

Farmers' perception of drought and its impact on a community livelihood in rural Northeastern Thailand

Abul Hasnat Md. Amir Faisal^{1*}, Anan Polthanee¹ and Arunee Promkhambut¹

ABSTRACT: This qualitative research using key informant group discussions, semi-structured interviews, focus group discussions, and community meetings was carried out to investigate the perception of drought and its impact on community livelihood at Ban Khammex, Kalasin province in Northeastern Thailand where the villagers are primarily engaged in farming, e.g. rice, sugarcane, cassava, rubber; livestock rearing; etc. The results indicated that the farmers were well aware about the drought issue; and their perception regarding drought in the study area is linked with erratic rainfall which included early cessation of rainfall, late start of rainfall, and, most importantly, no rain for long periods of time; while drought identifiable indicators were also related to weather conditions, and the impact of drought on crops was especially severe on rice. Most of the farmers could recall most recent drought years in comparison to the old ones, and they expected drought to become more frequent in the near future. Participants in the community observed that drought could obviously reduce local businesses, limit money for festival celebrations, severely impact on environmental issues, cause rapid emigration, and increase alcoholism. Public service providers also argued that drought increased the level of assistance seeking like water supply, loan reschedules, public pond diggings, health services, etc.

Keywords: perception, drought, impact, community

Introduction

The cumulative damage arising from drought in Thailand between 1989 and 2003 was estimated to be THB 4474.4 million or US \$112 million (Pavelic et al., 2012). In 2010, Thailand faced its worst drought in 20 years resulting in the water level of the Mekong River falling to its lowest level in 50 years (Danny, 2011) and at the same year Thailand experienced a devastating flood. In general, the impacts of drought are known to be more harmful than those of excess rainfall (Gadgil and Kumar, 2006). In Thailand, 9.2 million ha of rice growing area out of which 4.8 million ha rainfed lowland areas are found in Northeast Thailand (Jongdee et al., 2006), and classified as

shallow favorable and shallow drought-prone (Khush, 1984) which is a constraint of agricultural production in Northeast Thailand. Prapertchob et al. (2007) summarized major drought occurred in Northeast Thailand during 1970-2004 were as 1972, 1973, 1974, 1977, 1979, 1981, 1982, 1987, 1993, 1996, 1997, 1998 and 2004. More recently, drought again hit the northeastern region, and the Ministry of Agriculture and Cooperative estimated the drought affected area, between May 01-October 19, 2012 to be around 0.6 million rai (0.1 million hectares), of which 0.5 million rai (0.08 million hectares) were rice crops (USDA, 2012). Drought occurs as the result of large inter-annual and seasonal variability in precipitation (Boochabun et al., 2004), more specifically frequency of

¹ System Approaches in Agriculture Program, Department of Plant Science and Agricultural Resources, Faculty of Agriculture, Khon Kaen University, Khon Kaen 40002, Thailand

* Corresponding author: faisalofrd@yahoo.com

drought drives mainly uneven distribution of rainfall over an area within a year or within a rainy season or from year to year (Limpinuntana, 2001). However, drought per se is a very diffuse concept and the threshold identified for defining it is set somewhat arbitrarily (Agnew and Chappell, 1999; Wilhite, 2000). In Northeast Thailand, researchers mainly defined the drought as meteorological drought (Mongkolsawat et al., 2001; Prapertchob et al., 2007) whereas very little is known about how subsistence farmers in Northeast perceive drought with few exceptions mainly focused on impact and management strategies (Kano, 2006; Rigg and Salamanca, 2009). Do farmers refer to meteorological drought, the context in which this word is commonly used, or to something else? It is important to know the perception of the farmers because any attempts to elicit adaptive behavior patterns should come after understanding how climate variability is perceived by farmers and what shapes their perceptions (Shisanya and Khayesi, 2007; Slegers, 2008; Weber, 2010). For example, perceptions and knowledge of climate variability were found to account for adaptive responses and form the foundation of decision-making in a sample of apple growers in India (Vedwan and Rhoades, 2001). The perception of drought was examined in several countries (Myburgh, 1994; Dagel, 1997; Pearce et al., 2010; Nguyen et al., 2011; Habiba et al., 2012). On the other hand, agriculture is practiced by about 2.8 million households, comprising about 11.5 million people, a little over half of all the households and people in the Northeast (Grandstaff et al., 2008) which reflect that the region as agricultural

