Perceptions of gender dynamics in small-scale fisheries and conservation areas: a case study in the Pursat province of Tonle Sap Lake, Cambodia

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ABSTRACT

PERCEPTIONS OF GENDER DYNAMICS IN SMALL-SCALE FISHERIES AND CONSERVATION: A CASE STUDY IN THE PURSAT PROVINCE OF TONLE SAP LAKE, CAMBODIA

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Women’s contributions in small-scale fisheries of Tonle Sap Lake are often overlooked due to socio-cultural expectations of roles and responsibilities. I investigated whether there are differences between men’s and women’s perceptions of fishing and non-fishing practices, power, access, and control over fishing resources, and conservation and conservation areas in the Pursat province of Cambodia. I interviewed fishers and key informants and found that men more frequently acknowledged unequal power dynamics, access to, and control over fishing resources than women. Both groups had contrasting ideas of community fisheries and conservation. Fisherwomen believed they faced distinct challenges in conservation areas. Gender norms and community perspectives engrained specific roles and practices for women that limited more active participation. Future programs must be designed with detailed understanding of the ways that men and women perceive their engagement in fisheries and how norms may shape both opportunities that they have to actively participate in management.
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1. **Chapter 1: Introduction**

Small-scale fisheries, which can be defined as family or community-run operations that fish either coastally or inshore and use minimal technology and local market connections, are major contributors to global fish harvest (Mills et al., 2011). These operations, which typically use vessels under 15 meters long that operate manual fishing gear and simple machinery, catch fish for direct consumption at the household level and for income generation through fish trading (Shester and Micheli, 2011; The World Bank, 2010). While important, small-scale fisheries are often overlooked or misunderstood by academics, policy makers, and development and conservation practitioners.

Small-scale fisheries have been described as pillars in sustaining subsistence livelihoods and as employment that can alleviate poverty (Béné and Macfayden, 2007). Many marginal communities with few financial resources and low food security rely heavily on this form of livelihood as it requires low financial investment and can generate both food and income for the household (Roshko, 2011; Eriksson et al., 2015). Estimates of the number of working in small-scale fisheries are difficult to calculate. Andrew et al. (2007) suggests that as many as 40 million people are involved in small-scale fisheries worldwide; this number rises to 200 million if post-harvest work such as trading and processing are considered. However, other scholars such as Koralagama et al. (2017) contradict this estimation and argue that women alone account for 56 million people directly working in these fisheries.

Small-scale fisheries have often been described as male-dominated spaces wherein male practices often overshadow the roles of women in the industry (Koralagama et al., 2017). While men engage in more lucrative fishing activities, women often partake in relatively poorly paid
tasks related to cleaning, fish processing, and trading (Koralagama et al., 2007). These activities are often unrecognized and overlooked as invisible aspects of fishery work, and thus fishermen are typically considered household breadwinners (Koralagama et al., 2007). While women are often less acknowledged in small-scale fisheries, they make major contributions to fish harvests, fishing economies, and subsequently influence fish conservation. Harper et al. (2013) estimate in just the Pacific, the total revenue from small-scale fish harvests by women at 110 million USD, with an economic impact of approximately 363 million USD.

In addition to women’s contribution to the fishery economy, their roles in fisheries can also have drastic impacts on fish ecosystems and habitats. One example of this is fish gleaning, an activity often undertaken by women. This practice, which involves searching for shellfish in intertidal areas, can impact fish habitats by trampling shallow coral reefs and sea grass beds (Kleiber et al., 2015). Its impact was acknowledged in El Salvador, where fish gleaning in intertidal estuaries was previously banned for posing threats to offshore fisheries by disrupting fish breeding grounds (Kleiber et al., 2015). This is just one example of how women’s fishing activities can also have impacts on fish populations, albeit through practices that often go unacknowledged. However, the majority of fish management research and fishery statistics do not include the economic contributions and environmental impacts of fish gleaning (Fröcklin et al., 2013; Weeratunge et al., 2010). Community-based conservation initiatives that aim to address fishery challenges must understand the ways that gendered inequalities affect conservation practices, planning, and policies.

Community-based management has been widely recognized as a powerful tool in mobilizing and engaging rural communities to sustainably manage natural resources with
increasing environmental threats to fisheries (Leisher et al., 2016). Support for socio-cultural considerations in environmental management has been recognized as a way to address the shortcomings of traditional top-down forms of governance (Lau and Scales, 2016). Community-based management is particularly advantageous in alleviating development challenges facing rural communities while achieving environmental and conservation goals by including local opinions in decision making (Marschke and Nong, 2003). In fisheries literature, scholars turn to community engagement as a way to reduce fisher conflicts and improve local management practices (Nuon and Gallardob, 2011). However, management schemes are often limited in their ability to address underlying gender inequalities that disproportionately affect women’s access to and control over resources, resource use, and participation as key stakeholders (Leisher et al., 2006).

Awareness is growing regarding repercussions of gender inequality on poverty, unequal divisions of labour, and uneven power relations across a range of topics (Hillenbrand et al., 2014). In agriculture studies, scholars have widely recognized that women’s participation in farm training and agriculture extension is disproportionately low in developing regions (Ogawa, 2004). The importance of women’s roles in farming has also been largely neglected, along with their values, perceptions, and concerns (Parks et al., 2015). Similarly, small-scale fisheries research has largely focused on men’s fishing practices and perceptions, which discounts the significant contributions of women from household food security to the fishing economy to the sustainability of small-scale fisheries (Kleiber et al., 2015). In the Pacific, women are confined to using certain types of fishing methods and practices, such as gleaning, and were found to more frequently fish invertebrates while men more frequently fished vertebrates (Kleiber et al., 2015).
Transportation and time constraints are major limitations that restrict fishing areas and livelihoods available to women, not to mention existing cultural perceptions and household responsibilities that create additional barriers (Kleiber et al., 2015).

The Tonle Sap Lake of Cambodia provides a unique study area to understand interactions between gender dynamics and environmental protection. The lake’s hydrology sustains a plethora of wildlife and the livelihoods\(^1\) of 1.7 million men and women in Cambodia (Lamberts, 2006; Sithirith, 2005). Fishing is the dominant livelihood for most residents of the lake, as large harvests can be sold for income while families consume fish that do not reach the market (FAO, 2015). Subsistence fishing is often complemented with fish trade as fishers typically sell surplus catch as an additional form of income (The World Bank, 2010). Roshko (2011) notes that fish are an important capital that can be traded or sold for rice and other goods. As such, fishing can, in many cases, aid in poverty alleviation by being traded for other household necessities (Béné and Macfadyen, 2007). Particularly in vulnerable and marginal communities, fishing can contribute enormously to financial and food security as it requires low financial investment and a direct food source to households (Roshko, 2011; Eriksson et al., 2015).

Aside from the lake’s distinct ecological properties, small-scale fisheries in the Tonle Sap also provide opportune environments for studying gender and environment interactions as local communities take active roles in managing fisheries. Fisheries are community-managed spaces, although villagers often face challenges in gaining decision-making power in fishery governance and are susceptible to social, economic, and political marginalization (Ratner et al., 2014). In

\(^1\) This thesis will define ‘livelihoods’ as assets, activities and access to resources that collectively dictate the living gained by either individuals or households (Oberhauser et al., 2004).
conjunction with this, national fishery governance has transformed dramatically in the last century. After years of political conflict and war, entire communities have been displaced from their lands and many now rely on shared community fishery resources to maintain their livelihood (Ratner, 2006).

Tonle Sap faces increasing threats to fishing from both human influences and climatic factors (Nuorteva et al., 2010). Direct pressures such as overfishing and unsustainable fishing are dwindling fish populations while destroying fish habitats (Fitzgerald, 2013, Salayo et al., 2008, Allan et al., 2005). On the other hand, indirect threats like dam construction, deforestation, pollution, and agriculture damage environments that are key to the survival of native flora and fauna (MRC, 2010; Clements et al., 2010; Baran and Myschowoda, 2009; Parizeau, 2006; Heinonen). These changes are coupled with climatic changes that create unpredictable weather phenomena and change the lake ecosystem, further jeopardizing fish and other marine life dependent on them (IPCC, 2014; Nuorteva et al., 2010; Kummu and Sarkkula, 2008).

Increased migration towards the lake has contributed to overfishing, fish habitat destruction, and environmental degradation that threaten food security and livelihoods (Salayo et al., 2008). Moreover, climatic changes that alter the lake’s flow and seasonal predictability affect fish stocks and harvest opportunities (Nuorteva et al., 2014; Kummu and Sarkkula, 2008). In light of these concerns, both governmental and non-governmental actions have aimed to preserve the Tonle Sap ecosystem and its fisheries by promoting conservation and establishing conservation areas (Law of Fisheries, 2007; Conservation International, 2016). However, these initiatives do not necessarily address the persisting gender roles and cultural expectations that can serve as barriers to their participation and willingness to participate.
Political conflicts, poverty, and longstanding cultural traditions have contributed to Cambodia’s reputation as one of the lower-ranking countries in terms of gender equality in Southeast Asia (Chhoeun et al., 2008). Deep-rooted perceptions of gendered roles and stereotypes have constructed social boundaries that restrict men and women to preconceived responsibilities and practices. Moreover, fishery governance structures, such as community fisheries, often recreate these gendered spaces as women are seldom elected onto decision-making committees. As a result, most community fishery committees remain male-dominated (Resurreccion, 2006). Research on the perceptions of interactions between gender, fisheries, and conservation in the Tonle Sap Lake can reveal the concerns, challenges and responsibilities associated with each gender. In turn, this can lead to increased understanding of how gender dynamics intersect with small-scale fisheries and conservation management.

1.1. Research aims and objectives

While programmers and policy makers approach development challenges with good intentions, attention to the local norms and conditions that influence the roles and experiences of men and women is often lacking. Programs that seek to transform dialogues and culture around gender stereotypes must first understand the needs and perceptions of men and women from different stakeholder perspectives. Therefore, the overarching aim of this thesis is to explore perceptions of social factors relating to gender in small-scale fisheries and their impacts on men’s and women’s participation in Tonle Sap fisheries and conservation areas. In turn, this research aims to help guide programs and policies to better account for men’s and women’s needs and perspectives while transforming relations to address gender inequality.
The research presented in this thesis was partly inspired by previous research conducted in our research group that found results that contradicted literature findings. A previous research study, conducted between February and August 2015 by PhD Student Ratha Seng who is a collaborator on our major research initiative, explored livelihood adaptations to climate change in Cambodia. This household analysis, conducted in the Battambang and Kampong Thom provinces of Cambodia, found few differences between male-headed households and female headed households in fish catches during both wet and dry seasons. Similarly, Ratha Seng’s work revealed no significant differences between male-headed households versus female-headed households in their time spent on other types of work such as agriculture, off-farm jobs, and aquaculture. Ownership of resources such as boats and fishing gears were also similar between the two groups. These findings were contrary to my literature review, which suggested that women faced physical and social barriers that created different roles and practices between men and women. Participants from this study also reported high levels of participation of women in community fisheries, and that community fisheries actively engaged women in fisheries and decision making. Contrary to this, work by Resurreccion (2006) highlighted problems with assuming women’s unwavering willingness to participate in community fisheries and conservation without consideration of their perceptions, roles, and practices in the household and community. Moreover, participation does not necessitate power in decision making, and women participating in these spaces may face challenges that are not addressed in typical household level analyses.

Thus, due to conflict between the literature that led us to expect major gender-based differences and Ratha Seng’s data that did not show such differences, I sought to take a deeper
investigation of gender dynamics in villages associated with community fisheries and conservation. My research aim was to investigate perceptions of gender dynamics in small-scale fisheries and their impacts on male and female participation in fisheries and conservation. To do this my research objective sought to:

Explore whether there are differences and/or similarities between men’s and women’s perceptions with respect to 1) fishing and non-fishing practices, 2) power, access, and control over fishing resources, and 3) conservation and conservation areas in the Pursat Province of Cambodia.

Through understanding perceptions, I aimed to uncover whether there were differences between men and women in the way each gender perceived their own, and each other’s, fishing practices and behaviours. This research was conducted through two structured surveys in July of 2016 in four villages in the Pursat Province of Cambodia and focused on two specific types of fish conservation areas: government-managed and community-managed conservation areas. Details regarding methods will be covered in chapter three. This research was not intended to be a detailed gender analysis that observed actual behaviours and roles, but instead to offer insight into perceived gender norms and inequalities that future gender analyses and research can draw on. In turn, this work can contribute to preliminary understandings of the gender norms and inequalities existing in small-scale fisheries in the Tonle Sap, and be a backbone for further research that unpack the true needs, perspectives, and concerns facing fishermen and fisherwomen in these spaces. My hope was to apply this knowledge to improve current governance structures in managing conservation areas in the lake while addressing the concerns and needs of both men and women.
1.2. Thesis structure

This thesis is presented in a manuscript structure, and is separated into five chapters. The first chapter was a brief introduction and overview of aims and objectives and thesis structure. The second chapter provides extended literature on the three bodies of literature: (1) global contributions of small-scale fisheries and threats to freshwater fish; (2) gender dynamics in small-scale fisheries and barriers restricting women’s roles and capacity in fisheries; and (3) an overview of Cambodia’s changing fishery governance structure, Tonle Sap Lake’s unique ecology, and threats to fish decline. Chapter three is an extended methods section that includes in-depth explanations of methods and procedures used in my case study. It describes the two types of conservation areas that my case study focuses on, and two structured surveys conducted on fishers and key informants detailing: 1) fishing and non-fishing practices, 2) power, access and control of fishing resources, and 3) perceptions of community fisheries and conservation. Chapter four presents the manuscript “Perceptions of gender in small-scale fisheries and conservation: A Case Study in the Tonle Sap Lake, Cambodia”. This manuscript is designed as a stand-alone manuscript to be submitted to the journal Fish and Fisheries. The study’s main objective aimed to explore whether there were differences and/or similarities between men’s and women’s perceptions with respect to 1) fishing and non-fishing practices, 2) power, access, and control over fishing resources, and 3) towards conservation and conservation areas in the Pursat Province of Cambodia. Findings in this chapter contribute to preliminary understandings of perceptions of gender dynamics in small-scale fisheries, and create a backbone for future gender analyses to further explore underlying gender norms and roles that contribute to these differing perceptions. Chapter five covers research and practical implications, future research opportunities and an overarching conclusion. A bibliography and appendices section follows this
section. Appendix A is an extended literature review of gender-environment understandings that can help to explain academic understandings of women’s relations to nature. Appendix B describes research findings from previous research done by Ratha Sen that inspired this research on gender dynamics in small-scale fisheries. A copy of the individual fisher survey can be found in Appendix C. Finally, Appendix B is a copy of the key informant survey that was used in the case study.
2. Chapter 2: Extended literature review

This literature review is structured around three bodies of literature. The first is a discussion on small-scale fisheries at the global scale, decline in freshwater fish, and direct impacts of overfishing and unsustainable fishing on small-scale fisheries. The second body of knowledge distinguishes between ‘sex’ and ‘gender’ in the context of small-scale fisheries, and discuss women’s relation to fisheries, and societal expectations that present overlook and present barriers to performing these roles. The third body of literature reviews Cambodia’s past and current fishery governance structures, Tonle Sap Lake’s ecology and current conservation challenges that threaten fish populations, and conservation initiatives in place. These three bodies of literature serve as the scholarly backbone that aids in understanding gender dynamics in the Tonle Sap fisheries.

2.1. Global small-scale fisheries and threats to freshwater fisheries

This section will start by describing the significance of small-scale fisheries globally and move on to discuss its contributions to the fishery economy, food security and poverty alleviation. I then describe observations of global freshwater fish decline, and potential factors leading to this decline.

Although the precise statistics are difficult to obtain, it is thought that small-scale fisheries directly sustain the livelihoods of approximately 37 million people globally, and are sources of livelihood for approximately 90% of Asia’s population (FAO, 2017a). A Small-scale fishery can be defined as any fishing operation that uses a vessel under fifteen meters long, uses either manual fishing gear or simple fishing machinery, or is a family or community-run unit that fishes coastally or inshore and uses minimal technology and local market connections (Shester and
These operations are particularly prevalent in freshwater fisheries, which hold more than 13,000 freshwater species and account for 45% of fish globally (Ling, 2010). Freshwater fish harvest is substantial; the Food and Agriculture Organization of the United Nations estimates that 10 million metric tons of fish are caught per year not including unreported and unregulated fishing, with a large portion derived from small-scale fisheries (Taylor et al., 2016; Alves and Minte-Vera, 2013). However, other scholars argue that this number is substantially higher, as fish harvests from inland fisheries in Africa and Asia alone amount to 11 million tons (Cooke et al., 2016). In the Asia and Pacific region alone, fish harvests have risen by 1.6 million tons since 2004 (FAO, 2008).

Small-scale fisheries hold significance in alleviating poverty, generating income, and supporting food security (Barnes-Mauthe et al., 2013). While the Food and Agriculture Organization of the United Nations estimate that 37 million people are directly involved in small-scale fisheries, Andrew et al. (2007) suggest that as many as 200 million people are involved in some way. These tasks can include post-harvest work, fish trading, and fish processing (Andrew et al., 2007). Nonetheless, food security and the wellbeing of more than 500 million people are dependent on the state of small-scale fisheries around the world (Barnes-Mauthe et al., 2013). Of the estimated 36 million capture fisheries that exist, 97% are located in developing countries that face the greatest threats of food insecurity and poverty (Pomeroy and Andrew, 2011). Globally, fish account for 17% of the world population’s animal protein intake. This number rises to approximately 75% for the Cambodian population, making it a fundamental nutritional component of people in the nation (Ratner, 2006). However, limitations to governing small-scale fisheries lie in their fragmented roles in the fisheries sector, from fish harvest to
processing and market trade (Pomeroy and Andrew, 2011). As small-scale fishery associations and cooperatives are seldom in place to govern sustainable use of fish resources, the livelihoods of these fishers are easily threatened when fish are depleted (Pomeroy and Andrew, 2011).

The debate surrounding impacts of small-scale fisheries on fish stocks is controversial. Allan et al. (2005) state that the number of inland fishery landings have quadrupled, with a 3% increase annually since the 1950s. In Southeast Asia, fish stocks operate at between 5% and 30% of their normal levels (Salayo et al., 2008). In Cambodia, some argue that small-scale fisheries contribute little to ecosystem damage due to their low by-catch, minimal fish discard, and species-specific fish targets despite accounting for 60% of the nation’s harvests (Jacquet and Pauly, 2008). On the other hand, other scholars posit that the level of destruction from by-catch is variable and, in some cases, can eradicate entire populations of megafauna (Shester and Micheli, 2011). Freshwater fisheries are particularly fragile as freshwater biodiversity experience declines much faster than those of most terrestrial or saltwater systems (Reidy Lierman et al., 2012). Scholars postulate that this is due to the significant impacts of land use, nutrient inputs, sediment changes, and disposal of sewage waste on freshwater systems (Sala et al., 2000, Ricciardi and Rasmussen, 2001).

Overfishing has direct impacts on small-scale fisheries by depleting stocks and preventing stocks from replenishing. As the global population continues to rise, fisheries face ongoing pressures to intensify and keep up with growing food demands (Alliston et al., 2012). Mahon et al. (2008) note that overfishing occurs in both commercial and small-scale fisheries. Fishing down the food web – the fishing of large species down to small species – can eliminate large, slow-reproducing fish and leave remaining smaller species with rapid growth and quick mortality
to flourish (Allan et al., 2005). This phenomenon can be attributed to fisher preference for larger fish due to their higher market prices, which results in targeted fishing towards larger species (Roos et al., 2007). As the consequences of fishing down the food web take time to become visible, the effects of overfishing may not be immediately noticed due to the ability of catchers to change their target species and fishing methods before the absence of a species is noticed (Allan et al., 2005). Lack of monitoring may further exacerbate this situation as the true impacts of fishing down may not be accurately portrayed. In these ways, small-scale fishing can reduce biodiversity within the lake and reduce the abundance of certain fish species.

