# How Farmers Adapt to Floods (and Why They Don't) – A Study in Thailand

*Strengthening local capacity in the economic analysis of environmental issues*

The Economy and Environment Program for Southeast Asia (EEPSEA) was established in May 1993 to support training and research in environmental and resource economics across its 10 member countries (i.e., Cambodia, China, Indonesia, Lao PDR, Malaysia, Myanmar, Papua New Guinea, the Philippines, Thailand, and Vietnam.) It aims to strengthen local capacity for the economic analysis of environmental issues so that researchers can provide sound advice to policy makers.

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**Flooding and other extreme weather events have a significant impact on farmers in Thailand, where high water levels during the rainy season have affected many farms. Despite this, only a few farmers have made any significant changes to the way in which they manage their land. In order to see why this is the case and to highlight areas for action, a new EEPSEA study has looked at the factors that influence how farmers in the Nam Phong River Basin have responded to recent flooding.**

**The study is the work of Phumsith Mahasuweerachai and Piyaluk Buddhawongsa from Khon Kaen University and Chiang Mai University, respectively. It calls into question the current government policy of providing financial compensation to farmers affected by flooding, as this support is shown to discourage farmers from taking the necessary steps to protect their crops from flood damage. The study recommends that farmers should change the variety of their first rice crop to one that is less prone to flood damage. It shows that this would be financially beneficial to the farmers involved.**

A summary of EEPSEA Research Report No. 2015-RR21: "Farmers' Adaptation to Flood Disasters: Evidence from the Mekong River Basin in Thailand," by Phumsith Mahasuweerachai and Piyaluk Buddhawongsa.
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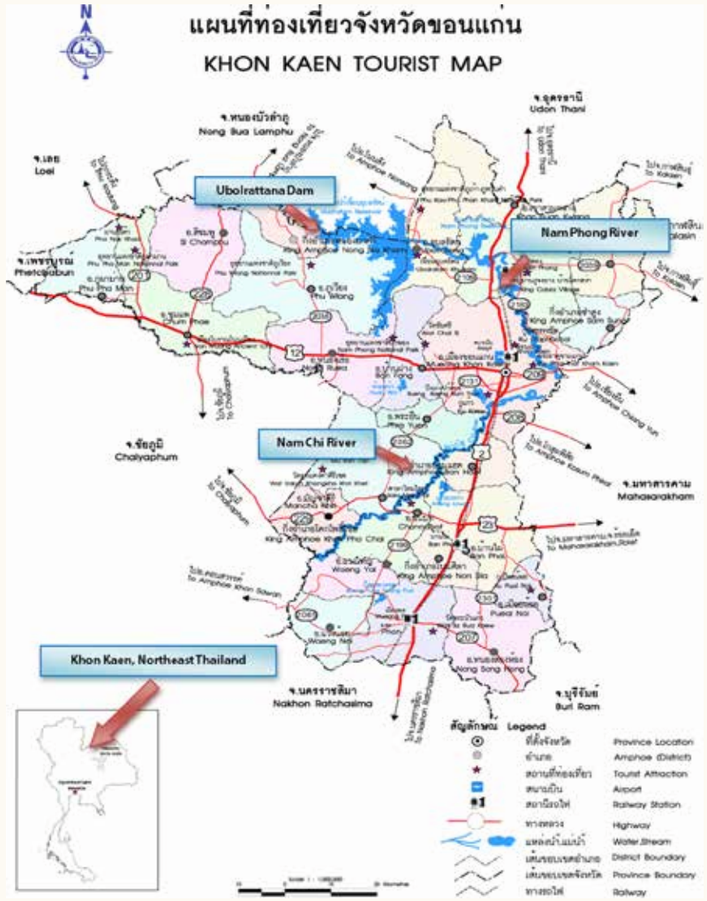


**Figure.** The study area in Thailand

## The flood challenge in Thailand

There is increasing evidence that globally, due to climate change and population growth, weather-related natural disasters will become more frequent, more intense, and more costly. Thailand has already experienced many such events in recent years, especially flooding in its river basins.

The Nam Phong River Basin, which is also part of the Mekong River Basin, is one of the areas of the country that is highly susceptible to flooding. Rivers in the region often overflow their banks during the rainy season (which occurs between June and October). For example, a very severe flood happened in 2011.

