



*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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Does Climate Change Drive Migration? A Study from the Philippines

As is in many developing countries, climate change poses a serious threat to agriculture in the Philippines. This has a knock-on effect on people's livelihoods and is causing some people to leave the land and move in search of jobs. To contribute to the understanding of the impact of climate change in the Philippines, a new EEPSEA study assessed its impact on rice productivity and domestic and overseas migration. The study is the work of Flordeliza H. Bordey, Cheryll C. Launio, and Eduardo Jimmy P. Quilang from the Philippine Rice Research Institute, Charis Mae A. Tolentino from the University of the Philippines Los Baños, and Nimfa B. Ogena from the University of the Philippines Population Institute.

The study shows that climate change reduces rice yields and farm revenues and, as a result, significantly increases the number of people emigrating overseas. It shows that this is having a greater impact on women than men.



A summary of EEPSEA Research Report No. 2013-RR10: 'Linking Climate Change, Rice Yield and Migration: The Philippine Experience', by Flordeliza H. Bordey, Cheryll C. Launio, Eduardo Jimmy P. Quilang, Charis Mae A. Tolentino, and Nimfa B. Ogena. Comments should be addressed to Flordeliza Bordey, Philippine Rice Research Institute, Maligaya, Science City of Muñoz, 3119 Nueva Ecija, Philippines. Tel: 63 44 456 0258 loc. 226. Fax: 63 44 456 0394 loc. 514. Email: fhbordey@email.philrice.gov.ph

In contrast, it also shows that the impact of climate change on rice yields may be acting as a constraint on domestic migration. The study highlights that migration abroad may provide valuable funds to help farmers adapt to climate change and it recommends that farmers be given advice on the steps they can take to do this. It also recommends that more must be done to counter the negative social impacts of outward migration.

The climate change challenge

Climate change is now globally recognized as one of the most pressing environmental issues of the 21st century. The Philippines is at particular risk from this threat. In the last 15 years, weather patterns in the country have changed and many of its regions have been seriously affected by extreme weather hazards such as tropical cyclones, floods, landslides, and droughts.

Climate change has a direct impact on agriculture and on the livelihood of farmers. In the Philippines, rice is a particularly important crop; it contributes some 28% of the gross value of Philippine agriculture. The impact of climate change on the country's rice crop and on rice farmers is therefore of particular interest to policy makers.

As such, the researchers set out to provide much-needed information on this issue. They focused on the impact that changes in climate and rice yields have on migration. This focus was taken because migration is an important livelihood strategy for Filipinos. As of 2009, there were 1.91 million Overseas Filipino Workers

(OFWs) whose remittances totaled USD17.45 billion. Domestic migration is also significant in the Philippines. The 2009 Family Income and Expenditure Survey indicated that remittances from domestic migrants constituted 3% of total family income.

Looking at the link: climate change and migration

Overall, the study assessed the extent of international and domestic migration that had been induced by changes in rice productivity due to weather changes since 1995. To do this, the researchers first looked at the changes that had taken place in the weather from 1995 to 2009 and assessed how these had affected rice productivity over the same period. Then they assessed how changes in rice productivity had affected domestic and overseas migration.

The researchers took into account a wide range of variables in their assessments and addressed the fact that rice productivity does not just

affect migration but that migration can also affect rice productivity (e.g., out-migration of skilled farmers can lower rice productivity).

Data on the number of OFWs per region was obtained from the Survey of Overseas Filipinos (SOF), which was conducted by the National Statistics Office. This survey collects data on the number of OFWs who were abroad in the last five-year reference period. Information on domestic migration was gathered from the 2000 Census of Population and Housing.

Data on regional rice production (including area harvested and yields) were obtained from the Palay (paddy rice) and Corn Production Survey of the Bureau of Agricultural Statistics. Weather information was acquired from the Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA). Weather data included daily minimum temperatures and rainfall levels.