The use of certain fishing gears in small-scale fisheries also pose threats to fish populations. Bottom trawls, which are nets that are towed across the sea or lake floor to harvest fish and invertebrates, have been criticized for their destruction to the benthic habitat (Fitzgerald, 2013; Salayo et al., 2008). While gill nets have a better reputation for targeting smaller fish species through their small mesh size, multi-gear fisheries can catch a wide variety of species at different life stages, which can impact fish reproduction and stock density in the following season (Allan et al., 2005). Electric gear fishing, which uses electric currents to shock fish, are particularly damaging because they can exterminate entire stocks that would normally breed to replenish the stock in the next year (Ratner, 2006). Lost or broken fishing gears released into the water can trap organisms, a process known as ‘ghost fishing’ (Fitzgerald, 2013). The use of Samras (a form of fishing gear that holds sediment) can also increase erosion and sedimentation in the lake, resulting in decreased water depth and harm to fish habitats (Heinonen, 2006). In Cambodia alone, more than 150 types of fishing gears have been recorded, which all have their own impacts on the environment (Béné and Friend, 2011). While these inland fisheries are vital for food security and livelihoods and interact with a range of ecosystem services, their significance
on the sustainability of global fisheries and livelihoods are often absent from international policy making or government priorities (Cooke et al., 2016).

Aside from direct pressures like overfishing and unsustainable fishing, indirect impacts such as land pollution, changes in water flow, habitat destruction, and the introduction of invasive species also threaten fragile freshwater fisheries (Dudgeon et al., 2006). Improperly treated agricultural waste can also leach into soils and water, increasing nutrient levels and leading to algal blooms (Bonheur and Lane, 2002). This is particularly common in areas where cattle grazing and crop production are prominent, which increases the likelihood of chemical leaching into soils and water channels (Bonheur and Lane, 2002). In a broader sense, climate change can indirectly impact small-scale fisheries by changing annual temperature, humidity, and water levels, which can change water conditions in freshwater bodies (Badjeck et al., 2010). Changes in climatic conditions may also be more advantageous for some species over others, altering fish harvests by small-scale fishers (Badjeck et al., 2010). Climatic changes have been observed to even affect freshwater fisheries as far as the Arctic, which demonstrates the magnitude of change experienced by freshwater fisheries globally (Reist et al., 2006). These changes inevitably impact the countless small-scale fisheries directly dependent on freshwater fisheries.

2.2. Gender and small-scale fisheries: women’s roles and practices, and barriers to female participation

This second body of literature pertains to gender and small-scale fisheries with specific examples from Cambodia, and will be separated into four distinct themes. The first theme gender-related theme will provide a brief discussion distinguishing between the terms ‘sex’ and ‘gender’. This will be used to explain how gender binaries have established deep-rooted roles
and practices associated with men and women. Second, this review of literature on gender and small-scale fisheries will explore literature that attempts to understand women’s relation to nature, and how these ideas function in the context of small-scale fisheries. The third theme is regarding cultural expectations and societal perceptions of women’s roles in fisheries. Finally, these ideas will be applied to Cambodia and in this final section, I will discuss the influences of gender disparity on female participation in fisheries and fish conservation in Tonle Sap Lake.

The first theme I discuss is the distinction between ‘sex’ and ‘gender’, Arenas and Lentisco (2011) define sex as the biological and genetic characteristics that correspond an individual as being male or female. The use of sex as a parameter for determining gender narrowly discusses the implications of physiological differences between men and women impact their roles in fisheries (Branch and Kleiber, 2015). However, Nightingale (2006) argues that using gender instead can be helpful in understanding how differences between presupposed sexes are created. From this understanding, gender can be used as a parameter to understand differences in the power, knowledge, and relations between different subjects. Arenas and Lentisco (2011) further argue that gender can explore the societal understandings of men and women, which are subject to change depending on changing societal views.

The definition of gender remains contested and is debated by feminist theorists. Post-structuralist scholar Judith Butler describes gender as “the repeated stylization of the body, a set of repeated acts within a highly rigid regulatory frame that congeal overtime to produce the appearance of substance, of a natural sort of being” (Butler, 1999, p. 43). Harding (1986) suggests that gender can be viewed as an analytical category that society uses to group social activities versus being viewed as a result of merely reproductive sex. Understanding this
perspective can help to comprehend its effects on the outward expression of gendered work (Harding, 1986). While authors such as Fausto-Sterling (2005) describe an intricate connection between sex and gender, authors such as Lorber (1994) argue that people are constantly “doing gender” through repeatedly performing certain interactions that reaffirms society’s gender binary system. Moreover, some scholars in the gender-environment relations field have commented on the importance of re-conceptualizing gender itself, and moving beyond the essentialist gender binary, and being inclusive of its intersectionality with other forms of social difference such as class and ethnicity (Hawkins and Ojeda, 2011). Others have argued that these relationships transcend scale, and are visible in different situations and spaces (Hawkins and Ojeda, 2011).

Lorber (2004) describes gender as a performative process, where gendered identities are created through expressions of acts that society categorizes as characteristic of men or women. This interpretation of gender and the environment is helpful in understanding Cambodia’s context as it considers the importance of power relations in shaping human-environment relations, and allows for the exploration of social challenges at different scales of fisheries governance. While various understandings of gender and environment exist, I argue that the unique historical and cultural context of Cambodia requires an understanding of Cambodian society’s prevailing essentialist view of sexed bodies leading to a binary gender system. Through this lens, gender is often perceived as a linear expression of an individual’s biological sex, which is outwardly expressed as their gender (Smiler and Gelman, 2008). Subsequently, societal roles and characteristics of men and women are stagnant, unchanging, and fixed in relation to biological differences between sexes (Smiler and Gelman, 2008).
With these considerations in mind, my research asked participants to identify as men or women. I acknowledge that other gender identities exist in Cambodia and that using men and women as categories can risk ignoring these identities, and possibly alienate participants by enforcing gender dualisms. However, with the constraints of the rural context we worked in, where traditional taboos and cultural stigmas regarding non-binary genders were likely prominent, I felt it necessary to limit my definition of gender to men and women in order to explore possible differences and dynamics between these two groups.

The second theme of this body of literature pertains to contemporary understandings of women’s relation to nature particularly regarding perceptions of women as being inherently “closer” to nature, material practices that contribute to gender inequality, and how these ideas connect to women in small-scale fisheries. Debates regarding women’s relation to the environment have been longstanding, and are big drivers for development programs to enlist women in work with natural resource management. One popular ecofeminist argument is the idea of the intrinsic “closeness” of women to the environment (Resurreccion, 2006). Some ecofeminist scholars argue that women’s biology leads them to be more vulnerable to environmental destruction and have greater desire to preserve and conserve nature (Meinzen-Dick et al., 2014). Women have also been described as taking on nurturing maternal roles as “caretakers of nature”, which attributes their reproductive tasks like child care and housework to their connection with natural resources around them (Resurreccion, 2006). Based on these ideas, it is reasonable to assume that women in small-scale fisheries would inherently want to participate in fish conservation and sustainable fishing as it benefits both small-scale fisher families and the environment. However, critics of ecofeminism argue that the conceptualization
of gender and the environment essentializes women as one homogenous group with the same backgrounds, knowledge, and experiences of the environment (Meinzen-Dick et al., 2014; Nightingale, 2006). These perceptions of women also exclusively examine women’s relationship with nature and ignore the ways that men interact with their environment (Meinzen-Dick et al., 2014; Agarwal 1992). As such, the willingness of men to participate in fish conservation and sustainable fishing is effectively left out of the conversation when approached through ecofeminism.

Advocates of feminist environmentalism focus on the idea that gender and nature relations are sourced from the material practices and interactions (Meinzen-Dick et al., 2014; Agarwal, 1992). For example, daily tasks such as collecting firewood or water allows women to attain certain ecological knowledges that connect them to their environment (Resurreccion, 2006). In relation to small-scale fisheries, women become familiar with fish and their habitats through their diverse work in fish processing different fish species, gleaning fish near the shores, and trading fish worth different prices. However, the assumption that women’s participation in natural resource management is straightforward and unwavering is met with criticism (Resurreccion, 2006). This assumption does not account for uneven power relations within fisheries, community perceptions, and additional work that take up women’s time and restrict them from participating in activities such as fish conservation (Resurreccion, 2005).

Feminist political ecology critiques this idea by opposing the essentialist view of women’s inherent connection to the environment. Instead, scholars writing about feminist political ecology often posit that culture shapes gender roles, spaces, resources, power relations, and socio-political undertakings (e.g. see Meinzen-Dick et al., 2014; Nightingale, 2006). In this line of
thought, the centrality of power is determined by social factors that are influenced by gender biases, which in the case of fisheries, places male fishers at positions of power that allow them to decide how women can participate in fishery activities (Fröcklin et al., 2013). This is magnified by women’s restrictions to the least lucrative fishing activities that places them low on financial contribution to the household. Feminist political ecology is particularly critical in addressing the critique that gender-environment studies focus more on the environment than gender issues (Nightingale, 2006). Nightingale (2006) argues that while environmental issues produce inequalities between men and women, gender inequalities also lead to environmental impacts. These processes, being inseparable, manifest through gendered divisions of work, discourse, and performance (Nightingale, 2006). In the fisheries context, men and women relate to fishing and fish conservation differently based on the roles they perform, their experiences with power in fishery management, and their encounters with access and control over resources. Within the fisheries and aquaculture literature, little research is focused on social, cultural, health, and educational disparities between men and women (Weeratunge et al., 2010). Small-scale fisheries researchers can improve their understandings of gender disparities by being attentive to feminist political ecology ideas on how socio-cultural factors shape power relations, access, and control. Thus, my research attempts to bridge some concepts from feminist political ecology with my data on perceptions of fishing and conservation practices. These findings may in turn speak to underlying gender norms that contribute to the production of gendered roles that further gender analyses can investigate.

The final theme of this body of literature pertains to community perceptions and cultural expectations that may pose barriers to female participation in fisheries and environmental efforts.
Small-scale fisheries have complex cultures and traditions unique from other livelihoods that require intersectional approaches to understand (Deb et al., 2015). However, the importance of culture and tradition to fish catch and small-scale fisheries management is often overlooked despite their impacts on the way it shapes men’s and women’s roles in fisheries (Kleiber et al., 2015). Lasting cultural perspectives often disregard the importance of women in the fisheries and have been found in some cases to affect the participation of women in conservation (Milne and Mahanty, 2015; Fröcklin et al., 2013). For example, gleaning shellfish and intertidal fish near the shorelines is not often considered ‘real fishing’ by fishing communities and instead considered part of food gathering (Harper et al., 2013). Participation in fisheries or fish programs are also influenced by financial situations, household dynamics, or persisting gender stereotypes in the community (Weeratunge et al., 2010). Societal considerations of women’s specific needs in fisheries is largely lacking. In Europe, only some European Union members have legislations in place that offer social benefits, maternity leave, and health care to women in fisheries, which disregards the needs of women working in fishery operations (Harper et al., 2013). Similarly, in Africa, women’s role in the distribution of fish through fish trading is critical to African fisheries and international trade (Harper et al., 2013). However, recognition of fish trading as an important component of the fisheries economy is traditionally non-existent.

Gender disparity is pervasive in Cambodia, as the nation ranks 109th out of 148 nations in the Gender Inequality Index (Maxwell et al., 2015). Reasons for this have been attributed to political conflicts, marginalization of impoverished groups, and traditional cultural perceptions of women as lower in rank than men (Chhoeun et al., 2008). Lilja (2013) explains that while women once held important political roles in Cambodia, this was changed during the late 19th century when
the upper class began describing women as occupying a subaltern role, and changed literature to
emphasizes these ideas (Lilja, 2013). This has persisted in contemporary teachings, where
“chhab srey” or “rules for girls” are still taught in school curriculums, which encourage girls to
be submissive, patient, and ‘good wives’ by obeying their husbands (Eng et al., 2010; Eng et al.,
2014).

Many scholars acknowledge that prevailing societal ideas of men and women affect the way
Cambodians interact with the environment and engage with ideas such as conservation. For
example, one study by Weeratunge et al. (2010) found that women were willing to participate in
community-based management programs focused on savings, credits and self-help programs, but
were indifferent towards taking leadership in decision-making committees. Factors such as
gender stereotypes, position in the household and financial status influenced their position on
program participation (Weeratunge et al., 2010). Additionally, participants listed gender
disparity, unequal access to education, social norms and difficulty balancing productive
workloads with reproductive workloads as factors affecting their participation in community-
based management programs (Weeratunge et al., 2010). Other scholars argue that society’s
perceptions of gendered roles affect the engagement of men and women in environmental efforts.
According to Chhoeun et al. (2008), Cambodian women are expected to stay at home and care
for the family once married. A 2005 Cambodia Demographic and Health Survey revealed that
42% of household survey respondents believed that married women should not be permitted to
work outside the household (Eng et al., 2010). As a result, these prevailing social norms can
reduce opportunities for women to engage with environmental initiatives such as fish
conservation. Thus, natural resource management programs that seek to mobilize women can
instead recreate gender inequalities if the needs and perceptions of women are not addressed mindfully.

2.3. Cambodia’s fishery regime and the Tonle Sap Lake

This body of literature covers three overarching themes. The first is a description of Cambodia’s continually changing fishery governance structure, including the nation’s previous fishery regimes and its current arrangement of community-managed community fisheries and its work with the government fisheries division. Second, I discuss the ecological significance of the Tonle Sap lake and threats to the system’s sustainability. A final theme is a discussion on current conservation initiatives and conservation areas in the lake.

Cambodia’s fishery regime has changed dramatically in recent decades, from the creation and abolishment of their century-old fishing lot system, to the establishment of formalized co-management (sometimes used interchangeably with community-based management) programs across the region (Sithirith, 2015; Sok et al., 2012). Each management system impacted the lake differently by altering the relationship between the state and local communities, and created its own set of challenges in fish conservation. These changes created a natural setting to understand the interplay between gender and environment by exploring community management of fisheries.

Before fisheries co-management was in place in Cambodia, a “fishing lot” system was used which dated back to the early 1900s (Sithirith, 2014). The fishing lot system functioned through the auctioning of exclusive fishing rights of certain plots of fishing areas to buyers (Resurreccion, 2008). Fishing lot sizes were variable and were marked using anchors or formal
sectioning of water (Sok, 2014). This form of governance was used pervasively in Cambodia for over a century before being abandoned during the Khmer Rouge regime between 1975 and 1981 (Resurreccion, 2008). Fishing lots were briefly re-introduced during the establishment of the People’s Republic of Kampuchea (Resurreccion, 2008). However, re-introduction was met with resistance and conflict were frequent between local fishers, private lot owners, and local authorities who fought over rights to fishing areas and floodplains (Resurreccion, 2008). Fishing lots also created unstable conditions for fishers, as lots were regularly auctioned off every couple years, and lack of concrete lease agreements encouraged many lot owners to intensify their catch through the use of illegal fishing gear (Sokhem and Sunada, 2006; Resurreccion, 2008). This added to mounting pressures on the nation’s fish supply and conservation challenges, particularly around the Tonle Sap Lake (Resurreccion, 2008). The lot system also created challenges for marginal fishers that were unable to buy lots and had to fish in less fish-abundant areas. Fishers who had no access to lots became frustrated with decreased catches and unfair distribution, which further contributed to disputes (Sok, 2014).

As tensions with lot owners and local fishers grew, the government issued the first of two fishery reforms in year 2000, where 56% of private fishing lots were reallocated to local people as ‘community fisheries’ and communities were given the power to manage fishery stocks (Resurreccion, 2008; Sok, 2014). This reform aimed to reduce the number and size of privately owned fishing lots and promote conservation efforts around Cambodia’s fisheries through community based management (Nuon and Gallardo, 2011; Dina and Sato, 2014). Consequently, Cambodia’s fishing areas were split into privately owned fishing lots, community-shared fishing lots, and open access fishing areas (Resurreccion, 2008). In the same year, the Community
Fisheries Development Office (CFDO) was created to supply scientific knowledge to the government and support, monitor, and govern community fisheries (CFDO, 2004). However, the reform did not dispel allegations of corruption within the fishery, as fishers accused fishery operators of restricting local access to fish abundant sites and allowing the use of illegal fishing methods (Dina and Sato, 2014). A second reform was enforced in 2012 which redistributed 77% of former fishing lots to communities, while 23% were set aside for conservation purposes (Dina and Sato, 2014). This arrangement acknowledged the agreement made between the state and local communities to co-manage the now formalized ‘community fisheries’.

Several terms have been used to describe the community-based management of Cambodia’s fisheries, including ‘community fisheries’, ‘community based fisheries’, and fisheries co-management’ (Fennell et al., 2008). Community fisheries were designed to include local people into conservation and sustainable fishing management schemes (MRC, 2010). In 2005, 284 community fisheries were established in the Tonle Sap lake alone, while a total of 440 community fisheries were dispersed throughout the Mekong Basin (Sok et al., 2012). In my study of the Pursat Province, a total of 57 community fisheries exist, consisting of 22 rice-patty community fisheries and 35 regular community fisheries. It was assumed that joint management of fisheries between local communities and the government would encourage conflict resolution between groups and reduce friction between fishers (Resurreccion, 2006). Policy makers, however, did not consider that converting private fishing lots to community fisheries could lead to increase illegal fishing and overfishing due to poor regulation enforcement and governance (Dina and Sato, 2014). Most community fisheries today face inadequate funding and are depending on financial support from non-governmental organizations or independent donors.
(Dina and Sato, 2014). Moreover, questions still linger as to how community-based fisheries management can be improved to effectively manage fish populations while providing adequate support to fishers (Ratner, 2006). Each community fishery ideally sets aside a small area as a “conservation area”, to conserve particular fish species and stocks (Sokrith Heng, personal communication March 23, 2016). However, state funding of these spaces is often limited and these conservation areas often poorly maintained (Dina and Sato, 2014). Its impacts on conservation are also contested. For example, Dina and Sato (2014) argue that challenges such as illegal fishing and overfishing remain due to weak enforcement of conservation regulations.

Government staff from Cambodia’s Fisheries Administration also work on the ground in the floating lake to oversee day to day operations in the Lake, and monitor Fisheries Administration’s designated conservation areas.

The second theme in this body of literature relevant to Cambodian fishery governance is the ecological significance of this system and threats to its sustainability. The Mekong River is one of the largest rivers in the world, spanning five countries in Southeast Asia (MRC, 2004). The Upper Mekong runs through China and Myanmar, and connects to the Lower Mekong, which includes Laos, Vietnam, Thailand, and Cambodia. The Mekong Basin generates an average of 2.5 million tons of fish annually and is home to many endemic species (Kingston et al., 2011; Sneddon and Fox, 2012). Within the basin lies the Tonle Sap Lake, often considered Southeast Asia’s largest freshwater lake and fourth most productive inland fishery in the world (Bonheur and Lane, 2002). While approximately 149 fish species have been identified in the Tonle Sap Lake, some scholars estimate up to 1,200 fish species living in the Mekong River migrate through this lake at any one point in their life cycle (Allan et al., 2005; Campbell et al., 2006).
The system experiences two distinct seasons – the wet season that usually lasts from May to November, and the dry season that persists for the rest of the year (Varis and Keskinen, 2006). The lake spans approximately 250,000 hectares during the dry season but can increase up to 1.25 million hectares in the wet season (Bonheur and Lane, 2002). Fluctuations in rainfall between dry and wet seasons leads to seasonal contraction of the lake system during flooding seasons. During the wet season, the body of the lake increases by five-fold and disperses fish throughout the water column (Bonheur and Lane, 2002; MRC, 2004). As water levels recede, fish are forced into channels, streams, and rivers where they are harvested in large quantities (MRC, 2004). The system also reverses in flow during the wet seasons, which is an important time for fish harvesting, as the majority of fish migrate through the lake (Bonheur and Lane 2002). The annual “Water Festival” celebrates this yearly resurgence of fish to communities (MRC, 2004). Thus, the seasonal flood pulse in the Tonle Sap system plays a critical role in fish abundance and ecosystem health by providing nutrients and spawning habitats, and filtering impurities in the water (Mensher, 2006). Entire floating villages move in and out of flooded forests between seasons to account for fish migrations and fluctuations in fish stocks.

