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## The effect of social capital on collective action in community forest management in Cambodia

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**Abstract:** Over the last two decades, an increasing number of developing countries have decentralised the management of their forests, which has spawned community-based forest management, also known as community forestry (CF). While CF has been promoted in many countries, few studies have provided persuasive empirical evidence of the factors that help community forest users organise collective action to manage the community forests. Furthermore, in the existing studies which link social capital with collective action, few examine whether community forest users' social capital, depleted by past armed conflicts, can be restored. In addition, scant attention has been paid to the importance of social capital in promoting collective action as the basis for community forest management in post-conflict societies. This case study comprised 35 CF communities from Siem Reap Province in Cambodia (a post-conflict society). Using exploratory sequential mixed methods, the study empirically examined whether registered community forest users' (CF members') social capital, severely depleted by past armed conflicts, could be restored and whether existing social capital helped CF members organise collective action to manage community forests. Based on household, village and CF management committee-level data, this study revealed that existing social capital such as social networks and cooperative norms between CF members, which had been depleted by Cambodia's prolonged armed conflicts, helped to organise collective action, although the forms of social capital varied according to the type of collective action involved.

**Keywords:** Cambodia, collective action, community forest management, post-conflict society, social capital

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## 1. Introduction

Over the last two decades, an increasing number of developing countries have decentralised forest governance from central to local governments, civil societies or private hands (Colfer et al. 2008). This has spawned community-based forest management, also known as community forestry (CF) (Food and Agriculture Organization of the United Nations (FAO) 2003). The main reasons for this policy shift include enhancing the effectiveness and efficiency of service delivery and maintaining equity and social justice (Colfer et al. 2008). Additionally, this community-based natural resource management approach is expected to contribute to biodiversity conservation and livelihood improvement for the local people, whose lives depend on these natural resources (World Bank 1999).

While CF has been promoted in many countries, and the importance of the users' collective action in ensuring sustainable community forest management is well acknowledged, few studies provide persuasive empirical and quantitative evidence of the factors that help community forest users organise collective action to manage community forests. The concept of social capital, popularised by Putnam in the development literature, is useful when analysing the variations of collective cooperative behaviour in terms of how social resources, including social networks, cooperative norms and trust, affect individual action and collective outcomes (e.g. Coleman 1988; Putnam et al. 1993; Grootaert 1998). However, as Nyhan Jones and Woolcock (2007, 2) noted, although ““social capital” is one such complex issue that benefits from the coherent integration of qualitative and quantitative approaches”, research investigating social capital has been predominantly conducted using either qualitative or quantitative methods (*ibid.*). The main advantage of utilising mixed methods is that ‘the combination of qualitative and quantitative approaches provides a more complete understanding of a research problem than either approach alone’ (Creswell 2014, 4). However, there are some challenges in employing mixed methods, such as the need for extensive data collection (e.g. a large number of survey respondents and a wide range of respondent details for qualitative data collection) and the time-intensive nature of data analyses (*ibid.*, 218). This study adopted mixed methods, and through an examination of 35 CF communities in Siem Reap Province in Cambodia, it empirically investigated whether registered community forest users’ (CF members’) social capital, severely depleted by past armed conflicts, could be restored.

In addition, it examined whether existing social capital helped CF members organise their community forest management's collective action. To answer these research questions, this study tested the following hypothesis I proposed based on the literature review in Section 2 and qualitative data analysis results in Section 4 – Existing social capital among CF members, as measured by social networks, cooperative norms and trust, helps CF members organise collective action in community forest management. This can be measured by participation in community forest patrols, attendance at CF-related meetings and the imposition of sanctions against offenders for illegal acts at CF sites.

While there are empirical studies which link social capital with collective action to manage community forests, Cambodia's CF is an interesting case. Cambodia experienced a tragic violent armed conflicts for over twenty-five years, particularly during the Democratic Kampuchea Period, which destroyed social networks, cooperative norms and trust among Cambodians, all of which are important for the promotion of community collective action. This study's findings contribute to the discussion about whether community members' social capital (depleted by past armed conflicts), measured in terms of social networks, cooperative norms and trust can be restored. They also contribute to the discussion on the importance of existing social capital in the promotion of collective action in community forest management in a post-conflict society.

This article is structured as follows. Section 2 provides a literature review on collective action in community-based natural resource management. Section 3 provides background information on the research sites and describes methods of data collection and analysis. Section 4 qualitatively explores the factors that help CF members organise their collective action in community forest management in Cambodia, focusing on existing social capital. Section 5 quantitatively examines whether existing social capital helps CF members organise their community forest management collective action. Section 6 summarises the findings and concludes.

## 2. Collective action in community-based natural resource management

What promotes resource users to organise collective action in community-based natural resource management? Two theories offer clues to an answer. Rational choice theory assumes that individuals act rationally and in self-interest based on their preference for maximising their utility, so this principle of individual rationality as the driver of actions or behaviour can be applied to explain social phenomena (Hechter 1987; Elster 1989; Coleman and Fararo 1992). When this theory is applied to forest users' collective action in community forest management, it might explain the social phenomena that community forest users' collective action is an outcome of each individual community forest user's rational choice.

However, Olson (1965, 2) challenged the widespread view that groups tend to further their interests, arguing it was not justified when based on the assumption that groups act in their self-interest in the same way as individuals. He contended

that unless the group was quite small, or unless there was coercion or another device (e.g. provision of separate and 'selective' incentives) to persuade individuals to act in the common interest, rational, self-interested individuals do not act to serve common or group interests (*ibid.*, 1–2, 51). In large groups, he argued, it is difficult to achieve a common interest because of the 'free-rider' problem, where the share of the total benefit going to any individual decreases and the organisation costs become greater (*ibid.*, 45, 48).

On the other hand, according to new institutional theory, institutions determine the action of individuals and groups. Kohno (2002, 13) observed that while there is no fixed definition of institutions, the concept of the institution can be classified under two broad categories: institutions as patterns of constraints (or rules) imposed on the actors' behaviour (see e.g. North 1990; Ostrom 1990) and institutions as a normative and cognitive frameworks which assess the relevance of actors' behaviour and their understanding of reality, such as behavioural norms and values (see e.g. Scott 1995).

As empirical research on successful natural resource management cases by local users increased, scholars began paying more attention to the roles of institutions in helping resource users organise collective action (Ostrom 1990; Baland and Platteau 1996). In this context, the concept of social capital as an influential factor has attracted the attention of researchers.