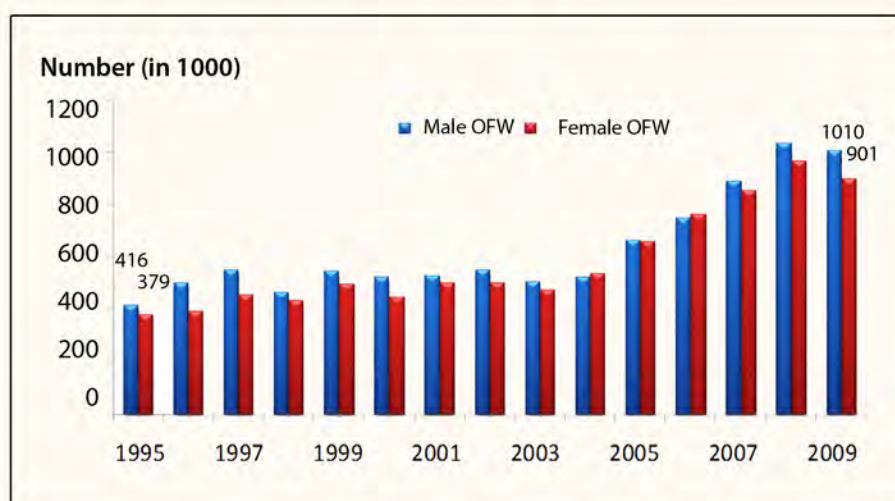


Figure 1. Number of OFWs by sex (1995-2009)
Source of basic data: National Statistics Office

Photo credit: Flordeliza Bordey



Climate affects rice yield and migration levels

As expected, rises in minimum temperatures during the dry season have had a negative effect on the average rice yield. In particular, a one degree increase in the summer minimum temperature decreased yields by 64 kg/ha. The higher night time temperature caused elevated rice respiration rate, which resulted in reduced tillers, lower plant height and biomass, greater number of unfilled grains, and lower yield. Similarly, rice yields diminished by 36 kg/ha for every one percent increase in the prevalence of wet days. The lower level of solar radiation that crops receive on wet days explains this. The average gross income per hectare was also negatively affected by an increase in wet days. On average, a one percent increase in the occurrence of wet days decreased farm income by Php356.00/ha.

The study found that changes in rice yield and gross revenue per hectare significantly affected overseas migration. In particular, the total number of OFWs increased by five persons per thousand of the population for every one metric tonne decrease in average yields. Similarly, the number of OFWs rose by one person per thousand of the population for every Php1,000 decline in the average gross revenue per hectare. The overseas migration of women was more significantly affected than that of men.

The study found that the number of domestic (inter-regional) migrants decreased by less than one person per thousand population for every Php1,000 decrease in average gross

income per hectare. Thus, contrary to the observed effects for overseas migration, the study suggests that a decline in rice productivity could actually reduce domestic migration. (Although it cautions that this result should be further verified when panel data on inter-regional migration rates becomes available.)

Fifteen years in focus

The linkages between weather, rice yields and migration is shown by what happened from 1995 to 2009. During this period, the five-year average dry season minimum temperature increased by 0.93°C leading to a 60 kg/ha decline in the five-year rice yield average. Similarly, the share of wet days in a year rose by 3.8 percentage points and caused a 136 kg/ha decrease in yield. This meant that the

country lost about 742,000 mt of rice or Php5.14 billion from 1995 to 2009 due to weather changes. As a result, about 99,000 to 102,000 individuals migrated overseas, among whom 57% were female. In comparison, about 19,000 individuals were not able to migrate inter-regionally due to Php1,352 reduction in gross revenue per hectare.