oriented. In Thailand, drought has the most profound effect on environmental and socio-economic at local, regional and the whole country as well (Mongkolsawat et al., 2001) and the drought impact analysis has been carried out mainly at the regional level. It has been noted that disaster impact ratios increase as the unit of analysis moves down from the national to the regional, community and household levels (CDRSS, 2006). There is no doubt that drought has a major impact on agriculture like production losses, livestock mortality, shortage of water, seasonal crop moisture deficiency etc. Moreover, drought causes serious reduction in income for both farmers and small businesspeople alongside major social impact in entire communities (Alston and Kent, 2004) which were put sidelined by the policy makers and researchers. In general, drought is considered as the key limitation of rural development in Northeast Thailand (Srisuk et al., 2001). Therefore, by focusing on the 2012 drought and past drought events, the study contributes to the understanding of the farmers' perceptions on the nature of drought, and its impact on the community livelihood.

1. Research design

1.1 Research area

The research area located at the Ban Khammex (16°30'17.47"N and 103°34'36.29"E), Phai sub district under Muang District, Kalasin Province, Northeast Thailand, covering an area of 1706 rai (6.25 rai = One ha) with a population of 706 persons, approximately 13 kilometers outside the provincial town of Kalasin.

1.2 Conceptual framework of drought perception

It is difficult to provide a precise and universally accepted definition of drought. Taylor et al. (1988) have specifically depicted how four coherent elements shape drought perception (Figure 1). Previous drought experiences (meteorological events that occurred during the farmers farming times) shape an individual's memory (drought events experienced by the farmers and could be recalled) and are an important influence on how someone defines drought (what farmers mean about drought). What

one remembers (recalled the previous drought events) as a drought depends on how and individual defines it; while on the other hand, what an individual defines as drought depends on one's recall memory. The way drought is defined and the way past droughts are remembered, influence an individual's expectation (how often the expected droughts to occur) of future droughts and behavior (how they react with drought which was not discussed in this paper). In the study drought perception was drawn in such a way (Figure 1) and the drought identifiable indicators were incorporated according to Slegers (2008).

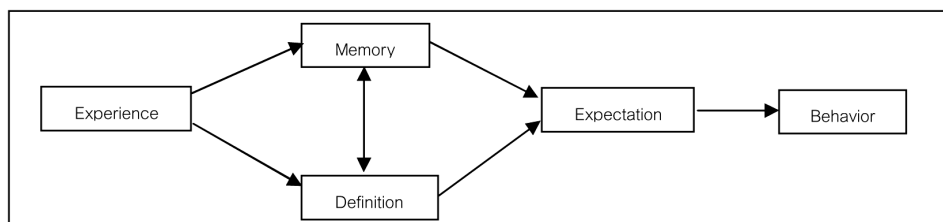


Figure 1 Elements shaping the perception of drought (Taylor et al., 1988)

1.3 Methodologies

As qualitative methods were used to produce descriptions of situations, events, people and systems interactions (Casley and Kumar, 1988) the following tools were used.

1.3.1 Key informants group discussion

After the frequent field visit during November, 2012 the key informants were selected on the basis of their role in the community

(Table 1). All the key informants (Six) had some biasness and for overcome this situation a group discussion were carried out during December, 2012 where the Key informants were asked to discuss on issues related to the socio-economic conditions of the village, major crops grown in the study area, drought and causation of drought, general impact of the drought on society and related issues on farming.

