

Burma Food Security Policy Project (FSPP)

QUARTERLY REPORT

APRIL-JUNE 2016

FOOD SECURITY POLICY PROJECT

**Associate Award No. AID-482-LA-14-00003
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Submitted by

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PROJECT OVERVIEW

The USAID Burma Food Security Policy Project (FSPP) was signed September 23, 2014. The project is implemented by Michigan State University (MSU). Implementing partners are the Centre for Economic and Social Development (CESD) in Burma, and the International Food Policy Research Institute (IFPRI). 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 FSPP during the quarter April - June 2016, including activity development and progress achieved during the period. This summary is organized with reference to the four project components.

INTRODUCTION

This quarter saw intensive activities across all components. These included: finalization and dissemination of the agricultural strategy white paper led by NESAC, implementation of a household and producer survey on aquaculture, agriculture and agricultural mechanization to more than 1100 households in Ayeyarwaddy and Yangon from April; scoping, design, pre-test and implementation of a survey of more than 60 agricultural machinery supplies and spare parts businesses in Yangon; presentation of the draft Mon State Rural Development Strategy to the Chief Minister of Mon State; and participation in and contributions to a series of high level meetings and policy forums.

COMPONENT 1: POLICY/STRATEGY ADVISING

This quarter saw FSP participate in a wide range of policy and strategy advising activities. These are summarized in the order in which they occurred, as follows:

- On April 1, Duncan Boughton and Steve Parker presented the draft agricultural strategy white paper on agriculture, *From Rice Bowl to Food Basket: Three pillars for Modernizing Myanmar's Agricultural and Food Sector* at a meeting with UMFCCI and senior USAID officials.
- Paul Dorosh and Mateusz Filipski (IFPRI) visited Myanmar to finalize the Mon State Rural Development Strategy, in consultation with Zaw Oo (CESD) and Duncan Boughton (MSU), from April 30 to May 4. The group met with the Chief Minister of Mon State and presented findings from the development strategy to senior members of the Mon State parliament during this period. A presentation made during this visit is can be accessed here: http://fsg.afre.msu.edu/fsp/burma/DevStrategy_Mon_state.pdf.
- On May 1, Myat Thida Win and Khan Htoo (CESD) met with the USAID Administrator Gayle Smith, at a town hall meeting with farmers in Htantapin and discussed findings from recent FSP scoping work on agricultural mechanization.
- Ben Belton (MSU) and Aung Hein (CESD) attended a meeting with senior Department of Fisheries officials in Nay Pyi Taw on May 26 to present five policy briefs on the future of fisheries and aquaculture in Myanmar as part of a panel comprised of members of Myanmar Fisheries Partnership.
- FSP helped organize a field visit for Justin Finnegan of the USAID Bureau of Food Security on June 9 to visit agricultural machinery suppliers, rental service providers, and users in Yangon and Twantay. He was accompanied on the visit by Myat Thida Win and Ben Belton.

COMPONENT 2: AGRIFOOD VALUE CHAINS

This period saw major survey activity. Intensive training on survey implementation and data entry, begun in the second half of March, was conducted for 48 enumerators from April 1-8 and April 25-30 (with a break from April 9-24 for Thingyan festival) in Thanlywin. More than 1,100 households from two clusters of village tracts in Ayeyarwady and Yangon regions with, respectively, high concentrations of aquaculture and agriculture operations were surveyed. Prior to the survey, a listing (census) of all households in aquaculture cluster village tracts was conducted. Listing of agricultural households occurred in step with survey rollout. Survey rollout began on May 2, and was completed on schedule by May 28. The

entire CESD research team was based in the field during this period to manage survey activities with the technical support and oversight of MSU staff. Data was entered in the field. A second round of data entry was completed by June 16 to enable crosschecking for entry errors, and data cleaning began immediately in preparation for analysis in July. A detailed survey analysis plan was completed during this period, and can be seen in Annex 1.

