



EVIDENCE-BASED CLIMATE CHANGE ADAPTATION *and Globally Important Agricultural Heritage Systems*

BACKGROUND

Climate change will present significant challenges for the agriculture sector in Asia. Future changes could be highly disruptive to regional rice systems creating potentially negative implications for food security.

Building on existing work FAO is undertaking in the Philippines (AMICAF project) and Thailand, FAO produces information and knowledge products for policy makers to better understand climate impacts on the region's rice productivity and markets, and to better manage climate risks

to the rice sector. Assessments of climate change impacts and policy simulations are aided by modelling frameworks. They provide the evidence needed to inform climate change adaptation planning and policies.

We are conducting one region-wide assessment that looks at the role of agricultural investments in rice price volatility, and national assessments for the Philippines (government expenditure and domestic rice market) and Lao PDR (climate impacts on domestic rice yield).

AGRICULTURAL INVESTMENTS IN ASIA AND RICE PRICE VOLATILITY

The role of agricultural investments growth in alleviating climate risks of rice production systems and rice markets was examined using a partial equilibrium model.

The Rice Economy Climate Change (RECC) model covers rice markets in 15 countries and regions (Thailand, Vietnam, Indonesia, Malaysia, the Philippines, Cambodia, Lao PDR, Myanmar, China, Japan, South Korea, India, USA, EU27 and the rest of the world).



Policy scenarios and simulation results under climate change conditions

Scenarios	Countries	Growth rate of agricultural investment during the projection period (2010-2030)		The coefficient of variation (CV) of international Rice Price (2010/12-2030)
		Land development	Machinery and Equipment	
Baseline	15 countries and regions	Same as 2000-2007 rate	Same as 2000-2007 rate	0.076
Policy scenario 1	ASEAN 8 countries	2.0% annum	1.0% annum	0.036
Policy scenario 2	The Philippines	2.0% annum	1.0% annum	0.072
Policy scenario 3	Thailand	2.0% annum	1.0% annum	0.055
Policy scenario 4	Vietnam	2.0% annum	1.0% annum	0.059
Policy scenario 5	ASEAN 8 countries	0.0% annum (no growth)	0.0% annum (no growth)	0.125

Rice yield in each economy is estimated from minimum and maximum temperatures, precipitation, and agricultural investments. Rice area harvested is estimated from rice and wheat producer prices and precipitation.

All climate variables for the future period come from a climate change projection by a global climate model under a greenhouse gas emission

scenario both in baseline and policy scenario projections.

It is assumed that the current growth rate of agricultural investments (land development, and machinery and equipment) from 2000-07 in each country will continue during the baseline projection period. Projections were made under several scenarios of agricultural investments in selected countries for comparison

against the baseline projection. These agricultural investments can be considered as climate change adaptation measures.

The simulation results suggest that the volatility in the rice price will increase compared to the baseline, if agricultural investment in ASEAN 8 countries do not grow during the projection period.

However, a constant agricultural investment increase (land development will increase by 2.0% p.a. and agricultural machinery and equipment will increase by 1.0% p.a.) in ASEAN 8 countries will contribute to a decrease in the international rice price volatility.

Particularly, investments in Thailand and Viet Nam are the most important in stabilising the international rice price under future climate change. (Climate, Energy and Tenure Division, FAO)

