

## **FOOD SECURITY POLICY PROJECT**

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**Submitted by**

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## PROJECT OVERVIEW

The USAID Burma Food Security Policy Project (FSPP) was signed September 23, 2013 and began operations immediately. The project is implemented by Michigan State University (MSU). Implementing partners are Myanmar Development Resource Institute – Centre for Economic and Social Development (MDRI-CESD) in Burma, the International Food Policy Research Institute (IFPRI), and WorldFish. The overall goal of the Project is to promote inclusive agricultural productivity growth, improved nutritional outcomes, and enhanced livelihood resilience for men and women through an improved policy enabling environment. Taking a broad view of agriculture, including the farm and off-farm parts of the food system, this goal will be achieved through increased capacity to generate policy-relevant evidence and gender-sensitive analysis that is used by stakeholders throughout the food system to improve policy formulation and implementation. This goal is to be achieved by two integrated objectives:

**Objective 1:** To address critical evidence gaps for informed policy debate and formulation. The Project will generate, synthesize, and disseminate new knowledge on targeted policy issues for which the current evidence base is insufficient, and thus facilitate and encourage reforms.

**Objective 2:** To foster credible, inclusive, transparent, and sustainable policy processes in Burma. The Project will strengthen the building blocks for Burmese national and state/region policy systems, promote inclusion of and dialogue among all stakeholders around critical policy issues, and disseminate globally sourced examples of successful innovation and best practice in policy system capacity building.

The project is comprised of an integrated set of four components that feed into these two objectives:

**Component 1:** Policy/strategy advising. This component is responsible for consulting with stakeholders and getting a sense of policy issues, doing outreach from research results to policy audiences, and conducting policy analysis.

**Component 2:** Agrifood value chains (AFVCs). This component is responsible learning about AFVCs and the specific issues faced by each one in terms of the field research and analysis, outreach of the study results, policy advising from the results, and capacity building for doing similar work.

**Component 3:** Household and communities livelihoods. This has the same set of responsibilities as the second component, but for its study area.

**Component 4:** Capacity and network building. This component funnels, cross-fertilizes, documents, and organizes the capacity building actions of the other three components. This is so other institutions interface with the project in a continuous way and builds to a body of imparted method and approach.

This report provides a summary of activities conducted by FSP during its third quarter of operation from April-June 2015, including activity development and progress achieved during the period. This summary is organized with reference to the four project components.

## **INTRODUCTION**

This quarter saw full implementation of the new work plan approved in early February 2015. Work during the quarter was heavily focused on implementation of the Mon State Rural Household Survey that will underpin the Mon State Rural Development Strategy, which the project will develop as one of its key research and policy outputs during 2015/16. This was a major undertaking in terms of personnel and logistics, requiring the entire project team to relocate to Mon State for around ten weeks. Despite this being the first large scale in depth household survey implemented by MDRI, the survey was executed on time and to a very high standard, due to the dedication and enthusiasm of the entire project team, and proved an extremely valuable learning and capacity building experience for MDRI as an institution and for all the individual researchers involved.

## **COMPONENT 1: POLICY/STRATEGY ADVISING.**

The main outreach activity completed during this quarter of the project was the hosting of a seminar, at the invitation of USAID, to present preliminary research findings on the structure of aquaculture value chains in Myanmar, tradeoffs between the allocation of land for aquaculture and paddy cultivation, and implications for land use policy. The seminar, which was hosted by MDRI, was well attended, by around 30 representatives from USAID, its project partners, donors, international organizations, and senior staff from MDRI and IFPRI. Dr Ben Belton gave a 30 minute presentation for MSU, introducing the project, providing an overview of key findings from fish value chain rapid reconnaissance activities, and developing an analysis of secondary data on land use for aquaculture and paddy cultivation in Myanmar and Bangladesh. The presentation was well received, and was followed by a lively and engaging discussion. The data presented were immediately requested by a mission developing a large aquaculture project on behalf of the EU, in order to strengthen the case for funding aquaculture interventions in Myanmar. The full presentation given at the seminar can be downloaded at: <http://fsg.afre.msu.edu/fsp/burma/index.htm#pp>

