

The effect of drought and the selling of cultivated farmlands on the livelihood of local farmers in Bagan-Nyaung U area

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Abstract: A case study was carried out to identify the impacts of drought and tourism development on reducing farmlands and the contribution of household income in Bagan-Nyaung U area. Recurrent droughts in the study area caused lower crop productivity and forced the local farmers to sell their farmlands for livelihood. During the same period, tourism developmental activities in study villages also stimulated the local farmers to sell-off their farmlands due to higher demand and market prices. Thus, reduction in per capita cultivated farmlands provided the opportunity towards participation in non-farm livelihood activities. Based on the primary household survey, the average annual household incomes were marginally higher among farmland-sold households when compared with non-sold households. The farmland-sold households have chosen a new development pathway by pursuing nonfarm-based livelihood strategies as ways to mitigate their dependency on farmland. These households over time tend to increase their durable asset base and mean household consumption expenditure patterns per annum. The reductions in farmland due to drought and tourism development have improved their household welfare by motivating them to take part in diverse non-farm livelihood opportunities. Non-sold farm households whose are completely dependent on agriculture for livelihood did not improve their standard of living in the study area. This clearly indicates the declining profitability of agriculture and increased dependency on non-farm livelihood opportunities. These findings are aptly reflecting the existing trends in many developing countries in South Asia. (232 words).

Key words: Durable assets, households' income, impact of drought, reducing farmland, tourism development.

Introduction

Bagan-Nyaung U area is one of the richest archaeological sites because it is the place of the ancient city where thousands of Buddhist monuments (temples, stupas, monasteries, etc.) located. It is situated in the central dry zone (CDZ) of Myanmar. The typical characteristic features of the central dry zone region are erratic rainfall, higher temperatures, sandy soils with low fertility and poor water-holding capacity. Majority of people living in this zone depend on agriculture and allied activities for their livelihood. The unit agricultural productivity is declining over time due to frequent droughts and erratic monsoon situation in Bagan-Nyaung U area. The strategy to improve further agricultural production in the zone consists of improved irrigation facilities, adaptation of climate change mitigation strategies, bringing more land under cultivation and advocating crop diversification through enhanced cropping intensity.

Bagan-Nyaung U area is severely affected by consequent droughts in which the average annual rainfall is often lower than normal rainfall over decades (data of Dry Zone Agricultural Research Farm, Nyaung U, 2003-2015). Since the region chronically receiving a lower quantum of rainfall compared to the other parts of Myanmar, farmers are surviving with unstable livelihood opportunities with little or negligible prospects of increasing agricultural production. According to Myanmar's National Adaptation Programme of Action (NAPA), the central dry zone is one of the most vulnerable to climate change (UNEP, 2012). The annual household agricultural incomes were not enough to meet their household expenses because of frequent experiences of crop losses. The negative deviations in household earnings from agriculture have threatened farmers' livelihood security and forced them to sell their farmlands. Thus, farmers started reducing their area allocation under different crops in the study area.

In addition, Bagan-Nyaung U area is one of the prime destination places for tourism in the country. Due to the

implementation of social and economic reforms in the early 2011, tourism has developed rapidly in Bagan-Nyaung U area and resulted in significant expansion of urban area and hotel constructions. The rapid urbanization has invaded and occupied the available farmlands in the vicinity. Due to that significant arable land has been diverted to non-agricultural purposes in the selected villages. The increased urbanization is also associated with a decline in agricultural land-use and intensity (Jiang *et al.*, 2013). Urbanization also created huge pressure on arable land and this in turn increased the unit farmland prices along the road side. The farmers were self-motivated to sell-off their farmlands due to higher market prices.

