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Climate change awareness in Lao

People's Democratic Republic

Individual household analysis

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Contents

Tables

Figures

Abbreviations and acronyms

AESA	Agro-ecosystem analysis
CIAT	The International Center for Tropical Agriculture
DMH	Department of Meteorology and Hydrology
FAO	The Food and Agriculture Organization
GEF	Global Environment Facility
IPM	Integrated Pest Management
FFS	Farmer Field School
SAMIS	Strengthening Agro-climatic Monitoring and Information
WC	System Weather and Climate

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Abstract

During the years 2019 to 2020, the Department of Agricultural Land Management of the Ministry of Agriculture and Forestry has been operating in various provinces to test the implementation and use of climate services for farmers. The activities were guided by the present survey. The present survey gathered information on the socio-economic profile of selected villages, knowledge and attitudes towards climate change, and the sources and types of weather and climate information received. Most of the farmers had heard of climate change and had experienced extreme/unusual events. Extreme weather events have resulted in a loss of agricultural production and a loss of income.

The present data of this survey are made public as they can be used to help design the content and delivery of weather and climate information, as well as information and education campaigns about climate change and government services for farmers. The main beneficiary of this survey should be the donor and international agency communities, as well as the government officials in charge of farmers' extension. At the time of the survey, LaCSA was still tested in a web form, and an app was not available. At that time, television, radio and loudspeakers are the preferred farmers' channels when receiving information, while implementing agencies should consider that none of the respondents chose SMS.

1 Introduction

Lao People's Democratic Republic (Lao PDR) is a landlocked country where many small farmers depend on rainfed agriculture. Climate variability thus has significant impact on agricultural production and farm decisions. The short wet season can decrease production because of inadequate water to support crop growth. On the other hand, severe rainfall can cause crop damage because of flooding, erosion, and crop submergence. As temperatures are projected to increase, the risk of drought and diseases is higher (Climate Risk Country Profile: Lao People's Democratic Republic (2021): The World Bank Group and the Asian Development Bank). Due to the important role of the weather and climate in agricultural production in Lao People's Democratic Republic it is important to deliver timely, reliable, and adequate forecasts to farmers. This information can help farmers make informed decisions that can help address the adverse impacts of climate variability.

The present survey gathered information on the socio-economic profile of selected villages, knowledge and attitudes towards climate change, and the sources and types of weather and climate information received.

2 Data collection

The selected villages are project sites of the Strengthening Agro-climatic Monitoring and Information System (SAMIS) project. Ten villages were surveyed, namely: Dongmeuang, Lamthen, Mai, Nakathang, Namthoung, Patoy, Phalaeng, Poung, Silimoun and Xe. In each village, five percent of the population was interviewed by trained government staff at a government office. The survey period was from May to June 2020.

Table 1 Number of survey respondents per village

Village	Number	Percent
Dongmeuang	24	10.1
Lamthen	21	8.8
Mai	15	6.3
Nakathang	39	16.4
Namthoung	37	15.6
Patoy	15	6.3
Phalaeng	32	13.5
Poung	23	9.7
Silimoun	11	4.6
Xe	21	8.8
Total	**238**	**100.0**

Elaborated by the authors.

3 General information

A total of 238 respondents from ten villages participated in the interviews. Most of the respondents were from Nakathang, Namthoung and Phalaeng villages. In general, there were more male respondents (54.62 percent) than female respondents (45.38 percent). However, in Mai, Nakathang and Namthong villages, there were more female respondents.

The average age of the respondents was 48.17 years old. The average age of the male respondents was higher at 50, as against 46 for females (see Table 2).

Table 2 Average age of respondents by village

Village	Age		
	Female	male	Total
Dongmeuang	48.9	49.1	49.0
Lamthen	55.9	49.4	51.9
Mai	38.4	54.2	43.7
Nakathang	47.1	52.9	49.3
Namthoung	44.2	52.2	48.1
Patoy	31.0	47.0	44.9
Phalaeng	53.1	50.5	51.8
Poung	39.0	46.1	43.3
Silimoun	40.8	53.0	48.6
Xe	42.1	49.7	46.8
Total	**45.9**	**50.1**	**48.2**

Elaborated by the authors.

Table 3 shows the number of respondents by village and age range. 63 percent of the respondents were aged 25-54, followed by 23 percent aged 55-64.

Table 3 Number of respondents by village and age range

	Age (Freq)				
Village	15-24	25-54	55-64	65 and above	Total
Dongmeuang	1	15	6	2	24
Lamthen	0	13	4	4	21
Mai	2	9	1	3	15
Nakathang	0	24	10	5	39
Namthoung	1	23	8	5	37
Patoy	1	9	5	0	15
Phalaeng	0	18	11	3	32
Poung	2	17	4	0	23
Silimoun	1	7	2	1	11
Xe	0	16	4	1	21
Total	**8**	**151**	**55**	**24**	**238**

Elaborated by the authors.

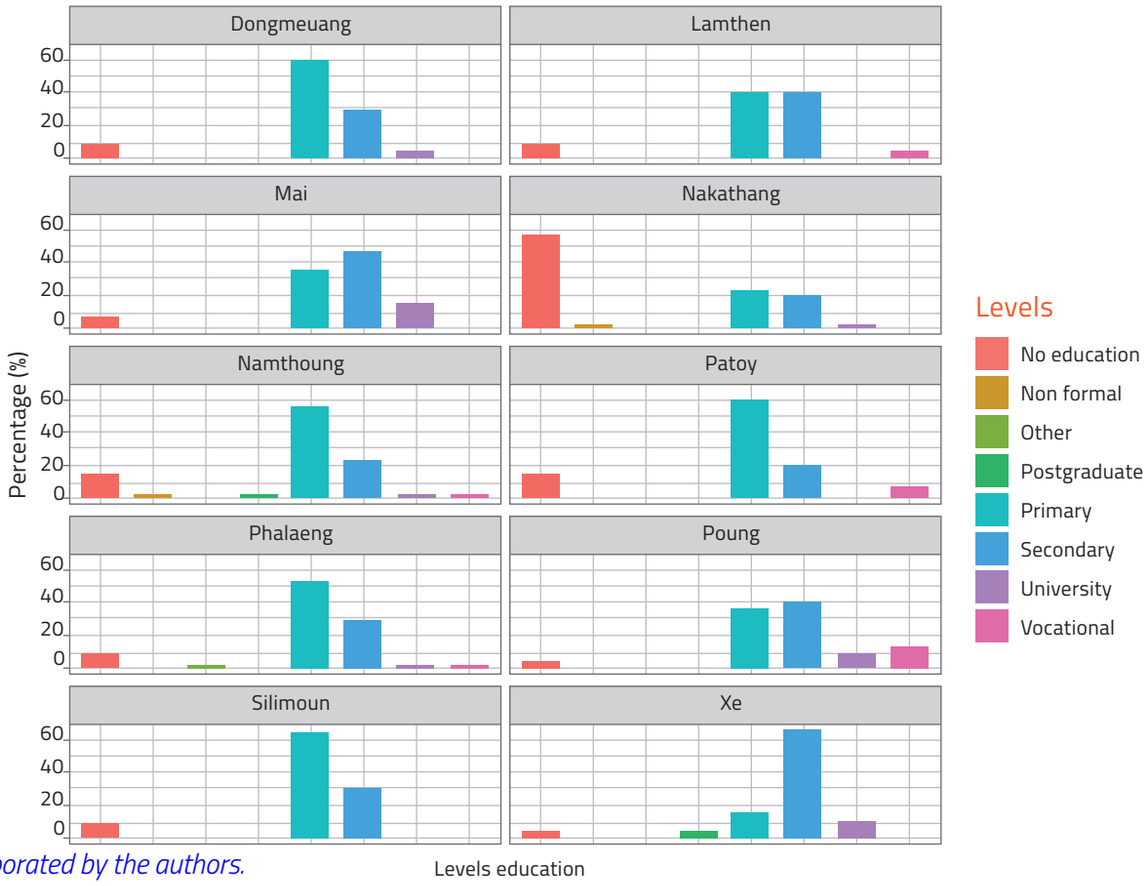
Table 4 Occupation

Occupation	Freq.	Percent
Farmer	199	83.6
Govt. official	12	5.0
Labourer	1	0.4
Shop owner	5	2.1
Student	5	2.1
Other	16	6.7
Total	**238**	**100.0**

Elaborated by the authors.

The highest level of completed education is shown in Figure 1. In Xe village, the figure shows that a large percent of respondents (65 percent) had completed secondary school level. This was also the highest level among farmers in Mai and Poung villages. Other villages including Doumeuang, Namthoung, Phalaeng, Silimon and Paloy indicate that 50-60 percent of farmers at these villages only completed primary school, while the data for secondary school was lower (below 40 percent). University and vocational levels accounted for a small percentage: only 15 percent in Mai had studied in college and a similar proportion in Poung had undergone vocational training. Nakathong was assessed as having the lowest educational level since 60 percent of its people had no education.

