored three major IF practices: 1.) Rice-fish Culture; 2.) Home Gardens (Vegetable and Herb); and 3.) Biomats. Separate trainings pertaining to these three topics were provided, but true to the premise of IF but most participant-farmers are currently utilizing all three practices in tandem.





Rice-Fish culture

In the past, farmers in Yen Dung were provided with support to raise fish through initiatives supported by the Food and Agriculture Organization of the United Nations (FAO). While the FAO project provided farmers with valuable knowledge, these trainings did not focus on integrating fish into the agricultural ecosystem of the farm, and fish were ponds where kept isolated from the rice fields.

As there are many known benefits of integrated rice-fish culture, TFA and partner, Initiatives for Community Empowerment for Rural Development (ICERD), surveyed both Bac Giang and Quang Binh provinces and asked farmers why they were not raising fish in or near rice fields? Many were aware of the benefits in doing so, but claimed that it was not possible because the pesticides that were being sprayed on the rice fields would surely kill the fish. At the time of the initial survey, farmers were applying insecticides 5-7 times/crop/season in addition to using herbicides (see **Preliminary Survey Data, Figure 5.1**). This realization led to further discussion regarding the impact of pesticides on aquatic life, and subsequently the implied impacts on the ecosystem at large and perhaps most critically, on human life.

Following these initial discussions, an agreement was made between ICERD, the Plant Protection Sub-Department (PPSD), and farmers within Yen Dung District to ensure that farmers would receive education and additional support in order to improve the rice field's ecosystem by reducing the use of chemical pesticides, applying IPM and SRI (wider spacing and use of fewer rice seedlings), and improving irrigation systems. Only by doing this could farmers then reap the full benefits of integrated rice-fish culture.

The first Farmer Field School (FFS) training was held in February 2014. Rice paddies with favorable water conditions for the development of aquatic animals were identified, and farmers (priority on the recruitment of women) who had fields adjoining each other within the selected area were invited to participate in the training. Those who agreed to participate were trained on related technical issues such as rice-fish culture and the utilization of chemical pesticide and fertilizer alternatives such as IPM, SRI, bio-agents, and composting. These trainings also promoted knowledge of indigenous species and guided farmers on how to select

appropriate species of fish for the rice field. Using this model, farmers were able to reduce input costs and track savings. The quality and amount of yield also increased because field grasses for feeding fish also protected the environment.

Another benefit of training on and application of the rice-fish farming method was demonstrated by the cessation of field burning. Traditionally, following harvest, farmers would always burn the straw in their fields to prepare the land for next season. This was once seen as an effective way to clear rubbish from the fields and “start fresh” but what farmers didn’t realize is that ecosystems are not meant to start fresh every season and in fact, they cannot. Burning fields season after season destroys all life in these fields, kills natural enemies (beneficial pests) and greatly diminishes natural agrobiodiversity. “Burning season” also greatly diminishes air quality resulting in major impacts to public health, particularly for those located in valleys where the smoke and debris settles.

When farmers in Bac Giang applied the rice-fish model in their field, they learned more about ecosystems and the importance of maintaining balance and agrobiodiversity so they ceased burning their fields. It is not a small feat to influence farmers to move away from what was considered a traditional approach to agriculture, but by allowing farmers to learn by doing and personally see and experience the benefits of alternative practices, they are not only willing, but excited to transition to sustainable practices.



Home vegetable and herb gardens

Training activities related to the nutritional and cultural value of indigenous vegetable and plant species have encouraged farmers to become more interested in growing a greater variety of vegetables in home gardens. REAL staff and local PPD departments have also made strides to provide market access opportunities for the selling of surplus yield to local markets in order to increase overall familial income.

After the initial training on Home Vegetable Gardens (April, 2014), 80 farmers (88% women) from 2 provinces (Bac Giang and Quang Binh) have created or expanded existing home vegetable gardens. Preliminary results indicate that in Yen Dung, income from growing vegetables in the home garden can increase per capita income by approximately 6,014-6,616 USD/ha/year (see **Results, Figure 5.7**).

Biomats

Many farming families in Yen Dung raise pigs and chickens for sale as well as to serve the nutritional needs of the family. They also use livestock manure to fertilize crops and buffaloes for plowing and harrowing. In these ways, some aspects of the farming system are in fact already integrated, but educational and logistical barriers still exist that prevent farmers from realizing the vast benefits of a wholly integrated farming approach.