Frequent crop failures due to drought have led to unaffordability of land for cultivation and continue future agriculture investments. The rising unit land prices were negatively impacted farmers, who no longer can afford to grow crops on these lands. Agriculture plays an important role in poverty alleviation and food security in Myanmar rural areas. But farming became not an adequate source of household income for all categorizes of farmers regardless of its size. Majority of the farmers from rural areas tried to move away from agriculture for their livelihood. Thus, the farmers in the study villages tend to sell their farmlands because of lower margins in cultivation. Negative impacts of farmland loss (due to urbanization and industrialization) have been found in China (Chen, 2007) and India (Fazal, 2000). The positive impact of farmland loss on rural livelihoods was noticed in China (Johnson, 2002) and Bangladesh (Toufique and Turton, 2002). The mixed impact of farmland loss on rural household livelihoods was not attempted so far in the literature (Tuyen *et al.*, 2014). Therefore, the present study made a humble attempt to identify these impacts of drought and tourism development on reducing farmlands in Bagan-Nyaung U area of Myanmar. Particularly the impact of selling farmlands on farmers' livelihood.

Materials and Methods

A case study was carried out in three villages, namely, Phyaug Seik Pin, Kun Sin Key and Tek The in Nyaung U Township. These villages are located at the southern edge of Nyaung U Township. On an average, these villages are located six kilometers away from Nyaung U Township (Fig. 1). A purposive random sample of 50 households were identified from the three villages and interviewed for the present study. The sample was post-stratified into farmland-sold households and non-sold households to minimize the bias in the selection. Data was collected with a structured questionnaire which was developed based on the study objectives and extensive review of the literature. The survey instruments were prepared highlighting the concerns of households relating to drought and agricultural activities, household characteristics, sources of household income, composition of household assets, and household expenditures etc. The primary data were collected from the selected households in the three study villages. Secondary data on historical rainfall was also collected from Dry Zone Agricultural Research Farm. The land use change data over time were also obtained from Settlement and Land Records Department, Nyaung U Township. Both descriptive statistic tools and independent T-test were applied to check whether there is a significant difference in the means among two-category (farmland-sold and non-sold households) of farmers.



Figure 1. Phyaug Seik Pin, Kun Sin Kye and Tek The village locations in Nyaung U Township.

Results

Socio-economic profile of sample: The socio-economic characteristics of sample households in the study area are categorized into farmland-sold households and non-sold households and summarized in Table 1. Male headed households are slightly dominated in case of farmland non-sold households when compared with farmland-sold households. Relatively, the average educational levels (no. of years of education) are better in case of non-sold household than sold household group. The mean farm size per household and household head experience in agriculture was marginally higher in case of farmland non-sold household sample than the farmland-sold households.

In both the groups, all the sample households indicated that farming is their primary occupation and livelihood. Majority of farmland-sold households availed the loan facility and their average borrowed amount is much higher than the other group of farmers.

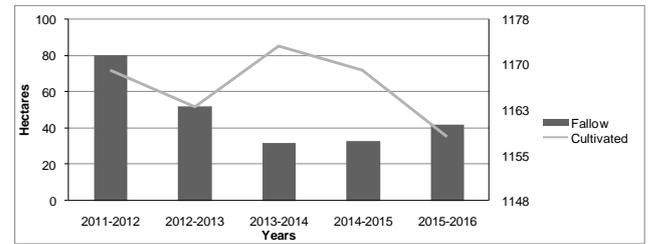


Figure 2. The relationship of cultivated and fallow upland area in Kone Dan Gyi village track during 2011-2012 to 2015-2016. Source: Settlement and Land Records Department, Nyaung U Township

Land sharing and utilization patterns in study village:

The study areas were in Kone Dan Gyi village track and Tek The village. Phyaug Seik Pin and Kun Sin Kye villages are included in Kone Dan Gyi village track. The land utilization particulars data collected during the last six years from the study villages are summarized in Table 2. In Kone Dan Gyi village track, the cultivated area trend was decreased while the fallow area was increased between 2011-2012 and 2015-2016 (Fig. 2). The increased urbanization (areas allocated to road, pond, canal and stream) was observed over a period of time. The rapid urban area expansion is due to the recent policy support and encouragement from government. Development of tourism industry in Bagan-Nyaung U area was also another major factor for declining farmlands per household.

