

ASSESSING A SOCIAL MARKETING CAMPAIGN ON WILDLIFE  
CONSERVATION IN NAM ET – PHOU LOUEY NATIONAL PROTECTED  
AREA, LAO PEOPLE’S DEMOCRATIC REPUBLIC

A Dissertation

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Doctor of Philosophy

by

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Reducing, or even eliminating, poaching in Nam Et – Phou Louey National Protected Area (NEPL NPA), in Laos, has been on the agenda of involved conservation parties for some time, and understanding local people’s intentions related to reporting poaching was considered paramount to ultimately modifying anti-conservation into pro-conservation behaviors. I reviewed literature about conservation-related applications of Rare’s Theory of Change (TOC) and the Theory of Planned Behavior (TPB). I found that each of these two theories was useful on some level in addressing conservation behaviors.

Next, I employed Rare’s TOC to assess a social marketing campaign (SMC) geared towards inducing people to report poaching more frequently. The SMC apparently did not affect an increase, but rather seemed to result in a decrease in poaching reporting, possibly because the SMC may have raised additional questions related to poaching enforcement and other issues. Also, the SMC did not appear to affect people’s environmental knowledge, attitude to report poaching, and perceived barriers to reporting, all considered pre-stages to changing people’s conservation related behavior. As similar changes in attitudes and perceived barriers occurred in

both treatment and control areas, there is a possibility that communication between people from these areas obscured results or, that a third variable (e.g. time, politics) led to this change, and the SMC had nothing to do with it.

I also investigated the utility of applying TPB in determining local people's intentions to report poaching, as well as determining how TPB constructs related to each other according to the model. While some of the TPB constructs related to each other according to the model, other constructs did not, and TPB ultimately failed to predict people's intention to report poaching. Family size emerged as an important factor correlated with reporting poaching, as it perhaps reflects socio-economic differences and/or factors relating to social network size. Overall, people may have perceived possible costs of reporting poaching, such as upsetting community members, to be greater than potential benefits, such as monetary rewards.

Implications of social network size and perhaps interpersonal communication need to be better understood to increase effectiveness of future conservation initiatives in NEPL NPA. Such conservation initiatives should involve employing SMC alternatives, such as engaging entire communities in reporting-poaching, supplementing cognitive with technical approaches to reduce poaching, and fostering alternative pro-conservation behaviors that improve people's socio-economic situations and thus alleviate poaching pressures.

## BIOGRAPHICAL SKETCH

Santi Saypanya (Laotian: ທ. ສັນຕິ ໄຊປັນຍາ) was born in 1976 in Vientiane Capital City, Lao People's Democratic Republic. Spouse: Vonglatsamy Saypanya (Laotian: ທ່ານ. ນາງ. ວົງລັດສະໝີ ໄຊປັນຍາ). Children: Daughter Kamoneluck Saypanya (Laotian: ນາງ. ກະມິນລັກ ໄຊປັນຍາ) and son Kunnatum Saypanya (Laotian: ທ. ຄຸນນະທຳ ໄຊປັນຍາ). Parents: Dai Saypanya and Soubanh Saypanya (Laotian: ທ່ານ. ນາງ. ໄດ ໄຊປັນຍາ ແລະ ທ່ານ. ສຸບັນ ໄຊປັນຍາ). Siblings: Meena Saypanya (Laotian: ທ່ານ. ນາງ. ມີນາ ໄຊປັນຍາ), Soukkunya Saypanya (Laotian: ທ່ານ. ນາງ. ສຸກກັນຍາ ໄຊປັນຍາ), Duangta Saypanya (Laotian: ທ່ານ. ດວງຕາ ໄຊປັນຍາ) and Vathana Saypanya (Laotian: ທ່ານ. ວັດທະນາ ໄຊປັນຍາ). Nieces: Malesa Saypanya (Laotian: ນ. ມາລິສາ ໄຊປັນຍາ), Nouthida Saypanya (Laotian: ນ. ນຸດທິດາ ໄຊປັນຍາ), and Vanvisa Saypanya (Laotian: ນ. ວັນວິສາ ໄຊປັນຍາ). Nephews: Vixanou Saypanya (Laotian: ທ. ວິຊະນຸ ໄຊປັນຍາ), Thanvah Saypanya (Laotian: ທ. ທັນວາ ໄຊປັນຍາ) and Wittaya Saypanya (Laotian: ທ. ວິດທະຍາ ໄຊປັນຍາ).

Santi Saypanya grew up in Vientiane Capital City of Lao People's Democratic Republic (Lao PDR). Worked on conservation education and outreach project with Wildlife Conservation Society – Lao PDR Program since 2002. Graduated from Comcenter College, Vientiane, Lao PDR in 2005. Received the M.A. degree in 2011 from University of Texas at El Paso (UTEP), and the Ph.D. degree in 2018 from Cornell University.

To conservationists, my parents, spouse and Soukkunya Saypanya

(Laotian: ທ່ານ. ນາງ. ສຸກກັນຍາ ໄຊປັນຍາ)

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## LIST OF ABBREVIATIONS

DNR	: Department of Natural Resources
HDRU	: Human Dimension Graduate Unit
LAO PDR	: Lao People's Democratic Republic
NEPL	: Nam Et – Phou Louey
NPA	: National Protected Area
SMC	: Social Marketing Campaign
TOC	: Theory of Change
TPB	: Theory of Planned-Behavior
WCS	: Wildlife Conservation Society

## CHAPTER ONE

### INTRODUCTION

As a professional working in the field of conservation in Laos, I have been concerned with developing and applying conservation strategies in the country's largest protected area, Nam Et-Phou Louey National Protected Area (NEPL NPA) since 2004. In NEPL NPA, the main specific threat to the area's biodiversity and ecosystem integrity has been ongoing poaching of threatened and endangered species (Hansel, 2004; Johnson et al., 2012; Kareiva & Marvier, 2011), both for the domestic and international black markets. Poaching in NEPL NPA also has been closely tied to local villagers encroaching on strictly protected areas (Johnson, 2013; Lynam et al., 2006; Steinmetz et al., 2014). Thus, engaging and integrating local people in conservation efforts may be a prerequisite for preserving the area's biodiversity and ecosystem integrity. My research interest of applying social marketing campaigns (SMCs) to further such engagement of local people complemented the efforts of my employer, the Wildlife Conservation Society (WCS), the technical advisors to the Lao government in managing NEPL NPA.

During my earlier professional career with WCS, working in conservation education and outreach, it became apparent to me that involving local people in our conservation efforts was in fact a key component to success; SMCs (a tool long tried in business) seemed to me a logical, promising way for delivering conservation messages to rural communities. WCS endorsed my idea and consequently provided me with the opportunity to develop an SMC for our largest protected area NEPL NPA,

in collaboration with Rare, a US-based conservation organization experienced in the application of SMCs in the field of conservation. The resulting campaign became my master's thesis project (Saypanya et al., 2013), and subsequently served as a pilot for the current study, as well as serving as a potential model for future conservation initiatives in other locations in Laos. Specifically, the SMC was geared towards informing local people about existing hunting regulations, and subsequently encouraging local people to more frequently report poaching to concerned government agencies, in an attempt to reduce poaching in NEPL NPA. My assumption in engaging this research trajectory was that some aspects of poaching could be addressed by engaging local people in reporting poaching, through applying a social marketing campaign. During my master's thesis research I became increasingly aware of the importance of factors that drive people's resolve to report poaching; it seemed to me that if I understood these factors, I could more specifically address them, and thus more readily engage people in reporting poaching, and thus perhaps reduce poaching more effectively. Consequently, I became interested in research-based social theoretical frameworks that could potentially identify the factors that predict people's increased likelihood in reporting poaching, or at least their intent to report poaching. Identifying such a model could greatly facilitate the planning of effective future conservation interventions, thus saving valuable time and resources.

In the present study I investigate the effectiveness of a SMC with regard to ultimately increasing people's reporting poaching behavior as well as the utility of two behavioral theories, Rare's Theory of Change (TOC) and the Theory of Planned Behavior (TPB) as potential predictive theoretical frameworks for local people's

intention to engage in reporting poaching. To that end, I structure this study in three parts, Chapters two, three, and four.

In Chapter two, I review critical literature by first introducing TPB, a behavioral theory developed by Ajzen (1985), concerned with the relationship between the strength of a person's intention of engaging in a certain behavior, and that behavior actually occurring. I subsequently introduce TPB's eight theoretical constructs, and how these relate to each other within the TPB model. These theoretical constructs essentially are concerned with how a person, embedded in his social environment, comes to form certain beliefs and attitudes that eventually lead to behavioral intentions and, ultimately, to specific behaviors. Next, I examine the key findings of relevant literature concerning TPB's past application in the environmental fields, and discuss criticism associated with TPB. Second, I introduce Rare's TOC, a behavioral theory based on the work of Weiss (1995) and Connell and Kubisch (1998), and subsequently adapted by Rare to the field of conservation behavior. I subsequently introduce the seven theoretical constructs of Rare's TOC, and also introduce Rare's conservation approach, a social marketing campaign, before examining published results of past Rare SMCs. In the last part of Chapter two I compare and contrast TPB and Rare's TOC, and discuss how aspects of both could inform social marketing campaigns, and conclude by exploring potential applications of TPB and Rare's TOC in the field of conservation.

In Chapter three, I assess whether a SMC applied in NEPL NPA was effective in influencing the different elements of Rare's TOC as relate to wildlife poaching in

that area, and whether or not the SMC affected reporting-poaching behavior among local communities. To that end my assistants and I carried out a total of 1,527 structured interviews, in 41 villages in NEPL NPA, 20 villages serving as treatment and 21 villages as control. Approximately half of these interviews took place during July/August 2014, before SMC application in the treatment area only. The SMC itself was applied in each treatment village in October 2014, on the topic of hunting legality, and contained elements of a staged play, as well as hunting-legality games and question-and-answer games involving villager participation. Give-away items were awarded for participation and correct answers. The second half of interviews was carried out approximately seven months after SMC application, during May 2015. Data analyses involved two steps. First, preliminary investigation of potential response differences (between treatment and control villages) due to differences in population characteristics are carried out via Chi-square analyses. Second, research-question analyses are carried out via one-way ANOVA on survey-question response-scores. Mean response differences between the two interview rounds (pre- and post SMC application) are assessed for the treatment area as well as the control area. Here, as stated in my research questions, I look for statistically significant differences between pre- and post-survey responses, which would then indicate an SMC effect, if observed in the treatment area only, but not in the control area.

In Chapter four, I assess the utility of applying TPB in the context of predicting local people's intention to report poaching. Specifically, I explore how some TPB constructs relate to other TPB model constructs, and how these constructs in turn predict intention to report poaching. To that end, some of the questions in the above-

described survey pertained to specific TPB constructs; responses from July/August 2014 survey only are included in TPB analyses. Here also, data analyses involved two steps. First, preliminary investigation of response differences (between treatment and control villages) due to differences in population characteristics are carried out via one-way ANOVA. Second, analyses are carried out using bivariate Pearson correlations on survey question response scores. Here again, as stated in my research questions, I look for statistically significant correlations that would indicate a relationship between TPB theoretical constructs according to the model, and thus indicate TPB utility as a suitable model for predicting people's intention to report poaching.

In Chapter five, the conclusion, I summarize results from Chapters three and four analyses, and outline recommended next steps to be taken in fostering the reduction of poaching in NEPL NPA. Specifically, I assess whether or not the applied SMC was effective overall in increasing reporting poaching in NEPL NPA; the SMC did not appear to have the desired effect on reporting poaching behavior. I also summarize the utility of Rare's TOC as a social theoretical framework for predicting reporting poaching behavior, and the utility of TPB as a social theoretical framework for predicting intention to report poaching. Neither Rare's TOC nor TPB presented as a satisfactory predictive model, as both contained elements that did not relate to the desired outcome variable, reporting poaching behavior, and intention to report poaching, respectively. Finally, I discuss potential next steps in conservation interventions to reduce poaching, and ultimately stabilize animal populations in NEPL NPA, and outline future research needs as identified by the present study.

## CHAPTER TWO

### THE THEORY OF PLANNED BEHAVIOR, RARE'S THEORY OF CHANGE, AND THEIR APPLICATIONS TO THE FIELD OF CONSERVATION

#### INTRODUCTION

In the field of conservation, understanding human behavior is considered imperative to identifying threats to plant and animal species, natural resources, and even overall biodiversity. Numerous theories have been put forth and applied to explain and model human behavior in an attempt to ultimately mitigate certain behaviors and thus reduce, or even eliminate, conservation threats. Especially of interest in this dissertation is predicting people's reaction to specific marketing campaigns that were designed to alter their negative behaviors in order to enhance animal populations or habitats, and thus address issues critical for conservation.

I investigated two behavioral theories: the Theory of Planned Behavior (hereafter, TPB) and Rare's Theory of Change (hereafter, Rare's TOC) to compare their theoretical foundations, assess their past applications in various fields, and assess which of these may be more suitable for future application to the field of conservation (and why), especially in the context of social marketing campaigns aimed at reducing conservation threats in Laos.

To that end, this Chapter is organized into four main parts and several subsections. Part 1 provides an overview of TPB, with the following subsections: (1.1) TPB constructs and development, (1.2) past application and findings in environmental fields, and (1.3) critiques of TPB. Part 2 pertains to Rare's TOC, and contains the

following subsections: (2.1) an overview of Rare's TOC constructs and development, and (2.2) an introduction to Rare's social marketing campaign and its application. Part 3 compares and contrasts TPB and Rare's TOC, and discusses how aspects of both could inform social marketing campaigns. Finally, Part 4 discusses recommendations for TPB and Rare's TOC applications in the field of conservation.

## PART ONE: THEORY OF PLANNED BEHAVIOR

The TPB is a psychological theory that provides a hypothetical framework for investigating human behavior, by outlining potential underlying causes (or theoretical constructs) for behavioral intentions. These hypothetical causes are rooted in people's cultural and communal settings, and are presumed to drive people's actions.

According to the TPB, the stronger a person's intention to engage in a certain behavior, the more likely intention is to predict such behavior (Ajzen, 2012).

## TPB CONSTRUCTS AND DEVELOPMENT

The introduction of the TPB can be traced back to early 1980's (Ajzen, 2011, 2012). The TPB consists of eight constructs, including (1) behavioral beliefs, (2) attitude, (3) normative beliefs, (4) subjective norms, (5) control beliefs, (6) perceived behavioral control, (7) intention, and (8) behavior. Below I define each construct and explain how constructs fit together in the TPB model.

1) Behavioral Beliefs (*'How useful is a behavior?'*)

Behavioral belief is a belief about the utility of engaging in a given behavior (Ajzen, 1991). For example, a student might believe that studying for a class is useful, because it would help her/him understand the lesson well, which in turn would lead to a good grade.

2) Attitude (*'How do I think and feel about an issue?'*)

An attitude is a composite of three components including (1) thoughts (the cognitive component), (2) feelings (the affective component), and (3) preliminary actions (the behavioral component) towards ideas, objects, or people (Heberlein, 2012; Petty & Cacioppo, 1981). In my example, the student has a positive attitude towards studying; studying for class this week is something s/he favors. As mentioned above, thoughts represent the cognitive component of attitude, and as such refer to the facts and beliefs people hold regarding an attitude object, subject, or topic (Bem, 1970; Heberlein, 2012). Here, the student is convinced (s/he thinks) that s/he needs to study for class so s/he can get a good grade. Feelings are the emotions of people regarding an object, subject and topic; for example, the student has a good feeling about studying for class. Preliminary action is the process of doing something, based on our thoughts and feelings. Given that the student thinks studying will result in a better grade, and s/he feels good about studying, s/he will take the preliminary action of perhaps arranging a study session with other people who study for class, to reinforce her/his own positive attitude. This preliminary action is different from the actual behavior 'studying for class.'

3) Normative Beliefs (*'How will others view what I am doing?'*)

Normative beliefs refer to how an individual thinks others perceive his behavior; what their family members, friends, and other important people think of him and his actions; and what may or may not be considered appropriate behavior in a given situation (Corral-Verdugo & Frías-Armenta, 2006). For example, a student believes her/his friends think studying for class is important.

4) Subjective Norm (*'How will others support me?'*)

Subjective norm is perceived support (or lack of support) for a behavior related to social pressure (e.g., family members, peers, social networks, social norms) (Ajzen, 2012; Albayrak et al., 2013; Heberlein, 2012). Subjective norm is divided into two components: injunctive norm and descriptive norm. Injunctive norm is an encouragement (or discouragement) from others to engage in the behavior. Referring to the given example, the student's friends think studying for class is important. Descriptive norm refers to whether others engage in the behavior (Ajzen, 2012; Albayrak et al., 2013). In my example, the student's friends themselves study for class. Thus, the student most likely will study because that is what her/his friends do and think.

5) Control Beliefs (*'What other factors will support/hinder me?'*)

Control beliefs refer to an individual's perception of factors that may make it easier (or harder) to engage in a behavior (Lachman et al., 2011). Multiple control beliefs combine to give an overall perception of barriers and challenges. In the

example of the student, possible time constraints (i.e., the amount of time available to study) form a control belief; the student either feels that s/he does or does not have enough time to study.

6) Perceived Behavioral Control (*'How able am I?'*)

Perceived behavioral control is the perception of an individual's ability to engage in a behavior, and takes into account control beliefs (Ajzen, 2012). The more a person thinks it will be easy to engage in a certain behavior, the more likely he will intend to engage in the behavior. In my example, the student realizes that s/he also has to work 40 hours this week on top of studying, and thus her/his perceived behavioral control is that s/he may not be able to sufficiently study for getting a good grade.

7) Intention (*'This is what I plan on doing.'*)

Intention is an individual's planned engagement in a particular behavior (Bratman, 1987). Based on the TPB, intention can be used as a predictor of behavior, where strong intention is a good predictor of behavior. Therefore, in the TPB model, intention is the most important predictor of behavior, because when an individual intends to do something, it will likely happen. Again, referring to my example, a student has a positive belief plus a positive attitude about how studying for class would lead to good grades (behavioral beliefs and attitude). Moreover, the student has beliefs that support studying because the student's friends think studying is important (normative beliefs and subjective norms). However, the student may not believe that s/he can manage to study for class, because s/he has to work 40 hours on top of

studying (control beliefs and perceived behavior control). Based on the TPB, considering the student's situation and social environment, s/he may still intend to study for class.

#### 8) Behavior (*'This is what I do.'*)

Behavior is the manifest way an individual acts (Bergner, 2011). The actual behavior is the final product in the TPB model; its direct predictor is intention, where intention itself can be predicted by the TPB's six constructs including behavioral beliefs, attitude, normative beliefs, subjective norm, control beliefs, and perceived behavioral control. Thus, actual behavior is indirectly predicted by the above six constructs; any one of those constructs of the TPB model might independently predict some aspects of behavior through intention. However, more than one, or all of these six constructs of the TPB may be needed to accurately predict intention and behavior. Again, considering the given example, if a student does intend to study, then this would lead to a high probability of the student actually studying for a class.

### RELATIONSHIPS BETWEEN THE EIGHT CONSTRUCTS OF THE TPB

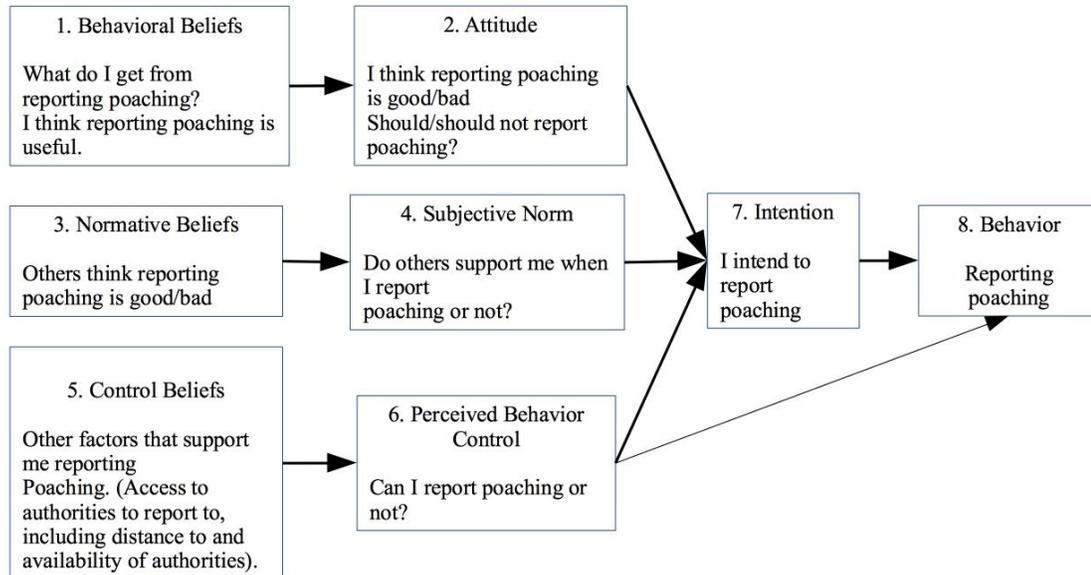
In the previous section I described each of the eight constructs of the TPB. In the following section, I explain how each of these constructs relates to others, to form a TPB model that can be used in explaining and predicting actual behaviors. The TPB model emphasizes that intention is the key factor in predicting behavior.

To follow the process that leads to intention, we look at attitude, subjective norm, and perceived behavioral control, the direct predictors of intention (see Figure 1). An

individual's attitude (that is, positive or negative feelings, thoughts, or preliminary actions) is influenced in turn by behavioral beliefs (whether or not it is right to engage in a particular behavior). An individual's subjective norm (whether or not the individual thinks that s/he will receive support from peers) is influenced in turn by normative beliefs (an individual's perception about what others will think of his/her behavior). Lastly, an individual's perceived behavioral control (the perceived ability to engage in the behavior) is in turn affected by control beliefs (perceived factors that will make engaging in an activity easy or difficult). A combination of these three – attitude, subjective norm, and perceived behavioral control – subsequently predicts intention (Ajzen, 1991). Finally, the TPB model suggests that behavior is predicted by intention. In some instances, behavior can be predicted by using perceived behavioral control directly, without identifying intention as a predictor. These might be cases where perceived behavioral control is strong and accurate, and can thus be used as a direct predictor of behavior.

The TPB was developed by Ajzen (1985), who extended the Theory of Reasoned Action (Ajzen & Fishbein, 1980) by adding the constructs perceived behavioral control and control beliefs (Ajzen, 2012; Ajzen & Fishbein, 1980) (see Figure 1). Some researchers have attempted to add other constructs to the TPB for better prediction of a behavior, including 'descriptive norms', 'self-efficacy', and 'moral obligation' (Kaiser & Scheuthle, 2003; St John et al., 2011). However, my work did not engage specifically with those additional constructs. Rather, I focused on Ajzen's (1985) eight constructs.

Figure 1: Eight constructs comprising the Theory of Planned Behavior, Ajzen (1991), applied to reporting poaching.



## TPB PAST APPLICATION IN ENVIRONMENTAL FIELDS, AND KEY FINDINGS FROM SUCH APPLICATION

TPB has been applied to various fields, including health (Amar, 2009; Conner et al., 2002; Godin & Kok, 1996; Schifter & Ajzen, 1985; Sheeran et al., 2001), psychology (Beck & Ajzen, 1991), and environment (Chao, 2012; Cheung et al., 1999; Greaves et al., 2013; Han et al., 2010; López-Mosquera et al., 2014); however, for the purpose of this Chapter, environmental applications of the TPB are the most relevant. These include investigations of hunting behaviors (Hrubes et al., 2001; Shrestha et al., 2012), and conservation and energy saving behaviors (Aipanjiguly et al., 2003; Han et al., 2010; Lo et al., 2012; Yazdanpanah et al., 2014). Some of those environmental applications aimed at predicting intention, while others targeted change in actual

behavior.

## LESSONS LEARNED FROM TPB PAST APPLICATION

Below I reviewed literature using the TPB to predict conservation-related intention (11 of 12 publications), behavior (four of 12 publications), or both (three of 12 publications) (see Table 1). Among the 11 studies investigating intention, 10 studies found either attitude, subjective norm, or perceived behavioral control, or a combination of these TPB constructs predicted intention, while only one study found none of the constructs predicted intention. Among the four studies investigating actual behaviors, all four studies found that perceived behavioral control and/or intention related to behavior, and one of these four studies found attitude and subjective norm in addition to perceived behavioral control related to behavior (see Table 1).

Among the 11 studies investigating intention was Greaves et al. (2013), who applied the TPB to explore environmental intention in an office setting, and found attitude, subjective norm, and perceived behavioral control predicted employees' intention to engage in various energy saving behaviors. Han et al. (2010) attempted to explain the formation of hotel customers' intentions to visit a green hotel and also identified attitude, subjective norm, and perceived behavioral control affecting people's intentions. Furthermore, attitude, subjective norm, and perceived behavioral control predicted hunting intention in Vermont, USA (Hrubes et al., 2001), strongly predicted intention regarding turtle conservation issues (Lo et al., 2012), and farm-level tree-planting intentions among farmers in Pakistan (Zubair & Garforth, 2006). Only two of the 11 studies found attitude and subjective norm, but not perceived behavioral control, significant predictors of intention. Aipanjiguly et al. (2003)

demonstrated attitudes and subjective norms relating to people's intention to comply with boating speed limits to conserve manatees in Florida, USA, while Chao (2012) found the same TPB constructs predicted intention to report environmental behavior of oneself and others in Taiwan. On the other hand, Shresta et al. (2012) reported only subjective norm and perceived behavioral control, but not attitude, predicted deer hunting intentions in Oregon big game hunters (Shresta et al., 2012), while López-Mosquera et al. (2014) identified only attitude as predictor for people's willingness to pay for urban park conservation in Spain. Similarly, Seeland et al. (2002), when investigating people's opinions on restrictions imposed on recreational green-space use in a Nature Reserve in Switzerland, demonstrated of all the TPB model constructs only subjective norms significantly and strongly predicted people's willingness to adhere to such restrictions in the future; attitude and perceived behavioral control did not by themselves significantly predict people's intention to comply. Only one in 11 studies found none of the TPB constructs predicted intention (Yazdanpanah et al., 2014).

Among the four studies investigating TPB constructs' impact on behavior, all found some of the constructs were good predictors. Beedell and Rehman (2000), when applying TPB to investigate pro-conservation farm management practices, demonstrated attitude, subjective norm, and perceived behavioral control directly predicted behavior (however, they did not investigate intention). Only perceived behavioral control, together with intention, directly predicted reporting energy saving practices of oneself and others in Taiwan (Chao 2012) and water management behavior of Iranian farmers (Yazdanpanah et al. 2014). Finally, intention was the sole

direct predictor of hunting behavior in Vermont, USA (Hrubes et al. 2001), where intention in turn was predicted by attitude, subjective norms, and perceived behavioral control (see Table 1).