- From March 29 to April 3, Dr. Xiaobo Zhang (IFPRI) visited Myanmar to conduct an intensive rapid scoping of agricultural mechanization in Ayeyarwady and Mandalay with Ben Belton and Myat Thida Win. The scoping revealed changing patterns of machine adoption taking place throughout the country, driven by rising wage rates and labor shortages. A short research note summarizing the findings was written and circulated to donors. This is included here as Annex 2. Following Dr. Zhang's visit, MSU and CESD staff designed a survey instrument for agricultural machinery supply businesses in Bayintnaung Market (Yangon) agricultural machinery dealerships and related enterprises in Myanmar. The instrument was pretested extensively with businesses located elsewhere in and around Yangon, and more than businesses were surveyed between June 22 and June 29. Analysis of this data will begin in the final quarter of the year.

COMPONENT 3: HOUSEHOLD AND COMMUNITIES LIVELIHOODS

- Finalization of the Mon State Rural Development Strategy continued during this period, with feedback provided during presentations to the Mon State Government incorporated into the report.

COMPONENT 4: CAPACITY AND NETWORK BUILDING

Capacity building and networking activities are reported below in sequence.

- Ben Belton (MSU) attended a fishery policy brief write shop from April 4-7 in Pin Oo Lwin. The write shop was organized by Myanmar Fisheries Partnership (a newly formed coalition of government, non-government and private organizations working on fisheries issues in Myanmar), and resulted in production of five policy briefs in English and Myanmar. Dr. Belton led the team producing a policy brief on aquaculture, based on findings from USAID supported value chain scoping work. The briefs are available to download from this link: <https://myanmarbiodiversity.org/portfolio-items/marine-fisheries/>.
- Duncan Boughton was an invited speaker on a panel at the launch event for the Proximity Design publication *Paddy to Plate* on May 31.
- On May 3, Ben Belton was interviewed by CNN about the potential of aquaculture development in Myanmar in the context of ASEAN integration for a segment on CNN business news titled The Road to ASEAN. The clip was broadcast on June 22. The video can be viewed here: <http://edition.cnn.com/videos/world/2016/06/21/road-to-asean-myanmar-aquaculture-spc.cnn>.
- Duncan Boughton and Ben Belton attended an OECD seminar Building Comprehensive Policy Framework for Sustainable Agriculture Development and Food Security in Myanmar on June 13, and an OECD-FAO-ASEAN Regional Conference on Policies to Enable Food Security, Agricultural Productivity and Improved Nutrition on June 14 and 15 in Nay Pyi

Taw. The former meeting was well attended by senior GOB officials and provided excellent opportunities for networking. Ben Belton gave a presentation titled *Fish, Fisheries and Nutrition Security in ASEAN* at the OECD-FAO-ASEAN meeting.

- Ellen Payongayong (MSU) conducted training on the use of STATA software for survey analysis for five CESD staff members who had joined since analysis of data from the Mon Household Survey, and refresher training for four experienced staff members, combined with data cleaning activities, from June 6 to June 30.
- CESD researchers worked with MSU and IFPRI staff to prepare five abstracts based on findings emerging from FSP research activities for submission to the Myanmar Update 2017 conference to be organized by Australian National University. Each of the abstracts addresses the conference theme of ‘transformation’ with respect to agriculture and is attached in Annex 3.

OTHER ISSUES

Management and Personnel Changes: No changes in project management or personnel occurred during this period.

Deliverables Completed: The project made excellent progress toward meeting its deliverables during this quarter. Activities for all surveys were completed to schedule.

PRIORITIES FOR PROGRAMMING DURING THE NEXT REPORTING PERIOD

Component 1: Policy/strategy Advising: Priorities during the next reporting period will include activities contributing toward the formation of a policy strategy unit in MOALI.

Component 2: Agrifood Value Chains: Priorities will be timely completion of data analysis for the aquaculture-agriculture-inputs survey, agricultural mechanization cluster survey, and preparatory work for a survey of non-farm components of the aquaculture value chain.

Component 3: Household and Communities Livelihoods: The MSRHS technical report and policy briefs will be published and disseminated.

Component 4: Capacity and Network Building: Networking and capacity building activities with the incoming government will be intensified to support the new administration in implementing effective agricultural policy, particularly through activities that build capacity to strengthen policy analysis capacity at MOALI.