## **COMPONENT 2: AGRIFOOD VALUE CHAINS.**

### **Fish Value Chain**

Fish value chain activities during this quarter were based predominantly on analysis of secondary data, and the write up of primary data collected during rapid reconnaissance of the fish value chain in late 2014. Secondary analyses included: exploration of data on the per capita consumption of fish and other animal source foods by geographical area and income category, derived from the dataset of the Integrated Household Living Conditions Assessment Survey (conducted in collaboration with researchers from IFPRI); historical changes in fish prices generated from the 'Selected Monthly Economic Indicators' collected by the Central Statistical Office and; data on farmed fish production and international trade from various sources. Data on domestic fish trade was also successfully collected from San Pya and Shwe Padauk fish wholesale markets in Yangon, after obtaining permission from Yangon City Development Committee. Preparation of a comprehensive report based on this analysis was nearing completion by the end of the quarter.

During June, Professor Xiaobo Zhang of IFPRI visited Myanmar for four days of intensive fieldwork in fish producing areas of Yangon and Ayeyarwaddy regions with MSU and MDRI staff to inform the development of more detailed plans for the implementation of an in depth study on fish value chains. During Prof Zhang's visit it was also possible to carry out some preliminary scoping work in advance of the development of a rapid reconnaissance study in agricultural mechanization and inputs. A summary note detailing findings from these activities is provided in Annex 1.

## **COMPONENT 3: HOUSEHOLD AND COMMUNITY LIVELIHOODS.**

The bulk of project work conducted during this quarter fell under Component 3, with the implementation of the Mon State Rural Household Survey. The survey questionnaire covered a broad range of issues pertinent to the analysis of rural livelihoods, including household consumption and assets, farm enterprise budgets, non-farm employment, migration, transfers and savings, health and education, access to public services and credit, subjective wellbeing, dietary diversity, and shocks. Results from the survey will inform the Mon State Rural Development Strategy report, a draft outline for which is included in Annex 2.

The survey was a major undertaking. The entire MDRI project team, comprised of six researchers, one fulltime research intern and three administrative/final staff relocated to Mon for the ten week duration of survey implementation activities. MSU survey expert Ellen Payongayong led the survey in the field. Additional field support was provided by visiting IFPRI and MSU researchers. An 'advance team' comprised of three pairs of members from civil society organizations in Mon State - including several alumni of capacity building training courses delivered by MDRI's sister organization, the Community Development and Civic Empowerment Program (CDCE) - were also recruited the visit all selected enumeration areas (EAs) ahead of survey implementation to inform the authorities, obtain permissions from non-state armed groups, and provide logistical support such as arranging accommodation and food for enumerators working in remote areas, and provide information on the state of road conditions and communications.

Sixty-six enumerators from Mon State, including residents of all 10 of the State's townships were selected to partake in the survey, from a pool of 250 interviewees. All enumerators were university graduates or students, and many were members of local civil society organizations in Mon State, including Mon language teachers, and referral workers for rural health facilities. Selected enumerators spoke a range of languages, including Mon, Karen and Burmese, necessary for survey implementation. Enumerators received two weeks of orientation and rigorous classroom and field based training, and a third week of refresher training following water festival before commencing data collection.

The sample is representative of rural households at the state level. To ensure sufficiently large numbers of each type of household to allow for statistically robust analysis of each livelihood profile type we oversampled households whose main occupations are paddy cultivation, rubber farming and marine fishing. EA maps drawn during the national census were provided to the project by the Department of Population, under the Ministry of Population and Immigration, providing a population sample frame within the geographical clusters selected for the survey. Twelve households were selected in each of 145 EAs, to give a total sample of close to 1700. It was necessary to replace five EAs selected in the original sample frame in Bilin Township in Northeastern Mon and three in Lamine in the south of the state, due to security and safety concerns. These EAs were replaced by alternatives but in the case of Bilin we hope to be able to survey the original EAs due to the importance of orchards in this area. Separate community questionnaires were also administered in every EA selected to a focus group of knowledgeable community members.

An MS student from MSU joined the survey team on Mon for 1 month to test a survey instrument on aspirations and the economics of hope which had to be dropped from the main household survey, and to support preparations for data entry activities. Data entry began in early June, using a specially developed entry format designed using CSPro software, and is expected to be completed in late July, next quarter. A total of 10 data entry staff have been recruited for data entry. All data will be double entered so that results can be compared to rapidly identify incorrect entries, thereby ensuring accuracy.