Table 1. Summary (in alphabetical order) of studies of Theory of Planned Behavior applications to conservation and environmental behaviors.

Authors	Intention/Behavior	Predicted intention	Predicted behavior?
Aipanjiguly et al. (2003)	Intention to follow boats speed limits	ATT SN	<i>N/A</i>
Beedell & Rehman (2000)	Pro-conservation farm management behavior	<i>N/A</i>	ATT SN PBC
Chao (2012)	1. Self-report on energy saving 2. Others-report on energy saving	ATT SN	PBC Intention
Greaves et al. (2013)	1. Intention to switch off PCs 2. Intention to video-conference 3. Water recycling intention.	ATT SN PBC	<i>N/A</i>
Han et al. (2010)	Intention to stay in a green hotel	ATT SN PBC	<i>N/A</i>
Hrubes et al. (2001)	Hunting intention and behavior	ATT SN PBC	Intention
Lo et al. (2012)	Participating in wildlife conservation	ATT SN PBC	<i>N/A</i>
López-Mosquera et al. (2014)	Willingness to pay for conservation	ATT	<i>N/A</i>
Seeland et al. (2002)	Intention to comply with use-restriction	SN	<i>N/A</i>
Shrestha et al. (2012)	Hunting intention	SN PBC	<i>N/A</i>
Yazdanpanah et al. (2014)	Water management intention and behavior	None	PBC Intention
Zubair & Garforth (2006)	Tree planting intention	ATT SN PBC	<i>N/A</i>

ATT= attitudes, SN= subjective norm, PBC= perceived behavioral control

## CRITIQUES OF TPB

Despite TPB's contributions to predicting intentions, critical debate on the TPB persists. Scientists for decades have criticized the TPB as too theoretical, rather than empirical (Gärling et al., 1998), and claimed TPB to be incomplete. For instance, Hsu and Huang (2012) claimed that an important limitation of TPB was ignoring the motivation construct. More generally, Evensen and Stedman (2015) rallied researchers to address TPB gaps in future research. Specifically, Evensen and Stedman (2017) argued TPB tamed researchers to think 'inside the box,' that is, induced researchers to only investigate factors matching TPB constructs, thus perhaps ignoring or missing additional factors. Thus, TPB has guided scientists into repeating similar research, which in turn presented redundant research results (Evensen & Stedman, 2017); such redundancy, however, does not expand on the initial model. Further, Miller (2017) suggested without evidence of the relationship between intention and behavior in the TPB model, one should not merely assume that behavioral intentions actually lead to behaviors.

In fact, there is much evidence that the intervention of larger, external factors often obscures the link between behavioral intention and actual behavior (e.g., Kollmus & Agyeman, 2002; Miller, 2017). Such factors might include, among others, environmental or economic aspects. For example, environmental factors influencing a farmer's intention to plant trees may well be independent of the farmer's behavioral norm or other TPB constructs. Farmers might think planting trees is a good idea; however a current drought (environmental factor) might make it impossible to plant

trees that season as the farmers want to use all water available for their crops.

Similarly, socio-economic constraints might affect actual behaviors despite intentions to the contrary; if the socio-economic benefits of a behavior change dramatically and outweigh the costs of the behavior, then we may see such behavioral changes, despite the related TPB, including the intention concept, not predicting such behaviors.

Another classical critique of TPB is the neglect of past behavior as a driver of future behavior (Han et al., 2010). To take advantage of the theory in predicting behavior change, a past behavior relating to the new specific behavior may be important. However, many times researchers and practitioners struggle to identify relevant past behaviors; thus a ‘change in behavior’ would not be measurable.

Also, one could criticize that TPB over-rates the importance of single individuals’ attitudes, while not giving enough weight to how such individual attitudes subsequently play out in a group setting. After all, individuals do not live in isolation, but are usually part of a community, and thus are linked to specific settings that may remain unchanged, even if single individuals change their attitudes. For example, a community may be located in a specific place, such a remote mountain valley, and its members make their living in certain ways, such as slash-and-burn practices for growing hill-rice and hunting wild animals for food. Even if a single individual in this community intended to adopt a different way of living, s/he may not be able to change her/his behavior, as the views and practices of the community as a whole might preclude doing so.

A last critique of TPB addresses the fact that it is very time consuming to collect data for constructing TPB models. The target audience has to allocate time to participate in interviews, and they might not feel they benefit from spending their valuable time answering multiple survey questions necessary for understanding and predicting their intentions and behaviors (Beedell & Rehman, 2000).

However, one should be reminded that TPB is merely a model, and thus represents a simplified version of reality, including only a subset of all factors that may actually result in any behavior. In answer to criticism of TPB's theoretical approach, some people suggested changing behavior using structural or technological approaches instead of cognitive. According to Heberlein (1974), the structural approach is 'to modify individual behavior by modifying the physical structure or social setting in which the action takes place' (Heberlein, 1974). A structural approach represents a top-down directive that results in people's behavior change, regardless of whether people actually understand and/or agree with such changes. For example, in a national park, people often cannot walk around at will, but rather limit their activities to certain areas; this could either be achieved by asking people to understand the reasoning behind this limited disturbance (the 'cognitive' approach), or else park authorities could construct a path where people are allowed to walk, and put up signs that people have to stay out of other areas, to force the desired behavior (the 'structural' approach). The consequences of such a structural approach might be an increase in regulations, and thus an increase in staff reinforcing such regulations, and related increase in costs to authorities. Technology can be employed as an additional tool in achieving individual human behavior change, or else to achieve social change

as a whole (Heberlein, 2012). For example, national park authorities might employ electric fences to prevent individuals from entering the park illegally and possibly poaching endangered animals living within the fenced-in area. Here, the fence would be the technology preventing potential poachers from accessing endangered animals.

Referring to constructs of the TPB, structural and technological approaches fit with subjective norm and perceived behavioral control. A new physical structure can establish a new norm (Heberlein, 1974), while technology might facilitate people's engagement in a particular behavior. It is obvious that the TPB still has some limitations in its applications; however it may still be valid as a simple model for identifying factors that lead to certain behaviors, and thus influencing changes in such behaviors.

## PART TWO: RARE'S THEORY OF CHANGE

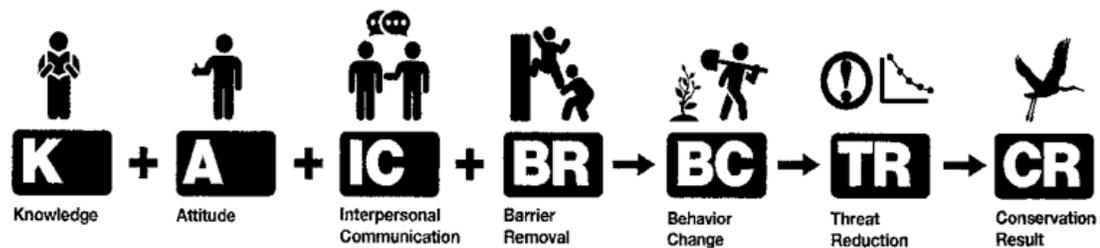
A TOC describes the links between certain specific initiatives and observable changes in human behavior over time. As such, this theory takes into consideration initial behavior, and cognitive as well as external factors (e.g., environment, community), which are then incorporated into an initiative (e.g., a learning activity, or campaign) to bring about specific behavioral changes.

## TOC CONSTRUCTS AND DEVELOPMENT

The term 'theory of change' (TOC) can be traced back to the late 1950s, to Kirkpatrick's (1975) 'Four Levels of Learning Evaluation Model;' however it remains uncertain whether or not this was the first time the term was used. Weiss (1995)

popularized the term ‘theory of change,’ which he defined as ‘a theory of how and why an initiative works.’ Building on her work, Connell & Kubisch (1998) defined TOC as, “a systematic and cumulative study of the links between activities, outcomes, and contexts of the initiative” (Connell & Kubisch, 1998). The Rare conservation organization developed a theory of change to explain how factors might influence people’s conservation behavior that includes seven constructs: (1) knowledge, (2) attitude, (3) interpersonal communication, (4) barrier removal, (5) behavior change, (6) threat reduction, and (7) conservation result (Hayden & Deng, 2013; Prochaska & DiClemente, 1982; Veríssimo et al., 2017) (see Figure 2).

Figure 2. Rare’s Theory of Change seven constructs (Veríssimo et al., 2017).



1) Knowledge

Knowledge includes information, facts, and skills a person has acquired through experiences, education, life-observations, and practice (Barclay & Murray, 1997). Rare’s TOC model predicts that providing knowledge of facts relating to a certain behavior is necessary before attempting to change the behavior.

## 2) Attitude

As in the discussion of TPB, attitude is defined as a composite of thoughts, feelings, and preliminary actions towards ideas, objects, or people. Attitude in Rare's TOC model is a predictor of behavior change through interpersonal communication and barrier removal (Butler et al., 2013). In the model, it follows knowledge, as knowledge might inform attitude.

## 3) Interpersonal Communication

Interpersonal communication is the direct communicative interaction between two or more individuals, that is, face-to-face exchange of knowledge, opinions, and practices (Carassa & Colombetti, 2015). According to Rare's TOC, if target audiences have knowledge and specific attitudes towards objects and/or ideas, they will probably communicate with other individuals or groups of people around them about whether or not they should perform a certain behavior. These individuals or groups in turn might provide target audiences with advice or demonstrate the desired behavior.

## 4) Barrier Removal

Barriers refer to any factor that prevents an individual, or target audience, from changing a behavior. Here, 'internal barriers' refer to psychological and/or emotional obstacles or challenges that an individual or target audience has to overcome. For example, an individual might be afraid of repercussions from the community if the individual intends on changing a behavior, or else might be too shy to engage in behaviors that differ from others, even in the absence of repercussions. 'External

barriers' in contrast refer to physical or situational obstacles that an individual or target audience has to overcome (Butler et al., 2013). For example, if farmers wanted to plant more trees, they must first find and obtain appropriate tree saplings for planting, and transport them to their farms; external barriers here might include unavailability and/or great expense of suitable tree saplings, or lack of a truck to transport saplings to the farm. Thus, the barriers in Rare's TOC are similar to some of the constructs of the TPB model, namely control beliefs and perceived behavioral control, as they include factors that may support or hinder an individual engaging in a certain behavior. One of the potential advantages of Rare's TOC over the TPB model is that Rare's TOC distinguishes between internal and external barriers, thus engaging a broader range of potential obstacles. Barrier removal then applies to any action breaking down or overcoming such obstacles, regardless of who takes this action. For example, a community itself could take action in overcoming an identified barrier, or a higher-level governing body might assist in removing a barrier or even remove a barrier by implementing relevant laws.

#### 5) Behavior Change

Behavior change is an act of a person, or group, in response to a given situation, person, or stimulus (Ajzen, 2012). This stage is where the actual behavior changes towards objects, ideas, and situations, into the desired behavior, after knowledge has been increased and attitudes changed through interpersonal communication, and perceived barriers have been removed.

6) Threat reduction

Threat reduction refers to either direct or indirect actions leading to the elimination of undesirable (often illegal) activities that harm and/or reduce wildlife populations (Salafsky & Margoluis, 1998). Based on Rare's TOC, threat reduction can be evaluated by examining over a certain period of time the constructs knowledge, attitude, interpersonal communication, and barrier removal, as well as resulting observable behavior change. For instance, scarlet macaw conservation in Saint Lucia showed significant threat reduction after a campaign during which local people's knowledge about the perils facing this species increased, local people's attitude towards the macaws became very positive (as the bird was elevated to 'national bird of Saint Lucia'), and people communicated positively about this species. Lastly, a significant barrier to the macaw population's recovery was addressed by stepping up government law-enforcement efforts to remove poachers from the macaws' habitat (Butler, 1992). Thus, in this example, by systematically addressing Rare TOC constructs, wildlife threats were greatly reduced.

7) Conservation Result

In Rare's TOC, the term 'conservation result' refers to a goal (or expectation) that is reached when a target audience moves along the line of Rare's TOC constructs, from knowledge, attitude, interpersonal communications, and barrier removal to behavior change, resulting in threat reduction, thus feeding conservation results. Referring back to the scarlet macaw example, when threats (such as egg removal from

nests), scarlet macaw numbers increased. Here, the bird population increase represents the conservation result (Butler, 1992).

## RELATIONSHIPS BETWEEN RARE'S TOC CONSTRUCTS

Rare's TOC combines knowledge, attitude, and interpersonal communication, as well as barrier removal, to affect conservation-behavior change. Rare uses social marketing campaigns to increase knowledge, identify and possibly shape attitudes, and afford people an opportunity to communicate amongst themselves and with experts, and thus identify and address barriers. The application of such programs based on the theory have reduced threats to wildlife conservation, which has resulted in an increase in wildlife populations in some cases. For example, in Gansu Province, China, the application of social marketing tools increased people's use of fuel-efficient stoves, thus reducing habitat degradation through fuel-wood collection, which ultimately benefitted the conservation of the golden snub-nosed monkey (DeWan et al., 2013). This was achieved by increasing people's knowledge about how over-harvesting fuel wood for cooking destroyed monkey habitat, and how they could harvest less fuel wood should they use eco-friendly stoves. Similarly, Rare's application of social marketing resulted in more sustainable fishing in the Philippines (Day et al., 2014). Here, fishermen's knowledge about the rules and benefits of existing no-fishing-zones and marine protected areas was increased via billboards and a campaign bus; attitudes about complying with conservation laws were improved through community mobilization, including the use of a mascot, thus instilling a 'pride of place' in local people and simultaneously fostering communication among involved parties

(fishermen and protected area managers). Moreso, illegal fishing was all but eliminated by employing a radio-show as a platform for fishermen reporting illegal fishing activities (Day et al., 2014). Also as a result of community mobilization, local people including women, became actively involved in guarding and managing the marine protected area, thus changing their conservation behavior, reducing overfishing threat and, ultimately, increasing actual and perceived fish abundance (Day et al., 2014). Elsewhere, in a National Protected Area in Laos, a social marketing strategy coupled with law enforcement was applied to increase incidences of reporting poaching and thus, ultimately, benefit tigers and their prey (Saypanya et al., 2013). While it was not possible within the relatively short period of time to demonstrate actual increases in wildlife, the campaign did increase reporting poaching; the campaign increased knowledge of people about why reporting poaching would be important to them, and removed a barrier by introducing a telephone hotline number to facilitate people's reporting poaching (Saypanya et al., 2013).

Based on this model, when the target audiences receive sufficient knowledge on wildlife conservation, they are able to better evaluate whether it is good or bad for them to be involved with wildlife conservation; that is, they develop (or change) their attitudes about the topic. Subsequently, if members of the target audience communicate with each other, and with other people around them (perhaps including family members, peers, and/or friends), they can assess and validate what they know, what they think, and how others think about wildlife conservation. Following this, the people in the target audience would consider, with external assistance if necessary, what barriers exist that may prevent them from engaging in a certain wildlife

conservation activity (or else from changing a certain behavior posing a threat to conservation). Here, relevant government bodies or international non-profit organizations might provide external assistance; these could facilitate the identification of potential barriers and subsequently suggest ways to remove or overcome such barriers. The removal/overcoming of such barriers should then facilitate a behavior change in the target audience. According to Rare's TOC, this process should then result in a reduction of conservation threats, and ultimately lead to conservation results, such as an increase in wildlife populations.

## SOCIAL MARKETING CAMPAIGNS AND BEHAVIORAL THEORIES

“Social marketing seeks to influence social behaviors not to benefit the marketer, but to benefit the target audience and the general society” (Kotler & Zaltman, 1971). Conservationists have long tried to modify human behavior detrimental to wildlife, habitats, biodiversity, and natural resources. Specifically, conservationists have employed social marketing campaigns to bring about such desired conservation behavior changes.

Social marketing campaigns (SMC) have been applied across many fields of research, including health, education, and environment. Following are some successful and unsuccessful applications of SMCs. For example, a study of a SMC aimed at reducing texting while driving suggested the SMC was unlikely to change texting behavior of male drivers, but had an impact on female drivers (Lennon et al., 2010). Evers et al. (2013), when evaluating the impact of a SMC on asthma awareness in older adults, found the campaign significantly increased the number of calls to an

asthma information line from the target audience in the intervention community. Similarly, Wilson et al. (2013) investigated the outcomes of a SMC to promote walking among low-income African American adults, and concluded that behavior subsequently changed towards increased walking. Another study of an SMC promoting the consumption of dark-green leafy vegetables and eggs in central Java, Indonesia, also found the campaign was successful (De Pee et al., 1998).

Despite the documented successful application of SMCs in several fields, unsuccessful SMC applications also have been well-documented (Smith, 2006). These included, among other campaigns across the world, the high profile US National Anti-Drug Campaign (Smith, 2006). Similarly, a SMC aimed at reducing heavy drinking in college-student residential halls was ultimately unsuccessful in changing the actual drinking behavior, even though the campaign increased student knowledge regarding the consequences of heavy drinking (Clapp et al., 2003, Lennon & Renfro, 2010). In addition, another study on heavy alcohol use found no significant decrease in alcohol use among college students after the implementation of a relevant social norms marketing intervention (Wechsler et al., 2003). After the implementation of a health-related SMC regarding condom-use to reduce HIV/AIDS occurrence in Fiji, researchers concluded that participants had increased levels of HIV/AIDS awareness after the SMC, but did not change their condom use behavior (Sewak & Singh, 2012). Finally, Cismaru and Lavack (2007) assessed the usefulness of social marketing to control obesity. They suggested that SMCs, representing the cognitive approach, might not work effectively in the absence of an emotional or fear appeal (Cismaru & Lavack, 2007; Paluck, 2009).

In the conservation field, one famous example of SMC application comes from the U.S.; the Smokey The Bear SMC successfully decreased the occurrence of forest fires caused by humans (Ballard, 2012). This campaign aimed to convince people that changing fire-starting behaviors was in the people's own interest, namely that 'not throwing burning cigarettes out of car windows' when driving through forests or 'completely extinguishing campfires' in the outdoors would reduce wildfire occurrence that could ultimately destroy human possessions, or even human lives.

#### SOCIAL MARKETING CAMPAIGNS BASED ON TPB

Social marketing campaigns are usually employed to drive certain desired changes in the behavior of a target population. The TPB might be an appropriate theoretical framework for the SMC approach, because the TPB was developed to better predict intention, while the SMC is a tool to facilitate behavior change. Moreover, the TPB framework and SMC are both based on cognitive approaches. Thus, one could use TPB to develop a more effective SMC in various fields. However, I did not find evidence in the literature of an application of a SMC that used TPB as its theoretical framework, nor did I find evidence of an explicitly stated relationship between the TPB and SMC. My literature review of TPB applications to environmental issues (see Table 1) found, in four of four studies investigating behavior predictors, behavior was predicted by intention, and/or attitude, subjective norm and perceived behavioral control. Furthermore, in 11 of 12 studies one or more TPB constructs predicted intention. Despite existing criticism of TPB (for example, Evensen & Stedman, 2017; Miller, 2017), these numbers suggest that TPB constructs

might yet be useful in planning SMCs, and thus perhaps increase SMC effectiveness in the field of wildlife conservation in the future.

## SOCIAL MARKETING CAMPAIGNS BASED ON RARE'S TOC

Rare's SMCs are based on the theoretical framework of Rare's TOC. Rare specifically applied marketing methods (Andreasen, 1994) to motivate behavior changes aimed at achieving biodiversity conservation results. However, even though Rare has been applying SMCs in over 56 locations globally for some time, only a small number of papers documenting Rare's successful implementation of SMCs have been published. These included initiatives addressing sustainable fishing in the Philippines (Day et al., 2014), conservation of golden snub-nosed monkey habitat in Gansu Province, China (DeWan et al., 2013), private land conservation in exchange for ecosystem-service payments in Veracruz, Mexico (Green et al., 2013), and reducing poaching in Lao PDR (Saypanya et al., 2013). Here, SMC success was documented in the final stage of Rare's TOC (see Table 2), either as actually achieving a conservation result demonstrated through increased fish populations, as reported local fishermen (Day et al., 2014) and increased forest area under private protection (Green et al., 2013), as threat reduction demonstrated through decreased fuelwood consumption and thus reduced forest destruction (DeWan et al., 2013), or as achieved behavior change demonstrated through increased reporting of poaching incidences (Saypanya et al., 2013). In all four studies, knowledge and attitude were significantly improved, and interpersonal communication increased. Where applicable, barriers were addressed and removed, and behavior changes subsequently observed.

This in turn resulted in conservation-threat reduction and, when assessed, in conservation results (see Table 2). I have found no accounts of published unsuccessful applications of Rare’s SMC.

Table 2. Social marketing campaign studies using Rare Theory of Change.

Studies	TOC constructs						
	K	ATT	IC	BR	BC	TR	CR
Day et al. (2014)	More people knew about no-take zone	More people agree to follow rules	Self-reported discussion increased	Better enforcement and management by locals	Less fishing in no-take zone	Fewer intrusions on no-take zone	Increase fish abundance and biomass (preliminary)
DeWan et al. (2013)	Benefit of fuel-efficient stove & environmental threat better known	Willingness to use FES	Observed increased discussions	Subsidies & technical support provided	More people used fuel-efficient stove, fewer trees cut	Reduced forest destruction	(Not yet demonstrated)
Green et al. (2013)	More people understood various conservation issues	Increased interest in registering for conservation	Observed increased discussions	Facilitation of land registration	More people signed agreement to conserve	Land-use change avoided	More forest protected
Saypanya et al. (2013)	Increased knowledge of ungulate important	More people wanted poachers punished	Observed increased discussions	(Indirect) N/A	Increased reporting of poaching	(Not yet demonstrated)	(Not yet demonstrated)

K= Knowledge; ATT= Attitude; IC= Interpersonal Communication; BR= Barrier removed; BC= Behavior Change; TR= Threat Reduction; and CR= Conservation Result

However, as not all of Rare’s implemented campaigns were published, and thus no evidence of one of Rare’s SMC having failed to achieve its goals is known to me, I was unable to evaluate the success rate of Rare’s SMC applications. Furthermore, the reported successes of Rare SMC applications might fall under organizational bias, as Rare partially provided financial support for Rare’s SMCs, and Rare staff members trained the researchers implementing Rare’s SMCs. Lastly, Rare’s SMCs are based on a specific version of TOC developed by Rare for their purpose, and as such Rare’s SMCs are not based on a well-recognized, behavioral-theoretical framework (such as, for example, TPB); while this in itself does not constitute a

weakness, some might argue that Rare's TOC has not been objectively scrutinized by the larger scientific community. These potential biases may have rendered Rare's SMCs' reputation more successful than is actually the case. Thus, a continued need exists to evaluate the effectiveness of Rare's SMC applications.

### PART THREE: COMPARING THE THEORY OF PLANNED BEHAVIOR AND RARE'S THEORY OF CHANGE

While both theories, TPB and Rare's TOC, are cognitive approaches, their formats differ in complexity. TPB presents itself in a complex format, with constructs arranged in an inverse tree shape, where three separate branches combine and simultaneously lead up to, intentions and ultimately, behavior. On the other hand, Rare's TOC presents itself in a more simple, linear format, where constructs are arranged in successive order that collectively lead up to behavior. This difference is perhaps indicative of the level of detail addressed in each model, with TPB representing a more detailed approach, and Rare's TOC a coarser approach, each with their potential merits and weaknesses. While a more detailed model might allow for specifics of behavioral constructs to emerge and thus inform the process of planning certain behaviors, it might also miss out on recognizing larger relations among factors and outcomes. A coarser model, on the other hand, might illuminate greater connections among constructs, as its scope is broader, but fail to pinpoint details critical to achieving behavior change. These differences might be further illustrated when comparing the constructs of TPB and Rare's TOC.

TPB and Rare's TOC differ with regard to how behavior is predicted: TPB predicts individual behavior via intention, while Rare's TOC predicts that a

combination of knowledge, attitude, interpersonal communication, and barrier removal together will induce behavior. Thus, TPB focuses mostly on internal and psychological constructs, whereas Rare's TOC includes external components. In doing so, TPB goes into greater detail than Rare's TOC when describing the factors that lead to an individual's engagement in a behavior; TPB appears to address more of the internal, subjective prerequisites on which individual attitudes, intentions and behaviors are based. Rare's TOC on the other hand appears to address more of the community-based factors that might be more directly assessed, through observations rather than respondents' opinions.

Thus, Rare's TOC provides a model that acknowledges broader challenges outside an individual's control, and implies collective behaviors that address larger problems. For example, where TPB talks about an individual's perceived ability to engage in a certain behavior (and thus about an individual's perceived barriers), Rare's TOC talks about barrier removal, thus implying that it is necessary to address and overcome challenges in order to bring about behavioral change. In Rare's TOC, challenges (or barriers) might be external/structural, or else internal to a community. Whatever the barriers are, however, Rare's TOC addresses them with their removal in mind, thus going a step beyond TPB, which merely identifies individuals' perceived barriers. For this reason, Rare's TOC may be more suitable than TPB when considering environmental and wildlife conservation issues, because in these situations people's collective behaviors are often the result of both internal and external barriers.

Overall, TPB appears to focus on individuals and their different perceptions, and how these different perceptions emerge from within the individuals. Rare's TOC on the other hand appears to focus on the collective behavior of a community, without explicit consideration of how that trend came to emerge from within individuals. TPB identifies factors that lead to current behavior, whereas Rare's TOC was developed with the intent to inform SMCs that aim at manipulating current behavior, thus implying that current behavior is already known.

Rare's TOCs thus might be more useful in solving specific conservation problems; a community's known behavior is to be changed in a certain way. For this, Rare's TOC examines external factors and how they support a desired behavior, and then specifically targets those factors that do not yet support the desired behavior change. For example, in a community where wildlife poaching is not reported to authorities, but should be, conservationists might increase community knowledge about the disadvantages of poaching and the advantages of reporting poaching to authorities, and remove possible barriers to reporting behavior, such as 'how to report poaching?', by setting up and explaining to communities the procedure for reporting poaching. The initial not-reporting behavior might then change into the desired behavior of reporting wildlife poaching to authorities.

However, it is possible that behavior change might only apply to a specific aspect of a field (e.g., the reporting of poaching), but not necessarily change a group's general perspective about that field (e.g., conservation in general); for example, Martin et al. (2017) showed people might hold paradoxical attitudes regarding different

aspects related to protected areas in Laos.

Rare's TOC might thus achieve certain behavioral changes related to a specific problem, until the more complex societal motives that drive community behavior can be changed over longer periods of time. Such complex societal motives, however, are based on individual motives, which are the specialty of TPB.

