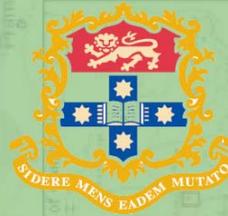




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DECENTRALISED GOVERNANCE OF IRRIGATION WATER IN CAMBODIA: Matching Principles to Local Realities



CHEA Chou, NANG Phirun, Isabelle WHITEHEAD,
Phillip HIRSCH and Anna THOMPSON

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Responsibility for the ideas, facts and opinions presented in this research paper rests solely with the authors. Their opinions and interpretations do not necessarily reflect the views of CDRI.

Front cover photo: Damnak Ampil scheme, Pursat province

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ACRONYMS

ADB	Asian Development Bank
AFD	Agence Française de Développement
CC	Commune Council
CDRI	Cambodia Development Resource Institute
CEDAC	Centre for Studies and Development of Cambodia
DAP	Damnak Amphil
DIA	District Internal Auditor
DOWRAM	District Office of Water Resource and Meteorology
FGD	Focus Group Discussion
FWUC	Farmer Water User Community
FWUG	Farmer Water User Group
GRET	Groupe d'Echanges et de Recherche Technologiques
GWP	Global Water Partnership
GWP-TAC	Global Water Partnership – Technical Advisory Committee
ICWE	International Conference on Water and the Environment
IMT	Irrigation Management Transfer
ISF	Irrigation Service Fee
IWA/UNEP	International Water Association/ United Nations Environment Programme
IWMI	International Water Management Institute
IWRM	Integrated Water Resources Management
JICA	Japan International Cooperation Agency
KI	Key Informant
M&E	Monitoring and Evaluation
MAFF	Ministry of Agriculture Forestry and Fisheries
MEF	Ministry of Economy and Finance
MFA	Ministry of Foreign Affairs
MoLVT	Ministry of Labour and Vocational Training
MoP	Ministry of Planning
MOWRAM	Ministry of Water Resources and Meteorology
MRD	Ministry of Rural Development
NCDD	National Committee for the Management of Decentralisation and De-concentration
NGO	Non Government Organisation
O&M	Operation and Maintenance
PDAFF	Provincial Department of Agriculture, Forestry and Fisheries
PDEF	Provincial Department of Economy and Finance

PDOWRAM	Provincial Department of Water Resources and Meteorology
PDRD	Provincial Department of Rural Development
PIMD	Participatory Irrigation Management and Development
RGC	Royal Government of Cambodia
SBK	Social Business Khmer
SCIRIP	Stung Chinit Irrigation and Rural Infrastructure Project
UNCED	United Nations Conference on Environment and Development
WCD	World Commission on Dams

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EXECUTIVE SUMMARY

Cambodia is currently embarked on a significant programme of irrigation development. The technical design of irrigation projects has generally improved, but there remain a number of challenges in the governance of irrigation that inhibit the schemes from working effectively, equitably and sustainably. This study investigates the extent to which the governance of irrigation matches the requirements of diverse irrigation schemes through detailed ethnographic study of three schemes: Rolous and Stung Chinit in Kampong Thom province and Damnak Ampil (DAP) in Pursat province. Specifically, it investigates (1) the degree of match between the governance arrangements and requirements imposed by the physical configuration of these schemes, and (2) ways in which stipulated governance arrangements have been modified in response to local requirements.

The study found discrepancies between actual governance practices and the ideal governance principles, as outlined in Participatory Irrigation Management Development (PIMD) and Integrated Water Resources Management (IWRM), and the spatial and infrastructural context of the schemes. Specifically, it was observed that the scale of the command areas is beyond the scope of Farmer Water User Community (FWUC) members and activists who do not have adequate technical knowledge or finances to repair, develop, and maintain irrigation infrastructure across their respective schemes. Second, the actual practice of irrigation management at the scheme and sub-scheme level diverges significantly from the principles of PIMD and IWRM. For example, the actual roles of the FWUCs fall short of those stipulated in their mandate and are not particularly well-executed.

The strongest role of the FWUCs across different case-study schemes is that of a mediator between farmers and PDOWRAM, rather than their principal mandate of competently managing the schemes. The FWUCs also have a role in allocating water from primary and secondary canals, resolving minor conflicts between farmers within the community, and collecting Irrigation Service Fees; however, the execution of these tasks is inconsistent and often lacking. The findings conclude that the current governance arrangements deviate from both the requirements imposed by the physical configuration of the schemes and the idealised theoretical governance purported in the PIMD policies. The study then suggests that to fix the problems, changes need to be made to policy and FWUC mandates as well as to the governance structure to provide more support to FWUCs and to adapt them to be more closely aligned with existing governance frameworks.

Cambodia is currently embarked on a significant programme of irrigation development. Some of the irrigation projects are large-scale, others are quite small¹. Expansion of irrigation involves the construction of new schemes and the rehabilitation of defunct or poorly constructed older ones, particularly those built during 1975-79 under the Khmer Rouge regime. The technical design of irrigation projects has generally improved, but a number of challenges facing the governance of irrigation hinder the schemes from working effectively and sustainably.

Irrigation governance is an essential part of the planning, construction and operation of irrigation infrastructure. There are two main reasons for giving more attention to better governance. First, irrigation water needs to be managed in such a way that it reaches the places and people it is supposed to in a predictable way, in sufficient quantity and at the right time. Second, the infrastructure that delivers water needs to be designed, provided and maintained so that it continues to deliver livelihood benefits in an equitable manner. This is not simply a matter of technical management. Experience with irrigation in many parts of the world has shown that the questions of who makes management decisions, at what level and on whose behalf have an important bearing on whether water and associated infrastructure will deliver properly functioning irrigation and the expected benefits. These are questions of governance: the design of authority structures and modes of collective action through appropriate institutions together with less formal arrangements are fundamental to effective irrigation management, equitable water allocation, sustainable use and conservation of water resources.

Governance has attracted a good deal of attention in Cambodia's recent development policy framework and decentralisation and deconcentration reform (D&D), including in the irrigation sector. Innovations have introduced principles of international best practice, particularly in the fields of participatory irrigation management and development (PIMD) and irrigation management transfer (IMT)². The decentralisation of irrigation governance is manifest at scheme level in the form of Farmer Water User Communities (FWUCs), which take on the primary governance role in partnership with Provincial Departments of Water Resources and Meteorology (PDOWRAM) on the one hand, and the farmers served by the irrigation schemes on the other. Governance challenges facing FWUCs include participation, transparency, decentralisation, integrated water resource management and a move towards "user-pays" based financing.

Irrigation governance involves the key tasks of water allocation, coordination to ensure efficient use of water by upstream and downstream farmers along the same irrigation source, system maintenance, and conflict management among those who share water and irrigation infrastructure. While the adoption of the FWUC model provides institutional certainty and a legal and policy framework for local irrigation governance, experience has been mixed. All FWUCs work to a common set of guidelines and regulations. Nevertheless, the decentralised irrigation governance enacted through FWUCs does not operate in a uniform physical or social landscape.

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- 1 For the purposes of this study, a large-scale irrigation scheme is defined as having a command area greater than 5,000 ha, medium-scale scheme between 200 -5,000 ha, and small-scale scheme less than 200 ha.
 - 2 IMT principles – where management of irrigation system is handed down to the Farmer Water User Community (FWUC) as set out in the water policy: Circular No.01, 11 January 1999 (Phnom Penh: MOWRAM).

This paper reports on a study to investigate the extent to which the governance of irrigation matches the requirements of diverse irrigation schemes. There is diversity in scale, physical layout and type of scheme. There is also diversity in how the principles of the FWUC are applied in practice. Through a detailed ethnographic study of three schemes, this paper investigates the degree of match between the governance arrangements and requirements imposed by the schemes' physical configuration. It also investigates how stipulated governance arrangements have been modified in response to local requirements, offering insights into the need for flexibility and space for local governance adaptation.

The two research questions that frame the paper are:

- a. Matching governance schemes to physical schemes: How well are existing governance structures and practices matched to the configuration and scale of irrigation schemes?
- b. Matching actual/practical governance to theoretical/ideal governance: To what extent does the practice of irrigation governance in system maintenance, water allocation, coordination and conflict management match “ideal types” and assumptions that come with governance initiatives such as Irrigation Management Transfer (IMT) and Participatory Irrigation Management and Development (PIMD) manifested in FWUCs? And why (what are the specific conditions in Cambodia that make such initiatives work, fail or need adaptation)?

Irrigation is frequently presented as a cornerstone of social and economic development in agrarian South East Asia. This is especially the case in Cambodia, where a significant proportion of the predominantly rural population is engaged in rice cultivation. The recent and strong emergence of a debate about irrigation efficiency and governance, stirred by a sudden growth in foreign private and semi-private investment in irrigation and rice production and the adoption of a new rice policy in Cambodia, has also been important in bringing irrigation issues to the fore. The country suffers from what is often characterised as an *economic scarcity* of water: although water is physically abundant in most areas (especially in the wet season between May and October), rural communities are often unable to utilise the available supply because of insufficient infrastructure. Government agencies, non-government organisations (NGOs) and communities are aware of this problem, and there is broad agreement that Cambodia's irrigation systems are not performing to their full potential (see, for example, ADB 2008). However, this consensus is only superficial. Different groups understand and respond to the irrigation development challenge in fundamentally different ways, depending on their ideological background and practical experience. This literature review aims to identify, account for and critique these differing perspectives – as they occur within the Cambodian, Southeast Asian and global contexts. It examines the body of irrigation theory and practice to test two key hypotheses (as suggested by the research questions): first, that physical irrigation schemes are not always appropriately scaled and otherwise matched to pre-existing social institutions; second, that ideal governance models do not always reflect what happens in practice.

2.1 Development, Governance and the “Hydraulic Mission”

An introduction to the multiple ways of framing the irrigation issue

Irrigation development can be framed as a technical engineering challenge, a social coordination exercise, or a question of exploiting water resources within ecological limits. In Cambodia, these diverse perceptions of the water management “problem” have led to correspondingly diverse (and often contested) water management “solutions”.

International development agencies and central governments have traditionally placed great emphasis on the physical and hydrological aspects of irrigation (Coward 1976; Barker & Molle 2004). In pursuit of the 20th century “hydraulic mission”, these “water bureaucracies” prioritised hard infrastructure over less tangible social initiatives (Reisner 1986; Molle *et al.* 2009). From the 1960s to the early 1990s in particular, civil engineers and technocrats promoted the construction of large-scale irrigation schemes as a pathway to development in Southeast Asia (Barker & Molle 2004; Ojendal 2000). On a strategic level, this development agenda was significantly influenced by Cold War geopolitics. Nevertheless, the specific preference for capital-intensive infrastructure projects can also be understood as a process of “technical rendering”. Applying the reasoning of Rose (1999) and Li (2006): when irrigation “experts” attempt to reduce complex social and environmental issues to their basic technical components, the ensuing policy responses are likely to be similarly narrow and technocratic. According to critics, these technical “solutions” might create a windfall for the well-connected, but will often make matters worse for most of the population (Molle *et al.* 2009). This is especially the

case when large-scale irrigation schemes are constructed without proper recognition of pre-existing small-scale community livelihoods.

In recent years, the prevailing “developmentalist” ideology has been strongly challenged by international commissions and grassroots voices alike (for example, WCD 2000; Living River Siam 2010). Traditional concepts of engineered water control and expert-driven water management are starting to give way to the more holistic and socially-embedded idea of “water governance” (Mollinga 2008). In general terms, water governance refers to:

...the range of political, social, economic and administrative systems that are in place to regulate the development and management of water resources and provision of water services at different levels of society (GWP 2002).

More specifically, the concept of “irrigation governance” recognises that physical irrigation technologies need to be accompanied by appropriately-scaled social and economic institutions (Coward 1980; Ostrom 1999). Through formal and informal means, this integrated approach seeks to achieve more efficient, equitable and sustainable irrigation outcomes. As stated by Elinor Ostrom, recipient of the 2009 Nobel Prize for Economics:

For the next several decades, the most important question related to water resource development is that of institutional design rather than engineering design (Ostrom 1999: 74).

2.2 Deconstructing “Participation”

Benefits and challenges of community involvement in irrigation governance

Ideally, irrigation governance should involve a diverse range of stakeholders at different levels of society. Within this broad principle, a number of specific ideas can be identified. Drawing on Arnstein’s (1969) “ladder of citizen participation”, Ribot (2000) argues that effective decision-making requires genuine power-sharing, not just tokenistic “fly in, fly out” consultation. According to Ostrom (1992), irrigation planners should give particular weight to the views of the most directly affected “recipient communities”. Calaguas and Francis (2004) focus on the temporal dimension, emphasising that community input is important at all stages of the design, construction and maintenance of an irrigation system. In the ever-expanding body of sustainable development literature, this collection of norms is often referred to as the “participatory approach”.

The idea of community participation has long been implicit in certain sectors of the water management literature (see, for example, Curran 1971; Coward 1976). Nevertheless, it is only in the last 20 years that a fully-fledged “participatory approach” has reached the development mainstream, propelled into the limelight by a series of international conventions and agreements. In preparation for the 1992 Rio “Earth Summit”, the Dublin Statement on Water and Sustainable Development (“the Dublin Principles”) stated that “water development and management should be based on a participatory approach, involving users, planners and policy-makers at all levels” (ICWE 1992: Principle 2). At the Rio Summit itself, Agenda 21 emphasised the need for “full public participation, including that of women, youth, indigenous people and local communities” (UNCED 1992: Article 9, Chapter 18). More fundamentally, Agenda 21 linked “participation” to wider agendas of “decentralisation” by calling for water to be managed “at the lowest appropriate level” (UNCED 1992: Article 12 (o) (i), Chapter

18). The 2002 World Summit for Sustainable Development reiterated these themes in a more prescriptive form. Its Johannesburg Plan of Implementation called for civil society “partnerships” and “capacity building” to enable stakeholder participation at all levels of water management (WSSD 2002: Article 25).