Broadly, social capital is often understood to refer to a social resource created through social relationships that enable individuals to be more productive, or groups to pursue shared goals more effectively. Although the term is generally credited to Hanifan (1916), a superintendent of schools in West Virginia, the concept has subsequently been applied in many different disciplines, including economics, sociology and political science. The works of Coleman (1988) on education and Putnam et al. (1993) on civic participation and democracy provided inspiration for most scholars' current work on social capital. The current literature can be categorised into nine themes (Woolcock 2010, 472): (1) families and youth behaviour problems; (2) crime and violence; (3) schooling and education; (4) community life, both 'virtual' and civic; (5) public health and environmental issues; (6) work and organisations; (7) general cases of collective action problems, such as the management of common-pool resources; (8) economic development; and (9) democracy and governance.

Since social capital is multi-dimensional (Woolcock and Narayan 2000; Grootaert et al. 2004; Pretty and Smith 2004; Ohno et al. 2010; Jicha et al. 2011), scholars focus on different dimensions when conducting their research. The main dimensions include networks, norms, trust, values, common rules and sanctions (Woolcock and Narayan 2000; Grootaert et al. 2004; Pretty and Smith 2004). Given this diversity, researchers across fields have attributed different meanings to social capital; however, the most widely accepted definition is the 'features of social organization, such as trust, norms, and networks, that can improve the efficiency of society by facilitating coordinated actions' (Putnam et al. 1993, 167). The concept of social capital has been used at many different levels, such

as country, state/prefecture, municipality, community, household and individual. Putnam's predecessors, such as Bourdieu and Coleman, considered social capital to be an attribute of individuals, whereas Putnam treated it as an attribute of communities (Office for National Statistics 2001, 9). Putnam's view of the functions of social capital, its three elements and a unit of analysis (community) coincide with the focus of this study. Therefore, this study uses Putnam's definition. In this study, I use the term social capital to refer to the social networks, cooperative norms and trust among CF members that enable people to coordinate collective action and to achieve their desired goals. Drawing on new institutional theory, I suggest that this social capital is a potential facilitator of CF members' collective action in community-based natural resource management.

Studies have previously examined the effect of social capital on collective action in natural resource management. Using survey data, Ohno et al. (2010) found that social capital affected individual participatory behaviour in the Yodo River watershed management in Japan, but functioned differently according to the type of social capital. They revealed that in smaller watersheds, bonding-structural social capital (relatively closed and stable social networks between individuals such as social relationships within neighbourhood associations) facilitated participation in major management activities such as waterway cleaning. They also revealed that in larger watersheds, while bridging-structural social capital (relatively open and fluid social networks such as social relationships within hobby clubs) facilitated participation, bridging-cognitive social capital (individual trust in those who belong to such social networks, such as hobby clubs) does not. Likewise, Sekhar's (2007) study of Chilika Lake in India revealed that the level of trust between individuals and groups had a major effect on outcomes in fisheries. Drawing upon her field visits and interviews in 87 CF sites in India and two districts in Nepal, along with previous case studies by other researchers in the same geographies, Agarwal (2000) demonstrated that women's social networks, embodying prior experience of successful cooperation, could provide an important basis for organising sustainable environmental collective action.

Although this study focuses on whether existing social capital helps CF members organise collective action, existing literature has identified other factors. Based on an extensive review of empirical studies, in collaboration with other scholars, Ostrom (2007, 2009) proposed a social – ecological system (SES) framework that structures the variables affecting the likelihood of self-organisation and sustainable resource use into four core subsystems. In 2014, McGinnis and Ostrom (2014) summarised changes to this SES framework. According to the updated SES framework, all the first-level core subsystems (resource systems, resource units, governance systems and actors) are composed of multiple second- and third-level variables that affect action (interactions and the resulting outcomes). This structure is further divided into lower tiers, most of which remain undefined. Broadly, a particular SES is linked to social, economic and political settings and to related ecosystems.

These studies have contributed to our understanding of resource users' collective action as well as the various factors that facilitate such action in community-based natural resource management. However, as many scholars have indicated, systematic tests based on a large-*N* analysis that identifies whether existing social capital helps resource users organise their collective action are lacking (Van Laerhoven 2010). This undermines the external validity of the results of these studies (*ibid.*). Therefore, by adopting both qualitative and quantitative methods on 35 CF cases in Cambodia, this study attempts to examine whether existing social capital helps CF members organise collective action in community forest management.

### 3. Research sites, data collection and analysis methods

#### 3.1. Background information about research sites

Past armed conflicts, particularly during the Democratic Kampuchea period (1975–1979), severely depleted social capital among villagers in Cambodia (Meas 1995; Colletta and Cullen 2000). During this period, the Khmer Rouge destroyed social networks among Cambodians by forcing residents of Phnom Penh and provincial towns to move to rural areas to work as agricultural labourers, forming work units with strangers to make Cambodia an economically self-sufficient country by increasing agricultural production. It also destroyed trust between Cambodians (Meas 1995). According to Colletta and Cullen (2000, 11), 'Community and family members were encouraged to spy and report on each other, destroying trust...' The devastating experience during the Democratic Kampuchea period and the subsequent armed conflict created a feeling of aversion to organisational activities among Cambodians and has made it difficult to organise collective action (Meas 1995). According to my fieldwork in my research sites from 2005 till 2009, difficulties of organising collective action among rural Cambodians were caused by depleted social capital among themselves rather than with government officials, as was the case during the past armed conflicts.

In Cambodia, approximately 13.9% of the total land area was converted from forest to non-forest areas between 1965 (forest cover area was 73% of the total land area) and 2006 (forest cover area was 59.1% of the total land area) (Forestry Administration 2008). Did the introduction of CF during the early 1990s help recover the Cambodian forest or slow the rate of loss? When CF was introduced in Cambodia in 1992 or 1993, 59.8% of the total land mass consisted of forest covered areas. In 2006, the total was only slightly lower (59.1%). Regardless, it is difficult to attribute this small decrease to the introduction of CF. However, since large-scale, private logging concessions that caused forest degradation were introduced around the same time as CF (Poffenberger 2013, 3–30), the forest cover would arguably have suffered greater losses without the implementation of CF.