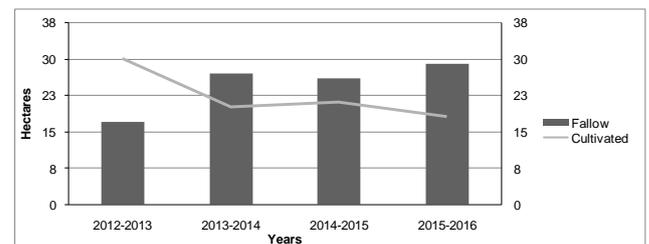


Figure 3. The relationship of cultivated and fallow upland area in Tek The village during 2012-2013 to 2015-2016.

Land sharing and utilization pattern details of Tek The village is also presented in Table 2. The cultivated area was nearly decreased to one-half while the area under fallow has gone-up significantly (Fig. 3). There were only ten farmers growing crops for their livelihoods. The main reason for significant decline in cultivated area was farmers were not willing to cultivate the crops. They have shifted their livelihood options from farm to non-farm activities in the village. Majority of village area was moved away from agriculture to non-agricultural purposes due rapid urbanization of Nyaung U Township. The socio-economic characteristics were changed in Tek The village from being fully dependent on agricultural activities

towards non-farm activities. The differential impacts arise from the inappropriate regulation exerted in agricultural

land and interrelated to poverty (El-Hefnawi, 2005).

Table 1. Socio-economic characteristics of household heads

Items	Variable	Sold households (N=32)	Non-sold households (N=18)
Gender of Head	Male	25	15
	Female	07	03
Age of Head	< = 50 years	08	04
	51-60 years	10	05
	61-70 years	10	06
	> 70 years	04	03
Education level (completed years)	< 5 years	17	11
	> 5 years	15	04
Major occupation	Farming	32	18
	Non-farming	0	0
Farm size (hectares)	< = 4.0 ha	15	07
	4.1 -8.0 ha	11	08
	> 8.1 ha	06	03
Loan facility availed	< = 20 years	07	03
	21-40 years	14	06
	> 40 years	11	09
Loan facility availed	Yes	25	12
	No	07	06
Size of loan amount (Kyats)	< = 100000	08	04
	> 100000	17	08

Source: Result of survey data (2016)

Table 2. Land use (hectares) in study area during 2011-2012 to 2015-2016

Village	Years	Upland	Fallow	Station	Road	Pond, canal & stream	Village	Airport	Religion	Others	Total
Kone Dan Gyi village track	2011-2012	1169	80	22	65	125	46	20	177	27	1731
	2012-2013	1163	52	25	70	125	53	30	185	28	1731
	2013-2014	1173	32	24	73	127	53	30	193	26	1731
	2014-2015	1169	33	24	73	127	53	30	196	26	1731
	2015-2016	1158	42	24	73	127	53	30	198	26	1731
Tek The village	2012-2013	30	17	5	17	64	36	23	12	3	206
	2013-2014	20	27	5	17	0	100	23	12	3	206
	2014-2015	21	26	5	17	0	100	23	12	3	206
	2015-2016	18	29	5	17	0	100	23	12	3	206

Source: Settlement and Land Records Department, Nyaung U Township

Droughts in the study area: Bagan-Nyaung U area is the central core of dry zone and affected by desertification and droughts in which the average rainfall levels are noticeably below than that of normal (Fig. 4). Mean annual rainfall in the dry zone is lower than the rest of the country, ranging from 500 to 1000 mm (IWMI, 2015). Bagan-Nyaung U area has been experiencing climate variability effects over decades. Thus, the central zone of Myanmar is highly vulnerable to drought as compared to other parts of the country (UNEP, 2012).

