

Copyright is owned by the Author of the thesis. Permission is given for a copy to be downloaded by an individual for the purpose of research and private study only. The thesis may not be reproduced elsewhere without the permission of the Author.

**Participatory Irrigation Management and the
Factors that Influence the Success of Farmer
Water User Communities: A Case Study in
Cambodia**

Bandeth Ros

2010

**Participatory Irrigation Management and the
Factors that Influence the Success of Farmer
Water User Communities: A Case Study in
Cambodia**

**A dissertation presented in partial fulfilment of the
requirements for the degree of Master of Applied Science in
Environmental Management**

at

Massey University, New Zealand



Bandeth Ros

2010

Abstract

The Participatory Irrigation Management approach was introduced into Cambodia in 2000, which was called the Participatory Irrigation Management and Development (PIMD). The goal of PIMD is to establish Farmer Water User Communities (FWUCs) to take over the management of irrigation schemes in their district in order to improve the performance of irrigation schemes and farmers' livelihoods. The implementation of FWUCs has resulted in both failure and success. Several studies have identified factors that influence the failure of FWUCs, but little research has focused on their success. By employing a single embedded case study approach, this research selected the most successful scheme in Cambodia to identify factors that influenced the success of the FWUC in irrigation management. The findings of this research could provide concrete assistance to the government, donors, and non-governmental organisations in improving the performance of less successful FWUCs in Cambodia.

The result of this research showed that the success of the O-treing FWUC was influenced by five internal and two external factors. The internal factors were: 1) the level of local participation, 2) the governance and management of the scheme, 3) the value of the benefits that flow from the irrigation scheme, 4) the quality of the irrigation infrastructure, and 5) the characteristics of the farmer members within the scheme. The external factors were: 1) the level of external support provided to the scheme, and 2) market access.

The success of the FWUC required farmer participation and this participation was enhanced when farmers obtained benefits from it. This research also found that access to markets was critical to make the benefits that flowed from the irrigation scheme more profitable to farmers, leading to farmer participation. Similarly, it was also important to make sure that the irrigation infrastructure was of a high quality to ensure the delivery of an adequate and timely supply of water to farmers so that they could grow crops that provided them with the benefits. This required external support from the Ministry of Water Resources and Meteorology, NGOs, and local authorities to help rehabilitate the scheme. External support was also critical for enhancing the governance and management of the scheme through assistance with the formation process, provision of financial resources, capacity building, rule enforcement, and conflict resolution. The governance and management of the scheme, in particular the leadership capacity of the FWUC was another critical factor because it ensured the maintenance and development of the irrigation infrastructure, the timely and adequate supply of water to farmers, farmers' trust and respect for leaders, and farmer participation. Finally, the success of the FWUC could not be viewed independently from farmer characteristics within the scheme. Farmers tended to participate in irrigation management when they had a history of self-organisation, when they were relatively homogenous, and when they were dependent upon farming for their livelihoods.

This research suggests that the successful implementation of FWUCs requires a focus on the seven factors and the interactions that occur between these factors. Irrigation stakeholders such as the Ministry of Water Resources and Meteorology, donors, NGOs, local authorities, local leaders, and farmers should work together to enhance these factors in order to ensure the success of FWUCs.

Acknowledgements

I would like to start by thanking the New Zealand Government for the scholarship that enabled me to continue my study at Massey University. I acknowledge the relentless support of all the staff at the International Student Support Office – in particular, Olive and Sylvia.

I am very grateful to my supervisors for their patience and the invaluable advice that has guided me throughout my research. I must thank Dr. Terry Kelly for his persistent guidance and encouragement to me. I would also like to specially thank Dr. David Gray for his contribution to this study's analysis and his critical comments on my writing. I thank you both for giving me a new insight into qualitative research methods. It has been a rewarding experience that I am grateful to bring home after two years in New Zealand.

