

RICE FARMERS RESPONSE TO CLIMATE CHANGE IN THE PHILIPPINES

T. H. Wilmoth, J. Popp, N. R. Burgos, and S. Bulayog

INTRODUCTION

Rice is not only a staple food item, but a bartering tool and a source of income for numerous citizens in the Republic of the Philippines. Because rice is an extremely water-dependent crop, it is highly susceptible to climate variability. The Leyte province is considered to be a type IV climate with "...evenly distributed rainfall throughout the year" (Koide et al, 2013). Although rain is evenly distributed year around, it is unpredictable and causes difficulty discerning between the wet and dry seasons and hinders rice farming.

In all, Filipino farmers were able to produce over 18.4 million metric tons of rice in 2013 (PSA, 2013). However, this supply is not sufficient to meet the country's demand. Due to the small amount of available farm land, high population growth rate, and lack of infrastructure the Philippines continues to be one of the world's top importers of rice.

Focusing on the Leyte province in the Visayas region (Figure 1), this study examines the beliefs of rice farmers regarding the effects of climate change on rice production. Understanding farmers' beliefs of climate change can help create educational programs through government and educational institutions to assist farmers in adapting to the climate change issues affecting rice production.

OBJECTIVES

This study: (1) examines Filipino farmers' awareness of, and beliefs regarding, climate change and its effects on rice production, and (2) examines possible factors that influence their beliefs regarding climate change.

METHODOLOGY

One hundred face-to-face surveys were conducted. Survey questions focused on: (1) 2011-2013 rice yields, (2) perceptions of climate change and its effects on production, and (3) farmer demographics. Likert Scale data regarding farmers' beliefs about climate change and its impact on production were collected. These data were used to build a theoretical general linear model (GLM) of factors that influence farmers' beliefs of climate change:

$$Y_i^0 = \alpha + \beta_1 AGE_i + \beta_2 GEN_i + \beta_3 VIL_i + \beta_4 ITR_i + \beta_5 YLD_i + \beta_6 EDU_i + \varepsilon_i$$

Where:

AGE = Age

GEN = Gender

ITR = Information from Television/Radio

YLD = Total kilograms/hectare Harvested in 2013

EDU = High School Graduate or Not a High School Graduate

VIL = Home Village (Five possible villages; Santa Cruz is the base)

Education, female gender, and getting climate change information from TV/radio were hypothesized to increase beliefs in climate change impacts.

RESULTS

Climate Change Knowledge and Response

Of the 100 farmers surveyed:

- 84% indicated having adequate or full knowledge about climate change and its impacts. The remaining 16% indicated little knowledge about climate change and its impacts.
- 95% believed climate change has negatively impacted rice farming.
- Only 25% changed any production practices to adjust for climate change. Most common changes were to adjust planting and/or harvesting dates either earlier or later than in previous years.

Factors that Influence Beliefs about Climate Change

75 observations were included in the model (Table 1).

Table 1: Model Results

| Parameter | Estimate | Standard Error | t Value | Pr > t |
|---------------------------|----------|----------------|---------|----------|
| Intercept | 21.3198 | 2.4796 | 8.60 | < 0.0001 |
| AGE | - 0.0289 | 0.0330 | - 0.88 | 0.3846 |
| GEN: Female | 1.2706 | 0.8145 | 1.56 | 0.1236 |
| VIL: Caridad | - 3.6298 | 1.0802 | - 3.36 | 0.0013 |
| VIL: Hilapnitan | - 2.2366 | 1.1466 | - 1.95 | 0.0554 |
| VIL: Kilim | - 5.2197 | 1.2441 | - 4.20 | < 0.0001 |
| VIL: Macos | - 4.1043 | 1.1490 | - 3.57 | 0.0007 |
| ITR | 2.7978 | 1.1056 | 2.53 | 0.0138 |
| YLD | - 0.0003 | 0.0002 | - 1.67 | 0.0989 |
| EDU: High School Graduate | - 1.8741 | 0.8238 | - 2.27 | 0.0262 |

Table 2: Climate Change Impact

| Impact | Response (%) |
|--------|--------------|
| Low | 6.67 |
| Medium | 88.00 |
| High | 5.33 |

Figure 1: Map of the Philippines



A. Farmer preparing rice paddy with plow and carabao.

B. Farmers transplanting rice.

DISCUSSION

Climate Change Knowledge and Response

Most farmers (88%) believe that climate change has a medium impact on rice production. Farmers noted that wet seasons are becoming wetter while dry seasons are becoming drier and water has become either more or less available, depending upon the production season examined. The impact on production is not viewed by most as extreme.

Factors that Influence Beliefs about Climate Change

The belief index is a measurement of a respondent's level of awareness of the effects of climate change on rice farming operations. A high belief index value indicates that the respondent believes the impacts of climate change on production are greater. While a lower belief index value indicates that a respondent believes the impacts of climate change on production are smaller.

The final model is comprised of nine independent variables for the 2013 production year. The R² is 0.3428. Three variables (village, information source, and education) are significant in the model. As expected, receiving information from television/radio is positively related to believing that climate change greatly impacted rice production. Respondents from Santa Cruz are most likely to believe climate change produces large impacts on production. Of the five villages, Santa Cruz is the closest to the ocean where farmers generally have larger paddies, and practice monoculture rice production. Therefore, they may be more aware of production changes for rice than producers who manage multiple crops. The independent variables age, gender, and yield were not significant.

This study suggests that farmers think they are knowledgeable about climate change and its impacts on production. However, very few are adapting their production practices to counter any negative impacts of climate change. The model shows that farmers' beliefs are related to education, source of information, and home village. This information will be useful to government and university personnel in the Visayas region who are interested in developing educational programs for producers to adopt best management practices.

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LITERATURE CITED

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