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Policy brief

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Agricultural Development and Climate Change[1]

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INTRODUCTION

Cambodia's economy is largely based on agriculture (Wokker *et al.* 2011: 1-3). More than 80 percent of the population make a living off the land. Most people are engaged in rice farming and to a lesser extent in livestock raising and cash cropping (cassava, maize, soybeans, peanuts sugarcane and rubber), which also provide important sources of income. As farmers mainly rely on rain water to produce their crops, wet season rice farming is critically important for rural livelihoods. Yields are adversely affected by the weather every year, but increasingly irregular rainfall distribution, prolonged dry seasons, higher temperatures and the frequency of severe natural events (flood, drought, cyclone), commonly associated with climate change, have had devastating consequences for agricultural production, investment and essential infrastructure over the last 15 years. Shortages of water and inadequate irrigation water allocation have led to conflicts among farmers which have proved difficult to resolve (Nang *et al.* 2011: 37-39). However, efforts to improve physical irrigation infrastructure will help increase crop productivity, particularly of rice.

Fish is the second staple food after rice. The increased number of fishers, conversion of wetlands for farming and the destruction of associated habitats, land use change in the watershed as forest is cleared for agro-industrial crop plantations and dam construction upstream, compounded by effects of climate change, specifically irregular precipitation and hydrological changes, have already depleted fish stocks and will continue to challenge sustainable fisheries resources management.

Forests are important sources of income and livelihood subsistence, especially for indigenous people and forest dwellers, and are critical for regulating and protecting the environment, conserving bio-diversity and maintaining vital eco-system services. However, expansion of the cultivated land area has gradually encroached on forest areas and diminished forest resources.

This policy brief focuses on the state of the agricultural sector in the context of the uncertainties of climate change in determining potential national agricultural production so as to ensure food security and poverty alleviation. The government of Cambodia has responded by setting out the National Adaptation Programme of Action to address immediate needs and concerns at grassroots level and guide the implementation

1 This policy brief is based on CDRI (2011), *Agricultural Development and Climate Change: The Case of Cambodia*, Working Paper Series No. 65 (Phnom Penh: CDRI), an overview of i) agricultural practice and technology in determining potential national production to ensure food security and poverty alleviation, and ii) adaptation strategies in response to land use and climate change impacts, in the context of overall national efforts to develop the agricultural sector.

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of adaptation initiatives so as to strengthen the agricultural sector's resilience and help mitigate the potential impacts of climate change and development while maximising the benefits of development efforts towards long term economic growth and poverty reduction.

OBJECTIVES AND METHODOLOGY

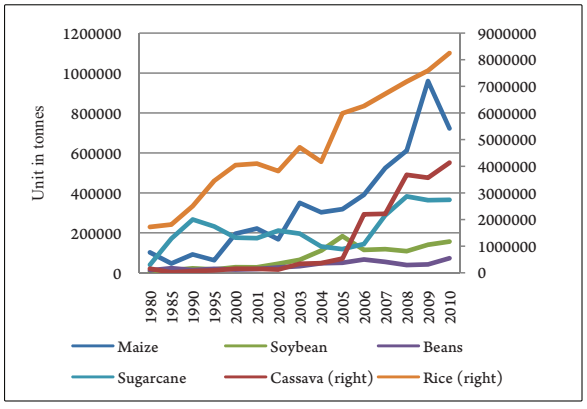
The study aimed to collect and aggregate information to reflect on the scope of Cambodia's agricultural development efforts in the context of climate change and provide in-depth insights with a view to food security and poverty alleviation, which can feed into policy-oriented adaptation strategies for agricultural development.

The research design entailed: (1) comprehensive literature review to collect secondary information and identify knowledge gaps to guide fieldwork; (2) fieldwork to garner information through focus group discussions and researchers' observations; and (3) two consultation workshops at technical and policy level to get critical inputs from a broad range of stakeholders on the way forward for agricultural development against the potential challenges posed by land use and climate change.

KEY MESSAGES

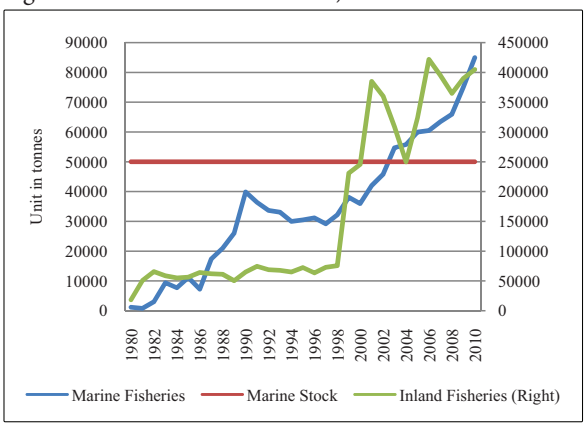
Agricultural production, particularly rice and other major cash crops, i.e. maize, cassava and soybeans, has been increasing annually (Figure 1). Increasing agricultural productivity is critical to achieving food security and poverty reduction.

Figure 1: Annual Production of Major Crops (tonnes), 1980-2010



Source: MAFF 2010, 2011a; NIS 2008

Figure 2: Annual Fish Production, 1980-2010



Source: FiA 2009, 2010

Rice production growth has significantly contributed to improvements in food security and poverty alleviation. By 2007, the overall poverty line for Cambodia had decreased to 30.1 from 34.8 percent in 2004 and 36 percent in 1997 (World Bank 2009: 27).