ANNEX 1

MYANMAR AQUA-AGRI SURVEY ANALYSIS PLAN

Household Characteristics Files to Be Generated

- Cluster type (Aqua/Agri)
- Township (Kayah, Twantay, Maubin, Nyaungdon)
- HH size
- HH type (Aqua/Agri/non-farm HH)
- HH expenditure quintile
- Ethnicity
- Migration status (migrant/non-migrant)
- Flood affected (Y/N)
- Landholding tercile
- Aqua farm size (<10 acre; >10-<40 acre, 40+ acre)
- Aqua farm type (nursery; semi-intensive; integrated; intensive)
- Agri-farm size (<5 acre; 5-10 acre; >10 acre)
- Agri-farm type (double crop paddy; 1 crop paddy + 1 crop non-paddy; single crop paddy; single crop non-paddy)
- Adoption of mechanized harvesting (Y/N)

Reference Files from Community Questionnaire

- Commodity prices and measures
- Name of nearest urban area to each village
- Distance and travel times from village to nearest urban area and Yangon

Outputs

Mechanization

Summary of modules F1, F2, M3, O3, P2, with reference to farm size, agri-farm type, cluster type

Output tables:

- Prevalence of ownership, rental in and rental out of machinery, by machine type + draft animals
- Use of machinery by agricultural activity
- Cost of machine purchase
- Cost of machine rental
- Type of rental service accessed/provided
- Returns from renting out mechanization services

- Timeline of adoption and acquisition of machinery
- Historical use of land preparation and harvesting machinery

Credit

Summary of modules Q1, Q2; W1; Community H1, with reference to HH type, expenditure quintile, landholding tercile, aqua and agri farm type.

Output tables:

- Prevalence of access to credit by source
- Distance to nearest source
- Interest rate by source, now and five years ago
- Prevalence MADB loans among agricultural HH; Reasons for not taking MADB credit
- Size, purpose, interest rate, whether necessary to sell crops for repayment
- Prevalence of non-MADB loans use for agriculture and aquaculture
- Size, purpose; form; interest rate; collateral; whether output tied

Land

Summary of module D1, D2, J1, R1, U1, and community questionnaire F1, F2, G1, G2, with reference to cluster type, township, HH type, expenditure quintile, farm type, migration status, adoption of mechanized harvesting.

Output tables:

- Levels of landlessness, ownership of other land types
- Farm size distribution, tenure conditions
- Timeline and conditions of land acquisition
- Land sale and rental value
- Prevalence, reasons for, consequences of, and extent of land disposal
- Share of agri-parcels cultivated in monsoon/dry season, flood affected
- Type of pond, timeline of pond construction, flood affected
- Share of ponds with license, licensing costs, reasons for not applying
- Share of ponds with La Na 39, necessity of applying, cost and time of application, reasons for not applying)
- Change in absentee landownership for aquaculture
- Change in number and area of farms in different size brackets, ownership status of farms by size bracket
- Change in prevalence of land rentals, change in land rental and sales value

Labor and Employment

Summary of modules E1, E2, E3, E4; K1, M5, O5; S4, S5, T9, T10, community questionnaire D1, with reference to: cluster type, HH type, landholding tercile, aqua farm size, aqua farm type, agri-farm type.

Output tables:

- On-farm and non-farm employment (jobs, person days) in agriculture and aquaculture clusters
- On-farm labor demand (person days/acre - family, permanent, casual, male/female) in agriculture and aquaculture
- Employment multiplier of agriculture and aquaculture
- Male/female wages/incomes for work/self-employment in agriculture and aquaculture
- Labor demand for agriculture in HH with and without mechanization
- Labor conditions for permanent farm labor
- Allocation of casual and family labor in agriculture by type of activity, cropping season, and crop
- Allocation of casual and family labor in aquaculture by type of activity, nursery, and growout
- Historical wage rates

Migration

Summary of module C, plus data from K1, M5, O5; S4, S5, T9, T10; community questionnaire C3, C4, D2, with reference to, cluster type, HH type, HH expenditure quintile, landholding tercile, adoption of mechanized harvesting.

