



*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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Economic Losses from the 2011 Thailand Floods: A Study of Bangkok Metropolitan Region

Throughout South and Southeast Asia, tens of millions of people are facing the combined threat of high rainfall, storms and floods. All of these extreme weather events are being made worse by the growing impact of global warming. The potential effect of such extreme weather was shown in 2011 when Thailand was hit by the worst flood it had experienced in 50 years. To help provide a greater understanding of the impact of this flooding – and to give insight into what should be done to guard against flooding in the future – a new EEPSEA study has produced the first comprehensive estimate of the economic losses experienced by households that were badly affected by the 2011 Bangkok flood.

The study finds that the median household economic cost of the 2011 Bangkok floods was equivalent to about half of an average household's annual expenditure. It highlights a number of factors that exacerbated the cost of the floods and calls into question the effectiveness of the city's early warning information systems. It recommends that the flood-warning information provided to households should be carefully designed so that it allows people to make informed choices about how to act. These findings provide important information for the Government of Thailand, which is currently considering which approaches to take to protect people and property from floods and to reduce the economic losses that floods cause.



A summary of the EEPSEA study on the 'Economic Costs Incurred by Households in the 2011 Bangkok Flood' by Orapan Nabangchang, Prinyarat Leangcharoen, Rawadee Jarungrattanapong, Maura Allaire, and Dale Whittington. The full paper was published in November 2014 by the Water Resources Research (WRR). Comments should be sent to: Orapan Nabangchang, School of Economics, Sukhothai Thammatirat Open University, Nonthaburi, Thailand. E-mail: orapann@gmail.com

The 2011 flood

During the 2011 floods that hit Thailand, more than 680 people were killed and nearly 12% of the surface area of the country was flooded. The economic losses and damages caused by this flood were estimated to be THB 1.4 trillion (USD 47 billion). The 2011 flood began in northern Thailand and eventually inundated much of Bangkok. Districts in northern Bangkok and in the provinces of Nonthaburi and Pathum Thani (in the Greater Bangkok metropolitan area) were especially badly hit. In many districts, floodwater rose to between two and three meters high and remained at this height for two to three months.

The flood was caused by storms and heavy rainfall. It was exacerbated by the various environmental changes that have taken place across Thailand in recent years, such as deforestation and urbanization. These changes meant that floodwaters rose faster and dissipated more slowly than they would have otherwise done. In addition, the inundation period was longer than it would have been because many drainage canals in and around Bangkok had filled with silt and debris.

This was the first major flooding disaster to hit a population center in South and Southeast Asia in which many people had a wide range of early-warning information (from sources such as the television, radio and internet). It therefore offered a unique opportunity to see whether such early warning systems are effective at reducing the impact of floods.

Gathering data on the impact of the floods

The study reviewed both the magnitude and make up of the economic losses caused by the Bangkok flood. It specifically looked at the impact of the flood on households in three of the city's hardest hit districts: Bang



The Chao Phraya River Basin drains about 30% of the surface area of Thailand. Four main rivers merge in Thailand's Upper Central Region to form the Chao Phraya River. The river begins in North Thailand and then flows south. Greater Bangkok is located at the southern, downstream end of the Chao Phraya River Basin in the Chao Phraya River Delta near the coast. (Map source: Wikipedia 2012)

Bua Thong District (Nonthaburi), Klong Luang District (Pathum Thani) and Don Mueang District (northern Bangkok). Within each of these three districts, two middle-income neighborhoods and two low-income neighborhoods were selected for interview. In all, a sample of 469 households was chosen. These households were first interviewed in January and February of 2012, while their memories of the flood were fresh. A second round of interviews was conducted a year later to measure any additional recovery costs.

In the first round of the survey, respondents were asked about specific actions that they had taken to prepare for the flood before it arrived, as well as their anticipated financial expenses from the repair and replacement of their property after the flood waters had receded. They were asked about health-related and non-health-related costs. In the second round of interviews, the

study team was able to collect data on the actual expenses incurred for the repair and replacement of any property damaged in the flood. Households were also asked about any government compensation they received and about any extra income they were able to generate.

Household costs of the floods

The information obtained from these household surveys (and other data obtained from secondary sources) was used to estimate the economic costs that households incurred before, during and after the floods. The net economic cost borne by a household was calculated as its total costs minus any compensation it received or new income it generated. The study also used regression analysis to see if early-warning information had reduced the costs that households had borne. The study also determined whether there were



any key factors (such as income level or location) that affected the losses households incurred.