Figure 1 Highest level of completed education



Elaborated by the authors.

In general, the results show that the male respondents completed a higher level of education than women. majority of the respondents (42 percent) completed primary education while a third completed secondary education (31.9 percent). Almost 17 percent of the total number of respondents, on the other hand, reported that they did not receive any formal education. A very small proportion of the farmer respondents had reached university and post graduate levels, with percentages of 4.2 percent and 0.8 percent respectively.

Table 5 shows the highest level of education completed disaggregated by gender. Most of the male and female respondents completed the primary level of education, with shares of 48.5 percent and 34.3 percent respectively. Furthermore, 36.2 percent of male respondents completed secondary education compared to 26.9 percent of female respondents. On the other hand, a high percentage of those who did not complete any level of education were women, with a share of almost 30 percent of the total number of female respondents.

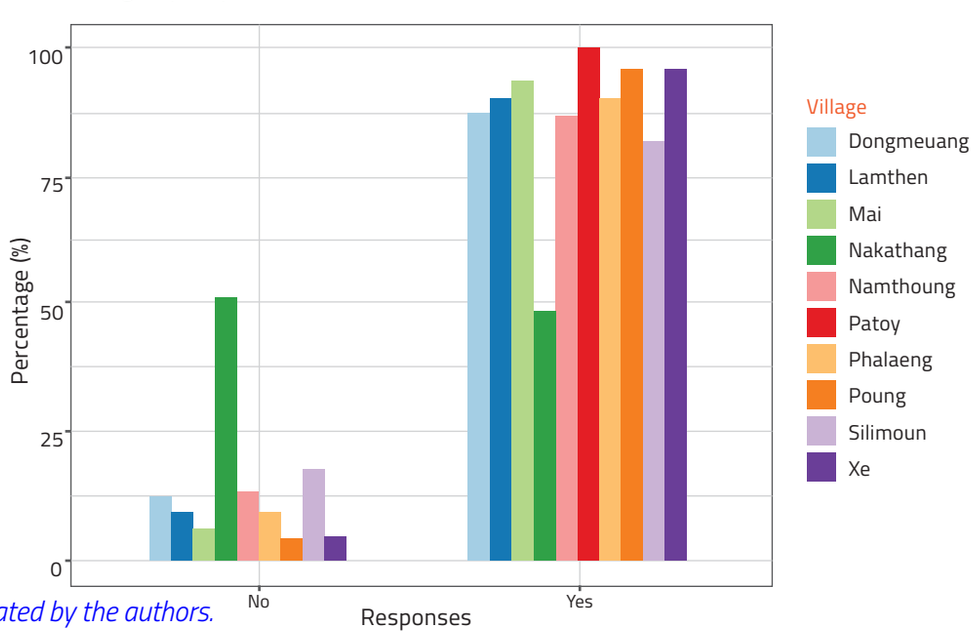
Table 5 Highest level of education completed by gender

Education Level	Female (%)	Male (%)	Total (%)
No education	29.6	6.2	16.8
Primary	34.3	48.5	42.0
Secondary	26.9	36.2	31.9
Vocational	1.9	3.9	2.9
University	4.6	3.9	4.2
Postgraduate	0.0	1.5	0.8
Non-formal	1.9	0.0	0.8
Other	0.9	0.0	0.4
Total	**100.0**	**100.0**	**100.0**

Elaborated by the authors.

Figure 2 shows the understanding of the official languages of Lao PDR of participating respondents. Almost all villages have sufficient knowledge to read/understand Lao, except Nakathang where many had no formal education.

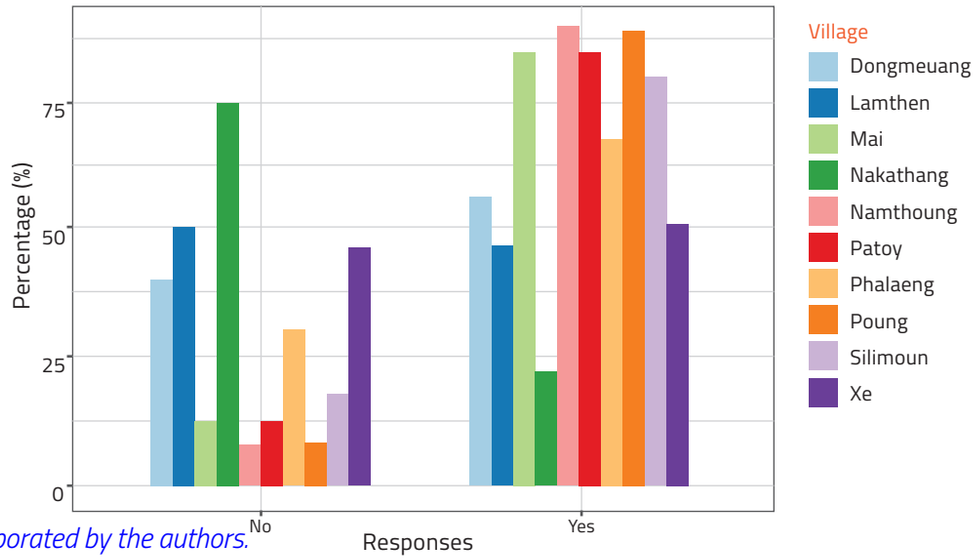
Figure 2 Percentage of respondents who can read and understand text and SMS in Lao



Elaborated by the authors.

Four villages including Mai, Namthoung, Patoy and Paung had the highest percentage of farmers with mobile phones, at approximately 80 percent. About 50 percent of respondents in Dongmeaung, Lamthen, and Xe confirmed that they owned personal mobile phones. Nakathang is the only village with few personal phones, at about 25 percent (see Figure 3).

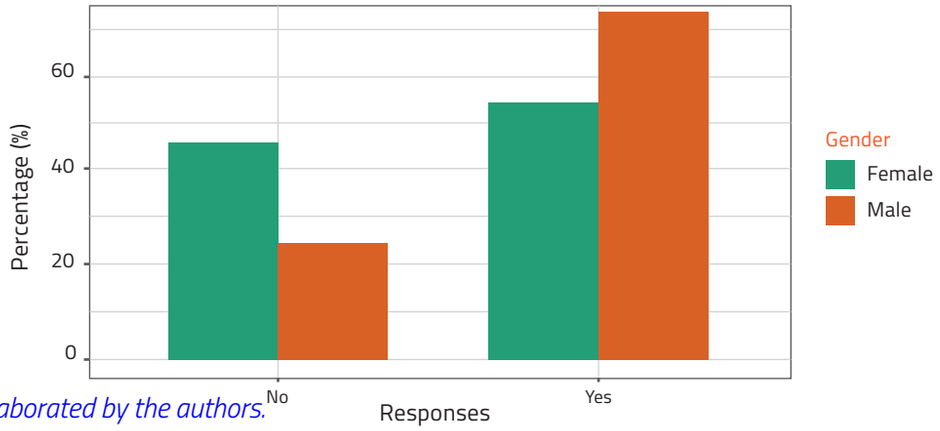
Figure 3 Phone ownership by village



Elaborated by the authors.

Figure 4 shows personal phone ownership by gender. In general, two out of three respondents had a mobile phone. For the male respondents, mobile phone ownership was higher, at three out of four. Phone ownership was is lower among women, with only one in two women possessing one. Note however that this question pertains to individual mobile phone ownership and not by household. This is important since a mobile phone can be utilized to provide access to information, not only weather and climate information, but also farming information and government support.

Figure 4 Phone ownership by gender



Elaborated by the authors.

In addition to phone ownership, it is also important to know the type of phone used by the farmers. Smartphones can connect to the internet and can thus be used to access or receive a wider variety of information than with a basic phone. Almost half of the total number of respondents (44.32 percent) owned a basic phone while 38 percent had a smartphone. Smartphone ownership was higher among men at 43.64 percent compared to 32.0 percent among women. However, many women respondents were unaware of which type of phone they owned.

Table 6 Type of phone owned

Type of Mobile Phone	Female	Male	Total
Basic phone	45.3%	43.6%	44.3%
Smartphone	32.0%	42.7%	38.4%
Don't know	22.7%	13.6%	17.3%
Total	**100.0%**	**100.0%**	**100.0%**

Elaborated by the authors.

Summary of findings:

- Most of farmers in the surveyed villages completed primary and secondary education. However, the majority in Nakathang had no education.
- Men completed higher levels of education compared to women.
- Most of the respondents by village can read and understand Lao.
- Two of three respondents have a mobile phone.
- Smartphone ownership is higher among male respondents.