Table 1 Characteristics of the key informants in Ban Khammex

Role in community	Knowledge
Soil doctor (61 years)	Brief knowledge about soil
Village Vice headman (52 years)	Socio-economic conditions
Village committee member (55 years)	Socio-economic conditions
Village representative for Tambon administration (47 years)	Local government support and service
Village representative for agriculture (49 years)	Agricultural knowledge
Elderly person (67 years)	Changes of farm practices and conditions over time

(Soil doctor = volunteers trained as soil consultants by the Department of Land Development; Agricultural representative = unofficially appointed by the District Agricultural Extension Office)

Key informants group discussion data were used for understanding the situation of the village and used in some cases for describing the context as descriptive nature.

1.3.2 Face-to- face interview

The face-to-face interviews were conducted during March to April, 2013 by structured interview schedule and the result was used for determining farmers' perception of drought. Firstly, the village headmen and agricultural representative are requested to list the names of all households not only based on the administrative records alone. A total of 30 random samples (out of 164 households) of

households were drawn from the list as described in Carletto and Morris (1999), it is important to randomly select households from the entire list. Afterwards, a prototype of survey instruments was developed and subsequently tested by 7 (other than 30 farmers) farmers in February, 2013. Incorporating their comments the final survey instrument was developed which had two sections with a mixture of open and close ended questions. In the first section, farmers were asked basic question about their socioeconomic conditions. The second section focused on how farmers "perceive" (think about and judge) drought (Table 2).

Table 2 Questions asked in the questionnaire on farmers' perception of drought

No.	Questions
1	What are main advantages and disadvantages of farming area?
2	What conditions most affect your farming operation?
3	Did you felt any kinds of problems in your operating area last year? What kinds of problem?
4	Did your crops/livestock/business get damaged or suffer drought year?
5	What does the word "drought" mean to you?
6	How did you recognize drought?
7	Have you experienced any other droughts in the last 20 years? What years?
8	What do you think about the causes of drought?
9	Suppose you had a drought this year. What would expect next year?
10	Do you think droughts will occur more or less frequently in the future in your locality?
11	What are your overall thoughts on drought? Is it just a normal part of your life?
12	What kinds of impact that your community faced during drought?

1.3.3 Focus group discussion

Focus Group Discussion (FGD) was conducted in July, 2013 by 10 farmers to generate information on the perception of drought, impact of drought on the community as well as to cross-check the information collected from the face-to-face interview sessions. Participants were recruited with the help of key informants (Soil doctor and village agricultural representative). It is noted that the farmers who were interviewed earlier was not included in the FGD. The whole session was audio recorded along with written notes. The average age of the farmers was 56.8 years where 60 and 40 percent of farmers were females and males, respectively.

1.3.4 Community meeting

By bringing together a cross-section of viewpoints, a community meeting is the perfect setting to exchange ideas and information (Enriquez, 1997). In our study we included people who represented different sectors of the community as well as those who were directly or indirectly play role in the community while lived outside of the village or inside. A similar type of approaches was earlier used by Woudenberg et al. (2008) to understand the sociological impact of drought on the community of South-Central Nebraska. With the aim to understand community impact, community meeting was conducted in

September, 2013 with a total of 24 participants, selected through the help of key informants and personal communications (visited different organization office and requested them to send acquainted representatives with the study village) by staying in the village. All the participants held a variety of jobs: one from sub district Agricultural Extension Office, one worked for Tambon administration office, one from village committee, one for religious organizations, one work in the field of education, one in community health service provider, two worked in agriculture related business (such as four wheel tractor owners, middlemen of the agricultural product), two were local shop keepers (one from food shops and the other from necessary commodities), one handicrafts producer, and 12 farmers from different farming systems. Sixteen of the participants were female and eight were male. Nine of the participants had been living in the area all their lives and the remaining eleven participants had lived in the area for an average of 45.6 years while four from the outside the village. The whole session was audio recorded along with written notes. The main sub topics (**Table 3**) were predetermined but those open their branches when discussion continued and allowed the participants to discuss freely until they agree with the answer.

