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CHALLENGES OF RURAL LIVELIHOODS IN THE CONTEXT OF CLIMATE CHANGE[1]

Introduction

Within the frameworks of good governance and inclusive growth where legitimate rights over natural resources and benefits derived from them must be equitably and sustainably allocated and flowed to every sector in society, natural resources management has shifted focus from productivity to sustainability. This has brought a complex array of environmental, social and economic concerns with the parameter of sustainable development that recognises healthy ecosystems as fundamental to economic and social wellbeing and poverty reduction (Saad-Filho 2010). The global vision behind this new perspective is for "...a world that is environmentally, socially and economically sustainable, and where economic growth is accomplished within the constraints of realising social objectives of poverty eradication and social equity and within the constraints of life support nature's carrying capacity, and a world where the challenges such as climate change, loss of biodiversity and social inequity have been successfully addressed " (UNEP 2012: 2).

Irrigation systems build resilience to Increasingly irregular rainfall due to climate change, Rolous Scheme, Kampong Thom province, June 2012.

In line with these frameworks, Cambodia is strongly committed to ensuring the efficient use and good management of its natural resources such as forests, water, land, fisheries and biodiversity. It provides strategic direction for integrating natural resource management into mainstream economic development planning for sustainable productivity and potential long term benefits of the country's natural resource base. Policies and strategies to ensure development and sustainable economic growth, poverty reduction and environmental sustainability are set out in the Cambodian Millennium Development Goals. However, climate change impacts such as droughts, flooding and higher temperatures, along with human-induced change due to development activities such as conversion of forestland, unlawful logging and illegal fishing, are putting the long term viability of remaining natural resources at risk (MoE & UNDP 2011). Rural people whose livelihoods depend on natural resources and agricultural farming will be hard pressed to cope

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with the adverse effects of climate variability and change. Certain groups of people, for example, women, women-headed households, the elderly and those with disability are particularly vulnerable to climate change impacts and will likely face even greater hardship.

This desk review report examines the potential challenges posed by climate change on the main resources that support rural people's livelihoods. The aim is to identify better ways to mitigate vulnerability and enhance adaptation capacity while ensuring livelihood stability in the face of an increasingly variable and changing climate.

The Complexities of Climate Change on Livelihoods

Defining Climate Change and Livelihoods

For the purposes of this study, "climate change" is defined as "any change in climate over time because of both variation and change in nature or human activity" (IPCC 2001: 984), and "livelihoods" as "the means by which households obtain and maintain access to the resources necessary to ensure their immediate and long-term survival. These essential resources can be physical, natural, human, financial, social, and political. Households use these assets to increase their ability to withstand shocks and to manage risks that threaten their well-being" (USAID 2005: 2).

Key Resources Supporting Rural Livelihoods

This article examines the key challenges of climate change and human-induced change that threaten the sustainability of key livelihood-supporting resources through a brief overview of the current situation in (1) the agriculture sector, and (2) the natural resources sector (water, land cover/forests, and fisheries).

Agriculture

Negative effects of climate change not only affect developing countries and poor populations disproportionately, they also affect the economic and social dimensions of sustainable development. In Asia, future climate change and increasing weather variability is likely to affect agriculture and heighten the risk of freshwater scarcity and food shortages (IPCC 2007a). This is especially true for Cambodia where agriculture is the primary source of income for the majority, particularly the rural poor. The country has suffered frequent floods, windstorms and droughts during the last decade. Floods impact severely on agricultural crops, livestock, fisheries, infrastructure, human settlements and welfare. For example, in 2009, the typhoon Ketsana affected 10 provinces, destroying an agricultural area of 40,136 hectares and damaging 67,355 hectares of rice. The total loss and damage to agriculture/livestock and fisheries, vital for local food security, amounted to USD56 million (RGC 2010). The recent 2011 flooding caused 250 deaths, affected 354,217 households and damaged 1,297 houses. Crops in the provinces around Tonle Sap Great Lake suffered severe damage. Losses include damage to about 431,476 hectares of rice with 267,184 hectares of paddy destroyed, and around 21,929 hectares of other crops with yield on 17,264 hectares wiped out (RGC 2012).