During this period Dr Paul Dorosh, Division Director of IFPRI's Development Strategy and Governance Division, was able to visit Mon state along with MDRI and MSU staff to meet with government officials, including the Chief Minister, and obtain access to information including state budgetary allocations and expenditures which will be analyzed in the Mon State Rural Development Strategy, and to develop a plan and program of work for completion of the strategy.

#### **COMPONENT 4: CAPACITY AND NETWORK BUILDING.**

Capacity building during this quarter was mainly experiential, with MDRI researchers 'learning by doing' through their implementation of the household survey in Mon State with the guidance of MSU's survey specialist. This extensive practical experience, covering a wide range of skills, will prove invaluable to these researchers and to MDRI as it plans and implements future research activities.

Dr Zaw Oo, MDRI-CESD's Executive Director and Ngu Wah Win, a member of the MDRI macro-economics team, visited MSU campus in the United States on April 2nd after participating in the World Bank land conference in Washington DC. They met with the head of MSU's AgBioResearch program to learn about the evolution of the research system in Michigan, and the role farmers, agribusiness and state government play in financing research. They also met with staff of MSU's remote sensing program with activities in the region.

Ben Belton met with Dr Kevin Fitzsimmons, COP of USAID Burma Aquaculture project to update one another, and provided advice on fish value chains to Nicholas Evans, a consultant implementing a study for USAID Burma on the potential for digital financial services in agriculture.

MDRI Research Assistant Kyan Htoo attended a forum organized in Bangkok by the ASEAN-Mekong NGO Engagement Program, from June 2-4 to give a presentation highlighting preliminary findings from the fish value chain rapid reconnaissance work. An abstract submitted to the Global Food Security Conference to be held at Cornell University, Ithaca, New York in October 2014 was accepted for presentation. The abstract is based on key findings from the presentation given at

the MSU/MDRI seminar held in April. The abstract is attached in Annex 4. Unfortunately it was not possible for MDRI and MSU staff to present project findings in the “Aquaculture Value Chain Development and Governance” at the University of Amsterdam’s Center for Maritime Research’s *People and the Sea* conference in June as planned, due it proving impossible to obtain visas in time.

## OTHER ISSUES

### **Management and personnel changes**

There were no major management or personnel changes during this period. Duncan Boughton served as acting COP for MSU, with assistance from Ben Belton. Two new Research Associates, Ms Myat Thida Win and Mr Zaw Min Naing joined the FSP project team for MDRI in April.

### **Deliverables completed**

The Mon State rural Household Survey was completed per plan.

### **LIFT funding approved**

A project entitled “Building the Evidence Foundation for Promotion of Agrifood Value Chain Development, Small Farm Modernization & Rural Livelihoods in Myanmar” was finalized at the end of June and will provide \$2,199,178 in complementary funding during the period July 2015 to June 2018.

## PRIORITIES FOR PROGRAMMING DURING THE NEXT REPORTING PERIOD

**Component 1: Policy/strategy advising:** During the next reporting period, the project will be doing outreach work to present findings and seek private sector, government and non-government feedback on a draft study detailing findings and policy recommendations from all fish value chain work to date. Ben Belton will visit the working areas of World Vision Myanmar in Ayeyarwaddy Region for a reconnaissance visit, and will provide advice on the development of a program of potential aquaculture interventions.

**Component 2: Agrifood value chains:** Planning activities during July with MSU and MDRI will support the development of a detailed work plan including details of

further in depth studies on aquaculture and rapid reconnaissance of other agrifood value chains during the period October 2015 – March 2016.

**Component 3: Household and communities livelihoods:** The main focus of work during the next reporting period will be cleaning and analyzing data from the Mon State Rural Household **Survey. IFPRI Research** Associates will be present in country during this time to train MDRI staff on the use of STATA software and to support them in analyzing data from the survey.

**Component 4: Capacity and network building:** MDRI Research coordinator Aung Hein was accepted for a place on a two week taught course on new structural economics to be held at Beijing University, China, from July 24 to August 1. Seng Kham, MDRI research associate, was asked to present findings from the pulses value chain rapid reconnaissance study at a conference hosted by the Australia Myanmar Institute, July 10-12, titled "Myanmar and the Sustainable Development Goals: Informed by the Past, Looking to the Future".