The Royal Government of Cambodia recognises deforestation and forest degradation as serious problems and has therefore launched forestry reforms for sustainable environmental management. As one of the important pillars of its forestry reforms, the Royal Government of Cambodia promotes CF because it has

the potential to achieve sustainable forest management and improve the livelihoods of poor people living near community forests. The Cambodian government defines a CF community as 'a community that voluntarily initiates the formation of a group under a Community Forest Agreement in order to conduct development activities and to use the forest resources within a community forest in a sustainable manner' (Royal Government of Cambodia 2003, 3). To promote CF, the Royal Government of Cambodia enacted the Forest Law in 2002 followed by a CF sub-decree in 2003 and CF guidelines in 2006.

Since CF was introduced in two Cambodian provinces during the early 1990s by international NGOs, even prior to the Royal Government of Cambodia promoting CF, the number of CF sites has increased remarkably. As of December 2009, 398 CF sites covering 378,098 ha (approximately 3.5% of total forest cover area) have either obtained or are in the process of obtaining official legal recognition (Regional Community Forestry Training Center for Asia and the Pacific (RECOFTC) 2009).

The CF communities in this research are located in Siem Reap Province, in the north-west of the country. It is one of the five provinces with the most significant loss of forest (Forestry Administration 2008). The FAO's project supported the development of a total of 59 CF sites in three provinces of Siem Reap (37 CF sites), Otdar Meanchey (11 CF sites) and Banteay Meanchey (11 CF sites) from January 1995 to April 2008 (FAO 2008). These covered 136 villages and protected and managed 83,558 ha (*ibid.*). External agencies (the Forestry Administration and the FAO) play significant roles in developing CF in Cambodia, as their support is indispensable for communities to acquire technical and community forest management skills (CF boundary demarcation, organising CF members collective action) and CF-related legal knowledge (rights and duties of CF communities, CF legalisation process). The main purpose of the project was to expand the responsible, productive and sustainable management of forest resources by local communities to meet their needs and stimulate development within these three provinces (*ibid.*).

### 3.2. Data

This study is based on my four rounds of fieldwork in Cambodia over a period of seven months from March 2005 to January 2009. During this time, I collected data from various sources, and at multiple levels (national, provincial, district, commune and CF community, village and household). The main research sites were 35 CF communities consisting of 42 villages under 21 communes, in 10 districts in Siem Reap Province. The total forest area managed by these CF communities is 17,512 ha. The size of community forest and number of CF member households in each CF community are shown in Table 1. Two CF communities out of the 37 FAO-supported CF communities were excluded because they had already discontinued CFs at the time of the surveys. Siem Reap Province was chosen from the three FAO's project sites because the first FAO project was launched in this province, and therefore, it was expected that CF member households would have

Table 1: Community forest size and number of CF member households in each CF community.

CF code	Community forest areas (ha) <sup>*1</sup>	Number of CF member households <sup>*2</sup>	CF code	Community forest areas (ha) <sup>*1</sup>	Number of CF member households <sup>*2</sup>
CF 1	1022	917	CF 19	86	144
CF 2	445	89	CF 20	59	189
CF 3	409	642	CF 21	112	74
CF 4	330	340	CF 22	2086	574
CF 5	61	61	CF 23	2367	299
CF 6	93	44	CF 24	697	145
CF 7	78	64	CF 25	1080	341
CF 8	63	48	CF 26	377	152
CF 9	78	96	CF 27	1037	330
CF 10	203	94	CF 28	1794	402
CF 11	277	107	CF 29	656	211
CF 12	215	84	CF 30	232	1123
CF 13	38	169	CF 31	207	212
CF 14	10	233	CF 32	16	223
CF 15	99	105	CF 33	913	302
CF 16	1514	150	CF 34	215	139
CF 17	330	81	CF 35	103	97
CF 18	210	145			

(Source) <sup>\*1</sup>: FAO (2008), <sup>\*2</sup>: Author's fieldwork in 2008.

more experience organising collective action. In addition, the FAO-supported CF project sites in Siem Reap are renowned for their achievements. The first 10 CF agreements in Cambodia were concluded between the FAO-supported CF communities in Siem Reap and the Forestry Administration.

This research employed exploratory sequential mixed methods (Creswell 2014). This method involves collecting qualitative data, analysing the data and using the findings to develop an instrument (survey questionnaire) which is administered to the sample. Second, this questionnaire is administered to a sample of the population to collect and analyse the quantitative data to answer the research questions. First, to collect qualitative data for this study, I conducted key informant interviews with community forest management committees (CFMCs), village chiefs and CF members; focus group discussions with CFMCs and CF members; and on-site observations in all 35 CF communities. In addition, I joined a survey team comprising representatives from the CFMCs, the Forestry Administration, and the FAO, which was conducting an inventory of community forest resources at one CF site. I also attended CF-related meetings held by CF communities. These helped me better understand forest conditions, the types of non-timber forest products (NTFPs) that CF members harvest and CF members' collective action. To better understand community forest management in Cambodia in general, and CF communities at research sites in particular, I interviewed officers from the Forestry Administration of the Ministry of Agriculture, Forestry and Fisheries (MAFF), who were working in CF offices at the national

and provincial levels; the staff of international donor organisations such as FAO and the RECOFTC, as well as representatives of several NGOs working on CF projects in Cambodia. Second, to collect quantitative data, I administered questionnaire surveys with CFMCs, village chiefs and CF members, using different types of instruments in all 35 CF communities. Either the author or her research assistants read questions to each respondent or groups of respondents, and then wrote down their answers.

My visits to each CF community ranged from two to seven occasions. I conducted the questionnaire surveys during the last round of fieldwork between October 2008 and January 2009. First, using random sampling methods, a CF member household questionnaire survey was conducted with 30 households in each of the 35 CF communities, a total of 1050 CF member households. Second, a questionnaire survey with the CFMCs was conducted in all 35 CF communities. Third, a questionnaire survey was conducted with village chiefs in 42 villages from the 35 CF communities. Seven of the CF communities in this research comprised multiple CF villages, so in these communities, only the two villages located closest to the CF were included.

### 3.3. Methods of analysis

Since this study employed exploratory sequential mixed methods, I first analysed the qualitative data using a hand-coding approach to distinguish different types of CF user collective action, as well as what helped CF members organise collective action, and then formed categories. The results are presented in Section 4. Next, these categories were used as variables in the subsequent quantitative data analysis presented in Section 5.