GOVERNMENT AGRICULTURE EXPENDITURE AND RICE MARKET IN THE PHILIPPINES

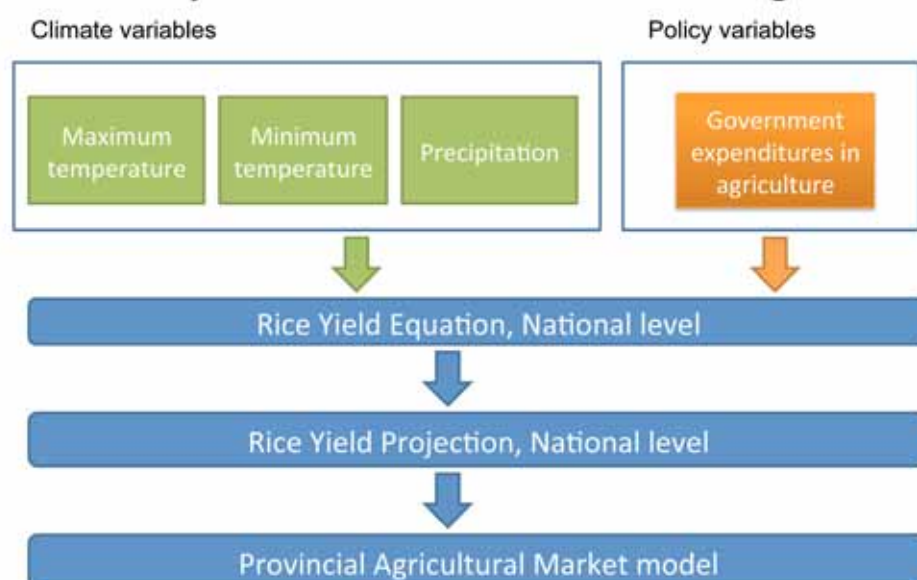
In this activity we undertake simulation and analysis of policy variables under climate risks that may affect rice production systems and rice markets in the Philippines. A partial equilibrium framework was adopted to determine the impact of the policy variables to the rice market.

An econometric model to simulate the impact of maximum temperature, minimum temperature and precipitation on rice yield by ecosystem for 1981-2010 in the Philippines was developed to make a projection of future rice yields up to year 2030.

A Provincial Agricultural Market (PAM) model will simulate impacts on the domestic rice market. Policy simulations will further determine the impact of government agriculture

expenditure on the domestic rice market under a changing climate. (National Economic and Development Authority, the Philippines)

Policy Simulation under Climate Change



CLIMATE CHANGE IMPACTS ON RICE YIELDS IN LAO PDR

This activity seeks to deliver knowledge products and decision tools for policy makers to better manage climate risks and identify adaptation needs for the rice sector in Lao PDR. Integrating historical yield information and high-resolution weather data, an econometric model was built to project long-term potential impacts of climate change on rice yields in Lao PDR.

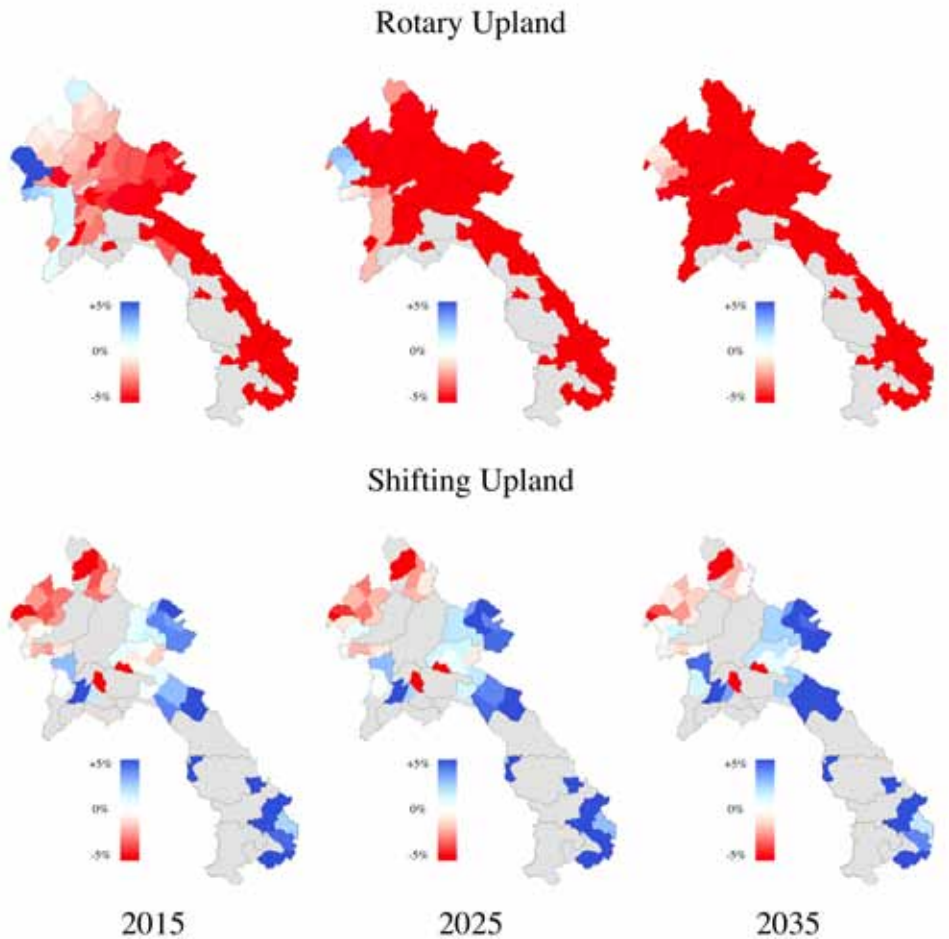
It is found that climate risk to the Lao PDR rice sector will vary significantly over space and time, and this heterogeneity presents an opportunity for policymakers and private stakeholders to learn timely and effective adaptation actions (e.g. crop diversification) before risks spread across the country. Two generic risk categories need to be monitored.

