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CLIMATE CHANGE ADAPTATION

A Systems Approach to Reducing Risks in Rice Production in Southeast Asia

By Felino P. Lansigan, Gernot Laganda, Reiner Wassman, and Anan Polthanee

Climate change is a global problem that affects all areas of human life. Both natural processes, like volcanic eruptions, and anthropogenic activities, such as population increase and industrialization, cause climate change. Furthermore, climate change has impacts on agriculture, forestry, public health, and other systems, and these effects vary across different places in the world.

Adaptation and mitigation measures are necessary to reduce the risks brought about by climate change. While adaptation considers future risks and seeks to prepare the society and the other systems to the impacts of climate change, mitigation aims to keep climate change below the dangerous level.

Systems approach

To respond to the far-reaching causes and effects of climate change, an integrated approach involving both mitigation and adaptation strategies is needed.

Since the effects experienced are location-specific, appropriateness for the locale where the strategies would be implemented should also be considered. Furthermore, different stakeholders, such as the scientific research community, international agencies, national governments, non-government organizations, local government units, and donor agencies, should be included in the formation and implementation of these strategies. The following are cases of how Southeast Asia adapts to climate change in their production of rice.

Climate change and Southeast Asia rice production

Asia largely depends on rice as its staple food. This could be observed in the trends showing that as the population in the continent increases, rice production also rises. It follows that a greater demand for rice results to its higher price.

Climate and environmental factors such as temperature increase, changes in rainfall


Binmaley, Pangasinan, Philippines | Photo by Manuel Rosario

patterns and distribution, weather hazards, and sea level rise affect rice production. Thus, there is a need to conduct more researches on how rice could be produced more efficiently.

Institution-level strategies

Rice plants are highly sensitive to heat stress. Since heat induces sterility in the plants during their flowering stage, rice production usually decreases with increasing temperature. Farmers adjust to the climate by planting during periods of lower temperatures. Further research on varieties that can withstand the heat may help solve the problem.

The International Rice Research Institute (IRRI), located in Los Baños, Laguna, Philippines, is currently working with different countries to produce varieties that can withstand drought. In one of their studies, the periods when rice plants flowered were recorded to help identify which varieties are tolerant to heat stress.

Recently, IRRI has developed a rice variety that can thrive even when submerged under water for 17 days.

These projects prove that stress-tolerant rice varieties can be developed as an alternative to currently grown varieties that are intolerant to new climatic stress. By transferring donor genes

for tolerance into high-yielding varieties usually used by farmers, the institute has come up with an effective strategy to develop varieties for unfavorable rainfed areas.

Aside from developing "climate-ready" rice varieties, IRRI is also working on reducing greenhouse gas (GHG) emissions. Agriculture and land use contributes to one-third of the total GHG emissions. Field experiments were conducted in connection with this. Water saving techniques were implemented in an effort to reduce methane emissions.

The strategies being employed by IRRI are only some institution-level practices that can be done in response to climate change.

Farm-level strategies

Farm-level measures can also contribute to efforts in responding to climate change. The following are some of the coping strategies employed by farmers in Thailand in response to the physical, biological, and marketing risks in rainfed rice production.

Physical risks

Physical risks mainly consist of those concerning rainfall (drought and flood) and soil (low fertility and salinity). In response to these risks, Thai farmers keep drought-resistant rice varieties and flood-resistant varieties. They also choose the appropriate combination of genetic resources, because cultivars chosen should also have growth durations that fit the landform for planting.

The farmers also look at the appropriate planting method that fits rainfall distribution in their locale. Usually,

Bac Ninh, Vietnam | Photo by Anh Tuan

during low intensity of early rainfall, the farmers use the direct-seeded rice method. On the other hand, during high intensity early rainfall distribution, they would have to transplant. When soil problems come up, the farmers then adjust by either applying manure or some other substance to the field, or using resistant rice varieties.

Biological risks

The second type of risk the farmers encounter is biological risk. This type of risk includes weeds, golden snail pest, and different plant diseases.Weeds can cause yield losses in direct-seeded rice. To address this problem, farmers in Northeast Thailand came up with a promising weed control method through rice cutting (cutting rice and weeds at a height of around 5cm above the ground).

In irrigated areas, golden snails also cause great yield losses. To combat the pests, farmers apply the fruit of golden shower (*Cassis fistula* Linn.) to their paddy fields.

Leaf blast, a major disease in Thailand, usually strikes the high quality rice variety susceptible to the disease. Thailand's Department of Rice has then developed a new cultivar resistant to the blast disease.

Marketing risks

Marketing risks, such as low prices of rice at the beginning of the season, were temporarily solved through government interventions like the rice pledging scheme.

The other coping strategies are to replace rice with other economic crops such as cassava and sugarcane, diversify in rice areas through multiple cropping and integrated farming, and replace rice with animal feed, like Ruzi grass. Keeping of drought-resistant animals and livestock, although they usually have lower production potentials than other species, is found to be the best survival strategy for drought resistant areas.

Coping with the Challenges

Climate change offers a myriad of problems, and communities should learn how to live with it, adapt, and respond to it. Different places may offer solutions that can differ from one another. What should be remembered is that location-specific climate risk management strategies should be assessed, considering their effectiveness and efficiency. What may be the appropriate measure in one place, or in one level, may not be the solution for another.

Preliminary draft prepared by Amy Christine S. Cruz
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"Systems Approach to Risk Analysis and Measures of Risk" by Dr. Felino P. Lansigan
"Managing Risks due to Climate Variability" by Dr. Felino P. Lansigan
"Climate Change Adaptation: Framework for Risk Reduction in a Changing Environment" by Mr. Gernot Laganda
"Managing Climate Risks in SEA Rice Production" by Dr. Felino P. Lansigan (for Dr. Reiner Wassmann) and Dr. Anan Polthanee

Southeast Asian Regional Center for Graduate Study and Research in Agriculture (SEARCA)
SEARCA, College, Los Baños
Laguna 4031 Philippines
Phone: +63 49 536 2290 local 161/402
Fax: +63 49 536 2283
Email: kc3@agri.searca.org