Due to the small plot sizes of most Vietnamese farms, livestock typically reside directly adjacent to home, causing intolerable odors and threatening the health of those who are forced to inhale the unclean air. In an attempt to reduce the odor in the home, many families have installed cement floors in animal coops and pens to facilitate easy rinsing, but this water is later discarded into the village sewage system, causing the stench and pollution to spread throughout the entire community. In addition to causing unpleasant and unsafe conditions for humans, unclean coops and pens have led to outbreaks of diseases among animals, including a seemingly incurable avian bronchitis that plagued the Yen Dung community prior to the introduction of biomats.

Biomats are layers of rice husk, sawdust, corn powder, and microorganisms that allow for the absorption of urine and feces. Biomats are refreshed every 8 months and the discarded material is then composted for an additional 3-9 months before it is applied to home garden or rice fields. Farmers Le Thi Hien and her husband Hoang Van Tan first heard about biomats on Vietnamese public television and tried using this method on their farm, but without proper education and guidance, the mats produced too much heat and were not effective. The family then reached out to the local PPST for support, which they were provided with in the form of REAL trainings. As a result of the community-wide trainings and demonstrated results, many farmers within Yen Dung now use biomats in chicken coops and apply the composted mat materials to home vegetables gardens and rice fields. There are also plans within the community to apply biomats for use in pigpens, but the technical aspects of this need to be addressed since pigs compact the biomat material more than chickens, therefore effecting the cleaning cycle and composition of the biomats.



Schedule of trainings (2014)

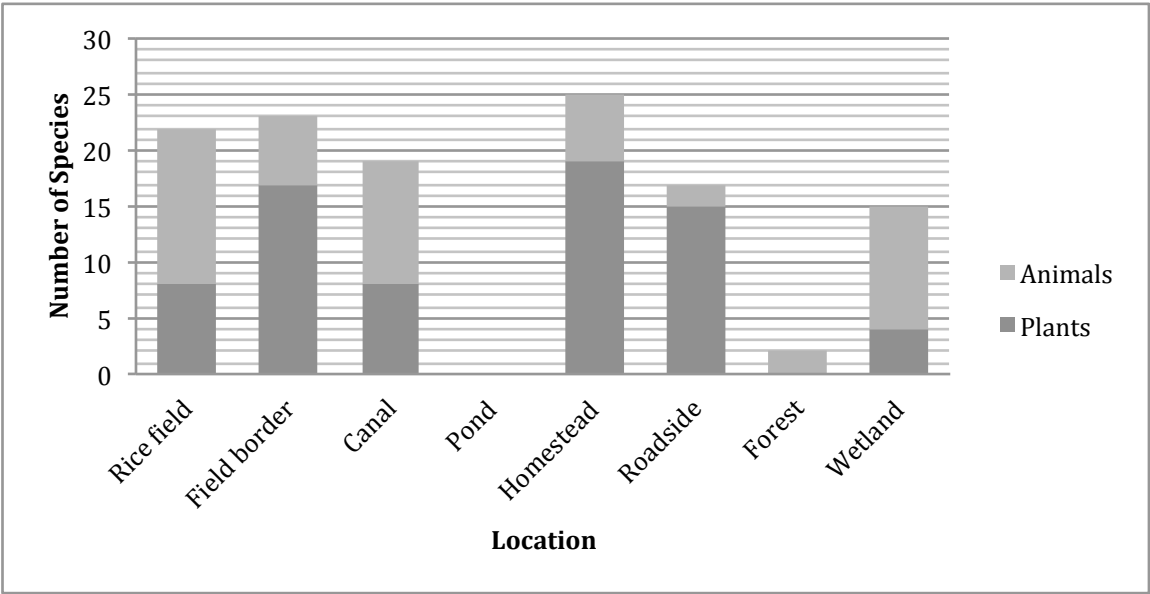
Topic	Date	Outcomes	Location
Conservation of Aquatic Animal (Fish) in the Rice Field	February 20, 2014	Total participants 30 (60% female)	Yen Dung, Bac Giang, Vietnam
Agrobiodiversity Conservation and Utilization/ Pesticides and Environments	March 7-14, 2014		Yen Dung, Bac Giang, Vietnam
Pesticide Impact Assessment	April 1 and April 29, 2014	Total participants 60 (75% female)	Yen Dung, Bac Giang, Vietnam
Conservation of Aquatic Animal (Fish) in the Rice Field	April 15, 2014	Total participants 30 (60% female)	Yen Dung, Bac Giang, Vietnam
Household Vegetable and Herb Gardens	April 20 and April 25, 2014	Total participants 60 (83% female)	Yen Dung, Bac Giang, Vietnam
Agrobiodiversity	May 7 and May 30, 2014	Total participants 60 (83% female)	Yen Dung, Bac Giang, Vietnam
Market Access	June 14, 2014	Total participants 27 (74% female)	Yen Dung, Bac Giang, Vietnam
Indigenous Vegetables	June 3 and June 24, 2014	Total participants 60 (83% female)	Yen Dung, Bac Giang, Vietnam
Agrobiodiversity	October 9-11, 2014	Total participants 40 (31% female)	Center for Continuing Education, Bac Giang*
Pesticide Impact Assessment	October 23-25, 2014	Total participants 40 (31% female)	Center for Continuing Education, Bac Giang*