Output tables:

- Outward migration – prevalence, destination location, occupation, prevalence and value of remittances, prior ownership of land
- Inward migration – origin of permanent workers, permanent or temporary migration; origin of temporary workers
- Community level - share of HH employing migrant labor; Now and five years ago: share of HH with an out-migrant; flows of inward and outward migrants within last five years

Aqua-farm Budgets and Yields

Summary of modules R1, S1, S2, S3, T1, T2, T3, T4, T5, T6, T7, T8, V1; community questionnaire E, with reference to: township, aqua farm size, aqua farm type.

Output tables:

- Total costs/HH, total costs/acre, variable costs/acre (seed, feed, labor, fertilizer, chemicals, fuel, harvesting costs, marketing costs, other), fixed costs/acre (depreciation, semi-fixed

assets, rent, other), gross margin, net margin (per HH, per acre) – for both growout farms and nurseries

- Yields/acre, by species (growout farms only)

Aquaculture Management Characteristics

Summary of modules R1, S1, S2, S3, T1, T2, T3, T4, T5, T6, T7, T8, V1; community questionnaire E, with reference to: township, aqua farm size, aqua farm type.

Output tables:

- Summary of growout characteristics, now, five and 10 years ago (Module V1)
- Number of commercial nurseries (weighted), number of growout farms (weighted), share of growout farms with non-commercial nurseries
- Share and quantity of seed stocked in commercial nurseries, by species, average stocking size, price and source
- Share and quantity of species stocked by commercial nurseries, average sales size, price and destination
- Share of commercial nurseries using feed and non-feed inputs, quantity of inputs used, cost and source of inputs used
- Duration of production cycle, method of growout pond construction and repair, method and frequency of drainage and refilling
- Share and quantity of seed stocked in growout farms, by species, average stocking size, price and source of seed
- Share of growout farms using feed and non-feed inputs, quantity of inputs used, brand of pelleted feeds used, credit arrangements for pelleted feeds, cost and source of inputs used
- Share and quantity of species harvested from growout farms, average sales size and price
- Share of growout farms using ice, source of ice, share of farms transporting fish to market by different means, quantity of fish self-consumed
- Average number of buyers, buyer type, share of buyers providing credit, payment details, commission paid on sales
- Share of farms producing poultry, type of poultry raised, duration of production cycle, ratio of pond area to feedlot area

Agri-farm Budgets and Yields

Summary of modules J1, K1, L1, M1, M2, M3, M4, M5, M6, N1, O1, O2, O3, O4, O5, P1; community questionnaire E, F2: with reference to: township, agri-farm size, agri-farm type, adoption of mechanization.

Output tables:

For Monsoon Paddy, Dry Season Paddy, Dry Season Non-Paddy, Non-Field Crops

- Total costs/HH, total costs/acre, variable costs/acre (seed, labor, fertilizer, other chemicals, machinery/draft animals, fuel, marketing costs, other), fixed costs/acre (depreciation, semi-

fixed assets, rent, other), gross margin, net margin (per HH, per acre) – for both growout farms and nurseries

- Yields/acre and HH

Agricultural Management Characteristics

Summary of modules J1, K1, L1, M1, M2, M3, M4, M5, M6, N1, O1, O2, O3, O4, O5, P1; community questionnaire E, F2: with reference to: township, agri-farm size, agri-farm type, adoption of mechanization.

- Share of HH producing monsoon paddy, dry season paddy, dry season non-paddy, non-field crops
- Summary of farm characteristics, now, five and 10 years ago (Module P1)

For Monsoon, Dry Season, and Both

- Type, variety, quantity, origin and cost of seed planted, seeding method
- Type, source and cost of irrigation
- Quantity, cost and source of chemical inputs
- Prevalence of machinery and draft animal use
- Quantity of crop produced (yield per acre and HH), sold, retained; timing and value of sales; type and location of buyer

Access and Infrastructure

Summary of community questionnaire modules C1, C2, J.

Output tables:

- Access and infrastructure (primary access route, date of construction, accessibility by season; water control and irrigation infrastructure, electrification)
- Access to nearest urban area and Yangon (distance; now and five years ago - mode of transport, travel time)

Miscellaneous

Summary of HH modules I1, I2, I3, T8, H, E4, Q3.