The Mekong River Commission (MRC), based on modelling the effects of various basin development scenarios, projects that the level (minimum and maximum) and duration of seasonal flooding in the Tonle Sap system will change (MRC 2010). It also calculated that between 1960 and 2005 the average temperature increased by 0.8°C, at decadal rates of about 0.20 to 0.23°C in the dry season and 0.13 to 0.16°C in the wet season, and that by 2100 the mean annual temperature will be between 1.4 and 4.3˚C higher (MRC 2009). This would lead to higher mean annual rainfall in the wet season, increased severity and duration of flooding and droughts, and widespread pests and diseases. Such changes would affect crop production where yields could increase in some areas and decline in others (*ibid*). Impacts of climate change are already affecting the lives and livelihoods of individuals and communities. Higher temperatures in the last few years have reportedly affected crops in many provinces of Cambodia. The droughts in 1997/8 caused farmers great hardship and pushed them into poverty—many even died. It is not uncommon for the short dry spell that usually occurs in the middle of the wet season to extend into drought, frequently damaging farmers' rice crops. The major drought in 2002—the worst ever experienced in Cambodia—affected two million people and caused USD38 million of damage (UNESCAP 2008).

Changes in seasonal weather patterns (particularly temperature and rainfall) have degraded the environment to some extent, potentially creating desertification, and already affected the cropping

calendar which could in turn undermine farmers' confidence in planting and managing production. Such challenges especially affect women as they play a vital role in providing/producing food, child nutrition and generating family income. A study by CARE (2002) in the annually flooded province of Prey Veng points out that flooding not only damages women's farming and assets, but also increases their workload. Because they have to spend more time collecting food (far from village) for their family and caring for children, they have less time for farming and earning daily income. As a last resort, they are often pushed into debt (loan) in order to cope (CARE 2002). A case study by the Women's Environmental Network (2010) also reveals that widows and orphans have real difficulty coping with climate change; already weakened by under-nutrition, they are particularly susceptible to disease.

Natural Resources

(i) Water

A climate change screening (i.e. assessment/ identification of climate change risks and adaptation options) conducted by Danish International Development Agency (DANIDA) and the Cambodia Climate Change Office (CCCO) of the Ministry of Environment (MoE) in 2008 reports that in Cambodia, vulnerability to climate change is high and current capacity to adapt and address impacts of climate variation is limited (DANIDA 2008). Water shortage, food insecurity and greater risks to human health and life as a result of climate change will particularly affect the poor and vulnerable. Chem and Someth (2011), for example, reveal that farmers face water shortage in the dry season, though there is much more water in the wet season. Water use conflicts between upstream and downstream irrigation/farming communities and different water user groups often flare up in the dry season. Existing irrigation systems simply do not have the capacity to ensure equitable allocation of water or enforce effective water resource management policies (Chem & Someth 2011).

Irrigation structures and hydropower dams in upstream locations divert water flow and effectively disconnect hydrological processes by changing the quality and quantity of water, resulting in too much or too little water and impeding fish migration and sediment movement. Changes in the hydrological cycle will create complexities for water quality, availability and allocation among water users in the river basins (MoE & UNDP 2011). Furthermore, because irrigation water planning and management is particularly fragmented, water shortage in the dry season is a major problem every year (Chem & Someth 2011).

Human activities (conversion of forest for agriculture, agro-industry, hydropower development) and climate change impacts (flood, drought) lead to the erosion of fertile topsoil from uplands to lowlands. This erosion further results in high sedimentation, exposes rock and sand which increases water run-off, decreases water quality and reduces agricultural productivity in key watersheds. Resultant of significant efforts to manage and protect the stability of natural resources and biodiversity in a sustainable manner, some important measures are already in place. These include draft sub-decrees on River Basin Management and Farmer Water User Communities, the draft National Action Plan (NAP 2011-20) to combat land degradation, Law on Protected Areas, Law on Fisheries and Law on Forestry. In addition, reservoirs in Tonle Sap Basin Protection and Conservation Zones I, II and III have been demolished and economic land concessions and private fishing lots cancelled (MAFF 2012; MoWRAM 2011; Nang & Yem 2010).

