CLIMATE CHANGE AND WATER RESOURCES

CAMBODIA HUMAN DEVELOPMENT REPORT 2011

Ministry of Environment
Cambodia

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1. Introduction

Water is fundamental to all aspects of human and economic development, encompassing agriculture, fisheries, forestry, health and disasters.

The central importance of water for meeting social and economic development objectives and the anticipated impacts of climate change are such that across the globe, many of the effects of climate change will be felt through water (World Bank 2010). This is especially true for Cambodia.

Because of Cambodia's central location in the Mekong River system, the country's water resource management has a trans-boundary dimension. Almost 86 percent of Cambodia's territory lies within the Mekong River basin, including the Tonle Sap basin (with 12 tributary sub-basins), the '3S' basin (Sekong, Sesan and Srepok Rivers) of the northeast, and the Cambodian Mekong delta. Water resources are highly dependent on this complex river system stretching across six countries, as well as on the natural 'flood pulse'. In addition, a number of smaller river systems drain from the high-rainfall Cardamom and Elephant Mountains in

Much of the action required to deal with climate change will happen at local level, involving the State, communities, civil society and the private sector.

the southwest into the Gulf of Thailand. Many of the key watersheds within the country are already seriously degraded.

Access to safe water and sanitation in Cambodia remains extremely low across rural areas. This has implications for people's health – with water-borne disease one of the main factors in the prevalence of illness. Access to water has only improved slightly (increasing from 42.6 percent in 2007 to 43.9 percent in 2010) and more than half of rural people still do not have access to improved drinking water. Rural people often have only a single source of drinking water (ponds, streams, rivers) that can be easily contaminated.

The main challenge is one of smoothing the availability and distribution of water throughout seasons, across regions and between users. The seasonal variation in Cambodia is dramatic, with high water levels and flooding in the rainy season, contrasted with parched soils and water shortages in the dry season (Öjendal 2000). Yet these normal processes of flood and recession – the flood pulse – drive the natural productivity of agriculture and fisheries. This is essentially a challenge of water resource governance.

2. Policy priorities: Irrigation and hydropower

The main national policy interests concerning water resources relate to expansion of water infrastructure for irrigation and hydropower. Given the widely held perception that water is underutilised in Cambodia, both irrigation and hydropower are considered to have great potential for economic growth.

With the vast proportion of agriculture dependent on rainfall, the development of irrigation is seen as the main mechanism for reducing vulnerability to the variability of the seasons and for increasing agricultural production.

Establishment of reliable energy sources is seen as a national development priority. The price of electricity in Cambodia is one of the highest in the world and considered a major impediment to both industrial development and development of the rural economy. The apparent abundance of water resources for hydropower appears to have enormous potential in Cambodia, with the Ministry of Industry, Mines and Energy (MIME) estimating the total achievable hydropower potential at about 8,000 MW (Clausen 2009).

Irrigation and hydropower development both require water resources and viable catchments and, to varying degrees, alter natural hydrological patterns that are themselves subject to impacts from climate change. Understanding these interactions is therefore essential for effective planning to ensure the sustainability of water resources and to minimise negative impacts. So far, planning mechanisms for assessing water resource options under a changing climate, and the potential impacts and tradeoffs, are not in place.

The risks associated with such development in Cambodia and across the Mekong basin, particularly for inland capture fisheries and

food security, are extremely high. These will have enormous implications for human development. These risks will all be exacerbated by climate change.

3. Climate change impacts on water and their implications

The Mekong basin has been highlighted in global assessments as one of the river basins that will feel the effects of climate change most severely (UNEP 2009). Climate change will affect the water cycle, bringing shifts in the timing, duration and intensity of rainfall patterns and seasons, changing the hydrology of major rivers and tributaries as well as groundwater recharge, and consequently, altering the quantity, quality, availability and distribution of water (TKK and SEA START RC 2009, Bates et al 2008).