Output tables:

- Share of foods in HH budget, share of food groups in food budgets
- Poultry (production budget, yields)
- Livestock (share of households producing, income)
- Resource extraction (share of HH employed in different activities, income)
- Paddy cultivation income and production of fish farmers, aquaculture income and production of paddy farmers

ANNEX 2

BRIEFING NOTE: MYANMAR'S MECHANIZATION REVOLUTION

April 4, 2004

Ben Belton, Michigan State University
Myat Thida Win, Centre for Economic and Social Development
Xiaobo Zhang, International Food Policy Research Institute

This note summarizes key findings and recommendations from a rapid scoping study of agricultural machinery suppliers and users conducted in Yangon, Ayeyarwady, and Mandalay from April 29 to March 3, 2016. The study reveals that unprecedentedly rapid adoption of labor saving agricultural machinery has occurred on a massive scale since 2013. This is a response to constrained rural labor supply and rising real wages resulting from rapid industrialization and the structural transformation of Myanmar's national economy.

Existing Policy Environment

- Unlike in many other countries, very few policy distortions impact the adoption of agricultural machinery in Myanmar: imports of agricultural machinery are open, tariff rates are zero or very low, and the market for agricultural machinery is highly competitive.
- Following the recent opening up of the financial sector, banks and other financial institutions are competing vigorously to provide credit at reasonable rates. Private land use rights (Form 7) can be used as collateral for these loans.
- The Agricultural Mechanization Department provides machinery rental services from 99 stations around the country. These were once the primary means by which farmers could access four-wheel tractors, but the machinery supplied is now out of date and not of the type preferred by farmers, and the supply of these services is unable to keep pace with current levels of demand.

Drivers of Agricultural Machinery Adoption

- Wage rates have risen extremely sharply since 2012/13, and shortages of labor at critical points in the agricultural production cycle are reported by all informants in all locations. Very rapid adoption of large-scale mechanization (combine harvesters and four-wheel tractors) has occurred in response to the constrained labor supply.
- The vast majority of farmers using large machinery do so by renting in services provided by rural entrepreneurs. A small number of larger companies also provide these services. For smaller machinery, both ownership and rental are very common.
- Owners of combine harvesters, four wheel tractors, and trawlerji (multi-purpose farm vehicles used for transporting heavy loads) all report being able to recoup their initial investments within 2-3 years, suggesting very high rate of return on capital.
- Most agricultural machinery of all types is purchased with financing arrangements provided by machinery suppliers and private banks. Customers can access these quickly and easily. At least five commercial banks and one company compete to offer these services. Interest rates are affordable and lower than most other developing countries. Dispersal of credit by the

Ministry of Cooperatives is reported to have contributed to the acceleration of farm machinery sales.

Combine Harvesters

- There has been a tremendous increase in use of combine harvesters throughout the country since 2013, but centered particularly in the Delta (the most important paddy cultivating region). Sales of combine harvesters in 2016 and 2015 are extremely brisk, and accelerating compared to 2014.
- Informants estimated the areal coverage of combine harvesters in Ayeyarwady region is already at between 30% and 60%, up from zero in 2012. Rice mills in Mandalay report the share of paddy harvested with combines more than doubling over the same period.
- A total transition from manual to mechanized harvesting in all areas where access is possible (a process that has taken one to two decades in other countries) will likely be completed in Myanmar in less than five years.

Two Wheel Tractors

- Two wheel tractors are the most widely owned type of agricultural machinery. They have been available in Myanmar for 25 years, but widespread adoption has taken off within the last decade. Sales are high, but have already plateaued in the Delta, reflecting very high existing levels of use in rice cultivation. Before 2009 most farming households in Ayeyarwady owned draft animals for use in land preparation, but draft animals have now largely disappeared from the areas visited.
- The diffusion of two wheel tractors is still ongoing in remoter areas of the Central Dry Zone, with machinery suppliers vigorously promoting sales in these locations in order to expand their market.
- Many farms producing oilseeds use both two wheel tractors and animal traction for different types of land preparation (ploughing and harrowing) because two wheel tractors cannot perform all land preparation activities required for oil seed cultivation. The use of rented draft animals remains common in Upper Myanmar, but levels of ownership are much lower than they were in the recent past.
- While two-wheel tractors are mainly produced in China, the majority of two wheel tractor wheels are manufactured in Myanmar. Domestic manufacture of these wheels has grown rapidly over the last four years. Some machine attachments such as plows are also manufactured domestically.