4 Awareness and knowledge of climate change

A. Perception of climate change

The farmers were asked if they had heard of climate change and if they believed in it. Almost 78 percent of respondents had heard of climate change. Of this total, 80.77 percent of the male respondents had heard of climate change as against 74.07 percent of female respondents (see Table 7).

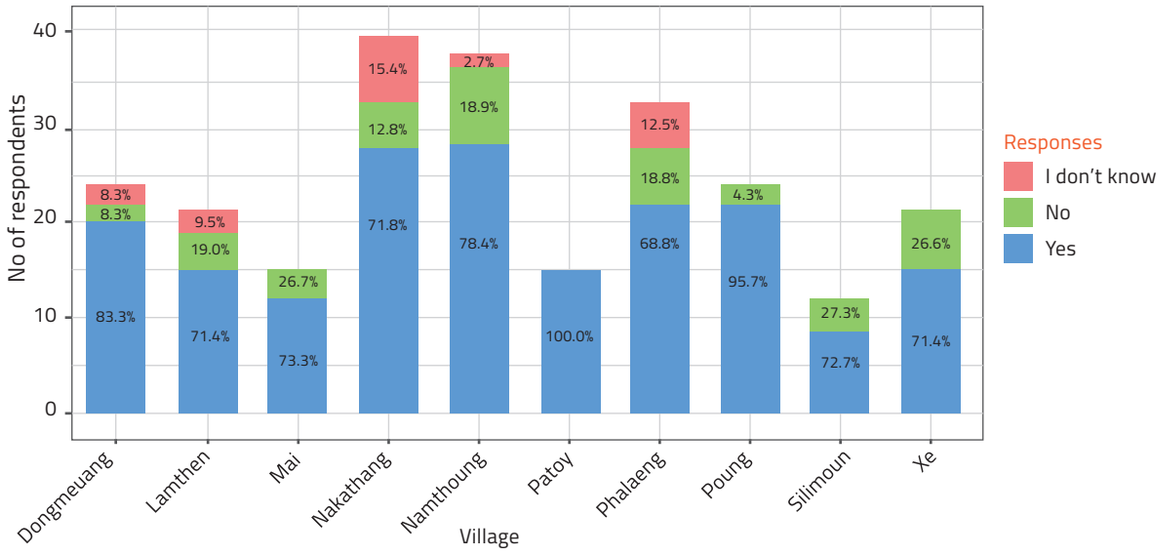
Table 7 Percentage of respondents who have heard of climate change

Have you heard of climate change?	Female	Male	Total
Yes	74.1%	80.8%	77.7%
No	18.5%	13.9%	16.0%
Don't know	7.4%	5.4%	6.3%
Total	**100.0%**	**100.0%**	**100.0%**

Elaborated by the authors.

Observed by village, a considerable percentage of respondents, (over 71 percent across all villages), affirmed that they had heard about climate change. All farmers in Patoy said that they had encountered information about climate change. On the other hand, a higher percentage of respondents in Mai, Silimoun and Xe had no idea of climate change, at 26.7 percent, 27.3 percent and 28.6 percent, respectively.

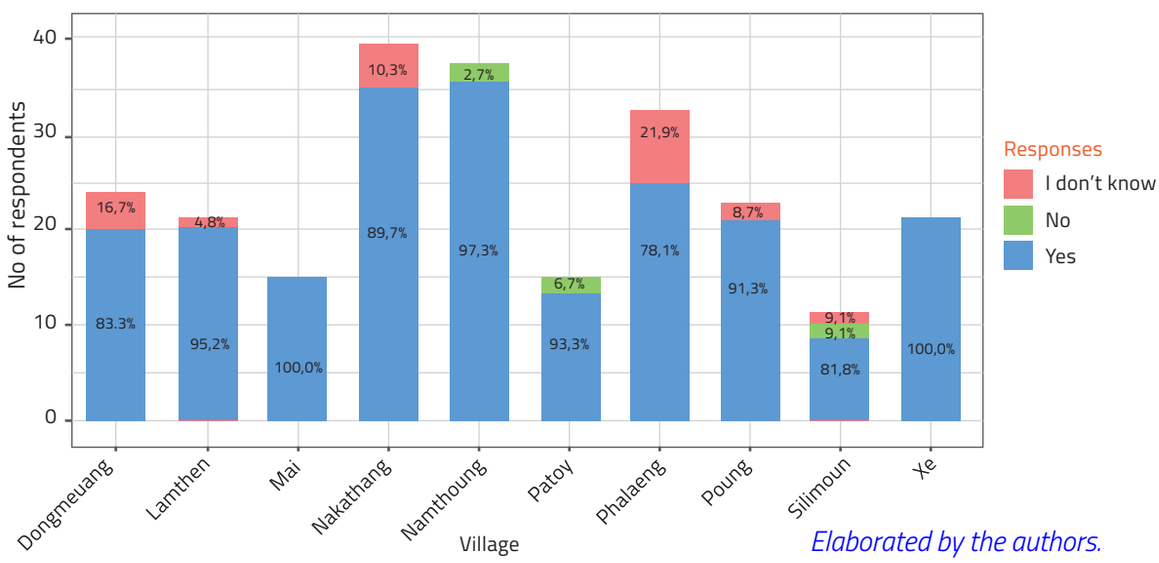
Figure 5 Percentage of respondents who have heard of climate change



Elaborated by the authors.

Even though many respondents had not heard of climate change, they still believed in the existence of the phenomenon: 100 percent of respondents in Mai and Xe, and significant percentages in other villages. Only few responses indicated that people did not believe in the occurrence of climate change in Namthoung, Patoy and Silimoun, at 2.7 percent, 6.7 percent and 9.1 percent respectively.

Figure 6 Percentage of respondents who believe climate change exists



Elaborated by the authors.

Among the total number of respondents, 91 percent believed in the existence of climate change. Almost 95 percent of male respondents believed in the existence of climate change compared to 86 percent of female respondents. 14 percent of the female respondents answered "Don't know" compared to only 2 percent pf male respondents (see Table 8).

Table 8 Belief in the existence of climate change

Do you believe climate change exists? Do you believe the climate is changing?	Female	Male	Total
Yes	86.1%	94.6%	90.8%
No	0.0%	2.3%	1.3%
Don't know	13.9%	3.1%	8.0%
Total	**100.0%**	**100.0%**	**100.0%**

Elaborated by the authors.

Those who believed in the existence of climate change had different opinions about its causes. The perceived causes of climate change and the respondents' opinions in each cause by village are shown in Table 9. Deforestation was the leading reason given, accounting for 94 percent compared to other causes for all ten villages. Next were carbon emissions from vehicles and large businesses. cited in Dongmeuang and Xe, at 80 percent and 62 percent respectively. Agriculture (such as methane from livestock and manure and nitrous oxide emissions from fertilizers) also accounted for 67 percent of responses in Mai village, where it was seen as the second most common cause. Burning fossil fuels such as oil and coal was cited as the second major cause of climate change in Nakathang and Patoy, at about 50 percent.

Table 9 Causes of climate change

Causes of Climate Change According to the Respondents (in percent)					
Village	Burning fossil fuels, such as oil and coal	Deforestation	Agricultural, such as methane from livestock and manure and nitrous oxide emissions from fertilizers	Carbon emissions from vehicles and large businesses	Don't know
Dongmeuang	50.0	95.0	35.0	80.0	5.0
Lamthen	5.0	100.0	20.0	45.0	0.0
Mai	26.7	93.3	66.7	13.3	0.0
Nakathang	42.9	85.7	34.3	40.0	8.6
Namthoung	22.2	97.2	36.1	19.4	0.0
Patoy	50.0	100.0	28.6	35.7	0.0
Phalaeng	24.0	92.0	16.0	32.0	8.0
Poung	23.8	90.5	33.3	38.1	4.8
Silimoun	33.3	100.0	44.4	11.1	0.0
Xe	28.6	100.0	33.3	61.9	0.0
Total	**30.1**	**94.4**	**33.3**	**38.4**	**3.2**

Elaborated by the authors.