These statements of intent are reflected in the widely adopted principles of Integrated Water Resource Management (IWRM). IWRM seeks to combine the insights of diverse stakeholders to maximise the interconnected social, economic and ecological uses of water (GWP-TAC 2000). According to its proponents, IWRM represents the interdisciplinary “best practice” in contemporary water management (see, for example, GWP 2002: IWMI 2007). However, critics of IWRM would point out that despite “extraordinary capital investment” in these ideals, the gap between theory and on-the-ground reality remains extensive (Jonker 2002; Jeffrey & Gearey 2006). Even within the United Nations Environment Programme, the implementation of IWRM has been pragmatically classified as “unfinished business” (IWA/UNEP 2002). Jeffrey and Gearey (2006) go further, arguing that “empirical evidence which unambiguously demonstrates the benefits of IWRM is either missing or very poorly reported”.

These criticisms are resonant of recent experiences of water management – particularly irrigation development – in Cambodia. In an official sense, central government has adopted the ADB’s Participatory Irrigation Management and Development (PIMD) framework to guide future irrigation projects. A key element of this policy is the Irrigation Management Transfer (IMT) process, which seeks to transfer most day-to-day irrigation responsibilities from state agencies to local communities and the private sector. Yet even with the best of intentions, ideas such as “holistic development”, “public-private partnerships” and the “participatory approach” may not be well understood at the local community scale (see, for example, Sneddon & Fox 2007; Rusten *et al.* 2007). It may not always be desirable – or even possible – to superimpose pluralist Western development ideals onto the traditional hierarchical societies of Cambodia. Even at the highest levels of Cambodia’s formal governance, it is difficult to trace the connections between ideas and implementation. Cambodia’s national Water Law was passed in 2007, yet as far as we can determine, this impressive-sounding title has not yet been “backed” with practical policies and regulations. This working paper seeks to provide a much-needed empirical perspective on these unresolved questions of irrigation governance in Cambodia. In particular, it draws on ethnographic research to investigate how “participation” actually works within real communities: in the paddy field, in the commune council (CC) headquarters, and in the FWUC meeting room.

2.3 “Appropriately-scaled” Irrigation Governance?

Theorising the connection between physical infrastructure and social institutions

Since the onset of the Green Revolution, the agrarian landscapes of Southeast Asia have been transformed by modern irrigation infrastructure. In pursuit of centrally-conceived “rural development” objectives, extensive new water supply schemes have been superimposed upon traditional societies and cultures. From Bali to Laos and Cambodia, the technical nature of these new schemes is enabling non-local experts and institutions to take on a much greater role in local irrigation governance. At the same time, indigenous water management institutions are often marginalised or ignored if they do not match the scale and organisation of the new physical infrastructure.

Yet over time, the development orthodoxy of matching modern physical schemes with modern, expert-driven governance has been challenged by an increasing depth of empirical evidence. An early critique was provided by Coward (1976), based on his study of the newly modernised Nam Tan irrigation area in western Laos. Coward concludes that the area's pre-existing water management traditions did not inhibit the modernisation process at all – in actual fact, the retention and adaptation of these traditions strongly contributed to the success of the new irrigation schemes. Rather than becoming irrelevant, traditional leadership roles (such as the village “waterman”) were being adapted to form a crucial “middle rung” of governance, which linked the efficiency of the regional water bureaucracy with the social networks and cultural cohesion of local water users.

In theory at least, this hybrid structure of modern and traditional irrigation governance bears a resemblance to Cambodia's FWUC system. As set out by the Ministry of Water Resources and Meteorology (MOWRAM) and the national FWUC statute, FWUCs are intended to function as independent community organisations, whose leaders are responsible for liaising with higher authorities while remaining primarily accountable to local water users. Yet in practice, FWUC leaders may lack the skills and incentives to do their jobs effectively. Furthermore, FWUC committees may struggle to navigate the pre-existing loyalties and power structures that exist both above and below their “middle rung” on the water governance ladder. The speculative phrasing here is deliberate: the current literature provides little evidence to confirm or dismiss these issues. This working paper aims to provide a more reliable empirical basis for discussing and resolving these potentially significant problems within Cambodia's irrigation governance regime.

In contrast to Coward's work in Laos, Lansing's (1987) study of traditional Balinese “water temple” irrigation presents a more pristine and idealised example of irrigation governance. Over several hundred years of organic development (prior to the Green Revolution of the 1960s onwards), Bali's culturally-embedded water governance institutions (*subaks*) became finely matched to the physical dimensions of its irrigation schemes. This relationship may even have been mutually reinforcing; for example, religious festivals were used to publicly calibrate Bali's complex dual calendar system so that farmers could accurately synchronise their irrigation water requirements (Lansing 1987: 330-332). Working in the opposite direction, the physical flow of water represented an important foundation of Balinese culture and religion. Lansing implies that the multi-dimensionality of these links enabled effective coordination and conflict resolution without the need for the centralised “oriental despotism” suggested by Wittfogel (1957). According to Janssen (2007: 188), Lansing and Kremer (1993) were able to show that “simple bottom-up interactions of *subaks* can lead to good performance of a very complex large-scale irrigation system”.

Superficially at least, Lansing's account of traditional Balinese irrigation seems far removed from the present situation in Cambodia. In comparison to Bali's ancient agro-ecosystems and socio-cultural continuity, Cambodia's irrigation governance institutions could be defined as very recent and very unstable. This argument holds some truth: Cambodia's long history of political disruption and internal migration (especially during the Khmer Rouge period) has completely prevented a synergy of its physical and socio-cultural topographies from developing, notwithstanding the fact that the Balinese case is perhaps unique. Yet in other ways, this argument should be treated with great care. Despite periods of disorder, policymakers should not presume that Cambodia represents a “clean slate” in terms of irrigation structures and irrigation governance. On the contrary, aerial surveys and archaeological evidence suggest

that Cambodians have practised large-scale irrigation agriculture for over a millennium, most famously during the Angkor era (see, for example, Moore 1989). Dating back to the 11th century, the eight by two kilometre West Baray reservoir is an example of Angkor-era infrastructure which is still in use today. Overall, while Cambodia's history of water management may not be as linear, uniform or well-documented as Bali's, it still provides an important backdrop for modern irrigation governance.

2.4 Water Scarcity and the Irrigation Service Fee

Compared across different contexts, what does “paying for water” really mean?

In developed and developing countries alike, most 21st century farmers can now expect to pay a fee in return for access to irrigation systems. Even where upfront infrastructure costs are covered by the state, ongoing operation and maintenance (O&M) costs are increasingly being shifted on to local communities and outsourced to private contractors (Molle *et al.*: Wester 2009: 341-342). This transition has occurred in the context of two (probably related) trends: the neoliberal era contraction of central government budgets, and the Agenda 21 promotion of decentralisation and “subsidiarity”.

In Australia and the United States, water has come to be regarded as a scarce resource with a distinct economic value and farmers must pay a market-based price for their water allocations and entitlements. In contrast, water is rarely seen as physically scarce in Cambodia. However, the economic significance of water is a serious consideration. The new PIMD policy has introduced a new rule for Cambodian farmers to pay an Irrigation Service Fee (ISF) to their local FWUC committee. The ISF in Cambodia and the water fees in Australia are based on very different economic premises. On the one hand, Australia's Murray Darling Basin is infrastructure-rich yet water-poor; it suffers from what Molden (2007) would term a “physical scarcity” of water. To manage this scarcity, the water is rationed by price: the region's farmers must pay a fee for the water itself (i.e. per megalitre). In comparison, Cambodia's ISF is designed to address the very different problem of “economic scarcity”. Cambodia is relatively water-rich, yet is infrastructure-poor; despite the abundance of water, Cambodian farmers do not have the means to exploit it productively. Accordingly, the ISF goes to the improvement and maintenance of water infrastructure and supports the operation costs of the FWUCs. It does not relate to the amount of water actually used.

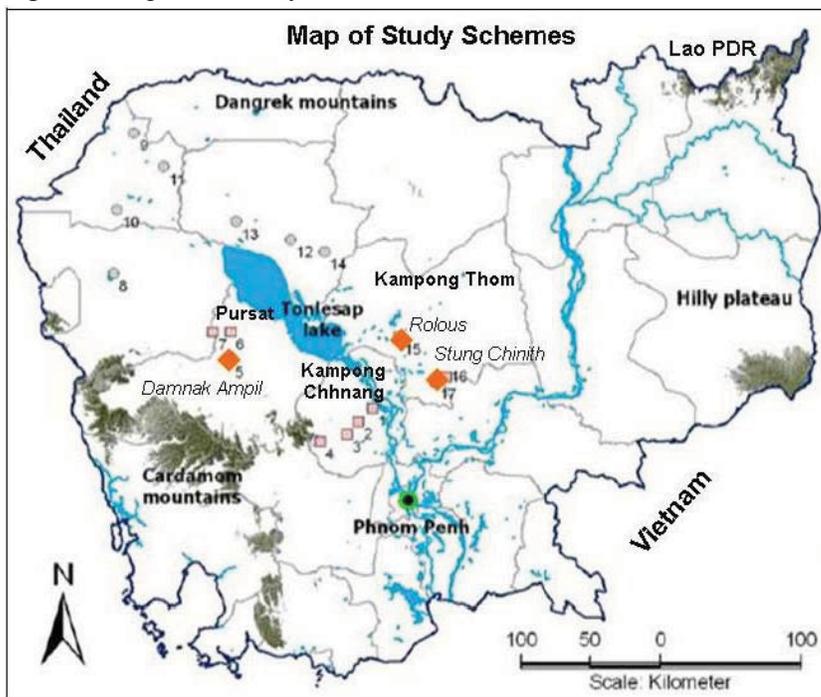
The distinction between “economic” and “physical” scarcity is based on sound economic logic and is well accepted in academic and policy-making spheres. However, when applied to complex local situations, it is a distinction that is apt to become blurred. There are a number of possible reasons for this. First, due to lapses in communication, local people may not understand the purpose of user fees. For example, given that the “ISF” is commonly translated into Khmer as “water fee” rather than “infrastructure fee”, do Cambodian farmers actually know what they are paying for? And how does this perception influence their willingness to pay? Second, a generalised label of “economic scarcity” at the river basin scale can mask acute physical scarcity at the village and plot scales. In Cambodia, this might occur when an upstream farmer blocks an irrigation canal and thus prevents water from reaching the farming plots located further downstream. Furthermore, physical scarcity in the dry season is a growing issue with increased double-cropping often relying on schemes originally designed and built for wet season supplementary irrigation only.

A number of data collection methods were used in this study from 13 July to 18 September 2010 in the three targeted schemes (see Figure 1). Multi-level stakeholder interviews at sub-national and local levels were conducted to obtain multiple perspectives on rural water management issues. Focus group discussions (FGDs), farmer interviews and research dissemination workshops at Kampong Thom, Kampong Chhnang and Pursat provinces were conducted to investigate key stakeholders' self-perceived roles and expectations in irrigation development and management, and to learn from their experiences of working within the framework of water governance in Cambodia. These approaches also sought to determine the level of consistency among the involved stakeholders in regards to understanding key aspects of water governance.

3.1 Site Selection and Mapping

Three irrigation schemes were chosen as case study sites, namely Rolous and Stung Chinit in Kampong Thom province, and DAP in Pursat province,. The case study sites were chosen to best represent other schemes around the Tonle Sap Basin. Consideration was given to the following: the level of participation and coordination in terms of ISF and O&M within the scheme, the development and irrigation infrastructure of the scheme, the FWUC management structure, the involvement of the private sector³ in irrigation management and development, and the management of conflicts over water use during periods of water scarcity.

Figure 1: Map of the Study Schemes



3 The introduction of private sector involvement in irrigation development and management at the western part of the Rolous scheme, Kampong Thom province (see map in the Findings section) was just taking place in the scheme in August 2010.

3.2 Key Informant Interviews

Key informants (KI) at local and provincial level from the Provincial Department of Water Resources and Meteorology (PDOWRAM) and private companies, as well as farmers, FWUC committee members and CC members were identified for interview and discussion through a set of guiding questions. These questions were developed based on the specific roles, expectations and experiences of organisations working in the water and agriculture sector. The purpose of the interviews was to seek information on water related issues.

The research team met with PDOWRAM and FWUC committees to discuss overall management of water in each case study scheme. Points of discussion included:

1. The creation of FWUCs
2. Rehabilitation of the schemes
3. Planning and irrigation development strategies for water related issues (IWRM, IMT, PIMD, ISF, O&M)
4. Allocation and management of water and irrigation infrastructure within each scheme (i.e., main, secondary and tertiary canals)
5. Relationships and coordination between the FWUC committee and the CCs within a scheme that crossed several commune boundaries.

3.3 FGDs with Farmers and Village Leaders

Information was also collected through FGDs. Farmer groups were chosen for their up- and down-stream geographical locations, limited coordination, and regular conflicts during periods of water scarcity. Two FGDs were held within each selected scheme. The first FGD comprised FWUC and village leaders and focused on general information such as type, scale, physical condition and topography of the schemes, canal systems, water allocation, coordination and conflict management, etc. The second session involved the FWUC committee but was also open to non-committee member farmers whose livelihoods were dependent on agriculture, in most cases wet and/or dry season rice farming. These FGDs were designed to collect general data and information about local administration and social issues, especially regarding agricultural activities, income generation and livelihood improvements as well as to inform and update stakeholders about water related issues (scheme development/rehabilitation and FWUC creation).