Four Wheel Tractors

- Growth in sales of four wheel tractors (which are around four times more labor saving than two wheel tractors) has accelerated very rapidly since 2013, particularly in Upper Myanmar, which accounts for 70% of national four wheel tractor sales.
- Four wheel tractors can replace nearly all of the land preparation functions performed by cattle in oilseed production, and are beginning to displace two wheel tractors wherever soil conditions and crop choice make substitution possible.

- Four wheel tractors have yet to displace use of two wheel tractors in rice cultivation to a significant degree because they are not well suited to operation on wet soils.

Trawlerji

- Use of Trawlerji is ubiquitous throughout rural areas for transporting crops, goods, and people. Trawlerji sales have been strong for many years and continue to grow.
- All of the largest agricultural machinery supply companies assemble trawlerji in Myanmar by combining domestically fabricated frames and imported Chinese parts, and sell them under their own brand names.

Groundwater Irrigation

- Farmers interviewed in Mandalay report that severe drought conditions over the last two years have impeded surface water irrigation from government dams, causing them to switch from dry season paddy to pulse and oilseed cultivation and, in extreme cases, to abandon crop cultivation all together. Groundwater irrigation from deep tube wells has increased rapidly in response. Tube wells are sunk by both government and private contractors, and private pump owners rent irrigation to users in the surrounding area.

Effects of Rapid Mechanization

- Combine harvesters represent a major cost saving for the farmer, as their use negates the need to hire labor for threshing (a saving of about one quarter of total harvesting costs). Savings gained by use of combines have thus partially offset rising labor costs, and have a time saving effect during periods when it is difficult to find sufficient labor.
- Combine harvesters reduce harvest/post-harvest losses of grain by around 10%, thereby raising the effective productivity of paddy land significantly.
- The main effect of substituting machine traction for animal traction is to save time. A four wheel tractor can prepare land at a rate of one hour per acre. Approximate times for land preparation using two wheel tractors and cattle are four hours per acre and 2.5 days per acre respectively.
- Growth of agricultural machinery sales is stimulating domestic industrialization: all trawlerji sold in Myanmar are assembled domestically using locally fabricated frames, most two wheel tractors are wheels are domestically manufactured; and two and four wheel tractors are assembled in-country from imported parts.

Challenges

- A high level of unmet demand for combine harvester services remains in rural areas with poor road access. Rice will likely lose its comparative advantage in inaccessible areas and ultimately be replaced with more labor saving crops.
- Uneven or narrow entry routes to individual rice fields and the configuration of parcels of agricultural land can also inhibit combine access.
- Use of combines on soft soils results in soil compaction, delaying planting times for pulses. Delayed planting increases pest infestation and pesticide use, which raises production costs and discourages adoption of mechanized rice harvesting among some pulse producers.

- Harvesting of pulses, which is highly labor intensive, has yet to be mechanized as varieties currently grown are not sufficiently erect for combines to work effectively.
- Labor shortages have encouraged a shift from transplanting to broadcasting rice as a labor saving measure in some locations, particularly where production is subsistence oriented. Yields from broadcast paddy are as much as 40% lower than yields from transplanting, so the overall effect of rising wages on paddy productivity is unclear.
- Several large machinery supply companies are already testing rice transplanting machinery, but face difficulties in mastering the preparation of seedlings for use with the machinery.

Policy Responses

- Ensure that all imports of agricultural equipment remain tariff free.
- Initiate infrastructure development projects to ensure that all villages are connected by roads and bridges (where required).
- Provide land-leveling services for fields and access points, and concurrent renovation of small-scale irrigation surface water irrigation schemes.
- Survey the availability of groundwater resources in drought prone areas.
- Initiate finance guarantee schemes to lengthen the duration of repayments on the hire purchase for agricultural machinery.
- Establish demonstration farms for rice seedling production with foreign technical support to accelerate adoption of mechanized rice planting equipment.
- Disseminate erect pulse varieties to facilitate mechanization of harvesting.
- Consider privatization of the Agricultural Mechanization Department.

