



*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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Helping Households to Adapt to Extreme Weather Events – Two Case Studies from the Philippines

Every year, the Philippines experiences around 20 tropical storms, making it the most storm-prone country in the world. Similar disasters are expected to become more frequent, more intense, and more damaging due to climate change and other environmental pressures. This makes it vitally important to make the Philippines more resilient to climate extremes. Such work involves strengthening a wide range of Filipino institutions, including households; however, little research has been done on how household members are affected by extreme weather events. To provide this vital information, a new EEPSEA study has looked at recent extreme typhoon and flood events in the Philippines, and assessed how these affected men and women in specific households.

The study is the work of a team led by Prof. Jaimie Kim B. Arias from the University of the Philippines Los Baños. The research finds that such extreme weather events has a very significant effect on the individuals within households, damaging their homes, possessions, incomes, health, and education. It also finds that different age groups and genders play different roles in the response to extreme weather. The study therefore recommends providing households with high-quality information, advanced warnings, and effective evacuation options. It also recommends providing households with support to help them make their homes and communities more resilient.



A summary of EEPSEA Research Report No. 2016-RR2:
"Impacts of and Adaptation to Extreme Weather Events: An Intra-household Perspective,"
by Jaimie Kim B. Arias, Jefferson A. Arapoc, and Hanny John P. Mediodia.
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Assessing the impact of extreme weather

The study looked at how households are affected by extreme weather events. The impacts the research team documented included both general impacts (that affect whole households) and specific impacts (that only affected specific members of a household). The study also looked at how households responded to such weather events and documented the adaptation measure they undertook. It identified which household members got involved in this work, and it looked at the significant factors that affected a household’s decision to act.

In addition, the study examined the roles of different gender and age groups in this response, and determined whether certain age or gender groups were more vulnerable to the impacts of extreme weather events. The effect that mangroves have on enhancing the resilience of coastal households against extreme weather was also evaluated.

Two case studies: Floods and a typhoon

As highlighted above, the study examined two case studies: one of extreme rainfall and subsequent flooding, and one of an extreme typhoon.

The first case study focused on Bacoar, Cavite. This area experienced extreme rainfall and flooding during the heavy monsoon rains in 2013. Bacoar is in Luzon near the country’s capital of Manila. It is prone to floods because of its proximity to Manila de Bay and because some of its areas are very low-lying. During the 2013 monsoon, the amount of rainfall that fell over a 24-hour period in Bacoar reached a level of 475.4 mm, which was greater than the city’s average expected rainfall for the entire month. As a

result, about 90% of the whole municipality had been inundated with water, which affected 17,000 families and displaced 2,000 households.

The second case study focused on Ajuy. Ajuy is in Visayas and is located 87 km north of Iloilo City, which is the provincial capital. Ajuy was one of the areas affected by typhoon Yolanda (international name: Haiyan). Typhoon Yolanda is one the most powerful typhoon ever recorded and the most catastrophic typhoon the Philippines has ever experienced. Yolanda was the epitome of an extreme weather event: it had a landfall wind speed of about 234 kph, and it caused widespread coastal floods and storm surges in provinces along the central Philippines as it made landfall on the 8th of November 2013.

The data used in the study was collected through a survey of 770 households. The head of each household, either male or female, was interviewed for the survey. A total of 370 households were surveyed in Ajuy, while 400 households were surveyed in Bacoar.