A debt is owed to the lecturers, staff, and post grad students in the Institute of Natural Resources, and to my friends and all Cambodians in Palmerston North. I am very thankful to Assoc. Prof. John Holland for his support during my study in New Zealand. I would like to thank Janet Reid for kindly spending time drawing conclusion with me on my last day. I would also like to voice my appreciation to Denise Stewart for all other ways she helped, and to postgraduate students and friends at Massey University for their assistance they provided to me. I never forget Stewart Hay, his wife Debbie, and their kids for always serving as my relatives in New Zealand. Ngaire and her husband Polin were always friendly and helped sort out my accommodation.

My special thanks also go to Mr. Phim Svay and his family for offering me a stay at their place during my fieldwork. I would like to thank the staff at the Ministry and Department of Water Resources and Meteorology, and the District and Commune authorities for their cooperation in providing good information for this research. I am also thankful to Mr. Chandara Ouk for giving me a ride during my fieldwork. There are not enough ways to say thanks to all the village chiefs and villagers in Chung Rouk and Prey Gniet Communes, Kong Pisei District, Kampong Speu Province for their warm welcome during my visit.

In addition, my gratitude goes to my colleagues at the Cambodia Development Resource Institute (CDRI). I gratefully thank Mr. Sedara Kim and his wife, Boraksmey, for their encouragement and guidance in my study. I would also like to thank Mr. Keosothea Nou for his mentoring over the phone and Susan Watkins for proofreading my last chapter. I thank all the researchers at CDRI for providing comments during my seminar.

A final big debt is owed to my parents, grandparents, aunt (in Wellington), brothers, sisters, brother-in-laws, and sister-in-laws for their ongoing spiritual support. I may never have come this far without their persistent encouragement and belief in me.

Table of Contents

Abstract	i
Acknowledgements	iii
Table of Contents	v
List of Tables	ix
List of Figures	xi
Abbreviations	xv
CHAPTER 1 INTRODUCTION	1
1.1 Background	1
1.2 The participatory irrigation management approach in Cambodia.....	2
1.3 Problem statement, research aim, and objectives.....	3
1.4 Research approach	3
1.5 Organisation of the thesis.....	4
CHAPTER 2 AN OVERVIEW OF THE IRRIGATION MANAGEMENT SYSTEMS IN CAMBODIA	5
2.1 Introduction.....	5
2.2 Pre-Angkor, Angkor, and Post-Angkor Periods	6
2.3 French Colonial Period	7
2.4 Prince Norodom Sihanouk Period (1953-1970).....	7
2.5 Khmer Republic and Pol Pot (Khmer Rouge) Period	8
2.6 From 1980 onwards.....	9
2.7 PIMD and Farmer Water User Communities (FWUCs).....	9
2.8 Summary.....	11
CHAPTER 3 FACTORS THAT INFLUENCE THE SUCCESS OF WATER USERS' ASSOCIATIONS UNDER THE PIM APPROACH	13
3.1 Introduction.....	13
3.2 WUAs and the definition of success	14
3.3 Factors that influence the success of WUAs	15
3.3.1 Internal factors.....	16
3.3.2 External factors.....	35
3.4 Conceptual framework.....	38