(ii) Land Cover/Forests

Forests are crucial for regulating the environment, carbon cycle and climate systems as well as for sustaining local livelihoods such as employment on plantations and in forest-based industries (timber and non-timber forest product processing), collecting food, medicinal plants and utility items, and generating income from local NTFP and carbon markets (MAFF 2009). Climate change is expected to disrupt forest productivity, increase biodiversity loss and hasten forest degradation including the loss of wet and dry forest ecosystems (MoE 2002; MRC 2009). The Intergovernmental Panel on Climate Change reports that forest expansion and forest migration will be curtailed and biodiversity threatened by land use change/reduced tree cover and population pressure (IPCC 2007a). Clearing forest areas for other land use, such as for urban purposes, agriculture and other developments, results in fewer trees to absorb carbon dioxide and release oxygen. The consequent increase in greenhouse gases and carbon dioxide emissions warm the atmosphere thus fuelling greater intensity and uncertainty in weather

variation and climate change impacts.

The depletion of forest resources due to lack of forestry management and land use planning could have disastrous consequences for the environment and local livelihoods, for forest-dependent communities in general and indigenous people in particular. The conversion of forestland is typically associated with immediate reduction in forest carbon stock (IPCC 2007b). Cambodia's forest area has declined considerably (Vong & Michael 2009): as of 2010, forest cover had decreased by 16 percent since 1965, with annual deforestation rate of 0.52 percent in 2002-10 (MAFF 2012). The expected increase in agro-industrial crop production, specifically rubber, cassava, sweet potatoes and soybeans, over the next few years will inevitably lead to expansion of cultivated areas (Ros *et al.* 2011). It is clear that the livelihood systems of communities close to large land conversion areas will be immediately affected by adverse impacts of human-induced change (e.g., restricted access to and control over land, water and forest resources) than climate change. Nonetheless, in the long term their standard of living (i.e., employment opportunities, infrastructure, public services such as schools and health centres, markets) is likely to improve.

(iii) Inland and Marine Fisheries

Marine and freshwater fisheries are important to Cambodian livelihoods. A preliminary analysis of the impacts of a one metre sea level rise on Cambodia's coastal zone undertaken by the Ministry of Environment identifies Koh Kong as the most vulnerable of the five provinces likely to suffer. Because the land along Koh Kong's coastline is mostly low-lying, about 0.4 percent of the total province area would be permanently under water, and mangrove and other forest, aquaculture, grassland and human settlements would be seriously damaged (MoE 2002).

The Tonle Sap Basin has the largest freshwater fishery in the country and in Southeast Asia. Hydrological change in the Tonle Sap Lake system would significantly change natural systems. In particular, contraction of the overall flooded area would affect the unique flood pulse (recession and flooding) of the Lake which supports a rich variety of plant species and aquatic life, disrupt the cycle of natural nutrient exchange, reduce overall ecosystem productivity, and lower fish production/catch (MRC 2010). The combined effects of over-fishing, climate change (precipitation), hydrological change (water flow, quality and quantity) and degradation of nutrients in the Mekong River and Tonle Sap Lake are expected to decimate fish habitats, fish stocks and lead to the extinction of fish species (Ros *et al.* 2011).

Discussion and Conclusion

Climate variability and its negative effects already challenge rural livelihoods, though the specific nature of climate change impacts continues to be uncertain. Despite Cambodia's robust economic growth in the last decade, climate extremes hinder efforts to reduce inequality between and within urban and rural areas and to narrow the gap between the rich and the poor (MoP 2010).

More attention must be paid to improving the agricultural sector as it is the main rural livelihood-supporting resource. Proper land and water management can positively contribute to water security (access to adequate quantity and quality), crop production and farming system resilience (e.g. crop and income diversification particularly in rain-fed farming systems). In 2009 Cambodia's community forests, projected to expand by up to 11 percent, totalled 401 and covered 380,587 ha or about 2 percent of the total land area. If the target is achieved then community forests would cover an area of more than two million hectares, contributing not only to local people's livelihoods but also to moderating climate change (Vong & Dutschke 2009).

Exploitation of coastal and marine fisheries is already beyond their regenerative capacity .and if it continues unregulated will likely deplete marine species and fish stocks and worsen the livelihood hardship faced by coastal fishing communities (Ros *et al.* 2011). Freshwater fisheries resources and livelihoods dependent on them face similar challenge. Lack of financial resources and low capacity hinder fishers in the Tonle Sap area from improving their livelihoods despite the government's bold fishery reform that released 538,000 hectares (56 percent) of former private fishing lots for public access (So *et al.* 2011). Multi-sectoral support (technical, financial) from all stakeholders along with strong law enforcement measures is essential to protect fisheries resources and to strengthen rural livelihoods. Likewise, livelihood diversification (ecotourism, vegetable cropping, micro-business) must be considered so as to reduce the pressure on rapidly depleting fishing grounds (*ibid*).