The most recent studies predict various climate change impacts for water resources in Cambodia (TKK and SEA START RC 2009). These include:

- Climate change is likely to significantly alter the Mekong River hydrological regime, upon which inland fisheries and agriculture depend (MRC 2009)
- Changes in seasonal distribution of rainfall, with drier and longer dry seasons, and shorter, more intense wet seasons (MoE 2010)
- Increased volume and intensity of wet-season rainfall, leading to increased floods and a marginal decrease in dry-season rainfall (Clausen 2009)
- Reduced flow of the Mekong and its tributaries in the dry season and increased flow in the rainy season (TKK and SEA START RC 2009)
- Higher drought risks in most of Cambodia's agricultural areas as a result of future climate change from 2025 to 2050 (MoE 2010)

Ecosystem based approaches are also being taken up by specific sectors. For example, fisheries management has increasingly advocated for the need to manage fisheries at different scales – both at community and local levels, but also at the broader river basin and landscape levels.

- Increased temperatures, with corresponding increases in evapo-transpiration (Fraiture et al 2007)
- Increased frequency and intensity of extreme events, such as floods and droughts (Eastham et al 2008)

Effects of these changes will be felt differently in different parts of the country, by different people. For example, for the Tonle Sap the predictions are for changes to the natural flood pulse, higher water levels and longer flood duration. The most immediate and dramatic effects would be felt in fisheries. Changes to the natural hydrology would alter the flood pulse (the reverse flow into the Tonle Sap from the Mekong), which drives natural productivity. For the Mekong delta, the impacts are likely to include extension of the area flooded and changes in the onset of the flood season, with the risk of increased water scarcity during the dry season (TKK and SEA START RC 2009).

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Drought occurs at different scales. Localised drought is also becoming increasingly apparent throughout many areas of the country, including areas that are also flood affected.

Such changes also would affect the key fishery habitats of flooded forests. This impact on fisheries has wide implications for human development, given that fish are the main source of protein in the local diet. Currently there are no viable alternatives to fish in local diets, and standards of nutrition remain poor across rural areas.

The main implications from the impact of climate change on the water sector are potentially exacerbated by the current condition of watersheds, catchments and floodplains that affect the runoff and recharge of groundwater, as well as by water resource development plans. Further degradation of catchments, watersheds and floodplains will thus lead to additional pressures on the ecosystems.

Without improved management, changes in water availability could lead to reduced water quality and greater water scarcity, particularly in the dry season – in turn leading to increased competition between sectors and among different users. These effects will be felt most acutely by small-scale farmers and fishers, and the poor.

Reduced water quality and availability for domestic use would have enormous impacts on human health, with most rural people still dependent on natural water bodies for drinking water.

In addition, collecting water from further afield would be more demanding on labour and time,

and likely to be felt most acutely by women and children. In some cases, water would need to be purchased placing an additional economic burden on poor households.

4. Actions

The core challenges of water resource management in Cambodia are of access and distribution.

Management of water resources requires looking at both supply- and demand-side issues and placing greater emphasis on balancing water sustainability, efficiency and equity. Underpinning this is the need to establish the institutions to manage water resources more sustainably and equitably among different uses and users (Brown et al 2007). This marks an important shift from looking mainly at the infrastructure and technology of water resources management (dams, reservoirs, canals, pipes and pumps) toward the inclusion of political, social, economic and institutional dimensions of access and distribution.

Integrated Water Resources Management

The central strategy for water management, enshrined in international agreements such as the World Summit on Sustainable Development (WSSD) and advocated by the IPCC, is Integrated Water Resources Management (IWRM).

IWRM is an integrated approach to balance water availability and water demand, so that access to water resources among different uses and users can be equitable, fair and economically efficient. It is also intended to ensure that water use is sustainable, taking into consideration ecosystem requirements for water.

Integrated Water Resources Management

IWRM is defined as a process that promotes the coordinated development and management of water, land and related resources to maximise the resultant economic and social welfare in an equitable manner, without compromising the sustainability of vital ecosystems.

Experience from around the world testifies to the technical, legal, institutional and management challenges of putting IWRM into practice.