In recent years, climate change and anthropogenic activities have become a growing threat to the Tonle Sap ecosystem and to the fishing communities dependent on it (Nuorteva et al., 2010). Salmivaara et al. (2016) explain that communities living in the Tonle Sap Lake, like many flood plain inhabitants, face considerable challenges when their physical environment changes due to the strong community dependence on the local ecosystem to sustain their society. Cambodia is a particularly unique environment to study the impacts of environmental protection
initiatives as the nation is largely aid-dependent and has relatively low adaptive capacity to climatic and environmental changes in fish stocks (Marschke et al., 2014).

A growing body of literature suggests that climate change will have severe impacts on the Mekong Basin and its ability to sustain the food and livelihood necessities of lake inhabitants (Kingston et al., 2011). These climatic changes increase the unpredictability of wet and dry seasons and alter water levels and water flow (Kummu and Sarkkula, 2008). Unusual flooding patterns, changes in flooded areas and pulses can pose threats to fishing opportunities and reduce land available for agriculture (IPCC, 2014; Nuorteva et al., 2010). In other cases, increased rainfall can cause flooding and change the flow of water impacting floodplain vegetation, fish habitats and human infrastructure (Kummu and Sarkkula, 2008; Nuorteva, 2010).

Aside from climatic factors, human activities have significant impacts on the structure and functionality of the lake. Firstly, increasing human migration towards the Tonle Sap creates growing demands on food, infrastructure and resources that affect the lake’s productivity (Salmivaara et al., 2016). Overfishing is a concern, particularly with the increasing number of people migrating towards the lake from 360,000 to over 1.2 million people between the 1940s and the 1990s (Allan et al., 2005). In Cambodia, many are worried about fish depletion as more people migrate to the Tonle Sap fisheries for better fish access, which affects fish supply and threatens food security, local livelihoods, and sustainability (Salayo et al., 2008). However, unsustainable extraction of fish species can have detrimental impacts on both fish and people dependent on them. In the case of Tonle Sap, some large, migratory species were heavily fished to extirpation while only small species of fish were left to grow (Allan et al., 2005). The Cambodian government has also been concerned about the types of gears used in these fisheries,
such as bottom trawls and electric shock gears, and have established laws that prohibit the use of gears and techniques that destroy fish habitats or reduce water quality (Fisheries Administration, 2007). Other methods like pumping, draining, or adding toxic substances to in order to acquire fish have also been deemed illegal (Fisheries Administration, 2007).

Activities such as dam construction, deforestation, and pollution drastically impact lake characteristics by altering wildlife habitat, water quality and flow, and fish abundance (Varis and Keskinen, 2006; Seak et al., 2012). Silt can accumulate upstream when dams are built, strengthening water currents and destroying fish habitats and human infrastructure (Cronin, 2011). Dams can also block fish migration roots and reduce water flow, which can have detrimental impacts on the 87% of migratory fish that live in the region (Baran and Myschowoda, 2009). Several dams are being constructed in the Upper Mekong, with another half dozen dams proposed for the Lower Mekong in Laos, Cambodia, and Thailand, which threatens the Tonle Sap Lake by storing large volumes of water and altering seasonal inflows (Cronin, 2011). Deforestation is another anthropogenic factor that is expanding largely due to demand for land expansion for infrastructure development, roads, and agriculture (Clements et al., 2010). However, this process can increase lake siltation and reduce water depth as flooded forests are vital in retaining sediment (Heinonen, 2006). Improper waste disposal by factories and settlements can further reduce the quality of the ecosystem and jeopardize plant and animal populations (Heinonen, 2006; MRC, 2010). Non-recyclable waste is typically burned, buried, or discarded into the lake, which pollutes the water and fish habitats (Parizeau, 2006). In light of these concerns, Cambodia has undertaken various attempts at conservation to preserve fishing practices and environmental sustainability.
The third theme in this exploration of the literature on fisheries in Cambodia relates to scholarship on the effect of current conservation initiatives. While the term ‘conservation’ can have multiple definitions, this study will follow the definition offered by International Union for Conservation of Nature (2016), which defines the term as “the protection, care, management and maintenance of ecosystems, habitats, wildlife species and populations, within or outside of their natural environments, in order to safeguard the natural conditions for their long-term permanence”. As such, for the purposes of this study, conservation follows this definition and is considered processes that aim to address challenges facing the ecosystem and wildlife in these regions. Kleiman et al. (2000) suggest that conservation programs should be evaluated by assessing both the objectives achieved and the processes used to achieve these objectives. However, success in meeting conservation goals does not necessitate achieving community goals or garnering local support and thus conservation should also involve community level engagement (Kleiman et al., 2000).

In an effort to recognize the ecological, political, and social significance of the Tonle Sap Lake, the Cambodian government established the system as a “multiple use area” in 1993 under the Royal Decree on Protected Areas (Campbell et al., 2006). In 1997, the United Nations’ Educational Scientific and Cultural Organization established the Tonle Sap as a biosphere reserve, while three core areas of the lake were designated as long-term protection and ecosystem conservation areas (Campbell et al., 2006). In addition, eight fish sanctuaries operate within the Tonle Sap Lake (Sithirith, 2015). As of 1993, several protected areas were also established, although the success of these areas in addressing conservation objectives with regards to local livelihoods is controversial due to lack of research and consideration of local
ecology (Clements et al., 2010). Other conservation initiatives include the establishment of a ‘payments for ecosystem services’ program jointly by the Ministry of Environment, Ministry of Agriculture, Forestry and Fisheries and an international NGO in 2002 (Clements et al., 2010).

In addition to top-down established fish protection areas, two types of conservation areas have been established in Cambodia (Table 1). Firstly, a series of formal conservation areas were established around the Tonle Sap Lake by the Cambodian government, with the overarching objective of recovering and sustaining fish stocks (Milne, 2014; Chadder, 2015). These Government-managed conservation areas (termed ‘Loh Bamrong’ in Khmer, which translates to reserved fishing lot or fish sanctuary zone) are defined by Cambodia’s Fisheries Administration as “habitats for flora and fauna” (Fisheries Administration, 2007). These areas are jointly governed by the Ministry of Environment and Fisheries Administration, and are patrolled by government staff, police, guards, and soldiers to monitor for illegal fishing activities (Brunner, 2014). However, financial support for managing these areas is lacking, and the challenge of funding full time patrollers and overall maintenance of these areas persists (Brunner, 2014). Moreover, the respective roles of the Ministry of Environment and Fisheries Administration overlap and conflict, which makes management of these areas complicated (Milne, 2014). Although the Fisheries Action Coalition Team report the existence of more than fifty government-managed conservation areas, Brunner (2014) argues that very few are sufficiently maintained. Despite this, government-managed conservation areas have been established in all five provinces the Tonle Sap (Brunner, 2014).

Aside from government-managed conservation areas, the government also established community-managed conservation areas in villages, which are managed by village community
fisheries, often with the help of NGOs (Table 1). These community-managed areas are considerably smaller than the government-managed conservation areas, and tend to be attached or close to the village it is managed by. During the dry season, fishers are prohibited from fishing in these areas as fish are given time to spawn and grow. When water levels rise in the wet season and flood these conservation areas, fish are able to move from conservation areas out to the lake, where fishers are able to harvest them. Community-managed conservation areas hold importance for both floating villages and in land villages as it represents a huge source of nutrients for nearby rice patties, and even fishers that don’t exclusively live on the lake can reap the spillover effects of the conservation areas during flooding seasons.

Although the creation of both types of conservation areas involves the participation of the state, there are a few key differences between community-managed conservation areas and government-managed conservation areas (Table 1). Firstly, government-managed conservation areas are much bigger in size than community-managed conservation areas. These areas are typically marked by a long post in the water and are patrolled by government staff at their floating station. On the other hand, community-managed conservation areas are patrolled by volunteer community fishery members and villagers. One major difference in the way these areas are patrolled is that only government-staff patrollers are legally allowed to arrest illegal fishers, while patrollers from the community do not hold this power. This easily creates conflicts between illegal fishers and community members that aim to protect the conservation area but have no legal power to enforce fishing rules. Through personal communication with villagers, I learned that a new legislation is being created to charge fees for fishers fishing outside of their respective villages to monitor cross-community fishing.
There is growing popularity among conservationists, scholars, state, and non-governmental actors to incorporate local communities in monitoring and managing conservation (Seak et al., 2012; Agarwal, 2001). Central to this notion is the idea that decision making should involve those that are most affected by proposed management schemes (Agarwal, 2001). In Cambodia, community fisheries represent an opportunity to engage local communities in sustainable fisheries management. However, a common assumption is that the inclusion of local peoples into conservation programs will promote greater public support for conservation and increase the success of conservation activities (Goodwin, 1998). As such, local participation can be viewed as a tool to both validate community support for conservation and provide opportunities for locals to participate in decision making (Goodwin, 1998). However, ignoring social issues like gender inequality can lead to interventions that do not fully address the needs of all those who are affected.
Table 1 Description of government-managed and community-managed fish conservation areas.

<table>
<thead>
<tr>
<th></th>
<th>Government-managed conservation areas</th>
<th>Community-managed conservation areas</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Established by:</strong></td>
<td>• Ministry of Environment</td>
<td>• Ministry of Environment</td>
</tr>
<tr>
<td></td>
<td>• Fisheries Administration</td>
<td>• Fisheries Administration</td>
</tr>
<tr>
<td></td>
<td>• Local community fisheries</td>
<td>• Local community fisheries</td>
</tr>
<tr>
<td><strong>Managed by:</strong></td>
<td>• Ministry of Environment</td>
<td>• community fishery members</td>
</tr>
<tr>
<td></td>
<td>• Fisheries Administration</td>
<td>• Elected committee members</td>
</tr>
<tr>
<td></td>
<td>• Local government staff</td>
<td>• Volunteer villagers</td>
</tr>
<tr>
<td><strong>Patrolled by:</strong></td>
<td>• Government staff</td>
<td>• Community fishery members</td>
</tr>
<tr>
<td></td>
<td>• Soldiers</td>
<td>• Elected committee members</td>
</tr>
<tr>
<td></td>
<td>• Police and guards (allowed to arrest)</td>
<td>• Volunteer villagers</td>
</tr>
<tr>
<td></td>
<td>• Volunteer patrollers</td>
<td></td>
</tr>
<tr>
<td><strong>Notes</strong></td>
<td>• Fishing prohibited all year</td>
<td>• Fishing prohibited year round</td>
</tr>
<tr>
<td></td>
<td>• Large areas spanning several hundred kilometers</td>
<td>• Small areas near village or community fishery</td>
</tr>
</tbody>
</table>
3. **Chapter 3: Extended methods**

To understand gender relations with respect to small-scale fisheries and conservation, I conducted a case study exploring men’s and women’s perceptions of fishing behaviours in fisheries and conservation areas in the Pursat province of the Tonle Sap Lake, Cambodia. Figure 1 shows the location of the Pursat Province in relation to other provinces surrounding the Tonle Sap Lake. This section will start by describing the two types of conservation areas that were explored in this study. I then discuss the study areas where interviews took place. I then move on to discuss the design of the two surveys, followed by participation selection, and how I selected and trained research assistants. Finally, I discuss how survey results were analyzed.

3.1 **Government-managed vs community-managed conservation areas**

Two types of conservation areas – government-managed and community-managed – were explored in this study. To interview government staff in the key informant surveys, interviews were conducted in the Kandieng and Krakor District where two government-managed conservation areas were located. These two areas were within boating distance to the four villages I conducted the remainder of the interviews. Government-managed conservation areas are managed and patrolled by a combination of state police, soldiers, government staff, and lake rangers. These areas differed from community-managed conservation areas particularly in size, as government-managed conservation areas span several hundred square kilometers.

The other type of conservation area I explored pertained to those managed by community fisheries. These conservation areas were located in the four villages mentioned above. A total of 57 community fisheries exist in the Pursat province, of which I investigated four. These four were selected as they were the only community fisheries with women in their committees, or had
existing partnerships with our research NGO partner Conservation International, which allowed us to enter the villages and conduct interviews. While both the villages and the community-managed conservation areas of Anlung Reang and Srey Cheok existed exclusively in the lake all year round, the community fishery of Kampong Prak was located on land while its conservation areas and associated village resided in the lake. This phenomenon is due to the fact that some villagers resided on land but still depend on the lake’s resources, and villagers could still be elected as committee members even if they resided on land near the floating village. Similarly, O’taprok’s floating village was located on the water while its community fishery was located on land. Kampong Prak had two conservation areas with one residing on land and one in the lake. The O’taprok community fishery managed two conservation areas, one on land in a rice field and the other in the lake. During the rainy season, floods allowed juvenile fish that had been spawning in the rice field conservation area to be flushed into the lake. This allowed fish to be protected during dry seasons and repopulate the fish during the rainy season.

We created two structured surveys to investigate whether there were gendered differences in: 1) fishing and non-fishing practices, 2) power, access, and control over fishing resources, and 3) perceptions of conservation and conservation areas. Structured surveys were useful in conducting face-to-face interviews as it allowed for specific question and themes to be discussed in a concise manner (Weller, 2015). These surveys were geared towards the exploration of fishers and their relation to community-managed conservation areas and government conservation areas. Firstly, a key informant survey was used to interview: 1) government staff managing government-managed conservation areas, and 2) community fishery committee members managing community conservation areas. The second survey was an individual fisher
survey intended for village fishers. All participants from both surveys were involved in fisheries in some way. Both surveys consisted of short answer and multiple-choice questions and were conducted through face-to-face interviews (see Figure 3).

Figure 1 Map of Pursat province in relation to other provinces surrounding Tonle Sap Lake, Cambodia.
3.2 Study area

Data collection took place between July 6th and July 30th, 2016 in four main villages the Pursat Province of Cambodia (Figure 2). Pursat has been previously described by Bond (2015) as containing one of the longest coastline in the Tonle Sap Lake. Villagers in these areas are highly dependent on fishing as a livelihood (Bond, 2015). Scholars such as Yen et al. (2009) reported an increase in fishing gears used but a decline in fish catch, which made this a particularly interesting study area. As will be discussed in the next section, these villages were selected based on the presence of women in their community fishery committees and their partnerships with our partnering NGO Conservation International. Key informant surveys took place in the Kandieng and Krakor Districts of Cambodia (Figure 2). Individual fisher surveys took place in four main villages in the Krakor district: Kampong Prak, O’taprok, Anlung Reang, and Srey Cheok (Figure 2). A total of 230 households resided in these four villages: 63 households in Kampong Prak, 50 in O’taprok, 68 in Anlung Reang, and 49 in Srey Cheok. Interviews took place in various areas including participant’s homes, boats, floating government offices, and on land. The four community fisheries existed in these four villages and were managed by their respective community fishery committee members.
3.3 Survey design

Our two surveys were designed to investigate the perceptions of men’s and women’s behaviour in the fisheries and conservation areas. Both surveys asked participants to identify as either men or women. The key informant survey was directed towards knowledgeable informants including government staff and community fishery committee members (See Appendix C for key informant survey). This survey began by identifying the participant’s role in the conservation area (either government-managed or community-managed) and his or her knowledge of the
conservation area. Questions included whether organizations supported the creation of conservation areas, gender-specific projects that organizations held in these villages, and their impacts on men and women. It also asked about the role of the government in supporting conservation areas, the presence of illegal fishing, and duties involved in managing and patrolling conservation areas. One important question I asked was the number of male and female staff in the participant’s community fishery conservation area. The survey then moved on to ask about differences in men’s and women’s fishing practices, activities performed, and perceptions of training needed for men and women. A final section asked about challenges that men and women faced in conservation areas, and whether opinions by men and women were heard.

The fisher survey was catered towards village fishers, in attempts to understand their perspectives on gender dynamics in fisheries and conservation areas (See Appendix D for fisher survey). This survey with questions about the participant’s education, past participation in development programs, perceptions of the purpose of conservation areas, and observations of illegal fishing. It then presented questions about the frequency of patrolling conservation areas, and whether participants felt there had been a decline in fish in the past half decade. The survey moved on to investigate fishing practices, whether the participant fished alone, reasons for not fishing alone, other activities that took up time, and activities that men and women engaged in, respectively. Another section asked whether participants believed men and women had equal access to fish, how access has changed, and if power and control of fisheries were equal between genders. The survey then asked about fishers’ attitudes towards fish conservation, whether they believed it was important, past participation in conservation projects, and whether they believed
conservation could be an alternative livelihood. Finally, participants were asked about the
greatest challenges they faced in conservation areas, possible reasons for not wanting to
participate in conservation, and whether their opinions about fish conservation were heard.

Certain fishing-related variables were important in designing survey questions. Previous
scholars have identified certain fishing-related variables to be different between men and
women, which I used in considering the types of variables to analyze in both surveys. One
example of this was found in Kawarazuka and Béné’s (2010) study, where they found that men
were involved in the majority of fishing activities, while women more often engaged in
background work such as fish processing and fish trading. This inspired us to ask about men’s
and women’s perceptions of each group’s fishing practices. Other important variables were
related to the types of activities that men and women performed such as fish processing, other
household work, and managing finances.

3.4 Participant selection

I selected villages for this study based on criteria that they were the only villages with
women in their community fishery committees, or had prior relationships with our partnering
NGO, Conservation International. In the Pursat province, only four villages (mentioned above)
had women committee members in community fisheries. Moreover, all villages had pre-existing
relations with Conservation International, which allowed my team the opportunity to enter these
villages and get village chief approval to conduct my interviews. It was important to have
existing relationships with these villages through Conservation International, as it allowed us
access to enter the villages and speak with village heads for permission to conduct my study.
Since there were very few women in community fisheries, we interviewed all community fisheries that had women in their committees, which in the Pursat province were five women.

Key informant participants were chosen through purposive sampling (Figure 3). A total of 30 participants were selected to answer the key informant survey. Participants were grouped as government staff that managed government-managed conservation areas and community fishery committee members that managed community-managed conservation areas. Two clusters of government staff existed in Pursat, one in the Kandieng district and one in the Krakor district. Twenty-one staff worked in the Kandieng district while 22 staff worked in the Krakor district. None of these staff were women; thus, none of the government staff I interviewed were women. In each district, I randomly selected 5 government staff to be interviewed using the key-informant survey, leading to a total of 10 government staff. With regards to community fishery committee members in the Pursat province, 15 men and 5 women from community fishery committees from the four main villages mentioned above were asked to participate in this survey. Only 5 women were selected as they were the only women who worked in these community fisheries. Thus, the number of men and women committee members interviewed was different in each village. These women had been elected onto the community fishery committee. A total of 15 male community fishery committee members were chosen in these villages. I chose to interview 3 male community fishery committee members in each village due to time constraints (Figure 3). The reason that 6 men were interviewed in O’taprok were because there were two divisions in this community fishery and thus I interviewed three male participants from each division. Only three men and no women were interviewed in Kampong Prak due to lack of women in its community fishery. Although Kampong Prak did not have any community fishery
committee members that were women, I selected this community fishery due to their ease of access and proximity to nearby villages that my research assistants interviewed.