Livelihood improvement, poverty reduction and climate change adaptation initiatives should consider the economic, social and productivity implications of protecting and improving the natural resource base, and ensure equitable access to and control over key resources by local communities. To some extent, policies aimed at environmental protection and ecological health are already integrated into international agriculture, industry and economic development decision-making and planning. Environmentally sustainable development is imperative to addressing challenges related to inclusive economic growth, social progress and poverty reduction, while adaptation to climate change as well as climate change mitigation is key to sustaining and improving rural livelihoods.

Disaster risk reduction programmes, climate-related disaster-preparedness and response strategies, and important resources (human, logistics, communication/information) must be in place to identify and prioritise exactly where, how and when to act as well as the institutions, communities and individuals that should implement these adaptive and response strategies. This is to mitigate the uncertainty of climate change and anticipated effects on water and food supplies, livelihoods and economies. The involvement of the state, private sector and civil society and, critically, the integration of local/indigenous knowledge, in planning and implementing income, land use and farming diversification strategies using appropriate eco-friendly technology would help sustain livelihoods and mitigate climate change and development impacts. Increasing adaptive capacity to cope with the challenges of both short and long-term climate changes is an urgent priority, particularly in agriculture and natural resources management sectors. Effective institutions at all levels, especially at local and community level, are needed to plan and implement adaptation actions so as to strengthen resilience to climate change, particularly to support poor, natural resource-dependent households, women and other vulnerable groups with limited capacity, assets and resources to cope with climate change challenges.

References

CARE (2002), *Flood Impact on Women & Girls: Prey Veng Province, Cambodia* (Phnom Penh: CARE)

Chem P. & Someth P. (2011), *Use of Hydrological Knowledge and Community Participation for Improving Decision-making on Irrigation Water Allocation,* Working Paper Series No. 49 (Phnom Penh: CDRI)

DANIDA (2008), *Climate Change Screening of Danish Development Cooperation with Cambodia*, Ministry of Foreign Affairs of Denmark, DANIDA

IPCC (2001), *Climate Change 2001: Impacts, Adaptation and Vulnerability* - Contribution of Working Group II to the Second Assessment Report on Climate Change of the Intergovernmental Panel on Climate Change, http://www.grida.no/publications/other/ipcc_tar/ (accessed 12 July 2012)

IPCC (2007a), *Climate Change 2007: Impacts, Adaptation and Vulnerability* - Contribution of Working Group II to the Fourth Assessment Report on Climate Change of the Intergovernmental Panel on Climate Change [M.L. Parry, O.F. Canziani, J.P. Palutikof, P.J. van der Linden &C.E. Hanson (eds.)] (Cambridge,UK; New York: Cambridge University Press)

IPCC (2007b), *Climate Change 2007: Mitigation Options* -Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [B. Metz, O.R. Davidson, P.R. Bosch, R. Dave & L.A. Meyer (eds.)], *Chapter 9: Forestry* (Cambridge, UK; New York: Cambridge University Press)

MAFF (2009), *Cambodia's National Forest Programme: Framework Document, 4th Draft* (Phnom Penh: MAFF)

MAFF (2012), *Draft of National Action Program to Combat Land Degradation in the Kingdom of Cambodia 2011-2020* (Phnom Penh: MAFF)

MoE (2002), *Cambodia's Initial National Communication* (Phnom Penh: MoE)

MoE & UNDP (2011), *Building Resilience: The Future for Rural Livelihoods in the Face of Climate Change, Cambodia Human Development Report 2011* (Phnom Penh: MoE & UNDP)

MoP (2010), *Achieving Cambodia's Millennium Development Goals* (Phnom Penh: MoP)

MOWRAM (2011), *Draft Sub Decree on River Basin Management* (Phnom Penh: MOWRAM)

MRC (2009), *Adaptation to Climate Change in the countries of the Lower Mekong Basin,* MRC Technical Paper No 24,http://www.mrcmekong.

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