*This case study focuses on interventions with farmers; however, plans for further expansion to non-formal and formal education sectors in Bac Giang and surrounding areas will open new opportunities for collaboration between farmers and the larger community.

Preliminary survey data

Participating farmers were provided with training on ABD and PIA. During and after these trainings, farmers groups surveyed the agrobiodiversity of their land and surrounding properties to establish a baseline before implementing alternative IF practices.

Figure 5.1.) Status of Agrobiodiversity, Quang Binh Commune, Yen Dung, Bac Giang, Vietnam, 2014



Results of the ABD survey identified 71 plants species and 52 animal species in Quang Binh commune and 133 plant species and 187 animal species were identified in the larger community including rice field, field borders, canals, ponds, homesteads, roadsides, forested areas, and wetlands.

While the collection of environmental and technical data a key aspect of the REAL education approach, the complex cultural components of the agricultural system and rural lifestyle must also be taken into account in order to ensure that the information gained and process felt is both relevant and sustainable. As part of FFS training, participants survey themselves and other community members in order to determine their conservation priorities as well as their current and intended use of natural resources.

As seen below in Figure 5.2, the medicinal value of plants in Yen Dung exceeds the nutritional and food source benefits by 5%, according to farmers and community members surveyed. A large percentage of these herbs and vegetables are local, indigeneous species. The diverse benefits of these plant species are well-known within local communities, but perhaps little-known or inaccessible to people in other areas. Through trainings and networking support, TFA and partners bridge local communities in Yen Dung to regional markets in a mutually beneficial exchange that aims to increase profits for farmers in Yen Dung while providing access to herbally and nutritiously valuable plants and vegetables for Vietnamese people.

Figure 5.2.) Diverse benefits of plants, Yen Dung, Bac Giang, 2014

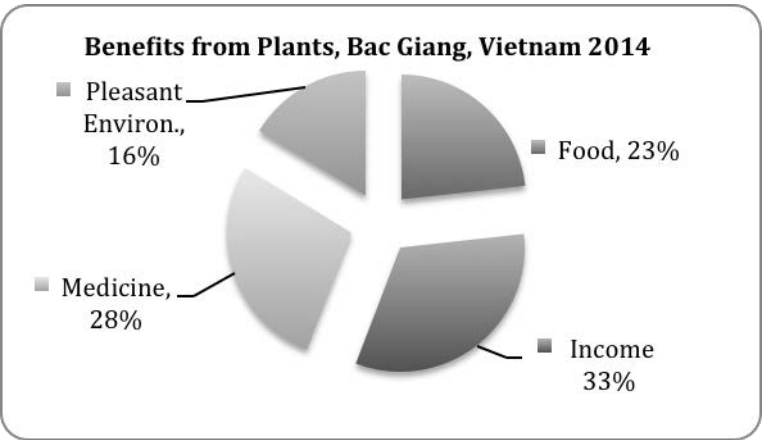
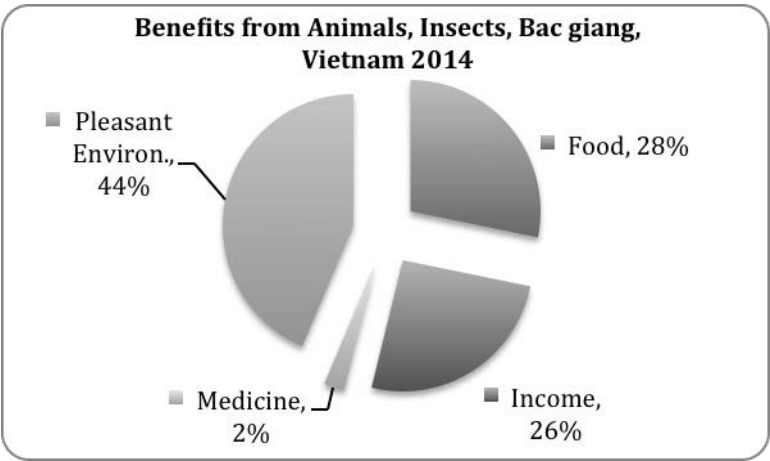


