Water Resource Management in Cambodia: History and Current Challenges

Phalla Chem and David Craig identify lessons learned through past experience, and a number of the key issues currently facing irrigation management, and reviews the Cambodian societies at different times, perceived water in the development of their civilisation.*

Introduction

Water has long been at the heart of Cambodian life, and of its geography, economy and culture. In a context where there has often been either too much of it or too little, depending on seasons and geography, the governance of water has been a major challenge, which different Cambodian governments have addressed in different ways, and to different extents. When governed well, water has been a source of great prosperity. In the absence of good governance, though, neither wealth nor investment in water management infrastructure has been sustained.

The aim of this article, under the framework of the Water Resources Management Research Capacity Development Programme (WRMRCDP), is to identify lessons learned through past experience, and a number of the key issues currently facing irrigation management. The article commences with a review of how Cambodian societies at different times, perceived water in the development of their civilisation. It then moves on to reveal current key issues in irrigation development and management by conducting a case study of Mlech reservoir in Kampot province. The aim of the case study is to find out what water is used for, how the Farmer Water User Community (FWUC) functions with regard to operation, maintenance and conflict resolution, and the impact irrigation has on rural livelihoods.

Overview of Water Resource Management in the Past

The following overviews are to look at the management of water at different times, from the pre-Angkor, Angkor, post-Angkor, French colonial, Norodom Sihanouk and Pol Pot periods.

Pre-Angkor Period

Cambodia's history becomes clear from the second century, when it was known as "Funan". The Funanese economy was initially built on trade; however, from the seventh century it became an agrarian economy which grew wet season, dry season and root crops, Feeny (1982: 35–38) cited in Vickery (1998); animal husbandry for food production; and crafts including weaving, sewing, and metalwork to produce articles of jewellery (Chandler, 1993: 15–16). According to Chinese reports on Funanese agriculture (Vickery M. 1998: 19; Chandler 1993: 6), Funanese society practised advanced techniques in water management and rice cultivation. Farmers stored water in man-made reservoirs, which they used for bathing and irrigating their crops (Chandler 1993: 6). Rice cultivation during this time produced a surplus, and this surplus was exchanged for cloth and other goods, which were traded along the river.

Angkor Period

The Angkor period, from A.D. 802 to 1431, succeeded in economic development through enhanced water management systems. Rainwater and Mekong floodwater were collected and stored in a manmade reservoir for irrigation and domestic uses. For example, West Barai reservoir is one of a number of good examples of water management infrastructure from the Angkor Wat period that remains in use today. There were year-round multiple rice harvests in the Angkor Wat area. Such high productivity helped to significantly strengthen the country's economy, and thus enhanced its prosperity. Chou Ta-kuan's *Account of Angkor (1296–1297)* noted that three or four rice harvests per year were possible due to the concentration of manpower, rich fertile soil and a perfect water storage system (Chandler 1993: 74).

However, it appeared that by the thirteenth or fourteenth centuries, at the end of the Angkor Wat period, successful water management was in decline. This decline might have resulted from a combination of causes – attacks from Thai and other foreign peoples, and/or internal conflicts would have led to most labourers on the water management system being diverted to war. It appears the water management systems gradually became damaged and fell into disuse. It is also possible that environmental factors played a part in the deterioration of water resources.

Post-Angkor Period

As seen above, at the end of the Angkor Wat period and before the French colonial period, the Cambodian economy was in a state of decline. It was a subsistence economy, in which people spent most of their time growing rice. Rice surpluses were rare during this period, and savings were very low. According to Minh Mang (1834), cited in Chandler (1993), villagers often used

* This article is based on the framework of the Water Resources Management Research Capacity Development Programme (WRMRCDP). Phalla Chem is former team leader for WRMRCDP and now is on study leave for his PhD. at Sydney University and David Craig is an advisor to WRMRCDP.

ponds to store water for irrigating their rice fields, but there were no longer the dam, reservoir or canal systems that had characterized the Angkor-civilization. The population was small and there were no incentives and little technology to assist farmers in diversifying their crops or improving their water management systems during this period.

French Colonial Period

Cambodia was a French colony from 1863 to 1953. In August 1863, King Norodom agreed to make Cambodia a French protectorate. A treaty with France ensured Cambodia was protected by France, and gave France the rights to timber concessions and mineral exploration in Cambodia. The Cambodian population during the 1860s was slightly less than a million (based on tax rolls) and more than 95 percent of this population lived in rural areas. They were subsistence farmers whose lives were based on the cultivation of rice crops. These farmers paid high taxes to the French, and the Cambodian economy was not in a healthy state (Chandler 1993: 100).

Nonetheless, Cambodia's economy slowly began to improve, particularly from the 1920s, by which time transport infrastructure had been developed. Road development facilitated the export of up to 100,000 tons of rice a year and rubber plantation products with French and Chinese entrepreneurs (Chandler 1993: 160, 162). Rice exportation played a significant role in the rural economy by increasing production to meet international demands and generating taxes, which were diverted into public works such as roads, electricity, and education.