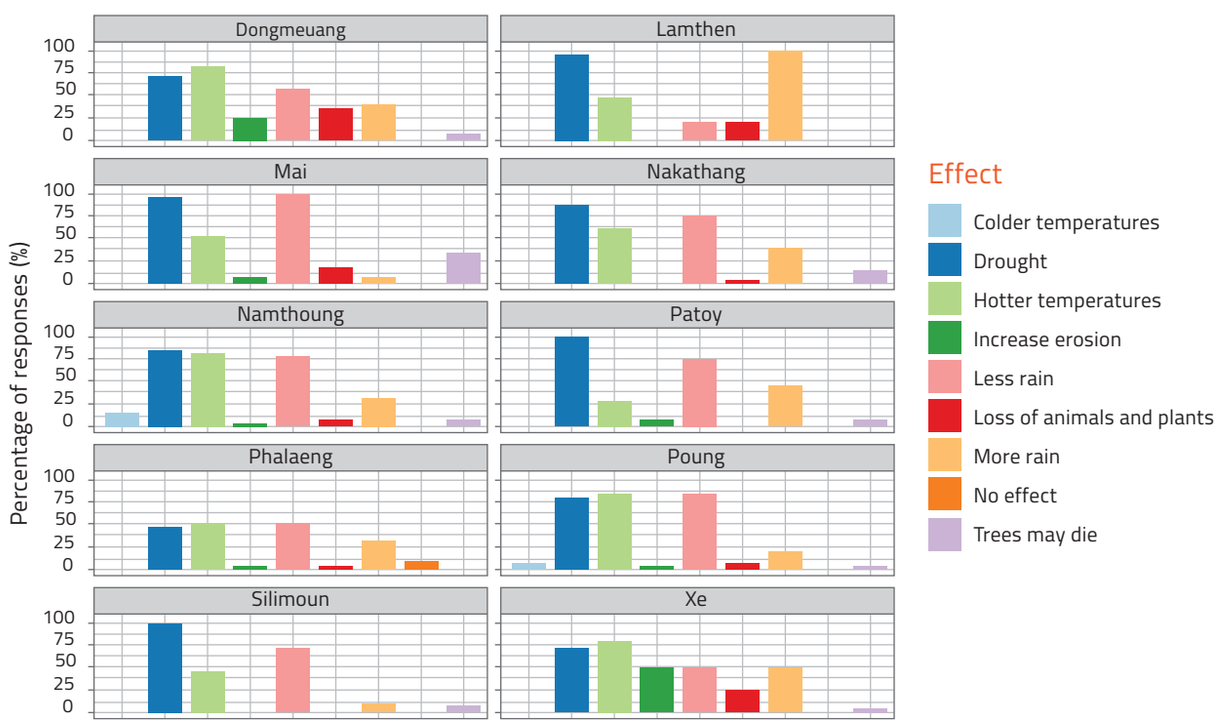
Summary of findings:

- Most of the respondents have heard of and believe in climate change.
- Deforestation, burning fossil fuels and carbon emissions are seen as causes of climate change in 10 villages in Lao People's Democratic Republic.
- Deforestation was cited by 100 percent of respondents in many villages, including Lamthen, Namthoung, Patoy, Silimoun, and Xe.

B. Effects of climate change

In Figure 7, respondents were asked about their perceptions of the probable future effects of climate change in their village. Drought, hotter temperatures, and less rain were most commonly cited. However, in Lamthen, more rain was cited by many respondents as a probable future effect of climate change.

Figure 7 Probable effects of climate change by village



Elaborated by the authors.

Table 10 shows the probable effects of climate change as perceived by the respondents (not per village). Drought, less rain, and hotter temperatures are the top three responses.

Table 10 Probable effects of climate change

Probable Effects of Climate Change	%
Drought	79.3
Less rain	63.3
Hotter temperatures	62.4
More rain	36.7
Loss of animals and plants	10.5
Increase erosion	8.9
Trees may die	8.0
Colder temperatures	3.0
Don't know	2.5
No effect	1.3
Others	0.4

Elaborated by the authors.

From Figure 7, the top three probable future effects (accounting for highest percentage) in each village were selected and reflect the respondents' perceptions of the probability of this occurring in the village. A Likert scale question was given, with five possible responses: not probable, somewhat improbable, neutral, somewhat probable and very probable. Table 11 below shows the percentage of response distribution for each criterion and the perceived probability of this happening in the village. Most of the responses are in the "somewhat probable" and "very probable" categories, which implies that respondents believe that climate change will impact their village.

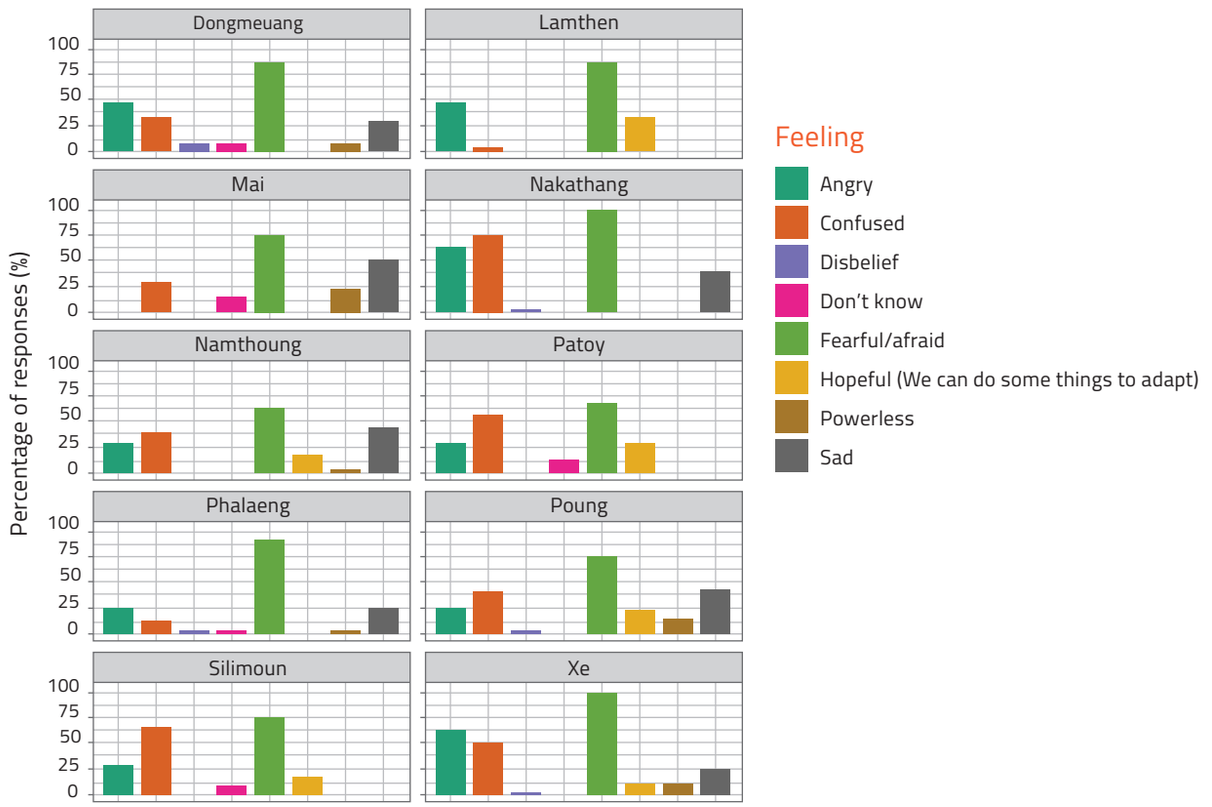
Table 11 Perceived probability of future effects of climate change on villages (in percentage terms)

Province	Top future effects	Not probable	Somewhat improbable	neutral	Somewhat probable	Very probable
Dongmeuang	Drought			5.9	41.2	52.9
	Hotter temperature			5.3	52.6	42.1
	Less rain			15.4	23.1	61.5
Lamthen	Drought				45.0	55.0
	More rain				47.6	52.4
	Hotter temperature				90.0	10.0
Mai	Drought			14.3	50.0	35.7
	Less Rain			13.3	26.7	60.0
	Hotter temperature				14.3	85.7
Nakathang	Drought			11.8	38.2	50.0
	Less rain			13.8	20.7	65.5
	Hotter temperature			8.7	13.0	78.3
Namthoung	Drought				6.7	93.3
	Less rain				25.0	75.0
	Hotter temperature			3.5	31.0	65.5
Patoy	Drought				26.7	73.3
	Less rain				44.4	55.6
	More rain					100.0
Phalaeng	Drought			21.4	42.9	35.7
	Less rain	6.7		13.3	46.7	33.3
	Hotter temperature	6.3		6.3	31.3	56.3
Poung	Drought	5.6			27.8	66.7
	Hotter temperature	5.3			26.3	68.4
	Less rain	5.3			36.8	57.9
Silimoun	Drought				27.3	72.7
	Hotter temperature				0.0	100.0
	Less rain				37.5	62.5
Xe	Drought				26.7	73.3
	Hotter temperature				50.0	50.0

Elaborated by the authors.

Respondents across all villages were afraid of climate change (65-100 percent). In Nakathang, the second common perception of farmers was "confused", with a share of 75 percent. Respondents had limited confidence in being able to adapt to impacts of climate change. For example, even though people in Dongmeuang, Mai, Nakathang, Phalaeng were afraid of climate change or even angry/ confused, they did not express much hope in terms of adaptation solutions. However, almost all of the respondents (97.0 percent) were willing to learn more about climate change.