TPB might thus represent a preliminary step in changing community behavior, by identifying individual's motives for a behavior. These motives could then be used in specifically tailoring SMCs to bring about lasting changes in people's behavior. Successful SMCs are based on reaching individuals emotionally or else at a level where people care; however, one would first have to know what the target audience cares about, or what is important to them. TPB, in establishing a baseline of people's motives, might thus inform long-term conservation strategies.

Both Rare's TOC and TPB represent potentially important tools for the field of conservation that could be applied at different levels of conservation planning: Rare's TOC in the development of short-term conservation strategies, and TPB in the development of long-term strategies. In conservation, where issues are usually very pressing, both of these theories might be applied together, approaching a problem from two angles simultaneously; solutions-oriented on one hand (Rare's TOC) and cause-oriented (TPB) on the other. Thus, as we solve the most pressing conservation problems by attempting to change people's behaviors as soon as possible (via SMCs based on Rare's TOC), we also investigate what motivated these people's behaviors that led to the conservation problem in the first place, or else what motivates people to

participate in a proposed conservation behavior (via TPB). These factors could then inform long-term conservation planning.

#### PART FOUR: RECOMMENDATIONS

Although there are some issues with the TPB model (Hrubes et al., 2001; Shrestha et al., 2012), it has been particularly useful in identifying key factors that could predict intention. Furthermore, the TPB model has demonstrated a consistent pattern in predicting intention, even though the model only occasionally predicted behavior directly (Ajzen, 1991; Armitage & Conner, 2001; Godin et al., 1993). This lack of predictive power of behavior might mainly result from the model's focus on individual level variables, while neglecting external factors that might make it hard or easy to act according to individual preference.

Therefore, I recommend employing TPB as a complementary tool to Rare's TOC in an investigation of community behavior related to conservation. Here, Rare's TOC would be used to establish general frameworks around a known conservation-adverse behavior, that is investigate community knowledge, attitude, and external barriers, with the specific intention of changing that behavior with the help of an SMC. The complementary application of the TPB model would provide additional information about the internal factors that drive people's intentions towards a given behavior, which would in turn be used to inform or fine-tune SMCs for more sustainable behavior change in the long-term.

Specifically, I propose to employ Rare's TOC and SMC in combination with TPB in a protected area in Laos. Lao PDR is a country with persistent conservation

threats, such as human-wildlife conflicts, bushmeat consumption, and ongoing hunting for traditional events among some of Lao's many ethnicities. At the same time, existing conservation/wildlife laws are only lightly enforced in Laos, as this developing country struggles with a current development boom and associated increased demand for certain natural resources by one part of the population, while on the other hand the rural population remains subsistence-based and thus dependent on natural products for their survival. As Lao's population is comprised of multiple ethnicities and cultures, with different traditions of wildlife consumption and resource use, protecting Lao's biodiversity poses a huge challenge. The prospective application of SMCs based on Rare's TOC, in combination with TPB, might reveal important and significant factors, external as well as internal, that determine how a community might respond to conservation initiatives. At the same time, applying Rare's TOC and TPB together might prove useful for future research, as this could mitigate some of the criticism attached to TPB: Rare's TOC could provide information on baseline behavior (before the application of an SMC), whereas information revealed by TPB's could guide researchers in how to achieve conservation results more efficiently and effectively. For example, people around a protected area might intend to stop poaching, but do not see a way to generate alternative incomes from appropriate, legal activities; here, TPB could inform protected area managers about people's intentions, or else about aspects that inform intentions (e.g., attitudes), thus guiding next steps to facilitate people's shift from poaching to generating incomes in new ways, such as engaging in alternative livelihood activities (e.g., growing saffron, coffee, and/or cardamom in agroforestry settings). In Laos, for example, the Wildlife Conservation

Society has been implementing just such an agroforestry program, strictly guided by conservation agreements that help villagers generate incomes, thus alleviating the need to poach to make money. At the same time, these incentives help reduce deforestation, as coffee and cardamom need forest cover to yield fruit. Here, TPB guidance would take on the form of assessing people's attitudes and beliefs about such incentives potentially applied in conservation, thus predicting if such proposed applications are favorably viewed by local people. Those prospective findings might make a significant difference in the success of proposed conservation incentives, for example to ultimately stop poaching behavior in the future. Lastly, the TPB might provide an additional theoretical framework for evaluating the Rare SMC's effectiveness in influencing behavior change. The TPB can provide additional constructs to Rare's SMC concurrently with Rare's TOC, so that uncertainty of the Rare's SMC effectiveness might be addressed.

## CHAPTER THREE

### ASSESSING A SOCIAL MARKETING CAMPAIGN TOWARD WILDLIFE CONSERVATION IN NAM ET – PHOU LOUEY NATIONAL PROTECTED AREA IN LAOS

#### INTRODUCTION

The Lao People's Democratic Republic (Lao PDR), a landlocked country (see Figure 3), is one of the most important hotspots for biodiversity conservation in Southeast Asia (Johnson, 2012). It is home to several endangered species such as, among others, the Laotian rock rat or *Kha-nyou* (*Laonastes aenigmamus*), Red-shanked douc langur (*Pygathrix nemaeus*), Saola (*Pseudoryx nghetinhensis*), Lao newt (*Laotriton laoensis*), and even tiger (*Panthera tigris*), some of which are endemic to the area. With a relatively low human population of 6.8 million and a density of 28 people per square kilometer, the remaining forest cover in Lao PDR was approximately 41% in 1998 (Stibig et al., 2004). However, as elsewhere, human populations are encroaching on forests in Laos; while Laos' biodiversity value remains high, it has experienced a rapid decline in wildlife (Kareiva & Marvier, 2011). In an effort to conserve critical biodiversity, the Government of Lao PDR has established 24 national protected areas (NPA) across the country since 1993 (see Figure 3), all of which fall under IUCN protected area category IV (Locke & Dearden, 2005). One of these protected areas, Nam Et-Phou Louey National Protected Area (NEPL NPA), is of global importance, as it contains the last confirmed tiger populations in southeast Asia (Johnson et al., 2006).

Local rural communities around NEPL NPA rely on natural resources for subsistence, leading to pressures from local hunters, primarily on tiger prey species (such as Sambar deer [*Cervus unicolor*], Gaur [*Bos frontalis*], Muntjac [*Muntiacus spp.*] and Eurasian wild pig [*Sus spp.*]) (Johnson et al., 2006, Johnson 2012; Vongkhamheng, 2011). Greater concerns relate to the impact of market-oriented poaching of both the tiger and its key prey species in NEPL NPA. Poaching refers to any illegal killing of prohibited wildlife species, and to the killing of managed wildlife species for purposes other than family consumption (subsistence), by using firearms or means that differ from traditional weapons (snare, bow and arrow), or outside the specified seasons and areas designated for subsistence hunting. High demand for wildlife, both for local consumption and for illicit international markets, significantly increases poaching behaviors (Haines et al., 2012) and constitutes the most significant threat to wildlife in the NEPL NPA (Johnson, 2012). Poaching also appears closely tied to village cattle grazing practices in NEPL NPA (Johnson et al., 2006; Lynam et al., 2006; Steinmetz et al., 2014); grazing areas of local villagers are not only located around NEPL NPA, but extend into the NPA as well, which provides opportunity for cattle owners to illegally harvest wildlife inside the NPA.

In an effort to reduce poaching activities in NEPL NPA, the Government of Laos, with support from Wildlife Conservation Society (WCS), attempted to involve local communities in reporting poaching activities as early as 2007. Reporting poaching would provide villagers with two potential benefits; first, the indirect benefit of reducing poaching, thus leaving more wildlife for more sustainable subsistence hunting, and second, the direct benefit of receiving a monetary reward of 30% of the

poacher's fine upon catching and convicting a poacher. This initial attempt to involve locals in reporting poaching failed however, presumably at least partially due to the fact that reporting poaching was not anonymous and reporting villagers feared the consequences of being identified as informants. To address this problem, an anonymous telephone hotline was introduced and advertised via a social marketing campaign in the districts within NEPL NPA that contained the NPA's headquarter, during 2009/10 (Saypanya et al., 2013). According to the logbook of the NEPL NPA officer responsible for this telephone hotline, this pilot project proved successful in increasing the number of telephone calls reporting poaching (Saypanya et al., 2013); NEPL NPA management consequently wanted to extend this project into another, more remote district of NEPL NPA. The present study documents the effectiveness of a social marketing campaign (SMC) on reporting-poaching behavior through a telephone hotline in the northern parts of NEPL NPA.

Figure 3. Location of National Protected Areas in Lao PDR (Sources: Wildlife Conservation Society – Lao PDR Program).



## SOCIAL MARKETING CAMPAIGNS

Following Stead et al. (2007, p. 461), social marketing is defined as:

*The application of commercial marketing technologies to the analysis, planning, execution and evaluation of programs designed to influence the voluntary behavior of target audiences in order to improve their personal welfare and that of society.*

SMCs are a popular method to motivate change in human behavior to achieve biodiversity conservation results (Andreasen, 1994; Day et al., 2014; Jenks et al.,

2010). The SMC in the NEPL NPA, developed according to Rare's TOC, illustrates how certain factors, such as people's attitude and knowledge regarding reporting poaching, may relate to the desired outcome of the campaign, here increasing the use of a telephone hotline to report poaching. Rare's TOC in this context states that conservation-related behaviors could be changed, by addressing several dynamic elements that form the basis of these behaviors. These elements include knowledge, attitude, interpersonal communication, and barrier removal. These may eventually lead to behavior change, and ultimately to threat reduction and conservation results (see Figure 2).

#### THEORY OF CHANGE

The model assumes that people carefully observe the results achieved by early adopters of the behavior before they adopt the behavior themselves. Rare's two main additions to Vaughan and Rogers' (2000) model are (1) the inclusion of barriers to reporting poaching and the inclusion of mechanisms to reduce or eliminate them as part of the social marketing intervention, and (2) the inclusion of additional stages that extend the model beyond behavior change to threat reduction and the desired conservation result. This more comprehensive model shows how the social marketing intervention is expected to impact the target audience(s) and identifies objectives at each stage, from knowledge to conservation impact (Butler et al., 2013).

## APPLICATION OF SOCIAL MARKETING CAMPAIGN

The application of social marketing campaigns to shape behaviors, and the effectiveness of SMCs, is illustrated by several studies. SMCs were shown to be effective in addressing texting while driving behaviors (Lennon et al., 2010; Miranda et al., 2013), increasing asthma awareness in older adults (Evers et al., 2013), increasing walking for health amongst African American adults (Wilson et al., 2013), and increasing consumption of leafy vegetables and eggs in inhabitants of central Java, Indonesia (De Pee et al., 1998).

Despite these positive examples, SMCs have not always been effective. For example, SMCs were not effective in the context of the US National Anti-Drug Campaign (Smith, 2006), in reducing high rates of alcohol consumption by college students (Lennon & Rentfro, 2010; Wechsler et al., 2003), and in influencing behaviors to reduce obesity (Cismaru & Lavack, 2007). In other studies, while SMCs were not effective in achieving the primarily intended outcome (behavioral change), they were able to increase awareness of the impacts of particular behaviors, or risks associated with certain behaviors, as in cases of heavy drinking among college students (Clapp et al., 2003) and risks of not using condoms in preventing the spread of HIV/AIDS (Sewak & Singh, 2012).

In Laos, the Wildlife Conservation Society (WCS) has been applying SMC-based approaches to addressing conservation behaviors in and around NPAs. Previous findings suggested that SMC was effective for wildlife conservation by impacting knowledge, attitude, interpersonal communication, and barrier removal, thus affecting

behavior change (Saypanya et al., 2013; Vannalath, 2006). Despite studies suggesting that SMCs were effective in this context, some questions remained to be addressed in this research. These included to what degree the SMC affected a behavior change in the present SMC application, what specific factors in the model might have altered the SMC outcome, and whether control sites were truly a control for the treatment.

## RESEARCH QUESTIONS

In this research I investigated whether the SMC was effective in influencing the different elements of Rare's TOC, knowledge, attitudes, and perception of barrier removal, as related to the direct threat of poaching in Phonethong District, Luang Prabang province, Laos. Furthermore, I investigated SMC's effectiveness with regard to ultimately influencing reporting-poaching behavior among local communities. The overall goal of this research was to identify improved approaches to influencing pro-environmental behaviors, in an attempt to strengthen protected area management. More specifically, I intended that the results of this research would inform the future implementation of similar SMCs around the NEPL NPA, in an attempt to further enhance conservation behaviors of local villagers. To that end, my research questions were:

1. How did people's knowledge, regarding the decline in environmental quality, change after SMC application, compared to people who had not been exposed to the SMC?
2. How did people's attitudes, regarding to report poaching, change after SMC application, compared to people who had not been exposed to the SMC?

3. How did people's perceptions of barrier removal, regarding their ability to report poaching, change after SMC application, compared to people who had not been exposed to the SMC?
4. How did people's reporting-poaching behavior change after SMC application, compared to people who had not been exposed to the SMC?

## METHODS

### EXPERIMENTAL DESIGN

This research employed a quasi-experimental design, that used pre- and post-test interviews among a control population and a treatment population (Kerlinger & Lee, 1966; Shadish et al., 2002), to assess the effectiveness of an SMC on knowledge, attitude, interpersonal communication, barrier removal, and behavior change. The construct interpersonal communication was excluded from subsequent analysis, as it became apparent only after interviews that no single interview question accurately represented this construct. The SMC was applied in the treatment area only, during the September 2014 and June 2015.

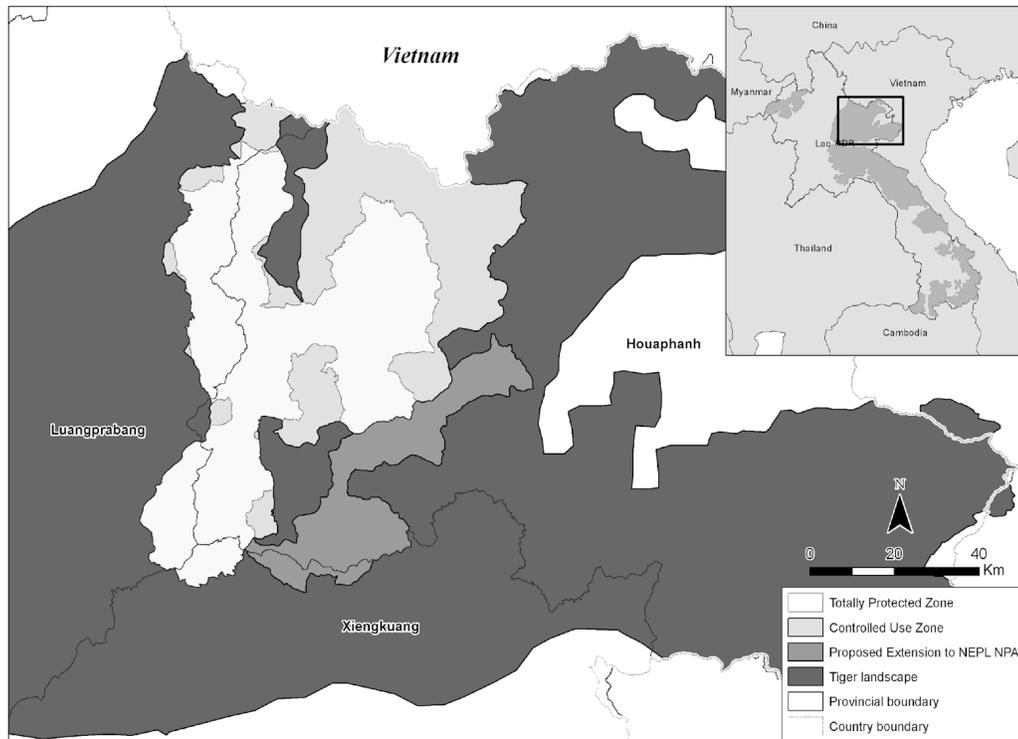
### SITE: NEPL NATIONAL PROTECTED AREA

This research was carried out in the NEPL NPA (see Figure 4). The NEPL NPA is a valuable biodiversity hotspot and crucial habitat for a range of endangered and vulnerable species, which includes the tiger (*Panthera tigris corbetti*). With regard to tiger conservation a recent study demonstrated that the NEPL is the only NPA in Indochina that has a confirmed breeding population of Indochinese tigers (Johnson et

al., 2012; Johnson et al., 2006). The NEPL NPA not only provides the most important habitat to tigers and many other endangered species and broader biodiversity, but it also provides critical ecosystem service functions such as sources of protein and non-timber forest products to people who live inside and around the NEPL NPA. In order to address these environmental and social values, the NEPL NPA is divided into a totally protected zone, controlled use zone, buffer zone and corridors between zones in accordance with the 1994 NPA Decree (Government of Laos, 2004). The controlled use zone is the area adjoining the totally protected zone in the NPAs, where original local residents (that is, people who lived in the area already before it was protected) may live and carry out livelihood activities in accordance with government legislations (Government of Laos, 2003; 2007; 2015) and management rules of the NPAs.

NEPL falls within nine governance districts across three provinces that surround the NEPL NPA: Houaphanh, Luang Prabang, and Xiengkhuang provinces. My research focused on Phonethong district in Luang Prabang Province, which served as a treatment area, and Aet district in Huaphan Province, which served as a control area.

Figure 4. Location of Nam Et – Phou Louey National Protected Area in Lao PDR (Sources: Sources: Wildlife Conservation Society – Lao PDR Program)



The treatment area had a population of approximately 18,400 people living in 41 villages across the district. Most of these villagers have direct or indirect access to the NEPL NPA for subsistence hunting, grazing, and collecting non-timber forest products. Here, ‘direct access’ refers to a villager personally carrying out any of these activities, whereas ‘indirect access’ refers to a villager benefitting from such activities having been carried out by another person in the family. In the context of Laos, local villagers’ settlement had happened long before NPAs were established in 1993; therefore, there is a compromise between conservation and the presence of villages in the NPA. Aside from those villages located inside the NEPL NPA, there are also many villages located around the NPA, in easy walking distance from the NPA. Thus,

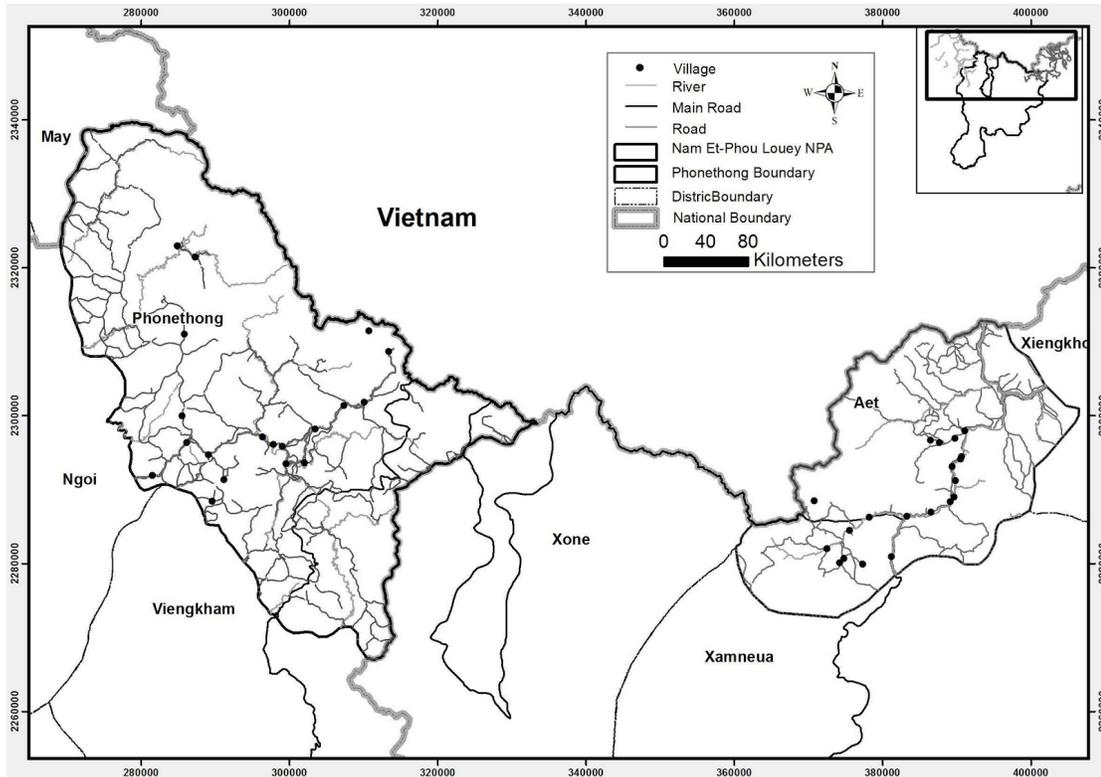
importantly, people from villages around the NPA are able to encroach on the NPA buffer zone, as well as the core area, to hunt, graze, and collect non-timber forest products.

The control area had a population of approximately 29,000 people who lived in 78 villages across the district (see Figure 5). The control area was similar to the treatment area in many aspects, including similar geography, land cover, presence of ethnic minorities, people's occupation and lifestyle, local access to NEPL NPA, and weak law enforcement efforts.

#### DATA COLLECTION

The surveys were carried out as structured interviews, with the pre-survey taking place during July-August 2014, and the post-survey during May 2015. Here, the post-survey was an exact repeat of the pre-survey, carried out in the same villages. In between pre- and post- surveys a SMC was applied in the treatment area only. Surveys were conducted in 20 of the 41 treatment area villages, and in 21 of the 78 control area villages (see Figure 5). Villages in both the treatment and control areas were chosen for inclusion based on two criteria: (1) distance from NEPL NPA border, to represent people living in various distances from the NPA, and (2) distribution of villagers' ethnicities, to equally represent the three major ethnic groups of the research population (Hmong, Khmu, and Lao Loum)

Figure 5. Distribution of surveyed villages in the treatment area (n= 20, Phonethong district, Luang Prabang province), and control area (n= 21, Aed district, Houaphanh province) in NEPL NPA, Lao PDR (Sources: Wildlife Conservation Society – Lao PDR Program).



The questionnaire instruments for the research were developed by Rare based on Rare’s TOC. Questionnaires included a section asking about general characteristics of the interviewee, such as gender, ethnicity, age, occupancy, and family size. Questionnaires also included one question each pertaining to the constructs of Rare’s TOC, (1) knowledge, (2) attitude, (3) barrier removal, and (4) behavior change (see Table 3). Answers to these questions were recorded on a 5-point Likert scale (see APPENDIX 1). Additional survey questions pertained to concepts of another behavioral theory, and are discussed elsewhere (see Chapter 4 of this dissertation).

Following the interviews, once tablets were connected to the Internet, data were uploaded into the iSurvey system, allowing easy access for subsequent analyses.

Table 3. Survey questions pertaining to Rare’s TOC constructs.

Rare’s TOC constructs	Survey Question	Likert-scale response options (1 – 5)
Knowledge	<i>‘How has environmental quality changed over the past 10 years?’</i>	1 (worse)- 5 (better)
Attitude	<i>‘For me to report poaching is bad/good’</i>	1 (extremely bad)- 5 (extremely good)
Barrier removal	<i>‘I am confident that, if I wanted to, I could report poaching’</i>	1 (definitely false)- 5 (definitely true)
Behavior change	<i>‘In the past 10 months, I have reported someone who was poaching’</i>	1 (very rarely)- 5 (very often)

The interview questionnaire was developed using the survey-application ‘iSurvey’ for mobile devices. Questions were initially developed in English, and subsequently translated into the Lao language. Interviews were held in the Lao language, but translated into relevant ethnic languages on an as-needed basis by the research assistants. To that end, research teams included assistants that among them covered the three ethnic languages of the area. Interview responses were recorded on electronic survey forms, using tablets. Research assistants were trained in data collection methods, and in the use of the survey instrument.

Prior to data collection, research permission was obtained from district cabinets and governors, which was then sent to inform all concerned village headmen. Headmen would then inform villagers to remain in the area during the time of the planned survey, or else villagers might be working away from the villages, in the fields and elsewhere.

Research teams of four people arrived in each village at the pre-arranged day, and were received by the village headmen and villagers. Upon arrival in a village, after formal greetings and introductions, villagers were asked if they wanted to participate in the survey. Volunteers to be included in the survey had to be residents of the village, and be between 15 and 55 years old. This age range was chosen as younger people (<15 years old) as well as older people (>55 years old) generally remained in their own village during normal daily activities, and were thus unlikely to engage in poaching themselves, or else observe and/or possibly report poaching. Additionally, an attempt was made to equally include men and women volunteers. Overall, researchers attempted to interview as many persons as possible in each village; this was easy as a typical village in that region contained between 30 and 50 houses, with villagers sitting on their porches or outside. Furthermore, in these remote villages the arrival of a research team was a much-anticipated event, which every villager attended. Thus villagers were eager to participate in surveys, even without incentives. Interviews were carried out in volunteers' houses, and lasted between 10-30 minutes each.

For reasons of confidentiality, as this survey pertained to the sensitive topic of poaching, villager's names were not recorded. Thus, it was likely that not all villagers interviewed during pre-surveys were also interviewed during post-surveys, and similarly, some people were likely included in the post-survey that had not been included in the pre-survey. However, while the exact percentage of this turnover could not be determined, researchers estimated it as relatively low based on the knowledge that villagers in these regions do not usually move from their own village, and few

deaths were estimated to have occurred among the age groups included in surveys in the 10 months between pre- and post-survey.

Between the pre- and post-surveys, in November 2014, a SMC was applied in each village in the treatment area only. The SMCs were carried out by the same four-person research teams that conducted pre- and post-surveys, assisted by a total of five additional staff from the four District Offices for Agricultural and Forestry, Environment and Natural Resources, Information, Culture and Tourism, as well as the District Administration Office.

Each village in the treatment area received its own SMC presentation, in the village's respective ethnic language. The research team carrying out the SMC arrived in each village around 9 A.M. one day, and left the village around 8 A.M. on the following morning. Before SMCs, village headmen were informed of our pending visit and necessary authorizations obtained. Upon arrival, the SMC team was assigned accommodations and subsequently set up stage for the evening's presentation, communicating with villagers to generate interest in participating actively, or as a viewer only. Villagers were usually involved in setting up and taking down the stage as well. The actual SMC event usually took place around 7 P.M., and lasted for approximately 2-4 hours pending on villagers' interest and continued involvement.