Norodom Sihanouk Period

Prince Norodom Shihanouk, crowned in 1941, advocated following the ancient Angkor Wat water management policies and improving water management structures. He also instituted self-help plans involving the younger generation to carry out water development programmes. In 1958 the Prince said: "the people must have enough water to drink and for their fields and rice paddies, even during the dry season" (Than 1982: 24, cited in Öjendal 2000: 180). However, there was little knowledge of how to re-scale traditional water management structures into larger ones.

Pol Pot Period

The Democratic Kampuchea (DK) regime controlled Cambodia from April 1975 to 1978. The DK, who considered rice as their economic mainstay, had an ambitious plan to attain rice yields of more than seven tons per hectare. To achieve this, Pol Pot forced the entire population to labour in rice cultivation and water management facility development, building dams and canal networks, for example. In a speech delivered in Phnom Penh on October 10, 1978, Pol Pot said: "Democratic Kampuchea must….as the first priority… attain rice yields more than those of Japan…who can attain 7 tons per hectare" (Martin 1983: 1, cited in Öjendal 2000).

Pol Pot focused on irrigation development as the way for Cambodia to become self-sufficient in rice production, and to obtain a rice surplus. He saw the northwestern region as a productive area that could achieve crop surpluses; hence most "new people"[1] were evacuated there to work in the rice fields. According to his four-year plan, Pol Pot proposed to increase rice production throughout the country to an average yield of three metric tons per hectare. To achieve this goal, Pol Pot pushed for extensive irrigation development, double or triple harvests per year, and long working hours. However, his four-year plan was written without any study as to whether these yields were actually possibly under existing water conditions and with existing soil types, nor what type of infrastructure would be appropriate. Instead Pol Pot called for an "all out, storming offensive" by all people (Chandler 1993: 211–216).

As a result, most hydraulic infrastructure built during this period was poorly designed and only partly completed, with no hydrological assessment or topographical surveys undertaken, which resulted in management and maintenance problems. Halcrow concluded that the irrigation schemes built during the Khmer Rouge period could be reused with proper technical rehabilitation designed to improve sustainable management and to maximize the schemes' functionalities (1994, cited in Öjendal, 2000).

Current Challenges of Water Resource Management

After the fall of the DK regime in January 1979, Cambodia set out to rebuild the nation through reshaping the political structure to adopt democratic rules, improving food security by enhancing the agricultural sector, and ensuring sustainable use of water resources by means of improving water resource management policies. However, most water resource management works were in dire straits, lacking both financial and technical capacities. Technical design and financial investment were heavily dependent on support from international organisations (IOs) and from international aid programmes of the United Nations.

Most irrigation works undertaken during this period were constructed as a matter of urgent priority without considering long-term sustainability or an integrated management approach. Large areas of the country were still unsecured during this time and there was a lack of coordination during the design process. As a result, many irrigation schemes rehabilitated during the 1980s and 1990s were never made fully operational, with most of them only partly completed, causing complications for water management today, including changed river flow

conditions, and deterioration of the river system, which affects irrigation.

Over the last decade, some areas of rain-fed rice and dry season rice crops have been enhanced through the provision of supplementary irrigation, a result of financial assistance received from various international organisations and agencies such as the World Bank (WB) and the Asian Development Bank (ADB). In fact 253 irrigation schemes were constructed and/or rehabilitated countrywide from 1999 to 2006. These schemes provide water security for rice cultivation over 716,453 ha (or 32 percent of the total rice cultivation area). Flood-control dikes have provided protection over 130,550 ha from seasonal Mekong flooding, and seawater polders have provided protection over an area of 18,390 ha from seawater intrusions (Sakhon Veng 2007).[2]

Case Study from Mlech Reservoir in Kampot Province

Methodology

In addition to 18 irrigation schemes studied around the Tonle Sap Lake, Mlech reservoir was chosen as a case study. Mlech reservoir is located in Chres Commune, Chumkiri District of Kampot Province. It was rehabilitated by MOWRAM in 2004 with a financial (loan) and technical support from the World Bank (WB). Mlech reservoir consists of a dam, spillway, irrigation outlets and canals. The reservoir can store 1.1 million cubic meters of water, provides supplementary irrigation for 2,150ha in the wet season and irrigates 750ha dry season rice crops.

The study used participatory rural appraisal techniques (PRA) such as project mapping, cross-transactions and focus group discussion (FGD). The case study is conducted to draw comparative lessons learned through the different irrigation investment models/approaches funded by government/ donors and managed by the community. Therefore, this case study was added as a special comparative case of a scheme outside the Tonle Sap area during the social/institutional assessment of the WRMRCDP's irrigated agricultural development in June 2007.

The tentative themes and checklists of questions were used in the FGD exercises with different groups of participants. In this exercise, the participants were purposively selected and formed into various FGD groups, which included: (i) FWUC leaders, (ii) farmers (upstream and down stream) of irrigation canal, and (iii) members of FWUC.

Findings

Certainly irrigation has enabled wider participation in the cash economy, through both a dry season rice crop (which, unlike the wet season crop, is sold) and through increased vegetable growing. The income added to farmers' pockets in significant, though it is likely that middlemen consume much of the commodity chain value. Reported increases in livestock holdings (cattle, pigs, chickens, and ducks) firstly represent strengthened insurance against other income/ crop failures and, secondly, assets that can be easily sold.

