CLIMATE CHANGE VULNERABILITY AND ADAPTATION IN ASIA AND THE PACIFIC: WORKSHOP SUMMARY

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Abstract. The Regional Workshop on Climate Change Vulnerability and Adaptation Assessment in Asia and the Pacific met to present and discuss assessments of vulnerability and adaptation to climate change in agriculture, forests, coastal resources, and water resources. Discussions were held in breakout and plenary sessions about the state of the science for vulnerability and adaptation assessment, conclusions that can be drawn about the vulnerability of the region to climate change, and where future research efforts should be directed. The workshop concluded that sea level rise is of greatest concern to island and coastal nations in the region, climate change will have a significant effect on agriculture, water resources are sensitive to changes in average climate conditions and to tropical monsoons and cyclones, and forests could be significantly affected by climate change. The workshop recommended that efforts to improve general circulation models continue and that countries in the region cooperate on the analyses of vulnerability and addressing adaptation measures. The workshop also concluded that results of vulnerability and adaptation assessments should be presented to policy makers and the public and that assessments continue to be undertaken to improve our understanding of the issue.

Key words: Asia, Pacific island nations, adaptation, agriculture, forest, coastal resources, water resources, sea level rise, national action plans

1. Introduction

Ranging from the boreal expanse of Siberia to tropical river deltas subject to tropical storms to small islands whose very existence is threatened by sea level rise, the Asia and Pacific region includes a breadth of ecosystems and socioeconomic systems vulnerable to climate change. With over three-fifths of the world's population, natural resources in many parts of the vast continent, archipelagos, and islands are already under stress.

At the Regional Workshop on Climate Change Vulnerability and Adaptation in Asia and the Pacific, recent studies on climate change vulnerability and adaptation were presented and reviewed. Research needs, further technical assistance on vulnerability and adaptation, and preparation of national communications that are required for all signatories of the U.N. Framework Convention on Climate Change were also discussed. How the region can address adaptation and develop national action plans on climate change was also discussed.

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2. Agriculture

2.1 CONCLUSIONS ABOUT VULNERABILITY

Agriculture is a key economic sector in the region and accounts for a high portion of the national GDPs. For example, 20% of Thailand's GDP is in agriculture. Substantial foreign exchange earnings are derived from exports of agricultural products, (e.g., 70% in the Philippines) and agriculture employs over 50% of the labor force in most countries (60% in Thailand). The region faces increasing population, spread of urbanization, lack of adequate water resources, and environmental pollution, which may hinder growth of the region's future agricultural productivity.

South and Southeast Asia are vulnerable to many environmental hazards, including frequent floods, droughts, cyclones, and storm surges that damage life, property, and agricultural production (e.g., Bangladesh is especially vulnerable). El Niño-Southern Oscillation (ENSO) events play a key role in determining yearly agricultural production across the entire region of South and Southeast Asia.

Many climate change impact studies have been conducted in various regions of South, Southeast, and East Asia. However, the impact of climate change on crop production remains uncertain not only because of uncertainties in climate projections, but also because of the lack of understanding of key processes in crop production, such as the direct effects of CO_2 and the complex interactions with water resources. Despite these significant uncertainties, and the limitation of the modeling studies outlined above, several conclusions can be made:

- Crop yields and productivity changes will vary considerable across regions. Thus, the pattern of agricultural production is likely to change across the region. Based on crop impact studies using $2\times CO_2$ equilibrium GCM scenarios, lower latitude countries have been shown to be more negatively affected. Nevertheless, crop yield simulation results vary widely (e.g., ±20% changes in yield) for specific countries sites across studies, and GCM scenarios.
- Vulnerability to climate change depends not only on physical and biological response but also on socioeconomic characteristics. Low income populations depending on isolated agricultural systems, especially dryland systems in semi-arid and arid regions, are particularly vulnerable. Many of these at-risk populations are found in South and Southeast Asia.
- Although global studies suggest that agricultural production appears to be sustainable under climate change as expressed by GCMs under doubled CO_2, the regions of South and Southeast Asia appear to be among the most vulnerable, and East Asia appears to be relatively less vulnerable. Furthermore, global studies have shown that incremental additional costs of agricultural production and additional risk of hunger under climate change, which could create a serious burden for some developing countries in the region.

Because of the key role that ENSO events play in determining yearly agricultural production in South and Southeast Asia, changes in ENSO frequency and severity would be likely to affect the agriculture of these regions.

2.2 SUITABILITY OF ADAPTATION MEASURES

Adaptation to climate change is likely in areas that are currently less climatically stressed; the extent depends on the affordability of adaptive measures, access to technology, and biophysical constraints such as land and water resource availability, soil characteristics, genetic diversity for crop breeding (e.g., crucial development of heat-resistant rice cultivars), and topography.