Table 3 Sub topics discussed in the community meeting

Serial no.	Sub topics
1.	Affect of drought on business, organization, faming and or the people.
2.	Impact of drought on the community.

2.3 Data analysis

Face to face interviews data were processed and statistically analyzed using SPSS and presented using simple descriptive statistics, percentage. In focus group discussion, the audio recordings were transcribed, supported by the written notes. Afterwards, the data were analyzed with themes and subthemes and presented in the form of table especially the ranking was done. In community meeting through audio recorded data along with written notes, thematic analysis was conducted as a number of themes and subthemes emerged from participants' initial

discussions about the effects of drought on their community which were presented with participants' comments.

3. Results and discussion

3.1 Profile of the respondents (face-to-face interview session)

The results from the face to face interview session revealed (**Table 4**) that, the average age of the respondents was 56.6 years and it ranges from 41 to 67 years where 63.3% and 36.7% belonged to female and male gender, respectively.

Table 4 Socio-economic characteristics of the interviewed farmers

Characteristics	Average	Frequency	Percent (%)
Gender distribution			
Principle operator female		19	63.3
Principle operator male		11	36.7
Age (year)	56.6 (SD=7.5, Max.=67, Min.=41)		
Family size (No. of head)	4.9 (SD=1.3, Max.=9, Min.=3)		
Farming experience			
< 30 years	30.4	12	40
≥30 years	(SD =4.6, Max.=39, Min.=22)	18	60
Education level			
Cannot read and write	5.87	2	6.7
(Years of school)			
Primary (1-6)	(SD =3.1, Max. =16, Min.=0)	19	63.3
High School (7-12)		8	26.7
College(13-16)		1	3.3
Farm size (ha)	2.17 (SD =1.9, Max.=7.84, Min.= 0.64)		
Producer group			
Only rice		11	36.7
Rice and cassava		7	23.3
Rice, Sugarcane and cassava		5	16.7
Rice and sugarcane		4	13.3
Integrated farming		2	6.7
Fruit growers		1	3.3
Annual income (THB)	85,760 (SD=41029.9, Max.=219000, Min.=60000)		

(Note: SD = Standard deviation, Max. = Maximum, Min. = Minimum)

The overall average family size of the sampled respondents was 4.9 persons. Data on education indicated that only 6.7% cannot read and write, whereas 63.3 % completed primary school level, 26.7% completed high school level and 3.3% was educated up to the college level. The average farming experience was 30.4 years while the maximum and the minimum was 39 and 22 years, respectively. The average farm area (cultivable land) of the farmers was 2.17 ha, where the maximum farm area was 7.84 ha and minimum was 0.64 ha. Among all the respondents 36.7 percent cultivated rice and 23.3 percent cultivated both rice and cassava. 16.7 percent of farmers engaged in rice, sugarcane, and cassava production whereas 13.4 percent cultivated both rice and sugarcane. Only 6.7 percent and 3.3 percent of the farmers have adopted integrated farming systems and fruit garden respectively. Besides these, two farmers engaged in doormat making as off-farm income source. The average annual income of the respondents was THB 85,760 (1 US\$ = 31 THB).

3.2 Farmers' perception of drought

Drought has different meanings for different farmers based on their perception of the physical environment, the type and degree of involvement with agricultural activities, and the extent to which it affects their financial well-being (Dagel, 1997). According to Taylor et al. (1988) and Slegers (2008), farmers' drought perceptions in this study were drawn as followings.