As a result, local farmers have started to think about how they can guard against flood losses by, for example, changing their cropping patterns.

However, relatively few precautions have been taken so far. This is because, historically, there has rarely been severe flooding in the area. As a result, almost no prevention, protection, or adaptation work has been done by the government or by farmers. The main significant action has been reactive: every time flooding occurs in the area, the government compensates farmers for their losses (about USD 455.45 for every hectare of rice fields that floods destroy). Farmers are able to get this compensation freely and do not have to purchase any form of insurance.

## What factors make farmers act?

To explore how farmers have adapted to flooding in the Nam Phong River Basin and to assess how they might respond in the future, the study looked at the factors that influence the decisions they make. The main factors that were considered were income from selling rice, the farmers' perceptions of risk, and government policy.

The study focused on four villages in Khon Kaen province, which is located on the northeastern region of Thailand, about 500 km from Bangkok. The study took place in 2012, a year after the catastrophic 2011 floods. At the time of the study, 660 households in the four villages have been affected by high waters.

Around 50 respondents were randomly selected from each village (these were all household heads and rice farmers). They accounted for approximately 30% of the total population of the study communities.

Due to the province's good irrigation infrastructure, farmers in the area grow rice twice a year. The first crop (which is mainly Jasmine rice) is planted from early June to mid-June and harvested around late November to early December. The second crop (mainly Pitsanolok rice) is grown from early January and harvested around mid-May (during the dry season). Flooding always occurs during the rainy season; thus, the Jasmine rice crop is most vulnerable to this challenge.

## Surveys and "choice experiments"

The farmers in the four villages were surveyed to get information about their households, including details of their socioeconomic status. They were also asked about their rice and other agricultural production, their perceptions of floods and risk, the steps they had taken to adapt to floods, their social capital, and their insurance cover. They were also asked about their knowledge of flood warning systems and their experiences of floods in the last five years.

The farmers then took part in a "choice experiment" to gauge how willing they would be to change the type of rice they farm. The choice experiment was based on the fact that, to deal with flooding, farmers have a number of options in terms of the crops they cultivate: they can grow Pitsanolok rice in place of Jasmine rice. Pitsanolok rice can be planted and harvested earlier, thus reducing the probability that it will be destroyed by flooding. They can also grow a new type of rice called "short-life rice," which has a shorter cultivation period than either Jasmine rice or Pitsanolok rice.

## The different crop options

In the choice experiment, respondents were informed about how flooding would affect their incomes depending on the variety of rice they chose (either Jasmine, Pitsanolok or short-life rice). In addition, they were presented with information on the monthly risks of flooding in their villages. Based on this data, the respondents were asked to choose which types of rice they would plant for their next first crop. The income generated from each type of rice was calculated by using the average yield for each type of rice and the prices that the different varieties had achieved between 2006 and 2010. Flood risks were calculated from the daily water levels of Nam Phong River from 1965 to 2011.

The net incomes obtained from cultivating Jasmine rice and Pitsanolok rice were found to be very similar (about USD 767.33/ha), while the net income from the short-life rice was calculated to be about USD 247.50/ha or less. However, considering the likely impact of flooding, Pitsanolok rice was found to provide the highest expected net income, followed by Jasmine rice and then short-life rice.

## How farmers have acted

The study found that the majority of farmers thought that flood patterns in their region had changed. Many also thought that the rainy season had been starting later and ending earlier.

The study found that farmers had done a number of things to cope with changes in flood patterns in the last five years. The three most common measures were (1) more irrigation, (2) changing crop varieties, and (3) building higher dikes. Only a few respondents had changed from crop to livestock, migrated to another area, found nonfarm jobs, or leased their land. This shows that, in general, the farmers preferred to continue crop cultivation even when there were flooding problems.

The sample farmers were slightly risk averse. However, when compared with other areas of their lives, farmers were willing to take more risks with respect to their agricultural production. Indeed, only 13 (6%) out of the 209 sample farmers had purchased insurance to deal with flooding problems in 2011 (the year of the extreme flood). Even though the number of respondents who purchased flood insurance doubled to 29 in 2012, most of these farmers said that they would not buy it again the following year.

There were various reasons why most of the respondents did not buy insurance: (1) they did not have enough information about insurance, (2) they did not have sufficient funds, and (3) they were not sure if they would really get paid by the insurance company if floods struck.