ANNEX 3

AGRICULTURAL TRANSFORMATION IN MYANMAR: OPPORTUNITIES AND CHALLENGES FOR A SMALLHOLDER-LED GROWTH STRATEGY

Topic Area: Economy

Kyan Htoo, Centre for Economic and Social Development
Duncan Boughton, Michigan State University

Myanmar is expected to have the fastest economic growth of any country in Southeast Asia. Yet 70% of the population and the majority of the country's poor live in rural areas where agriculture dominates the local economy. Any economic strategy that seeks broad-based economic growth must consider how to ensure that agriculture, and especially smallholder farmers, are able to increase productivity and incomes. For decades Myanmar's smallholder farmers were required to grow rice with limited access to improved varieties and production technologies. Yield growth was much slower than neighboring countries, and many smallholders found themselves mired in debt. Rapid increases in rural wage rates over the past three years due to labor scarcity accentuate the challenges faced by smallholders.

The government of Myanmar is committed to ensure farmers have the opportunity to improve their incomes. This paper has two objectives. First we summarize necessary elements for a new strategy, based on experience of other countries in the region, to improve the incomes and livelihoods of rural communities while increasing the availability of more stable, diversified, and nutritious diets to consumers. The strategy emphasizes a demand-driven (market oriented) approach that empowers Myanmar's smallholder farmers, equipping them with knowledge and technical inputs, and connecting them to urban and global markets. The second objective of the paper is to identify critical policy reforms and public investments necessary for the strategy to be implemented successfully. The reforms and investments are organized around three pillars: 1) strengthened access to land, water and production inputs; 2) modernizing small farm production through enabling farmers to choose the most profitable cropping patterns and production technologies; and 3) modernizing output markets and value added processing.

MYANMAR'S MECHANIZATION REVOLUTION: SYMPTOMS OF STRUCTURAL TRANSFORMATION

Topic Area: Economy

Myat Thida Win, Center for Economic and Social Development
Ben Belton, Michigan State University
Xiaobo Zhang, International Food Policy Research Institute

Since the civilian government came into power in 2011, Myanmar's economy has been experiencing unprecedented growth. Its growth rate is expected to reach 8.6% in 2016, and it is reported as the world's fastest-growing economy by IMF's World Economic Forum. Experience from other countries in the region suggest that structural transformation, in which the economy will transform from agriculture-based to more industrialized, will follow this political and economic transition. One symptom of structural transformation is increasing mechanization in agriculture, as the sector experiences shortages of labor and rising farm wages due to the movement of labor from agriculture to more productive industrial and service sectors.

This paper analyzes the mechanization of Myanmar's agricultural sector to evaluate the speed and depth of structural transformation in Myanmar. To do this, we triangulate data from a unique range of sources, including the datasets of the nationally representative Integrated Household Living Conditions Assessments surveys for 2005 and 2010, a recently completed household survey of 1,200 households in Ayeyarwaddy and Yangon regions, an enterprise survey of more than 60 agricultural machinery businesses in Yangon, and qualitative findings from a rapid reconnaissance in Ayeyarwaddy and Mandalay regions. We find that Myanmar's agriculture sector has already begun to encounter severe labor shortages. The rate of agricultural wages has approximately doubled within five years from 2011 to 2016 as many workers have shifted from the rural farm sector to urban industrial and service sectors. Farmers have responded by rapidly substituting machinery for manual labor. In the areas of Ayeyarwaddy surveyed, draft animals used for land preparation have almost disappeared, and nearly all paddy lands accessible to road are now using combines for harvesting. We conclude that the extent and pace of mechanization is a symptom of the profundity of the emerging structural transformation currently taking place in Myanmar.