Village fishers were selected for the fisher survey through a two-stage sampling approach (Figure 3). First, lists of all men and women fishers in each village were acquired from Conservation International. Then, seven men and seven women were randomly selected from each village list to participate in the survey, which leading to total of 56 participants (Figure 3). This number was selected due to the time constraint I had on data collection, as my team was restricted to 24 days of data collection. Moreover, I decided to interview an equal number of men and women as the key informant survey did not allow for an equal sampling of both men and women. An equal sampling may reflective in representing men and women’s perspectives and more accurately portray key differences between these two groups.
Figure 3 Participant selection for 1) the key informant survey and 2) the fisher survey.
3.5 Research assistants

Two research (one man and one woman) assistants were recruited from Battambang University to assist in a range of tasks from conducting face-to-face interviews and translations to speaking with locals and navigating around the local villages. These assistants had previously conducted the 2015 household analysis research (see Appendix B for details) and were familiar with the scope of our research group’s interests in food security and livelihoods in the Tonle Sap Lake. As the gender of my assistants could have created interviewer-induced biases or affected the level of comfort of my participants (Clifford et al., 2010), one woman and one man were selected as assistants. During interviews, assistants conducted interviews on participants of their respective gender. For this same reason, it was also important that I recorded the age and ethnicities of my assistants (Clifford et al., 2010). My research assistants translated both surveys from English to Khmer, Cambodia’s official language. To minimize errors in translation and ensure that translated questions conveyed the same meanings as the original English questions, both surveys were “back translated” from Khmer to English again by my research assistants (Clifford et al., 2010). English questions that did not translate coherently in Khmer were adjusted to maximize the likelihood of responses corresponding with questions. My assistants also translated all participant surveys from Khmer back to English to make interview data understandable to the rest of the research group.

Four pilot surveys were undertaken to allow research assistants to familiarize themselves with the surveys and clarify questions with the researchers. Pre-testing using pilot surveys was important to allow my research assistants to familiarize themselves with the questions in the survey, clarify questions with the researchers, and provide a space to prepare interviews for
actual interviews in the field (Clifford et al., 2010). Pre-testing studies also offered the opportunity to check the straightforwardness of survey questions, the delivery of responses, and ensure that responses were understandable, easy to follow and coherent (Clifford et al., 2010). Additionally, pre-testing helped to catch errors in the survey and led to more streamlined questions that properly reflected research intentions (Bowden et al., 2002).

3.6 Data collection and analysis

Surveys were conducted through face-to-face interviews, which allowed a broad range of questions on several topics to be covered in one interview (Clifford et al., 2010). I chose to conduct face-to-face interviews as it allowed participants to clarify complex questions with research assistants, which Clifford et al. (2010) argues leads to more meaningful and relevant responses. Having face-to-face conversations can also offer researchers a more grounded perspective that encourages better representation of underrepresented people (Gailey, 2015). Face-to-face interviews took place in several settings, including peoples floating homes, on boats, when fishers were sorting and fixing fishing gears, and when villagers were processing fish. In one instance, data collection occurred on top of a hand drawn tractor. As weather conditions were unpredictable, I conducted surveys in the mornings and early afternoons when storms were less likely to occur. Pre-testing of the survey was done in the first four days of fieldwork. During these interviews, I trained my assistants on how to begin the interview process, clarified survey questions, and how to engage with participants.

Most data collected in this survey were quantitative. IBM’s Statistical Package for the Social Sciences (SPSS) software was used to analyze data from both surveys. Pearson’s chi squared test was used to analyze most of the categorical variables in the individual and key
informant surveys. This test was used to determine if observed patterns matched expected values. Likelihood ratio tests were used to test variables with more than two cells that had an expected count of less than five. For some descriptive results, statistical tests were not used and results were simply reported.
4. **Chapter 4: Manuscript: Conservative Gender Roles in Fish Conservation? A Case Study in the Tonle Sap Lake, Cambodia**

**PREAMBLE:** The following is a standalone manuscript, in accordance with University of Guelph Department of Geography’s standards, designed to be submitted to the “Fish and Fisheries Journal”. This manuscript summarizes key results and presents the substantive contribution of this body of work. The structure of this manuscript begins with an introduction into gender and fish conservation in Cambodia that leads into the research aims and objectives of this work. It then discusses methods used to conduct two structured surveys. The section that follows presents the results from these surveys. A discussion section further examines my research findings. This manuscript ends with a section on the limitations of this research and a conclusion.

**4.1. Introduction**

Small-scale inland fisheries are important generators of food and income. The United Nations estimates that these freshwater inland fisheries generate approximately 10 million metric tons of fish per year and sustain the livelihoods of 37 million people around the world (Alves and Minte-Vera, 2013; Taylor et al., 2016; FAO, 2017a). Fish not only represent an important protein for nutrient intake, but also serve as a way to generate income and alleviate poverty in marginal communities (Barnes-Mauthe et al., 2013; Ratner, 2006). Several factors threaten freshwater fisheries. Overexploitation, pollution, disruption of water flow, habitat destruction, and the release of invasive species are just a few causes of fish depletion (Dudgeon et al., 2016). Using unsustainable fishing gears like bottom trawls and electric fishing gear have also been criticized for destroying fish habitats (Salayo et al., 2008; Fisheries Administration, 2007). Environmental
change can impact fish stocks negatively, and, in turn, can jeopardize fisher livelihoods and food security.

In response to the numerous threats to fisheries and livelihoods, many conservation programs attempted to incorporate local communities into conservation projects, with the assumption that their participation is straightforward (Ressurreccion, 2006; Allison et al., 2012). However, while some conservation programs work to engage women in conservation practices, knowledge of the repercussions of gender inequality and potential barriers to participation in conservation is lacking. Although fish conservation impacts both men and women in small-scale fisheries, the way that men and women are integrated into conservation initiatives often does not acknowledge underlying gender inequalities which can impact the outcome of conservation initiatives (Resurreccion, 2006). The Tonle Sap Lake of Cambodia is a particularly unique study area to understand gender perceptions because the lake’s unique hydrology and ecosystem have major influences on men’s and women’s fishing practices and roles.

To understand gender dynamics in Cambodia’s small-scale fisheries and conservation initiatives, I aimed to investigate perceptions of gender dynamics in small-scale fisheries and their impacts on male and female participation in fisheries and conservation. To address this research aim, my research objective sought to explore whether there are differences and/or similarities between men’s and women’s perceptions with respect to: 1) fishing and non-fishing practices, 2) power, access, and control over fishing resources, and 3) perceptions of conservation and conservation areas in the Pursat Province of Cambodia. In my discussion, I draw on particular ideas on power, access, and control from feminist political ecology literature.
to make connections between my data on perceptions of fishing and conservation practices and possible underlying gender norms that may contribute to the production of gendered roles.

4.1.1 Global small-scale fisheries

Although statistics regarding small-scale fisheries is difficult to assess, the Food and Agriculture Organization of the United Nations estimates that these freshwater inland fisheries generate 10 million metric tons of fish annually which excludes unreported and unregulated fishing (Taylor et al., 2016). However, this contradicts other scholars like Cooke et al. (2016) who argue that small-scale fisheries in Africa and Asia alone harvest 11 million tons of fish. Nonetheless, at least 37 million fishers are directly involved small-scale fisheries, and as many as 200 million people are involved in some way (FAO, 2017; Andrew et al., 2007). Fish are particularly important as they account for 17% of the world population’s animal protein consumption (Ratner, 2006). In Cambodia, fish account for 75% of the nation’s protein intake, and is a fundamental nutritional component in sustaining health and food security (Ratner, 2006). Aside from this, fish can serve as capital that can be sold for income or traded for rice and other goods (Béné and Macfadyen, 2007).

Concerns regarding the impacts of small-scale fisheries on fish depletion are growing. Although some argue that small-scale fisheries have little impact on ecosystems and have relatively low by-catch levels and fish discard, others argue that by-catch is variable and has, in some cases, been found to extirpate entire populations (Jacquet and Pauly, 2008, Shester and Micheli, 2011). Freshwater fisheries are especially sensitive and susceptible to more rapid fish depletion than most other salt water ecosystems (Reidy Lierman et al., 2012). This susceptibility is likely due to the greater influences of land use, nutrient and sediment changes, and pollution
on fish survival (Sala et al., 2000, Ricciardi and Rasmussen, 2001). According to Salayo et al., (2008), fish stocks in Southeast Asia function at 5%-30% of their historically recorded normal levels. Overfishing is a serious concern as global population increase and rising food demands intensifies fishing pressures (Alliston et al., 2012). Selective fishing of large fish can also alter biodiversity through fishing down, a process where large, slow reproducing species are depleting and only small species with short life spans are left (Allan et al., 2005).

Other unsustainable practices such as using harmful gears can also disrupt ecosystems and influence the future sustainability of fisheries. Bottom trawls have been widely criticized for their destruction of water beds by towing across the sea and lake floors, which is particularly harmful compared to trawls that work at higher levels of the water column (Fitzgerald, 2013; Salayo et al., 2008). Electric gear, which involves electric currents that shock fish, has been characterized as particularly damaging as it can eradicate entire stocks and decimate fish populations that normally replenish the stock in the next year (Ratner, 2006). In Cambodia, both bottom trawling and electric fishing are prohibited under the Fisheries Administration due to their destructive capabilities (Fisheries Administration, 2007). Other fishing gears can catch fish at different life stages, which can interrupt fish reproductive cycles and reduce fish stock density (Allan et al., 2005). These concerns are compounded when combined with other indirect impacts like land pollution, altering water flow, habitat destruction, and invasive species (Dudgeon et al., 2006). For example, agricultural waste from crops and livestock can leach into water ways and cause increased nutrients and algal blooms that decimate fish stocks (Bonheur and Lane, 2002). Broader concerns like climate change can wreak havoc on fisheries by altering climatic conditions to suit certain species over others, or alter water conditions (Badjeck et al.,
These climatic changes have been observed as far as Arctic fisheries, which illustrates the severity of changing climate conditions on freshwater fisheries (Reist et al., 2006).

4.1.2 Women in small-scale fisheries

Considerations of women’s roles in environmental management, including small-scale fisheries, is often lacking. Harper et al. (2013) estimate that approximately 130 million women participate in global marine fisheries. Despite women’s major contributions to small-scale fisheries through nearshore fishing, shellfish gleaning in intertidal zones, and post-harvest fish processing work, their efforts are seldom recognized or valued (Kleiber et al., 2015; Kawarazuka and Béné, 2010). Although women have been observed to perform different fishing practices compared to men, these practices still impact fisheries and fish stock in their own ways and should not be overlooked. An example of this can be found in El Salvador where women’s fish gleaning, or the retrieval of shellfish from intertidal areas, was prohibited due to concerns that gleaning led to the trampling and destruction of fish breeding grounds (Kleiber et al., 2015).

Indirect domestic roles, which are often ascribed to women, can also have impacts on the local ecosystem and native fauna. For example, some work attributed to women such as crop farming and livestock rearing have been argued to contribute to reduced water quality and fish habitat destruction (Resurreccion, 2008; Bonheur and Lane, 2002).

Although women contribute enormously to fishing, culture and tradition are powerful factors in shaping men’s and women’s roles in fisheries as well as women’s recognition in these spaces (Kleiber et al., 2015). For instance, some practices such as gleaning shellfish and intertidal fish from shorelines are often dismissed as food gathering practices and not ‘real fishing’, which undermines women’s contributions to fish harvests (Harper et al., 2013). Fish
trading is a critical component of fish distribution in Africa, and yet women’s contributions to the fisheries economy are largely unrecognized (Harper et al., 2013). In more developed regions like the European Union, considerations of women’s needs such as maternity leave, social benefits, and health care are only just beginning to emerge for women in these fisheries (Harper et al., 2013).

According to Maxwell et al. (2015), Cambodia places 109th out of 148 countries on the Gender Inequality Index, making it one of the higher ranked nations in terms of greatest gender disparity. Cultural expectations in Cambodia assert that women should stay at home and not engage with outside work and activities, which affects the ways that women participate in activities outside of the household (Eng et al., 2010). Some school curriculums still teach “chhab srey” or “rules for girls” to school girls, which encourage women to be submissive and obey their husbands (Eng et al., 2010; Eng et al., 2014). These biases can influence the way that men and women engage with community-based programs that seek to manage fisheries. In Weeratunge et al.’s (2010) study, women were interested in some development programs but indifferent towards participating in positions of leadership or decision-making. In this case, gender stereotypes were compounded with women’s positions in the household and their family’s financial situation, which affected women’s willingness to participate (Weeratunge et al., 2010). Other challenges they faced included limited access to education and trouble balancing their participation in programs with their reproductive tasks in the household (Weeratunge et al., 2010). Moreover, a Cambodia Demographic and Health Survey done in 2005 found that 42% of participants believed that married women should not work outside the home, which can be particularly challenging for community-based programs that seek to mobilize
women. Left unaddressed, these inequalities can lead to vastly different outcomes in conservation and resource management if women’s participation are anticipated but not achieved (Milne and Mahanty, 2015). Although state and non-governmental initiatives encourage the mobilization of women in community-based resource management, ignoring the social needs and gendered perceptions of women can create extra burdens and unknowingly recreate gender inequalities in these spaces (Resurreccion, 2006).

4.1.3 Feminist political ecology and gender dynamics in fisheries

My discussion section draws on some concepts from feminist political ecology in attempts to explain how my findings on perceptions of gender dynamics in fisheries may be connected to underlying gender norms and roles that are rooted in Cambodia’s socio-cultural context. Feminist political ecology is a useful theory in understanding gender dynamics in fishery management as it focuses on gender divisions of power, and its impacts on the agency for people to protect, change, and restore the environment (Kerr, 2014). According to Hawkins (2011), feminist political ecology allows for “a multi-scalar analysis of gendered rights and responsibilities, knowledge production and politics”, which is particularly important in understanding how gendered fishing practices and roles evolved in small-scale fisheries. This theory critiques ecofeminist ideas of an inherent connection between women and nature as it argues that gender inequalities are instead created through societal interpretations and constructions of characteristics associated with biology, which are different depending on class, race, geography, and culture (Rocheleau 1995). As such, the socio-cultural interpretations of gender roles create different capacities for men and women to participate and be recognized in fisheries.
In feminist political ecology, scholars argue that gender is central to resource access and control, and intersects with other identities such as race, class, ethnicity, and culture (Mollet and Faria, 2013). The ability to access fish and fishing resources, then, is shaped by the context and circumstances placed upon men and women in small-scale fisheries. Unlike other theories, feminist political ecology pays attention to the gendered practices and power dynamics that both affect and are affected by the environment (Nightingale, 2006). According to this, fish decline not only impacts women in fisheries, but the livelihoods and wellbeing of men as well. Subsequently, Nightingale (2006) argues that while environmental challenges affect both genders, gender inequalities impact and are impacted by environmental destruction (Nightingale, 2006). As most literature in fisheries and aquaculture lack data on socio-cultural disparities between men and women (Weeratunge et al., 2010), research that accounts for feminist political ecology’s ideas on how socio-cultural factors shape power relations, access, and control in my research can help to understand men’s and women’s perceptions of fishery and conservation practices to underlying gender norms and expectations.

With increasing environmental changes and threats to human livelihoods, state and non-governmental organizations are focusing their attention on generating local management of natural resources, particularly in countries in the Global South (Lau and Scales, 2016). However, programmers and policy makers often overlook the diverse groups and identities within communities, which homogenizes the varying needs and interests of these groups (Lau and Scales, 2016). Understanding perceptions of gender dynamics in fisheries and conservation is a critical first step in understanding the challenges, needs, and concerns of fishermen and fisherwomen in these situations. Community-based management programs and policies that
address these issues can improve local support for conservation efforts without overlooking or recreating gender inequalities.

4.1.4 Regional context: Tonle Sap Lake and Cambodian fisheries

Fisheries are vital to both commercial and subsistence livelihoods, and contribute majorly to Cambodia’s economy. The Tonle Sap Lake is an integral player in Cambodia’s fisheries as it possesses unique hydrology and complex human-environment interactions that sustain its rich biodiversity (Keskinen, 2006; Sithirith, 2015). However, both climatic and anthropogenic factors are impacting the sustainability of the Tonle Sap Fisheries. Scholars predict that climate change will have serious consequences on the Mekong Basin and, subsequently, the Tonle Sap lake’s ability to sustain communities that are directly dependent on it (Kingston et al., 2011; Keskinen et al., 2006). Climate change can increase the unpredictability of water flow and flood patterns, changes in rainfall, and unusual seasons (Nuorteva et al., 2010; Kummu and Sarkkula, 2008). These changes can disrupt fish habitats, flood plain vegetation and wreak havoc on human infrastructures (Nuorteva, 2010; Kummu and Sarkkula, 2008). Direct anthropogenic impacts such as overfishing, using unsustainable fishing gears, and “fishing down” by targeting specific species can devastate fish populations (Salayo et al., 2008; Allan et al., 2005). Invasive fishing gears such as bottom trawls can lift sea beds and destroy habitats, while floating broken gears can ‘ghost fish’ by unintentionally capturing organisms (Fitzgerald, 2013; Salayo et al., 2008). Indirect impacts vary widely, including dams that block water flow, agricultural runoff, and deforestation that leads to sedimentation in the lake (Clements et al., 2010; Baran and Myschowoda, 2009). Factory and household waste discarded in the lake can also damage the quality of habitats and affect fish populations (Heinonen, 2006; MRC, 2010). As these impacts
are likely occurring in the same areas, their effects are compounded, which jeopardizes the sustainability of these fisheries.

In light of these challenges, Cambodia established fish conservation areas. In the Tonle Sap Lake, two distinct types of conservation areas have been in operation: government-managed conservation areas and community-managed conservation areas. The Cambodian government formally established government-managed conservation areas in efforts to recover and sustain fish stocks in the lake (Milne, 2014; Chadder, 2015). Today, these areas have been established in all five provinces surrounding the lake (Brunner, 2014). These areas, which are jointly managed between the Ministry of Environment and the Fisheries Administration, are patrolled by a combination of government staff, police, guards, and soldiers (Brunner, 2014). Fishing is strictly prohibited in all government-managed conservation areas, and illegal fishers can be arrested for violating this rule. Although more than 50 government-managed conservation areas have been established, few are adequately managed due to limited funding (Brunner, 2014).

Within community villages, the government also established community-managed conservation areas, which are managed by village community fisheries. These community-managed areas are considerably smaller than the government-managed conservation areas and tend to be attached or close to the village it is managed by. Community fishery committee members, which are elected from the village, are responsible for planning and decision making in community fisheries and maintaining conservation areas. Fishers are prohibited from fishing in both government-managed and community-managed conservation areas. However, they reap the benefits from these areas in the wet season, when rising water levels flood these areas and allowing fish to be harvested as they populate other parts of the lake.
4.2. Method

This section will begin by describing two separate surveys that were conducted to explore my research objective. I employed 1) a key informant survey and 2) an individual fisher survey to understand fishing and non-fishing practices, access and control over fishing resources, and perceptions of conservation and conservation areas from the views of local fishers, community fishery committee members, and government staff.

4.2.1 Study area

Data collection took place between July 6th and July 30th, 2016 in the Pursat province. As will be discussed below, key informant surveys were conducted in the Kandieng and Krakor districts of the Pursat Province. The fisher surveys were conducted in four villages in this province: O’taprok, Srey Cheok, Kampong Prak, and Anlung Reang in the Krakor district of the Pursat province in Cambodia. These villages were selected because they were the only villages with female community fishery committee members and had existing partnerships with our NGO research partner, Conservation International.