Figure 5.3.) Diverse benefits of animals and insects, Yen Dung, Bac Giang, 2014



Survey results included in the 2014 ICERD annual report on REAL programming indicated that:

In Bac Giang, farmers use 20 active chemical ingredients for pest control. Five of these chemicals are toxicity level II, while the remaining 15 chemicals are toxicity levels III and IV.

Among 20 active chemical ingredients, there are 9 chemicals are used as insecticides, 3 are fungicides, and 8 are herbicides.

In Quynh Son alone, farmers use 21 active chemical ingredients for pest control. Of these 5 chemicals rate at toxicity level II and the remaining 16 chemicals are toxicity levels II and IV.

Among 21 active chemical ingredients, 8 chemicals are used as insecticides, 7 are fungicides, and 8 are herbicides. Others are unknown.

Figure 5.4.) Total amount of pesticides used, Yen Dung, Bac Giang, 2014

Type of crop	Xuan Phu Commune			Quynh Son Commune		
	Surveyed area (ha)	Total area of crop/ year/ comm . (ha)	Amount used/year/ crop (liter)	Survey area (ha)	Total area of crop/ year/ comm. (ha)	Amount used/ year/ crop (liter)
Potato	0.7		76,345	0.3	27	62,757
Rice	1.5	960	1,707,907	2.5	540	725,678
Vegetable	0.3	110	75,294	0.4	20	44,128
Corn				0.2	6	1,867
Total liters/year (All crops)		1,070	1,859,546		593	

Figure 5.5.) Pesticide spraying behaviors and results, Yen Dung, Bac Giang, 2014

	Xuan Phu	Quynh Son
Spray near canal and/or river	69.23%	76.47%
Spray near swamp and/or pond	38.46%	17.65%
Spray near big trees	7.69%	5.88%
Spray near forest areas	0.00%	0.00%
Spray on the field border	38.46%	41.18%
Spray in the rice field	76.92%	88.24%
Spray by the roadside	38.46%	11.76%
Spray near school	61.54%	23.53%
Spray near house	46.15%	29.41%
Observe fish die from spraying pesticides	38.46%	23.53%
Observe bees die from spraying pesticides	15.38%	17.65%
Wash pesticide contaminated clothing in the canal	53.85%	0.00%
Wash tank and equipment near water well	53.85%	29.41%

Data found in Figures 5.4 and 5.5 indicate that Xuan Phu Commune sprays significantly more pesticides than Quynh Son Commune and also that farmers in Xuan Phu demonstrate more high risk pesticides spraying behaviors. After this determination was made ICERD and the Plant Protection Department (PPD/PPSD) strongly promoted the rice-fish model in this area.



Figure 5.6.) Signs and symptoms of pesticide exposure

Signs and Symptoms	Bac Giang	
	Xuan Phu	Quynh Son
Burning nose	53.33%	48.00%
Insomnia	26.67%	32.00%
Red eyes	23.33%	28.00%
Burning / stinging / itching eyes	43.33%	52.00%
Excessive tearing	63.33%	8.00%
Runny nose	23.33%	24.00%
Excessive salivation	73.33%	16.00%
Dizziness	60.00%	44.00%
Exhaustion	20.00%	24.00%
Headache	76.67%	92.00%
Shortness of breath	20.00%	24.00%
Muscle weakness	16.67%	20.00%
Skin irritation	70.00%	4.00%
Sweating	76.67%	92.00%
Itching skin	86.67%	84.00%
Numbness	13.33%	12.00%
Cough	53.33%	8.00%
Sore throat	10.00%	12.00%
Twitching eyelids	70.00%	36.00%
Blurred vision	56.67%	16.00%
Tremor	6.67%	8.00%
Muscle cramps	16.67%	12.00%
Staggering gait	33.33%	32.00%
Diarrhea	23.33%	20.00%
Stomach cramps	3.33%	0.00%
Nausea	36.67%	16.00%
Chest pain / tightness burning	20.00%	24.00%
Vomiting	16.67%	8.00%
Seizure	0.00%	0.00%
Loss of consciousness	3.33%	8.00%
Coma	6.67%	0.00%