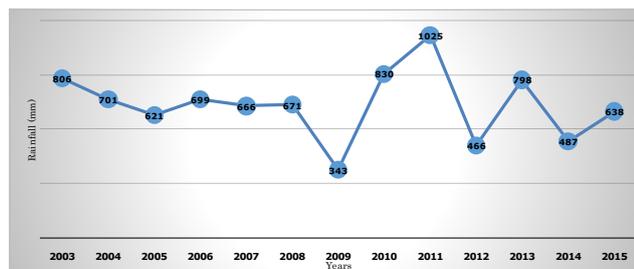


Figure 4. Annual rainfall over a period of 2003 to 2015 at Dry Zone Agricultural Farm, Nyaung U Township. Source: Dry Zone Agricultural Research Farm, Nyaung U Township.

The precipitation pattern in the Bagan-Nyaung U area can be characterized as a bimodal one, with an early rainy

season and a late rainy season occurring (Fig. 5). The rainy starts from May/June and extends to September/October. The bimodal rainfall pattern favors a double cropping system for the study area, meaning that farmers can grow twice on the same plot each year, and in which a second crop is planted after the first is harvested. There was a longer period of the dry spell during June/July. The average monthly temperature ranged from a minimum of 13°C to a maximum of 40°C between 2003 and 2015. Bagan-Nyaung U area is often recorded as the hottest place in Myanmar where a maximum temperature touches up to 43-44°C in April/May.

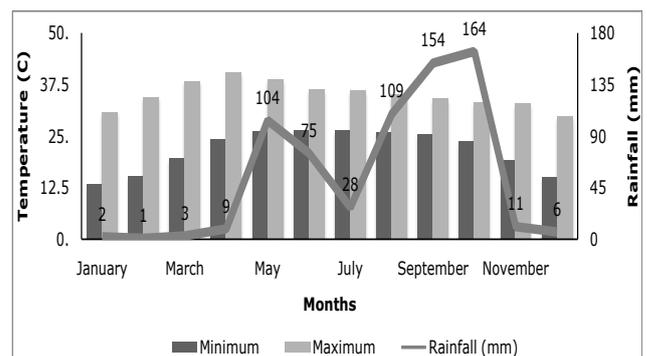


Figure 5. Average temperature and rainfall over a period of 2003 to 2015 at Dry Zone Agricultural Farm, Nyaung U

Township. Source: Dry Zone Agricultural Research Farm, Nyaung U Township

Drought occurs mostly in the early rainy period due to prolonged dry spells and shortage of soil moisture. This situation adversely affects the crop productivity in the study villages. Particularly, in Bagan-Nyaung U area drought years have significant adverse effects on the production of crops, leading to food shortages for both man kind and livestock in the region.

Table 3. Shifts in cropping systems (hectares per household)

Major crops	Area sown (ha)
<i>Past (decade ago)</i>	
1. Runner groundnut (<i>Virginia</i>)	2.71
2. Sesame (<i>in early rainy</i>)	1.30
3. Mungbean	0.61
4. Cucumber mixed kitchen crops	0.45
5. Erect groundnut (<i>Spanish</i>)	0.65
6. Sorghum	1.46
7. Mungbean+Pigeonpea	0.04
8. Sesame (<i>in late rainy</i>)	0.85
<i>Present (2016)</i>	
1. Runner groundnut (<i>Virginia</i>)	2.63
2. Mungbean+Pigeonpea	1.34
3. Cucumber mixed kitchen crops	0.16
4. Erect groundnut (<i>Spanish</i>)	0.16
5. Sorghum	0.77
6. Sesame (<i>in late rainy</i>)	1.34

Source: Result of survey data (2016)

Shifts in cropping systems: Major shifts in cropping systems in the study area over a decade period are summarized in (Table 3). Runner groundnut (*Virginia type*) was the dominant crop observed both in the past and present situations. It is preferred because it adapts well to the severe drought conditions. Groundnut is mainly grown

for home consumption (*cooking oil*) and draft feed (*crop stubbles*) for livestock purposes. To minimize the risk in cultivation, recently, farmers tend to cultivate groundnut as intercrop with other crops. The area allocation under crops such as sesame (*sown in early rainy season*) and erect groundnut (*Spanish type*) was reduced because of climatic aberrations and lack of assured returns.