3.3.1 Farmers' drought definition

Farmers talked about a 'good year' or 'bad year' when evaluating a crop season. Any disruption that limits crop harvest causes a bad year and most commonly farmers described it based on weather conditions (Table 5). In the group discussion, farmers stated that the word 'drought' became familiar to them through media and extension workers. Farmers' perception about drought was mostly found to be linked with rainfall related issues (Table 4). Majority of the farmers considered drought as erratic distribution of rainfall like no rain for a stated period of time (60%), late start of rainy season (53.3%), early cessation of rainfall (43.3%). Despite rainfall related interpretation, more than 30 percent of the farmers referred that crops/plants dry up or burned and seed/seedlings cutting were not germinate also considered as drought. On the other hand, 30 percent of the farmers stated that drought was the consequence of low water holding capacity of the soil which cannot support plant growth. Only 6.7 percent of the farmers pointed out other definitions of drought included insufficient feed for livestock, low crops yield etc. Dagel (1997) concluded the definition of drought given by the farmers of marginal areas of Western South Dakota were 'rainfall less than expected by some percentage', 'range operation affected', 'water deficiency' and 'when rainfall does not come at specific critical points during the year'.

Table 5 Farmers' definition of drought in the study area (multiple responses)

Definition	Respondents (N=30)	Percent of respondents	Ranking (N=10)
Shortage of rainfall	4	13.3	7
Early cessation of rainfall	13	43.3	3
Late start of rainy season	16	53.3	2
No rain for a stated period of time(10-20 days) during the rainy season	18	60.0	1
There is not enough soil moisture for plant because of low water holding capacity of the soil	9	30.0	6
Crops/plants dry up or burned	11	36.7	4
Seed /seedlings /cutting were not germinate	10	33.3	5
Other definition	2	6.7	8

Apart from those definition, Campbell et al. (2011) while working in the rainfed farming system in Southern St. Elizabeth, Jamaica found that 'no rainfall in rainy season', 'no rain in stated period of time' were the definition of the drought. It was evident that each region is unique in physical environment. In Northeast Thailand, researchers mainly defined the drought as meteorological drought (Mongkolsawat et al., 2001; Kano, 2006; Prapertchob et al., 2007). However, drought per se is a very diffuse concept and the threshold identified for defining it is set somewhat arbitrarily (Agnew and Chappell, 1999; Wilhite, 2000). Several researchers defined drought in terms of deficiency of actual rainfall compared with the long-term average rainfall (National Drought Mitigation Centre, 2006; Prapertchob et al., 2007). In the current study, farmers mainly focused on erratic distribution of rainfall within the rainy season not the total amount of rainfall. The statement mentioned by the farmers correlated with the findings of Limpinuntana (2001) who described 'drought in this region derived from the uneven distribution of rainfall over area, within a year, within a rainy season,

and from year to year'. In the recapitulation, from the above view of the farmers and focus group discussion, it could be concluded that 'drought is a result of erratic distribution of rainfall which leads to lack of sufficient water or precipitation for crops cultivation and finally the crop damage'.

3.2.2 Drought identifiable indicators

Drought identifiable indicators are related to weather conditions (rainfall, sunshine) and its impact on the crops (Table 6). Majority of the respondents (83.3%) stated that drought could be developed at any growth stages of rice crop if there was no rainfall during that time. On the other hand, 50 percent of the respondents mentioned indicator of drought as state of being not enough rainfall during the planting time (rice, sugarcane, cassava) and another 30 percent of the respondents mentioned the strong sunshine or too much hot as a indicator of drought. In the group discussion, farmers expressed that soil moisture remained for longer period of time during cloudy days in comparison to hot and sunny days. A few farmers felt that too much dust was also sign of drought.