## **ANNEX 1:**

### **Summary of focal areas identified for further study, based on exploratory fieldwork in Yangon and Ayeyarwady, June 20-24, 2015**

From June 20-24, a three person team comprised of Xiaobo Zhang (IFPRI), Ben Belton (MSU), and Zaw Min Naing (MDRI), visited three aquaculture clusters to explore possible themes for in depth study, and to conduct some preliminary scoping on agricultural mechanization.

Aquaculture areas visited were as follows: Kayan, the oldest aquaculture cluster in Myanmar; Hlegu, a node in a larger cluster of peri-urban integrated poultry-fish farms; Latkyargyi, a village tract in Ayeyarwady with numerous hatcheries, nurseries, and a mix of large and medium sized growout farms, part of which has been affected by the granting of land concessions to private companies. The team also visited San Pya fish wholesale market, and spoke with fish retailers at a wet market. For preliminary scoping on agricultural mechanization, the team interviewed farmers using power tillers for land preparation in Twantay (just west of Yangon), and visited Tongwa - a dynamic agricultural area to the east of Yangon, which is at the center of the green gram boom.

Based on these visits, the team identified a number of issues to explore and approaches to follow in subsequent in depth and rapid reconnaissance work:

#### **Measurement of information spillovers and technological adoption**

Hlegu, just to the north of Yangon is the location of one node in larger cluster of integrated poultry-fish farms, the first of which was established in 2005. The Hlegu cluster-node has grown rapidly since this time, to around 200 ponds, which occupy more than 1000 acres. The vast majority of these farms are owned by ethnic Chinese originating from Shan State. These farms supply much of the commercially produce broiler chicken consumed in Yangon, as well as significant quantities of fish. The farms employ large numbers permanent workers to tend chickens and fish, and temporary labor to load and unload feed and harvest fish and chickens. Almost all of these workers are rural-urban migrants from remote areas of Ayeyarwady and Bago regions, where there are few opportunities for regular employment. Land values have increased very rapidly in the area in recent years and, unlike in most of the locations visited, there is a dynamic private land rental market in the area which, combined with credit from feed suppliers, makes it possible for some smaller farmers to enter production with relatively limited investment capital.

Chicken farming is a high risk activity, with producers vulnerable to frequent price fluctuations and disease problems. Integration with fish (which utilize nutrients in plankton blooms fertilized by chicken manure that drops into ponds located below chicken houses) reduces risk for producers by lowering the breakeven point of chicken production, whilst reusing wastes from one production process as inputs into another in an environmentally sustainable manner. Rather than competing with one another directly, networks of ethnic Chinese farm operators are able to reduce risks and transaction costs by sharing information (e.g. on the credit worthiness of new market entrants) and innovations (e.g.

modification of the design of chicken houses; bonus systems for workers to incentivize achievement of higher chicken survival rates).

Multi-year panel data on the number and area of ponds within the cluster-node, number of chicken houses, and even the materials used in their construction can be obtained from Google Earth. Changes in farm size and ownership could be obtained through interactive participatory mapping exercises with farm operators, using Google Earth on handheld devices. When combined with farm survey data, this spatial information would make it possible to map adoption and spillover effects among network members, and measure their impacts in terms of accumulation and investment in assets and capital intensification, using actual (i.e. not recall) data on outputs obtained from satellite images (e.g. farm area, numbers and types of chicken house). The limited size of the cluster would make it possible to conduct a census survey of the entire sample, capturing the whole network within it.

An in depth study along these line would offer the opportunity to explore in detail a number of themes important to FSP. These include:

- Cooperation, technological adoption and spillover effects within farm clusters
- Factors affecting the supply of poultry and farmed fish (these already play a more important role in ensuring food and nutrition security in Myanmar than is generally understood, and will play ever greater roles in doing so in future as urbanization and incomes increase)
- Dynamics and outcomes of rural-urban migration
- Labor intensity and productivity in aquaculture and poultry production
- Land markets, land use titling, land speculation and the effects of private land rental on entry into aquaculture by producers

Most farm operators in the cluster speak excellent Mandarin. Xiaobo has several students who could help to conduct the interviews (in Mandarin where appropriate) in partnership with MDRI staff, providing an opportunity to learn from one another. One of Xiaobo's students also has excellent GIS skills, and could lead the spatial data analysis and mapping exercises, helping to build MDRI capacity on these techniques. These students would be available to conduct fieldwork during June/July 2016