The extent of area allocation and choices of crops are highly determined by the pattern of on-set and quantum of rainfall received. The sample farmers also opined that the traditional/local varieties have higher tolerance to mitigate the drought than modern/improved cultivars. However, improved varieties of mungbean and pigeonpea are preferred for obtaining higher productivity levels. Farmers always optimize their resource allocation under scarce situation to attain the maximum profit from their cultivation.

Average productivity levels: Overall, the sample farmers' perceived that the average productivity levels of crops were lower now than one decade ago (Table 4). Farmers experienced poor harvests about three times out of last seven years, where the yields were approximately half of a good harvest or even less (Matsuda, 2016). Sample farmers expressed that timely precipitation is essential for obtaining good harvest. Insufficient rains decline the crop growth during the early rainy season. The dry spells occur during June/July further aggravate this situation. Matsuda (2016) concluded that poor or negative returns from agriculture might have accounted for significant rural poverty in the central dry zone. The sample farmers also opined that they tend to do limited investments on crops due to high risk and uncertainty. This also might be another important reason for low adoption of crop improved production technologies and low crop productivity.

Table 4. Farmers' perceptions on productivity of major crops

Crops	Average yield (kg/ha)		
	Normal yield	Good yield	Bad yield
Runner groundnut	314	548	227
Sesame (<i>in early rainy</i>)	304	756	183
Erect groundnut	314	783	NA
Mungbean	435	914	156
Pigeonpea	435	484	170
Sesame (<i>in late rainy</i>)	277	371	121
Sorghum- (grain)	692	976	346
(fodder)	12 ton	16 ton	8 ton

Source: Result of survey data (2016)

Table 5. Changes in farmland holding sizes during the five years period

Items	Variables	Distribution (N=50)
Changes in land holdings	Yes	38 (76%)
	No	12 (24%)
Reasons for land holdings changing	Land sold	32 (84%)
	Land given	6 (16%)
	Not fit for agricultural cultivation	12 (31%)
Reasons for sale of land	Fetches higher prices	14 (37%)
	For livelihood	6 (16%)
Average how many hectares sold	Hectares/household	2.63
Average how much unit price	Hectare/ hundred thousand Kyats	623.2

Source: Result of survey data (2016), ** Significant at 10% level

Changes in farmland holding sizes: Cultivated land holding changes were noticed in nearly about 76% of study sample households during the five years period (Table 5). The remaining 24% sample households indicated that there were no changes in their farmland holdings. The survey data also points that nearly 84% of the total farmland holding changes were occurred due to sale of cultivated lands while another 16% were given land to non-agricultural uses i.e., airport, station, road, and canal. The reasons of land sale were various such as not fit for cultivation due to drought and poor soil (31%),

fetching higher market price (37%) and for livelihood (16%). On an average, 2.63 hectares of farmland per household was sold by sample farmers with a unit price of 623.2 hundred thousand Kyats per hectare. It is a remarkable decline in average farmland holding during the span of five years. In general, the land prices were much higher in the peripheries and on the road side. Selling small parcels of farmland was more attractive to sample farmers than the agricultural crop incomes in the study villages (Arandel and El-Batran, 1997; El-Hefnawi and Madbouly, 2001).

Table 6. Households' income

Items	Net income per year (hundred thousand Kyats)			
	Sold households (32)	%	Non-sold households (18)	%
Crops	20.5	20	16.7	18
Agricultural wages	1.0	1	0.3	
Non-agricultural wages	7.0	7	2.6	3
Salaries	6.9	7	7.4	8
Self-employment	33.6	33	38.9	41
Rental taxi	6.2	6	12.4	13
Interest from savings	25.6	26	16.3	17
Mean of households' income	100.7		94.5	
Standard deviation	118.1		132.5	
Std. Error Mean	20.8		31.2	
T-test value		-.172*		

Source: Result of survey data (2016), ** Significant at 10% level

Table 7. Comparison of households' assets of farmland sold and non-sold households