Table 6 Farmers' recognition of drought (multiple responses)

Categories	Farmers recognition	No. of Respondents (N=30)	Percentage %	Ranking (N = 10)
Weather and soil related	Soil dry up soon after rain	8	26.7	2
	Very strong sunshine/ too hot	10	30.0	6
	Not enough rainfall during planting time	15	50.0	3
	No rain/rain stop in tillering/panicle initiation stage/ early grain filling stage of rice	25	83.3	1
	Too much dust	2	6.7	5
Crops related	Mature sugarcane dry up	4	13.3	7
	Cassava stake were not germinated	6	20.0	8
	Crops started to burn	20	66.7	4
	Fruits droop up	1	3.3	10
Livestock related	There is not enough grass/weeds for livestock	2	6.7	9

Apart from weather and soil related issues, farmers noticed about crops damaged related issues were indicators of drought. Majority of the farmers (66.7%) reported that 'crops started to burn' was the main indicator of drought. Slegers (2008) while working in semi-arid central Tanzania found that 'crops/plants dry /seeds don't germinate' was the sign of drought identified by the farmers. Other crops related indicators were mature sugarcane dried up, cassava stake were not germinated and fruits drop up. It is also supported by Slegers and Stroosnijder (2008) where they argued that farmers' drought perceptions could be related to a scientific concept of agricultural drought. According to National Drought Mitigation Centre (2006), firstly meteorological drought occurs; secondly, agricultural drought follows because of a reduction of soil moisture, which induces plant stresses. However, farmers related drought not

only to weather and crops, but also to vegetation like grass for livestock and weeds. The end result is that many farmers identified drought accurately and the impact could be minimized as drought identified at early stage while they were powerless when drought occurred in latter stage of crops growth.

3.2.3 Recollection and expectation of drought frequency

In the face to face interview, when asked about the last drought, all farmers agreed that it was the ongoing drought. When they were further asked, if they had experienced other droughts, all the interviewee answered yes. All participants in the face-to-face interviews were relatively indistinct when asked "what years"; only a few were able to mention specific years of the past drought before 2000 (Table 7). Only a 67 years old farmer was able to remember severe drought between 1980-1985. In drought risk perception,

age or experience significantly affects recollection and expectation of droughts (Diggs, 1991). On the other hand, more than eighty percent of the farmers could recall recent drought year. Literature showed that it was easier for farmers to recall more recent events than those in the distant

past, and they could recall easily extreme events but not moderate ones (Taylor, 1988). In a nutshell, the way of past drought remembered might influence their expectation of future droughts and their activity to minimize detrimental effect of drought.

Table 7 Recollection of past droughts in respondents' state

Drought Year	No of respondents (N=30)	Percent of respondents
1980-1985	1	3.3
1993	3	10.0
1997	5	16.7
1999	5	16.7
2001	8	26.7
2004	15	50.0
2010	25	83.3

Diggs (1991) argued that if farmers do use the availability heuristic (learning from the past experience) to form assessments of future drought, differences in the perception of drought frequency should arise from differences in the extent of individuals' experience. In the study, among the respondents 40% has less than 30 years farming experience and 60% has more than or equal to 30 years (Table 4). Farmers who have

more than or equal to 30 years of farming experience were less likely to believe that droughts were becoming more frequent and they believed drought would remain at the same frequency. On the contrary, farmers with less than 30 years experience believed that drought would become more frequent in the near future (Table 8).

Table 8 Farmers' expectation of future drought frequency

Drought frequency	Farming experience (years)	
	less than 30 years (N=12)	more than or equal to 30 years (N = 18)
Becoming more frequent	7(58.3)	4(22.2)
Becoming less frequent	1(8.3)	3(16.7)
No difference	2(16.7)	10(55.6)
Don't know	2 (16.7)	1 (5.6)

(Digit in parenthesis refers to percentage of the respondents)

In the group discussions, farmers agreed that the number of drought years had increased and occurred in cyclic pattern from roughly once every 5 years to every 3 years. In line with the present findings, Kano (2006) stated that drought in Northeast Thailand occurred in a cyclic order.

3.3 Impact of drought on the community livelihood

The impacts from drought are the result of interplay between a natural event (precipitation deficiency) and social response (Wilhite et al., 2007) whereas the impact of drought on community was significant (Sartore et al., 2008). From community meeting, some thematic area and sub-themes regarding impact of drought on community livelihood emerged which were described with the following heading.