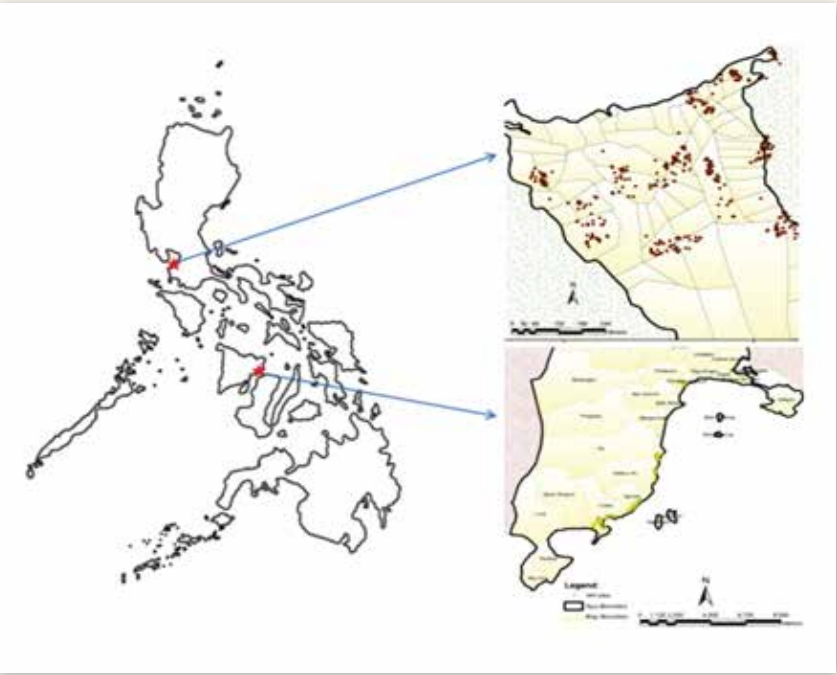


Figure 1. Map of the Philippines showing the location of the study sites
Note: The red dots represent the location of the household respondents in Bacoar, while the yellow dots represent the location of the household respondents in Ajuy.

Income in the case study areas

The majority (58%) of the respondent households in the Ajuy study site lived on a monthly income of less than PHP 5,000 (USD 114). This indicates that households in the region live below the World Bank standard of USD 1.25 per capita per month. The majority of households interviewed in Ajuy were dependent on the fishery sector, which helps explain the reason for the area’s low average income.

At the Bacoar study site, the average household income was PHP 19,773 per month, which is significantly higher than that in Ajuy. However, a substantial percentage of the households surveyed (27%) still lived in extreme poverty, earning less than PHP 5,000 per month. Being an urban area, the majority (79%) of the respondent households in Bacoar depended on employment in the commercial and services sectors (only 3% were dependent on agriculture and fisheries).

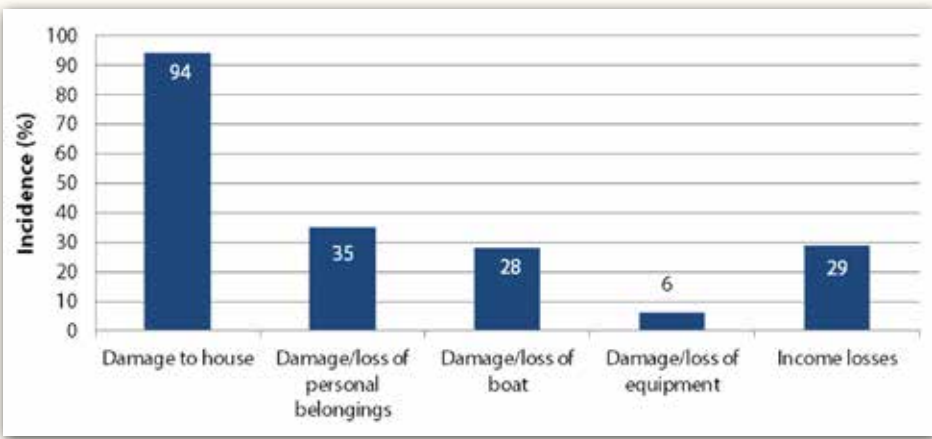


Figure 2. Incidence of property damages and income losses among respondent households during typhoon Yolanda

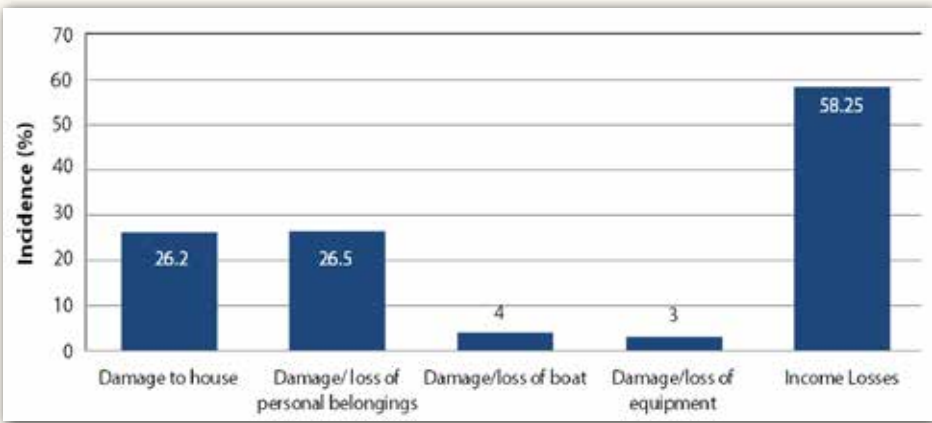


Figure 3. Incidence of property damages and income losses among respondent households during Habagat 2013

The impact of typhoon Yolanda

Households in Ajuy faced multiple hazards during typhoon Yolanda, which included strong winds, heavy rainfall, and storm surges. About one-third of the houses included in the study survey had been inundated during the typhoon, with water depths averaging about three feet. Almost every house in the survey was damaged by the typhoon. Fishing families were the hardest hit, since almost all of these households had lost their boats. At the height of the typhoon and during the evacuation, some households reported sustaining injuries—this was the most common health impact caused by the typhoon.