Results

Rice-fish culture

Based on the knowledge gained from REAL trainings on: Agrobiodiversity; Conservation, and Utilization and Conservation of Aquatic Animals (Fish) in the Rice Field; Pesticide Risks; Integrated Pest Management; and System of Rice Intensification conducted in 2014, there were 105 farmers (52% female) from 4 communes within 2 provinces (Bac Giang: Quynh Son, Xuan Phu; Quang Binh: Vinh Ninh, Loc Thuy) who applied the rice-fish culture model. The total land area this model was applied to was over 34ha.

The advantages of rice-fish culture compared to traditional mono-rice cultivation method are increases in profit, income, and total production. During the course of this study in Yen Dung, there was a 211 %-551% increase in profits compared to mono-rice cultivation practices. Familial income increased an average of 4 times. Total production value within the conservation fields (of rice, fish, and other aquatic animals) was 7,392 USD/ha, while production of the rice fields not utilizing conservation methods was valued at only 1,804 USD/ha.

On average, a farmer who implemented rice-fish culture practices yielded 2,217 USD from 0.3ha of land, while famers who did not apply conservation methods profited only 541 USD from the same of land area.

Figure 5.7.) Conservation of fish and aquatic animals in rice fields

	Quynh Son	Xuan Phu	Total Yen Dung
Area of conservation (ha)	20	10	30
Total farmer involved (67% women)	15	15	30
Rice Yield (kg/ha)	6,390	5,850	12,240
Rice production (USD/ha)	2,269	1,955	4,224
Production of Fish and aquatic animals (kg/ha)	7,795,333	8,030,000	15,825,333
Production of Fish and aquatic animals (USD/ha)	9,377	9,659	18,996
Production Combined: Rice, fish, aquatic animals (USD/ha)	11,646	11,614	23,260
Production inputs (USD/ha)	4,354	4,318	8,672
Profits (USD/ha)	7,292	7,295	14,567
Production increase, integrated Rice-fish Method v. Mono-rice Cultivation Method	513%	594%	551%

After completing FFS trainings on ABD and PRR, farmers who applied rice-fish culture methods decided to maintain the momentum by creating a Farmer's Club, an offspring of the already existent Farmer's Union and Women's Union. This club continues to meet monthly to discuss issues and challenges relating specifically to rice-fish cultivation, share experiences, and brainstorm solutions. Other agricultural activities (such as animal husbandry, financial matters, marketing, etc.) are also sometimes discussed during these meetings.

Biomats

In 2014, two women's groups in Yen Dung attended FFS trainings on self-production of organic fertilizer through the use of biomats from chicken dung, pig dung, and other biomass. These groups found that by applying organic fertilizer to rice, farmers were able to reduce the application of chemical fertilizer by 60%. Biomats also helped to reduce pollution in the rural environment by eliminating the need to dump waste in communal water sources and other areas.

Preliminary feedback on the use of biomats indicates positive results. Participating farmer's note that odor resulting from animal waste has reduced dramatically and is now undetectable from inside the home. Some farmers also indicate that they have plans to expand their use of biomats to other livestock quarters, but this will require additional technical training before proceeding as procedures and conditions will vary dependent on the animal species.

Home vegetable and herb gardens

Home gardens provide a readily available, low or no-cost supply of fresh, chemical-free, nutritious vegetables and herbs for the family; create home-based employment, especially for women, through preserving, processing, or drying perishable vegetables for later consumption or sale; generate income for the household through the sale of surplus vegetables and herbs.