3.3.1 Production losses

All annual crops yield losses were apparent, particularly on upper paddy areas. Participants and key informants pointed out that rice was affected most by the drought. According to Prapertchob et al. (2007), the estimated average rice production loss during drought years ranges between 12% and 55% of the mean annual output. The following quote from the rice farmers (Female, 49 years).

“Our rice crop has failed because of droughtGood year I harvested 300-350 kg per rai (6.25 rai = One ha) but last year I got at best 50 kg”.

Matured sugarcane yield was also decreased as most of the matured plant dried up while seedlings of sugarcane were not germinated. Participants also expressed that the cassava produced far less roots and weight than

the usual yield, fruits tree bear less fruits, new bamboo shoots were limited. Community members felt that their homegarden lost productivity as most of the villagers grew chilli (*Capsicum sp.*), eggplant (*Solanum melongena*) and phak whan pa (*Melientha suavis* Pierre) in their homestead.

3.3.2 Seeking assistance

Those working in the public sector (Tambon Administration Organization Office, Sub-District Agricultural Extension Office, village committee) reported an increase of demand for services, for example compensation for the crop damage, re-schedule of loan payments, introduction of irrigation facilities, request for effective early warning system of drought as well as rainfall, seeking more water for drinking as the local government already supplied water to the villagers under drought related disaster program. The participants also argued that the village tap water supply system was disrupted during drought and the public pond look muddy with soil surface cracks due to less water. The villagers requested to the Tambon Administration Office to provide assistance to deepen the pond to appropriate depth so water can be stored remain throughout the year. Village health volunteer mentioned that the older persons had suffered serious headache and most of them request her to measure their blood pressure more frequently which was an abnormal situation in comparison to the normal year. One male community interviewee (59 years) made comment on this matter.

“I feel so exhausted...always under stress ... suffered serious headache which makes me worried and I went to her(health volunteer) for getting massages.”

3.3.3 Local business

The effects of drought on rural small businesses are poorly researched and discussed with the following subheadings.

- **Non-Agricultural business:** In the village there are four food shops and five necessary commodities shop where farmers are regular customers. In the commodities shops the best selling product was alcohol (lão khão, Beer) as usual. By proportion 30.02% of Thai adults (age 15+) consumed alcoholic product in a 12-month period, while the North and the Northeast regions had higher proportions than the whole kingdom (NSO, 2008). During the drought year selling of alcohol product came little earlier than as usual. One shopkeeper (Female, 52 years) said-

“In my shop selling of beer and other alcohol was usually highest after harvesting of rice (November to December) but last year selling was pick up during October when drought hit and crops damaged”.

Farmers also agreed with the shopkeeper and they mentioned that alcoholic drinking increased because of crops damage, no hurry for harvesting and plenty of time to socialize which finally lead to drinking more and more.

Selling other commodities decreased while that of drinking water increased. She also mentioned that-

“Usually every dry season drinking water (nam duem) selling was increased but last year selling was highest than ever”.

Commodities shopkeeper also observed an overall decreased of sales, but not of fears of business closures. On the other hand, food shopkeeper (Female, 44 years) said-

“I lost some of my permanent customers as they move from the village and selling was not good. I have to close my shop for some days”.

- **Agricultural business:** According to the key informants, rice and sugarcane harvesting was done mechanically by contract harvesters but some of the farmers harvested manually, cassava was also harvested manually in the village. The agricultural machines owner spoke of remarkable decreased of harvester rent because rice damaged in most of the field, even the sugarcane. In addition, the following quote came from Agricultural middlemen (Male, 54 years).

“Last year my business was not good because of drought hit in the area.....Cassava yield was decreased, and could not supply enough cassava roots to the factory near our village”.