During the SMC, villagers were first exposed to a 20-minute role play staged by the research team, addressing elements of legal and illegal hunting practices, wildlife trade (which is generally illegal), and how to get involved in reporting poaching through a telephone hotline number. These topics were introduced, by a

narrator, through the stage-characters of three hunters; one who followed all regulations, one who followed some, and one hunter who followed no regulations whatsoever. After the role-play, question-and-answer sessions ensued, with villagers involved in open discussions of all given answers, followed by an explanation of the actual, correct answers by the researchers. Second, the SMC involved villagers in hunting-legality games, during which a core-zone, controlled use zone, and buffer zone were replicated in the village, and villagers first played animals or hunters moving through these zones, engaging in different activities. Then, hunters' demonstrated activities were subsequently discussed in the legal framework, involving the village audience in rating the hunters' performances based on their knowledge learned from the staged role-play earlier. Thus, these games illustrated how to be good hunters (as defined by the Lao government), and the risks associated with poaching. For correct answers to hunting legality questions during any of these activities villagers received a T-shirt or jacket as a prize. Third, a large poster (3x5m) was displayed, illustrating legal hunting conditions under the slogan 'Hunt for eating, not for extirpation', and village volunteers were asked to explain the pictures displayed in the poster. Lastly, every household in the treatment villages was presented with a gift-bag containing notebooks, calendars, a poster, and stickers featuring conservation-related messages and slogans (e.g., 'reporting poaching is easy'), and the telephone hotline number, to reinforce the presentation and activities. The hotline number was introduced in order to facilitate villagers reporting poaching to government agencies.

## DATA ANALYSIS

I used statistical software (SPSS version 20.0) to analyze data directly exported from the iSurvey system. First, I constructed a frequency table to summarize respondents' general population characteristics (gender, ethnicity, age group, family size, and occupation). Second, I investigated, via Chi-square tests, potential differences in villagers' population characteristics between treatment and control areas. Third, I conducted separately for treatment and control areas 1-way ANOVAs investigating the overall differences between pre- and post-survey mean response-scores to survey questions representing Rare's TOC constructs knowledge, attitude, barrier removal, and behavior change; these analyses served to determine SMC effectiveness. Where Chi-square analyses had previously identified differences in population characteristics between treatment and control areas, these 1-way ANOVAs were also carried out separately for each sub-group (that is, for example, separately for each of the ethnic groups) to ascertain whether sub-group had an effect on the comparison, between treatment and control area, of results on the TOC questions.

## RESULTS

### POPULATION CHARACTERISTICS IN TREATMENT AND CONTROL AREAS

A total of 1,527 interviews were conducted, 760 (49.8%) in the treatment area (379 pre-survey, and 381 post-survey), and 767 (50.2%) in the control area (380 pre-survey, and 387 post-survey). In the treatment area, interviewees included 389 males (51.3%) and 371 females (48.7%), from three ethnic groups: Hmong (n= 209, 27.5%), Khmu (n= 158 20.8%), and Lao Loum (n= 394 51.7%) (see Table 4). Within the

specified age range, people's age distribution in the treatment area was: 254 people between 15-29 years old (33.4%), 312 people between 30-44 years old (41.1%), and 194 people between 45-55 years old (25.5%). The majority of family sizes in the treatment area was 1-4 people (n= 418 or 55.0%), followed by 5-8 people (n= 268 or 33.3%), and 9 or more people (n= 74 or 9.7%). The main occupation of people in the treatment-area was farming (n= 722 or 95.0%), followed by village militia and police (n= 20 or 2.6%), and other government employees (n= 18 or 2.4%) (see Table 4).

In the control area, interviewees included 397 males (51.8%) and 370 females (48.2%), no different from the gender distribution in the treatment area ( $\text{Chi}^2$  [1df, n= 1,527] = 0.05,  $p = 0.431$ ) (see Table 4). People in the control area also represented three ethnic groups: Hmong (n= 331, 43.2%), Khmu (n= 157, 20.5%), and Lao Loum (n= 279, 36.4%); thus, the ethnic group distribution in the control area differed significantly from that of the treatment area ( $\text{Chi}^2$  [2df, n= 1,527] = 30.79,  $p < 0.001$ ). However, as this was the only area available in NEPL NPA with ethnic group distributions somewhat similar to the treatment area, this control area was the best one available. People's age distribution in the control area was not different from the treatment area ( $\text{Chi}^2$  [1df, n= 1,527] = 5.78,  $p = 0.056$ ): 236 people were between 15-29 years old (30.8%), 361 people were between 30-44 years old (47.1%), and 170 people were between 45-55 years old (22.2%). Family size distributions in the control group were: 192 people living in families between 1-4 people (25.0%), followed by 414 people in families between 5-8 people (54.0%), and 161 people living in families of 9 or more people (21.0%). Thus, more respondents lived in larger families in the control group, than in the treatment group ( $\text{Chi}^2$  [2df, n= 1,527] = 147.17,  $p < 0.001$ ).

As for people's main occupation: in the control area, most people were farmers (n= 710, 92.6%), followed by village militia and police (n= 46 or 6.0%), and other government employees (n= 11 or 1.4%); thus, the occupation-distribution in the control area was significantly different from that in the treatment area ( $\text{Chi}^2 [2\text{df}, n= 1,527] = 12.00, p= 0.002$ ), with more village militia and police than expected (see Table 4). However, because non-farmers made up only about 5% of the treatment area population, and <8% of control area population, by-occupation analyses of TOC concept questions was not subsequently carried out.

Table 4. Frequency table summarizing respondents' distribution between pre- and post-survey in treatment and control areas, across genders, ethnicities, age groups, family sizes, and occupations.

Variable	Area	Subgroup	N (%)	N Pre/ Post	Chi <sup>2</sup> (df=1)	p
Gender	Treatment	Male	389 (51.2)	200/ 189	0.051	0.431
		Female	371 (48.8)	179/ 192		
	Control	Male	397 (51.8)	189/ 208		
		Female	370 (48.2)	191/ 179		
Ethnicity	Treatment	Hmong	231 (30.4)	101/130	30.787	<0.001*
		Khmu	158 (20.8)	86/ 72		
		Lao Loum	371 (48.8)	192/ 179		
	Control	Hmong	331 (43.2)	157/ 174		
		Khmu	157 (20.5)	81/ 76		
		Lao Loum	279 (36.4)	142/ 137		
Age	Treatment	15 - 29 years old	254 (33.4)	125/ 129	5.779	0.056
		30 - 44 years old	312 (41.1)	160/ 152		
		≥ 45 years old	194 (25.5)	94/ 100		
	Control	15 - 29 years old	236 (30.8)	109/ 127		
		30 - 44 years old	361 (47.1)	184/ 177		
		≥ 45 years old	170 (22.2)	87/ 83		
Family size	Treatment	1 - 4 persons	418 (55.0)	188/230	147.166	<0.001*
		5 - 8 persons	268 (35.3)	145/123		
		≥ 9 persons	74 (9.7)	46/28		
	Control	1 - 4 persons	192 (25.0)	119/73		
		5 - 8 persons	414 (54.0)	183/231		
		≥ 9 persons	161 (21.0)	78/83		
Occupations	Treatment	Militia and police	20 (2.6)	13/7	12.001	0.002*
		Farmer	722 (95.0)	356/366		
		Government officer	18 (2.4)	10/8		
	Control	Militia and police	46 (6)	2/44		
		Farmer	710 (92.6)	377/333		
		Government officer	11 (1.4)	1/20		

## SMC SURVEY RESPONSES

The mean Likert-scale responses to survey questions representing Rare's TOC constructs knowledge, attitude, barrier removal, and behavior change, as relate to survey area (treatment vs. control) and survey time (pre- vs. post-survey), are listed in Table 5.

Table 5. Results from One-Way ANOVAs listing the mean response-scores to 'knowledge', 'attitude', 'barrier removal' and 'behavior change' survey questions.

SMC Constructs	Area	Mean		N	F(df= 1)	p
		Survey	(SD)			
<i>'How has environmental quality changed over the past 10 years?'</i>	Treatment	Pre	2.8 (1.60)	379	0.992	0.319
		Post	2.7 (1.42)	381		
	Control	Pre	2.7 (1.58)	380	3.978	0.046*
		Post	2.9 (1.51)	387		
Attitude <i>'For me to report poaching is bad/good'</i>	Treatment	Pre	2.5 (1.84)	379	148.031	< 0.001*
		Post	1.2 (0.81)	381		
	Control	Pre	2.9 (1.87)	380	255.876	< 0.001*
		Post	1.2 (0.80)	387		
Barrier removal <i>'I am confident that, if I wanted to, I could report poaching'</i>	Treatment	Pre	3.5 (1.83)	379	81.772	< 0.001*
		Post	2.3 (1.81)	381		
	Control	Pre	4.0 (1.60)	380	84.192	< 0.001*
		Post	2.8 (1.90)	387		
Behavior change <i>'In the past 10 months, I have reported someone who was poaching'</i>	Treatment	Pre	1.4 (1.10)	379	7.457	0.006*
		Post	1.2 (0.74)	381		
	Control	Pre	1.3 (0.97)	380	0.049	0.826
		Post	1.3 (0.97)	387		

\*Denotes statistically significant differences with  $p < 0.05$

## KNOWLEDGE

Mean response-scores to the knowledge question (*'How has environmental quality changed over the past 10 years?'* [1= for worse, 5= for better]) were as follows. In the treatment area, pre- and post-survey mean knowledge-scores did not

change ( $\bar{M}_{pre} = 2.8$  vs.  $\bar{M}_{post} = 2.7$ ,  $F(1df) = 0.992$ ,  $p = 0.319$ ) (see Table 5). On average, people retained their knowledge that the environmental quality had slightly changed for the worse over the past 10 years. This held true regardless of respondents' ethnicity and family sizes ( $p > 0.05$ , see APPENDIX 2). Thus, it appeared that the SMC did not affect knowledge in the treatment area, as there was no change in mean knowledge-scores between pre- and post-surveys.

At the same time in the control area, a slight, but statistically significant change in knowledge occurred between pre- and post-survey, indicating people were less knowledgeable about environmental quality changes (i.e., more likely to believe environmental quality had somewhat improved over the past 10 years) during post-survey ( $\bar{M}_{pre} = 2.7$  vs.  $\bar{M}_{post} = 2.9$ ,  $F(1df) = 3.98$ ,  $p = 0.046$ ) (see Table 5). Here, ethnicity affected responses. Only the Khmu appeared less knowledgeable over time ( $\bar{M}_{pre} = 2.3$  vs  $\bar{M}_{post} = 3.0$ ,  $F(1df) = 8.68$ ,  $p = 0.004$ ), whereas the knowledge of both the Hmong and Lao Loum did not change ( $p > 0.005$ ; see APPENDIX 2); they retained their initial views of the environment having somewhat changed for the worse (that is, degraded) during the past 10 years. Family size also affected overall results, with people from larger families (5-8, and  $\geq 9$  persons) appearing less knowledgeable over time about the environment having degraded during the past 10 years (5-8 persons:  $\bar{M}_{pre} = 2.5$  vs  $\bar{M}_{post} = 3.0$ ,  $F(1df) = 8.75$ ,  $p = 0.003$ ),  $\geq 9$  persons:  $\bar{M}_{pre} = 2.2$  vs.  $\bar{M}_{post} = 2.9$ ,  $F(1df) = 9.63$ ,  $p = 0.002$ ), whereas people from small families (1-4 persons) were more knowledgeable over time ( $\bar{M}_{pre} = 3.2$  vs  $\bar{M}_{post} = 2.7$ ,  $F(1df) = 4.93$ ,  $p = 0.028$ ) (see APPENDIX 2). These

changes occurred without an SMC having been carried out in the area, and must thus be attributed to other factors.

## ATTITUDE

Mean response-scores to the attitude question (*'For me to report poaching would be bad/good'* [1= extremely bad, 5= extremely good]) were as follows. In the treatment area, mean attitude scores decreased significantly between pre-survey and post-survey, indicating respondents had a more negative attitude towards reporting poaching during post-survey ( $\bar{M}_{pre} = 2.4$  vs.  $\bar{M}_{post} = 1.2$ ,  $F(1df) = 148.03$ ,  $p < 0.001$ ) (see Table 5). There was no effect of either ethnicity or family size on attitude in the treatment area ( $p > 0.05$ , see APPENDIX 2).

In the control area, mean attitude-scores also decreased statistically significantly between pre- and post-survey ( $\bar{M}_{pre} = 2.9$  vs.  $\bar{M}_{post} = 1.2$ ,  $F(1df) = 255.88$ ,  $p < 0.001$ ), indicating respondents in the control area also had a more negative attitude towards reporting poaching during post-survey. This was true for all ethnic groups and family sizes ( $p > 0.05$ , see APPENDIX 2). As attitudes changed in the same direction in both, the treatment and control areas, an SMC effect on attitude could not be demonstrated.

## BARRIER REMOVAL

Mean response-scores to the barrier removal question (*'I am confident that, if I wanted to, I could report poaching'* [1= definitely false, 5= definitely true]) were as follows. In both, the treatment area as well as control area, scores decreased

significantly between pre- and post-survey ( $\bar{M}_{pre} = 3.5$  vs  $\bar{M}_{post} = 2.3$ ,  $F(1df) = 81.77$ ,  $p < 0.001$ , and  $\bar{M}_{pre} = 3.5$  vs  $\bar{M}_{post} = 2.3$ ,  $F(1df) = 81.77$ ,  $p < 0.001$ , respectively) (see Table 5), thus indicating an increase in perceived barriers. There was no effect of either ethnicity or family size on barrier removal in either, the treatment or control areas ( $p > 0.05$ , see APPENDIX 2). As with attitude, because perceived barriers increased in both the treatment and control areas, the change cannot be attributed to the SMC.

## BEHAVIOR CHANGE

Mean response-scores to the behavior change question '*In the past 10 months, I have reported someone who was poaching*' [1= very rarely, 5= very often]) were as follows. In the treatment area, mean response-scores decreased significantly between pre- and post-survey, indicating people reported poaching even less frequently after SMC application ( $\bar{M}_{pre} = 1.4$  vs.  $\bar{M}_{post} = 1.2$ ,  $F(1df) = 7.46$ ,  $p = 0.006$ ) (see Table 5). Ethnicity affected behavior change: only the Hmong changed their behavior, with less poaching-reporting after SMC ( $\bar{M}_{pre} = 1.5$  vs.  $\bar{M}_{post} = 1.2$ ,  $F(1df) = 5.14$ ,  $p = 0.024$ ), whereas other ethnic groups did not change their behavior, reporting poaching equally rarely before and after SMC application ( $p > 0.05$ , see APPENDIX 2). Family size also affected behavior change: only people from small families (1-4 persons) changed their behavior, with less poaching-reporting after SMC ( $\bar{M}_{pre} = 1.4$  vs  $\bar{M}_{post} = 1.1$ ,  $F(1df) = 12.10$ ,  $p = 0.001$ ), whereas people from larger families did not change their behavior, reporting poaching equally rarely before and after SMC application ( $p > 0.05$ , see APPENDIX 2).

In the control area, mean response-scores to the behavior change question did not differ between pre- and post-survey, indicating that people reported poaching equally rarely over time ( $\bar{M}_{pre} = 1.3$  vs.  $\bar{M}_{post} = 1.3$ ,  $F(1,df) = 0.05$ ,  $p = 0.826$ ) (see Table 5). Ethnicity and family size did not affect results ( $p > 0.05$ , see APPENDIX 2).

## OVERVIEW OF THE RESULTS

In summary, the SMC had no apparent effect on knowledge, as mean response-scores did not change in the treatment area after SMC application. In the control area at the same time, instead of remaining unchanged, knowledge appeared to deteriorate: where people initially had at least some notion of the environment having changed for the worse, they were not sure about this anymore during post-survey.

Even though attitude mean scores in the treatment area significantly changed in the desired direction between pre- and post-survey, with people considering to report poaching as being bad during post-survey to a greater degree than during pre-survey, similar changes were also observed in the control area, suggesting that this effect cannot be attributed to the SMC.

The SMC did not affect people's perception of barrier removal in the desired way; people's confidence in being able to report poaching decreased after exposure to SMC, which suggested that people perceived even more barriers after SMC than before. Meanwhile in the control area, people's confidence regarding poaching-reporting also decreased significantly, suggesting they also perceived the addition of

barriers between pre- and post-survey; potential reasons for this are discussed in the section below.

Lastly, in the treatment area, SMC did not affect behavior change in the intended way, as people reported poaching even less frequently after SMC application than before. At the same time, there was no change in reporting-poaching behavior in the control area. This suggested that, at a minimum, certain aspects of the observed, unintended behavior changes might relate to the SMC application, which I discuss in the section below.

## DISCUSSION

Below I discuss potential explanations for my results for each of the TOC constructs knowledge, attitude, barrier removal, and behavior change, followed by a discussion of the potential implications of these overall results for assessing SMC effectiveness. Lastly, I discuss what these results imply about the study population's advancement from not-reporting poaching to the desired more conservation-oriented behavior, here reporting poaching more frequently, along the TOC pathway, and relevant recommendations for next steps to be taken by conservation managers in the pursuit of reducing poaching in the NEPL NPA.

## KNOWLEDGE

The results from my knowledge question analysis did not meet my expectations: in the treatment area, there was no statistically significant change in people's mean knowledge regarding *'how much the environment had changed during*

*the past 10 years*' after the SMC application. These results held true regardless of people's ethnicity and family-size. Had the SMC been effective, knowledge in the treatment area should have significantly increased between pre- and post-survey, reflecting people's realization that environmental quality had in fact deteriorated (change for the worse) during the past 10 years.

At the same time in the control area, where I expected no change, people overall were even less knowledgeable about the decrease in environmental quality during post-survey, compared to pre-survey. While this change was statistically significant, it was nonetheless very small in magnitude, and post-survey responses averaged around the '*I do not know*' center of the Likert-scale. This effect was specifically due to (1) the Khmu ethnic group exhibiting this apparent decrease in knowledge, while Hmong and Lao Loum ethnic groups' knowledge did not change over time; this was also due to (2) family size: members of small families were more aware of environmental degradation during post-survey, whereas members of larger families were less aware of environmental degradation during post-survey.

Perhaps the Khmu, less outspoken than Hmong and Lao Loum, were more cautious during post-survey (reporting '*I do not know*' when asked about environmental changes during the past 10 years), possibly due to an additional police presence in the area at that time. As became apparent only during post-survey, recent increased illegal logging in the control area had prompted the Lao government to station 42 additional law-enforcement personnel between pre- and post-survey in my control area villages, thus effectively changing the village occupation composition

from 0.5% militia and police during pre-survey, to about 11% during post-survey. These 42 policemen, however, mostly fell into the ‘small family’ group, and may thus have affected small-family responses changing between pre- and post-survey, towards ‘*the environment having degraded during the past 10 years*’; after all, these policemen had been stationed in the control area specifically because of recent environmental declines (that is, because of illegal logging activities).

As for the lack of demonstrated SMC effectiveness, there were at least two potential explanations. First, it was possible that the actual elements of the SMC did not optimally align with the questions chosen to represent TOC constructs, here specifically TOC’s ‘knowledge’ construct. The SMC carried out in the treatment villages had indeed contained elements that targeted increasing people’s knowledge about certain aspects of environmental degradation, mainly related to wildlife populations. As most people’s interaction with wildlife related to hunting, specific topics addressed in the SMC included permitted hunting and fishing areas and wildlife species permitted to hunt, permitted hunting gear and hunting season, as well as permitted hunting purpose. However, the question chosen to represent knowledge during surveys did not specifically contain any reference to hunting or wildlife populations, but instead asked more generally about changes in ‘environmental quality’. Perhaps villagers in NEPL NPA considered environmental quality measures as something different from numbers of wildlife available for hunting, or fishing. For example, people might have thought of controlled use zones and products found there for daily use, such as wild mushrooms or vines for consumption, firewood for

cooking, or medicinal plants for remedies; the availability of these products may not have changed much during the past years. Due to these potential differences in definition of environmental quality, the mental link between the survey question ‘*How had environmental quality changed during the past 10 years?*’ and the SMC elements addressing hunting-related issues, might not have been made, and hence responses to the survey questions did not change. People may not have realized the connection between hunting-legality demonstrations during SMC and the fact that increased poaching rates resulted in fewer animals in the area, which in turn constituted a decline in environmental quality. Since survey questions pertaining to attitude, barrier removal and behavior change specifically targeted poaching-related issues, a more specific ‘knowledge’ question pertaining to poaching, or else wildlife populations, might have been more appropriate in investigating an SMC effect on people’s knowledge. Such a specific knowledge question might have been, ‘*how has the number of [hunnable] animals changed during the past 10 years?*’

Perhaps it is important to include in future SMCs a definition for environmental quality, and how it might be affected by the SMC, as well as specific examples of environmental quality decline such as, for example, fewer animals, more logged areas, more people present in these areas on a more frequent basis, and so on. Examples should span all aspects of knowledge regarding environmental quality, not just poaching, to demonstrate the extent of environmental quality decline due to human activities in the recent past, and thus demonstrate the importance of abiding laws that protect natural resources, including wildlife. Similarly, such explanations and examples should be given to all interviewees during surveys, to more accurately

assess knowledge about environmental quality changes, rather than potentially assessing people's knowledge of the definition of environmental quality.

The second possible explanation for being unable to conclusively demonstrate an SMC effect on knowledge was perhaps people already knew about the decrease in environmental quality during the past 10 years, and thus did not gain additional knowledge from SMCs. However, people's apparent knowledge, namely that environmental quality had changed for the worse, was not reflected in their responses; instead they responded no change had occurred. As was evident from people's responses given during discussions during SMC application, villagers realized wildlife numbers had decreased over time, as their attempts to hunt were not as successful as they used to be in the past. Also during SMC discussions, people reported having to walk for longer distance to find animals to hunt. For fishing practices also, people mentioned that in the past, before going fishing, they would have prepared all cooking gear and ingredients because they were sure to catch the expected fish. However, in present days, it was very challenging for people to actually catch fish, and those finally caught were smaller and smaller. These accounts demonstrated people already knew about the decline of animals available for hunting and fishing even before the SMC; thus perhaps a mere 2-4 hour intervention in the form of a SMC did not add information on this topic, and thus did not affect people's views in this regard.

## ATTITUDE

Because people's attitudes had changed in the same direction in both the treatment and control areas over time, towards considering reporting poaching worse

during post-survey, I cannot attribute these attitude changes to the SMC. I offer three possible explanations for this result. First, the SMC was not effective, and observed attitude changes in treatment and control areas were both due to extraneous factors that equally influenced both areas; such factors could have included a nationwide campaign for increased environmental awareness, or else changes in NPA land-use policy that suggest environmental changes having taken place in the recent past. However, I am not aware of such extraneous factors potentially having equally affected attitude changes in both areas, treatment and control, thus rendering this explanation unlikely.

Second, perhaps the SMC was actually effective, thus accounting for observed attitude changes in the treatment area, while observed attitude changes in the control area were due to extraneous factors that influenced the control area only. As discussed earlier, additional police had been stationed in control area villages during post-survey, as a result of illegal logging activities, and the Lao government had furthermore dispatched a special delegation into some of these villages to investigate, as well as solicit people into future reporting of such illegal logging activities. It was therefore possible that the presence of these external policemen and/or the activities of the special delegation had increased interpersonal communication among villagers, and/or influenced people's conservation attitudes in the control area, thus mimicking the effect of the SMC in the treatment area. The observed significant attitude changes in the control area might reflect such an influence, thus rendering this second explanation somewhat probable.

Third, the SMC itself might have affected both the treatment and control areas, through interpersonal communication among villagers from both areas, thus accounting for observed attitude changes in the entire region. The SMCs in the treatment areas represented an unusual (that is, rare), and thus likely a memorable event in the lives of attending villagers, and give-away items received by every household during SMC application were likely to have enhanced and preserved SMC messages over time. It was thus possible that villagers' movements across the region during the time between SMC application and post-survey carried the SMC message with them. Interpersonal communication among people who attended the SMC, and people in control area villages, who did not, might have played a role in dispersing accounts of the SMC, and subsequently influenced control-area responses. However, am not sure of such information transmission, or else the dispersal of giveaway items into the control area have been documented. Moreover, assuming the SMC had been effective after all, one might expect SMC effect to be more pronounced among first-hand witnesses of the SMC, that is in treatment villages, and less pronounced among others that learned of SMC from hearsay, that is in control area villages. As it were, the magnitude of change was actually smaller in the treatment area than in the control area, while post-survey attitudes in the treatment area did not differ from those in the control area, thus perhaps rendering this third explanation less likely.

#### BARRIER REMOVAL

The SMC did not appear to have the desired effect on people's perception of barriers to the target behavior, reporting poaching. In the treatment area the results of

the barrier removal analyses were contrary to my expectations; the mean scores for confidence of being able to report poaching actually decreased during the 10 months between pre- and post-survey. Where people on average had been ‘*somewhat confident*’ being able to report poaching if they wanted to during the initial survey, they were unsure or even less than certain about the same question during post survey. Thus, in the treatment area, people appeared to perceive greater barriers after the SMC application compared to before.

The SMC delivered accurate information regarding reporting poaching, including what telephone number to call to report, the assurance that the informer’s anonymity would be maintained, and the information that people who report poaching would be compensated with one-third of the fine imposed on convicted poachers. Thus, people should have been encouraged to engage in reporting-poaching behavior. However, additionally, the SMC delivered information on caught poachers’ prosecution and fining. This information might have forced villagers to carefully evaluate the potential risks and benefits of reporting poaching. After all, in the remote study villages, communities are tight-knit, and poachers might be an integral part of the community, possibly even relatives. Thus, poachers might even hold a certain degree of influence over the potential informer, which would discourage people from engaging in reporting poaching. The realization of what would happen to prosecuted poachers, and the possibility of retaliation by the poacher, or other risks associated with reporting, might have increased people’s fear, and thus decreased confidence in being able to report poaching. People arguably chose what behaviors to avoid to maintain certain social relational patterns (Douglas & Wildavsky, 1983); in this

particular case, in order to continue a peaceful life in their village communities, perhaps people may have been influenced by fear of retaliation from convicted poachers and/or their families, or even fear of being ostracized by their own community for reporting, rather than fear of the depletion of future food supplies or perhaps even fear of being considered by authorities collaborators of poachers for not reporting. Finally, the SMC clearly demonstrated what types of hunting activities were considered legal, and which ones were considered poaching; it is possible that villagers themselves were thus reminded that some of their own activities had in fact been poaching. This realization might also have acted as added barrier to reporting poaching, and affected decreases in perceived ability to report poaching during post-survey.