After the FFS trainings, 80 farmers within 2 provinces (Bac Giang and Quang Binh) developed home vegetable gardens (88% female farmers). The creation or expansion of home gardens enabled women to produce safe food products, and provide diverse sources of nutrition for their families. In addition, this practice also allowed families to save money by not having to purchase vegetables from the market. Surplus vegetables and herbs can also be sold. Evaluation and impact assessment shows that in Yen Dung, income from growing vegetables, can increase the per capita income of about 6,014 – 6,616 USD / ha / year.

Barriers and success factors

Gender mainstreaming

In Yen Dung District approximately 70% of farmers are women. Women are not only responsible for farming, but also bear a number of additional domestic responsibilities including: financial management, purchase of household materials and supplies, meal preparation, and childcare. In many cases, female farmers are also left to look after their grandchildren when their own children elect to leave the farm to pursue more profitable or less labor-intensive work in urban areas.

In Vietnamese culture, the weight of these responsibilities does not go unrecognized, and women are highly respected within the familial unit and the community at large. TFA and ICERD take this into account when proposing and organizing programs, establishing a rapport with the communal Women's Union as a first step. In Yen Dung, the Women's Union paves the way for other farmers and families to participate in IF practices and provides a reliable and sustainable support for our programs.

In order promote gender equality and women's rights and empowerment, REAL programming has launched recent initiatives to collect gender-specific data relating to pesticide exposure, health effects, and decision-making processes. Although still in the beginning phases, this data has already provided valuable insights into behavioral patterns, cultural norms and expectations, and biological differences between genders that will help us to shape future programming and elicit policy-level support of gender equality and women's rights.



Figure 5.8.) Gender roles in Xuan Phu Commune, Yen Dung, Bac Giang, Vietnam, 2014-2015

	Man (%)	Woman (%)	Together (%)
A. Crop production and fish raising			
1. Level farm area	60	25	10
2. Plough field	85	10	5
3. Manage water in rice field	45	45	10
4. Select rice varieties for growing	40	50	10
5. Buy seed	20	60	20
6. Soak rice seedling	10	80	10
7. Sow rice seed	5	90	5
8. Maintain nursery- water and apply fertilizer	45	50	5
9. Remove rice seedlings	60	35	5
10. Transplant	3	90	7
11. Weed, insect, and disease control in nursery	45	50	5
12. Decide what kind of pesticide to use	40	50	10
13. Purchase chemical pesticides from store	25	60	15
14. Read label when preparing for spraying	55	40	5
15. Mix/dilute chemicals for spray session	40	50	10
16. Spray chemical pesticides	45	10	15
17. Harvest and thresh rice	10	70	20
18. Other physical farm labor	65	30	5
19. Process and sell products	40	50	10
20. Store and maintain tools and equipment	35	55	10
21. Select fish varieties	80	10	10
22. Buy fingerlings	80	10	10
23. Feed fish	60	40	0
24. Harvest fish	60	30	10
25. Sell fish	30	70	0
B. Childcare			
1. Dress children	4	85	11
2. Daily care of children	7	83	10
3. Transport children to school	45	45	10
4. Pickup children from school	50	45	5
5. Assist with homework	50	40	10
6. Manage children's finances	40	55	5

C. Household duties			
1. Food preparation/cooking	5	85	10
- Select and purchase food	4	76	20
- Select location to buy food	3	80	17
- Create family menu	5	85	10
2. Wash dishes	1	90	9
3. Clean house	3	87	10
4. Wash clothes	5	80	15
5. Iron clothes	40	40	20
6. Wash car/ motorcycle	65	25	10
D. Home garden			
1. Plant garden	60	30	10
2. Maintain home vegetable garden	30	55	15
3. Water plants and vegetables	40	45	15
4. Apply fertilizer to home garden and lawn	30	55	15
5. Control weeds in home garden and lawn	40	50	10
E. Miscellaneous			
1. Clean tools and household appliances	30	55	15
2. Repair tools and household appliances	65	25	10
3. Feed animals	40	50	10
4. Dress and administer medicine to family members	25	70	5
5. Participate in community meetings	45	50	5
6. Decide to join community activities/IPM groups	60	35	5
7. Farm and household accounting	40	40	20

This table contains data on gender roles and responsibilities as reported by men and women of the Xuan Phu Commune. In 2015-2016, TFA will continue to collect and analyze this data as well as data collected from all other TFA REAL project sites in an attempt to develop appropriate and responsive programming based on contemporary rural experience.