4.2.2 Survey design

A key informant survey was established that asked community fishery committee members and government staff about their knowledge and perception of gender dynamics in these spaces. A fisher survey was created for fishers to ask about their fishing practices and perceptions of gender dynamics in community fisheries and conservation areas. These surveys were tailored towards exploring gender dynamics in government-managed conservation areas and community-fisheries conservation areas as they presented a space where persisting gender roles, practices,
and stereotypes had been described. Both surveys were written in English and translated into Khmer, Cambodia’s official language, by two research assistants. The same research assistants also translated completed surveys from Khmer to English so results could be coded and analyzed in English. Pilot studies were held during both field seasons to teach research assistants how to speak with participants during interviews, familiarize assistants with the organization of the survey, and refine survey questions.

In both surveys, participants were asked to identify as men or women. While this can pose risks of ignoring other gender identities and enforcing gender dualisms, I felt it necessary to limit my definition of gender in this case study to men and women due to the constraints of the rural context we worked in, where traditional taboos and cultural stigmas were prominent. In this way, this research could more attentively explore perceptions of gender differences and dynamics between the categories of men and women.

4.2.3 Participant selection

Purposive sampling was used to select participants for the key informant survey. This survey was conducted on 1) government staff in government-managed conservation areas and 2) community fishery committee members in community-managed conservation areas. Ten male government staff from the Kandieng and Krakor district were interviewed. No female government staff were interviewed in this study as none worked in the Kandieng or Krakor districts. Additionally, 15 men and 5 women from 4 village community fisheries were selected to participate in the key informant survey. This resulted in a total of 35 key informants. Community fisheries were selected based on the presence of female community fishery committee members.
employed, as only 4 community fisheries had women on their committees. These villages consisted of: O’taprok, Srey Cheok, Kampong Prak, and Anlung Reang and were chosen because they were the only villages with community fisheries that had women in their committees or had previous partnerships with our partnering NGO Conservation International, which allowed us to access and conduct surveys in a timely manner.

A two-staged sampling approach was used to select village fishers for the fisher survey. We acquired lists of all men and women fishers in each village from Conservation International. From each village list, we randomly selected seven men and seven women to participate in the survey. These villages had pre-existing partnerships with our research group’s partner, Conservation International, which allowed my team to receive village chief approval to conduct interviews. This sample size was chosen partly to compensate for equal numbers of men and women participants in my key informant survey and also due to the limited time I had to collect data. A total of 56 fishers were interviewed; of these, 28 identified as men and 28 identified as women.

4.2.4 Research assistants

Two research assistants (one man and one woman) who were fluent in Khmer were employed to conduct face-to-face interviews using the two structured surveys. Both were research assistants that had participated in previous research associated with our research group and were familiar with conducting interviews. I trained research assistants by familiarizing them with surveys, running pilot studies, and clarifying their concerns. Prior to conducting these
surveys, I trained both research assistants by conducting pilot studies to familiarize them with the questions in both surveys, teach them how to approach participants, and practice conducting interviews on participants. Face-to-face interviews were conducted in Khmer by research assistants in peoples’ homes and in public spaces. As the gender of the research assistant may have influenced the levels of comfort and willingness of participants to answer survey questions, research assistants of the corresponding gender interviewed participants. After interviews, assistants translated survey results from Khmer to English, which allowed data to be coded.

4.2.5 Data analysis

Results were analyzed through IBM SPSS for statistical significance. In both surveys, I employed Pearson’s chi squared test to check for significance in categorical variables. For variables with more than two cells with expected counts of less than five, I used likelihood ratio tests. For other descriptive results, statistical tests were not used and results were simply reported. It was not feasible to use direct quotations as research assistants translated comments from Khmer to English and phrasings may have been altered to be understandable in English. Hence, translated comments were grouped into themes, which helped to further explain my results. These themes were grouped based on common terms that translated comments shared. As all comments were translated by my two research assistants, similar key terms were used in translation and thus helped me group these translated comments in into themes.

4.3 Results

This section first describes the sampled populations in terms of their demographics in the fisher survey and key informant survey. This section then proceeds to present findings on
variables relating to gender dynamics and fishing and non-fishing practices from the two surveys. Following this, I discuss findings related to gender differences regarding perceptions of power, access to and control of fishing resources between men and women. Finally, I describe results pertaining to gendered perceptions of conservation and conservation areas.

4.3.1 Demographics

Our individual fisher survey revealed that the average age of fishers was 36.27±11.27 (Mean±SD) years old (Table 2). The average ages of fishermen and fisherwomen were similar, with men averaging 36.32±10.96 years old and women averaging 36.21±11.77 years old. Almost all fisher participants were of Khmer descent, with only two out of 56 participants identifying as ethnically Vietnamese. Of the participants, 92.90% were married and the rest were single. Most participants (83.90%) did not migrate from other regions and were long time residents of their villages.

Most fisher participants in the fisher survey had limited education; 33.90% of all participants had no education, 53.60% had primary level education, 8.90% had secondary level education, while 3.60% reached college level education. Significantly more men (p=0.004) were associated with some form of education, while significantly more women were associated with no education. Fewer fisherwomen had primary education (35.71%) compared to men (71.43%); 53.57% of female participants had no education compared to 14.29% of male participants who had no education. None of the female participants had reached college level education, and 10.70% of them had secondary level education, which is higher than the percentage of men that reached any form of secondary education (Table 2).
On average, key informants were older than fisher participants, with a mean age of 43.30±9.74 years old. Average ages of male and female key informants were similar (Table 2). Participants reported working an average of 5.12±6.65 years in their respective conservation areas. Participants reported an average of 11.07±6.12 general staff that worked in each conservation area, with 2.00±4.84 being women staff and 9.03±4.69 being men staff. Heng (personal communication, March 23, 2016) noted that typical community fisheries consisted of approximately eleven elected managers, while government-managed conservation areas were typically run by six managers. The actual number of men and women staff in conservation areas varied depending on location and the community fishery.

Table 2 Demographics from the fisher survey and key informant survey.

<table>
<thead>
<tr>
<th></th>
<th>Fisher survey</th>
<th>Key informant survey</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fisher Men (n=28)</td>
<td>Fisher Women (n=28)</td>
</tr>
<tr>
<td><strong>Age (mean±SD)</strong></td>
<td>36.32±10.96</td>
<td>36.21±11.77</td>
</tr>
<tr>
<td><strong>Ethnicity (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Khmer</td>
<td>92.86%</td>
<td>100%</td>
</tr>
<tr>
<td>Vietnamese</td>
<td>7.14%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Education (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No education</td>
<td>14.29%</td>
<td>53.57%</td>
</tr>
<tr>
<td>Primary</td>
<td>71.43%</td>
<td>35.71%</td>
</tr>
<tr>
<td>Secondary</td>
<td>7.14%</td>
<td>10.71%</td>
</tr>
<tr>
<td>College/University</td>
<td>7.14%</td>
<td>0%</td>
</tr>
<tr>
<td><strong>Marital Status (%)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>10.71%</td>
<td>3.57%</td>
</tr>
<tr>
<td>Lived together</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Married</td>
<td>89.29%</td>
<td>96.43%</td>
</tr>
</tbody>
</table>
4.3.2 Gender differences in fishing and non-fishing practices

This section reports findings from the fisher survey and key informant survey regarding fish catch, fishing activities, and access and control of fish resources. In particular, data from the fisher survey revealed notable differences perceptions of time spent on fishing-related practices between men and women fishers. When asked about the percentage of time fishers spent fishing in a day, fisherwomen reported spending more time fishing than men did, as they reported spending an average of 58.21±17.65% of their day fishing, while fishermen spent on average 46.07±10.40% of their day fishing. When asked about fishing-related work performed by men and women, all men and almost all women reported that fishing was an activity performed by men (Figure 4). However, when asked if women fished, 89.29% of women reported that women fished, but only 21.43% of men acknowledged that women fished. When asked if men and women managed finances in the household, no men or women reported men managing finances, while 78.57% of men and 89.29% of women informed us that women performed this task (Figure 4). This data also revealed differences in women’s and men’s role in fish processing. Fewer men (57.14%) and women (46.31%) reported men performing fish processing compared almost all men (96.43%) and all women (100.00%) acknowledged that women processed fish. In regards to fish processing and fishing gear management, more men and women reported their respective genders performing the task than the opposite gender did (Figure 4).
Figure 4 Fisher perceptions of fishing-related work performed by men and women.

*Fishermen n=28, Fisherwomen n=28

We found differences between fishermen and fisherwomen regarding non-fishing and domestic activities. When asked about other non-fishing related work that fisheers performed, significantly more (p=0.04) women reported that they were responsible for household chores compared to men’s reports of performing household work (Figure 5). Similarly, a significantly greater percentage (p<0.0005) of women reported that childcare was part of their work compared to men’s responses (Figure 5). I learned through personal communication that farming on the lake involved gardening on boats and floating house attachments; however, differences between men and women in regards to farming were not significant.
Figure 5 Fisher perceptions of non-fishing related work performed by men and women.

![Bar chart showing gender differences in non-fishing related work](chart)

*Fishermen n=28, Fisherwomen n=28

4.3.3 Gender differences in power, access and control over resources

The following results include findings from the fisher survey and key informant survey on perceptions on the recognition of opinions between men and women, as well as perceptions of access and control of fishing resources. Comments were grouped into themes.

The following results were grouped according to perceptions of women’s participation in community fisheries, perceptions on recognition of opinions in community fisheries, and perceptions of conservation and its associated challenges. In particular, data from both surveys suggested that participation in community fisheries did not necessarily reflect equality in the
recognition of women’s opinions or ideas regarding fishing and conservation. In both the individual and key informant survey, fisher and key informant participants were asked if they believed that men’s and women’s opinions were recognized differently. Chi squared test revealed that significantly more men (p<0.01) reported that opinions were recognized differently across genders than we expected (Figure 6). Key informant women were the least likely to report that opinions across genders were recognized differently. Themes that emerged from comments suggested that fishers believed this inequality was associated with women’s opinions not being considered important, women not having time to provide opinions, men having better ideas than women, and a contrasting theme that women had more or better ideas than men (Table 3).

**Figure 6** Percentage of fishermen, fisherwomen, key informant men, and key informant women that believed men's and women's opinions were recognized differently, LR test, P < 0.001.
Findings from the fisher survey revealed significant differences in men’s and women’s perceptions of inequality regarding access and control over fish and fishing resources. For instance, when participants were asked about their perception of equal access to fishing and equal power in controlling fishing in the lake, significantly more women (p<0.0005) than men reported that both genders had equal access to fishing. This suggests more men acknowledged inequality in access between genders (Figure 7). Key themes emerged from directly translated comments, and centered on the importance of women’s opinions, women’s time availability, and perceptions of one group’s ideas as better than the other group’s ideas. One theme that participants reported regarding why there was unequal access was that men were able to fish farther from home while women stayed at home (Table 4). Other themes included that men caught more fish than women, and that men were more capable of using larger and more diverse fishing gears. Participants also indicated that men were more powerful, while women were not able to fish in certain spaces or at certain times due to safety reasons. One theme reported that women without husbands had equal access, while those with husbands had unequal access due to the extra duties involved in caring for a family (Table 4).
Figure 7 Fishers that believed there was equal access between men and women vs. fishers that believed there was equal power in controlling fishing.

*Fishermen n=28, Fisherwomen n=28*
Findings were similar when participants were asked if men and women had equal power in controlling fishing, although differences were less prominent (Figure 7). While 25% of women reported that both genders had equal power in controlling fishing, significantly less men (p=0.01) reported this to be true. Themes from comments suggested that this was because women were occupied with other duties such as managing finances and attending fishery meetings, or that women were inherently more afraid than men, or that they were less powerful or capable of protecting themselves than men particularly at night. Other themes included that men did not listen to women, and that women were not able to do heavy labour like men could.

### 4.3.4 Gender differences in perceptions of community fisheries and conservation

The surveys revealed further differences between men’s and women’s perceptions of conservation-related activities, eagerness to embrace conservation as an alternative livelihood, and challenges fishers faced in conservation areas.
Almost all fisher participants (98.2%) reported noticing fish declines in the past five years, and listed several factors for this decline (Table 5). All (100%) fisher participants and all (100%) key informant participants identified illegal fishing to be a problem in conservation areas. When asked about conservation-related work between genders, there were differences in women’s perception of men’s patrolling frequency and men’s reports of patrolling (Figure 8). While 89.29% of women reported that men patrolled conservation areas, only 21.43% of men reported that they patrolled. Few men and women acknowledged that women patrolled conservation areas (Figure 8). In a follow-up question that asked how often participants thought conservation areas were patrolled, 60.70% of men reported that conservation areas were patrolled weekly as opposed to daily or monthly, while 46.40% of women reported that conservation areas were patrolled daily. Both men and women reported that both genders participated in community fishery meetings. However, while 92.86% of women that reported men attending fishery meetings, only 35.71% men reported that men participated in these meetings (Figure 8).
Table 5 Themes from fisher comments on why fish has declined in last five years

<table>
<thead>
<tr>
<th>Themes from fisher comments on reasons for fish decline in last five years</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Direct anthropogenic</strong></td>
<td><strong>Weather related</strong></td>
</tr>
<tr>
<td>• Illegal fishing</td>
<td>• Bad weather</td>
</tr>
<tr>
<td>• Modern fishing gears</td>
<td>• Drought</td>
</tr>
<tr>
<td>• Dams</td>
<td>• Climate change</td>
</tr>
<tr>
<td><strong>Indirect anthropogenic</strong></td>
<td><strong>Lake/fish changes</strong></td>
</tr>
<tr>
<td>• Forest destruction/burning</td>
<td>• Receding water levels</td>
</tr>
<tr>
<td>• Habitat destruction</td>
<td>• Reduced fish population</td>
</tr>
<tr>
<td>• More people living in the lake</td>
<td></td>
</tr>
<tr>
<td>• Poor fishing regulation</td>
<td></td>
</tr>
<tr>
<td>• Corruption</td>
<td></td>
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</tbody>
</table>

Figure 8 Fisher perceptions of men’s and women’s participation in patrolling conservation areas and attending community fishery meetings.

*Fishermen n=28, Fisherwomen n=28*
Through personal communication as well as answers to the survey questions summarized in Table 5, I learned that a system was in place to regulate fishing. Outsiders could come to the village area and fish, but were subject to pay an informal fee that the government was attempting to formalize. Fishers were not allowed to fish in the government-managed conservation areas at any time of the year, and were restricted from fishing in the community-managed conservation areas during the dry season when fish spawn. I also learned that patrolling these waters was dangerous as patrollers sometimes clashed with fishers attempting to illegally fish in these waters.

My findings revealed similar trends between participant reports of their past participation in conservation projects and their perception of conservation as an alternative livelihood (Figure 9). Significantly more men (p<0.01) than women reported participating in conservation projects in the past (Figure 9). Similarly, likelihood ratio test revealed that significantly more men (p<0.0005) believed conservation could be an alternative livelihood compared to women who believed this (Figure 9). In a follow-up question that asked how fishers participated in conservation projects, 89.30% of men reported that they told others about conservation projects, while only 35.70% of women reported doing this. Those who believed conservation could be an alternative livelihood listed increased income, fish catch, and jobs as reasons (Table 6). When asked why conservation was not a possible alternative livelihood, men did not provide any comments while women listed several reasons (Table 6). One theme from participant comments suggested that conservation did not change current livelihood situations. Another theme that emerged was that conservation made it difficult to catch fish, as conservation areas became no-fish zones, even though these were previously areas that could be accessed by villagers. Other
themes suggested that participants believed conservation did not increase income levels, and that their situations were the same as before conservation areas were implemented. Participants who did believe that conservation could be an alternative livelihood mentioned that conservation could create other livelihoods and jobs for them. Other themes that emerged included participants believing that conservation could increase their fish catch either in the present or in the future, and that income was increased through conservation initiatives.

**Figure 9** Past fisher participation in conservation projects vs. fisher perception of conservation as livelihood option

![Bar chart showing participation in conservation projects and perception of conservation as a livelihood option](chart.png)

Men responses about men

Women responses about women

- Participated in conservation projects in the past (fishermen n=27, fisherwomen n=26) LR test, P = 0.003
- Believe conservation can be an alternative livelihood (fishermen n=28, fisherwomen n=28) LR test, P<0.001
Table 6 Themes from comments on why conservation is/is not a possible alternative livelihood

<table>
<thead>
<tr>
<th>Why it is possible</th>
<th>Why it is not possible</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Conservation creates other jobs</td>
<td>• Conservation does not increase income</td>
</tr>
<tr>
<td>• Conservation increases fish catch</td>
<td>• Conservation does not change my livelihood</td>
</tr>
<tr>
<td>• Conservation can increase my income</td>
<td>• Conservation makes it difficult to catch fish</td>
</tr>
<tr>
<td></td>
<td>• The situation is the same as before</td>
</tr>
</tbody>
</table>

To understand whether challenges faced by men and women were perceived differently between fishers and key informants, my two surveys asked fisher and key informant participants about what they considered to be the greatest challenges in conservation areas. Overcoming storms was a popular answer by fishers. I found that 67.86% of women reported that this was a great challenge for men, and 71.43% of women reported this to be so for women. However, this was less recognized by key informants, as only 8.00% of male key informants indicated this to be one of the greatest challenges for men, and none believed this so for women. Key informant women did not consider this as the greatest challenge for men or women.

A key finding was that mostly only fisherwomen acknowledged health and safety concerns as the greatest challenges in conservation areas. More than half of fisherwomen acknowledged that health was a challenge for both men and 82.14% of them believed this to be the case for women as well. However, fishermen and key informants did not mention this. I found similar findings regarding mentions of safety. Perceptions of safety as one of the greatest challenges for men and women were mostly mentioned by fisherwomen. More than three quarter (78.57%) of fisherwomen believed this to be a key challenge for men, and 85.71% of them felt this was one of the greatest challenges for women. Few fishermen (3.57%) reported that this was
a challenge for men and women, respectively. Twelve percent of key informant men indicated safety as a concern for men, and only 4.00% of them believed women faced this challenge.

Many key informant participants believed that men and women did not face any particular challenges in the lake. Female key informants were most supportive of this idea, as 80% of them believed that men and women faced no challenges. Twenty percent of key informant men reported that men faced no challenges, and 8% reported that women faced no challenges. However, no fishermen believed that men and women faced no challenges in the lake. Results revealed that 14.29% of fisherwomen reported men faced no challenges, while 3.57% reported that women faced no challenges.

4.4 Discussion

This section discusses contrasting findings between men’s and women’s perceptions revealed in the data, and the three broad themes of this paper: 1) fishing and non-fishing practices, 2) power, access and control over fishing resources, and 3) perceptions of conservation and conservation areas. Overall, results revealed several differences between men’s and women’s perceptions in all three categories. Results also suggested that inequalities regarding access and control over fisheries and the recognitions of women’s opinions existed in these communities, which may stem from deeper underlying socio-cultural ideas of men’s and women’s roles. My findings suggest differences in perceptions of impacts of conservation areas on livelihoods, and perceived challenges faced in these spaces. These observations question the efficacy of conservation areas in adequately addressing gendered livelihoods. Programmers and policy makers aiming to include men and women in protecting fish conservation areas need more
in depth analyses on gender dynamics in order to paint a realistic image of the current gender issues facing fishers in fish conservation areas, and challenges that need to be addressed.