Additional, more tangible factors might have presented as potential barriers only after the SMC. For example, reporting poaching anonymously via telephone hotline may not have been perceived as anonymous by the potential informer; the fear of being recognized by voice by the person answering the telephone, or else fear of being overheard by other villagers while making the informing phone call might have contributed to people's decreased confidence in being able to report poaching if they wanted to. Also, introducing the telephone hotline itself might have presented a new, hitherto unknown, barrier to reporting poaching. During our surveys, it became apparent that cell phone reception in this remote area was problematic, as telephone service was not always available due to bad weather or distance from nearest cell tower. Furthermore, many people did not have a cell phone (land lines being unheard of in these parts of Laos), and those who did were challenged with keeping their

phones charged, as electricity was not generally available in every village. Before the introduction of the hotline, occasional reports on poaching had occurred in person, and thus not anonymously, at either the district offices for agriculture and forestry, or for environment and natural resources, or at the police station in the district's capital, or else on the occasion that any one of these agencies' representatives visited the village. Visiting the district's capital, however, usually involved a 1-6-hour hike, or else a 10-90 minute motorcycle ride for those villages connected by road. Such visits thus represented a significant time commitment and possibly transportation-related expenses. However, while we hoped to have removed these initial barriers to reporting poaching by introducing the hotline, it appeared that different barriers were now in place.

Similar to the treatment area, people in the control area also appeared to perceive greater barriers to reporting poaching during the post-survey, compared to pre-survey. While people had been confident being able to report poaching initially, they were not sure anymore during post-survey. Here, similar to what was described above, some aspect of SMC might have reached the control area, due to interpersonal communication among people, thus perhaps influencing changes in barrier perception, much like they may have influenced changes in attitudes as discussed above. It appears people felt less confident reporting poaching as they learned more about issues relating to poaching, and consequences of reporting poachers. In addition, in the light of continuing increased police presence in the control area, as well as recent investigations into illegal logging by special delegations, it was not surprising that villagers' confidence to report poaching appeared affected. The presence of outsiders,

with greater perceived or actual power than that held by villagers themselves, possibly discouraged villagers from reporting anything, least of all illegal activities potentially involving some of their own people. Given Lao's more recent history, people in remote areas might remain cautious regarding outsiders.

## BEHAVIORAL CHANGE

Given the above discussions, it was not surprising that the SMC did not produce the expected increase in reporting-poaching behavior. Instead, during the months following the SMC, people's self-described poaching-reporting frequency significantly decreased (from 'rarely' down to almost 'never' reported) in the treatment area. At the same time, results from the control area reflected my expectations; no change in reporting-poaching behavior occurred.

It is possible that overall poaching rates might have actually declined in the treatment area between pre- and post-survey, and consequently fewer reports of poaching had occurred; during SMC, it was clearly demonstrated what types of hunting activities were considered poaching, hence reminding villagers of correct hunting practices. The SMC slogan, 'hunt for food, not for extirpation,' had illustrated how observing hunting laws was in the interest of villagers' future food supply, and thus perhaps enticed villagers to better comply with such laws. However, this statement remains speculative, as there were no data available on poaching rates in the area, nor other means of determining the extent of poaching.

The more likely explanation for the observed decline in poaching-reporting in the treatment area was that the SMC itself affected the observed decrease in reporting, perhaps associated with the increased perceived barriers discussed above. Since perceived personal risk might have been among these barriers, it was perhaps to be expected that reporting poaching behaviors further decreased; O'Connor et al. (1999) argued risk perception might serve as predictor for people's inclination to change behavior. Supporting this argument perhaps was that, in the treatment area only, people from smaller families (and thus smaller social networks) reported poaching less frequently after SMC, compared to before, possibly because they realized during SMC the consequences and potential risks of reporting poaching. At the same time, people from larger families did not change their reporting-poaching behavior, perhaps because they perceived fewer risks associated with reporting, as their larger social network might afford protection against possible retaliation from poachers.

The fact that poaching-reporting behavior did not change in the control area, where no SMC was applied, also supported the argument that the SMC might have affected declines of poaching-reporting in the treatment area. In fact, these results might support the notion of interpersonal communication having carried the SMC message into the control area as suggested earlier, where, in the form of second-hand information (that is, word of mouth), it might have affected the observed decrease in attitudes and increase in barrier perception similar to the treatment area. A counter-argument to this is that reporting-poaching behavior appeared unaffected by interpersonal communication: the observed decrease in reporting-poaching rates in the treatment area did not carry into the control area. However, one might argue that the

added police presence in the control area suppressed any desire to further decrease reporting-poaching rates (which had been lower initially than in the treatment area), so as not to appear uncooperative with law-enforcement personnel. Thus, the set of perceived barriers might have differed between treatment and control areas, consequently affecting a decrease of reporting-poaching behavior in the former, but no behavior change in the latter.

Some authors (Heberlein, 2012; McKenzie-Mohr, 2000) argued that because behaviors can be quite specific, interventions to change a certain behavior in the desired direction should be quite specific as well; however, as the present study perhaps demonstrated, interventions might actually affect behavior changes in the opposite direction of what was intended, regardless of specificity. In this study, a detailed demonstration of hunting legality issues coupled with information on what would happen to convicted poachers did not entice people to report poachers more frequently, but instead reporting decreased, possibly because people realized that some of their own activities inadvertently qualified as poaching. The social sciences have debated for several decades whether any particular approach really influences behavior, or else whether or not such influences really can be adequately measured. For example, in commercial marketing, success is indicated by sales indices; by contrast, in the complicated world of wildlife conservation, it is always challenging to measure whether the SMC truly influences a specific behavior change, in this case reporting poaching (Baruch-Mordo et al., 2011; Briceño-Linares et al., 2011). In addition, the specific type of behavior needs to be taken into account when assessing behavioral change, including whether or not the behavior is easy to engage in, if it is

safe to engage in, and the cost of engaging in the particular behavior (McKenzie-Mohr, 2000). These factors likely complicate the process of changing ‘reporting poaching behavior’; while it may be relatively easy to engage in reporting-poaching behavior, the potential risks of reporting poaching (such as, for example, facing repercussions from the poacher or his family), only made visible by the SMC, may outweigh the benefits (here, receiving 30% of the convicted poacher’s fine).

## OVERALL DISCUSSION

Based on Rare’s TOC model regarding this case, I did not demonstrate SMC application affecting an increase in knowledge, nor could changes in attitudes be attributed to the SMC, as these changes also occurred in the control area. Barriers also were not sufficiently addressed during SMC to induce people engaging more frequently in reporting-poaching behavior, but instead may have further increased barrier perception; this may have led to a decrease of actual reporting-poaching behavior. Thus, the link between Rare’s TOC constructs was not demonstrated, which might be attributed to certain weaknesses of SMC implementation, or else might be due to the TOC itself presenting an insufficient model for this particular study system.

As it were, the SMC scope might have been too limited, both topically as well as temporally, to effectively target reporting poaching behavior changes. The one-time SMC application appeared to have engaged people sufficiently to raise awareness regarding poaching-related issues, but insufficiently to address additional concerns that might have emerged only during SMC application, or else afterwards as a result of interpersonal communication among villagers.

Previous studies have indicated that SMC impacted knowledge, attitude and interpersonal communication along with barrier removal, which ultimately led to behavior change (Day et al., 2014; DeWan et al., 2013). In the present study, the SMC did not affect the hypothesized increase in conservation behavior, here reporting poaching behavior, as had been the case in similar studies in Lao PDR (Saypanya et al., 2013; Vannalath 2006). In fact, since the concept ‘behavior change’ in the TOC model follows only after the other constructs ‘knowledge’, ‘attitude’, and ‘barrier removal’, according to the TOC model, a change in behavior would only be expected if these prior concepts also had changed in the desired direction. Without demonstrated SMC effect on knowledge, attitudes, and barrier removal, target audiences might not be moved towards action (Fox & Kotler, 1980; but see Heberlein, 1974), in this case, changing their conservation-related behaviors. However, perhaps the TOC in itself is insufficient to adequately address all factors influencing individual behavior; it might be too simplistic to assume only knowledge and people’s attitudes and their perception of barriers affects behavior. Some of the constructs included in the TPB model might address additional drivers of behavior, such as normative beliefs and subjective norm (that is, a person’s perception of how others in their community view and consequently support, or oppose, his/her behavior) (see Chapter 2 of this dissertation). Furthermore, interpersonal communication was not as such assessed in this study, due to lack of valid data, and may well have contributed to behavioral decision-making.

Aside from these purely cognitive approaches, however, Heberlein (1974) argued there might be other approaches, such as technological or structural, to

influence behavior. Given that behavior change is a long-term process other approaches may need to be considered, either as an alternative to SMC application, or else in addition to improved SMCs, fine-tuned based on results from previous results, before measurable behavioral changes might be affected (St John et al., 2011; St John et al., 2014; Steinmetz et al., 2014). Such approaches might include, among others, (1) improving and expanding government policy on reporting poaching (currently, specific regulations pertaining to penalizing poaching are lacking in many countries, including Laos) (Baruch-Mordo et al., 2011; Briceño-Linares et al., 2011; Jacquet & Pauly, 2007; McMullan & Perrier, 2002), (2) focusing incentives on social relationships and loyalties, addressing levels of trust within the immediate community (Knapp et al., 2010), and (3) addressing levels of trust regarding the person receiving such reports (Hastings & Saren, 2003). (In the case of NEPL, it was government officers, who received poaching reports and subsequently initiated action; thus, it was up to these officers to maintain anonymity of informants, or else informants might face potential repercussions from poachers.) Additional approaches to be considered before behavioral changes may occur include adjusting the specific topics addressed by the SMC (Johnson et al., 2006), (4) change SMC's target behavior (Heberlein, 2012; McKenzie-Mohr, 2000), and potentially (5) adjust SMC mechanisms, including intensity and time-frame of the campaign, repetitions, and means of delivering the message (Baruch-Mordo et al., 2011). These approaches are discussed in greater detail below.

The lack of specific government policy on reporting poaching may influence the effectiveness of social marketing itself (Baruch-Mordo et al., 2011; Briceño-

Linares et al., 2011; Jacquet & Pauly, 2007; McMullan & Perrier, 2002). For example, it is unclear who or what government agency should receive reports about poaching, and/or how such reports should subsequently be followed up, and how reported poachers should be dealt with, including their immediate handling and ultimate punishment. Furthermore, there are no general regulations pertaining to the potential benefits to the informer from reporting poaching, as incentives to offset possible risks to the informer. Again, the decrease in poaching-reporting frequencies in the treatment area might have been a consequence of a perceived barrier increase; as specific information pertaining to the punishment of poachers, as well as pertaining to the potential rewards for informants, was disseminated during SMC, villagers only then might have weighed poaching-reporting benefits against costs, potentially ultimately regarding costs more important. Prior to SMC application in the treatment area in November 2014, there was no concrete commitment from concerned government agencies regarding their contribution to address poaching. Kennedy (2010) suggested social marketing techniques could be used to enhance people's adhering to environmental regulations. In other words, the SMC might be useful in disseminating relevant information about conservation-related laws to target audiences, and consequently facilitate changes in conservation behavior.

Social relationships and loyalties, and addressing levels of trust within the immediate community, may also have played a role in how SMC affected behavior change. The study was conducted in two comparatively remote areas, where villagers in general may have been more dependent on their close social networks. While the

SMC offered compensation to people who reported poaching (where such reports lead to arrests or confiscations), this potential benefit might have been outweighed in the minds of participants by the potential costs of being an informant on members of their social communities in settings, where there were fewer informants than non-informants. Ruttan (1998) argued if conformity were an important part of socialization, then individuals in such a society would have adopted a cooperative stance, in my study not-reporting poaching. Ruttan (1998) further argued that, as a result of such cooperation, specific 'local cultures' would have developed that helped the community to persist, and that such 'local cultures' could actually include both aspects that support individuals' interests or else go against individuals' interests. This may also help explain why in the current study I was unable to reproduce results from a previous study (Saypanya et al., 2013) in another, less remote location of the same protected area, NEPL NPA in Laos; here, study villages were located closer to NPA headquarters in a town at the edge of the NPA, and thus local cultures typical for isolated communities may have been less pronounced. In my study area, SMCs only just introduced the idea of reporting poaching, which would thus have represented a novel behavior in the area, while hunting (including poaching) constituted a long-practiced behavior in the study villages. Consequently, becoming an informer would stamp the informing individual as 'cultural outsider' in his own society, and should thus occur less frequently; according to Ruttan (1998) this should hold true regardless of whether or not individuals were actually interested in reporting poaching. It appears that SMCs alone may not be able to address, in reasonable time and within certain budget restrictions, all aspects of such perceived barriers to reporting poaching.

In addition, potential informants themselves might consider whether their own hunting practice fell under the poaching category (Knapp et al., 2010). As Smith (2006) pointed out, all behaviors compete with other behaviors to provide benefits to an individual. In the present study, poachers might demonstrate benefits gained from poaching, which in turn might entice others, who have been watching poachers, to turn their attention from reporting poaching to actually becoming poachers instead (Wiener & Doescher, 1991). Most people in the area were farmers, after all, and as such responsible to grow, or obtain by other means, resources for subsistence. In this light, benefits potentially gained from engaging in poaching might thus outweigh benefits potentially gained from reporting poaching, as the former were more immediately tangible. Socio-economic factors might thus have to be addressed first, in order to inform an effective SMC, and ultimately yield intended results (Buchthal et al., 2011), as it is clear that these factors are critical drivers for poachers and potential informants to take action.

Lack of trust of a person who handled the hotline telephone, and doubt regarding the actual launching of investigations following reporting, further might have presented a factor in lack of behavior change following the SMC. It was possible that even though some committed informants might have put effort into the reporting process (thus overcoming various barriers), they doubted that their reports would lead to any investigation, and thus/or not lead to conviction and consequent reward. Trust appeared to be the most important driver for informants to report poaching (Von Essen et al., 2015). In a previous study, one particular person in charge of the hotline number had demonstrated excellent conduct with informants, while at the same time actually

catalyzing the enforcement system. Thus, his efforts lead to the investigation of over 25 wildlife trade and poaching cases, and the subsequent conviction of perpetrators. His performance was exemplary in that his conduct was professional, and he maintained confidentiality of informants, thus gaining a reputation for trustworthiness that may have attracted additional informants (Saypanya et al., 2013). Arguably, the most important element to make the hotline number so well received was his reliability; an obvious indicator was that during his tenure on the job, no rumors emerged of informants not having received compensation after the conviction of poachers. It appeared that this officer, while maintaining anonymity of individual informants, managed to build strong trust-relationships with informant networks (Von Essen et al., 2015). Ahn and Ostrom (2008) emphasized that while individuals formed relationships this formation ultimately benefited smaller or larger groups (Ahn & Ostrom, 2008).

Another factor possibly having interfered with the expected increase in reporting behavior could have been the specific topic addressed by the SMC. For example, Johnson et al. (2006) reported the results of conservation interventions often depended heavily on what species was targeted during interventions. Furthermore, Clucas et al. (2008) documented that if a high-profile carnivorous species was identified as conservation target species, the species likely raised awareness, gained political support and attracted interest from donors, compared to species of lower profile. While tigers would thus lend themselves well to becoming the target species of a SMC in NEPL NPA, tiger conservation is very complex, as the species relies on large swaths of habitat, availability of prey, and lack of pressure from poaching,

among others (Johnson, 2013; Johnson et al., 2005; Johnson et al., 2012). Also, SMC effectiveness would be even more difficult to assess, as this species is much more rare in general. This would make monitoring population changes in this species very difficult, which could render it more difficult to convince people of the species' decline, and consequent need for human behavior change. Thus, the choice of species for SMC might affect changes in people's behaviors more than expected. In my study, there was no particular focus on any one species, but rather on all wildlife species generally eaten in the area. Perhaps a more specific focus on one particular species, such as for example the Sambar deer or else the muntjac, might have been more successful in bringing about a behavior change. A classic example of identifying a conservation target species for a successful Rare SMC was the Saint Lucia scarlet macaw (Butler, 1992), an attractive, conspicuous bird species the general public took an instant liking to. The applied SMC was so successful that the bird was subsequently endorsed as the national bird of Saint Lucia, and conservation programs have continued since (Butler, 1992). In contrast, in my study region, when I initially identified tigers as potential conservation target species, it brought to mind human-wildlife conflicts, taboos, and other local beliefs, which gave tigers a negative reputation, thus possibly precluding SMC's success from the start. The most important component of the successful SMC in Saint Lucia had been people's actual behavior, the target behavior of the SMC; people in Saint Lucia became personally engaged in protecting the scarlet macaw nests in order to help the birds reproduce chicks. This target behavior, while it required personal engagement, did not actually involve likelihood of danger. In my study in NEPL NPA in Laos, the actual target behavior of

the SMC was to convince local villagers to ‘report poaching’. There were two challenges associated with this target behavior; first, reporting-poaching behavior was very sensitive, potentially posing a risk to the person engaging in the behavior, or even potentially threatening the safety of the informants. Second, the target behavior necessitated that people first observed, or else knew about poaching; this in itself proved difficult, as poaching obviously happened in remote areas of the forest, where the average villager did not usually go during an average day. Thus, it was difficult for potential informants to actually observe poaching, which would have triggered subsequent reporting. Since perhaps there were few actual observations of poaching, or else few substantiated accounts of poaching activity, the resulting potential for reporting was low, and thus the actual reporting-behavior rare in my study overall.

Lastly, SMC mechanisms including intensity and time frame of the campaign, repetitions, and means of delivering the message might have a larger effect on SMC outcomes than first assumed. While continuity was one of the most important elements of a successful SMC (Baruch-Mordo et al., 2011), monetary-, time-, and other constraints often preclude such continuity in conservation. This appears especially true when considering SMC applications to address long-term behavior changes: there might not be an end in sight (Work Group for Community Health and Development, 2016). One might argue that a behavior change in the desired direction might thus be elusive for smaller-scale (temporal or else spatial) SMCs. However, given the results of the present study, it appears continued SMC application might actually add barriers on the way to changing conservation behavior, which revealed the need for fine-tuning the approach, or else adjusting the assessment tool. Merely repeating or extending the

existing SMC would not add anything to the cause, but its results could now be used to direct next stages of the long-term conservation effort in this important protected area in Laos. Since reporting poaching behavior did not increase after SMC application, alternate target behaviors could now be promoted. For example, a next step might be to focus on increasing people's knowledge of links between protecting wildlife species and villager's future food supply, and thus involving a greater part of the population in embracing stewardship of their natural resources for sustainability. This might, in time, lead to a new standard of accepted behavior in these villages, possibly even resulting in decreased poaching incidences. In marketing, advertising is one of the important elements (Aschemann-Witzel et al., 2012); here, too, assessing advertising-effectiveness is employed to direct future marketing strategies. Assessing people's perceptions regarding certain conservation-related issues, as was done in the present study, should direct future efforts. Conservation results might have to be pursued at many different levels simultaneously, and a change in people's behavior may not be achieved by direct route.

## CONCLUSION

The SMC carried out in two remote areas of NEPL NPA did not result in increased incidences of reporting poaching in the area, but instead might have decreased them. In the present study, the SMC appeared to have failed, possibly due to limited temporal and topical scope, in aligning knowledge, attitudes, and perceived barriers, a prerequisite to changing people's conservation behavior, according to Rare's TOC. In pursuing the overall conservation goal of reducing poaching, conservation managers in NEPL NPA may have to incorporate into future anti-

poaching campaigns two complementary strategies, (1) improve on SMC approaches, and simultaneously (2) employ alternative approaches to curb poaching.

While the results of my study did not necessarily endorse further SMC application, I argue that there are few alternatives to campaigning in the continued pursuit of conservation goals. Perhaps the next step towards reducing poaching in NEPL NPA should be to adjust the scope of campaigns according to results of this study. While it may be too much to expect poaching-reporting behavior to become the social norm in these environs any time soon, campaigns could aim at fostering a community-spirit of actively reducing poaching, thus perhaps making it socially less acceptable to poach. Specific SMC improvements should also include campaign repetitions over relatively short periods of time, and involve various means of information dissemination. At the regional level this could involve pro-conservation advertisements repeatedly broadcast via mass media, such as radio channels, whereas at the local level people could be more personally targeted, for example through anti-poaching concerts involving locally popular artists carrying the SMC message.

As for SMC-alternatives to curb poaching, approaches might include increasing interpersonal communication among villagers on topics regarding poaching. This could be achieved by, for example, facilitating village meetings to discuss in a safe and trust-building setting matters of wildlife decline, hunting and poaching, or else by devising and dispersing in villages books that foster environmental stewardship. Additionally, village economies could be improved through agroforestry livelihood incentives (for example, saffron or coffee), to alleviate

the need for poaching as a means for generating income. Lastly, perhaps through existing village governance structures, NPA managers might motivate villages to take ownership of conservation incentives, by setting up ‘village conservation councils’ that serve as a communication focal point for conservation issues within villages, as well as between villages and NPA managers. Simultaneously, at the national level, NPA managers must continue lobbying policy-makers to include into the national agenda conservation issues such as eliminating poaching, both by creating/reforming conservation laws, as well as strictly enforcing these in the field. Addressing these issues is likely a prerequisite to achieving observable changes in people’s conservation behaviors in the future, and will certainly require continued and possibly increased interaction between villagers and NEPL NPA managers.

CHAPTER FOUR  
USING THE THEORY OF PLANNED BEHAVIOR TO UNDERSTAND  
REPORTING POACHING BEHAVIOR

INTRODUCTION

The persistent, rapid decline and extinction of species across the world has forced conservation practitioners to examine the effectiveness of species conservation efforts (Kareiva & Marvier, 2011). Specific key drivers of the loss in wildlife species include habitat degradation, unsustainable land use and harvest practices, and illegal behaviors (Schultz, 2011). One of the most significant of these drivers is poaching, influenced by contextual factors including cultural traditions, economic factors (for example market-pull for Chinese traditional medicines), human – wildlife conflict, and other factors (Briceño-Linares et al., 2011; Burgess, 2011; John et al., 2014; Liu et al., 2011; Singh, 2008; Travers et al., 2010; Treves & Karanth, 2003). Poaching is not only a key threat to wildlife populations (O’Kelly et al., 2012, Robichaud et al., 2010; Steinmetz et al., 2014, Vongkhamheng, 2011), but also to biodiversity overall (Borchers et al., 2014, Brickle et al., 2008; Duckworth et al., 2012; Eliason, 2008, Haines et al., 2012, Hansel, 2004, Walston et al., 2010), as well as a key threat to local livelihoods (Johnson et al., 2010; Johnson et al., 2012). Studies from Laos, for example, indicated that the Nam Et – Phou Louey National Protected Area (NEPL NPA) provided sources of protein to people living inside and around NEPL NPA, who depended on the park for as much as 50% of household meat consumption (Johnson et al., 2010, Krahn & Johnson, 2007). Given this interrelation—both the impacts of poaching on wildlife populations and its impact on livelihood security, as well as the

potential role of local communities in poaching itself—engaging local people who are using wildlife in multiple ways is a key strategy for combating poaching (Steinmetz et al., 2014).

While a number of studies have looked at the killing of wildlife and its impacts, only a few studies have applied social science based theoretical frameworks to understanding these dynamics. St John et al. (2013) argued strongly for the systematic application in conservation science of solid theoretical frameworks and empirical foundations to help understand and predict human behaviors. More specifically, they described that researchers and conservationists needed to understand three components, namely livelihood, biodiversity, and natural resources and their supply and use, when attempting to more accurately predict human behavior (St John et al., 2013). As an example of studies that have used theoretical frameworks, Marchini and Macdonald (2012) developed and applied a framework based on the Theory of Planned Behavior (TPB) to understand ranchers' intentions to kill jaguars in South America. Their findings indicated that various factors together drove ranchers' intentions to kill jaguars, and the relative importance of these factors varied with region and affluence. In another study, Liu et al. (2011) also applied TPB, in this case to investigate bear poaching in China; here, poaching behaviors were analytically separated from other social behaviors related to reporting on poachers to law enforcement agencies.

Behaviors related to reporting on poaching to law enforcement agencies by local people to authorities are a particularly important aspect of research that may

inform better conservation practice. This is so for two reasons. First, residents local to the areas where poaching is occurring often have a more detailed understanding of these behaviors and, second, poaching by a limited number of individuals has broader social repercussions on local communities (given livelihood dependence on wild animals for subsistence), providing possible incentives to report. Moreover, where local community members may be mobilized to monitor and report on poaching in their community, this may increase the risks for poachers and exert social pressure on poachers, possibly encouraging conversion to legal hunting behaviors. Despite these possible advantages, poaching and the prospect of local involvement in reporting poaching to local authorities is complicated, requiring a nuanced approach to the application of existing behavioral theories and to its analysis.

In this research, I applied the TPB to understand factors that might predict poaching reporting behaviors. This study was conducted in collaboration with the Wildlife Conservation Society and Rare (another non-profit conservation organization), which used a social marketing campaign in an attempt to influence poaching behavior in Laos. Although the social marketing campaign did not directly invoke TPB, its theory of change incorporates a number of key constructs included in TPB (e.g., attitudes, behavioral intention). Also, the TPB has demonstrated consistency across multiple studies in predicting behavioral intentions, if not behaviors *per se*. The TPB might thus be used as a theoretical framework and tool in investigating factors that predict and improve understanding of reporting poaching behavior, or at least intention to report.

## THEORY OF PLANNED BEHAVIOR

The TPB is used to predict deliberate, planned behavior. According to the TPB when sufficient time is provided for people to plan how they are going to behave, the best predictor of the behavior is intention (Ajzen, 2012). The TPB consists of the following constructs (see Figure 1): *attitude* toward a behavior (hereafter, attitude), which is supported by *behavioral beliefs*; *subjective norm*, which is supported by *normative beliefs*; and *perceived behavioral control*, which is supported by *control beliefs* (Ajzen, 1991). *Intention* to engage in a behavior can in turn be predicted by *behavioral beliefs*, *normative beliefs*, and *control beliefs*, and should in turn predict *behavior*. These constructs are briefly described below (see Chapter 2 of this dissertation for full descriptions of TPB constructs).

## RESEARCH QUESTIONS

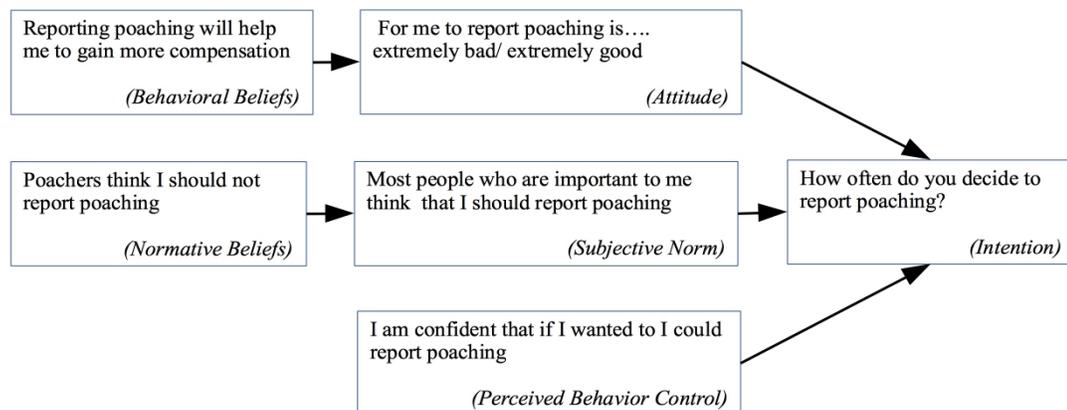
In this Chapter I explore the relationships among TPB constructs, represented by questions from an existing survey, and the influence of these constructs on intention to report poaching. Intention itself was assessed by the survey question ‘*How often do you decide to report poaching?*’ In this way, I contributed to the understanding of TPB’s potential for further application in the conservation field.