For the quantitative analysis, I conducted statistical analysis using the variables described in Table 2 to verify my hypothesis stated in Section 1. Based on the literature review, the SES framework (McGinnis and Ostrom 2014) was used to organise dependent variables (CF member collective action) and independent variables (factors which affect CF member collective action) that were both identified by the empirical qualitative analysis results in Section 4. To capture and measure these factors and the CF member collective action, 20 variables were selected. Table 2 describes the selected variables used to test the hypothesis in detail. The five variables (*SIZE*, *DIS*, *MEMBER*, *EXPEND* and *LAND*) are logarithmic to capture nonlinear relationships between the independent and dependent variables. The descriptive statistics for the variables used in this study are indicated in Table 3.

SPSS Statistics 22.0 was used to perform statistical analysis for my research data. For performing the statistical analysis, this study used regression analyses. For two dependent variables, *participation in community forest patrols* and *attendance at CF-related meetings*, ordered logistic regression analyses were conducted as they are ordinal variables. For the remaining dependent variable, *the imposition of sanctions against offenders*, I conducted binary logistic regression analysis as it is a binary variable. All dependent and independent variables

Table 2. SES framework's first-level core subsystems and second-level variables used in this study.

Variable	Symbol	Description	Units of measurement	Data source	Expected sign
<Interactions> (Self-organising activities=CF member collective action)					
Participation in community forest patrols	CA_PAT	Frequency of participation by at least one member of the household in community forest patrols organised by CF members themselves in each CF community in 2007.	1=none, 2=once a year, 3=2-3 times a year, 4=once a month, 5=2-3 times/month, 6=once a week, 7=more than once a week. The mean values of 30 households in each CF community were used as CF community level values. These CF community level values are recorded using the following scale: 1 ( $2.0 \leq x < 2.5$ ), 2 ( $2.5 \leq x < 3.0$ ), 3 ( $3.0 \leq x < 3.5$ ), 4 ( $3.5 \leq x < 4.0$ ), 5 ( $4.0 \leq x < 4.5$ ).	CFHH	
Attendance at CF-related meetings	CA_MET	How many types of the following three CF-related meetings has at least one member of the CF member household attended in the past? i) electing CFMC members, ii) making CF regulations, iii) raising CF members' awareness of forest conservation.	1=no attendance, 2=attended one type of meeting, 3=attended two types of meetings, 4=attended all three types of meetings. The mean values of 30 households in each CF community were used as CF community level values. These CF community level values are recorded using the following scale: 1 ( $x < 3.0$ ), 2 ( $3.0 \leq x < 3.5$ ), 3 ( $3.5 \leq x$ ). 1 if yes; 0 if no	CFHH	
Imposition of sanctions against offenders	CA_SAN	Dummy variable. Has the CFMC confiscated illegally harvested forest resources from offenders and/or fined offenders for their illegal acts in CF site since the commencement of its CF?		CFMC	

Table 2 (continued)

Variable	Symbol	Description	Units of measurement	Data source	Expected sign
<b>&lt;Resource Systems&gt;</b>					
<b>(Size of resource system)</b>					
Log CF size	SIZE	Size of community forest that CF community manages and uses	log (ha)	CFMC	+/-
<b>(Location)</b>					
Log distance from house to CF site	DIS	Distance from a CF member's house to his/her CF site	log (km)	CFHH	-
<b>&lt;Resource Units&gt;</b>					
<b>(Number of units)</b>					
Awareness regarding community forest degradation	AWARE	A CF member's perception of the seriousness of community forest degradation in terms of tree decrease	1=not serious at all, 2=not serious, 3=average, 4=serious, 5=extremely serious	CFHH	+
<b>&lt;Governance Systems&gt;</b>					
<b>(Government and nongovernment organisations)</b>					
External support1	SUPPORT1	CFMC's perception of the degree of support from Forestry Administration and FAO offering advice on community forest management. The mean scores for Forestry Administration and FAO were calculated for each CF community.	1=no support/very weak 2=weak 3=neither strong nor weak 4=strong 5=very strong	CFMC	+
External support2	SUPPORT2	CFMC's perception of the degree of support from Forestry Administration and FAO for raising awareness of CF members. The mean scores for Forestry Administration and FAO were calculated for each CF community.		CFMC	+

Table 2 (continued)

Variable	Symbol	Description	Units of measurement	Data source	Expected sign
(Property-rights systems)					
CF legal status	LEGAL	Dummy variable. Is the CF legally recognised?	1 if yes; 0 if no	CFMC	+
<Actors>					
(Number of relevant users)					
Log CF membership	MEMBER	Number of registered CF members in each CF community	log (persons)	CFMC	-
(Socioeconomic attributes of users)					
Workforce	WORK	Number of people in a CF member's household aged between 15 and 59 years old	Persons	CFHH	+
Log expenditure	EXPEND	Amount of CF member household's average annual expenditure	log (local currency Riel)	CFHH	-
Log farm land	LAND	Size of farm land a CF member household owns	log (ha)	CFHH	-
Organisational experience	ORG	Dummy variable. Has at least one member of the CF household participated in organisational activities related with community development with the exception of the FAO-assisted CF project in the past?	1 if yes; 0 if no	CFHH	+
Working far from home	WF	Dummy variable. Does an interviewed CF member work at a distance from home that precludes participation in CF activities?	1 if yes; 0 if no	CFHH	-
(Social capital)					
Social networks	NW	To capture the extent of significant networks an interviewed CF member has in the CF community, the following question was asked: How many CF members engage you with mutual help when problems arise in daily life?	1=none, 2=1-5 persons, 3=6-10 persons, 4=11-15 persons, 5=16 persons or more	CFHH	+

Table 2 (continued)

Variable	Symbol	Description	Units of measurement	Data source	Expected sign
Cooperative norms	NORM	CF member's perception of the level of cooperative norms shared between CF members. The CF member self-evaluated the level of cooperative norms by responding to the following statement: most CF members are willing to help each other when someone else is in trouble.	1=no such opportunities 2=strongly disagree 3=disagree 4=neither agree nor disagree 5=agree 6=strongly agree	CFHH	+
Trust	TRUST	CF member's perception of the level of trust between CF members. The CF member self-evaluated the level of trust by responding to the following statement: in general, most CF members do what they promised to do.		CFHH	+
(Knowledge of social-ecological system)					
Knowledge about CF	KNOW	Level of the CF member's understanding of CF. The CF member answered 10 questions, and the number of correct answers was counted. Questions included related to the purpose of CF, ownership, forest products that are allowed to be harvested, whether the respondents knew the CF boundary, etc.	Between 1 and 10	CFHH	+
(Importance of resource/dependence)					
Dependence on income from forest resources	DEPEND	Percentage of average annual household income generated from collected forest resources (i.e. selling firewood, other forest products, and handicrafts)	%	CFHH	+

Note: CFHH: CF member household. CFMC: CF management committee.

