

IMPACTS OF CLIMATE CHANGE AND LOCAL ADAPTATION STRATEGIES OF VARIOUS SOCIOECONOMIC GROUPS IN ISABELA, NORTHERN PHILIPPINES

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INTRODUCTION

Climate change is one of the biggest environmental, social and economic threats that the world is currently experiencing. Climate variability and change is presently a threat to development. Projections on climate change show that the global temperature is continuously increasing. Based on the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, 2001), the world average temperature will increase by 1.4°C to 5.8°C between 1990 and 2100 if the current levels of emission are not reduced. This is mainly due to anthropogenic sources such as the use of fossil fuels especially in the developed countries.

The extreme climate variability experienced in Isabela province, Cagayan Valley region, Philippines include strong typhoons such as Typhoons Imbudo in July 2003, Typhoon Yoyong in 2004, Super typhoons Paeng and Reming, both in 2006, Typhoons Frank and Helen in June and July 2008, respectively. Recently, severe landslides in Karanglan, Nueva Ecija in August and September 2009 separated Cagayan Valley from Metro Manila. This was triggered by continuous heavy rains. As of October 2009, there were 19 typhoons that hit the country. On September 26, 2009, the cities of Marikina and Pasig in Metro Manila and the town of Cainta in the province of Rizal were extremely flooded due to Typhoon Ondoy (Ketsana). This is the worst flood that occurred since 1967. Typhoon Ondoy affected Isabela. On October 3, 2009, super typhoon Pepeng (Parma) hit the provinces of Cagayan and Isabela. Damaging typhoons frequently hit the province of Isabela and floods are common in some parts of the northern part of the province including the town of Cabagan. Due to the poor infrastructure and location, Cabagan is particularly vulnerable to climate change. In November 2008 and 2009, some *barangays* (villages) in the town of Cabagan, Isabela were flooded.

This study assesses the impacts of climate change to local communities in the municipality of Cabagan in Isabela province, Philippines. It also determines some local adaptation strategies to climate change by various socioeconomic groups which includes farmers, employees from both government and private agencies, and entrepreneurs.

METHODOLOGY

The data in this study were obtained in Cabagan, Isabela in Northern Philippines using purposive sampling. There were 28 respondents who come from various socioeconomic groups – farmers, government and private employees, and entrepreneurs. In this survey, there were ten (10) farmer respondents interviewed – four rice farmers, three corn farmers, and three farmers that produce various kinds of vegetables. In addition, there were ten (10) employees interviewed – seven government and three private employees. There were eight (8) entrepreneur respondents interviewed. Most of these entrepreneurs were owners of school canteens, *sari-sari* stores (small scale stores/microenterprise), and general merchandize.

RESULTS AND DISCUSSION

Impacts of Climate Change

Some of the impacts of climate change that are currently experienced in the municipality are water shortages, decreases in crop yield (agricultural productivity) and food availability (security), livelihood, and poor health.

Data obtained from PAG-ASA, Region 2, indicated that the three highest mean monthly rainfall (in mm) noted were in October 1996, October 1998 and August 2005. The rainy or wet season in Isabela is from May to October. The highest mean annual rainfall was registered in 2005 followed by years 1996 and 1999 and the highest mean annual temperature was registered in 1998, and in 2005 and 2006.

Data obtained from the Bureau of Agricultural Statistics, Region 2, show that the highest yield of 4.0 million tons of corn per hectare was obtained in 2003, 2004 and 2007. The corn yield in 2005 is low which confirms that one of the impacts of climate change is decrease in yield or low agricultural productivity. Low agricultural productivity will consequently affect food security and the health of the people.

Adaptation Strategies of the Respondents from various Socio-economic Groups

Droughts and floods are a part of the Filipinos' lives. Typhoons are hitting the country more frequently. In the Philippines, the sector most affected by climate change, so far, is agriculture and food security (Amadore, 2005).

Farmer Respondents

In this survey, there were ten (10) farmer respondents interviewed. Table 2 shows the local adaptation strategies of the farmer respondents.

Table 1. Local adaptation strategies of the farmer respondents.