Direct risks refer to impacts on domestic food production through changes in yields and other factors. Indirect risks can be transmitted through markets, affecting food security and livelihoods. An early warning mechanism of the kind developed here is recommended to identify risk as it emerges and more effectively target adaptation policies. (The Government of Lao PDR and the University of California, Berkeley)

Globally: **more than 90%** of the world’s farms are small scale (less than 2 hectares).
75% of the world’s poor are rural and most are involved in farming.



Projected rice yield changes by type of cultivation



GLOBALLY IMPORTANT AGRICULTURAL HERITAGE SYSTEMS (GIAHS)

Globally Important Agricultural Heritage Systems are defined as “remarkable land use systems and landscapes which are rich in globally significant biological diversity evolving from the co-adaptation

of a community and its needs and aspirations for sustainable development with its environment”.

These systems provide essential ecosystem goods and services and food security for millions of local community members and indigenous peoples, well beyond their borders.



Small scale farms account for **1.9 M** crop varieties.

Rice farming diversity beats disease: glutinous rice and hybrid rice intercropping control rice blast.

“Intensification without simplification”.
“GIAHS calls for dynamic conservation, emphasizing a balance between conservation, adaptation and socio-economic development”.





Rice Terraces cascading down the slopes, present a dramatic vista. These represent the collective efforts of **countless generations of farmers** who have developed ingenious irrigation systems that have allowed them to **share water, protect the surrounding forests, and develop rice varieties that survive at over 1,000 meters.**



Evolving systems, evolving culture. Tradition and culture have always been an integral part of rice-based livelihood systems. Local cosmologies and perceptions of landscapes enable farmers to develop and adapt crops to niches in their ecosystems. **Cultural adaptation increases biodiversity:** Asian farmers maintain drought resistant plant varieties and plant communities.



Rice and fish culture – a **model of ecological symbiosis** and an ingenious approach to generating ecological, economic, social and cultural benefits.



GIAHS have other values beyond production of foods and fibres.

These living and evolving systems and communities have kept their distinct identities intact on the strength of unifying values such as culture, nature, family, community, history, and a sense of belonging to their natural habitats.

GIAHS are models of resilience, identity and food sovereignty.

WAY FORWARD

We will explore ways to link the regional model and national models in a coherent framework.

Evidence indicates that adaptation risks and opportunities are very heterogeneous, and we plan to develop more detailed evidence on the rice sector at the sub-national level in the next assessments to more effectively support policy makers.

Most importantly, there is a need to establish better linkage with other components of the Regional Rice Initiative field activities, supporting timelier, evidence-based planning for climate change adaptation and sustainable rice production.