Table 3: Mean, standard deviation, minimum, and maximum of variables used in this study.

Variable	Mean	SD	Min.	Max.	Variable	Mean	SD	Min.	Max.
CA_PAT	2.800	1.158	1	5	WORK	3.159	0.345	2.533	3.833
CA_MET	2.600	0.604	1	3	EXPEND	14.372	0.418	13.559	15.321
CA_SAN	0.800	0.406	0	1	LAND	0.025	0.339	-1.150	0.606
SIZE	5.459	1.350	2.303	7.769	ORG	0.407	0.141	0.067	0.633
DIS	0.639	0.835	-1.287	1.929	WF	0.661	0.120	0.333	0.900
AWARE	3.873	0.353	3.033	4.600	NW	2.822	0.184	2.467	3.233
SUPPORT1	4.057	0.539	2.000	5.000	NORM	5.173	0.166	4.700	5.433
SUPPORT2	4.157	0.579	3.000	5.000	TRUST	4.655	0.217	4.333	5.267
LEGAL	0.514	0.507	0	1	KNOW	6.879	0.464	5.600	7.733
MEMBER	5.140	0.803	3.784	7.024	DEPEND	11.899	10.334	0	39.637

Note: N=35. Source: Author's questionnaire survey.

identified by the empirical qualitative analysis results in Section 4 were used for the three types of community collective action in this study. However, none of the independent variables were statistically significant for the dependent variable, *the imposition of sanctions against offenders*. Therefore, as a next step, I used one of the SPSS's variable selection methods called backward elimination (Wald), which enabled me to specify how independent variables were entered into the analysis. Using this, all the identified independent variables were entered in the equation first and then SPSS conducted removal testing of some of those independent variables from the full model, based on the probability of the Wald statistic. All models in which any of the independent variables were statistically significant using the backward elimination were also presented in Table 5.

Since this study uses a CF community as the unit of analysis, the data collected at the household-level for the variables described in Table 2 were converted to CF community-level data. The mean values for the 30 households in each of the 35 CF communities were calculated and used as CF community-level data. This study used this method to calculate the collective social capital of CF communities, because forms of social capital that helped CF members organise collective action were captured better by data on each individual's reliable social network, the level of cooperative norms between CF members generated through daily interactions and the degree of trust between CF members.

Table 3 reports descriptive statistics results on the variables used in this study.

Table 4 presents regression results for two cases of CF member collective action (community forest patrols and attendance at CF-related meetings), and Table 5 presents regression results of the imposition of sanctions against offenders.

## 4. Empirical analysis: qualitative analysis

### 4.1. Collective action in community forest management

Interviews with key informants, such as CF members, CFMC members, village chiefs and officers of Forestry Administration and FAO, as well as focus group

discussions at the surveyed CF communities revealed that CF communities commonly organised three types of collective action to manage their community forests. These comprised participation in community forest patrols, attendance at CF-related meetings and the imposition of sanctions against offenders. When commencing, CF communities have organised collective action based on guidance provided by Forestry Administration and FAO. Although the frequency and extent of collective action varied across the surveyed CF communities, in general, the content of the three types of collective action was categorised as follows in the sections below. Another type of community collective action called wooden pole harvesting was only organised in CF communities with abundant forests. Thus, it will not be examined here.

#### **4.1.1. Participation in community forest patrols**

First, there are clear differences in participation levels depending on the size of the community forest and strength of the communities. For example, the size of the community forest varies from 10 ha to 2367 ha, and the number of CF member households ranges from 44 to 1123. Accordingly, patrol methods and the number of members in each patrol group differ across CF communities. However, in general, community forest patrols shared the format discussed below.

In each CF community, meetings were held to discuss patrol methods and conduct groupings. CF members were divided into a group of five to ten people comprising relatives, neighbours and/or friends. At the meeting, CF members made general rules as to when, where and how to patrol. In most communities, each group took turns patrolling, but in some, only CFMC members patrolled if CF members were uncooperative. Generally, the leaders of each group coordinated the dates and times of the patrols. In communities where patrols were regularly performed, the frequency of the patrols ranged from daily to monthly. The patrol time ranged from three hours to an entire day. In some CF communities, members patrolled together, but in others, the groups were divided into subgroups to patrol different sections of the forest to save time. If offenders were found, the patrol group informed the CFMC, which then consulted the Forestry Administration.

#### **4.1.2. Attendance at CF-related meetings**

Second, CF-related meetings were held to discuss important issues among CF members. In the surveyed communities, three types of CF-related meetings were considered important: electing CFMC members, making CF regulations and raising CF members' awareness of forest conservation. The first two types of meetings were held with the support of officers from the Forestry Administration and FAO when CF commenced. The third type were held occasionally, particularly when officers from the Forestry Administration and/or FAO visited the communities. Attendance rates for the first two types of meetings were high in all CF communities because the results directly affected CF members' use of community forests.

### **4.1.3. Imposition of sanctions against offenders**

Third, when CF members found offenders during patrols or near the community forest, they promptly reported it to the CFMC or village chief. In accordance with CF regulations, the CFMC imposed sanctions against the offenders. In most of the surveyed CF communities, the first capture resulted in a warning, the second capture resulted in the confiscation of harvested trees and three (or more) captures incurred a fine. Some communities established a fixed penalty fine per tree or cart, although other communities decided on the amount based on the size of the trees or the market price. Meanwhile, some communities reported the illegal act to the Forestry Administration if offenders did not pay the fine; however, other communities consulted if the CFMC had difficulties dealing with illegal acts.