### **Agricultural mechanization**

Interviews in Twantay and Tongwa townships (dynamic agricultural areas close to Yangon producing, respectively, double cropped rice, and rice and pulses), revealed a high degree of mechanization, with most farms owning power tillers for land preparation. Few households plow using animal traction, but the widespread transition from cattle to power tillers is recent. Most harvesting is still reliant on manual labor (mainly women). Some farmers own threshing machines, and rural entrepreneurs also provide threshing and other machine services. An agricultural machinery showroom visited by the team began to supply 75-90 HP tractors and large combine harvesters, imported from India, three years ago. Large farmers and agricultural companies are the main customers, with the former renting out services, as well as using for their own land preparation. The minimum area on which a combine harvester can be operated was reported as 0.2 acres, meaning that small farm size is not an impediment to their use. Mechanization and machine services, both of which are reasonably priced, appear to be spreading

rapidly as rural wages rise, are likely to continue to do so in future, and will be essential if agricultural intensification is to occur, particularly given the high ratio of land to labor in Myanmar.

Based on initial observations, it appears that conducting a meso-scale scoping exercise on agricultural mechanization will be relatively straightforward, given the brief timeframe within which change has occurred (making recall accurate), the relatively small numbers of suppliers and service providers, the 'lumpy' nature of the farm machinery (which make these assets easy to identify), and broad similarities in pricing observed (for machines, services, labor). The geographical scope of the study will have to be broad however, as these services are widely available throughout the country and a range of agricultural zones (dynamic and hinterland, delta and dry zone etc.) will need to be covered. In depth work could adapt existing IFPRI survey instruments on agricultural mechanization in Ghana, China and elsewhere. A PhD student from UC Davis who will be visiting IFPRI during July has already done good theoretical work on mechanization in China, but wants to do more empirical work also. It might be possible to involve her in research in Myanmar.

### **Farm size, on- and non-farm employment and land**

Key research questions emerging from earlier rapid reconnaissance work on the fish value chain are outlined below. The importance and policy relevance of these questions was reaffirmed during the field visits.

- What are typical enterprise budgets and productivity levels for aquaculture, and how can farm efficiency be improved?
- How does aquaculture compare to other forms of agriculture (particularly rice) in terms of employment intensity and duration, wage rates, investment capital, risk, and returns?
- How do employment generation, farm productivity and production linkages associated with large scale aquaculture operations compare with those in smaller scale commercial fish farms?
- What types of livelihoods does aquaculture create and displace, and what are the effects on welfare and wellbeing?
- How and in what ways do low income households engage in aquaculture value chains, and how could these value chains become more inclusive?
- How are aquaculture producers able to access land and alter land use?
- How do large scale land acquisitions affect rural livelihoods and what can be done to mitigate their impacts?
- How would removing/altering restrictions on land use affect the development of aquaculture and agriculture, and what policy changes would result in the most equitable outcomes?

It is envisioned that these questions will be answered through an integrated farm and livelihoods survey, representative of the population of a village tract or township with a high concentration of households engaged in aquaculture and related activities (hatcheries, nurseries, fingerling traders etc) as well as agriculture (paddy, orchards etc.) and landless households. Additional structured interviews would be conducted with other up- and downstream actors in the value chain in key roles (e.g. traders of feed and harvested fish) to understand changes taking place within the supply chain and their relationship with and impacts on changes taking place within the farm sector.

## ANNEX 2

### Mon Rural Development Strategy Report (draft outline)

- I. Introduction [Mateusz, Paul, Duncan, Than Tun]
  - Objectives of the study
  - Key issues in Mon State Rural Development:
    - Backdrop: migration economy, labor shortages, rising wages.
    - Agricultural challenges and opportunities: low-productivity rice, low-quality rubber, new lucrative cash-crops emerging (fruit), fish.
    - Non-farm rural economy challenges and opportunities.
- II. Overview of Mon State Economic Structure [Kyan Htoo, Ulrike, Ben Belton]
  - Trends in output, income, etc. (analysis of secondary data w/ comparison w/ other Asian countries), rural and urban population, Ag tables, Fish & livestock ...
  - Use State-level statistics from the planning bureau; statistical yearbook
- III. Household characteristics, poverty profiles, income sources
  - [Mateusz, Duncan] Repackage the Livelihood Analysis into a chapter:
    - Stats on income sources: Food Crop cultivation, Cash crop cultivation, livestock, local wage-work, salaried employment, migration, resource extraction, non-farm enterprise.
    - Regional distribution / agro-ecological zone
    - Distribution by income quintile or landholding quintile.
  - [Ben, Ulrike, Kyan Htoo] Land use and land rights... Landlessness stats: # landless, average plot size, area uncultivated. History of land re-distributions/confiscations.
- IV. Labor and Migration [Xiaobo, Mateusz, Emily, Ni Lei]
  - Trends in migration, labor markets, remittances
    - Stats by destination, by gender, by activity (“migrant characteristics”)
    - Stats by land ownership, income status, dependency ratio, (“sender hh characteristics”)
    - Stats on remittance sending/receiving
  - Impacts of migration on Mon Economy
    - Remittance use: consumption and investment
    - Labor shortage:
      - Wage levels and trends
      - In-migration from poorer states of MM
      - Shifts towards new crops (ex: chilies -> banana)
      - Mechanization
      - Low labor-intensity practices (broadcast vs transplant)
- V. Opportunities and challenges in the Agricultural Sector