Figure 8 Feelings about climate change



Elaborated by the authors.

Most of the respondents had experienced extreme or unusual weather events (see Table 12). Of the 238 respondents, 184 (77.31 percent) had encountered extreme/unusual weather events, such as floods, droughts, and storms. On the other hand, 44/238 (18.49 percent) respondents had no experience while 10/238 (4.20 percent) respondents did not know/remember.

Table 12 Experience of extreme/unusual weather events by gender (in percentage terms)

Have you ever encountered extreme/ unusual weather events, such as floods, droughts, storms?	Female	Male	Total
Yes	75.0	79.2	77.3
No	18.5	18.5	18.5
Don't know/Can't remember	6.5	2.3	4.2
Total	**100.0**	**100.0**	**100.0**

Elaborated by the authors.

In terms of experience of extreme/unusual weather events, responses varied by village. In Lamthen, Nakathang and Xe villages, more than 90 percent of respondents had experienced extreme/unusual events as against 41 percent in Phalaeng village.

Table 13 Experience of extreme/unusual weather events by village (in percentage terms)

Have you ever encountered extreme/ unusual weather events, such as floods, droughts, storms?	Yes	No	Don't know/ Can't remember	Total (n=238)
Dongmeuang	83.3	16.7	0.0	100.0
Lamthen	90.5	0.0	9.5	100.0
Mai	66.7	33.3	0.0	100.0
Nakathang	94.9	2.6	2.6	100.0
Namthoung	86.5	10.8	2.7	100.0
Patoy	53.3	46.7	0.0	100.0
Phalaeng	40.6	40.6	18.8	100.0
Poung	82.6	17.4	0.0	100.0
Silimoun	54.6	45.5	0.0	100.0
Xe	95.2	4.8	0.0	100.0
Total	**77.3**	**18.5**	**4.2**	**100.0**

Elaborated by the authors.

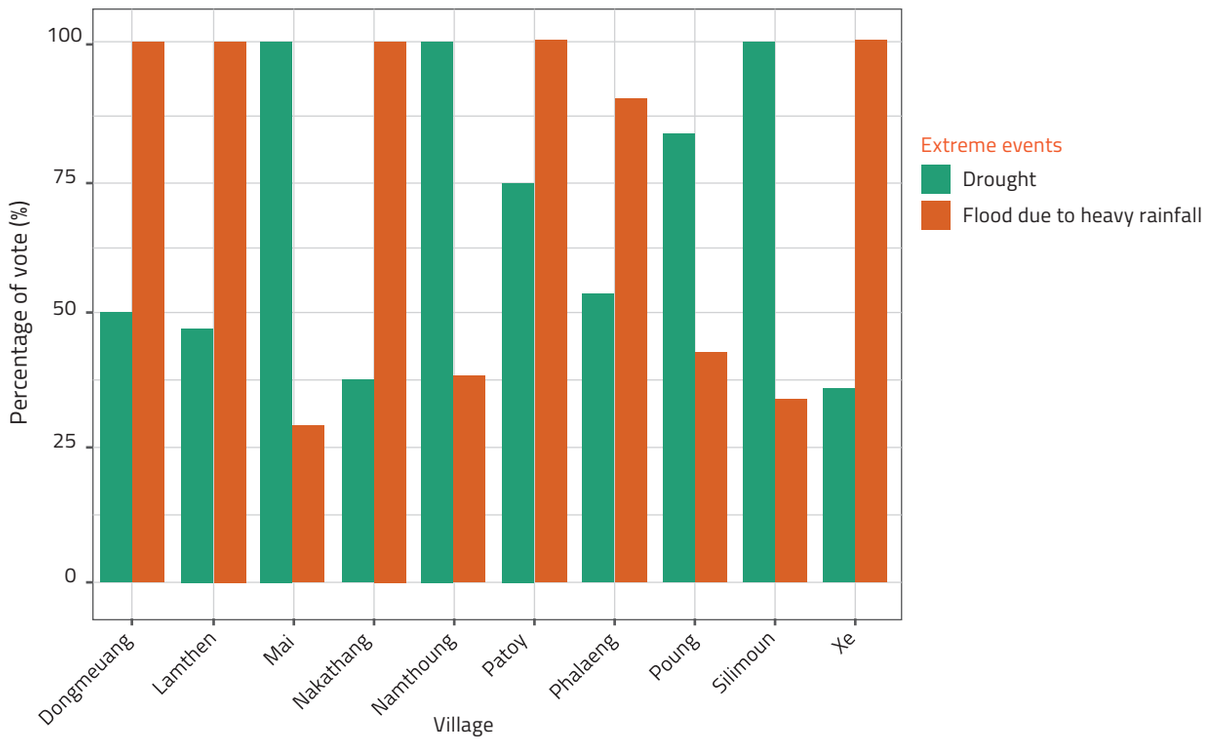
Furthermore, the respondents were asked about the types of extreme/unusual events they had experienced. Of those respondents who responded positively, almost 77 percent had experienced flooding due to heavy rainfall and 64 percent had experienced drought. The responses varied by village. All respondents in Dongmeuang, Lamthen, Nakathang, Patoy and Xe villages had experienced flooding as against less than 40 percent in Mai, Namthong and Silimoun villages. In these villages, all respondents who had experienced extreme/unusual events had experienced drought.

Table 14 Types of extreme/unusual events experienced by village (in percentage terms)

Village	Experience of flooding due to heavy rainfall	Drought
Dongmeuang	100.0	50.0
Lamthen	100.0	47.4
Mai	30.0	100.0
Nakathang	100.0	37.8
Namthoung	37.5	100.0
Patoy	100.0	75.0
Phalaeng	92.3	53.9
Poung	42.1	84.2
Silimoun	33.3	100.0
Xe	100.0	35.0
Total	**76.6**	**63.6**

Elaborated by the authors.

Figure 9 Experience of extreme events



Elaborated by the authors.

Summary of findings:

- Drought, hotter temperatures, and less rain are the most common effects that farmers in almost all villages have heard about.
- Respondents fear climate change and believe that the impact of climate change will happen in their village. They are also willing to learn more about climate change.
- Most have experienced extreme or unusual weather events such as flooding and drought.
- Experiences vary by village.

C. Solutions applied to extreme weather events

Table 15 shows a list of activities undertaken by respondents after experiencing extreme/unusual weather events. Most of the respondents stated that they stopped cutting trees and maintained trees and vegetation after experiencing extreme/unusual weather events. However, a high percentage took no action.

Table 15 Solutions applied to extreme weather events

No	Managements applied when extreme weather happened	Count of vote
1	Stopped cutting trees	90
2	Took no action	71
3	Maintained trees and vegetation	62
4	Changed crop variety	56
5	Made property more resistant to threats	54
6	Cleared drains	43
7	Built/fixed irrigation cannels/gates/dykes	37
8	Built wells and/or other water resources	36
9	Planted trees and vegetation along water courses	35
10	Changed my cropping system	19
11	Cleaned or helped to maintain public drainage systems from waste	3

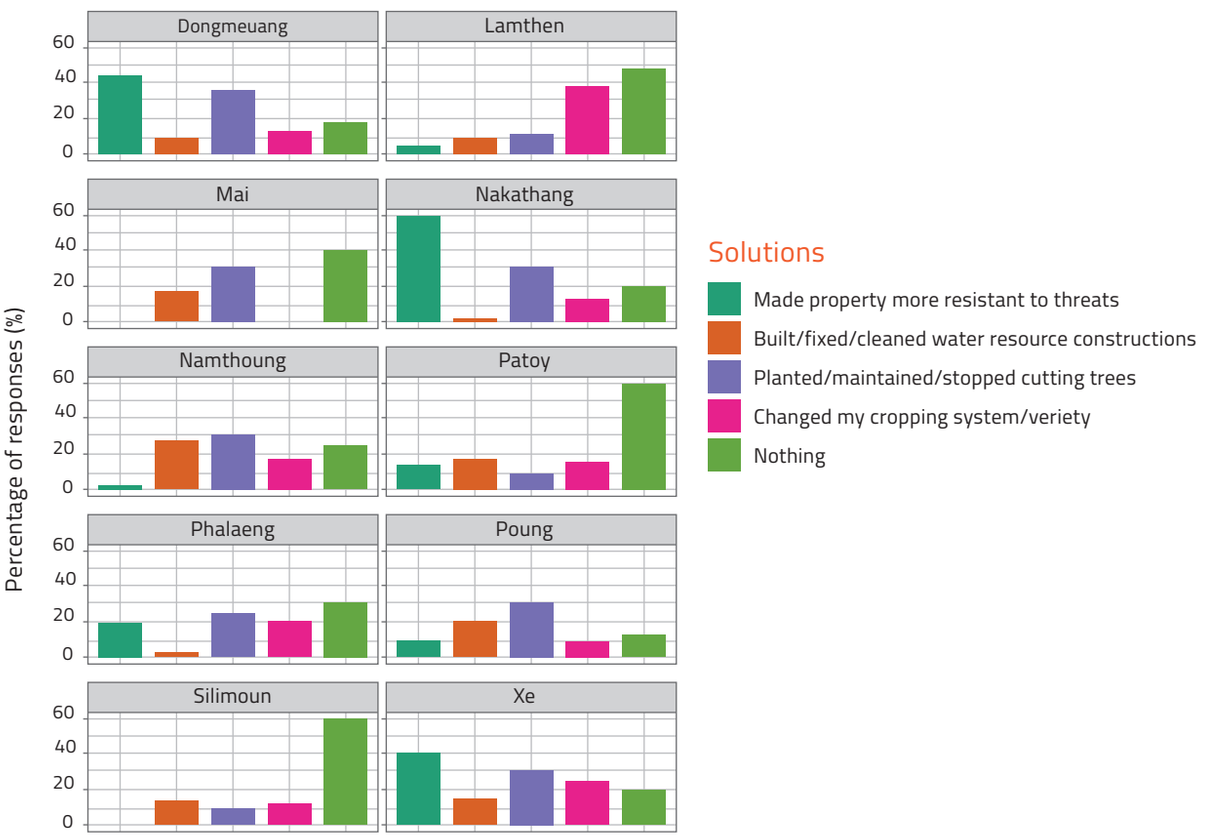
Elaborated by the authors.