4.4.1 Gender dynamics in fishing and non-fishing practices

The fisher and key informant surveys revealed differences in intra-household division of labour, which was contrary to the previous household research that prompted this study (see Appendix B). In this way, the present study builds on scholarly work on the gendered division of labour that suggest gender may in part determine many societal roles, responsibilities and activities assigned to men and women (e.g. see March et al., 1999). Fisher reports associated some fishing practices with one gender, but reported other practices as being performed by both men and women. For example, men and women fishers agreed that women more often performed fish processing than men, which is consistent with previous scholars that observed women to more often engage in fish processing than men in Southeast Asia (Harper et al., 2013; Arenas and Lentisco, 2011). However, whether other types of work, such as fishing gear management, were associated with a particular gender was less obvious between genders in the fisher survey. Both men and women engaged in fishing gear management. From personal communication, I learned that a range of tasks including untangling nets, cleaning fishing gears, and preparing fishing instruments were performed by working together. This was contrary to previous scholars who described fishing gear management to be generally only performed by women in capture fisheries (Fröcklin et al., 2013). My findings suggested that not all fishing-related activities were associated with a particular gender. Instead, certain practices may have been ascribed to men or women based on societal ideas of roles that men and women were expected to perform in these fisheries.
One question brought conflicting views about women’s contributions to fishing. In my fisher survey, many women associated with fishing as part of their work, while few men acknowledged that women fished. This may be due to differences in perceptions of what ‘real’ fishing is, as men often engage in open lake fishing, while women perform other types of fishing like gleaning or inshore fishing (Harper et al., 2013). In this way, the results presented here confirm trends noted by Harper et al. (2013). Similarly, Ahmed et al. (1998) argue that while men and women participate in fishing, fish selling and fishing gear management, predominant societal attitudes offer little recognition of women fishing. Moreover, past scholars have identified that men tended to focus on more lucrative off-shore fisheries while women engage in near-shore fishing and fish processing (Leisher et al., 2016). This may explain why fewer men acknowledged that women fish as they may not consider gleaning or inshore fishing as actual forms of “real fishing”. Fishing activities that take men outside of the home may also prompt men to overlook fishing activities that women perform near the household even though they contribute considerably to the formal economy (Harper et al., 2013). Nonetheless, women’s contributions to family income, food security, and the fisheries sector are still considerable. For example, female-headed households in Cambodia have been found to rely heavily on lakeshore fishing as an income source (Resurreccion, 2006).

Women’s contribution to the informal economy is often underrepresented in the formal economy due to the monetary-based nature of value chains (Matthews et al., 2012). While fisherwomen in my surveys reported that they engaged in fishing activities, acknowledgement by fishermen was disproportionately low compared to that of women. In Cambodia, women’s economic activity rate has been found to be close to that of men’s (Brickell, 2011). However,
Harper et al. (2013) argues that traditional societal gender roles often lead to the idea that women contribute little to fishery economies. While men have been characterized as the breadwinner of the family being hunters and fishers, women are tasked with the role of tending to their families and managing the household (Harper et al., 2013). However, women’s engagement in the workforce has changed dramatically, and pre-existing perceptions of women as exclusively caretakers of the household are dated (Harper et al., 2013). Thus, lack of recognition of women’s contributions in the fishery workforce paints an unrealistic picture of the fisheries sector and further strengthens inequalities in fisheries.

In my two surveys, some types of non-fishing activities seemed to be associated with one gender, although both groups engaged in some form of productive and reproductive work. Childcare was an activity that both genders described as women-associated work. Participants reported both genders engaging in household chores. I also observed women mending fishing nets and tending to floating gardens. Similarly, Hart’s (2008) study investigating South Africa’s agricultural policies found that social structures in communities established different roles for men and women. While men were more often involved in resource extraction and managing livestock, women were more engaged with organizing social activities and preparing food for events (Hart, 2008).

Cambodia’s economy is changing dramatically, particularly through increased engagement of women in both the formal and informal economy (Brickell, 2011). Yet, women’s household workload has remained largely the same (Brickell, 2011). Cambodia’s Ministry of Women’s Affairs reports that women’s contribution to household work are twice that of men (Brickell, 2011). Although both men and women reported that they engaged in household chores, women
also had the responsibility for caring for children in the household. Challenges arise for women trying to balance raising their families and household responsibilities while engaging in the same level of income-generation as men (Arenas and Lentisco, 2011; Asian Development Bank, 2002). Brickell describes this as a “double burden”, where women must balance household and family expectations with new forms of employment to further provide for the family. This unequal distribution of roles and responsibilities affects women’s access to resources, not to mention both women’s livelihoods and household security (Fröcklin, 2013). Furthermore, Resurreccion (2006) cautions that development programs that seek to engage women in environmental projects may instead create extra burdens for women if their household chores and other responsibilities are not accounted for.

4.4.2 Gender dynamics in power, access, and control of resources

Participation in community fishery discussions reflected tension in power dynamics. In the fisher survey, both fishermen and fisherwomen reported that women participated in community fishery meetings. However, the number of women formally elected as committee members in community fisheries was considerably lower that of men. Similarly, in the government divisions, no women worked in managing conservation areas in either the Kandieng or Krakor districts. More importantly, men in both the fisher survey and key informant survey reported that women’s opinions were less recognized than that of men. This suggested that while participation by women in fishery meetings may have been high, their voice and power to influence decisions in these meetings were limited. In other words, women’s presence and participation in these meetings did not necessarily reflect power in influencing fish resource management. In this way, these results also confirm points made in a wide body of literature (e.g.
see Resurreccion, 2006). For instance, community fisheries have been described as inherently
gendered spaces as they operate under male-dominated electoral systems that often lead to
unequal power relations, distribution of work and resource access between men and women
(Resurreccion, 2006). My findings strengthened this argument, as low employment and lack of
power to voice opinions was duly noted by both fishermen and key informant men. These factors
can impede the extent to which women can meaningfully participate, and their power in
changing fisheries management. In another view, women may not wish to participate in the same
roles as men. This was observed in Weeratunge et al.’s (2010) findings, where women were
willing to participate in community-based management programs but reluctant to take on
leadership or decision-making roles. Weeratunge et al. (2010) suggested that gender stereotypes,
financial status, and women’s positions in the community impeded their willingness to
participate. As such, Resurreccion (2006) calls for a more “holistic” understanding of women in
these spaces instead of excluding women from community fisheries so that planning and
governance schemes can more properly address inequalities while being mindful of the needs of
women.

Another substantial finding was that more fishermen were aware of unequal access to and
control of fishing resources between genders compared to fisherwomen. Definitions of resource
access and control of resources vary. This observation builds on one definition offered by March
et al. (1999) that broadly describes access as “an opportunity to use a resource” (pp. 19). Control,
however, involves the ability to decide how this resource is used (March et al., 1999). In many
instances, women have access to a resource, but are unable to control how this resource is used
or managed (March et al., 1999), which is concurrent with my findings in this research. Feminist
political ecology is useful in explaining these findings as it brings attention to the unevenness of access and control over resources between men and women (Hovorka, 2006). Through this lens, it can be argued that gender disparities stem from women’s unequal access to the same benefits, training, and tools in managing resources that men do, which restricts women’s capacity to control these resources (Nightingale, 2006). Changes, then, must seek to transform gender relations by increasing the capacity for women to control the use and management of fishing resources through increasing their recognition and decision making power in both state and community management groups.

While more fisherwomen in my survey believed that they had equal access, fewer women felt they had equal control over fishing. One reason behind this could be linked to the unequal education opportunities between men and women, as both surveys revealed disproportionately higher levels of primary and college education in men compared to women. Education may affect understandings of power, inequality and demolish traditional gendered roles, which in turn influences the way men and women recognize inequality in daily interactions. Jayaweera (1997) further argues that education is an important tool in empowering individuals to widen their knowledge and skills. Thus, unequal education opportunities may lead to different understandings of gender equality, power and rights to resource acquisition, which is evident in Cambodia where a previous survey on demographics and health in 2005 found that half of Cambodian households prioritized education sons over daughters (Eng et al., 2010). Another possible reasoning behind a greater proportion of women reporting equal access and control to fishing resources than men’s reports could be because women were afraid of negative cultural or community attitudes towards them. This concurs with Gubrium et al.’s (2012) point that cultural
norms and social stigmas, particularly in potentially marginalized groups, may affect how participants engage with the study and affect the outcome of survey results (Gubrium et al., 2012). While this may have been a possible finding in my research, it still suggests that gender inequalities are existent in these spaces and potentially commandeer men’s and women’s discussions on resource access and control.

4.4.3 Gender dynamics in perception of conservation and conservation areas

Our surveys revealed gendered differences in perceptions of conservation and its associated challenges, which were not identified in previous household research (Appendix B). Participant understandings of the importance of fisheries conservation were evident in this data. Most participants were aware of the potential that conservation initiatives had in protecting spawning areas, increasing fish stocks and sustaining these populations for future generations. However, fewer women were involved in conservation projects or acknowledged conservation as an alternative livelihood compared to men. As more men attended conservation projects and learned about the importance and impacts of fish conservation on fishery sustainability, their opinions concerning conservation may have increased their support for conservation as an alternative livelihood. This is consistent with Goodwin’s (1998) argument that engaging local community members in conservation initiatives can engender understanding of and support for conservation. Women who were not exposed to the same types of conservation projects may have had different understandings and views of conservation, which may have explained their decreased support for conservation.

There were discrepancies regarding the frequency of patrolling of conservation areas and participation in community fishery meetings described by men and women. More fisherwomen
believed that men engaged in these activities than what was reported by men. Similarly, almost half of women believed that conservation areas were patrolled daily, whereas more than half of male participants believed these areas were patrolled weekly. This calls into question the true efficacy of community-based management, as there seemed to be differences in what men and women fishers thought was occurring in conservation areas, versus the level of conservation activities that was taking place. Another possible explanation for this could be pressure for women to present their families and communities in good light and supportive of conservation so that development programs and government groups view their communities positively.

Fishers also discussed difficulties of living near conservation areas as the majority of them were expected to patrol and monitor these spaces without compensation while risking their own safety. Although government staff assisted villagers in apprehending illegal fishers, community members were still responsible for managing community-managed conservation areas without the authority to arrest violators. Personal communication revealed that patrolling conservation areas was indeed a great challenge for fishers, as conflict with illegal fishers could quickly become violent. Moreover, enforcing laws that prohibit or restrict fishers from fishing may not be the most plausible solution as this may affect local livelihoods, reduce food and income, and create even greater burdens for already marginalized groups (Gillespie, 2016).

Primarily fisherwomen reported health and safety concerns when fishing or patrolling conservation areas. The Food and Agriculture Organization of the United Nations (2017) argues that when women are provided equal access to resources, health is placed at high financial priority aside from providing food, clothing, and education for the family. This may explain my finding of women’s concerns for health and safety, as the ability for these factors to shift the
family dynamic and contribute to household stability puts them at high priorities for women (FAO, 2017b). Moreover, unpredictable storms and precipitation can turn patrolling into a perilous activity. As men are often considered the breadwinners of the family (Harper et al., 2013), women may perceive health and safety risks to be extremely high. Losing the breadwinner of the family can jeopardize family stability, food security, and livelihood sustainability.

4.4.4 Limitations

Each of my surveys each presented their own set of limitations. As I sampled participants that had previous relations with conservation and/or Conservation International, their understandings of conservation may be higher than those who have not been exposed. I also chose to interview community fishery committees with women so that I could gain an understanding of women’s perceptions in committees. However, this may have influenced findings as committees without women may have different perceptions of gender dynamics. Moreover, I only sampled 4 villages in the Pursat province, and may have missed more marginalized groups of men and women if they were not in villages that had partnerships with Conservation International.

Questions regarding fisher opinions of government policy were not easily understood by participants as they had difficulties understanding the intricacies of government level policies related to conservation areas. Moreover, translation of the survey question answers posed some difficulties. As some Khmer phrases were unique to the language, it was difficult for my research assistants to provide direct translations in English, particularly regarding complex questions on roles in community fisheries and conservation areas. Direct annotations were also not possible.
because of this barrier. Instead, I could only group my comments into themes and use these themes to explain participant response choices. Moreover, it was difficult to incorporate other identities such as ethnicity and class into my studies as the majority of the participants were of the same ethnicity and were in similar financial and economic situations.

Another predominant limitation was that storms easily affected interview times, as villagers typically turned off communication devices during bad weather that made communication and arranging interviews difficult. I also had to accommodate for the villagers’ working schedules, and ‘moving days’ when entire floating villages moved to a new location for the wet season. Thus, times for interviews were limited and restricted the number of people my research assistants and I could speak with. Interviews were conducted near the wet season when daily storms were frequent, making it dangerous for my research assistants and I to access floating villages. This further restricted interview opportunities. Some fishers were cautious that my research assistants and I were related to the government and were cautious to speak with us in the beginning of the data collection period. To gain their trust, my research assistants and I spent part of the pilot study days introducing ourselves to the villages to ensure them that we were separate from Cambodia’s Fisheries Administration so they could freely discuss their concerns. It was difficult to conduct interviews in one of the villages as many of them had extremely negative feelings towards the conservation areas and did not want us to ask about details of their involvement with conservation. Many were upset about the extent to which the conservation areas intruded on their fishing practices.
4.4.5 Conclusion

While gender inequalities were found to persist in small-scale fisheries in the Tonle Sap Lake, recognition of and interest in addressing these inequalities is growing. My findings suggest that although women’s activities in small-scale fisheries are vital in sustaining village fishery businesses, prevailing ideals of gender roles perhaps still obscure the true significance of women in the fishing sector and overlook their concerns. My findings also suggest that more work needs to be done in addressing women’s power in fisheries management, ability to access fishing resources, and control fisheries management. Understanding men’s and women’s contrasting perspectives towards conservation also revealed the challenges of working in conservation areas, and differing views of conservation’s efficacy. This research exposed a plethora of perceptions regarding gendered roles, inequalities and norms that still need to be addressed in these fishing households, community fisheries, and fish conservation areas. Understanding the ways that conservation initiatives can affect these gendered spaces can lead to profoundly different environmental and social outcomes. In doing so, state and non-governmental initiatives can create projects that address fish conservation concerns while broadening the social acceptance of gender equality in traditionally male-dominated fisheries.
5 Chapter 5: Final Wrap-up

5.1 Challenging women’s roles in fisheries: empowerment

The World Bank argues that women empowerment can bring about critical consciousness, or awareness of one’s circumstances (Cornwall, 2016), through “…enhancing an individual's or group's capacity to make choices and transform those into desired actions and outcomes” (Alsop et al., 2005 pp. 120). One definition of empowerment describes the ability for people at the individual, community, and organizational level to gain control of their current situations (Sharaunga et al., 2016; Kar et al., 1999). Women’s empowerment is also pivotal in community-level understanding of gender roles and its impacts on the transformation of power relations over time (Dineen and Le, 2015). Others describe women’s empowerment as capable of increasing their capacity “to participate in, negotiate with, influence, control and hold accountable the institutions that affect their lives”, which is applicable to my findings of lack of female representation in this case study (Sharaunga et al., 2016). According to Sharaunga et al. (2016), empowerment focuses on the relationship between women and men, and how this affects women’s access to, and control over, resources. However, empowerment in one area does not necessarily transfer into other aspects of work or family life (Cornwall, 2016). Thus, an inclusive long-term scheme that promotes gender equality both at work and in the household is important to address gender issues at play.

While women empowerment is a dominant theme in development goals, it is important to be cautious about how women empowerment is brought about. Gender mainstreaming, for example, was first conceived to acknowledge the disadvantaged position of women and the need for governments to focus on gender equality and women empowerment in policy and governance.
(Alston, 2014). This concept has been used previously in Conservation International’s other action plans in Cambodia. Key to gender mainstreaming projects is their ideal inclusion of gender at every level of work (Baachi and Eveline, 2014). However, Alston (2014) argues that ways of empowering women is context-dependent and culturally sensitive, thus policies to mainstream gender must account for cultural gender biases and practices. While rural women are often targeted in development projects in hopes of encouraging gender mainstreaming, true gender mainstreaming is sometimes misunderstood and projects do not often consider the true constraints of rural women (Hart, 2008). Paradoxes exist in gender mainstreaming due to controversy over project goals, the risk of projects reinforcing gender biases, and its applicability at local institutions that are inherently highly gendered spaces (Alston, 2014; Wittman, 2010; Baachi and Eveline, 2010; Walby, 2005). Cambodian community fisheries are examples of this, where disproportionately more men are employed over women, and women’s influence at the decision-making levels remains sparse despite gender mainstreaming projects. Thus, the way that programs and policies attempt to address prevailing gender inequalities must be sensitive to cultural context, clear on project goals, and concise about the way that success is measured.

5.2 Research and practical implications

This research contributes academically and practically to understandings of gender and fisheries. Through my two surveys, I found that men and women had different perceptions of the types of fishing and non-fishing work performed by each gender. Thus, this research was able to show that women’s roles in fisheries are indeed often overlooked and neglected in fisheries management. This research also contributed practically to understandings of power dynamics and resource access and control, which is important in refining fishery management groups like
community fisheries. My research suggests that current arrangements of community fisheries do not fully accommodate the voices of women or give women the capacity to control resources. Aside from these, my research uncovered important findings regarding fisher perceptions of conservation, and uncovered key questions regarding the efficacy of community-based conservation. Understanding both men’s and women’s attitudes towards conservation in critical for state and non-governmental programs and seek to mobilize local communities in the diverse conservation initiatives in the Tonle Sap. Without fully considering the needs, challenges, and ideas of both genders, support from local communities may lead to vastly different outcomes.

With regards to the research implications of this thesis, this research offers a preliminary understanding of gender forces at play in Cambodia’s small-scale fisheries. While some literature attempt to consider gender in fisheries (Harper et al., 2013), relatively little fisheries research in the global south pay attention to gender roles and its socio-economic impacts on men and women (Weeratunge et al., 2010). This research can foreground future gender analyses to explore deep-rooted socio-cultural factors in Cambodia that contribute to differences in men’s and women’s perceptions of their roles and practices in fish and conservation. This research also bridges the fields of small-scale fisheries research with feminist political ecology research by showcasing how survey questions informed by feminist political ecology ideas can expose contrasting perspectives on power, access, and control of fisheries. With regards to Cambodia, this research also contributes to scholarly understanding of the relationships between gender and fish conservation, which may probe further research that investigates different methods of transforming relations to bring about gender equality and meet sustainability goals.
5.3 Future research opportunities

There are many areas for future research opportunities. As this research was not a full gender analysis that explored underlying cultural, historical, social implications leading to gender dynamics in Cambodia’s small-scale fisheries, future work can further this area of research. As my research only explored perceptions, focus groups, semi-structured surveys, and ethnographic approaches like participant observation can be done to present the actual differences in practices and behaviours between men and women. This information can then be compared with my data on perceptions of behaviour to understand whether perceived behaviours and actual behaviours are the same. Further gender analysis work can also help to make connections between observed gendered differences in small-scale fisheries and prevailing gender roles and cultural norms in Cambodia. Future conservation programs and community-based management schemes can turn to my preliminary work and other gender analyses to make programs more attentive to gender-specific needs and concerns.

Other research possibilities include exploring the types of goals set forth in gender-specific fishery conservation programs, and its impacts on broader gender narratives can be an important area of research. As non-governmental organizations often create tailored conservation programs aimed at a particular gender, it will be helpful to understand whether these program goals contribute to actual changes in gender perspectives and practices. Research in natural resource management should more deeply explore the ways that women contribute to the formal and informal fishing economies. This allows for discussions on the true significance of women in the economy, and how these dynamics are changing with change in societal attitudes of gender. More broadly, this research can be coupled with studies on whether these gender roles in the
fishing economy impact fish conservation differently, and if so, to what extent. Finally, Lau and Scales (2016) have mentioned that gender is only one identity of an individual, and other identities should be explored to fully understand how intersectionality relates to human-environment interactions. Other gender identities also exist and should not be ignored in the context of small-scale fisheries research. Thus, my final recommendation is to encourage future investigation the intersection of other gender identities, ethnicity, class, with other identities, and how these intersections impact perceptions and practices in fisheries governance and sustainability.