The welfare losses per household from typhoon Yolanda were estimated to be up to six times the household income in Ajuy (as high as PHP 40,642). There were a number of households in Ajuy that benefited from the protection offered by mangrove cover. These households experienced less damage to their properties than those that did not have this protection (as much as PHP 7,641 less damage).

Typhoon Yolanda caused the prolonged suspension of school classes in Ajuy. This was because some schools were damaged by the storm and because some schools were used as evacuation centers. The average number of school days missed by students in Ajuy was 30.

This may be disconcerting as this level of disruption could have had a significant impact on the pupils’ education.

The impact of flooding in Bacoar

In Bacoar, households were affected by heavy rainfall that caused massive flooding across the city. This flooding was more extreme than expected, both in terms of its water depth and coverage.

The study survey found that 71% of the sampled households reported experiencing flood water getting inside their homes, with floodwater depths averaging about two feet. The average flood height along Bacoar’s roads was observed to be even higher at about 3 feet. This means that the roads were not passable by car. Access both in and out of the city was therefore blocked.

The study found that the rainfall and flooding in Bacoar resulted in damage to each household worth the equivalent of about a third of the city’s average household income (worth up to PHP 6,477). These welfare losses were due to various impacts such as damage to property and assets, lost income, illnesses, and injuries.

How households prepared for extreme weather

Many households in Ajuy and Bacoar undertook a wide range of measures to protect themselves from extreme weather and to make their homes more resilient. Men and women were found to do different types of adaptation work: men undertook activities that required physical strength, such as reinforcing the walls and roofs of their homes, while women did more ‘domestic’ tasks such as storing water and food.

Households that had completed disaster risk reduction and management (DRRM) training were more likely to prepare their homes in advance of extreme weather events, as were households that had engaged in community adaptation activities, and those that had received information and warnings from local government.

Many households (e.g., 69% in Ajuy) had to evacuate their homes in the face of typhoon Yolanda and the flooding in Bacoar. However, only a small percentage of those who needed to evacuate did so in a pre-emptive manner (i.e., prior to the extreme weather hitting). People were reluctant to evacuate because they did not want to leave their belongings unguarded for fear of being robbed. They also felt that evacuation centers were inadequate and uncomfortable.

Not all households received information or warning prior to the typhoon in Ajuy and the flooding in Bacoar; many did not undertake any preparations or actions prior to the typhoon and flooding. Indeed, some of those households that had received warnings did not act. The main reason for inaction was due to households underestimating the strength and severity of the upcoming extreme weather event.

Warnings and information need to be improved

When people in Ajuy were asked what kind of assistance they would like to receive during such events, the top three preferences were (1) information and early warning, (2) financial assistance, and (3) the provision of evacuation

centers. In Bacoar, flood mitigation strategies (e.g., the construction of floodways and improved drainage systems) were the most popular options. People also asked for the regular clean-up of rivers and waterways.

Given the fact that extreme weather warning are not reaching all households, the study recommends for the local government to find creative ways of ensuring that warnings are disseminated to each and every household in their jurisdiction. For instance, in rural Ajuy, warnings could be posted in conspicuous places such as marketplaces or schools. In the urban Bacoar, the local government could take advantage of social media sites and the internet to disseminate information. In addition, the local government should still provide early warning services.

Based on the results of the study, the respondent households reported that they had underestimated the threat of the two weather events. Thus, the quality of information being provided is important. For instance, aside from stating the intensity of an approaching typhoon, the information provided to the public should state the likely impacts of the weather event. It should also recommend adaptation actions that should be taken.

Households need help to adapt to extreme weather

To further encourage people to make necessary adaptations, households (especially those along vulnerable coastal areas) should be

required to attend DRRM training or seminar. The government should also provide support for community-wide action. To help households cope financially during extreme events, it is recommended that they should be encouraged to set aside an emergency fund.

In addition, local government agencies should ensure that evacuation centers are comfortable such that people will be encouraged to take evacuate their homes when the situation becomes too risky. If possible, they should also deploy security personnel to deter looting. If the situation calls for it, local government agencies should also enforce mandatory evacuation procedures or even permanently relocate households that are in danger.

All vulnerable public infrastructures, including schools, should also be climate-proofed. In addition, coastal communities should be encouraged and helped to protect and rehabilitate mangrove forests.

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