The study found that median household economic losses were about THB 95,138 (USD 3,089). These losses were equal to about six months' worth of self-reported household expenditures (and about three months' worth of self-reported household income). Total economic costs varied dramatically between households. Economic costs were higher for middle-income households than for poor households. Costs were somewhat higher for residents in Bang Bua Thong (where the floodwater was especially deep and where it rose most rapidly). Economic costs borne by poor households as a percentage of annual household expenditure (53%) were slightly larger than those borne by wealthy households (48%).

Composition of the flood costs

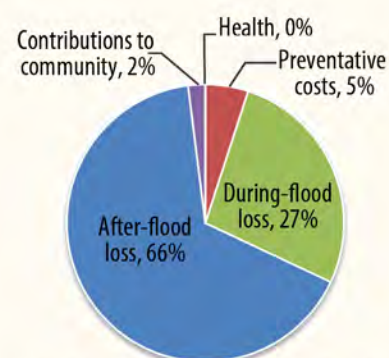
The study's analysis of the composition of the total household economic costs revealed that about 5% of total household costs were incurred before the flood, 27%

during the flood, and 66% after the flood (see figure). Preparatory costs included expenditure on materials such as sandbags and water pumps. Economic costs during the flood included expenditure on alternative shelter, materials to cope with flooding, emergency food and drinking water, and increased travel costs. Foregone income was the largest component of non-health related losses incurred by households during the flood; the mean cost of this lost income was THB 27,276 (USD 885) per household.

Economic losses after the floods included the cost of car repairs and of housing maintenance, repair and replacement. Damage to homes and belongings made up the largest component of these losses by far. Particularly high losses were incurred for the replacement of furniture and electrical appliances, and for cleaning homes. Most homes were constructed of concrete or simple wood frames and few suffered permanent structural damage.

Only 52 households (11% of the sample) had one or more members who suffered from an illness or

accident that was caused by the flood. Two flood-related deaths were reported. One was due to electrocution and the other was due to drowning. No value was assigned to these deaths. Had this been included, the estimated total household costs would have been around twice the value actually calculated. Nearly all households received disaster compensation; however, these payments did little to reduce the total economic losses of the vast majority of households. In addition, few households generated additional income during the flood (only 4% of the sample).



Mean total flood cost = THB 162,050

Composition of mean household costs, full sample

Factors that increased the flood cost

The study found that higher income households spent somewhat more on preventative costs. Apart from their self-reported income, the income status of these households was reflected by the number of cars they owned and their level of education. This indicates that they had more property to protect than other households in the survey.

It was also clear that district-level flood warnings made no significant difference to the costs that households had to bear. This is because, before the 2011 flood arrived in the Greater Bangkok metropolitan area, most households in the study areas knew it was coming. As a result, almost everyone incurred preventative costs to mitigate the expected losses. Conventional wisdom holds that flood-warning systems are one of the most cost-effective ways to reduce flood losses. However, when information is widely available, as was the case in Bangkok, this might not be so true.

Indeed, the study found that the problem for most households was not a lack of early warning information. Instead, households reported that they found it difficult to assess the quality and accuracy of the information from different sources. They also found it difficult to determine what the likely consequences of the flood would be for them. This was partially due to the content of the information they received, which was often not of much practical value. For example, instead of being informed about the volume of water coming, households would have benefited more from information about expected water depths, as this would have helped them to decide



Evacuation from a flooded market in Bangkok in November 2011.
(Photo credit: David Lobby under creative commons license at www.flickr.com)

whether to move their cars and belongings. Many deaths due to electrocution might also have been avoided simply by providing warnings that households should turn off their electricity once floodwaters reached their homes.

Households also faced severe limitations on the way they could act in response to the information they received. Several households said that they had managed to move their automobiles to higher ground, specifically onto elevated motorways. Some also managed to move their possessions to the second floors or roofs of their dwellings. Unfortunately, many people did not have sufficient time to take these precautionary measures.

What can be done to mitigate costs

These findings point to the need for the government to focus on developing alternative policies to reduce the economic costs that flooding brings and to help households to cope with these costs. For example, very few households in the study had any kind of flood insurance. The study therefore recommends that the government should facilitate

the development of a market for catastrophic flood insurance for households. More should also be done to assess the risk of future flooding and to discourage development in flood-prone areas. The study also recommends that the government should improve the usefulness of flood warnings and that it should work to make it easier for people to move their belongings out of harm's way. The findings also bring into sharper focus important policy questions, such as the comparative advantages and disadvantages between structural and non structural control strategies.

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