In terms of detailed management applied each village, the activities in Table 15 are organized into four groups, as follows:

- Management related to trees/vegetation including: maintained trees and vegetation, planted trees and vegetation along water courses, or stopped cutting trees – grouped as planted/maintained/ stop cutting trees.
- Built wells and/or other water resources, built/fixed irrigation channels/gates/dykes, cleared drains and cleaned or helped to maintain public drainage systems from waste – grouped as build/ fixed/cleaned water resources constructions.
- Introduced farming management techniques such as changing crop variety or cropping system – grouped as changed my cropping system/variety.
- Made property more resistant to threats and Took no action are two unique categories.

Figure 10 below shows the average percentage of each management group applied by residents in ten villages. Dongmeuang, Xe and Nakathang considered that making property "more resistant to threats" helped them during drought/flood. "Planted/maintained and stopped cutting trees" applied commonly to all ten villages, but the percentage that conducted this practice was not so high (below 40 percent). Surprisingly, almost 70 percent of habitants in Patoy and Silimoun said that they took no action in cases of extreme weather. Farm management (change cropping system/crop type) was only widely used in Lamthen village.

Figure 10 Solutions applied to extreme weather events



Elaborated by the authors.

Summary of findings:

- High "took no action" response in the wake of experiencing extreme or unusual events.
- Varying management techniques applied after experiencing extreme or unusual events.

D. Effects of extreme weather on respondents

Table 16 shows the effects of extreme/unusual events. Most respondents stated that losses in agricultural production from extreme weather (80.25 percent) were followed by a loss of income.

Table 16 Effects of extreme/unusual events

Effects of extreme/ unusual events	All (n=238)	Dongmeuang (n=24)	Lamthen (n=21)	Mai (n=15)	Namthoung (n=37)	Patoy (n=15)	Phalaeng (n=32)	Poung (n=23)	Silimoun (n=11)	Xe (n=21)
Damage to property	14.7	33.3	0	0	0	0	25	4.4	0	38.1
Loss of livestock	28.6	66.7	23.8	33.3	13.5	46.7	12.5	17.4	0	52.4
Loss of agricultural production	80.3	91.7	71.4	66.7	83.8	66.7	71.9	73.9	63.6	100
Loss of income	44.5	41.7	0	53.3	54.1	26.7	43.8	47.8	36.4	47.6
Health hazards	0.4	4.2	0	0	0	0	0	0	0	0
Lack of potable water (water shortage)	9.7	20.8	4.8	0	13.5	0	15.6	17.4	0	4.8
Loss of trees	12.2	20.8	0	40	16.2	13.3	15.6	13	0	9.5
I or a member of the family migrated permanently or temporarily	0.8	4.2	0	0	0	0	0	0	0	4.8
One or more of my children stopped attending school	0.0	0	0	0	0	0	0	0	0	0
None	13.9	4.2	28.6	33.3	13.5	33.3	18.8	8.7	27.3	0
Don't know	0.4	0	0	0	0	0	0	4.4	0	0
Not applicable	1.3	0	0	0	0	0	6.3	4.4	0	0

Elaborated by the authors.

The effects of extreme/unusual events vary by village. In Dongmeuang village, more than 90 percent reported a loss of agricultural production. two out of three respondents also reported a loss of livestock. Almost 42 percent reported a loss of income and 33 percent reported damage to property.

In Lamthen village, 72 percent reported a loss of agricultural production and 24 percent reported a loss of livestock. However, none reported a loss of income and damage to property and 29 percent reported no effects of extreme/unusual events.

In Mai village, two out of three respondents reported a loss of agricultural production and one in three reported a loss of livestock. Over one in two experienced a loss of income from extreme/unusual events. 40 percent also reported a loss of trees.

In Namthoung village, 84 percent experienced a loss of agricultural production and over 50 percent experienced a loss of income. None reported damage to property.

In Patoy village, 67 percent reported a loss of agricultural production and 47 percent reported a loss of livestock due to extreme/unusual weather events.

In Phalaeng village, 72 percent experienced a loss of agricultural production and 44 percent reported a loss of income. one in four experienced damage to property.

In Poung village, 74 percent reported a loss of agricultural production and 48 percent reported a loss of income. 17 percent reported a loss of livestock and lack of potable water respectively.

In Silimoun village, two out of three respondents reported a loss of agricultural production and one in three reported a loss of income. Other effects of extreme/unusual events were not experienced.

Lastly in Xe village, all respondents experienced a loss of agricultural production and over half reported a loss of livestock. 48 percent reported a loss of income and 38 percent experienced damage to property. None of the respondents reported not experiencing the effects of extreme/unusual events.

Fifty-four percent of the respondents reported that someone in the authority had informed them about what to do in case of disaster such as flooding or drought. The results varied by village. In Mai, none of the respondents were informed. In Xe and Lamthen village, less than 25 percent reported not being informed.

Table 17 Number of farmers informed by authorities about what to do when disaster occurs, by village

Have you been told by someone in authority what to do if a disaster such as flooding or droughts occur?tt				
Village	n	Yes (%)	No (%)	Don't know/Can't remember (%)
Dongmeuang	24	54.0	42.0	4.0
Lamthen	21	57.0	19.0	24.0
Mai	15	0.0	100.0	0.0
Nakathang	39	49.0	49.0	3.0
Namthoung	37	30.0	70.0	0.0
Patoy	15	33.0	67.0	0.0
Phalaeng	32	41.0	53.0	6.0
Poung	23	30.0	65.0	4.0
Silimoun	11	18.0	73.0	9.0
Xe	21	76.0	24.0	0.0
All villages	**238**	**41.0**	**54.0**	**5.0**

Elaborated by the authors.

Forty-seven percent of male respondents reported having been informed by authorities compared to 34 percent for females.

Table 18 Number of farmers informed by authorities about what to do when disaster occurs, by gender (in percentage terms)

Have you been told by someone in authority what to do in case of disaster such as flooding or drought?	Female (n=108)	Male (n=130)	All (n=238)
Yes	34.3	46.9	41.2
No	57.4	51.5	54.2
Don't know/Can't remember	8.3	1.5	4.6

Elaborated by the authors.