## **4.2. Factors affecting collective action**

### **4.2.1. Existing social capital at the community level**

The forms of social capital that currently exist in Cambodian villages are a pivotal issue. According to fieldwork interviews with CF members, social capital existed among Cambodian villagers, and they utilised it when organising communal activities, such as Buddhist ceremonies, wedding ceremonies, funerals, community development projects (e.g. road repairing) and when interacting with each other (e.g. helping with rice planting and harvesting, borrowing money). Strong horizontal social capital was formed with relatives, neighbours and friends. Although social capital (largely destroyed during the Democratic Kampuchea period) has gradually been restored, it had again declined because villagers were busy working outside their villages. Consequently, interactions between villagers gradually became less frequent. Vertical social capital between CF communities and the Forestry Administration or FAO was also indispensable for CF communities to be formed and sanction offenders for their illegal acts.

The following sections explore whether existing social capital helped CF members organise community forest management collective action. If other factors helped the members, their relative importance for social capital was tested as presented in the quantitative analysis discussion in Section 5.

### **4.2.2. Participation in community forest patrols**

In the surveyed CF communities, existing social capital, such as social networks, cooperative norms and trust between relatives, neighbours and/or friends, was effectively utilised for patrols. Patrols were conducted on a group basis. To use this existing social capital that had been generated through mutual help in farming, religious events and daily interactions, the patrol groups tended to form between relatives, neighbours and/or friends. During interviews with CF members, many said they felt more obliged to cooperate in patrols if they were asked to participate by someone they knew closely.

Social capital was vital not only among CF members but also between CF members and CFMC and between CFMC and Forestry Administration. In some

CF communities, CFMCs informed CF members of patrol dates via their group leaders. In CF communities where the CFMC, group leaders and group members had good cooperative relationships and trusted each other, the group members were more likely to participate in patrolling. Additionally, social networking and trust between CF members, CFMC and the Forestry Administration were also important. These types of social capital were used when offenders were found and sanctions were imposed against the offenders.

In CF communities where patrols were not properly conducted, some CF members lost trust in their CF projects and in other CF members due to frequent illegal logging and unsolved land-grabbing problems. In most cases, the offenders (CF members and people outside CF communities) are poor people who undertake illegal logging because they cannot find other ways to earn money. Land-grabbing problems persist if resettlement negotiations fail with residents who live in proposed community forest areas.

In sum, all three forms of social capital helped CF members participate in community forest patrols. This study also found other factors that encouraged CF members' participation. CF members were more likely to participate in patrols if their CF was legally recognised. Some CF members in the surveyed communities stated, 'If the CF is legally recognised, we can catch offenders because we have a solid legal foundation for catching offenders.' In addition, CF members who heavily depended on forest resources, who have knowledge about their CF and who had a sense of crisis about forest degradation tended to participate in patrols to protect their forests from offenders. The support of external agencies (Forestry Administration and the FAO) was indispensable as they helped decide patrol formats and raise members' awareness of the importance of protecting their forests. Next, CF members who had previous organisational experience with community development projects supported a cooperative working environment by coordinating patrol shifts and sharing responsibilities. In contrast, member participation was limited if the number of household members was small, if the breadwinner worked a long way from home or if the CF site was far from home. As Olson (1965) argued, in CF communities with large numbers of registered CF members, participation in patrols is less likely due to the 'free-rider' problem.

#### **4.2.3. Attendance at CF-related meetings**

When calling CF members to attend CF-related meetings, CFMCs utilised existing social networks. When CF-related meetings were held, CFMCs orally informed CF members of the date, time and venue, either through group leaders or directly to CF members. In small CF communities, the CF chief alone or CFMC members shared the work of traveling to every household to inform them of the meetings. The call for meetings spread more smoothly when the relationships between the CFMC, group leaders and CF members were positive. In addition, CF members were more likely to attend the CF meetings if they were asked to attend the meetings by people with whom they had good relationships, and if CF members shared cooperative norms. As was the case with patrols, CF members lost trust in their CF projects and other

CF members, and CF meetings gradually ceased if the CF community encountered frequent illegal logging or unsolved land-grabbing problems. In sum, all three types of social capital encouraged CF members to attend CF-related meetings.

In addition to social capital, this study revealed other factors that encouraged CF members to attend CF-related meetings. CF communities with strong external support of CFMCs had greater CF member attendance. In obtaining CF legal status, CFMCs held many meetings encouraging members to attend with support from the Forestry Administration and FAO. Therefore, CF communities whose CFMCs received strong external support had larger turnouts than those without it. CF members whose households depended on forest resources, and who had a sense of crisis about forest degradation, were more likely to attend meetings to learn how the CF project affected their use of the forest and its condition. In addition, if the number of household members was large, it was easier to send one person to represent the household by coordinating a work schedule between household members.

Conversely, CF members who worked far from home had difficulties attending the meeting because the meetings were usually held during the day. The larger the number of CF members in the CF communities, the more difficult it was to get a higher attendance rate at the meetings due to free-riding. CF members who lived far from their own CF sites were less likely to attend the meetings because they were less likely to depend on the community forest, and therefore they did not have much interest in CF projects.

#### **4.2.4. Imposition of sanctions against offenders**

To properly impose sanctions against offenders, good relationships among CF members, CFMC and the Forestry Administration are necessary to coordinate information about offenders and consult about their proper treatment. Additionally, catching offenders and reporting them to the CFMC is more likely when CF members share cooperative norms. In CF communities where levels of trust between CF members were high, they would cooperatively catch offenders who betrayed their trust. In sum, all three types of social capital – social networks, cooperative norms and trust – helped CF members impose sanctions against offenders.

In addition to social capital, other important factors that helped CF members impose sanctions against offenders included having CF legal status, external support and a large forest. As in the patrol case above, CF members emphasised that without CF legal status and external support from the Forestry Administration, it was difficult for them to impose sanctions against offenders because they did not have a legal rationale. CF communities with large forests and sizeable trees attracted more criminal activity.

#### **4.2.5. The influence of past armed conflict on current social capital used for collective action in community forest management**

The above qualitative analysis results revealed that social capital helped CF members organise all three types of collective action. Horizontal social capital formed

between relatives, neighbours and friends, destroyed earlier by armed conflicts, now helps CF members organise collective action. Vertical social capital, which the Khmer Rouge utilised to control Cambodians during the Democratic Kampuchea period, now binds CF communities and the Forestry Administration/FAO and helps CF members organise collective action. While previous studies showed that devastating experiences during the Democratic Kampuchea period and the subsequent armed conflicts depleted social capital between Cambodians and created an aversion to participation in organised activities, this study revealed that CF members collectively organised community forest management, utilising both horizontal and vertical social capital.