- Rice [*Paul, Duncan, Seng Kham, Zaw Min Nyaing*] Challenge: low productivity.
  - Issues of inputs/practices: varieties, irrigation, fertilizer use.
  - Issues of environmental conditions: pests, salinization
  - Issues of financing: most farmers purchase inputs on loans, and forced into early sale of harvest at low prices. Extending loan repayment term.
  - Value chain: Issues are mainly upstream. Value chain analysis should have extra upstream focus, find out why low adoption of improved varieties, whether multiple-seasons are possible with irrigation infrastructure, etc.
  - Solutions?
  
- Fish [*Ben, Seng Kham*]
  - Wild catch: Access to ocean fish, marketing issues, declining stocks, etc.
  - Fish-farming may come in as a success story
  
- Rubber [*Mateusz, Zaw Min Nyaing*]
  - Challenge: Stuck in low-quality/low-price equilibrium, need to shift to a high-quality/high-price equilibrium like Thailand. Issues stem from:
    - Technology (sulfuric acid vs. formic acid)
    - Varieties (“wild seed” vs. clones)
    - Lack of reliable large-scale buyer demanding high-quality. Need for coordination at macro-level.
    - Lack of supporting institutions
  - Value chain: needs to a systemic shift from low-level to high-level equilibrium. Downstream: value chain analysis should focus on figuring out whether there is potential to secure buyer contracts which can incentivize high-quality production. Upstream: figure out why formic acid expensive (compare with Thailand). Midstream: look at farmer organizational structure. Coordination crucial for the equilibrium switch to materialize.
  
- Fruit crops: opportunities. [*Mateusz, Ben, Duncan, Aung Hein, Zaw Min Nyaing, Myat*]
  - Rambutan, Pomelo, Mangosteen, Mango, Durian, Banana
  - Growing demand in urban centers, rising prices, quicker transport.
  - “High-tech” operations with smart water use.
  - Low labor intensity, seasonal but off-season compared to rice harvest.
  
- Other crops (?) [*Ben, Duncan*]
  - Pulses [*Duncan*]
  - Vegetables – high value added, irrigation-based. Do not conflict with rice harvest or paddy-land zoning law.

- Betel nut – require government permissions?, potential for exports to India – Indian traders coming to Myanmar
- Ag Extension [*Duncan, Adam Kennedy, Aung Hein*]:
  - Cross-cutting theme: lack of ag extension. Inputs, improved ag technology (access to improved seeds, research stations, information regarding pesticides for pulses). Invest 2% + of ag GDP in ag research.
  - Link back to issues mentioned in all previous sections (rice pests, etc.)

#### VI. The rural non-farm economy [*Mateusz, Paul, Xinshen*]

- Rural investment climate, non-farm enterprises [Maybe run a business survey in the fall, as part of the case studies].
- Simulations of linkages of output growth to household incomes (small vs large farms, etc.)
- Rural-urban linkages
- Case studies (clusters, linkages, etc.)
- Private efforts in electrification. (Maybe a case study? Generators and fuel engines are wide-spread as a business).
- Village modeling: simulate is the impact of migration and rising wages, show how labor force migration ripples through the village economy. Provide scenarios for Mon to increase its agricultural output despite that trend.