3.4 Farmer Interviews and Field Observations

Farmer interviews were conducted after the FGDs to verify data and information garnered from the FGDs. Representatives from 12 to 25 households were selected for interview in each of the case study schemes. These households were chosen to represent a range of geographic locations across the scheme: the first group from the lower scheme, the second from the middle scheme, and the third from the higher scheme. Interviews with farmers were conducted privately so as to evoke responses that were not influenced by the presence of a FWUC committee member. These interviews were often conducted in the interviewee's rice paddy where field observations could also be made and consisted of general questions about the use of water resources for agriculture, water allocation, farmer participation and understanding of ISF and

O&M issues concerning water usage as well as local practical solutions and conflict resolution mechanisms. Some of the questions posed in the FGD were asked again in farmer interviews in order to validate the previous responses. The questionnaires designed for interviewing farmer were used flexibly – that is, responses from the first FGDs and KI interviews were used to direct the farmer interviews where necessary.

Field observations were taken alongside the farmer interviews to get more of an idea about present irrigation management, water allocation practice, the physical structure of the irrigation systems, and other water related issues. Importantly, observing the location of the interviewees' rice paddy within the irrigation system contextualised their responses and perceptions of the issues. The field observations provided better opportunity for the team to access and collect as much data and information as possible and to witness first-hand how and where water related issues have occurred in specific geographical conditions. During the discussion, maps produced by the research team were used as a support tool so that farmers could point out the exact locations of critical issues and potential locations for infrastructural solutions e.g., where a canal system could be built to solve water shortage issues or to improve water allocation and management in the area.

3.5 Provincial Workshops

A number of provincial workshops were held in Kampong Chhnang, Kampong Thom and Pursat provinces to collect data and information and to seek further advice that could contribute to better irrigation management and increased agricultural production. The workshop provided a good opportunity for all stakeholders to discuss:

1. A common vision
2. Strategies for improving irrigation systems
3. Key issues and potential solutions
4. Stakeholders' responsibilities in irrigation management
5. Appropriate advice on important methodologies to be established by the team to fruitfully participate in the development of guidelines for water allocation, and the best practices to improve irrigation management and water governance at local level.

3.6 Data Triangulation

Data from the literature review, farmer and KI interviews, FGDs and workshops were cross-checked (through communication with stakeholders) and compiled. This “triangulation” method ensures the reliability of the data and thus data analysis is more convincing.

In-depth data analysis was undertaken to: 1) identify root causes of the water issues and gaps or inconsistencies between policies and farmer practices, and to seek proper resolutions from stakeholders; 2) have a clear understanding of the specific conditions in Cambodia that may help governance initiatives such as PIMD and IMT, and to help FWUCs operate effectively; and 3) assist public policy decision-makers in comparing and evaluating policy alternatives.

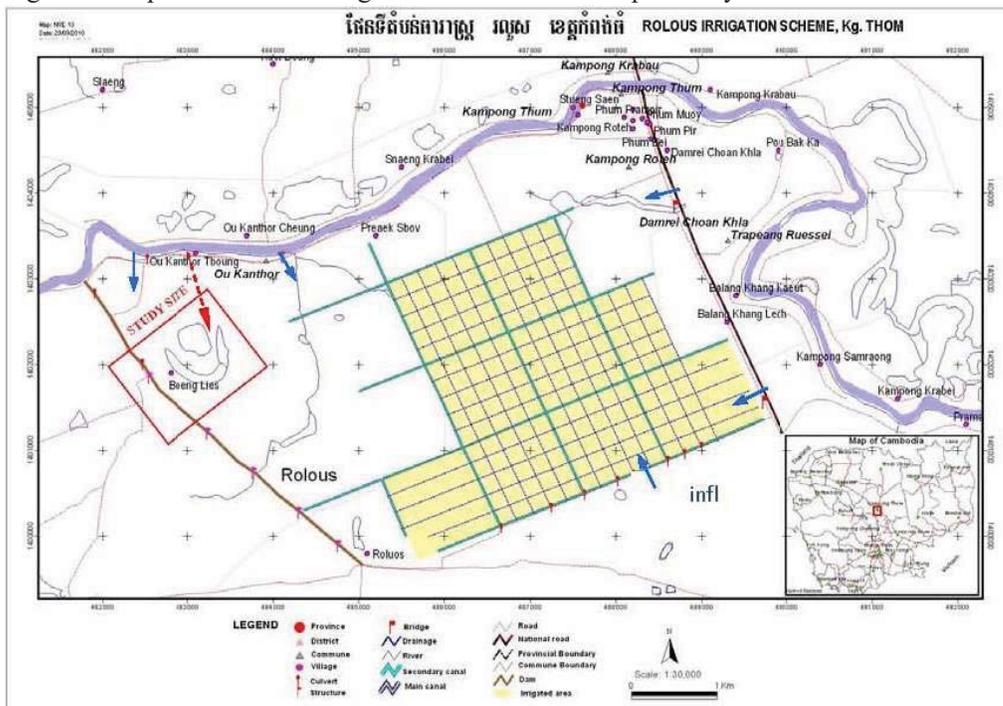
Table 1: Farmer, FGD and KI Information

Scheme	Province	Date	Village	Commune	Farmer	FGDs	KIs	Participants
Stung Chinit	Kampong Thom	11-21 Jul 2010	6	3	15	2	9	Villagers, FWUCs, PDOWRAM and village chief
DAP	Pursat	13-18 Sept 2010	3	7	25	2	10	Villagers, FWUCs, PDOWRAM, CCs, water guard, and village chief
Rolous	Kampong Thom	11 -17 Aug 2010	4	2	12	2	8	Villagers, FWUCs, private company, PDOWRAM, commune and village chief

4.1 Rolous Scheme

Rolous irrigation scheme is located about 7 km to the west of Stung Sen Town (the provincial capital of Kampong Thom province). It is typical of a shallow bundled reservoir. Water flows into the scheme through five areas: Po Bakrong Bridge, Balang drainage pipe, Tbung Cham Bridge, Prek (stream) Sbove, and Prek O Lok (Figure 2). Stung Sen, Prek Sbove and Chong Mong streams contribute the largest proportion of water to the scheme. The command area of the scheme is about 1,009 ha; it crosses seven villages and four *sangkats*/communes⁴: O Kunthor, Kampong Rotes, Damrey Cheankla and Sroyov. There are three topographic levels of paddy land in the Rolous scheme. The lowest level rice paddies are in the south-west, the mid-level paddies are around the centre of the scheme and the highest level paddies are in the east.

Figure 2: Map of the Rolous Irrigation Scheme and In-depth Study Site



A 4 km long dam was built in 1969 to store water for agriculture in the Rolous command area. In 2004, it was rehabilitated by Social Business Khmer (SBK) Research and Development and has seven “gates” or head-structures, two drainage pipes and 13 regulators. Rolous is considered a medium-scale irrigation scheme and it benefits approximately 882 households. Main, secondary and tertiary irrigation canals within the system were built during the Khmer Rouge regime (1975-1979) and have since deteriorated due to lack of regular maintenance and repair. These canals were severely damaged by the Ketsana storm in September 2009. The seven head-structures are used to control the flow of water into the scheme. These gates are closed during the wet-season to store water for use during the dry-season.

4 Data collected from the annual report 2010 of Social Business Khmer (SBK) Research and Development.

Private sector involvement in irrigation development and management began in August 2010 and provides opportunity for dry-season rice crops to be cultivated to the west of Rolous scheme. The privately owned infrastructure will ensure there is water in the main canals close to Boeung Lies irrigation dam during the dry-season. The cost of water services provided by this infrastructure is USD100 per ha per crop; farmers using the private canals must also pay the operational cost for pumping water from the canal to the paddy fields which costs an additional USD50-60 per ha per crop. Before the private company came to the area, some farmers would spend around USD60-USD100 per ha per crop for pumping water from the river to the main canal and from the main canal to their rice fields. The cost of this pumping differs from one farmer to another, depending on how far his/her rice field is from the main canal.

Table 2: Summary Information on the Rolous Scheme

Description	Rolous
Built	1969 (dam) 1975-1979 (canal systems)
Rehabilitated	2004
Size (command area in ha)	1,009
Wet season in ha	610
Dry season in ha	376
Physical layout	Shallow bundled reservoir
Scheme type	Gravity-fed system
Year FWUC was established	2004
Communes	3
Villages	7
Households	882

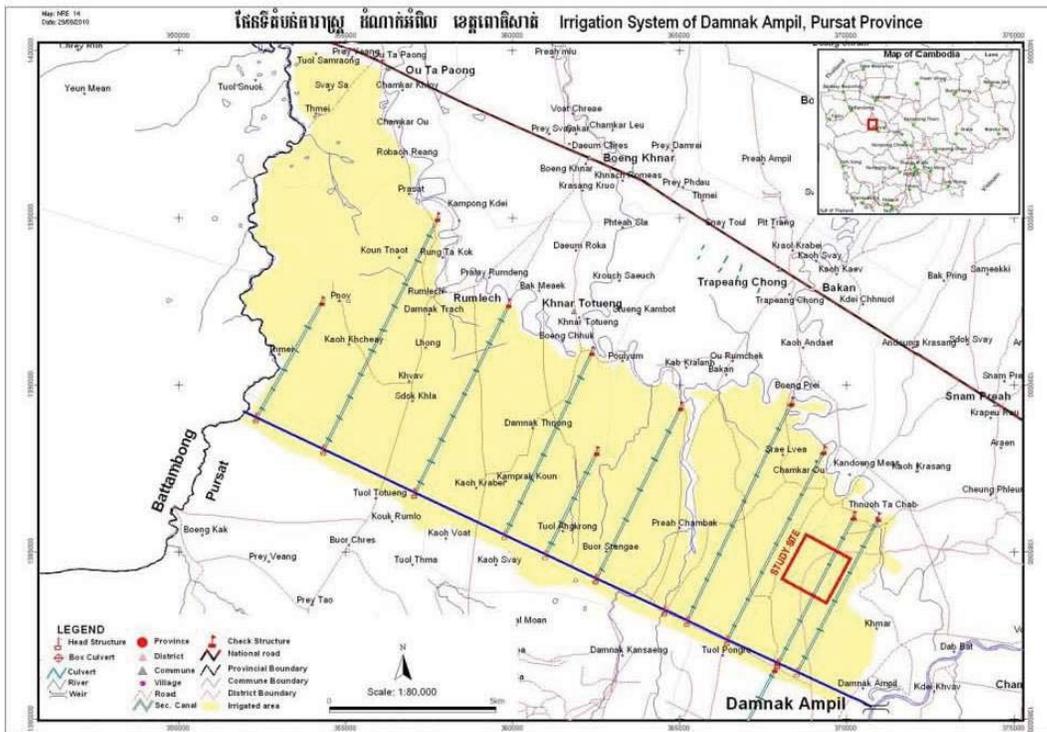
Both wet and dry-season rice are cultivated in Rolous; however dry-season rice can only be cultivated in the northern and western areas of the scheme where irrigation infrastructure and access to rivers facilitates it. Wet-season cultivation is dominant and covers approximately 610 ha compared with dry-season cultivation, which covers approximately 376 ha. Dry-season rice farming is becoming increasingly popular as the yield is approximately two times that of wet-season rice (which is only approximately 1.5-2.5 tonnes per ha). The increase in dry-season farming has put a strain on water resources in the area, in particular towards the end of the wet-season when the planting of dry-season rice begins. Even with the high yield that dry-season crops can produce, the fluctuating market price of rice relative to the production costs (e.g. use of pumps, fertilisers and privately owned canals) is still a key factor influencing the willingness of farmers to grow a dry-season crop.

Rolous irrigation scheme had two FWUCs in 2004: one around Prek Sbov village and the other around Rolous village. In 2007, however, on realising that they did not have the capacity to manage the scheme well the Prek Sbov FWUC committee members asked the Rolous FWUC leader to take charge and manage the whole area. This was arranged and the two communes were integrated. The Rolous FWUC has four members: the leader, the deputy, the financier and the accountant. There are four FWUGs, which are sub-units of the FWUC in Rolous. The FWUGs are represented by four villages, namely O Kunthor Tbong, Prek Sbov, Rolous and Kampong Samrong.

4.2 Dannak Amphil (DAP) Scheme

Dannak Amphil (DAP) scheme is located about 15 km to the west of Sampao Meas (Pursat town) of Pursat province and approximately 190 km northwest of Phnom Penh. It is a water basin surrounded by highlands and lies in the heart of Pursat province (Figure 3). The primary river contributing to DAP scheme is Stung Pursat River. A number of downstream irrigation schemes share water from DAP, namely Kroch Seuch, Anlong Svay, Wat Leap and Kampang. The DAP scheme command area covers approximately seven communes and 50 villages and is considered a large-scale irrigation scheme.

Figure 3: Map of the DAP Scheme and In-depth Field Study Site



The DAP scheme has wooden gates and was built between 1976 and 1978 during the Khmer Rouge period. It was designed to divert water from the Pursat stream into a main canal that was supposed to then supply water to the whole command area of about 27,000 ha. The irrigation system was unmaintained until 2005 when works began to refurbish the main canal: although this was completed in 2010, most of the secondary and tertiary canals remain in a poor state. The main canal is 25 km long and connected by eight secondary canals, three head-structures and seven regulators. There are still a number of farmers who do not benefit from the canals and have to use their own means to divert or take water from the main canal to their fields. The Japan International Cooperation Agency (JICA) rice field demonstration project is due to be carried out between 2011 and 2013. It will cover approximately 100 ha shared by three villages: Khma, Kandeung Meas and Thnous Tachap. The project will involve the construction of a complete canal system which is intended to demonstrate to local farmers how further irrigation infrastructure development should be carried out.

In Pursat, only 10-11 percent of paddy fields can be irrigated for dry season rice cultivation⁵. Within the DAP scheme, wet season rice is cultivated on approximately 20,000 ha and dry season rice on approximately 5,000 ha. In the last few years, farmers have increasingly been trying to cultivate dry-season rice whenever they have adequate amounts of available water. This increase in dry-season cultivation has thus occurred in paddies that are close to the main canal. Current statistics report rice yields of 2.5-3 tonnes per ha in the dry season, and 2-2.5 tonnes per ha in the wet season. Although these statistics represent the average, water shortages have been a serious issue for farmers in Pursat where periods of drought have occurred in the wet season in the last few years and are becoming longer each year, sometimes to the extent that farmers with fields far from the irrigation canals have to use a pumping machine to supplement rain water.