5.4 Final conclusion

Taking a gender lens to approach small-scale fisheries offers a unique platform to explore the pathways in which equality, power, access, and attitudes intersect with fishery and development goals. More importantly, it can reveal the impacts of considering socio-cultural factors in on human livelihoods in environmental initiatives. In order to address the needs of both men and women while serving environmental protection goals, programmers and policy makers need to consider gender discourse and the social, economic, and cultural consequences associated with these discourses. Although incorporating local participation in environmental protection is vital in accounting for community needs and goals, there also needs to be consideration of the diverse gender and other identities and factors that affect the participation of both men and women in these spaces. In turn, these considerations can more mindfully and sensitively address conservation and gender goals.
6 Bibliography


Dineen, K., & Le, Q. V. (2015). The impact of an integrated microcredit program on the empowerment of women and gender equality in rural Vietnam, 49(1).


Growing concerns regarding gender issues and its connection to environmental challenges has contributed to the expanding field of gender-environment studies (Hawkins and Ojeda, 2011). While many scholars acknowledge the implications of gender on environmental issues, debate on how the two interact has been ongoing (Nightingale, 2006). Several theories have shaped the way gender-environment relations are analyzed and applied. These theories are constantly transformed and reconceptualised; this in turn affects how we understand nature, material practices, and environmental management. (Hawkins and Ojeda, 2011).

One longstanding argument of women’s relation to nature, particularly evident through ecofeminist lines of thought, is the idea of the intrinsic “closeness” of women to the environment (Resurreccion, 2006). Ecofeminist scholars such as Shiva (1989) argue that the oppression of women and nature are linked, and that human’s oppression of nature is synonymous to men’s oppression of women. Based on this theoretical approach, women are viewed as producers of life through their child-bearing abilities. Some ecofeminist scholars argued that women’s biology leads them to be more vulnerable to environmental destruction and have greater desire to preserve and conserve nature (Meinzen-Dick et al., 2014). Women have also been described to take on nurturing maternal roles as “caretakers of nature”, which attributes their reproductive tasks like child care and housework to their connection with natural resources around them.
(Resurreccion, 2006). Ecofeminism was important in acknowledging the value of informal and traditional knowledge that women possessed which gave them a unique connection to the environment (Nightingale, 2006). However, critics argue that the conceptualization of gender and the environment essentializes women as one homogenous group with the same backgrounds, knowledge and experiences of the environment (Meinzen-Dick et al., 2014; Nightingale, 2006). These perceptions of women also exclusively examine women’s relationship with nature and ignored the ways that men interacted with their environment (Agarwal 1992). As such, these theories ignore the effects of class, race, and other identities on interactions between gender and the environment.

Agarwal’s (1992) description of feminist environmentalism critiques this notion, by including the importance of class differences in her argument for this philosophy. Feminist environmentalist scholars focus on the idea that gender and nature relations are sourced from material practices and interactions (Meinzen-Dick et al., 2014; Agarwal, 1992). For example, daily tasks such as collecting firewood or water allows women to attain certain ecological knowledges that connect them to their environment (Resurreccion, 2006). In doing so, this theory emphasizes the relation between material realities of women that shapes their division of labour and access to resources (Agarwal, 1992). Additionally, class and race identities also structure the ways in which people interact with their environment, resulting in gendered differences in power, access, and types of labour performed (Agarwal, 1992).

Feminist political ecology builds on ecofeminism and feminist environmentalism, but offers a direct critique of the essentialist view of women’s inherent connection to the environment. Rocheleau et al. (1996) argue that intersectionality of gender with race, culture and class is
important in the lived experiences of people and their environment. Culture then defines gender roles, spaces, resources, power relations and socio-political undertakings (Meinzen-Dick et al., 2014; Nightingale, 2006). In this line of thought, gender is a process and human-environment interactions traverse scales (Nightingale, 2006). Feminist political ecology is particularly critical in addressing the critique of gender-environment studies focusing more on the environment than gender issues (Nightingale, 2006). Nightingale (2006) argues that while environmental issues produce inequalities between men and women, gendered inequalities also lead to environmental impacts. These processes, being inseparable, manifest through gendered division of work, discourse, and performance (Nightingale, 2006). These inequalities are created through the “social interpretation of biology and social constructions of gender that vary by culture, class, race, and place” (Rocheleau 1995). Thus, intersectionality and divisions holds great power in influencing the outcomes of social interactions between humans and the environment. In some cases, women have been observed to break gender inequalities in order to improve natural resource management practices, but are met with societal resistance to preserve existing cultural and patriarchal attitudes (Hart, 2008).

Criticisms by Nightingale (2006) center on the argument that feminist political ecology assumes an essentialist definition of gender, and disproportionately more attention is paid to women over men, which can lead to the restoration of essentialist views of gender. Post-structural feminism speaks to this argument as its conceptualizes gender-environment relations as a product of performance of subjectivities and gender discourse, and not from material practices (Nightingale, 2006). While post-structuralist feminism is another possible approach to examine gender in this study, it presents limitations when applied to a developing world context,
particularly in the case of Cambodia. For instance, taking a post-structuralist approach to gender through describing subjectivities (an individual’s interpretation of gender) instead of identities may be difficult in these contexts due to the prevailing societal views of a binary gender system and dualisms. Moreover, ignoring societal interpretations may leave out important gender-based differences in livelihoods, decision-making power, and interactions with the environment.

7.2 Appendix B – Research findings from previous research in 2015

Research rationale:

A household analysis consisted of a household survey and a community fishery survey was developed and conducted by PhD Student Ratha Seng, a collaborator on our major research initiative exploring livelihood adaptations to climate change in Cambodia between February and August 2015. These two structured surveys consisted of short answer questions and multiple choice questions. Both surveys were conducted in the Battambang and Kampong Thom provinces. These two provinces were selected based on their relatively high fish dependency scores, based on data from the World Fish Center in 2015 (Nasielski et al., 2012). Fish dependency scores ranks the extent to which households are dependent on fish in sustaining their (World Fish Center, 2011). In these provinces, 113 villages ranked medium, high, to very high on in fish dependency. Of these villages, 45 villages were randomly selected. These villages were a mixture of water-based (floating in the lake the whole year), water and land based (floating for at least three months a year), and land based (on land but dependent on fish). In each village, 5% of households were randomly selected. The preliminary objective of this household analysis was to target communities that were dependent on fish to some extent; hence, households were sourced from both areas near the lake and those further in land.
Findings:

The household analysis revealed only a small difference in ownership of fishing resources between male-headed and female-headed households. Data suggested that both household groups owned similar values in fishing equipment.

**Average values (in Cambodian Riel) of fishing equipment owned by male-headed households vs. female-headed households**

<table>
<thead>
<tr>
<th></th>
<th>male-headed households</th>
<th>female-headed households</th>
<th>One-way ANOVA</th>
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<tbody>
<tr>
<td>Average value of boats</td>
<td>379966.22 ±430189.16</td>
<td>598030.30 ±1708103.82</td>
<td>p=0.078</td>
</tr>
<tr>
<td>Average value of motorboats</td>
<td>1237916.67 ±1640493.24</td>
<td>1133333.33 ±751468.15</td>
<td>p=0.789</td>
</tr>
<tr>
<td>Average value of two finger gill net</td>
<td>42304.42 ±83390.45</td>
<td>30451.61 ±28843.07</td>
<td>p=0.432</td>
</tr>
<tr>
<td>Average value of bicycles</td>
<td>75564.27 ±235975.14</td>
<td>76666.67 ±115859.96</td>
<td>p=0.984</td>
</tr>
<tr>
<td>Average value of purse seine net</td>
<td>439959.2 ± 918829.53</td>
<td>16500 ±19091.88</td>
<td>p=0.522</td>
</tr>
<tr>
<td>Average value of cast net</td>
<td>59213.018 ±71382.87</td>
<td>116666.67 ±57735.03</td>
<td>p=0.168</td>
</tr>
<tr>
<td>Average value of hook line</td>
<td>23944.44 ±31183.65</td>
<td>3000 ±2000</td>
<td>p=0.253</td>
</tr>
<tr>
<td>Average value of electric gear</td>
<td>109945.97 ±109914.57</td>
<td>130000 ±27386.13</td>
<td>p=0.690</td>
</tr>
</tbody>
</table>
The household analysis found few differences in fishing practices between male-headed households and female-headed households. Changes in seasons had similar impacts fish catch for both types of households (Figure 5). On average, wet season catches were larger than dry season catches but no significant differences were found between the catches obtained by male or female-headed households in either seasons (Figure 5). Likewise, both groups of households spent similar amounts of time spent fishing; male-headed households spent 41.53% of their day fishing while female-headed households spent 40.92% of their day fishing.

**Average catch (kg) per day during wet vs. dry season between male-headed and female-headed households.**

![Average catch (kg) per day during wet vs dry season*](image)

*Male-headed households n=558, female-headed households n=49

Our household analysis revealed only a small difference in ownership of fishing resources between male-headed and female-headed households. Data suggested that both household groups owned similar values in fishing equipment (see Appendix A). However, we found a
small difference between male-headed households and female-headed households in ownership of boats. More female-headed households owned a non-motor (typically wooden) boat compared to male-headed households while a slightly greater percentage of male-headed households owned a motor boat, although these were not significant (Figure 7). In both cases, few households owned more than one boat and the most number of boats owned by a household was four.

**Percentage of households that own a non-motor boat vs. motor boat.**

*Male-headed households n=558, female-headed households n=49

The household analysis found similar trends between male-headed households and female-headed households regarding time spent on work. Concurrent with our findings on fish catch, we found no significant difference between male-headed and female headed
households on their respective time spent on agriculture, off-farm jobs or aquaculture (Figure 9). Both male-headed and female-headed households spent the most time on fishing compared to other types of work. Households spent the least time working in aquaculture compared to agriculture and off-farm jobs.

**Average percentage of time in a day spent on non-fishing work.**

<table>
<thead>
<tr>
<th></th>
<th>Male-headed households</th>
<th>Female-headed households</th>
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</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>30.00%</td>
<td>20.00%</td>
</tr>
<tr>
<td>Off-farm jobs</td>
<td>20.00%</td>
<td>25.00%</td>
</tr>
<tr>
<td>Aquaculture</td>
<td>10.00%</td>
<td>5.00%</td>
</tr>
</tbody>
</table>

*Male-headed households n=558, female-headed households n=49

Our household analysis reported that the majority of participants believed women took an active participatory role in community fisheries and fisheries management. Of the participants who took part in the community fishery survey, participants reported high levels of interaction between community fisheries and women, and that community fisheries actively engaged women in their activities and decision making. The survey revealed that
90.69% of participants felt that community fisheries engaged with women in their respective communities. Similarly, 93.32% (n=565) of them felt that women participated in community fisheries in some way, and 87.17% (n=568) reported that women actively participated in community fishery activities in some form.
7.3 Appendix C – Individual Fisher Survey

Gender and fisher participation in Conservation International and community fishery conservation programs in the Tonle Sap Fishery:

**Individual Fisher Survey Survey**

This structured survey questionnaire will be used to conduct individual interviews with fishers engaging in Community Fishery conservation areas and state-led Fish Conservation Areas (FCA) between June and August of 2016. This questionnaire examines variables that affect why and how fishers engage with fish conservation measures in conservation areas.

Participant understands role and has given verbal consent (please check)

Part 1: Interviewer identification

<table>
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Part 2: Participant identification
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<td>d. ជីវពូជ /Diploma/ Certificate</td>
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<td>Is it government funded or NGO-funded?</td>
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Can you briefly describe this program?

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</table>

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| What activities are involved in managing a conservation area? | 3.8.0 ការប្រតិបត្តិការអាជីវកម្មកម្រិតជាតិ អាចមានការប្រឈមប្រាក់របស់ប្រទេសប្រកួតប្រជុំណាមួយឬអាចមានការប្រឈមប្រាក់របស់ប្រទេសប្រកួតប្រជុំឬអាចមានការប្រឈមប្រាក់របស់ប្រទេសប្រកួតប្រជុំឬអាចមានការប្រឈមប្រាក់របស់ប្រទេសប្រកួតប្រជុំឬអាវុធជាច្រើនរបស់ប្រទេសប្រកួតប្រជុំ?  
How often are conservation areas patrolled? | a. មិនមាន/None  
b. ពេលប្រឈមប្រាក់/Daily  
c. ដោយឆ្នាំងសម្រាប់Weekly  
d. ខែមិញ/Monthly  
e. មិនឃើញយើងឬ/Other, please specify:  
_______________________ |

| 3.8.1 ការប្រតិបត្តិការអាជីវកម្មកម្រិតជាតិ អាចមានការប្រឈមប្រាក់របស់ប្រទេសប្រកួតប្រជុំណាមួយឬអាចមានការប្រឈមប្រាក់របស់ប្រទេសប្រកួតប្រជុំឬអាចមានការប្រឈមប្រាក់របស់ប្រទេសប្រកួតប្រជុំឬអាវុធជាច្រើនរបស់ប្រទេសប្រកួតប្រជុំ  
Who is involved in patrolling? |  |

| 3.9.0 ការប្រតិបត្តិការអាជីវកម្មកម្រិតជាតិ អាចមានការប្រឈមប្រាក់របស់ប្រទេសប្រកួតប្រជុំណាមួយឬអាចមានការប្រឈមប្រាក់របស់ប្រទេសប្រកួតប្រជុំឬអាចមានការប្រឈមប្រាក់របស់ប្រទេសប្រកួតប្រជុំ  
In your opinion, has the quantity of your fish catch decreased in the last five years?  
មាន____ មិនមាន____ មិនឃើញ____  
YES________NO_________ DON'T KNOW_________ |

| 3.9.1  
Why or why not? |  |

---

**Part 4: Participant fishing**

| 4.1.0 តើកេសាកព័ត៌មានពីការប្រល័យបោះពុម្ព?  
ប័ត្រាចំណុចស្ទីរ? | a. ប្រព័ន្ធរបស់ប្រទេស/0-3 months of the year  
b. ប្រព័ន្ធរបស់ប្រទេស/ 3-6 months of the year  
c. ប្រព័ន្ធរបស់ប្រទេស/ 6-9 months of the year |
<table>
<thead>
<tr>
<th>4.2</th>
<th>How many month do you fish in one year?</th>
<th>d. <strong>9-12 months of the year</strong></th>
</tr>
</thead>
</table>
|     | **Are you allowed to fish everywhere?** | ។/ត/៖ ត/៖ បិដីង  
YES  NO DON'T KNOW |

| 4.3 | ប្រឈមបំពង់ ក្នុងក្នុងរបៀបប្រឈមបំពង់យើង?  
If not, where are you **NOT** allowed to fish? |
|-----|------------------------------------------|-----------------------------------------------|
|     | ។/ត/៖ ត/៖ មិន ឹង  
YES  NO DON'T KNOW |

| 4.4 | ព្រះអាទិត្ត អ្នក ឈ្នះរីក នៅពេលដែលអ្នកប្រឈមបំពង់?  
Why do you choose to fish? (circle ONE) |
|-----|------------------------------------------|-----------------------------------------------|
|     | a. អ្វីដែលអ្នកប្រឈមបំពង់/ ប្រឈមបំពង់  
   /Other livelihoods do not make enough money  
   b. ប្រឈមបំពង់បង្កើត ប្រឈមបំពង់ប្រឈមបំពង់  
   /Better livelihood compared to farming  
   c. ប្រឈមបំពង់បង្កើត  
   /Easy to catch fish  
   d. ការប្រឈមបំពង់  
   /Good fish market  
   e. ផ្សេងៗ ប្រឈមបំពង់  
   /Other, please specify: |

| 4.5 | ក្នុងក្នុងរបៀបប្រឈមបំពង់? Do you fish alone? |
|-----|------------------------------------------|-----------------------------------------------|
|     | ។/ត/៖ ត/៖ បិដីង  
YES  NO DON'T KNOW |
| 4.6.0 | ប្រើប្រាស់ក្នុង ទិស្ពិទ្ធ តែងតែល្អ ឬមិនតែងតែល្អ?  
If not, is there a reason why you do not fish alone? |
| a. ឱ្យឯកសារប្រើប្រាស់និងប្រកួត  
I do not prefer to fish alone |
| b. ក្នុងការប្រកួត  
It is not safe to fish alone |
| c. អ្នកប្រាក់ប្រឹក្សា ឬមិនប្រាក់ប្រឹក្សា  
My family does not want me to fish alone |
| d. ផ្ទះរីករាយក្នុងការប្រកួត  
My community perceives me negatively if I fish alone |
| e. ក្នុងការប្រកួត  
I catch more fish if I fish with others |
| f. ផ្នែកទូទៅ/ Other, please specify:  
_______________________ |

| 4.7.0 | ប្រើប្រាស់ក្នុង ទិស្ពិទ្ធ តែងតែល្អ ឬមិនតែងតែល្អ?  
If you do not fish alone, who do you go with? (circle all that apply) |
| a. ឪពុក/ Parent  |
| b. បង/ Sibling  |
| c. រូបាល/ Relative  |
| d. ស្រស់/ Spouse  |
| e. ប្រាំក្នុង/ Friend  |
| f. ផ្នែកទូទៅ/ Other, please specify:  
_______________________ |

| 4.8.0 | នេះគឺជាដំណើរការពីរយៈពេលមួយ ដែលអ្នកស្ចាត់  
What percentage of time in one day do you spend fishing (%)?  :____ % |

| 4.9.0 | នេះគឺជាដំណើរការពីរយៈពេលមួយ ដែលអ្នកស្ចាត់  
What other activities take up your time in a day? |
| a. ការងារ/ Household chores  |
| b. ការសុវត្ថិភាព/ Child care  |
| c. ការប្រកួត/ Farming  |
| d. ការប្រកួត/ Fish processing  |
| e. ការសុវត្ថិភាព/ Fish trading  |
| f. ផ្នែកទូទៅ/ Other businesses  
_______________________ |
| g. ផ្នែកទូទៅ/ Other, please specify:  
_______________________ |
### Part 5: Attitudes towards gender in fishing

#### 5.1.0

<table>
<thead>
<tr>
<th>What activities do men perform? (circle all that apply)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Fishing/Fishing</td>
</tr>
<tr>
<td>b. Fish processing</td>
</tr>
<tr>
<td>c. Fishing gear management</td>
</tr>
<tr>
<td>d. Finances</td>
</tr>
<tr>
<td>e. Monitoring/patrolling</td>
</tr>
<tr>
<td>f. Administration</td>
</tr>
<tr>
<td>g. Community fishery meetings</td>
</tr>
<tr>
<td>h. Other, please specify:</td>
</tr>
</tbody>
</table>

#### 5.2.0

In your opinion, do you think men and women

<table>
<thead>
<tr>
<th>มี/ไม่มี ต่างกันไหม?</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>มี/ไม่มี ต่างกันไหม?</td>
</tr>
</tbody>
</table>