#### VII. Government policy and investments (*Than Tun, Adam, Aung Hein*)

- Structure of government. “Devolution” from Union to State level.
- Revenues and Expenditures (national/state/townships/village tract)
- Assess effectiveness of improve public service delivery in infrastructure, health and education (household survey data):

#### VIII. A Strategy for Rural Development (*Than Tun, Paul, Duncan, Xinshen*)

- Illustrate cases that show it is possible to change; success stories that speak to role of government and policy:
  - Rice: mechanization, irrigation, varietal selection. Perhaps find a location where irrigation canals were rehabilitated.
  - Rubber: quality issue. Case study of location producing higher quality, or of village with a coop or other type of multi-actor coordination.
  - Orchards and vegetables: many case studies in Mudon. Describe the value chain. Impediments to exports = scope for improving policy.

- Migration: case study of Tirana village with huge houses built by migrants. That village has poor market access: maybe compare with other village with better market access, where remittances are being spent more productively. [*Mateusz, Xiaobo*]
  - Fish-farming: new activity, very lucrative. Ref. land use regulation policy. [*Ben*]
- Land use regulations reform options?
- Rural financing reform options?
- Organizational reforms options?
  - Rubber farmer associations
  - Quality control
  - Agricultural Extension (varieties and pests)

## ANNEX 3

### **You Can Have Your Rice and Eat Fish Too: Rice, fish, land use trade-offs and food security in Myanmar and Bangladesh**

Ben Belton, Aung Hein, Kyan Htoo, L. Seng Kham, Paul Dorosh and Emily Schmidt

Rice and fish are the most important components of the diet in both Myanmar and Bangladesh; rice provides the majority of energy, and fish provides a major share of micro-nutrients. This paper presents results from extensive fieldwork, supported by analysis of geospatial imagery and a detailed evaluation of national statistics, to address critical policy questions around the allocation of land to paddy and fish cultivation in Myanmar.

Optimal locations for farming fish are usually those best suited to cultivating rice, and most fish ponds in both countries are constructed on converted rice paddy. In order to protect rice security, Myanmar strictly regulates the conversion of paddy land to fish ponds. Bangladesh has no such restrictions, and has promoted aquaculture development heavily as a high value agricultural activity, with profit margins per hectare averaging around an order of magnitude greater than those possible from paddy cultivation.

Both countries have already achieved self-sufficiency in rice production. The area under paddy in Myanmar has grown around four times more quickly than that in Bangladesh, in percentage terms, over the last decade. Paddy yields in Myanmar grew at around half the rate of those in Bangladesh during this period however, and remain among the lowest in the region. In Myanmar, paddy cultivation is dominated by a single monsoon crop. Production increases have been achieved mainly through horizontal expansion of planted area, in part through large land concessions granted to companies, with attendant social and ecological problems. In Bangladesh, increases in paddy production have been driven primarily by smallholder-led intensification, characterized by widespread adoption of groundwater irrigation, double cropping and high yielding varieties.

Despite a policy environment hostile to the development of aquaculture, the high returns possible have contributed to significant growth of the activity in Myanmar during the last decade. However, Bangladesh currently devotes 3.5 times more land to ponds (647,800 ha, versus 182,000 ha), and produces around two times more farmed fish (1.7 million t, versus 0.9 million t) than its neighbor. Most of the fish farmed in Bangladesh is produced by commercially-oriented smallholder producers, while in Myanmar the majority originates from large farms (>50 ha). Despite the rapid growth of aquaculture in both Myanmar and Bangladesh, the land devoted to ponds represents only a small share of total paddy area (2.3% and 5.6% respectively), and the relative shares of land under fish ponds and paddy land have increased little over the last decade.

Liberalization of Myanmar's land use policy could increase fish production substantially. The potential loss of rice area resulting from such a policy change is small. Under current conditions, a shift to ratios of rice land to pond area similar to those found in Bangladesh would imply a maximum decrease in paddy area and production of 3%. However, Myanmar

also possesses ample scope to generate higher yields from the existing cropped area by intensifying paddy production. Any reductions in paddy area resulting from the conversion of arable land to ponds could easily be made up, and exceeded, through greater production efficiencies, raising Myanmar's rice yields closer to the levels achieved by its neighbors. Policies should therefore aim to promote smallholder rice intensification and smallholder diversification into commercial aquaculture *simultaneously*. Doing so could improve producer incomes dramatically, whilst increasing the availability and accessibility of fish to consumers.

[www.feedthefuture.gov](http://www.feedthefuture.gov)