3.3.4 Festival

The Buddhist temples are the central feature of most villages in Northeast Thailand and are used for religious ceremonies, festivals, and community meetings (Moulton, 2008). In order to construct and maintain temple facilities and hold festivals, at certain intervals villagers have to organize to gather and manage resources (materials, money and labor). There are 12 festival celebrated by villagers throughout the year as Buddhist religion festival. The participants have the awareness that less money is available for arranging the festival during the drought. The religion organization member mentioned about fewer donations for temple was observed during drought.

3.3.5 Environmental issues

Community members opined that the landscape was burned which reflects a picture of

black and white, farm ponds were dried up earlier than usual which limited the abundance of natural fish, number of dead shrubs and herbs all around the field, wild plant species decreasing (Mushroom, Phak khom: *Amaranthus viridis* L., Phak plang: *Basella alba* L., Phak kik: *Telosma minor* Craib) mainly from the upland and upper paddy. In Kalasin, 70% wild products were collected from the rice field and 37% wild food plant species from secondary woody areas, homegarden, and in the upland fields, mainly consisting of fields with cash crops of cassava and sugarcane (Cruz-Garcia and Price, 2011).

3.3.6 Migration

Two types of migration were observed in Northeast Thailand, one is seasonal and other more permanent (Naivinit et al., 2010). Seasonal migrations occurred after harvesting of rainfed rice during the long dry season (December to May). On the other hand, the permanent migrants no longer participate in farming activities but send remittances to the households and these migrants are usually young adult male and female (Naivinit et al., 2010). The above mentioned two types of migration were observed in the study area according to key informant group discussion. Previous year migration started early than usual at the end of October, 2012. On the other hand, some participants usually worked in large farms for harvesting of sugarcane and rice but they explained that last year (drought year) they have not enough work in the village which forced them to migrate in order to maintain some cash flow. One of the participants (Female, 57 years) mentioned that-

“Our income does not cover our expenses and we have to do all the work ourselves

relying on past savings in order to keep our farm ongoing and don't employ people”.

Participants also mentioned that at least eight farm families migrated from the village to the city area. Rigg and Salamanca (2009) found that moving the family from the village to urban and peri-urban areas for non-farm work opportunities is a way to response during the crisis in Northeastern Thai village. One participant (Male, Aged 48 years) said-

“My neighbor moved from the village with his family and probably he will not come back. I cannot share my problems, even cannot drink with him during Sang kalan festival”.

The member from village committee mentioned that-

“We do the best we can by helping each other and want our community to stick together and grow. We don't want people to move out”.

In brief, rural community experienced significant suffering as a result of drought not only in the farming sectors but also in various settings on the community livelihood. This highlighted that drought had a meaning at community level, particularly perceived concern about the continuity and viability of the community.

Conclusions

Droughts are normal climatic phenomena in Northeast Thailand which lowered the water resources for drinking and irrigation as well as production losses and consequent human misery with far reaching impact on the community. The results indicated that farmers were well aware about drought issue and their perception regarding drought in the study area was linked

with weather related. Drought identifiable indicators were also related to weather conditions and its impact on the crops especially rice which means agricultural drought. Most of the farmers could recall most recent drought year in comparison to old ones which in turn might end up with breakdown of well planned adaptation strategies. This research may enhance the policy maker knowledge about the farmers understanding which help them to formulate better management strategies by establishing an operational definition of drought to identify the beginning, end, and degree of severity of a drought.

Agricultural production losses, which are key indicators of the drought impact measurement, are only a part of the overall socioeconomic impact on the community whereas the community suffered other means such as lower down of local business, limited money for festival celebration, environment issues, rapid out-migration and also abandoned of the village by the few villagers, increase in alcoholics drinking. In the community meetings, public service provider also argued that increase the level of seeking assistance like water, loan reschedule, public ponds digging, health service etc. Now in the disaster mitigation policy community approach is gaining popularity and this finding can be used as a basis for developing the approach in Northeast Thailand by increasing community awareness with cross-agency approaches.

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