Table 3: Summary of Information on the DAP Scheme

Description	DAP
Built	1976-1978
Rehabilitated	2006, 2010
Size (command area in ha)	27,000
Wet season in ha	20,000
Dry season in ha	5,000
Physical layout	Main canal, secondary and tertiary canals
Scheme type	Diversion weir/main canal
Year FWUC was established	mid-2007
Communes	7
Villages	50
Households	NA

The World Bank supported PDOWRAM to establish the DAP FWUC, which was registered at MOWRAM in 2004-05. This FWUC committee consists of a chairperson, two vice chairs, one finance officer and one accountant (all of them CC members). The first commune councillor (first *chum tup*) of Lolok Sar commune chairs the FWUC. According to PDOWRAM, when the scheme is completely restored, FWUGs will be established to take responsibility for water allocation along the secondary canals. PDOWRAM plans to provide training about PIMD and other related water resource management principles to the FWUC committees, FWUGs, communes and villagers living along the main canal so that they can better manage the irrigation system.

4.3 Stung Chinit Scheme

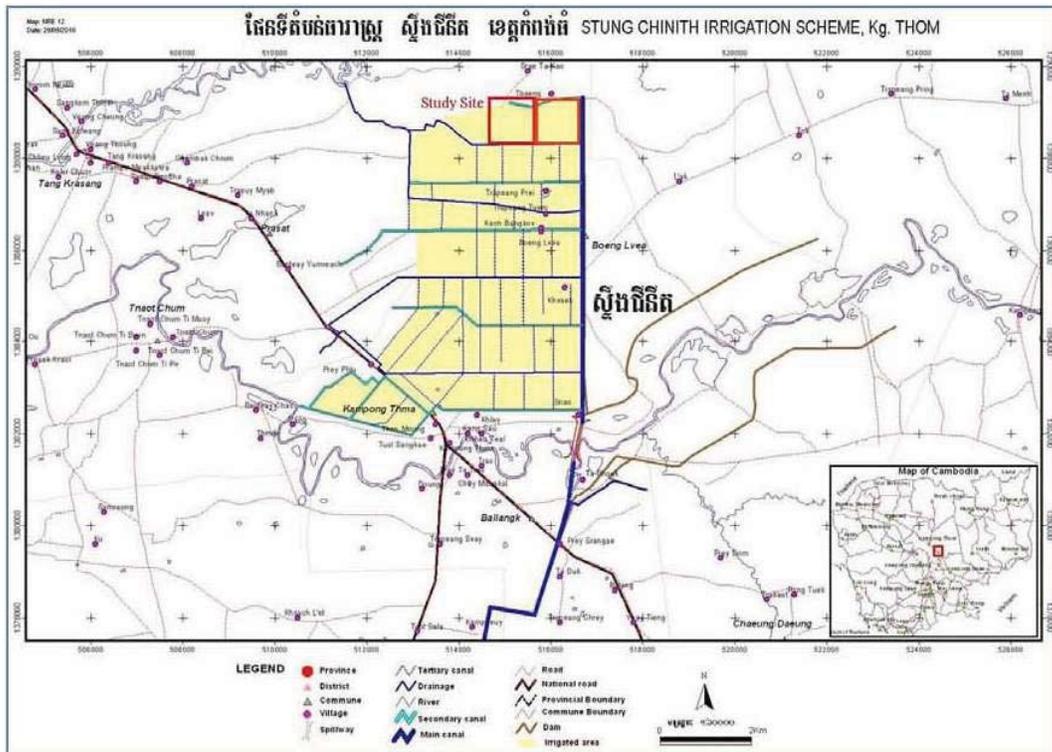
Stung Chinit scheme is located in Santuk district, Kampong Thom province, approximately 140 km north of Phnom Penh. The main water source that feeds the scheme is Stung Chinit River. The scheme irrigates an area of 2645 ha, benefitting 3000 households across 24 villages within three communes⁶; it is considered a medium-scale irrigation system (Figure 4). The

5 Information from PDAFF Director, Pursat, 2010.

6 Data from interviews with PDOWRAM officials in Kampong Thom, 2010

paddies were reorganised into rectangular sections in order to accommodate the irrigation canals; there are approximately 48 paddy blocks each covering approximately 50-100 ha⁷.

Figure 4: Map of Stung Chinit and In-depth Case Study Area



The irrigation system was built in 1978 during the Khmer Rouge period and was rehabilitated in 1980-87, 1989, 1990 and again in 1993 by MAFF. In 2000 and from 2002 to 2008, it was studied and renovated as part of the Stung Chinit Irrigation and Rural Infrastructure Project (SCIRIP), which was jointly funded by the ADB, Agence Française de Développement (AFD), and the Royal Government of Cambodia (RGC). SCIRIP focussed on: 1) the creation of FWUCs; 2) improvements to the farming systems⁸; 3) the restoration of irrigation infrastructure⁹; and 4) the development of access roads and rural markets¹⁰. The Stung Chinit scheme was finally reconstructed and consists of a diversion weir and 700 m long spillway, a 16 km main canal, five secondary canals, a few exemplary tertiary canals¹¹ and a main reservoir designed to store 23 million cubic metres of water to irrigate the whole command area. Most of the canals in the system are gravity-fed.

The farmers of Stung Chinit mainly cultivate traditional wet-season rice, and some dry-season rice. They also do fishing and raise livestock. The Stung Chinit scheme was designed to supply enough water for 1500 ha of wet-season rice paddies and 500 ha of dry-season rice

7 Data from interviews with FWUC committee member, Stung Chinit, 2010

8 Funded by AFD and implemented by MOWRAM

9 Ibid.

10 Funded by ADB and implemented by MRD

11 Designed to demonstrate how and where further tertiary canals may be built. However, since the completion of the SCIRIP project, no further tertiary canals have been built by the farmers.

paddies. There is an abundance of water in Stung Chinit in both wet season and dry season. Despite this, few farmers opt to cultivate dry-season rice. Instead they look for jobs elsewhere, for example in the rubber plantations of Tumring, or they grow other crops e.g. cucumbers and watermelons. Those who cultivate dry-season rice are faced with insect infestation, fairly low yields of 3-4 tonnes per ha (where wet-season yields are 2-2.5 tonnes per ha), destruction of crops by cattle, the high price of fertilisers and pesticides and volatile rice prices.

Table 4: Summary of Information on Stung Chinit Scheme

Description	Stung Chinit
Built	1977
Rehabilitated	1980-87, 1989, 1990 and 1993 2000, 2002 and 2004
Size (command area in ha)	2,645
Wet season in ha	1500
Dry season in ha	500
Physical layout	Complete canal systems (main canal, secondary, tertiary canals and drainage). Divided into 48 blocks of 50-100 ha.
Scheme type	Spillways
Year FWUC was established	2002-2004 (registered 2006)
Communes	3
Villages	26
Households	3,000

The FWUC in Stung Chinit was formally established in 2002 and registered by MOWRAM in 2006 (Chem *et al* 2010). A new committee was recently elected in 2007, with 26 villages across the three communes in the command area participating¹². The FWUC has 10 members¹³ consisting of the chairperson, the first vice-chair in charge of irrigation and the second vice-chair in charge of O&M (both with one assistant each), the financial officer and the secretary who is in charge of internal regulation and conflict resolution. In addition, the FWUC has three support staff: one director who is in charge of general management, consultancy, reporting, planning and communication with a support committee, and two assistants one of which is in charge of general affairs and the other is responsible for financial works. The PDOWRAM is responsible for the management of water in the main canal drainage infrastructure while the FWUC committee is responsible for the secondary canals and other drainage. FWUGs will be established to manage the tertiary and drainage canals.

12 Based on communication with FWUC committee member, 2010

13 There are five mandated staff members (one chairperson, two vice chairpersons (one as finance officer and one as secretary) and five supplementary staff members (two assistants for each vice-chair and three support staff including one director with two assistants).

5.1 Introduction to Findings

Water governance manifests differently in each of the case study schemes. This is due to a number of factors including differences in scale, physical infrastructure and structure of water governance bodies, farmer participation and coordination, internal capacity of the FWUC committees, and external support for the FWUCs in individual schemes. Findings from interviews and field observations are presented in the context of how irrigation systems are actually governed and managed in rural Cambodia, and the extent to which local people are involved in scheme management. This chapter is divided into three themes that encompass the information gathered from the interviewees: actual governance arrangements, farmer participation, and stakeholder coordination. The four elements of irrigation governance (system maintenance, water allocation, coordination and conflict management), as identified in the research questions of this study, transcend the thematic divisions of this chapter and are addressed as case study examples throughout the chapter.

5.2 Actual Governance Arrangements

5.2.1 Legitimacy of FWUCs

The recognition of FWUC legitimacy was strongest at PDOWRAM level; villagers and MOWRAM did not always fully recognise the FWUC committee as a legitimate governance body. The FWUCs in DAP and Stung Chinit are formally registered with MOWRAM. Rolous has had an operational FWUC since 2004, and has already held three elections for its committee members (in 2004, 2007 and 2010¹⁴); however, it has not yet been registered with MOWRAM even though it is formally recognised by the villagers and PDOWRAM. A Rolous FWUC representative reported that all requirements stated in the FWUC establishment statute were fulfilled, but the budgetary limitations of both the FWUC and PDOWRAM meant that a MOWRAM representative was not invited to attend the election. Although recognising the existence of the FWUC committee as a governance body, some farmers explained that because of the lack of formal written registration from MOWRAM they had little trust in the FWUC committee's ability to manage the scheme. These feelings were "validated" by the FWUC committee's inadequate action in the wake of the Ketsana storm in 2009 and its inability to demonstrate technical and agricultural capability.

An interview with PDOWRAM representatives in Pursat revealed that donor agencies had advised that a policy be set in place to prevent community members already holding positions of authority (e.g., CC members) from being elected as FWUC committee members¹⁵. This advice had been fairly influential until recently. The newly established FWUC in DAP has seven CC members, one from each of the communes within the command area. The Pursat PDOWRAM justified this, saying that the CC representatives are "well known and popular, have had management experience, have displayed good leadership in the past, own rice paddies in the command area and have an adequate economic situation". Based on these factors, a

14 The most recent election was conducted in May 2010; a PDOWRAM staff member was invited/attended (communication with FWUC leader in Rolous, 1 April 2011).

15 This was not included in the guidelines on FWUC establishment.

group of middle class¹⁶, popular, community members were appointed in the FWUC election in Pursat province. Similarly, the deputy chair of the FWUC in Rolous was a former CC member and was elected on similar grounds to the appointed DAP FWUC committee members i.e. for being known in the community as honest and transparent in financial dealings. Furthermore, the deputy has good networks within the state system and had previously displayed good leadership by being responsive to the demands and problems of farmers. In contrast, the FWUC committee in Stung Chinit entirely consisted of non-position holding community members.

5.2.2 Actual Roles of the FWUC

When a FWUC is established, the PDOWRAM, in collaboration with the FWUC committee, creates a statute outlining the roles and responsibilities of the committee as well as detailing issues such as estimated ISF requirements. This statute is most commonly based on a template included in Circular No.1 on the Implementation Policy of Sustainable Irrigation Systems (MOWRAM 1999). The mandated roles of FWUC committees, therefore, are similar within each scheme.

The differences between the roles of the FWUC committees primarily lie in their technical and financial capacity as well as the level of communication between the FWUC members and other stakeholders. Although the FWUCs in each case study scheme achieve varying levels of operational success, the common roles of the FWUC committees as revealed through the interviews and field observations, are:

1. To act as a “point of call” for farmers when issues of water management arise that they cannot resolve among themselves and to discuss these issues with PDOWRAM, CCs and sub-national authorities in order to resolve them
2. To manage water allocation and resolve minor conflicts within the community
3. To organise the collection of ISF for O&M
4. To encourage and promote farmer participation
5. To coordinate with authorised provincial departments, local authorities, academic centres, private sector and NGOs for scheme development and maintenance
6. To disseminate government policies and report/share information with farmers, government and other concerned stakeholders.

Interviews in Rolous, particularly with farmers, revealed that the FWUC committee there lacks the capacity to respond quickly and adequately to resolve issues within the irrigation command area. For example, when the farmers expressed an urgent need to repair the infrastructural damage caused by Ketsana storm in 2009, the FWUC was slow to respond which created distrust in a number of farmers; said damage had still not been addressed at the time of writing. Despite this, farmers would still relate their water issues to the FWUC committee and this position as the “point of call” or mediator had become its primary role. The FWUC committee would ordinarily report farmers’ issues to PDOWRAM or the CC and a solution would be arrived at and communicated to the FWUC committee who in turn would pass on the information to the farmers.

¹⁶ Farmers who spend approximately USD2.5 per day (on food and agricultural inputs), have a paddy field of approximately 2-3 ha, 3-4 head of cattle (cow or buffalo) or 1 two-wheeled tractor.

In DAP, FWUC committee members and a village leader explained that even though the farmers are not always satisfied with the response time to their requests, the issues are often eventually solved by the FWUC committee in collaboration with PDOWRAM. They believed this was largely true due to the good system of communication between the FWUCs, CCs, district governors and PDOWRAM. Farmers of DAP said that they supported their FWUC committee and trusted them. It was reported that the committee has an aptitude for solving water conflict issues. For example, during a recent period of water scarcity, farmers raised an issue regarding water allocation to one of their CC members who was also a member of the FWUC committee, who contacted PDOWRAM which sent a representative to settle the issue. Of course, this method of resolution is only possible when issues can be solved through practical and technical assistance i.e., when there is still water in the main canal and agreements such as the re-adjustment and re-allocation of water can be reached.