The majority of farmers in Vietnam are women, so therefore women are also engaged in handling pesticides and making decisions regarding the purchase of pesticides. Although it still seems that men are taking on the role of spraying pesticides, women are directly exposed when mixing chemicals and by tending to crops on a daily basis. Pesticide exposure poses amplified health threats to

women due to their lower body weight and unique endocrine systems. New mothers who come in direct contact with pesticides may inadvertently pass on their contamination to their baby through breast milk. Pesticide Risk Reduction training is hugely important in Vietnam to help women to better understand the impacts of chemical pesticides on themselves and their families.

Programmatic sustainability

True to the concept of sustainability, perhaps the most crucial aspect of the REAL educational approach has been an insistence on sustainable program models. The Field Alliance deploys educators to provide trainings to students and farmers, aids in the initiation of programs, and intervenes when necessary regarding policy-level decisions and fiscal support. Aside from these interactions, The Field Alliance encourages participant-learners to self-sustain and form their own goals and standards of accountability. Sustainability of the programs in Bac Giang remain stable into the foreseeable future as farmers have seen the benefits of IF and continue to express interest and commitment both to maintaining current practices, and also deepening their knowledge of related topics by requesting additional trainings.

Multi-level engagement and support

TFA believes that learner responsive, bottom-up approaches form the basis of the most beneficial and sustainable educational models. In order to optimize this learner-centered approach in a rapidly changing environmental and cultural climate, formal, non-formal, and private sector institutions must continually develop diverse and responsive programs. TFA facilitates this by linking public and private organizations, and providing not only hands-on, in the field training and support, but also reliable fiscal and administrative support of ongoing projects.

Continued expansion to villages and provinces surrounding current project sites is necessary not only for increasing awareness and building a sense of community, but also from a practical environmental perspective. As explained by Fliert et al, “ecological processes are not restricted to the artificial boundaries of crop fields. As a result, the cultivation practices of one farmer will impact on the ecological conditions of their neighbours’ fields. Farmers do, therefore, benefit from collectively making decisions and taking actions relating to issues that are of importance in this respect (247).”¹

¹ Fliert, E., Dung, N., Henriksen, O., & Dalsgaard, J. (n.d.). From Collectives to Collective Decision-making and Action: Farmer Field Schools in Vietnam. *The Journal of Agricultural Education and Extension*, 13(3), 245-256.

While continued interest and active involvement of farmers is vital to the sustainability of REAL programs and IF in Vietnam and elsewhere, additional upper-level support is also needed. The support of governmental and non-governmental organizations is not only a logistical requirement, but also prevents farmers from feeling alone in their struggles and expands the network of support. TFA, ICERD, PPD, and MARD, conduct regular outreach and site-visits to farming communities, provide financial support and training, act as reliable consultants to farmers as issues arise within the community, and connect local farmers with regional and international markets, particularly the marketing and distribution of local, indigenous vegetables and herbs. Without this multi-level support, engagement, and expressed passion for this work, thousands a farmers would not be able to receive the benefits of REAL programming.

Many farmers, already struggling to make ends meet, are reluctant to change their farming approaches, especially when it involves additional training or initial investment, without the guarantee of a market for their products. As such, supporting and maintaining connections to local, regional, and national markets is also vital to the continued development of this program. TFA collaborates with private sectors, commercial markets, and international non-profits like Cambodia HARVEST to provide farmers with the knowledge and sense of security that they need to produce high quality, safe agricultural outputs.



*“Before, when we saw the insects, we would kill them.
Now we know which are good and which are bad,
and we talk about it together before we do anything.”*

- Farmer, Baan Pratcha Saam Ari, Vietnam

Reflections and recommendations

REAL programming in Yen Dung has been active now for just over two years with a total of four communes involved. Proof of the success of these programs and strategies has begun to radiate throughout the surrounding regions and neighboring communes and provinces have actively expressed interest in receiving trainings and implementing pesticide-free (or reduced pesticide) farming, SRI, and IF. It is crucial to maintain this momentum and provide farmers with the support and resources that they need in order to move agricultural systems and practices in Vietnam towards a safe and sustainable future.

In 2015, the Non-formal Education Department (NFE) produced official training booklets on ABD and PIA to be used nationwide in CEC's. These booklets were also made accessible online to facilitate distance learning and provide increased access to educational materials. Continued collaboration with the NFE and within formal education sector is imperative in the expansion and development of this program in Vietnam. Integration of agriculture and related subjects into the basic primary curriculum will provide Vietnamese citizens with a higher degree of self-sufficiency, making way for a secure future for agriculture, guaranteed food supply, and ever-increasing, market-responsive export opportunities. The NFE Department is particularly key in the development of this program.