Items	Unit	Sold households (32)	Non-sold households (18)
Cultivated land	Hectares	5.71	7.13
Draft animals	%	65	72
Cow/cattle	%	13	5
Thresher	%	6	5
Gold	%	78	61
Motor car	%	44	33
Motorbike	%	91	83
TV	%	25	11
Fridge	%	13	11
Mean of households' assets (hundred thousand Kyats)		4044.6	2258.6
Standard deviation		4269.7	1585.9
Std. Error Mean		754.7	373.8
T-test value			-1.703**

Source: Result of survey data (2016), ** Significant at 10% level

Contributions of households' income: The farmland-sold households, on an average, earned higher annual household income (100.8 hundred thousand Kyats) than non-sold households (94.6 hundred thousand Kyats) (Table 6). Data analysis revealed that farmland-sold households obtained a large income (33%) from self-employment (*like a business*), followed by interest earnings from saving (26%) and crops cultivation (20%). The non-sold households obtained incomes from self-employment (41%), followed by crops cultivation (18%) and interests from saving (17%). In general, self-employment includes small business, shops, tailoring, bricks lying, carpentry as well as trading etc. The data clearly reveals that self-employment is more important source of household income for rural households than crops cultivation. Thus, most of the farmers in the study area are attempting to diversify their sources of household income for their livelihood. In household economics, diversification is identified as one of the best risk minimization strategy of households often adapted by

dryland farmers in Semi-Arid Tropics (Walker and Ryan, 1990). Even though there was a significant difference in annual household incomes between two categories of farmers, it is not statistically significant among them. The average earnings from savings and interests were relatively higher in farmland-sold households than non-sold households. The farmland-sold households could be investing higher on inputs and management which in-turn gave better returns from agriculture. The incomes generated from wages in agriculture and non-agriculture sources were about 8% in farmland-sold households while it was only 3% in non-sold households. This clearly implies that the family members of farmland-sold households tend to participate more in different jobs to maximize their earnings.

Household assets: The survey results summarized the status of household assets of farmland-sold and non-sold households in Table 7. On average, farmland-sold households have relatively less farmland (5.71 hectares) than non-sold households (7.13 hectares). With regards to

extent of draft ownership, farmland-sold households have a lower level (65%) compared with non-sold households (72%). The lower level of draft ownership implies that few farmers sold their draft animals because of reduced farmland holdings. But the extent of investments on other durables (motor car, motor bike, TV and fridge) was much higher in case of farmland-sold households than other category. The unit purchases on gold also relatively higher in case of farmland-sold households. The data clearly implied that the farmland-sold households increased their quantum of durables assets by selling of their farmlands. There is significant difference in the total household asset ownership between these two groups. The differences between them also proved to be statistically significant at 10% level. The extent of household assets indicates both the welfare and credit worthiness of the household. The results of the present study also concluded that farmland-sold households have informal employment structure and they tend to spend more on durable assets to improve their standard of living.

Table 8. Household consumption expenditure

Items of expenditure	Distribution of household expenditures (%)	
	Sold households (32)	Non-sold households (18)
Rice	24.0	24.6
Cooking oil	16.0	15.5
Non-vegetarian food (meat)	12.8	11.8
Health	9.6	15.0
Education	15.2	12.3
Ceremonies	22.4	20.9
Mean of expenditure (hundred thousand Kyats/year)	30.7	27.3
Standard deviation	13.4	13.5
Std. Error Mean	2.4	3.2
T-test value	-0.863*	

Source: Result of survey data (2016), ** Significant at 10% level

Table 9. Comparison of offerings and other factors across groups

Items	Distribution of other social factors (%)	
	Sold households (32)	Non-sold households (18)
Donations		
Waso robes	63	61
Kathina robes/Shinbyu	78	50
Built/renovated religious purpose	56	17
Mean donation (hundred thousand Kyats/year)	10.3	4.9
Standard deviations	5.7	5.2
Std. Error Mean	1.0	1.2
T-test value	-3.33***	
Others		
Housing facilities	41	5
Saving to bank	22	11
Acquired to car	28	5

Household consumption expenditure: Average household consumption expenditure of farmland-sold households and non-sold households are summarized in Table 8. Overall, the total annual household expenditure was slightly higher in case of farmland-sold households

than non-sold households. On average, nearly 24% and 16% of total household expenditure was spent by both category of households respectively on rice and cooking oil in the study area. The unit expenditure on non-vegetarian food (meat) was slightly higher in case of farmland-sold households than other category.