## 5. Empirical analysis: quantitative analysis

This section empirically and quantitatively examines whether existing social capital helps CF members organise the three types of community forest management's collective action discussed above.

### 5.1. Factors affecting 'CF Member Participation in Community Forest Patrols (CA\_PAT, hereafter PATROLS)'

To verify the hypothesis stated in Section 1, an ordered logistic regression analysis was conducted. Sixteen independent variables identified by the qualitative analysis results presented in Section 4 were used (see Table 2 for details of both dependent and independent variables). Table 4 indicates the regression result.

The result of the ordered logistic regression analysis supported the hypothesis, by demonstrating that the social capital variables *social networks* and *cooperative norms* had positive effects on *PATROLS*, but they were not statistically significant at the  $p < 0.05$  level. Both *social networks* and *cooperative norms* showed the expected signs. *Social networks* had a positive effect on *PATROLS*, indicating that CF communities whose CF members had larger social and reciprocal networks were more likely to gain CF member participation in patrols. This is because CF members used their social networks to encourage participation from other CF members. This result aligns with the social capital literature, such as Putnam's theory, which has argued that horizontal networks promote collective action (Putnam et al. 1993). *Cooperative norms* also had a positive effect on *PATROLS*, indicating that CF communities whose CF members shared a high level of cooperative norms were more likely to gain CF member participation in patrols. This is because CF members participate in patrols based on cooperative norms to solve the forest degradation problem faced by the community.

According to the results of the ordered logistic regression analysis, although not social capital variables, the three variables, *expenditure*, *working far from home*, and *knowledge*, yielded statistically significant results and showed the expected signs. *Expenditure* had a negative effect on *PATROLS*, indicating that low income households tended to participate in patrols. Although it was not statis-

tically significant at the  $p < 0.05$  level, *dependence on income from forest resources* also showed a positive effect on *PATROLS*. This indicated that CF member households which depend on forest resources for income tended to participate in patrols. This is because they need to protect their forest resources from being stolen by offenders. *Working far from home* had a negative effect on *PATROLS*, indicating that CF members who did not work far from home were more likely to participate in patrols. If they worked far from home, they could not participate in patrols which were normally carried out during the daytime. *Knowledge* had a positive effect on *PATROLS*, indicating that CF members who had more knowledge about their CF were more likely to participate in patrols. According to my interviews with CFMC members in all CF communities during my fieldwork, CF members who attended CF-related meetings learned about the conditions of their forest and the importance of protecting their forest and were thus more likely to participate in patrols.

Although it was not statistically significant at the  $p < 0.05$  level, *CF membership* had a negative effect on *PATROLS*, indicating that CF communities with a small number of CF member households tended to gain their CF members' participation in patrols. According to my interviews with CFMC members, CF communities with large memberships found it difficult to gain CF members' cooperation with patrols due to the 'free rider' problem.

## 5.2. Factors affecting 'CF member attendance at CF-related meetings (CA\_MET, hereafter MEETING)'

Similar to *PATROLS* in Section 5.1, to verify the hypothesis stated in Section 1, an ordered logistic regression analysis was performed using independent variables identified by the qualitative analysis results in Section 4 (see Table 2 for details of both dependent and independent variables). Table 4 indicates the regression result. Of 11 independent variables identified in qualitative analysis results in Section 4, one variable *workforce* was excluded from the model to avoid multicollinearity problems.

The result shows that the two variables *social networks* and *CF membership* yielded statistically significant results. Both variables showed the expected signs. In support of the hypothesis, the result from the ordered logistic regression analysis showed that the social capital variable *social networks* had a positive and significant effect on *MEETING*. This indicates that CF communities with larger CF member social networks were more likely to have CF members attend CF-related meetings. As with *PATROLS* in Section 5.1, CF members used their social networks to encourage other CF members to attend meetings. Empirical studies have confirmed that CF-user social networks promote collective actions in community forest management (Agarwal 2000).

In addition to the social capital variable, *CF membership* had a negative and significant effect on *MEETING*. This indicates that CF communities with a small number of CF member households were more likely to have CF members attend

Table 4: Results of ordered logistic regression analysis on CF member participation in community forest patrols and CF member attendance at CF-related meetings.

Independent variables	Dependent variables							
	Participation in community forest patrols (CA_PAT)				Attendance at CF-related meetings (CA_MET)			
	Coef.	SE	Wald	Sig.	Coef.	SE	Wald	Sig.
<i>DIS</i>	-0.898	0.678	1.754		0.961	0.954	1.014	
<i>AWARE</i>	-1.989	1.682	1.398		-3.611	3.035	1.415	
<i>SUPPORT1</i>	1.168	0.890	1.720		0.190	1.118	0.029	
<i>SUPPORT2</i>	0.263	0.915	0.082					
<i>LEGAL</i>	0.927	1.262	0.539					
<i>MEMBER</i>	-1.187	0.719	2.722	†	-2.566	1.285	3.984	*
<i>WORK</i>	2.929	1.874	2.445					
<i>EXPEND</i>	-3.156	1.514	4.344	*	1.311	2.366	0.307	
<i>LAND</i>	-2.352	1.990	1.398					
<i>ORG</i>	1.325	3.731	0.126					
<i>WF</i>	-10.564	5.076	4.331	*	-6.271	7.813	0.644	
<i>NW</i>	4.803	2.847	2.846	†	15.636	6.559	5.683	*
<i>NORM</i>	5.448	2.991	3.317	†	-0.656	4.552	0.021	
<i>TRUST</i>	-1.582	3.080	0.264		2.105	3.854	0.298	
<i>KNOW</i>	2.425	1.186	4.179	*				
<i>DEPEND</i>	0.100	0.053	3.509	†	0.136	0.082	2.741	†
Threshold								
[Patrols=1]	-2.950	28.966	0.010					
[Patrols=2]	0.401	28.890	0.000					
[Patrols=3]	4.392	28.963	0.023					
[Patrols=4]	7.063	29.015	0.059					
[Meeting=1]					33.211	53.000	0.393	
[Meeting=2]					38.552	53.582	0.518	
Pseudo R-Squares:								
Cox and Snell			0.734				0.600	
Nagelkerke			0.771				0.753	
McFadden			0.439				0.575	

Note: N=35. † $p < 0.10$ , \* $p < 0.05$ .

Source: Author's questionnaire survey.