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Images

Front cover (from top left to bottom right)

1. Farmer in Lao PDR provides tour of fields and discusses plant spacing.
2. Leader of Women's Savings Group in Cambodia proudly displays her organic lettuces.
3. Student experiment with potted plants at a primary school in Chiang Mai, Thailand.
4. Students harvest vegetables in a school garden in Chachoengsao, Thailand.
5. A female farmer in Cambodia shows TFA staff her organic long beans.
6. An elderly Cambodian farmer discusses his transition to organic farming methods.
7. Female farmers in Lao PDR during a tour of their village and fields.

Back cover (from top left to bottom right)

1. Two female farmers pose in their shared farming area in Northern Vietnam.
2. The Field Alliance Director, Marut Jatiket, talks with a Thai farmer while touring an organic banana farm.
3. Two farmers from Sakon Nakhon province in Thailand show TFA staff the results of an FFS training on SRI and organic farming methods.

Cambodia

1. A female farmer in Cambodia shows TFA staff her organic long beans.
2. A typical village homestead in Cambodia.
3. Pesticide packets and containers collected by students.
4. Men work together to install pesticide disposal containers in a village in Cambodia.
5. A farmer shows TFA staff a water collection hole/aquatic habitat he built into his field.
6. A young female farmer in Cambodia.
7. This farmer was taught how to make organic fertilizers during an individualized outreach tutorial.
8. Members of a Women's Savings Group in Cambodia during an interview by TFA staff.

Lao PDR

1. Community members and farmers work together during a training in Lao PDR.
2. Female farmers in Lao PDR during a tour of their village and fields.
3. A young child who attended a farmer training with his mother.
4. Eating together after a training activity in Lao PDR.
5. Laotian woman practicing traditional weaving on a foot operated loom.
6. Indigenous plants and herbs are conserved and harvested to make traditional medicines.
7. Teachers and community members during a presentation to TFA staff. Meetings are typically held in the school building.
8. Students participating in REAL activities.

9. Students participating in REAL activities.
10. Students participating in REAL activities.
11. A man displays a large catch from a conservation pond in Lao PDR.
12. During a community tour in Lao PDR.

Philippines

1. Town square in Davao del Norte, Philippines.
2. Teachers and administrators meet during a piloting session re: integration of organic agricultural subject into the BEC.
3. Students participate in lessons re: integration of organic agricultural subject into the BEC.
4. Teachers and administrators following a team retreat re: integration of organic agricultural subject into the BEC.

Thailand

1. Students at Ban Nong Tao School rear frogs.
2. The road leading to Ban Nong Tao School.
3. Students at Ban Nong Tao School cultivate mushrooms.
4. The larger of two student test plots where they can experiment with REAL activities and approaches.
5. Staff from the local hospital takes samples from students and teachers to detect pesticide residue in blood.
6. Teacher Trainers and REAL program participants in Sakon Nakhon, Thailand.
7. Teacher Trainers and REAL program participants in Sakon Nakhon, Thailand.
8. Plants and labels surround Ban Nong Tao School.

Vietnam

1. Farmer from Bac Giang shows TFA staff his rice-fish paddy with adjustable gate to allow fish to swim in and out of depending on water level and farmer needs.
2. Primary school in Bac Giang that serves as a community meeting place.
3. A farmer catches fish from the rice field.
4. The home garden of the leader of the Women's Union. These women serve as role models for the community.
5. Biomass in use at the home of another member of the Women's Union. Currently being used in chicken coops and pig stalls. This woman and her husband originally heard about the use of biomaterials to reduce odor on local television, but when they attempted the method that was described, it failed. This is when they requested expert consultancy from the Plant Protection Department and in partnership with TFA and a training was organized.
6. A farmer herds a group of geese past staff during a site visit.
7. Another image of members of the Women's Union meeting with TFA staff in a farmer's home.
8. A farmer from Bac Giang being interviewed by TFA and PPD staff regarding his involvement in REAL programming.

The Field Alliance wishes to thank all of our partners and supporters for their contributions to this publication, the projects outlined therein, and to the continued daily implementation of our educational programs.