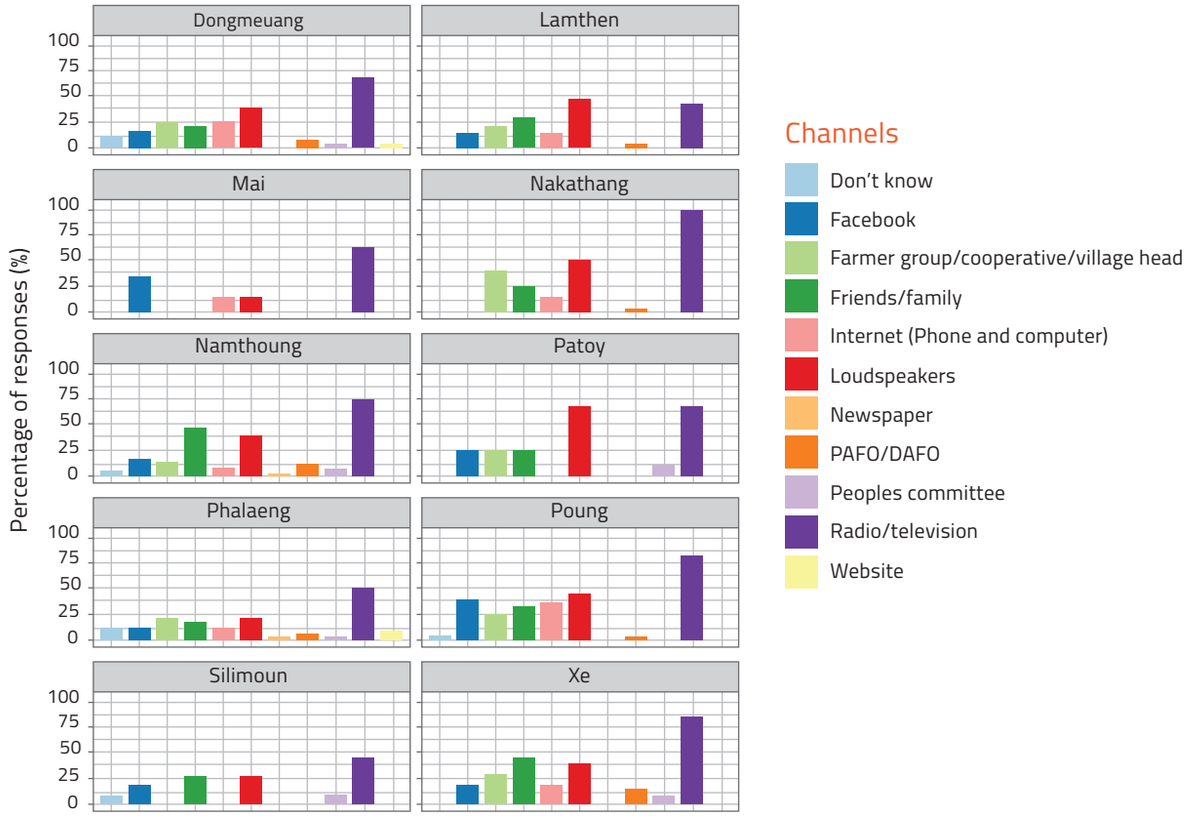
Summary of findings:

- The effects of extreme/unusual events vary by village.
- Male respondents are more informed by authorities about what to do when disaster occurs than women.

5 Access to information

Respondents were asked how they usually received warnings about unusual weather events. 100 percent of respondents in Nakathang received the news from television/radio – the most common platform when accessing disaster information. This channel also accounted for significant percentages of responses from other villages (from 60 to 85 percent), except Lamthen (below 50 percent). A high proportion of farmers in Patoy village received their warnings through village loudspeakers (above 70 percent). Meanwhile, the proportions in the remaining villages were lower, at about 50 percent or less. Mai village had limited communication channels with only four sources including television/radio, Facebook, Loudspeakers, and internet (phone). Fellow farmers, friends and family members were the secondmost effective channels for respondents in Namthong and Xe villages, at almost 50 percent (see Figure 11).

Figure 11 Channels used to receive warnings of unusual events



Elaborated by the authors.

Table 19 shows the various channels used by respondents for warnings of unusual weather events. television and radio were the main channels. Other important channels were loudspeakers and networks such as friends/family and village. None responded that they received information via SMS. Only 6.3 percent received information from PAFO/DAFO.

Table 19 Channels for receiving warnings about unusual weather events

Channels for receiving warnings about unusual weather events	%
Television	69.7
Radio	54.2
Loudspeakers	38.7
Friends/Family	27.3
Village head/news reader	19.7
Facebook	17.6
Internet (phone)	16.0
Farmer group	8.0
PAFO/DAFO	6.3
Don't know	4.6
People's committee	3.8
Website	1.3
Other	1.3
Newspaper	0.8
Cooperative	0.4
Internet (computer)	0.0
SMS	0.0
Farming contractor	0.0
Call centre	0.0
WhatsApp group	0.0
NGO	0.0
Input providers	0.0
Loan providers	0.0

Elaborated by the authors.

Most respondents received information from two or more channels – with most receiving information from 2 to 3 channels.

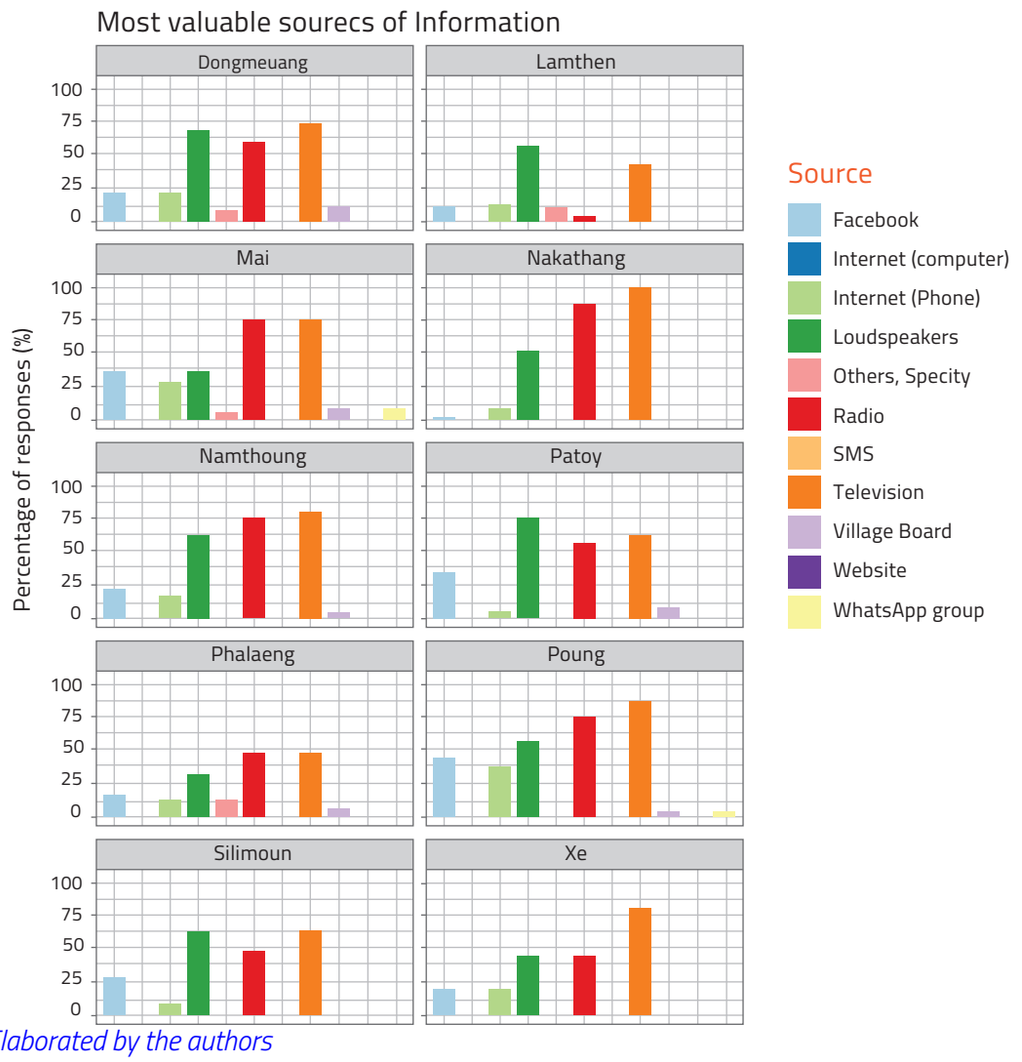
Table 20 Number of channels used for receiving warnings of unusual weather events

Number of Sources	Freq.	Percent
0	11	4.6
1	53	22.3
2	58	24.4
3	51	21.4
4	27	11.3
5	30	12.6
6	5	2.1
7	3	1.3
Total	**238**	**100.0**

Elaborated by the authors.

The correlation between the most valuable sources of and channels for accessing information above is consistent. Across all respondents, 100 percent in Nakathang and Poung villages stated that they most frequently used the television channel to acquire information. These proportions are also significant in other villages. Radio and loudspeakers were the second and third most common channels for accessing information cited by farmers.

Figure 12 Most valuable sources of Information



Elaborated by the authors

Television, radio and loudspeakers were the most valuable sources of information. However, a higher percentage of female respondents identified radio and loudspeakers. This might be due to their limited phone ownership. 27 percent of male respondents cited the internet, which they accessed via their phones. None of the respondents received information via SMS.