Increased rice production is largely attributable to the expansion of the wet season cultivated area rather than the intensification of farming (MAFF 2011). Dry season rice farming contributes just 14 percent of total rice production. Irregular rainfall will inevitably impact on the productivity of wet season rice and other cash crops. Irrigation water is a significantly important input for rice farming.

Fisheries: Both marine and inland captures have increased annually, particularly over the last 10 years (Figure 2). Current marine capture is greater than the existing stock's ability to naturally replenish and fishing quotas may have to be reassessed if fisheries resources are to be managed sustainably. Degradation of wetlands, flooded forest and coastal habitats such as mangroves, sea-grass meadows and coral reefs is another critical constraint to fisheries resources management.

Forest resources are important for local livelihoods and the environment. National Forest Policy is emphasised in the CMDG to have maintained forest cover over at least 60 percent of the total land area by 2015. However, forest cover in 2010 reportedly stood at about 56.94 percent (FA 2010). The National Forest Policy is considered to be a critically important driving force to rehabilitate degraded forests and reforest denuded areas.

CLIMATE CONSTRAINTS TO AGRICULTURE

The Mekong River Commission calculated that the average temperature in Cambodia increased by 0.8°C from 1960 to 2005 (MRC 2010). It is projected that the mean temperature will have risen a further 0.3 to 0.6°C by 2025, and another 1.4 to 4.3°C by 2090. The expected warming will be more severe from December to June.

Cambodia has often suffered from drought, flood, storm and after-effects such as flash floods. For example, the damage caused by typhoon Ketsana in 2009 is estimated to have totalled about USD132 million. Floods alone cause losses to the value of USD100 to 170 million each year (RGC 2009). The frequency of natural shocks has increased over the last few decades. The biggest floods occurred in 1984, 1996 and 2000, damaging around 400,000 to 450,000 ha of paddy fields. Meanwhile, the country's most severe droughts in 1994, 1997, 1998 and 2004 destroyed approximately 250,000 to 400,000 ha of paddy rice (MAFF 2010b).

The combined impacts of these consecutive droughts and floods have compounded the hardships associated with poverty, and hit rural people the hardest in terms of livelihood improvements. The trend in poverty incidence, from 36 percent of the population living below the poverty line[4] in 1997 to 34.8 percent in 2004 and 30.1 percent in 2007 (RGC 2002; World Bank 2009: 27), to some extent reflects the relationship between drought, flood and poverty and in part is attributable to efforts to promote agricultural development, particularly in rice farming.

Climate change impacts combined with the effects of landuse change, associated with development efforts such as hydropower dams and agro-industry, could cause changes in water levels, hydrological flows and water quality.

KEY FINDINGS

- Rice production has increased, largely as a result of the expansion of the wet season cultivated area. Dry season farming currently contributes 14 percent of total rice production. Limited agricultural technology, poor application of inputs (new seed varieties, fertilisers, pesticides) and limited access to irrigation water are the main constraints to improving productivity.
- Yields of major crops i.e., cassava, maize, sugarcane and soybeans have also increased. Although signs of cassava price recovery in the first half of 2011 led to expanded plantation, production is dependent on market demand and historically volatile prices.
- Total annual fish captures, both marine and freshwater, have increased. Changes in precipitation and hydrological flow alongside this high fishing effort will likely deplete fisheries stocks. This situation needs to be urgently addressed in order to secure the sustainability of fisheries resources.
- Forest resources remain important for the environment and local livelihoods, especially forest dwellers' subsistence, albeit they no longer provide as many benefits as they used to. Expansion of agricultural land has encroached on forest land, even protected areas.
- Agricultural production is highly susceptible to the increasing number of natural shocks; drought, flood and cyclone have caused significant damage to crops and infrastructure, particularly rice farming. These events tend to hit the most vulnerable rural poor the hardest. Supplementary water from irrigation schemes is essential to overcoming the significant constraint posed by irregular rainfall so as to improve rice productivity.

Overall, every development effort towards increasing agricultural production is significantly important for poverty alleviation and food security. Such efforts should be environmentally sound. In addition, appropriate measures must be taken to ensure sustainable natural resource management. Fluctuating market prices have forced farmers to shift their cultivation. Similarly, the further development of physical irrigation infrastructure

4 Defined as the percentage of the population living on less than USD1.25 per capita per day at 2005 international prices (World Development Indicators- http://data.worldbank.org/data-catalog/world-development-indicators, last updated 2 March 2011, accessed 27 October 2011)

is expected to create more opportunities for intensive farming, for instance double or triple rice-cropping.

POLICY IMPLICATIONS

- Development of the physical irrigation infrastructure is urgently needed to intensify agricultural production and help mitigate the uncertainties of climate change i.e. irregular rainfall, so as to ensure national food security.
- Proper land-use/cover management and conservation should be taken into consideration to ensure that development efforts are not only environmentally sound but also protect the forest ecosystems that support the agricultural system at large.
- Government institutions and local authorities should devise mechanisms to regularly monitor and evaluate agro-industrial development so as to maximise the sector's adaptation and resilience to climate change.
- Farmers should have access to technical know-how and agricultural extension services, such as training on the system of rice intensification, fertiliser application and pest management, so as to increase agricultural productivity and diversification.
- Appropriate measures should be taken to ensure the effective and efficient implementation of initiatives so as to meet the aims of national policies, particularly forest management policy and the long term adaptation strategy for agricultural development.

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