Wider political economy aspects of the rural situation are important for the longer-term impact of irrigation on livelihoods. Currently, the real money to be made is in the land itself, which is regularly doubling in value, whether irrigated or not. Irrigation itself only adds relatively marginally to the value of the land; location and other topographical aspects matter much more here. Even in remote communes the research team visited, land prices are reported as having trebled in the past two years, purely, it seemed, on a speculative basis. Clearly, if bigger investors continue to get involved with irrigated farmland, a number of aspects can be expected to change. They may simply sit on the land and not maintain cropping or invest in irrigation infrastructure. Whether they lease it to local farmers, or actively become involved in larger scale cash cropping, the current fine balance of things means the FWUC work may be altered.

Economies of scale are crucial here to cash cropping investment, and this could well mean major pressure on resources in the dry season where larger farmers demand to be able to secure large amounts of dry season water for cropping. Their size and influence may mean they would wield significant power in FWUCs, or at least create conflict within what is now a mostly fairly equitable and locally democratic system of allocation in times of shortage. This imbalance between many small users and larger, wealthy and powerful ones will be especially important if there is conflict. There is a great deal of evidence now that in Cambodia conflicts can be sorted out locally where there are only local people involved. Outside 'big fish', however, are able to act to acquire resource access and rights in ways that mean local organisations like FWUCs are not able to do much about it.

Finally, any current survey of irrigation development in Cambodia must recognise the importance of donor projects and the challenge these individual projects pose for sustainability and the long term capacity of subnational government bodies to manage water resources. Clearly there is no large regional planned or operated 'system' determining what happens in irrigation design across most of Cambodia. Instead, there are many projects, involving specific works (often mainly headworks), instigated and built by donors in cooperation with central agencies.

This pattern means there are high rents to be extracted in and around the project itself, for those actively involved in managing the projects themselves. Conversely, central agencies have little incentive to build for the long term, as they are able to hand operations and management and maintenance over to local actors. As a result, the number of facilities able to be produced with existing donor monies is reduced; as, perhaps, is the quality. The centralised nature of the project planning and implementation has a

number of other effects. Local capacity at PDOWRAM is not much developed: they get to implement FWUCs, sometimes it seems in places where previous FWUCs have already been partially mobilised. On the other hand, if the basic design and implementation is good (as it seems to have been in the cases we saw) then the project approach can build a useful foundation, around which many small or fragmented irrigation support projects from NGOs, and whatever agricultural extension and other supports can be built, through PDAFF for example, without damaging the basic integrity of the system.

Well-formed and working FWUCs can, however, make a difference. In some locales the team visited there was good evidence of control being exercised by local user groups.

- Conflicts were being resolved by the groups themselves, or at village level. We didn't hear of any commune involvement, much less the involvement of anyone from outside.
- Fees were being negotiated in an open, deliberative environment. Requests from users for lower fees when water levels were insufficient to meet demand were met. Fees were waived when crops failed as a result of extreme dry conditions.
- Local systems of measurement were being used to calculate fees. When we asked how much per hectare, they didn't know: instead they used local measures, indicating local control and well grounded local understanding.
- Free rider issues were not a significant factor: some of those outside the hydraulic boundaries did pump water across other people's land, but this created no major grief.
- Some aspects of irrigation management were being proposed in the Seila commune planning process.
- Overall, irrigation contributed a number of new small income opportunities, enhancing local people's security on their land, and increasing their stake in FWUG processes. This, too, enhanced local control.

However, it is also relevant to considering the ways these projects fit with not just local commune, but also wider provincial planning processes. While both lack reach, they can add something to a well-designed and implemented project. But both are powerless if the project is not well realised. The Commune Planning Process can add tertiary improvements and provide some maintenance: but it cannot fix major problems. Provincial planning across departments and within water resources is somewhat disempowered: it has no control over what arrives with the project, or when, and many of the benefits are controlled centrally. A province gains little in capacity building or control from having a large project built in its area, but it is given the responsibility for maintaining many ongoing aspects.

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The centralised nature of the project planning and implementation has a number of other effects. Local capacity at the Provincial Department of Water Resources and Meteorology (PDOWRAM) is not much developed. They get to implement FWUCs, sometimes, it seems, in places where previous FWUCs have already been partially mobilised. On the other hand, if the basic design and implementation is good (as it seems to have been in the cases we saw) then the project approach can build a useful foundation, around which many small or fragmented irrigation support projects from NGOs, and whatever agricultural extension and other supports can be built, through PDAFF for example, without damaging the basic integrity of the system.

Endnotes

1. "New people" were those who lived in a city, outside Khmer Rogue controlled areas, before 1975.
2. His Excellency Sakhon Veng, Co-chair of TWGAW and Secretary of State of MOWRAM, presented his progress report on Irrigation Development and Management on the occasion of the First Cambodian Development Cooperation Forum at CDC, 19th to 20th June 2007 (www.cdc.crdb.gov.kh/cdc/first_cdcf/session1/progress_report_vengsakhon.htm)

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