Kampong Thom PDOWRAM stated that the FWUC was established to promote the management of water and help local beneficiaries improve their agricultural productivity. It also said that Stung Chinit FWUC members presently only report issues relating to ISF collection and conflict management but that they are encouraging the FWUC to consult them on other matters as well.

...the FWUC committee, which was elected by the farmers, must consider selecting good fertilisers, seed, pesticides, crop types, developing plans and leading the farmers to get the good yields.¹⁷

With technical support from PDOWRAM and PDAFF, the DAP FWUC committee recruited a number of farmers to attend an agricultural training course on such activities as how to make and apply compost and manure and how to raise cattle. These awareness building activities were seen as very significant by the farmers as they help to increase their produce. PDAFF selected key farmers from Kampong Thom province to train others in agricultural extension practices. PDAFF, PDOWRAM and the FWUC committee hoped that these farmers would demonstrate the techniques they had learnt to others and that on seeing the success of the new techniques, more farmers would also adopt these methods. In fact, few farmers adopted the new techniques that were taught to them after PDAFF left.

Conflicting opinions about the water allocation capability of the FWUC committee were given during the farmer interviews and FGDs in Stung Chinit scheme. Some farmers said that water allocation was working smoothly under FWUC management and that the committee responded well to local water allocation issues and was often able to provide technical solutions to help the farmers. Other farmers expressed discontent at the lack of help from the committee in solving problems relating to tertiary canals within and between individual paddy fields. A villager explained, however, that though the role of the FWUC does encompass trying to solve farmers' problems, they want the farmers to gain knowledge and experience by participating more in farming activities rather than being solely dependent on the committee.

FGDs with farmers in Stung Chinit revealed that because they paid the ISF, farmers believe that the FWUC committee is responsible for ensuring adequate water allocation to their rice fields i.e., managing the tertiary canals and drainage infrastructure. On the other hand, the FWUC committee felt that their role is not to take care of water in individual rice

17 Interview with Director of Kampong Thom PDOWRAM, 2010, PDOWRAM Office

paddies, but more to take care of water allocation in the whole block¹⁸ and to manage O&M of secondary canals and other large-scale infrastructure such as roads and head-structures. This misunderstanding has caused water allocation issues which are difficult to solve. Nonetheless, the FWUC committee has tried to engage farmers and cooperate with them to tackle these issues.

Methods of achieving financial transparency and the FWUC's authority over expenditures differed between the case-study schemes. In Rolous, the FWUC committee had no discretionary power and all expenditures had to be signed off by the CC. The opposite was true of Stung Chinit; here, the FWUC committee had full discretion over expenditures, but was expected to report on how much money had been allocated and to what to the farmers at regular meetings (held once or twice a year). This was not applicable for DAP as no ISF was collected there.

To secure money for sustainable scheme O&M, the Stung Chinit FWUC committee devised an ISF strategy under the guidance and advice of MOWRAM and external donors, mainly ADB and AFD. Based on the interview with the Stung Chinit FWUC, the amount of ISF collected from farmers was not enough to pay the previous year's O&M costs and only covered approximately 70 percent of total expenditure. The remaining 30 percent was contributed by the government and AFD through Group d'Échanges et de Recherche Technologiques (GRET) and the Centre for Studies and Development of Cambodia (CEDAC). Now that financial support from AFD through GRET and CEDAC has ended, it is necessary to increase the ISF to cope with their monthly expenses. The ISF strategy was designed to allow sustainable O&M after external support ceases; however, some farmers suggested that the plan may not be viable (see the next section on participation). In Rolous, the FWUC committee is able to collect some ISF contributions, but because farmers in the southern region of the scheme lack confidence in the committee, only a small percentage of farmers (30 percent of total households in the scheme) are willing to contribute. The lack of ISF contribution in DAP was reported to be partly because the main canal has not been fully rehabilitated; consequently, the scheme is unable to provide adequate irrigation services to farmers¹⁹.

5.2.3 FWUC Capacity: Resources and Challenges

Human resources and technical and financial capacity are closely linked and essential for FWUCs to fulfill their management tasks. The level of capacity varies significantly in the different case-study schemes depending largely on the level of support mechanisms in place for the FWUCs. Although water allocation is supposed to be a key role of the FWUC committee, it was evident in each of the case-study schemes that the scale of the command areas is far too large for this to happen. FWUC committees interviewed in this study had neither the human resources nor the technical and financial capacity to solve such problems. While FWUGs are supposed to support the function of the FWUC, to a large extent they exist only in name; they do not provide any notable support to the FWUC committee in water allocation or water conflict resolution.

PDOWRAM plays an important role in each of the schemes in providing technical and to a lesser extent, financial capacity to the FWUCs. It was apparent that the coordination between the FWUC and the PDOWRAM is very important to building FWUC members' technical capacity in terms of water allocation and system maintenance. Although there were reports of

18 In the Chinit Scheme there are about 48 blocks of 50-100 ha.

19 Based on communication with a FWUC member, 2010.

water related issues in DAP, on the whole farmers felt that water allocation is being managed smoothly. This suggests a good level of technical capacity within the DAP FWUC. PDOWRAM revealed, however, that the training and other support they had been giving to the FWUC committee was not developing their ability to operate as independently as the PDOWRAM would have liked.

Farmers' perception of the technical capacity of their FWUC committee was influenced by the infrastructural limitations of the scheme which are intrinsically linked to financial capacity (i.e., lack of money means lack of infrastructure). The broken and undersized head structures and the lack of secondary and tertiary canals in Rolous make it very difficult for water allocation to be managed successfully, especially in the south-western region of the scheme. The Rolous FWUC admitted that water management issues within the scheme are complicated and that the money raised by the ISF contributions is not enough to meet the costs of repairing the infrastructure within the scheme.

Financial capacity is a serious issue in the three case-study schemes. They all require either new irrigation infrastructure, or the repair and maintenance of existing structures. In Rolous, the average collected ISF is less than USD500 (2,000,000 riels) per annum; approximately 3 percent of this is used for hosting meetings and buying stationary and other sundry items for the FWUC committee and the rest is used for O&M. This amount is usually only enough to make some small improvements to the main canal. In 2008, the FWUC received USD1750 (7,000,000 riels) for O&M from the CC who had recently sold the use of the Prek Sbov stream to a private owner to operate a fishing lot. This was a one-off payment and the money was only enough to cover the repair of approximately 200-400m of the main canal in the northern part of the scheme.

The two major problems outlined above could not be resolved to the lack of funding. Rolous farmers that have paddies around Boeung Lies wanted to build a canal between the Stung Sen River and Boeung Lies to ensure water in the lake during the dry season. This canal would enable them to grow dry-season crops without having to pay the annual water service fee, which many of them could not afford, to the private company for use of the main canal. Those who had the money were more willing to contribute a one-off payment of USD50-100 to the FWUC to build this canal than to pay the private company water service fee. Due to two years of poor crops and low yields, a number of farmers could not pay anywhere close to this amount and thus the canals could not be built. Farmers from the Rolous area had suffered annual damage to their wet-season rice crops caused by upstream farmers and fishing lot owners retaining water for their own competing water needs. The farmers here said that they wanted to rehabilitate the canal system (originally built in 1975-1979) or build levees or dams as well as drainage systems between the different land levels (classified as low, medium and high) so as to protect their crops. This would also allow farmers near Rolous village to release water as and when needed without affecting upstream crops (see Rolous Map in Chapter 4). Again, this project for better allocation of water within the scheme had not been implemented due to the lack of financial capacity.

In Stung Chinit, MOWRAM, PDOWRAM, external donors and advisory organisations had provided both technical and financial support (financial aid ended in June 2009). This support significantly increased the technical capacity of the FWUC committee to manage water allocation, and provided money to support the committee's functions as well as to cover O&M costs of the irrigation infrastructure. The external support programme was designed to

gradually “wean” the farmers off external financial support year by year until the end of the project. The FWUC estimated that USD15 (60 thousand riels) per ha per annum was required from each farmer to cover O&M costs. Now that external aid has stopped, there is serious concern over maintaining the budget for monthly O&M and administration costs. At the time of study, the collected ISF only covered approximately 60-70 percent of O&M costs and a number of farmers admitted they were already struggling to pay and would not be able to afford a larger fee. Kompong Thom PDOWRAM stated that this was not a unique situation, and that many FWUCs in Kampong Thom province had collapsed or malfunctioned due to the shortage or cessation of financial and technical support from external agencies.

5.3 Participation

5.3.1 Farmer Contributions to ISF

The long term operation of FWUCs and irrigation infrastructure is dependent on a number of financial sources, but primarily the ISF. While systems similar to ISF may have been successful in other parts of the world, two main problems arise in the Cambodian context. First, many farmers reported not being able to afford the ISF. Second, farmers from DAP claimed that Cambodians have never had to pay for water to grow rice, and they believed that they could get sufficient water from rainfall without having to pay the ISF. A common sentiment was expressed across the three case-study schemes: farmers did not want to pay ISFs if they did not benefit directly from the irrigation scheme. Farmers in each case-study scheme had had a different experience with the ISF and proffered differing reasons for accepting or rejecting it. None of the farmers within the DAP scheme and only 30 percent of those in the entire Rolous scheme command area had paid the ISF, whereas close to 100 percent of the farmers within Stung Chinit irrigation scheme had paid the fee to the FWUC.

Although none of the farmers at the DAP scheme had paid ISF at the time of study, MOWRAM, in consultation with the farmers, arrived at a recommended amount of rice (140 kg per ha per year) to be paid by each farmer household in lieu of cash for the ISF. The recommended amount is 100 kg rice per ha per crop for gravity-fed irrigation and a reduced fee of 60 kg rice per ha per crop for pump-fed irrigation rice to account for the fuel costs incurred (Chem *et al.* 2010). The FWUC committee of the DAP scheme reported that farmers may agree to pay the ISF once the benefits of the irrigation system could be demonstrated. Therefore, the committee believes that the irrigation system must be complete and properly functioning before the scheme can be self-sufficient and independent of external financial aid.

In Rolous, most of the farmers who contribute ISF live around Boeung Lies and are beneficiaries of the current irrigation infrastructure. These farmers have generally paid USD1.25 (five thousand riels) per ha per annum and some had paid as much as USD2.50 (10 thousand riels) per ha per annum. A number of farmers here were even willing to pay a one-off USD100 (400 thousand riels) service fee to the FWUC to build a new canal between Stueng Sen and Boeung Lies rather than pay the same amount plus the price of pump fuel each year to the private company for use of the main canal. Many however had not been able to afford this for the last couple of years, let alone the normal service fee of USD1.25 per ha per crop per year due to bad harvests. Farmers from the area around Rolous village stressed that if they felt the FWUC committee was working to ameliorate their situation, they would be willing to pay the ISF. However, at the time of study little support had been given to this group of farmers. Consequently, the collection of ISF in this region of Rolous scheme had been unsuccessful.

Farmers who paid the private company fee of USD100 live predominantly to the west of the privately owned main canal. This area receives sufficient, reliable and timely amounts of water from the canal and farmers have achieved greater and more consistent yields. Furthermore, the private company promises its clients full financial compensation for crop failure should it be unable to provide adequate water for cultivation, thus markedly reducing the risk to farmers' livelihoods. Although interviews with farmers in this region were not within the scope of this research, it may be inferred that they were content to pay the significantly higher private service fee because they received reliable irrigation services, and insurance compensation from the company, in addition to having steadier and larger incomes.

The FWUC in Stung Chinit collects ISF from all the farmers within the irrigation scheme. The ISF rate at the time of study was USD6.25-7.50 (25 thousand-30 thousand riels) per ha per annum which is to be increased to USD15 in 2013 (60 000 riels) so as to ensure that O&M costs can be covered without having to rely on external funding. Farmers in the community generally expressed concern about the imminent increase in ISF. During the interviews, one farmer said:

...I don't agree with increasing the irrigation service fee. I pay only 30 thousand riels per year. I spend around two hundred thousand riels per hectare on fertilisers, seedlings, labour (eight thousand riels per day) and other necessities so I cannot afford to pay anymore... (Sre Ta Kaor villager, Stung Chinit Scheme, 2010)

It is generally agreed that the ability of the Stung Chinit scheme to maintain O&M post-external funding will depend on whether the farmers manage to shift from mono-cropping to double or triple-cropping which would mean they could then afford to pay the increased ISF.

5.3.2 Farmer Participation in Meetings and Elections

It was apparent from the farmer interviews that many of them had ideas about what should be done to solve irrigation problems. It was also apparent however, that in all of the schemes some of the farmers had trouble getting a response to their ideas from the CC, FWUC committee or local authorities either due to a lack of funds or an alternative agenda held by the committees or local leaders. In other cases, farmers simply did not want to participate in FWUC activities.

The FWUC committee in Rolous was less responsive to the requests of the farmers with land near Rolous village than to those with land near Boeung Lies. When asked about participation in the FWUC election, the farmers from around Rolous said they were reluctant or did not want to take part because they had no trust in the FWUC committee and felt they never got help from them. In Stung Chinit, however, farmer participation in the FWUC elections was high, and farmers in all 25 villages across all the communes within the command area voted. Although some farmers in DAP responded that they would vote for the current FWUC members when the election was organised, at the time of study they had not yet had the opportunity to vote.

Despite wide participation in electing FWUC committee members, participation in irrigation related dialogue is not particularly strong in the Stung Chinit scheme. One farmer reported that the people are not willing to participate or listen to the committee members because they do not see the committee as a group with any authority or power.

5.4 Stakeholder Coordination

5.4.1 Local Coordination

Coordination and information flow between all relevant stakeholders from local to national scale is critical to implementing PIMD, yet field interviews and observations revealed that this remains inconsistent within and between stakeholder groups across the three case study schemes. Furthermore, conflicts emanating from water scarcity, lack of camaraderie and inequitable water allocation, among other factors, commonly arise in each of the schemes.