Cambodia has made progress on establishing a policy framework for water resources in line with global commitments under the WSSD Johannesburg Plan of Implementation 2002. The Law on Water Resources Management was approved in 2007, building on the National Policy on Water Resources Management and the Strategic Plan on Water Resources Management and Development (2005-2008). The Water Law is set within the framework of IWRM, recognising the different sectoral interests in water while calling for greater coordination and the need to balance social and environmental considerations. Cambodia has attempted to strengthen such coordination with formation of the Ministry of Water Resources and Meteorology (MoWRAM) in 1999, bringing most of the responsibilities for water resource management under one government agency. In addition, the Water Law includes several articles that deal directly with rights, organisation and participation of water users.

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The existence of local-level institutions within the D&D framework, as well as institutions with responsibility for resource management (such as Community Fisheries and Community Forestry committees), offer potential building blocks of river basin institutions.

However, the experience of putting these IWRM principles into action is limited and highlights the kinds of challenges that will need to be addressed (Clausen 2009). Despite development of the legal framework, in practice current water resource planning tends to follow sectoral interests of particular Government agencies rather than the hoped-for integrated approach (JICA 2007, Clausen 2009). Coordination and collaboration across these agencies remains weak (Clausen 2009, CDRI 2008a), and so far progress has been limited in putting in place the necessary institutional arrangements, either at national or river basin levels (Clausen 2009, Roux 2005). There is an urgent need to involve local stakeholders in the analysis of problems and identification of appropriate actions.

River basin institutions and processes

The formation of river basin organisations is a key element of IWRM. So far, however, progress has been limited in establishing such organisations in Cambodia. The Tonle Sap Authority (TSA) is the only river basin organisation established to date, under a Royal Decree in September 2007. Under the auspices of MoWRAM, the TSA brings together 36 local and provincial representatives from the six provinces around the Tonle Sap river basin, along with line Ministries with a remit related to water. It also aims to bring together international organisations and non-governmental organisations (RGC 2007, Tonle Sap Authority 2010).

Experience from the setting up of river basin organisations in the Mekong region likewise is highly informative, suggesting the need to build up river basin organisations from smaller constituent elements, thereby ensuring effective local participation involving diverse resource users. The existence of local-level institutions within the decentralization and deconstruction (D&D) framework, as well as institutions with responsibility for resource management (Farmer Water User Groups, Community Fisheries, Community Forests) offers other potential building blocks of river basin institutions (Clausen 2009).

Perhaps more than any other intervention for climate change resilience, management of water resources depends on actions at the regional as well as the local level. For Cambodia, this is firmly at the scale of the Mekong basin.

IWRM information needs

Managing water for different needs among stakeholders depends a great deal on availability of reliable information. This area remains weak in Cambodia and across the countries of the Mekong.

Systems for management, processing and quality control of data also remain weak. No system exists to integrate climate and weather forecasting with hydrological features, at national, provincial or community levels (Solar 2009). Hydrological flows represent a particularly critical area where significant further data are required.

Environmental flows

Maintaining environmental flows at both upstream and downstream levels – in other words, ensuring that ecosystems continue to function and provide economic and social benefits – also stands as a central feature of IWRM, requiring effective coordination between MoWRAM and the Ministry of Environment. However, the legal framework, rules and regulations, and institutional mechanisms for such integrated management are not in place.

Assessing options and impacts

Ultimately, IWRM is about making choices about how water should be managed and distributed. With so much national and regional interest in developing large-scale water resources infrastructure, the need is urgent to put in place appropriate mechanisms for assessing water resource options and impact assessments. This requires strengthening existing impact assessment processes in the country, moving toward application of Strategic Environmental Assessments (SEAs) that allow the State and other stakeholders to consider policy objectives and options for meeting these, and assessing various impacts both locally and more broadly. It is essential that human development considerations are prioritised, and that local stakeholders can participate effectively in decisions about water resources.

5. Summary

Managing water is essential for meeting human development objectives. The current rates of access to safe drinking water stand out as major concerns to human health and well-being that urgently need to be addressed.

For Cambodia to deal with climate change across different sectors, it also will need to address management of water resources and the ecosystems on which water itself depends. The same kinds of multi-scale, integrated, participatory approaches that are ingredients of IWRM will be urgently needed for agriculture, fisheries and forestry. This is a technical challenge requiring capacity and knowledge, but it is also a governance challenge, requiring new ways of working and, critically, of ensuring effective public participation in all stages of decision-making.

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