CHAPTER 4	RESEARCH METHODS	41
4.1	Choice of research strategy	41
4.2	Choice of case study design	41
4.3	Overview of the single embedded case study	43
4.3.1	Sampling	44
4.3.2	Design of data collection protocol	47
4.3.3	Data collection process	48
4.3.4	Within-case analysis and interpretation	57
4.4	Ethical considerations	61
4.5	Summary	61
CHAPTER 5	CASE DESCRIPTION	63
5.1	Introduction	63
5.2	The history of the O-treing irrigation scheme	63
5.3	The physical infrastructure of the scheme	65
5.4	Characteristics of the O-treing Farmer Water User Community	67
5.4.1	Villages, topography of farmland, and water routes	68
5.4.2	Local livelihoods	72
5.4.3	Poverty and land tenure	72
5.4.4	Cultivation practices	73
5.5	Formation of the O-treing Farmer Water User Community	74
5.6	Decision-making structure of the O-treing Farmer Water User Community	76
5.7	Summary	78
CHAPTER 6	CASE STUDY RESULTS	79
6.1	Introduction	79
6.2	Definition of success	79
6.3	Factors that influenced success	81
6.3.1	The level of local participation	83
6.3.2	The governance and management of the scheme	101
6.3.3	The value of the benefits that flowed from the irrigation scheme	119
6.3.4	The quality of the irrigation infrastructure	123
6.3.5	The characteristics of farmers	125
6.3.6	The level of external support	126
6.3.7	Market access	128
6.4	Conclusion	131

CHAPTER 7	DISCUSSION	133
7.1	Introduction	133
7.2	Classification of the case	133
7.3	Definition of success	135
7.4	Factors that influence the success of the FWUC	135
7.4.1	The level of local participation	136
7.4.2	The governance and management of the scheme	140
7.4.3	The value of the benefits that flowed from the irrigation scheme	147
7.4.4	The quality of the irrigation infrastructure	148
7.4.5	The characteristics of farmers	149
7.4.6	The level of external support	150
7.4.7	Market access	152
7.5	Summary and conclusion	153
CHAPTER 8	CONCLUSIONS	155
8.1	Introduction	155
8.2	Research conclusions	156
8.3	Implications of findings	161
8.4	Evaluation of the methodology	164
8.5	Future research	166
REFERENCES		168

List of Tables

CHAPTER 4

Table 4.1.	Types of respondents and sample size	47
Table 4.2.	Example of a summary of the data.....	58

CHAPTER 5

Table 5.1.	Timeline of Scheme Rehabilitation	66
Table 5.2.	Data on households and irrigated farmland in Prey Gniet Commune.....	68
Table 5.3.	Data on households and irrigated farmland in Chung Rouk Commune.....	68

CHAPTER 6

Table 6.1.	The criteria used by different stakeholders to assess the success of the O-treing Farmer Water User Community	80
Table 6.2.	Division of authority amongst leaders in the O-treing Farmer Water User Community and other administrative bodies	106
Table 6.3.	Examples of the costs accrued and revenue produced from dry season crop production, 2008.....	120

CHAPTER 7

Table 7.1.	Important characteristics of the case study.....	134
------------	--	-----

List of Figures

CHAPTER 3

- Figure 3.1. A diagram of the conceptual framework for the relationship between internal and external factors impacting on the success of WUAs 39

CHAPTER 4

- Figure 4.1. Basic types of designs for case studies 42
- Figure 4.2. A diagram of the single embedded case study method, as adapted from Merriam (1998) and Yin (2003)..... 43
- Figure 4.3. Map of Cambodia 45
- Figure 4.4. Map of Kampong Speu Province..... 46
- Figure 4.5. Broad question areas for the interviews with the local authorities and government officials 49
- Figure 4.6. Broad question areas for interviews with FWUC leaders 50
- Figure 4.7. Broad question areas for household interviews 52
- Figure 4.8. Broad question areas for focus group discussions..... 53
- Figure 4.9. A sample of the matrix created with committee leaders..... 55
- Figure 4.10. An illustration of the interaction between the description, classification, and connection phases in within- case data analysis 60

CHAPTER 5

- Figure 5.1. A map of the O-treing irrigation scheme..... 67
- Figure 5.2. The organisational hierarchy of the O-treing Farmer Water User Community..... 77

CHAPTER 6

- Figure 6.1. A diagram of factors that contributed to the success of the O-treing Farmer Water User Community 83
- Figure 6.2. A diagram of the mechanisms through which the level of local participation impacted on the success of the FWUC 84
- Figure 6.3. A diagram of the mechanisms through which the participation in the payment of irrigation service fees impacted on the success of the FWUC 85