Theoretically at least, FWUCs are to delegate the management of small tertiary canals (between paddy fields) to FWUGs. Although FWUGs had been established (e.g. in Rolous), their significance was small and while there was some communication within FWUGs, there was little to no communication between them. In Stung Chinit, the FWUC committee organised separate meetings in each village within the scheme to discuss water related issues with farmers. The Stung Chinit FWUC leader stated that 30-50 people from each village are expected to attend the meetings, but these numbers were not always met. One Prasat villager stated that only 10-30 farmers from his village would attend which did not represent all of the farmers. Overall, it was stated that approximately 50-60 percent of the scheme's total number of farmers had attended these meetings.

Examples of self-organised farmer coordination were seen in Rolous, where small groups of farmers with adjacent fields had pooled their money to pay the fuel costs of irrigation pumps. This local coordination however was found to only occur in the rice fields near to the main canal in the west. Elsewhere in the scheme farmers faced similar co-ordination issues to farmers in other schemes often related to the over use of fertilisers which affect downstream rice paddies, and the cutting of dykes and levees without consulting neighbouring farmers.

Infrastructure development is vital to the effective and timely allocation of water; however, it requires a high level of commitment and participation from all stakeholders. Lack of cooperation and commitment from farmers of the farmers was often found to be a major barrier to infrastructure development in the case-study schemes. In DAP, farmer interviews revealed that most farmers are willing to allow new construction or restoration of the tertiary canals that were built in the mid 1970s; however, farmers with small rice paddies objected to any canals being built at all as the construction would require them to sacrifice a portion of their already insubstantial land which would have a significant effect on their income and livelihood.

...I have only a very small paddy plot of about 30 m square. I live alone. I need to rent it to get some money to buy things from the pagoda. If the canal is built, it will cut across the middle of my paddy land, I will lose land, so I would not agree to contribute my paddy land... (Kmar Villager, DAP Scheme, 2010)

A general sentiment expressed by many of the farmers interviewed from each case study scheme was that they would be willing to contribute money and cooperate in projects that would bring them quick and direct benefits and would not incur further risks to their livelihoods.

The Pursat PDOWRAM director pointed out that the key criteria for successful management and allocation of water by the FWUC committees are technical capacity, coordination and good information flow/communication between PDOWRAM, FWUC and local farmers and villagers. More specifically it is necessary for FWUC committees to be

aware of: 1) the need for irrigation water during the dry spell in the wet season; 2) when and where water scarcity may occur in the dry season; and 3) the possibility of water shortage at the beginning and the end of the wet season. The PDOWRAM officer pointed out that this awareness must be accompanied by the capacity to plan, allocate or store water as required on their own (i.e. ideally without PDOWRAM's guidance). Moreover, FWUC committees must be able to ensure that their members and farmers 1) understand these issues well, and 2) get proper agricultural knowledge.

Two scales of local coordination issues or conflicts were found to occur across the three case-study schemes: 1) between neighbouring farmers, and 2) between farmers from upper and lower regions of the same scheme. At the local scale, coordination and collaboration between farmers was often inhibited by the fact that farmers who share adjacent rice paddies often come from different villages that are kilometres apart. It was observed and reported that this situation makes it difficult for farmers to develop camaraderie and mutual trust and to amicably resolve issues regarding their rice paddies. In the DAP and Stung Chinit schemes, conflicts regarding broken levees between neighbouring fields often occur where farmers have allowed their buffalo to trample levees to transport rice or let water into their own rice fields, and more often than not left the levees unrepaired²⁰. Understandably, such action leads to conflict as the victims would lose their water and with it their investment in fertiliser/pesticide and the results of their hard work, ultimately resulting in reduced rice yield and livelihood.

The Kampong Thom PDAFF noted that at the time of study, a number of farmers in Stung Chinit scheme were not taking good enough care of their rice crops. After planting rice (broadcasting seeds) they would abandon leave their field to find work elsewhere until harvest time. It was often the case that farmers in neighbouring fields would cut the levees of these absent farmers' paddies to take water to their own rice fields. When interviewed, one farmer said:

...I used to chop/cut down the dam/levee and steal water from a Sre Ta Kaor villager. That water can be used for some rice fields. We do it because Sre Ta Kaor villagers can receive more water from the drainage. (Sangkrou Villager, Stung Chinit Scheme, 2010)

The situation in Rolous demonstrates the coordination struggles and conflicts that arise over water allocation at sub-scheme level, between upstream and downstream water users with differing water needs. The environmental issues are annual flooding of Rolous and Sroyov areas, which began to occur after the renovation of the Rolous irrigation dam, and poor water allocation at the scale of the command area. These have been the primary causes of conflict between farmers. There are essentially four groups of water users in the Rolous scheme which require water at different times of the year and in different quantities. The first group consists of O Kunthor farmers living to the east of the main, privately owned, canal near Boeung Lies; the second comprises farmers living and farming near Rolous village in the south-west; the third consists of the private fishing lot owners operating in Prek Sbov stream; and the fourth includes those farmers with fields in the central to north-east region of the scheme. The irrigation infrastructure does not meet the quantity, or the temporal demands of these four water user groups. Every year, the FWUC committee with the support of the CC and PDOWRAM, has tried to lobby the FWUC farmers to discuss and negotiate water allocation strategies for the wet-season. However, the actual beneficial outcomes of these efforts had been few, especially for the farmers in the Rolous village area whose problems cannot be solved without fundamental re-development of the scheme's infrastructure.

20 Interview with villagers in Tbeng Village, 2010.

In DAP, where the irrigation system runs through several villages, water allocation conflicts had arisen annually as villagers from Kandeung Meas village, located near the lower part of the secondary canal, would close the canal that takes water to the upper villages of Khma and Thnous Tachap to use the water for their own purposes. Farmers from Kna and Thnous Tachap reported their anger at this annual conflict over water supply.

5.4.2 Regional Coordination

Theoretically, communication mechanisms between PDOWRAM and FWUC committees seemed to be well established in each of the case-study schemes, but not in practice. Coordination at this level had some failings, primarily with regard to ineffective training and lack of financial resources. Other important relationships at a larger than local scale include that between local government bodies and private companies, donor agencies, other provincial government departments (e.g. PDAFF) and the relationship between neighbouring FWUCs that rely on i.e. share the same body of water (e.g. in the case of DAP).

The PDOWRAM and FWUC committees of all three case-study schemes communicate on a regular basis, which is partly because all of the schemes are not far from PDOWRAM offices. A PDOWRAM officer would often come to the scheme and meet with one or some of the FWUC members to assess the water levels in the fields and advise on the opening and closing of the head-structures. In this fashion, the PDOWRAM provided technical assistance to the irrigation schemes.

PDOWRAM has maintained close support for the DAP FWUC over the past two to three years. After the irrigation system was built, PDOWRAM continued to be very closely involved with management decisions within the scheme so as to build the FWUC's technical knowledge and independence. At the time of study it was reported that all water allocation decisions had been made through consultation and consensus between the FWUC committee and PDOWRAM. For example, whenever the FWUC wanted to open a head-structure to allow water into a particular rice field, they would wait for approval from PDOWRAM so as to avoid any unforeseen negative consequences. While this cooperation and consultation was commendable, the Pursat PDOWRAM believed that they should ultimately be trying to help the FWUCs to become more independent and self-reliant in managing their scheme. Stung Chinit and Rolous received less detailed support from PDOWRAM; for example, in Rolous (before the new private company investment) PDOWRAM donated a big water pump to the north-west part of the scheme but failed to follow up with on-the-ground technical advice. Farmer reports from Stung Chinit and Rolous suggest that the PDOWRAM should give technical assistance when the FWUC and the farmers cannot resolve issues themselves.

Water conflict issues in DAP happen on a wider geographic scale than in the other two case study schemes as the DAP scheme (located in Bakan district, Pursat province) is within the same catchment as Mong Russei district in Battambang province and shares the same main river source as a number of other irrigation schemes, both upstream and downstream. The farmers in the DAP scheme had recently increased their production of dry season rice despite being warned of physical water shortages by PDOWRAM and the FWUC committee. PDOWRAM and the FWUC were unable to effectively prevent these farmers from trying to grow dry season rice as their livelihoods depend on the extra resources. PDOWRAM had often been asked to assess the hydrological situation and decide whether it would be beneficial to release water from upstream schemes as neither the FWUCs nor the district authorities had the capacity or authority to make this decision and negotiate water allocation agreements at

water catchment scale. There had been some incidents of farmers from DAP scheme, out of desperation for water, going to upstream schemes to try to illegally release water by breaking the locks on the head structure. Water conflicts commonly arise during periods of water scarcity. Despite efforts to manage water allocation and resolve conflicts, there is no firm mechanism to ensure proper water management at a greater-than-command-area scale.

The level of coordination between locals and external private investors was only observable in the case of Rolous at the time of study. In this case there had been no consultation between the private company and local people, not even with the FWUC committee or CC. Rather, the company and PDOWRAM made the decision and local people were merely told that from that time on they would have to pay an annual service fee of USD100 to use water from the canal. The private canal has only benefited approximately half of the farmers – those with rice fields to the west of the main canal. The lack of farmers' sense of ownership and responsibility is because there is no functional avenue for them to participate in irrigation management decision-making. To a degree, this sentiment extends to the FWUC committees as well. The committees had little power as was demonstrated in Rolous with the introduction of the private canal. They had no opportunity to protest against or reject the investment; they could only ask the private company to register formally and discuss irrigation issues with PDOWRAM. The FWUC said that the private company that owned the main canal had agreed to cooperate with local authorities and provincial departments (in particular PDOWRAM) to resolve issues, case by case, to achieve an outcome that would bring the expected benefits to all stakeholders. At the time of study there was no evidence of this happening.

Many established FWUCs in Kampong Thom province had collapsed or were malfunctioning due to shortage of financial and technical support from external agencies. In response to this, the FWUC established at Stung Chinit was organised and technically and financially supported by development partners or NGOs. In particular, GRET and CEDAC gave regular help with regards to water management and the function of the FWUC. This external support underpinned the successful operation of the FWUC until June 2009 when the programme ended. The Stung Chinit FWUC developed a reasonable level of technical capacity in irrigation scheme management through the support from GRET and CEDAC; the concern at the time of study was that the monthly budget for operation and administration would not be covered by the collected ISF.

Even where the will for coordination exists between farmers, village leaders, CCs, FWUC committee members and the PDOWRAM, regular communication has often been hampered by geographical distance, which would incur travel and telephone costs that the committees and farmers could not easily afford. This was the case in DAP, where proposed monthly meetings to report on water allocation, crop planning and conflict management between the FWUC members had not been held due to unaffordable out-of-pocket expenses. In Stung Chinit however, where at the time of study external funding was available, meetings between the FWUC and PDOWRAM were being conducted weekly and the support committee²¹ members met once a month with reasonable consistency.

21 The support committee is chaired by the district governor, and comprises representatives from concerned provincial departments, commune and commune councils, police and FWUC.

This research proposed two research questions to guide the empirical review. Below is the analysis of the empirical input in relation to the two research questions.

6.1 The Match between the Governance Arrangement and the Physical Infrastructure

How well are existing governance structures and practices matched to the configuration and scale of irrigation schemes?

Most irrigation governance in Cambodia presently reflects two different approaches: that of the Khmer Rouge's hydraulic mission²² which pursued large-scale irrigation infrastructure projects, and the current participatory approach to governance which tries to delegate management functions to community level by establishing FWUCs as local governing bodies for irrigation schemes. It is not surprising that the large-scale infrastructure built during the Khmer Rouge era is mostly incomplete and not technically sound given the short time-span of the regime and its lack of technical capacity. Nor is it surprising that the community approach has had little success in becoming grounded in Cambodian culture given that (1) Cambodia has no or little historical experience of this kind (Oversen *et al.* 1996), and (2) the people had a bitter experience with the so-called participatory approach of the collective farming experiment of the Khmer Rouge. These two conditions are further accentuated by the fact that the hydrological system in Cambodia is highly inter-connected and diverse. These factors raise the question of how the existing poor and incomplete infrastructure, embedded in Cambodia's rich and interconnected hydrological environment, and the current community-approach to governance, entrenched in the existing patron-client political culture and hierarchical governance structure, can intersect. Findings from the three case-study schemes show the discrepancy between these two components both within the community and beyond and across technical line agencies, which must ideally be solved at the same time if the discrepancy is to be reduced, and raise three key challenges: financial and technical capacity, human resources, and coordination.

The financial challenge is to find a way for the local body (i.e., FWUC) to acquire sufficient financial resources to not necessarily complete, but improve the infrastructure to a level that responds to the needs of the farmers and to also maintain the operation of the infrastructure system. Findings are consistent with Chea's (2010) observations that FWUCs are generally expected to operate using the ISF as its main financial source, even though ISF initiatives are evidently very hard to implement in the Cambodian context. Only 30 percent of the farmers from Rolous and zero percent from DAP pay ISF, whereas interestingly over 90 percent of farmers in Stung Chinit pay up. Some farmers reported that they are more willing to pay when the infrastructure is able to provide adequate water supply for their crops. Given this and the situation in each of the case-study schemes, making fundamental improvements to infrastructure which would facilitate sufficient and reliable water allocation to farmers is a pre-requisite to successfully collecting ISF contributions.

22 Hundreds of irrigation projects were implemented nationwide during the Khmer Rouge period (1975-79). Canals and dams were dug across the entire country. The state used extreme violence to force the whole population to fulfill its impossible plan.

To recap the discussion on the complexity of water scarcity (see Literature Review), in Cambodia there is not only an “economic scarcity” but in some cases, a “physical scarcity” as well. For example, in the north western region of Rolous (near Boeung Lies) water is physically scarce at the sub-scheme level and economic scarcity (i.e. severely underdeveloped infrastructure) compounds the issue for farmers. Here, farmers are aware where their ISF payments go – the development and maintenance of infrastructure – but in a number of cases they simply cannot pay it due to low agricultural yields resulting from water scarcity. There is an intrinsic shortage of water in DAP – even upstream users feel that there is not enough water – and distributing it from upstream schemes to DAP is not feasible because there are no concrete canals between the schemes, and to allow the water to flow through the natural river would result in substantial losses through infiltration and evaporation.