Local Adaptation Strategies	Farmers (n=10)
Planting mungbean and other crops in between cropping	3
Use of organic fertilizer.	4
No fertilizer inputs	2
Not following the recommended amount of fertilizer	1
Adjusting the plant calendar	3
Optimizing rice productivity and optimum use of fertilizers and other inputs.	3
Planting drought-resistant varieties of corn.	1
Planting when there is still soil moisture.	1
<i>Bayanihan</i> among families.	4

n = number of respondents

Three farmers said that planting other crops such as mungbean in between cropping is the strategy that they employ. The farmer respondents said that they practice this strategy to increase soil quality. Four of the ten farmer respondents mentioned the use of organic fertilizer as a strategy. These farmers said that organic fertilizers are cheaper than inorganic, hence, more affordable. Two farmer respondents said that they have no fertilizer inputs in order to lessen the amount of money at risk. Some of the poor farmers interviewed said that they do not want to take risks and therefore, will not use fertilizer at all. Another farmer never follows the recommended amount of fertilizer. Three farmers mentioned that adjusting the plant calendar is a good option. As an example, one corn farmer said he usually plants the first cropping in May and the second in December. The usual planting is in October, however, in recent years, typhoons hit the province in October and November. In October 2009, two typhoons hit the province. Three farmer respondents mentioned the following: Optimizing rice productivity and optimum use of fertilizers and other inputs. One corn farmer said he plants drought-resistant varieties of corn. Another farmer plants when there is still soil moisture. Four mentioned *bayanihan* among families. This is a Filipino tradition which shows the cooperative effort among family members during planting and harvesting seasons. Family members volunteer to help in planting and harvesting.

Employees from Government and Private Agencies

There were ten (10) employees interviewed in this study. The adaptation strategies of the employee respondents are summarized in the table below.

Table 2. The adaptation strategies of the employee respondents

Local Adaptation Strategies	Employees (n=10)
Water harvesting/rainwater collection	10
Buying enough provisions for the coming months	9
Planting vegetables in their backyards	8
Planting fruit trees in their backyards	8
Selling seedlings	1
Loans	7
Selling recyclable materials to junk shop owners	2
Reusing old materials	7
Use of public transportation	10

All of the employee respondents practice water harvesting/rainwater collection. When it rains, the respondents said that they put their pails outside in order to harvest rain water. This can be used later for watering plants, for cleaning bathrooms, cars, kettles, etc. Nine respondents buy enough provisions. Eight, out of 10 respondents, plant vegetables and fruit trees in their backyards. Interestingly, there is one respondent that sells seedlings. Seven respondents said that they loan from lending institutions such as the Government Service Insurance System (GSIS), *Pag-ibig*, and Social Security System (SSS). Two respondents sell their recyclable materials to junk shop owners while seven reuse old materials. All of the respondents use public transportation in order to lessen their expenses.

Entrepreneurs

In this study there were eight (8) entrepreneur respondents interviewed. Most of these entrepreneurs were owners of canteens, *sari-sari* stores (small scale stores/microenterprise), and general merchandize.

Table 3. The adaptation strategies of the entrepreneur respondents

Local Adaptation Strategies	Entrepreneurs (n = 8)
Water harvesting/rainwater collection	8
Fuel wood gathering	7
Short-term loans from cooperatives, banks, etc.	1
Short-term loans to clients in the form of goods	8
Buying locally grown produce	6
Use of public transportation	8

The Challenge

Climate change is one of the biggest challenges the world is facing at the moment. Adaptive capacity of human systems is low and vulnerability is high in the developing countries of Asia including the Philippines. The country must act and respond now to the threats posed by climate change.

There is an urgent need for an effective and sustained program to enhance the level of climate change awareness among policy/decision makers, the various stakeholders, the media, students and the academe, and the general public, for their own empowerment (Amadore, 2005). The Philippines has to intervene to minimize these risks and to prepare adaptive measures that would anticipate social and economic consequences which cannot be mitigated.

Climate change affects all sectors. Hence, various agencies have climate change mitigation and adaptation programs. The challenge is for the Philippines government to consolidate these efforts and move in one direction so that the country will have a coherent and integrated policy and action framework to mitigate, and adapt to, climate change.

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