To understand intention to report poaching, I framed my research questions as below (also see Figure 6):

1. What is the effect of behavioral beliefs towards reporting poaching on attitude to poach?

2. What is the effect of normative beliefs towards poaching on subjective norm to report poaching?
3. What is the effect of attitude towards poaching on intention to report poaching?
4. What is the effect of subjective norm towards reporting poaching on intention to report poaching?
5. What is the effect of perceived behavioral control towards reporting poaching on intention to report poaching?

Figure 6. Research questions based on TPB construct relationships.



## METHODS

### STUDY SITE: NAM ET – PHOU LOUEY NATIONAL PROTECTED AREA

This research was carried out in the NEPL NPA, especially in Phonethong district, Luang Prabang province (see Chapter three of this dissertation for full descriptions of Lao PDR and the study site).

## DATA COLLECTION

The survey was conducted during July 2014, in 20 of the 41 research area villages in Phonethong district, Luang Prabang province (see Figure 7). Criteria for including villages is fully described in Chapter three of this dissertation and see Chapter three of this dissertation for full descriptions of data collection). (see APPENDIX 1).

Figure 7. Distribution of 20 surveyed villages in the research area (Phonethong district, Luang Prabang province) in NEPL NPA, Lao PDR (Sources: Wildlife Conservation Society – Lao PDR Program).

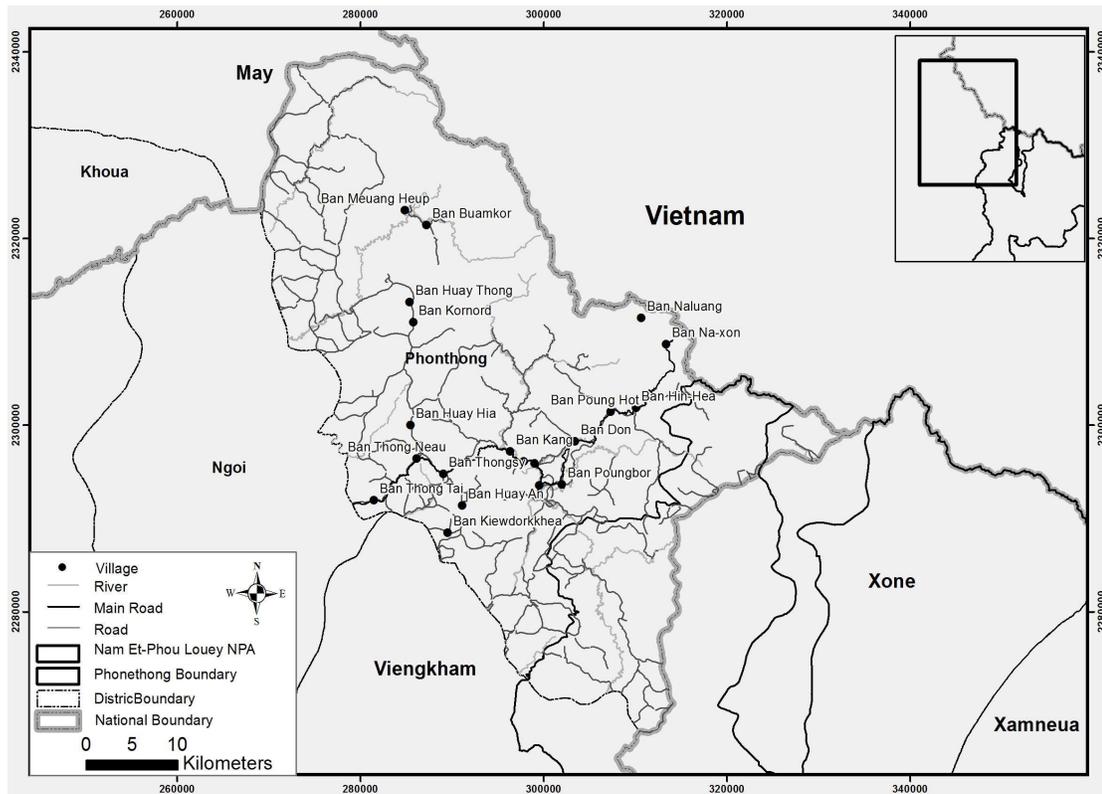


Table 6. Survey questions pertaining to TPB constructs

TPB constructs	Survey Question	Likert-scale response options (1 - 5)
1. Behavioral belief	<i>'Reporting poaching will help me to gain more compensation'</i>	1 (extremely unlikely) - 5 (extremely likely)
2. Attitude	<i>'For me to report poaching is bad/good?'</i>	1 (extremely bad) - 5 (extremely good)
3. Normative belief	<i>'Poachers think I should not report poaching'</i>	1 (extremely unlikely) - 5 (extremely likely)
4. Subjective norm	<i>'Most people who are important to me think that I should report poaching'</i>	1 (extremely false) - 5 (extremely true)
6. Perceived behavioral control	<i>'I am confident that, if I wanted to, I could report poaching'</i>	1 (extremely false) - 5 (extremely true)
7. Intention	<i>'How often do you decide to report poaching?'</i>	1 (very rarely) - 5 (very often)

#### DATA ANALYSIS

I used statistical software (SPSS version 20.0) to analyze data directly exported from the iSurvey system. First, a frequency table was constructed to summarize respondents' distributions across genders, ethnicities, and family sizes (the general population characteristics). Second, I investigated potential differences in responses between genders, and among members of different ethnicities, and family sizes, using 1-way ANOVAs on mean response-scores to survey questions representing the different TPB constructs. Third, the effects of specified TPB constructs on other TPB constructs, as stated under 'research questions', were analyzed overall, via bivariate Pearson correlation procedure on response-scores to the research questions described earlier. Where answers differed among respondent-subgroups, such as among ethnic groups, genders, etc., (as determined by 1-way ANOVAs, see above), bivariate

Pearson correlation procedures were repeated separately for each of these subgroups to investigate subgroup effects on research questions of TPB construct relationships.

## **RESULTS**

### **GENERAL POPULATION CHARACTERISTICS**

A total of 378 people were interviewed. The interviewees included 199 males (52.6%) and 179 females (47.4%), from three ethnic groups: Hmong (n= 101, 26.7%), Khmu (n= 86, 22.8%), and Lao Loum (n= 191, 50.5%). Interviewees' age distribution in the research area was as follows: 124 (32.8%) were between 15 - 29 years old, 160 (42.3%) were between 30 - 44 years old, and 94 (24.9%) were between 45 - 55 years old. Family sizes in the research area ranged from 1 - 4 people (n= 187, 49.5%), to 5 - 8 people (n= 145, 38.4%), and 9 and more people (n= 46, 12.2%) (see Table 7).

### **RESPONSES TO TPB CONSTRUCT QUESTIONS**

Overall responses (n= 378) to questions representing different TPB constructs are summarized in Table 8. Where population characteristics (such as ethnicities, family sizes, etc.) affected overall results, separate response-scores are listed for relevant subgroups (see Table 7).

Behavioral beliefs of people in general were that they believed it was somewhat unlikely that reporting poaching would help them gain compensation ( $\bar{M}$ = 2.6 on a 5-point Likert scale, where 1 meant 'extremely unlikely', and 5 'extremely likely') (see Table 8). This was true regardless of respondent's gender and age (see Table 7). Ethnicity and family size both affected behavioral beliefs ( $F_2$ = 3.82,  $p$ =

0.023, and  $F_2= 3.49$ ,  $p= 0.031$ , respectively). Hmong considered it unlikely ( $\bar{M}=2.2$ ) that reporting poaching would gain them compensation, while Khmu's response was neutral ( $\bar{M}= 2.9$ ) (Tukey  $p= 0.017$ ). Similarly, people from small families (1-4 persons) considered it unlikely ( $\bar{M}=2.3$ ) that reporting poaching would gain them compensation, while people from  $\geq 9$  person-families gave a neutral response ( $\bar{M}=3.0$ ); however this overall statistically significant difference could not be detected by specific post-hoc analysis (Tukey  $p= 0.054$ ).

Table 7. Respondents' characteristics and response-scores for TPB constructs

Population characteristic		N (%)	1.Behavioral beliefs	2.Attitude	3.Normative beliefs	4.Subjective norm	6. Perceived behavioral control	7. Intention
			Mean (SD)	Mean (SD)				
Gender	Male	199 (52.6)	2.7 (1.83)	2.5 (1.88)	3.8 (1.73)	3.0 (1.91)	3.5 (1.83)	1.8 (1.48)
	Female	179 (47.4)	2.4 (1.71)	2.4 (1.81)	3.8 (1.70)	2.5 (1.81)	3.5 (1.84)	1.9 (1.57)
ANOVA results:			$F_1= 1.99$ $p= 0.159$	$F_1= 0.41$ $p= 0.521$	$F_1= 0.04$ $p= 0.851$	$F_1= 8.64$ $p= 0.003^*$	$F_1= 0.06$ $p= 0.808$	$F_1= 0.43$ $p= 0.515$
Ethnicity	Hmong	101 (26.7)	2.2 (1.65)	2.3 (1.74)	4.3 (1.45)	2.8 (1.89)	3.5 (1.80)	1.7 (1.36)
	Khmu	86 (22.8)	2.9 (1.78)	2.4 (1.86)	3.7 (1.75)	2.9 (1.93)	3.3 (1.85)	2.1 (1.6)
	Lao Loum	191 (50.5)	2.6 (1.82)	2.6 (1.89)	3.7 (1.78)	2.6 (1.86)	3.6 (1.84)	1.9 (1.53)
ANOVA results:			$F_2= 3.82$ $p= 0.023^*$	$F_2= 0.62$ $p= 0.538$	$F_2= 4.22$ $p= 0.015^*$	$F_2= 1.02$ $p= 0.363$	$F_2= 0.91$ $p= 0.405$	$F_2= 1.46$ $p= 0.233$
Age	15-29 yrs	124 (32.8)	2.5 (1.77)	2.5 (1.87)	3.8 (1.77)	2.7 (1.90)	3.5 (1.85)	1.9 (1.53)
	30-44 yrs	160 (42.3)	2.4 (1.75)	2.3 (1.79)	3.8 (1.67)	2.7 (1.86)	3.6 (1.82)	1.8 (1.49)
	45-55 yrs	94 (24.9)	2.9 (1.82)	2.6 (1.91)	4.0 (1.65)	3.0 (1.91)	3.4 (1.85)	1.9 (1.56)
ANOVA results:			$F_2= 1.82$ $p= 0.163$	$F_2= 0.69$ $p= 0.502$	$F_2= 0.37$ $p= 0.694$	$F_2= 0.76$ $p= 0.468$	$F_2= 0.20$ $p= 0.821$	$F_2= 0.15$ $p= 0.861$
Family size	1-4 pers	187 (49.5)	2.3 (1.79)	2.1 (1.72)	4.1 (1.60)	3.1 (1.92)	3.3 (1.90)	1.9 (1.60)
	5-8 pers	145 (38.4)	2.7 (1.72)	2.8 (1.89)	3.6 (1.77)	2.4 (1.79)	3.7 (1.78)	1.9 (1.36)
	$\geq 9$ pers	46 (12.2)	3.0 (1.82)	2.9 (1.88)	3.5 (1.80)	2.6 (1.83)	4.1 (1.66)	1.6 (1.29)
ANOVA results:			$F_2= 3.49$ $p= 0.031^*$	$F_2= 8.96$ $p< 0.001^*$	$F_2= 5.32$ $p= 0.005^*$	$F_2= 6.16$ $p= 0.002^*$	$F_2= 4.20$ $p= 0.016^*$	$F_2= 1.10$ $p= 0.335$

<sup>1</sup>Behavioral belief: 'reporting poaching will help me to gain more compensation' (1= extremely unlikely/ 5= extremely likely)

<sup>2</sup>Attitude: 'For me to report poaching is bad/good?' (1= extremely bad/ 5= extremely good)

<sup>3</sup>Normative belief: 'Poachers think I should not report poaching' (1= extremely unlikely/ 5= extremely likely)

<sup>4</sup>Subjective norm: 'Most people who are important to me think that I should report poaching' (1= extremely false/ 5= extremely true)

<sup>6</sup>Perceived behavioral control: 'I am confident that, if I wanted to, I could report poaching' (1= extremely false/ 5= extremely true)

<sup>7</sup>Intention: 'How often do you decide to report poaching?' (1= extremely rarely/ 5= extremely often)

Attitudes of respondents in general were slightly negative towards reporting poaching ( $\bar{M}$ = 2.5 on a 5-point Likert scale, where 1 represents ‘extremely bad’, and 5 ‘extremely good’) (see Table 7). This held true regardless of respondents’ gender, ethnicity, and age (see Table 8). However, family size affected respondents’ attitudes ( $F_2= 8.96, p< 0.001$ ); while people from small families (1-4 persons) regarded reporting poaching bad ( $\bar{M}$ = 2.1), people from larger families (5-8, as well as  $\geq 9$  persons) held more neutral attitudes regarding reporting poaching ( $\bar{M}$ = 2.8, and  $\bar{M}$ = 2.9 respectively) (Tukey  $p< 0.001$ , and  $p= 0.010$ , respectively).

Table 8. Overall (n= 378) mean response scores to questions representing TPB constructs behavioral beliefs, attitude, normative belief, subjective norm, perceived behavioral control, and intention.

TPB constructs	Survey Item	Mean	Std. Deviation
1. Behavioral belief	<i>‘Reporting poaching will help me to gain more compensation’</i>	2.6	1.78
2. Attitude	<i>‘For me to report poaching is ... bad/good?’</i>	2.5	1.84
3. Normative belief	<i>‘Poachers think I should not report poaching’</i>	3.8	1.71
4. Subjective norm	<i>‘Most people who are important to me think that I should report poaching’</i>	2.8	1.89
6. Perceived behavioral control	<i>‘I am confident that, if I wanted to, I could report poaching’</i>	3.5	1.83
7. Intention	<i>‘How often do you decide to report poaching’</i>	1.9	1.52

<sup>1</sup>Behavioral belief: ‘reporting poaching will help me to gain more compensation’ (1= extremely unlikely/ 5= extremely likely)

<sup>2</sup>Attitude: ‘For me to report poaching is bad/good?’ (1= extremely bad/ 5= extremely good)

<sup>3</sup>Normative belief: ‘Poachers think I should not report poaching’ (1= extremely unlikely/ 5= extremely likely)

<sup>4</sup>Subjective norm: ‘Most people who are important to me think that I should report poaching’ (1= extremely false/ 5= extremely true)

<sup>6</sup>Perceived behavioral control: ‘I am confident that, if I wanted to, I could report poaching’ (1= extremely false/ 5= extremely true)

<sup>7</sup>Intention: ‘How often do you decide to report poaching?’ (1= extremely rarely/ 5= extremely often)

Normative beliefs were that poachers likely thought they (the people) should not report poaching ( $\bar{M}$ = 3.8 on a 5-point Likert scale, where 1 meant ‘extremely unlikely’, and 5 ‘extremely likely’) (see Table 8). Gender and age did not affect normative beliefs, however ethnicity and family size did have an effect ( $F_2= 4.22$ ,  $p= 0.015$ , and  $F_2= 5.32$ ,  $p= 0.005$ , respectively) (see Table 7). Hmong were more in agreement with the statement *poachers think people should not report poaching* ( $\bar{M}$ = 4.3) compared to Khmu ( $\bar{M}$ = 3.7) (Tukey  $p= 0.017$ ). Similarly, people from small families (1-4 persons) were more in agreement with the statement *poachers think people should not report poaching* ( $\bar{M}$ = 4.1), compared to people from families of 5-8 persons vs ( $\bar{M}$ = 3.6) (Tukey  $p= 0.012$ ; see Table 7).

Respondents’ views on the subjective norm item suggested they believed that people important to them probably did not want them to report poaching ( $\bar{M}$ = 2.8 on a 5-point Likert scale, where 1 represented ‘extremely false’, and 5 ‘extremely true’) (see Table 8). This was true regardless of respondents’ ethnicity and age (see Table 7). However, gender and family size affected the subjective norm ( $F_1= 8.64$ ,  $p= 0.003$ , and  $F_2= 6.16$ ,  $p= 0.002$ , respectively; see Table 7). While women thought people important to them perhaps did not want them to report poaching, men gave a neutral response, ( $\bar{M}$ = 2.5 vs.  $\bar{M}$ = 3.0,  $p= 0.003$ ). Similarly, while respondents from 5-8 person families thought people important to them perhaps did not want them to report poaching ( $\bar{M}$ = 2.4), people from small families (1-4 persons) gave a neutral response ( $\bar{M}$ = 3.1) (Tukey  $p= 0.002$ ) (see Table 7). Responses from members of  $\geq 9$  person families ( $\bar{M}$ = 2.6) were similar to those of medium size families and not statistically

significantly different from small families' responses (Tukey  $p > 0.05$ ).

Perceived behavioral control scores indicated that respondents overall were somewhat confident in their ability to report poaching if they wanted to ( $\bar{M} = 3.5$  on a 5-point Likert scale, where 1 represented 'extremely false', and 5 'extremely true') (see Table 8). Gender, ethnicity, and age did not affect perceived behavioral control; however, family size did have an effect ( $F_2 = 4.20$ ,  $p = 0.016$ ) (see Table 7). People from small families (1-4 persons) were only somewhat confident about their ability to report poaching, while people from larger families ( $\geq 9$  persons) were quite confident ( $\bar{M} = 3.3$  vs  $\bar{M} = 4.1$ ; Tukey  $p = 0.023$ ).

People's intention to report poaching was reflected in their overall response; they rarely decided to report poaching ( $\bar{M} = 1.9$  on a 5-point Likert scale, where 1 represented 'extremely rarely', and 5 'extremely often') (see Table 8). This held true regardless of respondents' gender, ethnicity, age, and family size (see Table 7).

## RELATIONSHIPS BETWEEN TPB CONSTRUCTS: RESEARCH QUESTION RESULTS

### BEHAVIORAL BELIEFS AND ATTITUDE

There was a weak, positive, linear correlation between behavioral beliefs and attitude (Pearson's  $r = 0.25$ ,  $p < 0.001$ ) (see Table 9). This positive correlation indicated respondents who did not believe that they gained compensation from reporting poaching also considered reporting poaching bad or, vice versa, respondents who believed they gained compensation from reporting poaching also considered reporting

poaching good. There was no effect of gender, ethnicity, or age on this correlation (see APPENDIX 3), but family size affected results. Responses from people from larger families (5-8 and  $\geq 9$  persons) demonstrated a moderately strong correlation between behavioral beliefs and attitude (Pearson's  $r = 0.47$ ,  $p = 0.005$ , and  $r = 0.40$ ,  $p = 0.047$ ), whereas no correlation was evident in people from small families (1-4 persons) (see APPENDIX 3).

Table 9. Results from bivariate Pearson correlation analyses of effects of TPB constructs behavioral beliefs on attitude, normative beliefs on subjective norm, attitude on intention, subjective norm on intention, and perceived behavioral control on intention. (Asterisks \*\* and \* denote statistically significant results at  $p < 0.001$  and  $p < 0.05$ , respectively.)

	r	n	p
1. Behavioral Belief ' <i>Reporting poaching will help me to gain more compensation</i> ' on 2. Attitude ' <i>For me to report poaching is ... (bad/good).</i> '	0.245**	378	<0.001
3. Normative Belief ' <i>Poachers think I should not report poaching</i> ' on 4. Subjective Norm ' <i>Most people who are important to me think that I should report poaching.</i> '	0.197**	378	<0.001
2. Attitude ' <i>For me to report poaching is ... (bad/good)</i> ' on 7. Intention ' <i>How often do you decide to report poaching?.</i> '	0.05	378	0.334
4. Subjective Norm ' <i>Most people who are important to me think that I should report poaching</i> ' on 7. Intention ' <i>How often do you decide to report poaching?.</i> '	0.047	378	0.069
6. Perceived Behavioral Control ' <i>I am confident that if I wanted to I could report poaching</i> ' on 7. Intention ' <i>How often do you decide to report poaching?.</i> '	-0.104*	378	0.043

<sup>1</sup>Behavioral belief: 'reporting poaching will help me to gain more compensation' (1= extremely unlikely/ 5= extremely likely)

<sup>2</sup>Attitude: 'For me to report poaching is bad/good?' (1= extremely bad/ 5= extremely good)

<sup>3</sup>Normative belief: 'Poachers think I should not report poaching' (1= extremely unlikely/ 5= extremely likely)

<sup>4</sup>Subjective norm: 'Most people who are important to me think that I should report poaching' (1= extremely false/ 5= extremely true)

<sup>6</sup>Perceived behavioral control: 'I am confident that, if I wanted to, I could report poaching' (1= extremely false/ 5= extremely true)

<sup>7</sup>Intention: 'How often do you decide to report poaching?' (1= extremely rarely/ 5= extremely often)

## NORMATIVE BELIEFS AND SUBJECTIVE NORM

There was a weak, positive linear correlation between normative beliefs and subjective norm (Pearson's  $r = 0.197$ ,  $p < 0.001$ ) (see Table 9). Based on obtained mean response-scores for separate TPB constructs (see Table 7), the positive correlation here indicated higher normative belief values (response scores  $> 3$ ) were associated with more neutral subjective norm values (response scores = 3), whereas more neutral normative belief values were associated with lower subjective norm values (response scores  $< 3$ ). In other words, respondents who believed poachers likely did not want them to report poaching were unsure whether or not people important to them wanted them to report poaching, while respondents who were less certain about poachers' thoughts supposed people important to them might not want them to report poaching; however this relationship was very weak. There was no effect of age on this correlation (see APPENDIX 3), but gender, ethnicity, and family size affected results: men, Lao Loum, and people from larger families reflected overall results, while there was no correlation between normative beliefs and subjective norm in women, Hmong and Khmu, and people from small families (see APPENDIX 3).

## ATTITUDE AND INTENTION

Overall, there was no correlation between attitude and intention (Pearson's  $r = 0.05$ ,  $p = 0.334$ ) (see Table 9); the frequency of deciding to report poaching was unrelated to whether or not people viewed reporting poaching as bad. However, when looking at potential differences between genders, ethnicities, and family sizes, it

became apparent that certain differences existed between subgroups (see APPENDIX 3). There was a statistically significant, negative correlation between attitude and intention for people from 1-4 person families; these respondents decided less frequently to report poaching possibly because they also considered reporting poaching worse than respondents from largest families. Similarly, women, and Hmong also tended towards a negative correlation between attitude and intention, however this was not statistically significant ( $p= 0.058$ , and  $p= 0.050$ , respectively; see APPENDIX 3).

#### SUBJECTIVE NORM AND INTENTION

Subjective norm did not correlate with intention (Pearson's  $r= 0.047$ ,  $p= 0.069$ ) (see Table 9). In this context, people's perception of how others would support them, if they reported poaching, was unrelated to how often they decided to report poaching.

#### PERCEIVED BEHAVIORAL CONTROL AND INTENTION

There was a weak, negative, linear correlation between perceived behavioral control and intention (Pearson's  $r= -0.104$ ,  $p= 0.043$ ) (see Table 9). In this context, people who were very confident being able to report poaching if they wanted to also rarely decided to report poaching. The weakness of this correlation might have been due to the fact that women's perceived behavioral control did not correlate with intention.

#### DISCUSSION

Overall, the TPB provided an incomplete model for predicting behavioral

intention. Based on my data, behavioral beliefs related to attitude, normative beliefs related to subjective norm, and perceived behavioral control related to intention, whereas neither attitude nor subjective norm was correlated with intention. All relationships were weak at best.

The correlation analysis of behavioral beliefs and attitude investigated the relationship between people's views on the potential gains from reporting poaching, and how people generally viewed reporting poaching (bad or good). The weak, positive correlation between behavioral beliefs and attitude suggested people might have preserved a generally cautious outlook regarding the issue of reporting poaching; they considered reporting poaching somewhat bad, possibly because they did not believe in gains from reporting poaching outweighing the potential costs of possible retributions for having reported a poacher. This was also reflected in the analyses of single TBP constructs, where average responses of all interviewees suggested a positive relationship between behavioral beliefs and attitude. Interestingly, respondents from small families (1-4 persons) did not reflect this overall relationship: their behavioral beliefs and attitude were unrelated. On average, people from small families believed less so than people from larger families in gaining compensation from reporting poaching, and they also considered reporting poaching somewhat worse compared to people from larger families, who had neutral attitudes on the subject. Perhaps because small families represented a smaller social support-system, there were fewer people in these families potentially supporting a claim for compensation from reporting poaching, or else there were fewer people potentially averting retribution against informers from poachers themselves, or else poachers'

families. Social network size was influential in Li's (2017) investigation of educators' practices; people with more connections were more likely to change their practices.

Furthermore, this lack of correlation between behavioral beliefs and attitude among people from small families might also suggest that this group differed from larger family groups with respect to some other factor such as, for example, the social responsibilities held. People in the '1-4 persons family' group included young couples without children, or else young families with small children; having few dependents, their socio-economic responsibilities were not as pressing as those of larger families. Thus, there might not have been a need for additional income such as, for example, from reporting poaching.