This task of improving the infrastructure would not be feasible if left solely to the newly-established FWUCs. Both externally sourced financial capital and technical support are required in the beginning, with the management functions ideally being transferred to the local committee as soon as their capacity is adequately developed. A key factor to keep in mind is that the participatory approach at community level is alien to Cambodian culture and needs to be planted in the minds of the local populace and nurtured before it can become independent, self-reliant, and left to grow on its own. The Rolous case is one example where the introduction of the participatory approach has not been adequately nurtured. The FWUC here is financially weak, has no discrete power, and lacks capacity to undertake the development and maintenance of the infrastructure.

As the development of new infrastructure at scheme or sub-scheme level is often expensive and in order to provide immediate benefits for farmers’ livelihoods, it may be more effective for the FWUC to focus its efforts on the development and maintenance of irrigation systems on a smaller scale. Such small-scale projects may involve the mobilisation of farmers to complete the development and repair of tertiary canals and drainage infrastructure, which according to interviews with farmers would meet their immediate needs. The findings demonstrate that some co-ordination by the FWUC is required because if left to their own devices, farmers would likely be unable to co-ordinate these activities themselves (e.g., in the Stung Chinit case). Such actions by the FWUC committee are also relatively cost free. A shift towards this focus may well evoke discontent in farmers who are not getting any attention or close assistance from the committee; however, it would demonstrate beneficial practical and concrete action being made by the FWUC committee which would ultimately contribute to the development of social capacity, trust, and recognition of the FWUCs by the farmers.

The second challenge is the lack of human resources within the local governance body relative to the size of the scheme and the technical capacity required to properly manage it. Each case study scheme covers several communes and cuts across many villages. Furthermore, the infrastructure remains incomplete in all of the schemes. Even though it compares better against its counterparts, the Stung Chinit scheme still lacks tertiary canals. The vast, poorly constructed and incomplete infrastructure creates not only a financial, but also a technical burden on the management of the scheme. The present FWUC committees of both Rolous and DAP only have, in practice, fewer than ten members and despite not having been trained formally nor comprehensively, they are expected to carry out the management tasks within their schemes which both cover in excess of 1,000 hectares of farmland. The Stung Chinit case is better in terms of the well-designed structure of the local governance system; but the vast size of the command area and the complexity of multiple and overlapping governance bodies

(i.e. the existence of additional structures and temporary staff—see Findings chapter) still raise the question of whether effective implementation will be possible in the post external-funding period that Stung Chinit has recently entered.

Understanding of FWUC committee responsibilities and tasks is still blurred, even among the committee members. None of the FWUCs in the three case study schemes had taken care of building or repairing tertiary canals. In Stung Chinit for example, the FWUC committee felt that their responsibilities and tasks do not include helping or mobilising farmers to build tertiary canals. Instead they believed that their role is to address larger scale issues –maintaining the existing large infrastructure such as main and secondary canals, leaving crucially important but understated small-scale activities to individual farmers. This poses the question of why confusion exists when the PIMD policy clearly states that the FWUC is to act as the lowest and most local governance body to which management responsibilities are transferred. It is reasonable, based on the evidence of discrepancy between the physical size of irrigation schemes and the human resources of the FWUCs, that the geographic scale of the schemes is simply too large for the FWUC committee to manage; in reality, this supposedly “grassroots level” governance body still needs lower bodies to take care of tasks at the smallest scale (i.e. managing tertiary canals and drainage infrastructure). There is a rational argument for promoting farmer responsibility over irrigation in their own fields, but the lack of coordination, and financial and technical capacity at this level, as shown in the findings, renders this impractical. If the schemes are to remain as large as they are today, smaller governance groups (i.e. FWUGs) as suggested in the PIMD should be properly established, trained and coordinated. The leaders of these small but crucial groups need to be firmly integrated into the FWUC to ensure information flow and cooperation between the lowest and middle rungs of governance and ultimately ensure the effective operation of these truly “grass roots level” groups.

Finally, the third major challenge is coordination. Hydrologic systems are not confined by administrative boundaries such as those that define villages, communes or schemes. Catchment-scale management is well established in both theory and practice in many countries and is revered for its use of environmental boundaries as the unit of management. While government structures for catchment-scale management do not yet exist in Cambodia, good co-ordination and communications throughout the technical line agencies (i.e. FWUC, PDOWRAM, MOWRAM) may effect similar outcomes. The potential benefits of having some form of management capacity at the catchment scale include better facility to: more equitably and efficiently allocate available water within a catchment, resolve water scarcity conflicts, and protect the ecological health of the river system. The need for management at this scale is highlighted in the case of DAP where water scarcity is being experienced annually due to competing water demands of upstream users within the catchment. As already stated (see Case Study Sites chapter), the catchment in which the DAP scheme is located extends across numerous schemes, districts and even two provinces. FWUC committees, CCs, village leaders and district leaders do not have the authority to decide on matters of water allocation between up and downstream schemes and so PDOWRAM must be consulted to make the decision, which in some cases involves the PDOWRAM in both Battambang and Pursat provinces. The findings suggest that the smoothness of the inter-link between well-planned infrastructure and a well-devised governance system may lead to smoother operation of local governance tasks (i.e., the case of Stung Chinit versus the other two cases).

This paper recognises the importance of the pre-existing embedded governance systems and urges a look into the irrigation governance issue not only with a focus on establishing a

local body to run the management and maintenance tasks but also on establishing an entire system of local governance which can be integrated into the existing governance structure. This means the concurrent establishment of a local governance body with set rules and regulations and support systems. Without this, the programme would undoubtedly fail, as noted by Oncken and Burrows (1994) who state that to delegate without confidence that the management tasks are on the right track and that the people can successfully handle the tasks on their own is not delegating but abdicating responsibilities. The importance of such a support system is also recognised in PIMD and policy implementers are urged to move beyond organising and to begin restructuring the support system for FWUCs by identifying new roles for relevant government agencies. Response (that translates into practical action) to this initiative though is rare, often due to a lack of willingness to take on more duties and a lack of financial capacity.

In sum, to improve the match between infrastructure and governance arrangements, a number of idealistic objectives must be considered. Infrastructure needs to be improved to a level that is able to provide satisfaction to farmers in terms of rice yield so that they really can see the significance of the FWUC committee as the legitimate governance body with authority over the irrigation scheme. The structure of FWUCs needs to be modified to integrate smaller scale groups i.e. FWUGS and technical capacity needs to extend beyond just a few leaders within the committees. FWUCs should try to produce concrete and visible outcomes for the community at a more local scale in order to build people's trust. FWUC management mechanisms must be transparent in order to call for greater participation; leaders must be role models and financial transparency is imperative. Efforts to revise and integrate various policies related to water and its wider ecosystem to guide implementation at the local level are needed. These five objectives might be hard to achieve in the short-term, but if not taken into consideration the quest for good local governance of the irrigation system might be hard to realise.

6.2 Modification of Stipulated Governance Arrangements

To what extent does the practice of irrigation governance in water allocation and system development and maintenance, manifested in FWUCs, match ideal types and assumptions that come with governance initiatives such as IMT and PIMD? Why (what are the specific conditions in Cambodia that make such initiatives work, fail, or need adaptation?)

The two ideal objectives of good irrigation governance were initially stated as: to provide water to reach people and places reliably and in sufficient quantities at the right times, and to provide infrastructure design and maintenance that delivers sustainable livelihood benefits in an equitable manner. This means good irrigation governance will need mechanisms to allocate water effectively; at the same time, it will need mechanisms to design, develop, maintain and manage the infrastructure in a sustainable and equitable manner. The four principles of PIMD policy (i.e. establishment of FWUC, building management capacity of FWUC, participatory repair and improvement of irrigation infrastructure, and provision of irrigation and agricultural extension) highlight the mechanisms needed to achieve these two ideal objectives. This is also in line with one of the IWRM principles of managing water at the lowest appropriate level (UNCED 1992). Despite best efforts at PIMD, findings from the three case study schemes show that these ideals of governance are hardly being met in practice. In Rolous and DAP, water allocation is unpredictable due to poor and incomplete infrastructure as well as because of an incomplete governance structure that lacks the requisite capacity²³. While water allocation

23 See the previous section on the mismatch between the infrastructure and the governance arrangement

in the Stung Chinit scheme has been better than in the other two case-study schemes, problems of water retention and drainage still arise due to the lack of tertiary canals. In all three cases, infrastructure development/rehabilitation is almost solely dependent on external funding; in two out of the three case study schemes, rehabilitation of the main infrastructure remains incomplete and infrastructure maintenance is next to non-existent. There are five main reasons why initiatives such as PIMD do not work in the Cambodian context.

First, there is the mismatch between the large incomplete and poor infrastructure and the current financially and technically weak community approach. Financial, technical, and coordination constraints had prevented the implementation of FWUCs within the three case-study schemes from reaching full potential. Consistent with IWRM critics, the study acknowledges that finding the capital investments needed for the success of this ideal is a problem beyond the sole capacity of the FWUCs as a local body. This capital would ideally go towards the improvement of the physical infrastructure and empowerment of the local water governance body.

The second reason is that the present community approach failed to take into consideration the existing power structure within Cambodia. This is a legacy of the 1960s Green Revolution where indigenous water management institutions were often ignored or marginalised if they did not match the scale and organisation of the new physical infrastructure. In Cambodia, the idea imposed by donor agencies that FWUC leaders should not be already established community leaders, though having its merits such as promoting greater transparency and a system of checks and balances, marginalises the embedded Cambodian patron-client culture that is responsive to established authorities (e.g., village leaders, group leaders, commune councillors). Newly introduced middle-rung governance bodies may struggle to navigate pre-existing loyalties to power structures that exist above and below them on the water governance ladder. Such a situation was evident in the case of the Rolous FWUC. On the one hand, it is perceived by some farmers as not being wholly trustworthy, efficient or capable enough to manage the irrigation needs of the farmers; on the other, it had trouble being independent from PDOWRAM and the CC in terms of consulting and reporting issues to them. The overarching impression is that members of the FWUC committee are more trusted and respected when chosen from the existing power structure within the community (as in the case of the DAP scheme)..That said, some members of the Stung Chinit scheme FWUC did not belong to the existing power structure yet had achieved some degree of success in irrigation management. However, it remains to be seen if their success is completely dependent on the technical and financial support of their donor, or whether they will retain their effectiveness after said support has been withdrawn.

Third, while the present community approach emphasises community participation and ISF enforcement, these concepts are outside Cambodia's historical experience and even worse, do not fit with Cambodian cultural norms. Agrawal and Gibson (1999) define community participation as the coming together of local people in order to define priorities and develop rules and policies in the community, to implement these rules, and to enforce them. Similarly, Calaguas and Francis (2004) also call for an emphasis on "community inputs at all stages of the design, construction, and maintenance of irrigation system" in an ideal participatory approach. This has hardly happened in Cambodia. In Rolous and DAP, there were scarcely any meetings where fellow farmers had been called upon to express their views or concerns. On the rare occasions when farmers were called to attend a formal meeting (for example, for the field work of this research), many were reserved in voicing their complaints in front of the

authorities, influenced no doubt by elements of Cambodian culture which may deem public complaints to be disrespectful. In DAP, farmer participation in decision-making does not exist, and decisions seem to be made by PDOWRAM while the FWUC's role is more one of reporting upwards and waiting for PDOWRAM's instructions. This is in part attributed to the vastness of the scheme which puts it beyond the financial and technical capacity of the FWUC. Also significant is that reporting upwards and waiting for instruction is strongly embedded in the Cambodian culture, where it is perceived to be the right behaviour for lower and less powerful governance bodies within the patron-client hierarchical governance system. In Rolous, farmers have hardly participated in the election of the FWUC association because they simply do not trust the election as a mechanism for selecting good and capable leaders who could solve their problems. Participation in terms of ISF contribution varies from case to case. Findings from the three case-study schemes show some positive outcomes from enforcing the ISF policy; however, the low economic status of many farmers complicates the collection of ISF. Even though paying for water is not rooted in Cambodian history, the findings demonstrate that people do not mind paying for it as long as the governing body (FWUC) is able to deliver water and infrastructure services to them. In terms of the nuances of Cambodian culture, paying state authorities for services is not a new thing.

The fourth reason is the lack of congruence between the water policy and its implementation as well as the internal inconsistency in the water policy itself. The two main goals of PIMD are to deliver efficient, sustainable, reliable and environment-friendly irrigation systems (i.e. an improved physical irrigation infrastructure), and to increase the roles and responsibility of the FWUC at every stage of programme implementation (i.e. IMT approach to enhance community participation). Yet, as shown in Rolous and DAP, implementation of the PIMD policy has generally focused on establishing the FWUC, and rarely on improving the holistic physical infrastructure to a minimum acceptable standard. Moreover, little attention has been given to forming a complete support system to coordinate with FWUCs, such as FWUGs to work at the smallest scale i.e. farm plot level and a support team to work from the provincial level. This might be because the essence of Cambodia's water policy does not really permeate to the level of community implementation and the PIMD implementing agencies (MOWRAM and PDOWRAM especially) lack the financial and technical capacity to make this happen. As noted earlier, once established the FWUCs are expected to be independent despite their lack of financial and technical capacity.