CF-related meetings. As with *PATROLS* in Section 5.1, according to my interviews with CFMC members in 35 CF communities, those with the large memberships tended to encounter difficulties with CF members' participation in the CF-related meetings due to the 'free rider' problem, and difficulties with informing all member households of the dates, times and venues of meetings in advance. Another variable *dependence on income from forest resources* showed a predicted positive effect on *MEETING* but was not statistically significant at the  $p < 0.05$  level. This indicates that members of the CF communities who depend on income from forest resources were more likely to participate in CF-related meetings. According to my interviews with CF members and CFMCs in all CF communities during my fieldwork, those whose members harvested NTFPs, such as wild

Table 5. Results of binary logistic regression analysis on imposition of sanctions against offenders.

Independent variables	Models												
	T3-M1			T3-M2			T3-M3			Wald	Sig.		
	Coef.	SE	Wald	Sig.	Coef.	SE	Wald	Sig.	Coef.			SE	Wald
SIZE	0.679	0.676	1.009										
LEGAL	19.715	4662.526	0.000										
SUPPORT1	42.585	9325.054	0.000		5.793	3.087	3.522	†	5.284	2.675	3.903	*	
NW	-1.190	6.308	0.036										
NORM	9.761	9.751	1.002		8.079	4.491	3.236	†	7.381	3.992	3.420	†	
TRUST	9.009	10.459	0.742		5.437	4.710	1.332						
Constant	-260.656	37,300.347	0.000		-87.298	43.981	3.940	*	-57.088	26.699	4.572	*	
-2 Log Likelihood			10.544				17.260				18.954		
Cox and Snell R <sup>2</sup>			0.503				0.398				0.368		
Nagelkerke R <sup>2</sup>			0.796				0.629				0.582		
Hosmer and Lemeshow goodness-of-fit:													
χ <sup>2</sup>			8.994				1.236				2.945		
Df			6				7				7		
Sig.			0.174				0.990				0.890		

Note: N=35. †p&lt;0.10. \*p&lt;0.05.

Source: Author's questionnaire survey.

grass to make blooms and baskets, wild vegetables and wild fruits and were more interested in preserving their forest, were more likely to gain members' participation in CF-related meetings.

### 5.3. Factors affecting 'imposition of sanctions against offenders (CA\_SAN, hereafter SANCTION)'

To verify the hypothesis stated in Section 1, I conducted a binary logistic regression analysis using six independent variables identified by qualitative analysis results in Section 4 (see Table 2 for details of both dependent and independent variables). Table 5 indicates the regression results. Model T3-M1 in Table 5 includes all six independent variables. Next, as explained in Section 3.3, SPSS's variable selection method called backward elimination (Wald) was used to determine which independent variables should be entered in other models. The results of other models T3-M2 and T3-M3 are also presented in Table 5.

According to the results, only one variable *external support 1* yielded a statistically significant result, and the variable showed the expected sign. This indicated that CF communities advised by the Forestry Administration and FAO on community forest management were more likely to impose sanctions against offenders. According to my interviews with CFMCs in all surveyed communities and officers of Forestry Administration in Siem Reap Province, CF communities advised by the Forestry Administration and FAO about community forest management, including sanction methods, were more likely to properly impose sanctions against offenders. This was because such CF communities knew how to deal with offenders.

The social capital variable *NORM* showed a predicted positive effect on *SANCTION*, though it was not statistically significant at the  $p < 0.05$  level. This indicates CF communities whose CF members shared cooperative norms tended to impose sanctions against offenders. This was perhaps because those CF communities where existing cooperative norms were high not only among CF members but also between CF members and CFMCs were more cooperative in reporting, catching and sanctioning those offenders who caused damage to their forest.

## 6. Conclusion

This study's findings indicate that new institutional theory explains CF members' collective action in community forest management in Cambodia. In support of the hypothesis, results of the quantitative data analysis demonstrated that existing social capital helped CF members organise all three types of collective action. CF member participation in community forest patrols was positively enhanced by existing social networks and cooperative norms ( $p < 0.10$ ); CF member attendance at CF-related meetings was positively enhanced by existing social networks ( $p < 0.05$ ); The imposition of sanctions against offenders was positively enhanced by the existence of cooperative norms ( $p < 0.10$ ). The first two types of collective

action, CF member participation in community forest patrols and CF member attendance at CF-related meetings, require CF members' participation. CF members' social networks were conducive to organising collective action which are needed to mobilise CF members and gain their participation. Another social capital variable, cooperative norms, seems to be helpful when organising collective action which requires members' cooperation in carrying out CF management activities, such as forest patrols and sanctioning.

This study confirmed the multi-dimensional nature of social capital discussed in the existing literature (Woolcock and Narayan 2000). This study confirmed two forms of social capital – social networks and cooperative norms – as important in organising collective action in community forest management; however, the remaining social capital variable, trust, is not. These results also revealed that the forms of social capital that helped CF members organise their collective action differed depending on the types of collective action, suggesting that the most useful form of social capital for a particular collective action should be identified at an early stage and should be used effectively to manage community forests.

The depletion of social capital that resulted from prolonged armed conflicts in Cambodia has stimulated debate about whether rural villagers cooperate in the organisation of communal activities (Ovesen et al. 1996; Ledgerwood 1998). As an answer to the first research question of this study, the evidence provided herein suggests that depleted social capital among CF members can be restored and does help them organise certain types of collective action to manage community forests in a post-conflict society.

The results suggest that sustainable community forest management requires an effective use of existing social capital between CF members, which enhances the likelihood of organising collective action. When forming patrol groups, understanding social networks and cooperative norms among CF members would help ensure regular and continual participation. Social networks also can be used to mobilise CF members for CF-related meetings. Therefore, capacity building of CFMCs, who take initiatives in mobilising CF members for patrol groups, meetings and imposing sanctions, is vital, with support from external agencies, particularly at the initial stage of CF implementation.

The main potential methodological limitation in this study was the small sample size (by using a CF community instead of a household as a unit of analysis, the sample size was reduced from 1050 to 35), which might have caused the regression models used in this study to underperform. This study used all possible CF communities in one province in Cambodia as a sample and did not include CF communities in other provinces, which have different historical and socio-economic backgrounds, and different levels of external assistance in community forest management. Although the findings with a small sample size did not negate the role of existing social capital in organising community forest management's community collective action, future research with a larger sample size would be required to further generalise the findings of this study.

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