Regarding on non-food expenditure, lower amount of health expenditure (9.6%) was observed in case of farmland-sold households compared with non-sold households. However, the expenditure on education in farmland-sold households (15.2%) was higher than non-sold households (12.3%). Similar trend was also observed in case of annual expenditure on household ceremonies. These trends clearly visualize the move towards an improved welfare situation of farmland-sold households than non-sold households in the study villages. Even though there was a marginal difference in total household expenditures between two categories of farmers, it is not statistically significant.

Other social factors: Qualitative data on donations (*ahlu*) were also collected during household interviews to estimate the total donations offered by the sample farmers in a particular year. These details across two categories of farmers are summarized in Table 8. Almost all the sample households were offering donations to Buddhist images or monks in the study villages. The normal donation items are depend on Myanmar calendars such as offering robes to Buddha images; to the Buddhist monks (*Waso robes*, *Kathina robes*); and offering variety of food stuff and gifts to the aged and *Shinbyu* ceremonies etc. Although the same proportion of *Waso robes* donations were observed between two category of farmers, *Kathina robes and Shinbyu* ceremonies were significantly higher in case of farmland-sold households. *Kathina robes and Shinbyu* ceremonies are generally more costly that enables to donate only by well-off households. Specific donations on built/renovated religious purposes were also significant higher in case of farmland-sold households than other group.

On the whole, a total donation in a year offered by non-sold households was estimated about 4.9 hundred thousand Kyats. The farmland-sold households offered donations at least two to three times higher (10.3 hundred thousand Kyats per year) than their counterparts. It is also observed that farmland-sold households donate more not only in terms of total amount per annum but also in frequency (*no. of times per annum*) than non-sold households. The data results clearly implied that the social impact of farmland-sold households was much more than non-sold households.

In addition to offering, other factors of housing facilities and acquiring of number of motor cars have also increased in case of farmland-sold households (Table 9). Overall, the results of the household survey indicated that the selling of farmlands have improved the living standard of farmland-sold households to a certain extent. Instead of using bamboo or toddy palm leaves roof houses, sampled households started to live in tin shed and brick wall houses and they could also afford to buy motor cars as tangible assets. The access to increased assets in farmland-sold households exhibited enhanced alternate employment

opportunities in the study area. This has ultimately helped them to improve their livelihood options over time.

Discussion

Bagan-Nyaung U area, itself has unlikely weather conditions such as high temperature, scarce rainfall etc. Drought is the natural event there. Even though the local farmer tended to grow their crops as per usual under this climate uncertainty, as agriculture is the main source of income. The dominant cropping is runner groundnut which adapted to the severe drought conditions. The cultivation of sesame in early rainy season is becoming less because climatic fluctuations have become more intense with frequent droughts in early rainy season and rainfall patterns changing. The study area currently has become more to the intercropping of mungbean and pigeonpea in order to ensure production from at least one crop as insurance against unreliable rainfall. JICA (2013) reported that farmers always consider how to get higher farm income by choosing varieties with higher price and suitable crop varieties to cope with scarce and fluctuating rainfall.

According to the household interviews, the average productivity of cultivated crops has decreased and fluctuated widely. The choice of crops and cropping systems mainly depends on rainfall in the study area. Farmers stated that timely precipitation is essential and insufficient moisture for crops growth during the early rainy season and dry spell in June/July led to lower yield. Matsuda (2016) pointed out that low agricultural productivity and occasional poor harvests due to the unreliability of rainfall might account for rural poverty in the central dry zone.