Table 21 Most valuable sources of information, by gender

	all		female		male	
Sources	n	%	n	%	n	%
Television	238	87.4	108	87.0	130	87.7
Radio	238	69.8	108	79.6	130	61.5
Internet (phone)	238	20.6	108	13.0	130	26.9
Internet (computer)	238	0.4	108	0.0	130	0.8
SMS	238	0.0	108	0.0	130	0.0
Facebook	238	15.1	108	15.7	130	14.6
Website	238	0.0	108	0.0	130	0.0
Loudspeakers	238	64.3	108	74.1	130	56.2
WhatsApp group	238	0.8	108	0.0	130	1.5
Village board	238	2.5	108	1.9	130	3.1
Others	238	8.8	108	11.1	130	6.9

Elaborated by the authors.

Table 22 shows the preferred channels for receiving information. Similar to Table 21, television, radio and loudspeakers were the preferred channels (generally offline). None of the respondents reported receiving information by SMS.

	all		female		male	
Sources	n	%	n	%	n	%
Television	238	84.0	108	85.2	130	83.1
Radio	238	75.6	108	80.6	130	71.5
Internet (phone)	238	21.4	108	11.1	130	30.0
Internet (computer)	238	1.3	108	0.0	130	2.3
SMS	238	0.0	108	0.0	130	0.0
Facebook	238	17.7	108	17.6	130	17.7
Website	238	1.3	108	0.9	130	1.5
Loudspeakers	238	74.4	108	79.6	130	70.0
WhatsApp group	238	2.9	108	0.0	130	5.4
Village board	238	4.6	108	2.8	130	6.2
Others	238	3.4	108	4.6	130	2.3

Elaborated by the authors.

Table 23 shows the most important weather, climate information and agriculture advisories for the respondents. Weather forecasts (seven-day, next-day and three-day) were the three most important. Climate forecasts covering the next month and coming three months were important to more than one in three respondents. Storm advisories were important only to 9.3 percent.

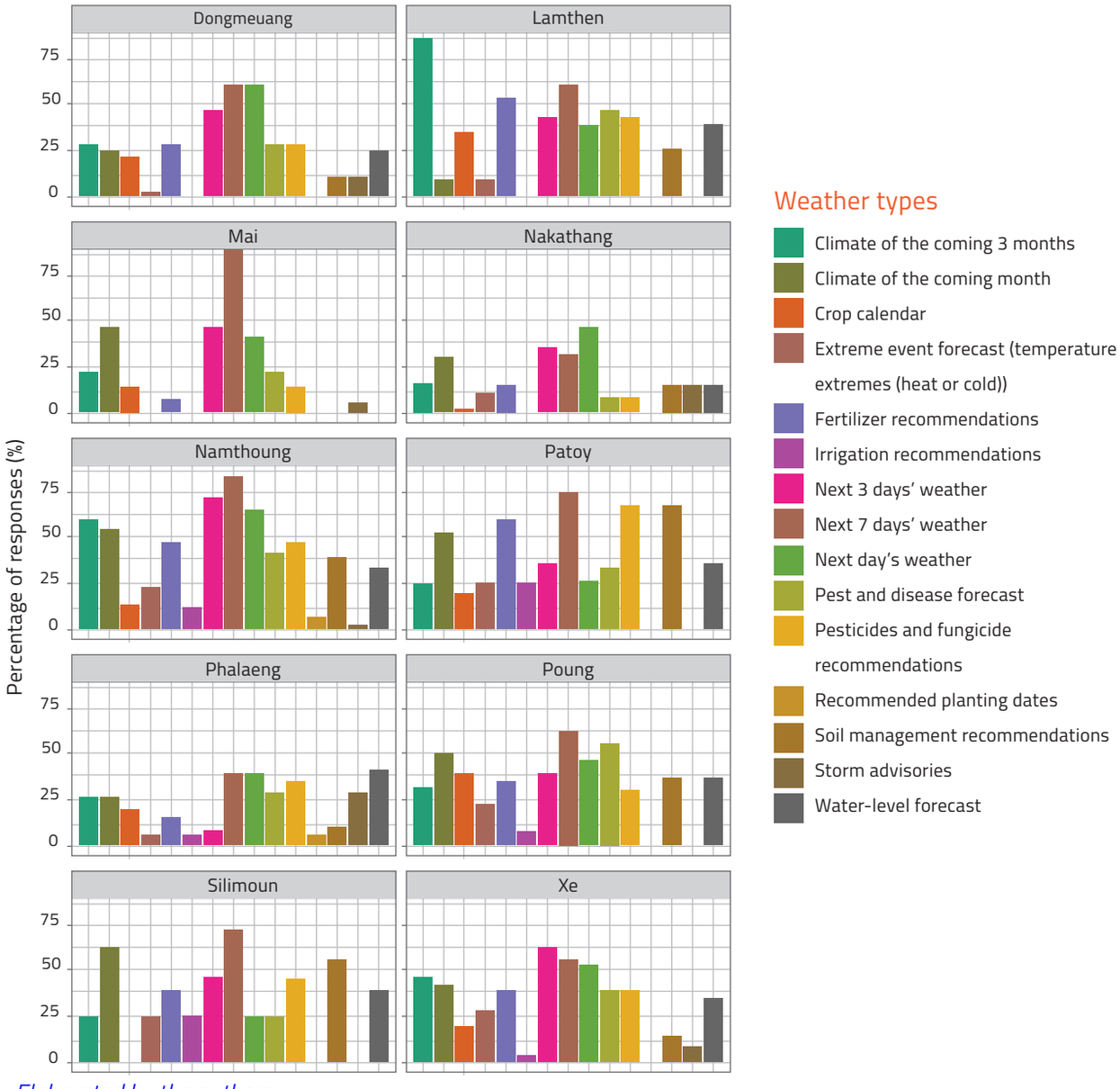
Table 23 Important weather, climate information and agriculture advisories

Which weather, climate information and agriculture advisories are important for you?	%
Next seven days' weather	59.1
Next day's weather	46.8
Next three days' weather	42.6
Climate of the coming month	38.4
Climate of the coming three months	37.6
Pesticides and fungicide recommendations	33.3
Pest and disease forecast	32.1
Fertilizer recommendations	32.1
Water level forecast	29.5
Soil management recommendations	24.5
Crop calendar	17.3
Extreme event forecast (temperature extremes: heat or cold)	15.6
Storm advisories	9.3
Irrigation recommendations	7.2
Recommended planting dates	1.7

Elaborated by the authors.

Figure 13 shows the many types of agricultural advisories that are important to the respondents, which also varied by village. The top five most important agro-climatic information sources for farming were weather, climate information and agriculture advisories – accounting for a high percentage of responses from 11 provinces including the following: climate of the coming three months, next seven days' weather, next three days' weather, climate of the coming month, and next day's weather

Figure 13 The relative importance of weather and climate information



Elaborated by the authors.

Eight of the 11 provinces cited the next seven days' weather advisories with their top three sources of weather climate information, with more than 50% of votes, as shown below:

Table 24 Importance of next seven days' weather advisory by province

Provinces	Percentage of votes for next seven days' weather (%)
Mai	93.3
Namthoung	83.7
Patoy	73.3
Silimoun	72.7
Poung	60.8
Dongmeuang	58.3
Lamthen	57.1
Xe	57.1

Elaborated by the authors.

Summary of findings:

- Social media, including television and radio, play the most important role in accessing extreme weather information for farmers from nine villages, followed by local loudspeaker. However, in Lamthen village, the rate for loudspeakers is higher.
- No SMS, call centre, or services from NGO and input providers provide people with updated warning on unusual weather events.
- Television, loudspeaker and radio still account for the dominant percentage of votes in terms of preferred sources of information.
- SMS and website recorded 0 votes from respondents.

6 Summary

The survey looked at farmer awareness of and attitudes towards climate change and access to weather and climate information. Most of the respondents were farmers with limited formal education, having mainly completed secondary education and lower. However, most can read and understand text. More than 80 percent had a personal mobile phone and phone ownership was higher among men than women. The average age of the respondents was 48 (50 for men and 45 for women). These data can be used to help design the content and delivery of weather and climate information, as well as information and education campaigns about climate change and government services for farmers.

Most of the farmers had heard of climate change and believed in the existence of climate change. Deforestation was seen as the primary cause of climate change. Drought, hotter temperature and less rain were believed to be the main effects of climate change and most respondents felt fearful of climate change.

Most of the respondents had experienced extreme/unusual events such as flooding due heavy rainfall and drought, although the rate differs among villages. Stopping cutting trees was the activity undertaken by most respondents after experiencing extreme or unusual events, followed by no action. This reflects limited adaptation options or knowledge when addressing the adverse impacts of extreme weather events. Extreme weather events have resulted in a loss of agricultural production and a loss of income. The effects also vary among villages.

Television, radio and loudspeakers are important sources of warnings, weather and climate information and are also the preferred channels in receiving information. None of the respondents chose SMS, which may be due to the cost in case of subscribing to such advisories or weak coverage in their location.

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