The correlation analysis of normative belief and subjective norm essentially investigated if respondents' perception of support from important people, for reporting poaching, related to respondents' beliefs that poachers thought people should not report poaching. Respondents who presumed poachers did not want them to report poaching were unsure about whether or not people important to them wanted them to report poaching, possibly because among these important people were some who supported reporting poaching, and some who did not. Important people not in support of reporting poaching could have included poachers themselves (or their relatives) as well as non-poachers, both against reporting poaching for different reasons: the former for not wishing to be exposed as poachers, the latter for fear of retaliation or other societal costs from reporting poaching. Those respondents who counted poachers among their acquaintances, and thus possibly among their important people, might

also have been more familiar with poachers' preferences regarding reporting poaching, compared to respondents not acquainted with poachers, and thus responded more readily that poachers likely did not want them to report poaching. On the other hand respondents indicating they 'did not know', when asked if poachers wanted them not to report poaching, presumably were not familiar with poachers, and thus might not count poachers among their important people. These results perhaps indicated that for some respondents, but not for others, poachers might occupy a position of importance. Considering the question of who were the important people for respondents in this study, one might focus on gender, ethnicity, or else family size, as results had indicated differences among subgroups of each of these population characteristics. For example for women, it was often their husbands (Mann & Luangkhot, 2008; Phengkay, 1999), or else their fathers or brothers, who influenced their perceptions (subjective norm). Furthermore, in my study area it was the men who hunted (Foppes et al., 2001); thus women would not know about the occurrence of poaching incidents. Even if they knew about such incidents, women might not inform against poachers if their husbands did not want them to. Additionally, women in these remote villages might not traditionally undertake official business, such as reporting to local authorities, but rather defer to the men in their household. Also, women in rural Lao PDR might be somewhat more influenced by the opinions of their immediate social network than men (GRID, 2005). Perhaps as a consequence, women's subjective norms did not correlate with their normative beliefs. A man's important social network, on the other hand, was mainly comprised of other men (GRID, 2005), any of them like himself a possible hunter (and thus potential poacher). Depending on a

man's social influences (whether hunters, poachers, or others), and a man's own involvement in hunting or poaching, there was a greater variety of possible subjective norms among men than women. This diversity in possible subjective norms among men might also have resulted in the observed relationship between normative beliefs and subjective norm in men.

Furthermore, because their correlation was weak, normative belief and subjective norm might have been related not directly, but in a more complex way via other, less obvious variables. These might include economic pressure, culture, or others (Rigg, 2006). For example, family size might have represented differences in economic pressure, with smaller families experiencing different economic pressures than larger families. The results of my study might be viewed supporting this notion: normative beliefs did not correlate with subjective norm in respondents from small families, unlike respondents from larger families. Larger families might experience greater demand for food, or cash income, as there were more dependents to support, but might also have sufficient family members to tend their fields and grow their own food. Thus perhaps, smaller families might be more dependent on hunting. Kamuzora and Mkanta (2000) also reported larger families were less often poor, compared to smaller families in rural Tanzania. Alternately, because larger families had sufficient members working the fields, some of these family members might even be free to go hunting as a means to generate additional food or income. As it were, small families differed from larger families in their behavioral belief, normative belief, subjective norm, and perceived behavioral control, thus suggesting economic pressures might play a substantial part. Martin et al. (2017) also described specific economic concerns

playing a role in people's views of NEPL NPA in Laos, where poor households perceived different limitations on access to agricultural land than non-poor households. Similarly, the Wildlife Trade Monitoring Network (TRAFFIC; 2008) suggested a high dependency of people in rural Lao PDR on the harvest of wild animals and plants to cover seasonal and emergency food shortages; such dependencies might be more pronounced in economically strained families.

Similarly, cultural differences were represented by different ethnic groups, which in turn differed in their normative beliefs. Hmong people represented the most direct and outspoken of these ethnic groups, appearing more opinionated about poachers' not wanting others to report poaching; they were also the ethnic group more known than other ethnic groups for their forest-knowledge and thus perhaps for their activities in the forest, including hunting (Vang, 2013). All these factors might explain Hmong people's normative beliefs not correlating with their subjective norm, unlike those of Khmu and Lao Loum people. Castella et al. (2013) also suggested differences in the frequency of natural resource access between ethnic groups in NEPL NPA, and Tomforde (2003) suggested Hmong utilized natural resources more destructively than the Karen ethnic group in Thailand. Culture-based differences in natural resource use between ethnic groups were also described by Holmes (2004) from Tanzania, East Africa. Martin et al. (2017) summarized these cultural, historical, and place-bound aspects influencing people's behaviors as 'ideational explanations', and recommended incorporating such aspects into investigations of human behavior.

Although an overall correlation between respondents' attitude and intention

could not be demonstrated, attitudes and intentions correlated significantly for people from small families (1-4 persons). People from small families considered reporting poaching much worse compared to people from largest families, while all respondents appeared to have little intention to report poaching. For all other respondents, the frequency of deciding to report poaching was independent of what people thought about reporting poaching. One might expect, if attitude were a predictor for intention, people with a negative attitude towards poaching (that is, the attitude ‘reporting poaching is somewhat bad’) also to have little intention of reporting poaching.

Although on average people did consider poaching somewhat bad, and also rarely decided to report poaching, the lack of an overall correlation between attitude and intention might also indicate that people’s actual intentions remained in doubt. As it was, intention was assessed by how often people decided to report poaching, which could be interpreted as emphasizing the *decide* aspect of the question, or else the *report* aspect. People might have rarely *decided* to report poaching because the opportunity to decide rarely arose (perhaps because people did not observe much poaching); in this case, people’s actual intention regarding reporting poaching remained unclear, as they might or might not have intended to report. Alternately, people might have rarely decided to *report* poaching (when poaching was actually observed), thus indicating their intention not to report poaching. Thus, depending on people’s interpretation of the survey question, intention scores might have reflected these differences, and consequently possibly obscured the relationship between attitude and intention, and indeed any other construct’s relationship with intention.

Having said this, people's subjective norm also did not relate to their intention, that is people's views of how others would support them reporting poaching was unrelated to how often they decided to report poaching. The lack of a correlation between subjective norm and intention might further be due to the fact that, while intention itself was unaffected by respondents' population characteristics, subjective norm was affected by gender and family size; women and men, as well as people from different family sizes, represented different subjective norms. Some respondents were possibly influenced by people unsupportive of reporting poaching, while others were not; these differences might have cancelled each other out in the overall analyses. Closer inspection of the possible relationship between subjective norm and intention by gender, family size, and ethnicity revealed no statistically significant correlation there, either, although Khmu appeared to lean towards a positive association ( $p=0.052$ ; see APPENDIX 3).

The sole predictor of intention in my study was perceived behavioral control: overall, people who perceived being able to report poaching appeared to have even less intention to report compared to people who were less certain about their ability to report. The weakness of this negative correlation, while possibly also reflecting the above discussed uncertainty of actual intention, was possibly due to observed differences between genders and ethnic groups: only men and Khmu people reflected the overall statistically significant relationship between perceived behavioral control and intention, while others did not.

## GENERAL DISCUSSION

The overall aim of my research was to understand a certain conservation intention, namely reporting poaching, by utilizing the TPB as a theoretical framework. The results suggested some TPB constructs related to each other, and to intention to report poaching. In particular, behavioral beliefs significantly predicted attitudes, normative beliefs significantly predicted subjective norm, and perceived behavioral control significantly predicted intention to report poaching. However, while statistically significant, these correlations were all rather weak. Neither attitude nor subjective norms significantly predicted intention to report poaching. Hrubes et al. (2001) demonstrated both, people's attitudes and subjective norm significantly predicted hunting intentions in the U.S. On the other hand, Seeland et al. (2002) found only subjective norm, but neither attitude nor perceived behavioral control, significantly predicted people's intention to comply with future restrictions of recreational activities in a nature reserve in Switzerland.

Concerning the conservation implication of these findings for NEPL NPA in Laos, people's intention to report poaching was not demonstrated. At this point in time, intentions to report poaching remained unclear at best, thus indicating poachers will likely be able to continue poaching as before, without increased risk of being reported. It appeared people might have perceived mixed support from their community for reporting poaching. Without such support people might retain a cautious outlook on informing against poachers, especially since people did not appear to see much benefit from informing. Rather than hoping to increase people's intention to inform against poachers, protected area managers in Lao PDR might consider

looking for alternative avenues to engage villagers in pro-conservation behavior. Alternatives might include, but not be limited to, increasing discussions among villagers about the societal costs of poaching, the socio-economic benefits from observing wildlife protection laws, and the power of communities to engage in the management of their respective natural resources. Such discussions might optimally be staged/induced, facilitated and guided by protected area managers together with village elders.

## LIMITATIONS

Certain limitations were identified in the course of this study. Intentions might be driven by multiple dimensions of additional factors, such as culture and traditions (León & Montiel, 2008), and more specifically social structure (Heberlein, 2012), taboos (Bennett & Rao, 2002), and hunting practices (Willcox & Nambu, 2007). Culture in my study was represented by ethnicity; ethnic groups in this study differed with regard to their behavioral beliefs and normative beliefs. Cultural differences among ethnic groups might include how openly people express their opinions, or how they utilize the physical environment (for example, engaging in hunting), or whether or not to abide by certain laws. These differences might not be accurately captured by merely one survey question representing any one of the TPB constructs. To illustrate more accurately the great range of potentially influential factors, each TPB construct might better have been represented by a composite of several survey questions, rather than by a single question. Employing composites of several survey questions would also greatly reduce the possibility of respondents interpreting any one survey question in different ways, as might have been the case with the question representing intention.

Reducing potential ambiguity in how respondents interpreted survey questions might have minimized the potential for obscuring results.

## CONCLUSION

Notably, the TPB approach did not provide much insight into intention to report poaching. This research used a cognitive approach, which is most effective when the prospective intention and associated behavior change does not negatively affect the target audience's socio-economic condition (Carter et al., 2013). In other words, intentions to engage in a certain behavior appear stronger when socio-economic benefits outweigh the costs of the intended behavior. In the present study, it appeared neither the social benefits nor the economic benefits were perceived to outweigh the costs of the intended behavior, namely to not report poaching. While people viewed reporting poaching as bad, they also appeared not to believe in gains from reporting poaching, nor in sufficient support from others in their community in their reporting. Intentions might be driven by additional factors rooted in people's culture and society. As it were, the demonstrated predictive power of behavioral belief, normative belief and perceived behavior was weak, thus suggesting TPB by itself represented an unsatisfactory theoretical foundation in the context of my study.

Miller (2017) suggested merging TPB with other behavioral theories might extend future TPB utility; elsewhere (Chapter 3 of this dissertation) I investigated the utility of Rare's Theory of Changed behavior in predicting people's conservation behavior, and demonstrated that the theory has limited success in predicting behaviors. The results from this Chapter suggest the size and nature of respondents' social

networks may play an important role in predicting people's conservation-related intentions. Thus, perhaps it might prove more rewarding to utilize, in context with TPB, social network theory (Katz et al., 2004) to more specifically address this social component. The results of TPB's limited utility in my study might be used to demonstrate this need to focus more on network aspects of communities in NEPL NPA, Laos.

## CHAPTER FIVE

### CONCLUSION

Wildlife conservation has been an important issue for many decades. National as well as international agencies and nonprofit organizations have long attempted to intervene on behalf of conservation, and to optimize such interventions over time. Nam Et – Phou Louey National Protected Area (NEPL NPA) in Laos, Southeast Asia, is one of the innumerable places facing conservation challenges, and especially threats to wildlife from poaching (Johnson et al., 2006). Reducing, or even eliminating, poaching activities in NEPL NPA has been on the agenda of many conservation parties for some time, and understanding local people's behaviors, and their drivers, was considered paramount to ultimately changing anti-conservation into pro-conservation behaviors. In the present study, I employed Rare's Theory of Change (TOC), as well as the Theory of Planned Behavior (TPB), to assess local people's attitudes, beliefs, and intentions about reporting poaching incidents to authorities.

In Chapter two of this dissertation a review of conservation-related applications of TPB and Rare's TOC suggested each of these theories might be useful on some level, but lacked in other aspects, and therefore engaging both might enhance conservation outcomes. Specifically, TPB can be described as focusing on individual level variables that predict intentions and/or behaviors while neglecting external factors that might facilitate or hinder people acting on their preferences. A literature review of TPB applications to predicting environment-related behavioral intention and actual behavior revealed that behavioral intention was predicted in 10 of 11 studies, by

either an individual's attitude, subjective norm, or perceived behavioral control, or a combination of these TPB constructs, while actual behavior was predicted by perceived behavioral control and/or intention in four of four studies. Rare's TOC, on the other hand, investigates community related factors, such as interpersonal communication among members of a community or barriers affecting the community as a whole. At the same time, Rare's TOC pays little attention to individual psychological drivers at the base of people's behaviors; for example, an individual's belief about how others in their community consider a contemplated behavior or the perceived utility of a contemplated behavior. A literature review of TOC-related studies revealed behavior changes resulted in all of the published cases of Rare's TOC application, that is, in the context of an implemented social marketing campaign (SMC), with documented advancement of a community on the TOC-model's path from knowledge and attitude, via interpersonal communication and barrier removal, on towards pro-conservation intention and behavior, and ultimately conservation results, where applicable. For these reasons I was interested in applying, in the current research, both theories together, complementarily, Rare's TOC to establish a general framework around a known conservation-related behavior (here, reporting poaching) and TPB to provide information about internal factors (within individuals) such as, for example, individuals' beliefs regarding this behavior. The insights gained from the combined theories could ultimately strengthen the design of future conservation interventions.

In Chapter three of this dissertation I investigated the influence of the SMC on the different TOC elements: knowledge, attitude, and perception of barrier removal,

and ultimately, SMC's effect on increasing reporting poaching behavior. Overall, the intended effect of the SMC did not occur, as analyses of TOC constructs revealed similar changes in attitude and barrier removal had occurred in both the treatment and control areas, whereas knowledge did not change in the treatment area, while decreasing in the control area. As for the anticipated behavior change, after SMC application people in the treatment area reported poaching even *less frequently*, while no change in reporting frequency occurred in the control area. Rather than remove perceived barriers, the SMC appeared to have raised additional barriers to reporting poaching, without subsequently allowing sufficient time to address these perceived barriers. Overall, the SMC may not have been successful because (1) its content- and/or temporal scope were insufficient to address all aspects of reporting poaching, (2) Rare's TOC itself was insufficient in modeling increased reporting poaching behavior, (3) 'reporting poaching' presented an untenable target behavior, as it may have been associated with high social costs, (4) interpersonal communication about SMC may have occurred between people from the treatment and control areas, and/or (5) other events in the control area affected changes in attitude and barrier perception that resembled the observed changes in the treatment area. I concluded that interpersonal communication needs to be focused on in the future, on the one hand to address and possibly remove barriers that prevent people from reporting poaching, and on the other hand to understand people's communication-dynamics between treatment- and control areas.

In Chapter four, I investigated the utility of applying TPB to understanding local people's intentions to report poaching, and specifically how the separate TPB

constructs related to each other and, ultimately to intention to report poaching.

Overall, the TPB provided limited insights into people's intention to report poaching, as the demonstrated relationships among TPB constructs were weak. However, TPB application did identify family size was important, as small families differed from large families with respect to their behavioral belief, normative belief, subjective norm, and perceived behavioral control, possibly as a reflection of socio-economic differences and/or factors relating to social network size. Socio-economically, small families presumably have smaller demand for resources compared to larger families, and may thus be less inclined to report poaching for the reward. Regarding social networks, small families presumably also have a smaller social network, leaving them with less immediate support compared to larger families, and thus leaving them more vulnerable to potential retaliation, if they reported poaching. Overall, people appeared to perceive the possible costs of reporting poaching, such as perhaps upsetting community members, greater than the potential benefits, such as monetary rewards.

In summary, the study population was not at a point to engage in reporting poaching behavior, as reporting poaching decreased even further after SMC implementation in the treatment area. The effectiveness of SMC could thus not be established, and the links between TOC constructs were not demonstrated; this was either due to certain weaknesses of SMC topical content (as they may not have optimally addressed all issues related to reporting poaching), SMC implementation (as the temporal scope may not have been sufficient), or else because Rare's TOC provided an unsatisfactory model for predicting reporting-poaching behavior in my study area. Given the sensitivity of this target behavior, and the potential implications

associated with engaging in reporting poaching, it is possible that Rare's TOC model is too simplistic. Also, attitudes may be difficult to change, and their relationship with behavior is not clearly established. Thus, it might be more suitable to employ a modified TOC model, which includes repeated feedback loops between knowledge and attitude, with punctuated smaller conservation incentives in between, where knowledge informs attitude and vice versa, and consequently both could gradually be adjusted towards a more conservation-friendly perspective. Once such a pro-conservation perspective is reached, the conservation incentive would then move on towards the next step, the perception of barriers and their removal, before modifications of behavior might be expected.

The TPB also did not provide a satisfactory model for predicting people's behavioral intention to report poaching in my study area, but suggested the size and nature of respondents' social networks might play an important role in predicting people's conservation-related intentions. Network importance was also hinted at by findings from SMC application, as interpersonal communication may have played a role in shaping people's attitudes and perception of barriers, and possibly even reporting poaching behavior. In this study TPB results pointed to communication among people of a shared social network as a factor to be taken into consideration in future research.

### FUTURE RESEARCH

Specifically, future research should investigate social links among people, that is, investigate how and why people are linked in NEPL NPA (e.g., blood relationship,

economy, collaboration for other reasons), and how they communicate within villages, as well as across the conservation landscape. Within villages, gaining an understanding of communication channels might facilitate understanding and aligning people's pro-conservation opinions, and perhaps subsequent behaviors, in their immediate community more effectively, thus ultimately saving time and resources, and enhancing conservation outcomes. At the landscape level, demonstrating the importance of communication between treatment and control areas is important for two reasons.

First, as long as communication patterns are not fully understood between people from treatment and control areas, an SMC effect (or, for that matter, the effect of any conservation incentive) cannot clearly be demonstrated in the event of similar survey responses obtained in both. While in theory one could designate a more distant control area, and thus minimize or eliminate potential communication between treatment and control areas, in practice this might be impossible given NEPL NPA's spatial limitations. If interpersonal communication between treatment and control area, that is across the landscape, were indeed demonstrated, the present results might be interpreted more clearly; without an understanding of general communication patterns, it will be difficult to establish the effect of any incentive, as researchers may not be able to isolate the treatment area from the control area.

The second reason for demonstrating the importance of communication between villagers from treatment and control areas is to use such communication to advantage for conservation managers: if people from the treatment area communicate

the message of a conservation initiative to people from the control area, then the effect of the initiative might actually reach much further than presently assumed.

Consequently, conservation initiatives would thus cover larger areas or, in other words, fewer initiatives might be needed to cover the initial target area, and thus, ultimately, save conservation funds. Future research should also address how frequently people communicate within villages and across landscapes, what topics, if any, are discussed, what means of communication are mostly employed, and where such communication takes place (e.g., in local markets, neighborhoods, in homes, or elsewhere). The focus here should lie on understanding communication at three different hierarchical levels at least: (1) within families, (2) among communities at various spatial scales, and (3) among conservation managers. Communication within families might be directed by interests of family security, and be based on trust among family members; within-family communication topics might thus range from strategies to maintain food and physical security to topics that strengthen trust and collaboration among family members. Communication between communities might be directed by more loose social connections, based on more distant family relations, ethno-cultural relations, trade, and/or other types of social connections; between-community communication topics might include, among others, economic collaboration or the planning of larger-scale social events that also build trust across the landscape. Lastly, communication among conservation managers would be directed at exchanging experiences and coordinating conservation efforts at a large spatial scale, and relevant topics would thus include, among others, information about planned future conservation strategies, results from past-applied initiatives, and

information regarding scientific insights from different areas that might be integrated into applied conservation.

In summary, it is important to establish if and how far information travels across the landscape, and how long this would take, as well as what communication channels are most effective, and what topics are most readily communicated. Insights gained from such research could advise future information dissemination in the attempt to shape conservation behaviors. Here also, it would also be important to establish to what degree interpersonal communication actually facilitates or hinders the occurrence of specific conservation-related behaviors in NEPL NPA, especially in the view of socio-economic benefits for individuals and/or communities. Such benefits might include increased access to food or monetary resources, as well as increased personal security for individuals and families within their community. Even if the occurrence of interpersonal communication were established, members of a shared social network might not actually alter their behaviors for various reasons, such as their own position in the community, their socio-economic situation, or additional factors. Establishing conclusively the role of communication in shaping people's willingness to alter their conservation-related behavior would provide an important tool in shaping future conservation strategies.

Another critical topic for future research is to determine basic animal population statistics, as well as acquire more specific information on actual poaching rates in NEPL NPA; access to reliable information on species presence and population size, and poaching rates, would allow conservation managers to assess the

sustainability of protected species' populations, and consequently inform immediate needs for conservation action. Obtaining such data, however, presents a major challenge in NEPL NPA, a vast landscape of hard-to-access terrain, covered in dense vegetation, and containing few human resources for effectively patrolling the actual conservation area, even with technical assistance. For example, in a pilot study, a network of camera traps had been established in a relatively small, remote section of the NPA, where it did indeed serve to establish some baseline data on species occurrence, if not actual population densities (Johnson et al., 2004). However, several of these camera traps were soon destroyed, stolen, or else the memory cards were removed, presumably by poachers, aside from being subjected to expected technical limitations. Establishing actual poaching rates will prove even more challenging, especially as NEPL NPA is partially delineated by an international border with Vietnam; without hard evidence, such as animal parts, found within the NPA, it is virtually impossible to conclude poaching has occurred. Poaching rates and animal population statistics can partially be estimated indirectly, via information from remote local markets dealing in bushmeat and other, even more illegal animal products; however, vendors are extremely cautious, and origin of such products not easily/conclusively determined.

#### NEXT STEPS IN CONSERVATION INITIATIVES

Based on my findings I recommend a potential course of action to reduce poaching in this largest protected area in Laos. Several possibilities should be

considered, either separately or else in combination. These include: (1) employing alternatives to SMC when engaging local people in reporting poaching, (2) facilitating alternative pathways for reporting poaching, and (3) taking alternative approaches to ultimately reduce poaching. Lastly, (4), I suggest alternative pro-conservation behaviors that should be fostered in the future.

#### (1) SMC alternatives

First, to engage local people in reporting poaching behavior, alternative methods to SMCs should be applied, such as hosting facilitated discussions on poaching and/or broader conservation-related topics among villagers.

Facilitated discussions should be held in smaller groups initially, and increased eventually to include the larger community. Results from my study suggested women and men, members of different ethnic groups, and participants from different family sizes might differ in their views regarding conservation-related issues. Discussion topics could be modified as per participants, for example discussions among men (as potential poachers) might revolve around how poaching reduces future food supply, or else men's role as models for others in the community and the associated importance of following hunting laws themselves, especially if the audience includes law-enforcement personnel. Discussions among women might include family meal planning and food supply, how to increase food diversity, including a decreased emphasis on meat in the diet, and how to grow and utilize additional foods and engage in animal husbandry.

In some areas of NEPL NPA, where land-pressure is relatively small and human population densities are still low, such targeted discussions may lead to success. However in certain other areas of NEPL NPA, where some of the agricultural land has recently been allocated for commercial maize production, access to agricultural land for subsistence-use now presents a problem for the poorest villagers; they consider NPA hunting restrictions increase their difficulty of meeting food requirements (Martin et al., 2017). In these communities, targeted discussions aimed at increasing reporting poaching might not lead to success.

## (2) Alternative pathways for reporting poaching

Allowing people to explore and express their views in such guided discussions might prepare the way for the second potential approach towards decreasing poaching, namely to utilize alternative pathways to report poaching. Specifically, rather than enticing individuals to report poaching on their own, it should be an entire community, or a larger part of a community, that reports poaching. Ostrom (2002) suggested that larger administrative authorities could enable the formation of self-governing units that regulate common-pool resource use. In NEPL NPA, this role could be taken on by WCS, through their conservation education and outreach staff. Results from my study suggested individuals might fear retribution when reporting poaching, either from poachers (and poachers' families) or else from the larger community. Involving the larger community in reporting poaching could be achieved by inducing the community, by demonstrating that unchecked poaching is associated with wildlife declines, to set up a reporting-poaching protocol. Here, steps for reporting are laid

down and agreed upon by all, to be followed in case of a poaching incidence having come to the attention of any community member. The steps of such a protocol could include (1) an individual (or small group) giving an initial, informal report to a designated village reporting-poaching authority that would then perhaps (2) record the report and subsequently bring it before a village council for internal review, before (3) the council would then decide to either penalize the poacher directly, or else report the poacher to higher authorities, such as conservation managers. Thus, the entire community would be involved in the decision to report, and no single individual would be left with the responsibility, and the actual or perceived risks associated with reporting. However, despite the fact that collaboration among community members is increased when mechanisms for protecting resources are community-internally devised, rather than externally devised (Frohlich & Oppenheimer, 1996), communities might not collaborate on dealing with poachers without tangible direct benefits. Therefore, perhaps the first step here would be to inquire, in such community discussions, how communities view their potential involvement in addressing poaching and what, if anything would induce a community to get involved.

### (3) Alternative approaches to ultimately reduce poaching

The focus in my study has been on increasing reporting poaching behavior through a cognitive approach, in an attempt to ultimately reduce poaching in NEPL NPA. However, alternative approaches might be taken, including technical approaches, to modify poaching behavior directly (Heberlein, 1974). For example, in the past, conservation praxis often involved erecting physical barriers such as fences

around protected areas, to limit unauthorized access and thus perhaps decrease illegal activity. In NEPL NPA, while this is neither desirable (as per agreement local people are allowed limited access to the NPA) nor practical (as NEPL NPA is large and difficult to access), managers could perhaps modify such a technical approach to augment other conservation incentives. For example, sensors could be installed on some of the established access paths into the NPA totally protected zone, to monitor human activity, and thus gain an understanding of what areas of NEPL NPA are most frequented in this way. This would allow NPA rangers to take action accordingly, but also allow conservation incentives to more specifically be directed at areas of greater human access to NPA.

Rather than keeping track of general human movement in the NPA, some conservation managers keep track of the movement of animals; radio collars are regularly fitted onto individuals of the most prized, that is most rare, protected species such as tigers. This would allow for remote tracking, via satellite, of such individuals by NPA rangers, who could subsequently monitor the animals' whereabouts. Should any of these individuals' signals cease to move for some time, this would be reason to investigate a potential poaching incidence, and thus possibly gather evidence against poachers. The main set-back of this approach, aside from the initial cost of purchasing radio collars and telemetry equipment and obtaining necessary permits for such undertaking, would be that prized individuals first must be located, and subsequently sedated before a radio collar can be fitted. This would be a major undertaking in NEPL NPA, as the area is vast, the terrain difficult to maneuver, and vegetation very dense. Aside from this, handling animals for such a procedure imposes stress on the

animal, and might thus endanger its health, or even life; this risk must carefully be weighed before taking such an approach, especially where rare or highly threatened species are concerned.

Another, certainly more unusual technical approach to minimizing poaching is inspired by a method used in the U.S. legal system for some time; there, repeated offenders of certain crimes must wear a special bracelet that essentially functions as a tracking device, so the offender's general location is known. Perhaps some convicted poachers should be required to wear such a bracelet for some time after their offence, to minimize their potential further poaching. Regrettably, this solution may be too futuristic for some time to come, as the legal rights of people generally outweigh those of animals, no matter how rare.