Explaining the different trends in domestic and foreign migration

Overall, the study shows that more migrants from the Philippines are heading abroad. This is due to the higher wages they can get. For example, a household helper working abroad can receive as much as Php20,000 per month whereas, for similar work in Metro Manila, he or

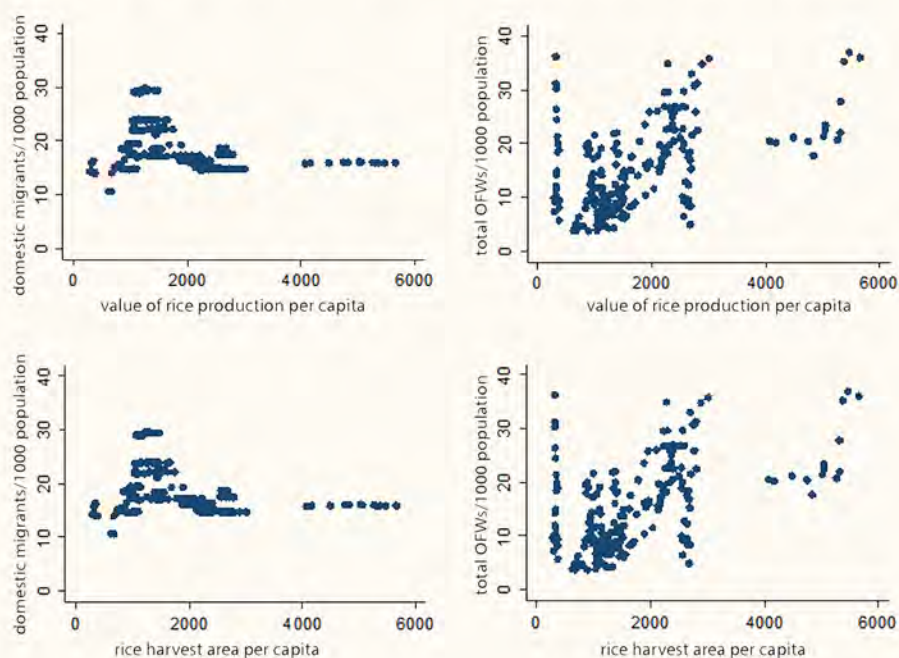


Figure 2. Domestic migrants and OFWs per 1000 population versus per capita rice harvest area





or she can only earn a minimum wage of about Php2,500 monthly.

A likely explanation for the impact of rice yields on domestic migration is that domestic migrants are more likely to come from poorer households who cannot afford the money to send family members abroad. As a decline in rice yield or gross revenue will have a greater impact on poorer households it will therefore have a greater constraining impact on those who would be sending people to work locally.

For households that have access to the necessary resources, overseas migration can be used as a strategy to diversify income and adapt to the negative effects of climate change on rice yield and revenues. Thus, with the climate expected to become warmer and wetter in the succeeding decades, it is expected that the rate of migration of overseas workers will increase.

Policies that can help farmers cope with climate change

One potentially positive outcome of the increase in overseas migrants is that higher levels of remittances are expected to flow back to rural areas. This could potentially revolutionize the agricultural financing system in rural areas. Specifically, the increase in liquidity could provide the capital needed to adopt new technologies, counter the negative effects of climate change, and improve rice productivity in the long-run.

Thus, it is important to keep information on the latest rice technologies flowing into rural areas. It is also important to channel this information to those OFWs who might act as financiers. The use of information and communication technologies such as the Internet and short messaging service (SMS) can help in this aspect. Opportunely, the Philippines has already established electronic learning modules for rice production and has put up an SMS center intended for rice farmers.

Mitigating the negative impact of overseas migration

Unfortunately, overseas migration has a huge social cost despite its economic benefits. For instance, overseas migration can negatively affect the growth and well-being of children, especially when mothers have to work overseas. To address this, the government can improve its social services and provide better early childhood care and education especially in rural areas. With migration becoming the norm rather than the exception, increasing the number of day-care centers in rural areas, as well as improving the curricula of early childhood and basic education, could help ease the social burden of migration.

In light of the study's findings that a weather-related decline in rice productivity can reduce the number of domestic migrants, it is important that policy makers recognize that poor families will be worse off; since

they are more income vulnerable and food insecure, they will have fewer opportunities to diversify their income. These households should therefore be targeted for training on crop diversification, as this will lessen their vulnerability to productivity losses due to climate change.

Finally, it is clear that research and development (R&D) can provide technology options that can offset the negative effects of climate change on rice yield and income. Thus, it will be important to intensify rice R&D to help mitigate the impacts of climate change on migration.

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