The lower incomes from agricultural work have threatened farmers' livelihood security and forced them to sell the farmlands and depend on different income sources for their survival. In addition, Bagan-Nyaung U area is one of the main destinations for tourism. The demanding in hotel construction which caused to raise farmland prices and stimulates to the local farmers for selling. There were more households who sold farmlands as fetching higher farmland price and personal financial need.

According to the survey, the farmlands-sold households tend to have a higher level of annual household income than non-sold households. Self-employment or business is identified as a dominant source of total household income in the study area. In addition, others income generating activities such as rental taxi and interest from saving are perceived to be contributed significantly to improving the standards of living. The results of the study showed that more than half of their incomes derived from other sources, though agriculture remains the major source of rural income for the farmers. Thus, the single source income of agriculture not covered for their account for livelihoods in the study area. The natural tendency of rural households to engage in multiple occupations is very commonly noticeable in the study area. This indicates that income diversifications were observed on households through farmland sold, participation in wages and interest earnings from deposits etc. The dependency on multiple enterprises diversifies their sources of household income

and minimizes the negative deviations in total earnings.

The differences in household assets were observed between these two groups of households. On average, farmland sold households has substantially less farmland and a lower level of draft ownership compared with non-sold households. The farmers in the study area have reduced their land and livestock assets over a period of time due to the decrease in crops cultivation and rapid urbanization. However, the farmland-sold households tend to increase the durable assets such as gold, motor cars, motorbikes, TV, and fridge etc. In every asset category studied, farmlands-sold households have acquired more items than non-sold households. This is evident through the selling of farmlands and investing more on the durables assets. According to the primary survey, most of the farmers have sold their farmlands and moved out of agriculture such as rental taxi for tourist, self-employments/business. Some prefer to save in physical asset of gold and cash deposits in the bank. Nem Nei Lhing *et al.* (2010) pointed out that household savings can provide protection against risks and also provide opportunities to expand the existing economic activities. The results of the present study also concluded that farmlands-sold households have informal employments structures and they tend to change to alternative employments very easily.

In addition, the farmland-sold households tend to increase their households' consumption expenditures and more participate in donation activities. As previously discussed, changes in livelihood choices towards nonfarm activities may be a way to raise rural household welfare. These nonfarm activities, however, are not sure to sustain for farmers in future. Agriculture is crucial in terms of employment, food security and budgetary allocation, even though the share of agriculture income has decreased in the study area. Therefore, agricultural activities should be promoted through the distribution of agricultural inputs such as improved seeds and fertilizers, more economic crops and better extension services delivery in order to boost agricultural production.

Conclusion:

Recurrent droughts in Bagan-Nyaung U area forced the local farmers to sell-off their farmlands and diversify their income earning opportunities towards non-agriculture. Due to high risk and uncertainty in agriculture, the total cultivated area in the selected villages as well as the mean per capita farmland holdings were reduced over time. The primary household survey has revealed significant changes in landholding during the study period. Non-viability of agriculture and the development of tourism activities have immensely contributed to this shift. The farmers have started diversifying their earning opportunities from agriculture to non-agriculture and minimizing the risk. The share of non-farm income in the total household income has started increasing while contribution from agriculture is losing its ground.

The data analysis has clearly concluded that mean annual household income was slightly higher (6.6%) in case of farmland-sold households than non-sold households. Even though it is not statistically significant marginal difference between these figures were observed. The average

earnings from agriculture, savings in bank and wage incomes have contributed for enhanced incomes in case of farmland-sold households. The increased participation in the informal sector not only helped the farmland-sold households to mitigate negative consequences of land loss but also opened-up a new avenue of livelihood opportunities. This has clearly helped these households to improve their durable asset structure and annual household consumption expenditure. The changes in average household assets were significantly different (at 10% level) between two category of farmers. However, the variations in annual household consumption expenditures were not statistically significant. Additionally, farmland-sold households were also actively participated (significant at 1% level) more in donation activities. Overall, the findings aptly support the rural transformation of Myanmar from farming to non-farming sectors and increased dependency on non-farm employment opportunities.

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