#### (4) Alternative pro-conservation behaviors to foster

Rather than targeting poaching directly, fostering alternative pro-conservation behaviors might also eventually decrease poaching. Such behaviors might include generating alternative incomes by growing cash crops in agroforestry initiatives, raising livestock for family consumption and/or trade, and cultivating community gardens for food diversity. This would represent a more structural (rather than cognitive) approach (Heberlein, 1974), which actively involves communities in relieving pressures on natural resources in the NPA that may jeopardize future food security. The assumption here is that the larger part of poaching occurs for subsistence reasons or else because of economic strain; both could be alleviated by such initiatives, especially if entire communities could be involved. Overall, such behaviors

should aim towards increased conservation-stewardship, that is, take responsibility for, for example, future food supply, and thus the future of the natural environment. Community involvement in biodiversity conservation against direct benefit has for some time presented a viable approach in conservation (Milne & Niesten, 2009). In NEPL NPA, one example of a successfully applied incentive to increase conservation stewardship through the creation of alternative income opportunities involved the setup of a direct-payment system from ecotourism (Eshoo et al., 2018). Here, several villages were involved, together with local government and NPA managers, in developing a contract specifying the distribution of benefits from ecotourism, conditions of managing ecotourism, and mechanisms that discourage involved villagers from poaching and trading wildlife (Eshoo et al., 2018).

However, by nature, structural fixes of human behavior are very complex and thus slow to implement, as they involve modifying the physical structure and/or social setting in which human behavior takes place (Heberlein, 1974). In developing countries, funds are not easily allocated to such purpose. Thus perhaps it would be more realistic to outsource conservation efforts. In Laos, in the case of NEPL NPA, this would mean the government would agree to NEPL NPA being leased, under strict conservation agreements, by private companies or else non-government agencies (NGOs), and consequently managed by these. Private companies and NGOs often have greater flexibility acting, and more flexible means of raising funds and allocating monies. The future of NEPL NPA as a functioning ecosystem, with viable animal populations, might be more certain if conservation efforts were privatized, and NPA management, for the specified duration of the lease agreement, were entirely given

into the hands of those who lease it. Such arrangements have successfully been implemented for some time in other parts of the world (e.g., the Little Karoo region in South Africa; Gallo et al., 2009).

Relieving poaching pressures and stabilizing animal populations in NEPL NPA in Lao PDR remains an ongoing conservation challenge and must be addressed by all means possible. Increasing local villagers' pro-conservation behaviors therefore might rely on managers employing a combination of cognitive, structural, and technical approaches.

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## APPENDIX

### APPENDIX 1. RESEARCH QUESTIONS

1. Respondent agrees to be interviewed (if no, keep tally on separate sheet of paper)  
 Yes       No
2. What number is your favorite number?  
1      2      3      4      5
3. Interviewers/enumerators  
 Santi Saypanya       Sysomphane Sengthavideth       Muas Yachithor  
 Khampavath Smanbod
4. Supervisor  
 Dr. Marianne Krasny and Dr. Richard Steman
5. Village \_\_\_\_\_
6. Date \_\_\_\_\_
7. Survey period  
 Pre-survey Treatment area (Phonethong district)  
 Pre-survey Control area (Add district)  
 Post- survey Treatment area (Phonethong district)  
 Post- survey Control area (Add district)
8. Gender of respondent  
 Female       Male

‘To begin I would like to ask you some questions about yourself’

9. What ethnic language do you speak?  
 Hmong       Khamu       Lao Loum       Other \_\_\_\_\_
10. If you belong to a religion, please tell me which religion. If you do not belong to a religion, please say ‘none.’  
 Buddhism       Animism       Hindu       Muslim       Catholic  
 Protestant       Jewish       None       Local/Traditional  
 Other \_\_\_\_\_       Refused to answer
11. If you belong to an ethnic group (or tribe), please tell me which ethnic group (or tribe) you belong to. If you do not belong to an ethnic group (or tribe), please say ‘none.’  
 Hmong       Khamu       Lao Loum       Other \_\_\_\_\_
12. How old were you at your last birthday?  
 15 – 29 years       30 – 44 years       45 – 55 years
13. What domestic meat do you prefer eating?  
 Chicken       Duck       Pork       Dog       Beef       Goat       Fish  
 Goose       Pigeon       Partridge       Other \_\_\_\_\_
14. What wild meat do you prefer eating?  
 Muntjac       Wild pig       East Asiatic porcupine       Bush-tailed porcupine  
 Birds       Squirrels       Rats       Bamboo rats       Macaque       Snakes  
 Pangolin       Monitor Lizard       Frog       Fish       Turtle/Tortoise  
 Sambar deer       Civet       Rabbit       Green peafowl       Owl  
 Woodpecker       Parrot       Sun bear       Asiatic Black bear       Elephant

All animals       Other \_\_\_\_\_

15. Do you have children?  
 Yes  No
16. How many people live in your household?  
 1 – 4 persons       5 – 8 persons       ≥ 9 persons
17. Which of the following best describes your recent main activity?  
 Working for wages  Trader/Businessmen       Farmer       Retired  
 Soldier       Police       Financial official       Forester       NPA        
Housewife  
 Student       Teacher       Lawyer       Park ranger  Mobile patrolling team  
 Other government officer  Not sure/Do not know know        
Other \_\_\_\_\_
18. What additional activities do you do?  
 Village militia       Village police       Village headman  
 A member of Youth       A member of Women Union       Soldier  
 Police       Financial officer       Forester       A member of negotiation unit  
 A member of Conservation unit       Village volunteer for first aid       Elder  
 Other \_\_\_\_\_
19. How would you rate the overall health of the local environment?  
extremely bad:      1      2      3      4      5      : extremely good
20. How has environmental quality (and or/wildlife populations) changed over the past 10 years?  
Changed to the worse: 1      2      3      4      5      : changed to the better
21. Do you think poaching affects wildlife population in your village use area?  
extremely unlikely      1      2      3      4      5      extremely likely
22. How do you feel about the current number of tigers?  
extremely less:      1      2      3      4      5      : extremely more
23. How do you feel about the current number of prey species?  
extremely less:      1      2      3      4      5      : extremely more
24. For me to poacher is  
extremely bad:      1      2      3      4      5      : extremely good
25. During the past one year, you have reported poaching?  
definitely false:      1      2      3      4      5      : definitely true
26. During the past one year, you have reported wildlife trade?  
definitely false:      1      2      3      4      5      : definitely true
27. For me to report wildlife trade is  
extremely bad:      1      2      3      4      5      : extremely good
28. For me to report poaching is  
extremely bad :      1      2      3      4      5      : extremely good
29. Most people who are important to me think that I report poaching  
should not:      1      2      3      4      5      : should
30. I am confident that if I wanted to I could report poaching  
definitely false:      1      2      3      4      5      : definitely true
31. Generally speaking, how much you care what park management says on poaching?

- not at all:           1       2       3       4       5       : very much
32. Reporting poaching will help me to gain more compensation  
Extremely unlikely: 1       2       3       4       5       : extremely likely
33. How often do you decide to report poaching?  
very rarely:           1       2       3       4       5       : very frequently
34. How often do you decide to report wildlife trade?  
very rarely:           1       2       3       4       5       : very frequently
35. How often do you decide to report poaching?  
very rarely:           1       2       3       4       5       : very frequently
36. Poachers think I should report poaching  
extremely unlikely: 1       2       3       4       5       : extremely likely
37. Poachers think I should not report poaching  
extremely unlikely: 1       2       3       4       5       : extremely likely
38. In the past 10 months, I have talked to someone about poaching.  
very rarely:           1       2       3       4       5       : very frequently
39. In the past 10 months, I have reported someone who was poaching?  
very rarely:           1       2       3       4       5       : very frequently
40. In the past 10 months, I have reported someone who was selling wildlife?  
very rarely:           1       2       3       4       5       : very frequently

APPENDIX 2: SEPARATE RESULTS FROM 1-WAY ANOVAS BY ETHNICITY, BY FAMILY-SIZE, AND BY OCCUPATION: DIFFERENCES BETWEEN PRE- AND POST-SURVEY MEAN RESPONSE-SCORES, IN TREATMENT AND CONTROL AREAS, TO QUESTIONS PERTAINING TO RARE'S TOC CONSTRUCTS.

SMC construct	Population	Area	Change in Mean Response-score (grey cells: statistically significant results, p< 0.05)						
			Hmong	Khmu	Lao Loum				
<p>Knowledge Overall</p> <p>M<sub>pre</sub>I=2.8 vs M<sub>post</sub>I=2.7 (F(1)=0.992, p=0.319)</p> <p>M<sub>pre</sub>C=2.7 vs M<sub>post</sub>C=2.9 (F(1)=3.978, p=0.046)</p>	Ethnicity	Treatment	M <sub>pre</sub> = 2.7 vs M <sub>post</sub> = 2.4 (F(1)= 2.09, p= 0.149)	M <sub>pre</sub> = 2.8 vs M <sub>post</sub> = 3.0 (F(1)= 0.52, p= 0.473)	M <sub>pre</sub> = 2.9 vs M <sub>post</sub> = 2.9 (F(1)= 0.18, p= 0.672)				
		Control	M <sub>pre</sub> = 2.8 vs M <sub>post</sub> = 2.9 (F(1)= 0.04, p= 0.846)	M <sub>pre</sub> = 2.3 vs M <sub>post</sub> = 3.0 (F(1)= 8.68, p= 0.004)	M <sub>pre</sub> = 2.7 vs M <sub>post</sub> = 2.9 (F(1)= 0.83, p= 0.362)				
	Family size	1-4 pers			5-8 pers		≥ 9 pers		
		Treatment	M <sub>pre</sub> = 2.8 vs M <sub>post</sub> = 2.6 (F(1)= 2.29, p= 0.131)	M <sub>pre</sub> = 2.9 vs M <sub>post</sub> = 2.9 (F(1)= 0.08, p= 0.776)	M <sub>pre</sub> = 2.6 vs M <sub>post</sub> = 2.6 (F(1)= 0.00, p= 0.997)				
	Control	M <sub>pre</sub> = 3.2 vs M <sub>post</sub> = 2.7 (F(1)= 4.93, p= 0.028)	M <sub>pre</sub> = 2.5 vs M <sub>post</sub> = 3.0 (F(1)= 8.75, p= 0.003)	M <sub>pre</sub> = 2.2 vs M <sub>post</sub> = 2.9 (F(1)= 9.63, p= 0.002)					
	Occupation	Militia/police			Farmer		Government		
		Treatment	M <sub>pre</sub> = 3.2 vs M <sub>post</sub> = 3.0 (F(1)= 0.09, p= 0.762)	M <sub>pre</sub> = 2.8 vs M <sub>post</sub> = 2.7 (F(1)= 0.56, p= 0.455)	M <sub>pre</sub> = 3.8 vs M <sub>post</sub> = 3.3 (F(1)= 0.931, p= 0.349)				
	Control	M <sub>pre</sub> = 4.5 vs M <sub>post</sub> = 3.3 (F(1)= 1.41, p= 0.242)	M <sub>pre</sub> = 2.7 vs M <sub>post</sub> = 2.9 (F(1)= 2.33, p= 0.127)	M <sub>pre</sub> = 2.0 vs M <sub>post</sub> = 2.7 (F(1)= 0.17, p= 0.693)					
	<p>Attitude Overall</p> <p>M<sub>pre</sub>I=2.4 vs M<sub>post</sub>I=1.2 (F(1)=148.03, p&lt; 0.001)</p> <p>M<sub>pre</sub>C= 2.9 vs M<sub>post</sub>C= 1.2 (F(1)= 255.88, p&lt; 0.001)</p>	Ethnicity	Treatment	M <sub>pre</sub> = 2.3 vs M <sub>post</sub> = 1.3 (F(1)= 32.24, p< 0.001)	M <sub>pre</sub> = 3.3 vs M <sub>post</sub> = 1.2 (F(1)= 153.90, p< 0.001)	M <sub>pre</sub> = 2.5 vs M <sub>post</sub> = 1.1 (F(1)= 91.95, p< 0.001)			
			Control	M <sub>pre</sub> = 2.6 vs M <sub>post</sub> = 1.2 (F(1)= 77.49, p< 0.001)	M <sub>pre</sub> = 2.8 vs M <sub>post</sub> = 1.3 (F(1)= 39.30, p< 0.001)	M <sub>pre</sub> = 3.3 vs M <sub>post</sub> = 1.2 (F(1)= 24.72, p< 0.001)			
		Family size	1-4 pers			5-8 pers		≥ 9 pers	
			Treatment	M <sub>pre</sub> = 2.1 vs M <sub>post</sub> = 1.2 (F(1)= 4.79, p< 0.001)	M <sub>pre</sub> = 2.8 vs M <sub>post</sub> = 1.2 (F(1)= 86.15, p< 0.001)	M <sub>pre</sub> = 2.9 vs M <sub>post</sub> = 1.2 (F(1)= 21.95, p< 0.001)			
Control		M <sub>pre</sub> = 3.1 vs M <sub>post</sub> = 1.3 (F(1)= 56.73, p< 0.001)	M <sub>pre</sub> = 3.0 vs M <sub>post</sub> = 1.2 (F(1)= 195.02, p< 0.001)	M <sub>pre</sub> = 2.2 vs M <sub>post</sub> = 1.3 (F(1)= 18.47, p< 0.001)					
Occupation		Militia/police			Farmer		Government		
		Treatment	M <sub>pre</sub> = 3.0 vs M <sub>post</sub> = 1.0 (F(1)= 6.83, p= 0.018)	M <sub>pre</sub> = 2.4 vs M <sub>post</sub> = 1.2 (F(1)= 128.73, p< 0.001)	M <sub>pre</sub> = 3.8 vs M <sub>post</sub> = 1.0 (F(1)= 16.60, p= 0.001)				
Control		N/A	M <sub>pre</sub> = 2.9 vs M <sub>post</sub> = 1.3 (F(1)= 208.89, p< 0.001)	N/A					
<p>Barrier Removal Overall</p> <p>M<sub>pre</sub>I=3.5 vs M<sub>post</sub>I=2.3 (F(1)= 81.77, p&lt; 0.001)</p> <p>M<sub>pre</sub>C=4.0 vs M<sub>post</sub>C=2.8 (F(1)= 84.20, p&lt; 0.001)</p>		Ethnicity	Treatment	M <sub>pre</sub> = 3.5 vs M <sub>post</sub> = 2.3 (F(1)= 25.23, p< 0.001)	M <sub>pre</sub> = 3.3 vs M <sub>post</sub> = 1.9 (F(1)= 24.83, p< 0.001)	M <sub>pre</sub> = 3.6 vs M <sub>post</sub> = 2.5 (F(1)= 117.67, p< 0.001)			
			Control	M <sub>pre</sub> = 3.9 vs M <sub>post</sub> = 2.9 (F(1)= 26.14, p< 0.001)	M <sub>pre</sub> = 3.9 vs M <sub>post</sub> = 2.9 (F(1)= 12.60, p< 0.001)	M <sub>pre</sub> = 4.3 vs M <sub>post</sub> = 2.9 (F(1)= 50.17, p< 0.001)			
		Family size	1-4 pers			5-8 pers		≥ 9 pers	
			Treatment	M <sub>pre</sub> = 3.3 vs M <sub>post</sub> = 2.3 (F(1)= 31.80, p< 0.001)	M <sub>pre</sub> = 3.7 vs M <sub>post</sub> = 2.3 (F(1)= 38.08, p< 0.001)	M <sub>pre</sub> = 4.1 vs M <sub>post</sub> = 2.9 (F(1)= 7.27, p= 0.009)			
	Control	M <sub>pre</sub> = 4.2 vs M <sub>post</sub> = 2.9 (F(1)= 26.95, p< 0.001)	M <sub>pre</sub> = 4.0 vs M <sub>post</sub> = 2.8 (F(1)= 48.63, p< 0.001)	M <sub>pre</sub> = 3.9 vs M <sub>post</sub> = 3.2 (F(1)= 7.46, p= 0.007)					
	Occupation	Militia/police			Farmer		Government		
		Treatment	M <sub>pre</sub> = 5.0 vs M <sub>post</sub> = 1.5 (F(1)= 19.72, p< 0.001)	M <sub>pre</sub> = 3.5 vs M <sub>post</sub> = 2.3 (F(1)= 69.03, p< 0.001)	M <sub>pre</sub> = 4.6 vs M <sub>post</sub> = 1.5 (F(1)= 24.06, p< 0.001)				
	Control	M <sub>pre</sub> = 5.0 vs M <sub>post</sub> = 1.5 (F(1)= 19.72, p< 0.001)	M <sub>pre</sub> = 4.0 vs M <sub>post</sub> = 3.1 (F(1)= 53.20, p< 0.001)	M <sub>pre</sub> = 5.0 vs M <sub>post</sub> = 2.5 (F(1)= 1.48, p= 0.254)					

APPENDIX 2: CONTINUED

SMC construct	Population	Area	Change in Mean Response-score (grey cells: statistically significant results, p< 0.05)		
			Hmong	Khmu	Lao Loum
Behavior Change Overall $M_{preI}=1.4$ vs $M_{postI}=1.2$ $F(1)=7.46$ $p=0.006$  $M_{preC}=1.3$ vs $M_{postC}=1.3$ $F(1)=0.05$ $p=0.826$	Ethnicity	Treatment	$M_{pre}=1.5$ vs $M_{post}=1.2$ ( $F(1)=5.14$ , $p=0.024$ )	$M_{pre}=1.3$ vs $M_{post}=1.2$ ( $F(1)=0.23$ , $p=0.631$ )	$M_{pre}=1.3$ vs $M_{post}=1.1$ ( $F(1)=3.83$ , $p=0.051$ )
		Control	$M_{pre}=1.4$ vs $M_{post}=1.4$ ( $F(1)=0.05$ , $p=0.825$ )	$M_{pre}=1.4$ vs $M_{post}=1.5$ ( $F(1)=1.08$ , $p=0.300$ )	$M_{pre}=1.2$ vs $M_{post}=1.1$ $F(1)=0.32$ , $p=0.571$ )
	Family size		1-4 pers	5-8 pers	$\geq 9$ pers
		Treatment	$M_{pre}=1.4$ vs $M_{post}=1.1$ ( $F(1)=12.10$ , $p=0.001$ )	$M_{pre}=1.3$ vs $M_{post}=1.3$ ( $F(1)=0.10$ , $p=0.791$ )	$M_{pre}=1.5$ vs $M_{post}=1.5$ ( $F(1)<0.01$ , $p=0.978$ )
	Control	$M_{pre}=1.3$ vs $M_{post}=1.3$ ( $F(1)<0.01$ , $p=0.943$ )	$M_{pre}=1.3$ vs $M_{post}=1.2$ ( $F(1)=0.03$ , $p=0.868$ )	$M_{pre}=1.4$ vs $M_{post}=1.5$ ( $F(1)=0.34$ , $p=0.559$ )	
	Occupation		Militia/police	Farmer	Government
		Treatment	$M_{pre}=1.4$ vs $M_{post}=1.0$ ( $F(1)=0.80$ , $p=0.382$ )	$M_{pre}=1.4$ vs $M_{post}=1.2$ ( $F(1)=6.397$ , $p=0.012$ )	$M_{pre}=1.4$ vs $M_{post}=1.0$ ( $F(1)=0.80$ , $p=0.387$ )
	Control	N/A	$M_{pre}=1.3$ vs $M_{post}=1.3$ ( $F(1)=0.75$ , $p=0.388$ )	N/A	

APPENDIX 3. RESULTS FROM BIVARIATE PEARSON CORRELATION ANALYSES OF EFFECTS OF TPB CONSTRUCTS BEHAVIORAL BELIEFS ON ATTITUDE, NORMATIVE BELIEFS ON SUBJECTIVE NORM, ATTITUDE ON INTENTION, SUBJECTIVE NORM ON INTENTION, AND PERCEIVED BEHAVIORAL CONTROL ON INTENTION BY RESPONDENTS' POPULATION CHARACTERISTICS DISTRIBUTION ACROSS GENDERS, ETHNICITIES, AGE GROUPS, AND FAMILY SIZES. ASTERISKS (\* and \*\*) DENOTE STATISTICALLY SIGNIFICANT RESULTS AT  $p < 0.05$ , AND  $p < 0.01$ , RESPECTIVELY).

		1. Behavioral Belief on 2. Attitude	3. Normative Belief on 4. Subjective Norm	2. Attitude on 7. Intention	4. Subjective Norm on 7. Intention	6. Perceived Behavioral Control on 7. Intention
Overall	r	0.245**	0.197**	0.049	0.047	-0.104 *
	n	378	378	378	378	378
	p	<0.001	<0.001	0.334	0.069	0.043
		(M <sub>1</sub> = 2.6) (M <sub>2</sub> = 2.5)	(M <sub>3</sub> = 3.8) (M <sub>4</sub> = 2.8)	(M <sub>2</sub> = 2.5) (M <sub>7</sub> = 1.9)	(M <sub>4</sub> = 2.8) (M <sub>7</sub> = 1.9)	(M <sub>6</sub> = 3.5) (M <sub>7</sub> = 1.9)
Male	r	-0.262**	0.259**	-0.119	0.062	-0.148 *
	n	199	199	199	199	199
	p	<0.001	<0.001	0.094	0.388	0.037
		(M <sub>4</sub> = 2.7) (M <sub>7</sub> = 2.6)	(M <sub>3</sub> = 3.8) (M <sub>4</sub> = 3.0)	(M <sub>2</sub> = 2.6) (M <sub>7</sub> = 1.8)	(M <sub>4</sub> = 3.0) (M <sub>7</sub> = 1.8)	(M <sub>6</sub> = 3.5) (M <sub>7</sub> = 1.8)
Female	r	-0.295**	0.110	-0.142	-0.124	-0.056
	n	179	179	179	179	179
	p	<0.001	0.142	0.058	0.097	0.459
		(M <sub>4</sub> = 2.4) (M <sub>7</sub> = 2.3)	(M <sub>3</sub> = 3.8) (M <sub>4</sub> = 2.5)	(M <sub>2</sub> = 2.3) (M <sub>7</sub> = 1.9)	(M <sub>4</sub> = 2.5) (M <sub>7</sub> = 1.9)	(M <sub>6</sub> = 3.5) (M <sub>7</sub> = 1.9)
Hmong	r	0.279**	0.154	-0.196	0.114	-0.085
	n	101	101	101	101	101
	p	0.005	0.125	0.050	0.256	0.399
		(M <sub>1</sub> = 2.2) (M <sub>2</sub> = 2.3)	(M <sub>3</sub> = 4.3) (M <sub>4</sub> = 2.8)	(M <sub>2</sub> = 2.7) (M <sub>7</sub> = 1.7)	(M <sub>4</sub> = 2.8) (M <sub>7</sub> = 1.7)	(M <sub>6</sub> = 3.5) (M <sub>7</sub> = 1.7)
Khmu	r	0.295**	0.291**	-0.152	0.210	-0.255 *
	n	86	86	86	86	86
	p	0.006	0.007	0.162	0.052	0.018
		(M <sub>1</sub> = 2.9) (M <sub>2</sub> = 2.4)	(M <sub>3</sub> = 3.7) (M <sub>4</sub> = 2.9)	(M <sub>2</sub> = 2.3) (M <sub>7</sub> = 2.1)	(M <sub>4</sub> = 3.0) (M <sub>7</sub> = 2.1)	(M <sub>6</sub> = 3.3) (M <sub>7</sub> = 2.1)
Lao Loum	r	0.209**	0.182 *	-0.083	-0.071	-0.033
	n	191	191	191	191	191
	p	0.004	0.012	0.256	0.332	0.650
		(M <sub>1</sub> = 2.6) (M <sub>2</sub> = 2.6)	(M <sub>3</sub> = 3.7) (M <sub>4</sub> = 2.6)	(M <sub>2</sub> = 2.4) (M <sub>7</sub> = 1.9)	(M <sub>4</sub> = 2.6) (M <sub>7</sub> = 1.9)	(M <sub>6</sub> = 3.6) (M <sub>7</sub> = 1.9)

APPENDIX 3. CONTINUED

		1. Behavioral Belief on 2. Attitude	3. Normative Belief on 4. Subjective Norm	2. Attitude on 7. Intention	4. Subjective Norm on 7. Intention	6. Perceived Behavioral Control on 7. Intention
1-4 pers	r	-0.010	0.085	-0.169 *	-0.011	-0.089
	n	187	187	187	187	187
	p	0.950	0.245	0.021	0.886	0.228
		(M <sub>1</sub> = 2.3) (M <sub>2</sub> = 2.1)	(M <sub>3</sub> = 4.1) (M <sub>4</sub> = 3.1)	(M <sub>5</sub> = 2.4) (M <sub>7</sub> = 2.0)	(M <sub>4</sub> = 3.1) (M <sub>7</sub> = 1.9)	(M <sub>6</sub> = 3.3) (M <sub>7</sub> = 1.9)
5-8 pers	r	0.474**	0.254**	-0.091	-0.016	-0.063
	n	145	145	145	145	145
	p	0.005	0.002	0.279	0.848	0.449
		(M <sub>1</sub> = 2.7) (M <sub>2</sub> = 2.8)	(M <sub>3</sub> = 3.6) (M <sub>4</sub> = 2.4)	(M <sub>5</sub> = 2.5) (M <sub>7</sub> = 1.9)	(M <sub>4</sub> = 2.4) (M <sub>7</sub> = 1.9)	(M <sub>6</sub> = 3.7) (M <sub>7</sub> = 1.9)
≥ 9 pers	r	0.402**	0.294**	-0.122	0.016	-0.244
	n	46	46	46	46	46
	p	0.047	0.047	0.421	0.914	0.102
		(M <sub>1</sub> = 3.0) (M <sub>2</sub> = 2.9)	(M <sub>3</sub> = 3.5) (M <sub>4</sub> = 2.6)	(M <sub>5</sub> = 2.3) (M <sub>7</sub> = 1.6)	(M <sub>4</sub> = 2.6) (M <sub>7</sub> = 1.6)	(M <sub>6</sub> = 4.1) (M <sub>7</sub> = 1.6)

*Grey cells indicate sub-group results do not reflect overall results.*

<sup>1</sup>Behavioral belief: 'reporting poaching will help me to gain more compensation' (1= extremely unlikely/ 5= extremely likely)

<sup>2</sup>Attitude: 'For me to report poaching is .... bad/good?' (1= extremely bad/ 5= extremely good)

<sup>3</sup>Normative belief: 'Poachers think I should not report poaching' (1= extremely unlikely/ 5= extremely likely)

<sup>4</sup>Subjective norm: 'Most people who are important to me think that I should report poaching' (1= extremely false/ 5= extremely true)

<sup>6</sup>Perceived behavioral control: 'I am confident that, if I wanted to, I could report poaching' (1= extremely false/ 5= extremely true)

<sup>7</sup>Intention: 'How often do you decide to report poaching?' (1= extremely rarely/ 5= extremely often)