PIMD policy documents suggest that the success of the PIMD programme completely depends on whether a FWUC can be capable of governing and financing the management of an irrigation system sustainably. This research has shown that in practice, FWUCs are more or less powerless and inefficient. Additionally, their inefficacy and meagre resources undermine their ability to generate local legitimacy. For example, the Rolous FWUC committee was not aware of the extent of its discrete power. One of the PIMD policy principles states that local people are the ones who define what water services they will receive and the ones who select their service providers. This means that any private company operating within a scheme should be selected by the FWUC; in practice, the FWUC in Rolous did not even dare to question the setting up of a new private water company in their command area. The company only needed to contact the provincial governor and then find a place in the commune to establish its operation. All that the FWUC (and CC) could do was to ask the company to register with PDOWRAM. This is an example of the way in which the political culture in Cambodia blurs the regulatory boundaries of the legal framework.

The DAP FWUC is caught in the political-cultural trap of not daring to decide on anything without first consulting PDOWRAM. This behaviour may easily result in the FWUC committee being seen as an extended arm of MOWRAM/PDOWRAM, overseeing tasks such as collecting and reporting statistical and other community information to PDOWRAM, which falls short of the PIMD ideal local management committee and the vision set out in the water policy itself. As Kim and Ojendal (2007) observe, “[in Cambodia] democratisation of political institutions has come much further than democratisation of the content of local politics”.

Finally, the fifth reason is the uncoordinated nature of various reform policies in Cambodia. There are many interrelated reforms in the country, but they have not been implemented in a clear sequence which has stalled overall progress. There are two possible outcomes from this: a series of partial reforms, or an overall blockage caused by a bottle-neck of institutional arrangements where no reforms are able to come to full fruition (Horng & Craig 2008). For example, it is recognised that the focus of PIMD policy should move beyond organising the FWUC to restructuring the support system for FWUCs by identifying new roles for relevant government agencies. However, empirical data suggest that this second dimension of the task is largely dismissed if there is no sufficient funding (as in Rolous and DAP). While the FWUCs are operating based on the PIMD/IMT policy reform of MOWRAM, little effort has been put into integrating this policy within the overarching decentralisation reform where natural resource management responsibilities are delegated to the commune authority. The water policy fails to address how the commune and the FWUC should be working together or how PDOWRAM fits into the process. Findings from Rolous and Stung Chinit show that the FWUCs there rarely meet with the CC to discuss solutions to issues together. Instead, the FWUCs just report issues to the CC or more commonly to PDOWRAM, which they perceive to be more capable and more relevant. Integrating the FWUC and the CC governance bodies, as was seen in the case of DAP, could be one solution to ameliorate the lack of local governance coordination.

From the perspective of a wider decentralisation framework, there is still a lot to be done before PIMD/IMT policy can be integrated into the major D&D national reform. The National Committee for the Management of Decentralisation and Deconcentration (NCDD 2010) report claims that while on average only about 10 percent of the *Commune/Sangkat* Fund is used for irrigation-related development, 95 percent of the District Investment Fund has been invested in irrigation schemes each year since 2006. Even though the case studies of the Rolous and the DAP schemes touched upon some involvement of the CCs’ authority in the work of the irrigation community, this study did not look at the roles of the district in irrigation/agricultural services. On the one hand this could be one of the limitations of the study, while on the other it could mean that the district government is not very involved in the case-study irrigation schemes. If the first scenario is true, further study in this area would be needed. This is particularly relevant now that the current stage of the national decentralisation programme (2009-2019) is focusing on improving governance structures and human resources at district and provincial levels, augmenting the performance of those governance bodies and helping the CCs deliver services to the people (NCDD 2010). This being done, functional and financial assignments at the provincial and district levels can no longer be ignored, with the linkages between the district and the irrigation service becoming even more significant.

The last main issue in these uncoordinated reforms lies beyond the decentralisation reform to include reform policies within other related technical line ministries, such as forestry, fishery and land. As articulated in the literature, IWRM combines the perspectives of diverse stakeholders to maximise the interconnected social, economic and ecological uses of water.

Water development and management, from this view, should involve users, planners and policy-makers at all levels (ICWE 1992). This ideal, however, is hard to achieve. For example, in the Cambodian context the community approach has been adopted to manage almost all types of natural resources i.e., fishery community, and community forestry. And since fishery, forestry and water-ways often intersect, one wonders what the situation would be like if all these communities were to present their loyalties to their respective technical line agencies especially when the coordination within and between said agencies is weak at every level. Ojendal (2000) notes three challenges at national level that prevent ministries from working in an integrated manner: young constitution; low degree of communication between ministries, a pattern that sometimes becomes deeply politicised in the administration of each ministry (reinforcing inter-ministerial strife); and inconsistent funding by donors (creating jealousy and competition). These coordination problems are presently being resolved under the Organic Law through the establishment of a unified administration at provincial and district levels. As planned, the government is working towards improving human resources and structure at these two governance levels first. Whether a unified administration will function well and be able to solve the existing coordination issues in Cambodia is yet to be seen.

To summarise, besides the discord between infrastructure and current governance practice, a number of other issues hinder the match between ideal governance and its actual practice. Although some of these issues could be addressed at the local level with some minor adjustments to practice (e.g., integrating FWUCs into the existing power structure), some may need a much longer time to succeed (e.g. raising awareness about community-based management and democracy to the community at large so that people understand and accept both their rights and responsibilities as community members). Others may need still greater efforts by bottom-level and top-level government bodies (e.g. to modify water policy and make it more practical and adaptable to the diversity of local environments and multiple constraints), or stronger political will from all levels (e.g. to coordinate various reform policies together under the overarching decentralisation reform framework). All of these issues, like the ones mentioned in section 1 of this chapter, are hard to achieve both in the short and medium-term, but if ignored will likely hinder the progress of the national programme of irrigation development.

6.3 Concluding Comments and Further Research

This study found discrepancies between actual governance practices, ideal governance principles as outlined in PIMD and IWRM, and the spatial and infrastructural context of the schemes. Specifically, it observed that the scale of the command areas is much too large for the human resources within the FWUCs especially given their inadequate technical knowledge and limited finances to repair, develop and maintain infrastructure across their respective schemes. Second, the actual practice of irrigation management at scheme and sub-scheme level has diverged significantly from the principles of PIMD and IWRM. For example, the actual roles of the FWUCs have fallen short of their mandate and have not yet been particularly well-executed. Rather than their principal mandate of competently managing the schemes, the strongest role of the FWUCs demonstrated across all three case-study schemes is that of a mediator between farmers and PDOWRAM.. Other roles of the FWUC include water allocation from primary and secondary canals, conflict resolution between farmers, and ISF collection. However the execution of these tasks has been inconsistent and often lacking. Despite these discrepancies, the study highlights the quality of the intertwined relationships between these three components of irrigation management as one key determinant of good irrigation governance at local level.

The study also noted two main factors behind the discrepancies between actual governance practice and ideal governance principles. The first relates to the physical, economic, social and environmental complexity of irrigation water as a flowing and inter-connected substance. This makes its governance mode more complex and multi-disciplinary than might be assumed when drafting the ideal governance policy. Coordination across different sectors (i.e. ministries) needs to be strongly considered in the creation of such policies. The second factor is Cambodia's complex political culture where formal institutions are often weak and fused with informal arrangements underpinned by patronage and party politics. These informal arrangements are strong, if not dominant, in actual irrigation governance. To make local, formal institutions stronger in such a context, they need to be embedded within the community's existing power structure. This may be achieved by identifying and nominating popular leaders into the institutions.

It is recommended that future studies into the area of irrigation management consider water resources as an economic, social, environmental and spatially crucial element. Perceiving water in this way brings added, but critical, complexity to research in the domain of irrigation governance. Although not included in the scope of this study, it is recognised that district and provincial government bodies are critical to the next stage of decentralisation implementation in relation to providing services for the people (NCDD 2010). Future research to determine the roles of these agencies is needed. Finally, given the mismatch between what is written in water governance policies and what actually occurs at implementation level, it will be beneficial to further explore the differences between these policies and their implementation by various sectoral line agencies against the broader context of natural resource management.

Change must be enacted through various stakeholders at a local and larger-than-local level to reduce the lack of congruence between the ideal and actual governance practice as well as between the physical size of the scheme and the governance system design. Reducing this lack of congruence will result in greater agricultural productivity, improved livelihoods and allow faster progress towards the national goals of irrigation development and poverty reduction. Specific recommendations arising from the study are listed below:

At Local Level:

- Integrate FWUCs into the existing power structure within the community through the nomination of group leaders, village chiefs and commune councillors (i.e., existing local governance system) or traditional leaders (e.g., achar, former local state leaders, elders) and other outspoken individuals with leadership skills in the FWUCs, to embrace the patron-client relationship already embedded in Cambodian culture.
- Mobilise farmers into functional FWUGs, the leaders of which must be integrated into the FWUC.
- Diminish the physical expanse of command areas or increase the size of the FWUC strategically, taking representatives from different communes and villages across the scheme.
- Undertake greater knowledge dissemination about farmers' rights and responsibilities in regards to the irrigation scheme and its management as drafted in the PIMD policy to nurture farmers' sense of ownership and willingness to participate.
- Conduct greater knowledge dissemination about the purpose and necessity of ISF contributions from all farmers.
- Facilitate greater non-formal communication between FWUCs and farmers to foster greater trust in the governance body and social capacity within the scheme.

At Sub-national Level (including NGOs):

- Enforce the development of realistic exit strategies by donor agencies at the start of projects so as to ensure the sustainability of schemes once donor funding has finished.
- Unify administration through encouraging, legislating and enforcing greater involvement and commitment from governance bodies at the provincial and district levels to coordinate schemes and manage issues that concern water sharing at a catchment scale (i.e., between upstream and downstream users). This engagement with the mainstream government system has to be conceived as a long-term process to advance institutional changes within the government system.
- Disseminate knowledge about local hydrology to FWUCs and other local authorities to assist in environmentally responsible and agriculturally effective water allocation.

At National Level:

- Align policy and foster greater coordination across different line ministries given the complexity of water as a flowing and inter-connected substance physically, economically, socially and environmentally. This makes its governance mode more complex and multi-disciplinary than might have been assumed when the current governance policy was drafted.
- Provide financial support for the building of complete irrigation infrastructure and for the maintaining of the complete infrastructure when the cost is beyond the capacity of the community
- Enforce the implementation of the deconcentration reform so that it could provide needed support to the local administration

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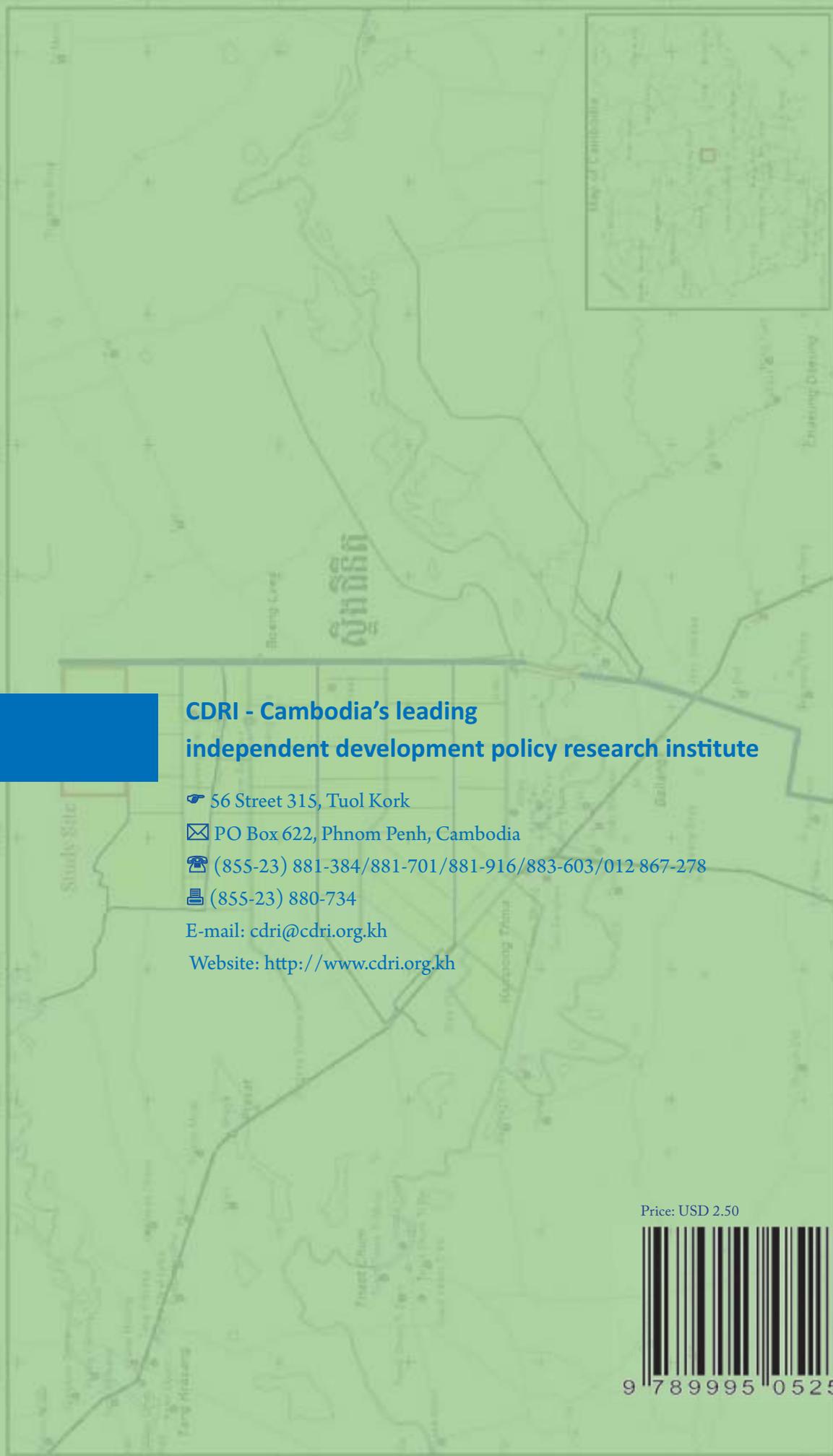
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