## The results of the choice experiment

In the choice experiment, farmers preferred rice varieties that would provide higher incomes and that would reduce the potential impact of flooding. The factors that affected their decisions on which type of rice to choose were (1) the income generated from rice, (2) the risk of flooding linked to each type of rice, and (3) farmers' perceptions on changing rainfall patterns.

Farmers who perceived that rainfall patterns were changing tended to choose Pitsanolok rice to replace Jasmine rice as their first crop. Those who opted to switch from Jasmine rice to short-life rice did

**Table 1.** Risk preferences of the sample farmers

| Risk Preference | Frequency | Percentage |
|---|---|---|
| *Risk Preference in General* | | |
| Low (less than 4): Risk averter | 78 | 37.32 |
| Medium (4–6): Risk neutral person | 63 | 30.14 |
| High (7–10): Risk taker | 68 | 32.54 |
| Average | 4.79 | |
| *Risk Preference in a Specific Area (Average)* | | |
| Financial matters | 3.98 | |
| Respondent's health | 3.67 | |
| Family's health | 3.29 | |
| Work | 4.16 | |
| Agricultural production | 4.51 | |
| House and assets | 3.68 | |

*Note*: Scale was 0 – 10: 0 = completely risk averse and 10 = fully prepared to take risks

**Table 2.** Minimum price of short-life rice that sample farmers were willing to accept for switching from Jasmine rice

| Indicator | Frequency | Percentage |
|---|---|---|
| Minimum Price (USD/kg) | 0.20 | |
| Average Price (USD/kg) | 0.41 | |
| Reasons to Switch | | |
| Less risk of being flooded | 105 | 57.38 |
| Cost effectiveness | 71 | 38.80 |
| Higher yield and disease tolerance | 7 | 3.83 |

*Note*: Only 183 responded to this question

so because short-life rice has a lower risk of being lost through flooding, is cost-effective, has a high yield, and is disease-tolerant. Farmers with a higher proportion of owned land tended to be more likely to select short-life rice to grow.

Since short-life rice is cheaper than Jasmine rice, farmers were asked to indicate the price that they would expect to receive for this rice if they switched to it. The average acceptable price was USD 0.41/kg. Overall, farmers were willing to accept, on average, THB 70 (about USD 2.25) less per rai, if the risk of flooding could be reduced by 1%.

## Flood patterns not significant

It was expected that concerns over changing flood patterns would affect the rice-choice decisions that farmers made. However, this issue was not found to be significant for either Pitsanolok rice and short life rice. This can be explained by the fact that many farmers stated that the flood in 2011 had been very unusual and that they did not expect this kind of flood to happen frequently in the future.

Despite this, it was clear that the financial help provided by the government reduced the likelihood that farmers would put any adaptation measures in place. In particular, farmers who strongly believed that the government would support them were more likely to stay with their current first rice crop (i.e., Jasmine rice), even though this type of rice is very badly affected by flooding.

Significantly, government financial help was the factor that had the biggest impact on farmers' decision about which rice variety to adopt. It would appear that, in the past, the impact and risk of flood losses have been partially absorbed by the government. This has meant that farmers have not had to change the way in which they cultivate their land.

Furthermore, help from the government has ironically weakened the crop insurance market that the government has been trying to develop. Because the government provides compensation, many farmers see no need to buy insurance to mitigate their flood risks.

## Farmers should choose Pitsanolok rice

It is clear that using Pitsanolok rice for the first cropping season would be the best choice for the farmers in the study area. However, even though this would make financial sense, it is not possible to say with certainty that the farmers will make this change. Their actual decisions will depend on other relevant factors such as their thoughts about the likelihood of future flooding and their perception of risk. It will also depend on government policy and on the financial help that is provided.

## What should the government do?

Given the results above, the government should consider new ways of mitigating the impacts of flooding on farmers, and this should be done in such a way that farmers are encouraged to find ways to adapt. It should also be made clear that the government will not step in every time there is a disaster, so as not to encourage a dependent attitude amongst farmers.

For instance, farmers can be encouraged to develop their own risk management strategies by providing them with training on diversified farming methods and by providing them with information on the possible crop choices that are available. In addition, providing farmers with crop insurance advice and information should improve their ability to manage their own risk. This may be the best option for the farmers in the study area because almost half of those who had not taken up crop insurance cited a lack of information as the main reason for their inaction.

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