UNEVEN DEVELOPMENT AND TRANSFORMATION IN MYANMAR'S FISH FARMING VALUE CHAIN

Topic Area: Economy

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Aquaculture (fish farming) has a potentially significant role to play in achieving rural development and food security goals in Myanmar, but its status is poorly understood. Using multiple sources of data, including a structured survey of 1,200 households in Ayeyarwady and Yangon, qualitative data from 250 in-depth interviews, and geospatial analysis of satellite images, we address this knowledge gap, assessing changes in the structure and performance of the aquaculture value chain over the last 10 years, and their impacts on rural communities and their economies. We find that a *quiet revolution* has taken place, as evidenced by a proliferation of actors throughout farm and non-farm segments of the value chain. This development, and the associated transition from paddy cultivation to fish farming, has resulted in a variety of transformations in fish pond clusters, in terms of: land use and access, farm incomes, levels of off-farm wage employment, and rural-rural and rural-urban migration. However, these processes have been highly uneven. Aquaculture development has been concentrated in a handful of townships where regulations governing agricultural land use have been relaxed informally. Furthermore, despite the emergence of significant numbers of small- and medium-scale commercial fish farms and SMEs, ownership in most value chain segments remains highly concentrated. For instance, very large farms (sized more than 100 acres, and operated primarily by absentee owners or companies) account for 60% of total pond area, and a single company retains a virtual monopoly on fish feed production. Realizing the full potential of aquaculture will be an important piece of the puzzle if Myanmar's agriculture is to transition toward the production of more diverse, higher value agricultural produce. To do so will require fostering and facilitating more inclusive and more evenly distributed patterns of aquaculture development and growth than exist at present.

MIGRATION AND AGRICULTURAL TRANSFORMATION IN MON STATE

Topic Area: Migration, Economy

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After decades of military rule and international economic sanctions, the country of Myanmar is now one of the remaining least developed countries in the South-East Asia. Low wages and poor employment opportunities have been prompting citizens of Myanmar to seek income-earning opportunities in neighboring countries, creating labor shortages at home. At the same time, the antiquated agricultural system is struggling as it starts to compete on international markets. The crop sector is facing enormous pressure as low levels of profitability coincide with massive out-migration of labor resources to neighboring Thailand. Using primary household data collected in the southern state of Mon, we shed light on the extent of these challenges, and investigate how the large outflow of migrants is prompting transformation in the agricultural sector. Our results suggest that migration is associated with a shift to less labor-intensive agricultural practices such as mechanized land preparation and harvest, but possibly also to rice seed broadcasting rather than transplanting, land being left fallow, and rubber trees left untapped. Migration is thus creating constraints which shape the restructuring of Mon State's agriculture, the direction and speed of which will determine the long-term viability of the sector.

THE ROLE OF HOPE IN MYANMAR'S RURAL TRANSFORMATION: INSIGHTS FROM HOUSEHOLD SURVEY DATA FROM MON STATE

Topic Area: Economy

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In recent years the topic of aspirations has generated excitement and intrigue among empirical development economists. Many have pointed out that for most of its short history, development economics has primarily focused on relieving the *external* constraints of the poor. The emerging literature on aspirations and hope is part of a larger trend to expand the possibilities of what truly binds the economic and social progress of individuals, households, and societies. Development economists are now considering the existence, and even the primacy, of *internal* constraints the poor may face.

Myanmar's rural sector is where the majority of people who live in poverty reside. Thus, Myanmar's rural transformation necessitates a wide-reaching exit from poverty. Recent research in psychology suggests that living in poverty may have specific psychological consequences that may stall, or even prevent, a future escape from poverty. One emerging explanation for this finding is that poverty itself influences how individuals form aspirations about and hope in the future.

This paper explores the role of hope in Myanmar's rural transformation in three ways. First, we apply a theoretical model of the *economics of hope*, which defines hope as a function of aspirations, agency, and pathways. Second, we draw insights from data generated by a household survey representative of rural Mon State, including 503 households in 48 enumeration areas that aimed to empirically measure each of the essential elements of hope—aspirations, agency, and avenues. We find that roughly a third of the sampled population possesses sufficient levels of each of these elements. Finally, using the data collected in this survey and aided by the theoretical model of the economics of hope, we highlight several policy implications from the data collected in this survey to develop a psychologically enhanced rural development strategy for Myanmar's rural transformation.