Figure 6.4.	A diagram of factors that influenced farmer participation in the payment of irrigation service fees	86
Figure 6.5.	A diagram of the mechanisms through which farmer participation in water distribution impacted on the success of the FWUC.....	91
Figure 6.6.	A diagram of the factors that influenced farmer participation in the water distribution process	92
Figure 6.7.	A diagram of the mechanisms through which farmer participation in scheme maintenance impacted on its success.....	94
Figure 6.8.	A diagram of the factors that influenced farmer participation in scheme maintenance	95
Figure 6.9.	A diagram of the mechanisms through which farmer participation at the FWUC meetings impacted on the success of the FWUC	98
Figure 6.10.	A diagram of the factors that influenced the local attendance at the FWUC meetings.....	99
Figure 6.11.	A diagram of the factors that influenced farmer participation in decision making during FWUC meetings.....	100
Figure 6.12.	A diagram of the mechanisms through which the governance and management of the scheme impacted on the success of the FWUC	101
Figure 6.13.	A diagram of the mechanisms through which the decision-making structure impacted on the success of the FWUC.....	103
Figure 6.14.	A diagram of the mechanisms through which the leadership capacity impacted on the success of the FWUC.....	107
Figure 6.15.	A diagram of factors that influenced the leadership capacity of FWUC leaders	109
Figure 6.16.	A diagram of the mechanisms through which the FWUC formation process impacted on the success of the FWUC	111
Figure 6.17.	A diagram of the factors that influenced the FWUC formation process	111
Figure 6.18.	A diagram of the mechanisms through which rule implementation impacted on the success of the FWUC.....	114
Figure 6.19.	A diagram of the factors that influenced the effectiveness of rule implementation in the FWUC	115
Figure 6.20.	A diagram of the mechanisms through which rule enforcement impacted on the success of the FWUC.....	115
Figure 6.21.	A diagram of the factors that influenced rule enforcement in the FWUC	116

Figure 6.22.	A diagram of the mechanisms through which rule adaptation impacted on the success of the FWUC	118
Figure 6.23.	A diagram of the factors that influenced rule adaptation in the FWUC	119
Figure 6.24.	A diagram of the mechanisms through which the value of benefits impacted on the success of the FWUC.....	122
Figure 6.25.	A diagram of the factors that influenced the value of benefits that flowed from the irrigation scheme	122
Figure 6.26.	A diagram of the mechanisms through which the quality of the irrigation infrastructure has impacted on the success of the FWUC	123
Figure 6.27.	A diagram of the factors that influenced the quality of the irrigation infrastructure	124
Figure 6.28.	A diagram of the mechanisms through which the characteristics of farmers impacted on the success of the FWUC	126
Figure 6.29.	A diagram of the mechanisms through which external support impacted on the success of the FWUC.....	127
Figure 6.30.	A diagram of the factors that influenced the level of external support for the FWUC	128
Figure 6.31.	A diagram of the mechanisms through which the availability of market access impacted on the success of the FWUC	129
Figure 6.32.	A diagram of the factors that influenced market access	131

Abbreviations

ADB	Asian Development Bank
CBNRM	Community-Based Natural Resource Management
CPRs	Common Pool Resources
DoWRAM	Department of Water Resources and Meteorology
FAO	Food and Agriculture Organisation
FWUC	Farmer Water User Community
IMT	Irrigation Management Transfer
ISFs	Irrigation Service Fees
MoWRAM	Ministry of Water Resources and Meteorology
NGOs	Non-Governmental Organisations
OECD	Organisation for Economic Co-operation and Development
PIM	Participatory Irrigation Management
PIMD	Participatory Irrigation Management and Development
RGC	Royal Government of Cambodia
TWGAW	Technical Working Group on Agriculture and Water
UNDP	United Nations Development Programme
WB	World Bank
WFP	World Food Programme
WUAs	Water Users' Associations