YES ☐ NO ☐ DON'T KNOW ☐
| 5.2.1 | ផ្លូវប្រយោជន៍ការអភិបត្ឆិរសើរសមាជិក មនុស្សលីកនីតិ ប្រយោជន៍ការអភិបត្ឆិរសើរសមាជិក មនុស្សលីក?  
Why or why not? |
|--------|-------------------------------------------------|
| 5.3.0 | ការននសាទព្តីនៅ ដល Fish access has remained the same  
Fish access has increased, men have greater access to fish now  
Fish access has decreased, men have less access to fish now  
Don’t know |
| 5.3.1 | ការននសាទព្តីថយចុេះ នៅកនុងតាំបន់  
Why do you think this is? |
| 5.4.0 | ការននសាទព្តីនៅ ដល Fish access has remained the same  
Fish access has increased, women have greater access to fish now  
Fish access has decreased, women have less access to fish now |

have equal access to fish?
<table>
<thead>
<tr>
<th>5.4.1</th>
<th>បានប្រឈមបន្តការសិក្ខារសម្រាប់ស្រុកសិក្ខារសម្រាប់របស់អ្នកឈើសុទ្ធាពីរដ៏ចុងក្តី?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ដ. ស្លឹកឈឺ/Don’t know</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>5.5.0</th>
<th>គូតិសិក្សាកំពូលហើយមានការប្រឈមបន្តការសិក្ខារសម្រាប់របស់អ្នកគ្នា?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ល្អ/ធង ១១ បដិសាទី២ ឬមិនបដិសាទី២</td>
</tr>
<tr>
<td></td>
<td>YES  និង  NO  ឬ DON'T KNOW  ឬ</td>
</tr>
</tbody>
</table>

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<th>បានប្រឈមបន្តការសិក្ខារសម្រាប់របស់អ្នកគ្នា?</th>
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</tr>
<tr>
<td></td>
<td>YES  និង  NO  ឬ DON'T KNOW  ឬ</td>
</tr>
</tbody>
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<th>បានប្រឈមបន្តការសិក្ខារសម្រាប់របស់អ្នកគ្នា?</th>
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<td>ល្អ/ធង ១១ បដិសាទី២ ឬមិនបដិសាទី២</td>
</tr>
<tr>
<td></td>
<td>YES  និង  NO  ឬ DON'T KNOW  ឬ</td>
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</tbody>
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<th>បានប្រឈមបន្តការសិក្ខារសម្រាប់របស់អ្នកគ្នា?</th>
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<td>ល្អ/ធង ១១ បដិសាទី២ ឬមិនបដិសាទី២</td>
</tr>
<tr>
<td></td>
<td>YES  និង  NO  ឬ DON'T KNOW  ឬ</td>
</tr>
</tbody>
</table>
**Part 6: Attitudes towards conservation areas**

<table>
<thead>
<tr>
<th>6.1.0</th>
<th>6.1.1</th>
<th>6.2.0</th>
<th>6.2.1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Do you agree that fish conservation is important?</strong></td>
<td></td>
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<tr>
<td><strong>Why or why not?</strong></td>
<td></td>
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<tr>
<td><strong>Have you participated in fish conservation projects/groups in the past?</strong></td>
<td></td>
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<tr>
<td><strong>Why or why not?</strong></td>
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<tr>
<td>6.3.0</td>
<td>បូជាបំបាច់ សម្រាប់ការបោះឈឺសោន ផ្ទៃរឿងស្រសែនប្រភេទនេះ ប្រភេទប្រភេទគឺមានរូបភាពប្រសើរ? (If answer DK/ND go through to 6.4.0)</td>
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<td></td>
<td>If yes, do you think there are differences between how men and women participated in this conservation project?</td>
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<td></td>
<td>ដើម្បីឈឺសោនឋិត ឬ មិនឈឺសោន?</td>
<td>ឈឺសោន ឬ មិនឈឺសោន ពួកអ្នក ឬស្រសែន</td>
<td>ស្រសែន ឬ មិនស្រសែន មានពីរសេះ</td>
</tr>
<tr>
<td>6.3.1</td>
<td>បូជាបំបាច់ សម្រាប់ការបោះឈឺសោន?</td>
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<td></td>
<td>If there are differences, what differences? :</td>
<td></td>
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<tr>
<td>6.4.0</td>
<td>បូជាបំបាច់ សម្រាប់ការបោះឈឺសោន ហើយ ប្រភេទប្រភេទនេះបានប្រឈមស្តរសើរ?</td>
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<td></td>
<td>If yes, has this project led to changes in your fishing practices?</td>
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<td></td>
<td>ដើម្បីឈឺសោន ឬ មិនឈឺសោន?</td>
<td>ឈឺសោន ឬ មិនឈឺសោន ពួកអ្នក ឬស្រសែន</td>
<td>ស្រសែន ឬ មិនស្រសែន មានពីរសេះ</td>
</tr>
<tr>
<td>6.4.1</td>
<td>បូជាបំបាច់ សម្រាប់ការបោះឈឺសោន?</td>
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<td></td>
<td>If yes, what changes? :</td>
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<tr>
<td>6.5.0</td>
<td>ការធ្វើការបោះឈឺសោន ដ៏រីករាល់?</td>
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</tr>
<tr>
<td></td>
<td>How do you participate in fish conservation?</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>a. ឈឺសោនចូលរួមរីករាល់/ I fish less</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>b. ឈឺសោនបោះឈឺសោនពីរសេះ/ I fish only specific species</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>c. ឈឺសោនបោះឈឺសោនពីរសេះអ្នកបោះឈឺសោនក្នុងមួយសេះ</td>
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<tr>
<td></td>
<td>d. ឈឺសោនបោះឈឺសោនពីរសេះអ្នកបោះឈឺសោនក្នុងមួយសេះ តាមរយៈអ្នកបោះឈឺសោន</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
I tell others about fish conservation measures

e. បង្ហាញការសម្រួលអំពីការអភិវឌ្ឍ
   ឈ្មោះ/  I participate in conservation projects

f. បង្ហាញការសម្រួលអំពីការអភិវឌ្ឍ
   ឈ្មោះ/  I do not participate in fish conservation

g. បន្ទាប់ពីប្រទេសមក
   ផ្លាស់/Other, please specify:
   ______________________________
   ______

h. 6.6.0 សួស្រួលអំពីការអភិវឌ្ឍ

Do you feel that fish conservation negatively impacts you in any way?

འរ/បើ ៤ ប្រើ ជូនប្រើ

YES ______ NO _______ DON’T KNOW_______

6.6.1 បើអោននហតុអ្វើ ឬមិនអោននហតុអ្វើ?

Why or why not?

6.7.0 សួស្រួលអំពីការអភិវឌ្ឍ និងការចូលរួមអោននមានគំនិតសំខាន់

ឈ្មោះ/  Does fish conservation and participation in conservation projects make sense?

អាល/បើ ៤ ប្រើ ជូនប្រើ

YES ______ NO _______ DON’T KNOW_______
Do you feel comfortable attending fishery meetings in conservation areas?

Why or why not?

<table>
<thead>
<tr>
<th>6.7.1</th>
<th>បើកោលអាហារឬបើស្ថានស្ថាន!?</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.1.0</td>
<td>ការបង្កើតប្រចាំឆ្នាំក្រោយប្រទេសឃុនីយ ?</td>
</tr>
<tr>
<td></td>
<td>In your opinion, what are the greatest challenges that men face when fishing?</td>
</tr>
<tr>
<td></td>
<td>___________________________________________________________</td>
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<td></td>
<td>___________________________________________________________</td>
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<td>___________________________________________________________</td>
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<td></td>
<td>___________________________________________________________</td>
</tr>
<tr>
<td></td>
<td>___________________________________________________________</td>
</tr>
</tbody>
</table>

| 7.2.0 | ការបង្កើតប្រចាំឆ្នាំក្រោយប្រទេសឃុនីយ ? |
|       | In your opinion, what are the greatest challenges that women face when fishing? |
|       | ___________________________________________________________ |
|       | ___________________________________________________________ |
|       | ___________________________________________________________ |
|       | ___________________________________________________________ |
|       | ___________________________________________________________ |

| 7.3.0 | ការបង្កើតប្រចាំឆ្នាំក្រោយប្រទេសឃុនីយ ? |
|       | In your opinion, why might men want to participate in fish conservation? |
|       | ___________________________________________________________ |
7.4 In your opinion, why might men not want to participate in fish conservation?

7.5 In your opinion, why might women want to participate in fish conservation?

7.6 In your opinion, why might women not want to participate in fish conservation?

7.7 a. Fishery training
### 7.8.0  Do you think working in fish conservation can be an alternative livelihood for you?

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>YES</strong></td>
<td><strong>NO</strong></td>
<td><strong>DON'T KNOW</strong></td>
</tr>
</tbody>
</table>

**Why or why not?**

### 7.9.0  Do you think your opinion about fish conservation has any impact to government policy decision?

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>YES</strong></td>
<td><strong>NO</strong></td>
<td><strong>DON'T KNOW</strong></td>
</tr>
</tbody>
</table>

*(Positive and suggestion answer)*

---

**Note:**

- **b.** Adult education courses
- **c.** Business management
- **d.** Savings group
- **e.** Child care
- **f.** Family planning

---

**Note:**

1. **What services do you think can help to address the challenges you face in conservation areas?**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
</table>
| **b.** Adult education courses
| **c.** Business management
| **d.** Savings group
| **e.** Child care
| **f.** Family planning

---

**Note:**

2. **Do you think working in fish conservation can be an alternative livelihood for you?**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>YES</strong></td>
<td><strong>NO</strong></td>
<td><strong>DON'T KNOW</strong></td>
</tr>
</tbody>
</table>

**Why or why not?**

---

**Note:**

3. **Do you think your opinion about fish conservation has any impact to government policy decision?**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>YES</strong></td>
<td><strong>NO</strong></td>
<td><strong>DON'T KNOW</strong></td>
</tr>
</tbody>
</table>

*(Positive and suggestion answer)*
| 7.9.1 | ប្រឈមចំណាត់ថ្នាក់ ប្រភេទអាចការត្រូវបានទទួល កើតីមួយដែល?  
If yes, where are your opinions heard? |
| 7.9.2 | នៅពេលដែលការសម្រួលការ បោះឆ្នោត បានអនុញ្ញាតឱ្យ ប្រការសម្រួលឈ្នះ?  
Do you think this differs between men fishers and women fishers? |
Gender and fisher participation in Conservation International and community fishery conservation programs in the Tonle Sap Fishery:

Key Informant Survey

This structured survey questionnaire will be used to conduct key informant interviews with managers in Community Fishery conservation area managers and state-led Fish Conservation Areas (FCA) between June and August of 2016. This questionnaire will identify on management, fisher engagement, and manager perceptions of relations between gender and participation in conservation.

Participant understands role and has given verbal consent (please check)  

Part 1: Interviewer identification

<table>
<thead>
<tr>
<th>1.1.0</th>
<th>ការប្រើប្រាស់សកម្មភាព (ថ្ងៃ/ថ្ងៃ/ខែ/ឆ្នាំ)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2.0</td>
<td>សារៈប្រើប្រាស់សកម្មភាព</td>
</tr>
</tbody>
</table>

Part 2: Participant identification

<table>
<thead>
<tr>
<th>2.1.0</th>
<th>សរ</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.2.0</td>
<td>ឈុត</td>
</tr>
<tr>
<td>2.3.0</td>
<td>ក្រុមការពារក្នុងការប្រការ</td>
</tr>
</tbody>
</table>
### Part 3: participant role in conservation area

<table>
<thead>
<tr>
<th>3.0.0</th>
<th>What is your main occupation?</th>
<th>a. Are you a conservationist? b. Are you a research assistant?</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1.0</td>
<td>What is your role?</td>
<td>conservationist?</td>
</tr>
<tr>
<td>3.2.0</td>
<td>What is your role?</td>
<td>research assistant?</td>
</tr>
<tr>
<td>3.3.0</td>
<td>Are you a conservationist?</td>
<td>Yes/No</td>
</tr>
<tr>
<td>3.4.0</td>
<td>If not, what is your main occupation?</td>
<td></td>
</tr>
<tr>
<td>3.5.0</td>
<td>Number of years working in conservation area</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>2.4.0</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2.5.0</td>
<td>쟀ព្មិតសិកា</td>
<td>a. បឋមសិកា b. អ្នុវិទាល័យ c. សាកលវិទាល័យ d. សញ្ជាប័ព្ត e. នផសងៗ</td>
</tr>
<tr>
<td>3.6.0</td>
<td>Did you participate in the creation of this conservation area?</td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>---------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td>រី/េ្ កនុងការបនងកើតតាំបន់អ្ភិរកសននេ្ នៃប៉ាុ្ ម្ ៍ ឬនទ ៍?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>YES ________ NO ________</td>
<td></td>
</tr>
</tbody>
</table>

Part 4: Conservation area វិស្ថិប្បនិងកើតតាំបន់អ្ភិរកស

<table>
<thead>
<tr>
<th>4.1.0</th>
<th>ស្រុក</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1.1</td>
<td>ភូិ្</td>
</tr>
<tr>
<td>4.1.2</td>
<td>ភូក្</td>
</tr>
<tr>
<td>4.1.3</td>
<td>រៀត</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4.2.0</th>
<th>How many conservation areas do you have?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ភូមិក្លិបស្រុកកើតតាំបន់អ្ភិរកស ម្ ឬនទ ៍? (number)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4.3.0</th>
<th>What is the size of this conservation area (km²)?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ភូមិក្លិបស្រុកកើតតាំបន់អ្ភិរកស ស្បែងអាចែ ម្ ៍ ឬនទ ៍?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>4.4.0</th>
<th>What is the name of this conservation area?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ភូមិក្លិបស្រុកកើតតាំបន់អ្ភិរកស ឈ្មោះអ្វើ៍?</td>
</tr>
</tbody>
</table>

133
### 4.5.0
Has an organization supported the establishment of the conservation area?

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
YES | NO | DON'T KNOW |

### 4.5.1
If yes, what is the name of this organization?

### 4.6.0
Does this organization offer projects specifically for women or men?

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
YES | NO | DON'T KNOW |

### 4.6.1
If yes, what is the name of the program?

### 4.6.2
If yes, do you think this project has led to

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
YES | NO | DON'T KNOW |

(if no/dk go through to 4.6.4)
<table>
<thead>
<tr>
<th>Question</th>
<th>4.6.3 ឬ 4.6.4 ឬ 4.6.5</th>
<th>4.7.0</th>
</tr>
</thead>
<tbody>
<tr>
<td>If yes, what changes have been made to men through this project?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If yes, do you think this project has led to changes in fishing practices in women?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If yes, what changes have been made to women through this project?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>If yes, what changes have been made to practices in men?</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Does the government offer any financial or any supports to this conservation area?</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>----------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>4.7.1</td>
<td>បណ្តាលបំផ្លាញ ឬ ការជួយសម្រាប់ ក្នុង ប្រជាជនីយោបុត្រ?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If yes, what type of support does the government offer?</td>
<td></td>
</tr>
<tr>
<td>4.7.2</td>
<td>បណ្តាលបំផ្លាញ មុខការ សេរីស្រើស្រ ឬ (អំឡុង)?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>If the government offers direct financial support, approximately how much funding does it receive annually (riel)?</td>
<td></td>
</tr>
<tr>
<td>4.8.0</td>
<td>អ្វើំងការដែលតម្រូវការទុននេះ?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>What do you think is the purpose of this conservation area?</td>
<td></td>
</tr>
<tr>
<td>4.9.0</td>
<td>អ្វើំងការដែលតម្រូវការ មួយទឹកកូន ប្រជាជនីយោបុត្រ?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Do you think illegal fishing is a problem in this conservation area?</td>
<td></td>
</tr>
<tr>
<td>4.9.1</td>
<td>អ្វើំងការដែលតម្រូវការ មួយទឹកកូន ប្រជាជនីយោបុត្រ?</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Do you think illegal fishing is a problem in this conservation area?</td>
<td></td>
</tr>
<tr>
<td><strong>Is illegal fishing monitored in this conservation area?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
| 4.9.2 ឈ្មោះការព្យាយាមប្រការជូន

Who monitors illegal fishing? |

<table>
<thead>
<tr>
<th><strong>What duties are involved in managing a conservation area?</strong></th>
</tr>
</thead>
</table>
| 4.9.3 ជាមួយការព្យាយាមប្រការ

What duties are involved in managing a conservation area? |

<table>
<thead>
<tr>
<th><strong>How often is this conservation area patrolled?</strong></th>
</tr>
</thead>
</table>
| 4.9.4 ការប្រការជាមួយប្រការ

How often is this conservation area patrolled? |

<table>
<thead>
<tr>
<th><strong>Who is involved in patrolling?</strong></th>
</tr>
</thead>
</table>
| 4.9.5 ក្នុងការប្រការ

Who is involved in patrolling? |

<table>
<thead>
<tr>
<th><strong>How many people in total are general staff in each conservation area?</strong></th>
</tr>
</thead>
</table>
| 5.0.0 រដ្ឋការព្យាយាមជាដើម

How many people in total are general staff in each conservation area? |

<table>
<thead>
<tr>
<th><strong>5.1.0 ឈ្មោះការព្យាយាមជាក្នុងការប្រការ</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1.2 ឈ្មោះការព្យាយាមជាក្នុងការប្រការ</td>
</tr>
</tbody>
</table>

<p>| 137 |</p>
<table>
<thead>
<tr>
<th>How many staff are women?</th>
<th>How many staff are men?</th>
</tr>
</thead>
<tbody>
<tr>
<td>___________</td>
<td>___________</td>
</tr>
</tbody>
</table>

### Part 6: Gender in conservation areas

#### 6.1.0
Do you think there are differences between men and women in fishing practices? (if no/dk go through to 6.2.0)

#### 6.1.1
If there are differences, what are they?

#### 6.1.2
Why do you think there are these differences?

#### 6.2.0
What activities do men perform?

<table>
<thead>
<tr>
<th>p. Fishing</th>
<th>q. Fish processing</th>
<th>r. Fishing gear management</th>
<th>s. Finances</th>
</tr>
</thead>
<tbody>
<tr>
<td>___________</td>
<td>____________________</td>
<td>___________________________</td>
<td>____________</td>
</tr>
<tr>
<td>6.3.0</td>
<td>What activities do women perform? (circle all that apply)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------</td>
<td>---------------------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a.</td>
<td>Fishing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td>Fish processing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td>Fishing gear management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td>Finances</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e.</td>
<td>Monitoring/patrolling</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f.</td>
<td>Administration</td>
<td></td>
<td></td>
</tr>
<tr>
<td>g.</td>
<td>Community fishery meetings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>h.</td>
<td>Other, please specify</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>6.4.0</th>
<th>Do you need any fishing training?</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>DON'T KNOW</td>
<td></td>
</tr>
</tbody>
</table>

| 6.4.1 | Why or why not?                                       |

| 6.4.2 | If yes, what kind of fishing training?                |

<table>
<thead>
<tr>
<th>6.5.0</th>
<th>Do you think women also need fishing training?</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES</td>
<td>NO</td>
</tr>
<tr>
<td>DON'T KNOW</td>
<td></td>
</tr>
</tbody>
</table>
### Part 7: Opinions on gender and challenges in conservation areas

#### 6.5.1

<table>
<thead>
<tr>
<th>និយម្តូវការប្រើសម្រួល?</th>
<th>Why or why not?</th>
</tr>
</thead>
<tbody>
<tr>
<td>និយម្តូវការប្រើសម្រួលក្នុងសម្រាប់អនាម័យ?</td>
<td>If yes, what types of fishing training?</td>
</tr>
</tbody>
</table>

#### 7.1.0

<table>
<thead>
<tr>
<th>លោកលើកសកមមភាពអ្វើែេេះដរបុរស</th>
<th>What other activities do you think men participate in other than their activities? (circle all that apply)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. នេះការង្ហរផាេះ</td>
<td>Household chores</td>
</tr>
<tr>
<td>b. នេះពេញ ឬ ច្រើន់ Child rearing</td>
<td></td>
</tr>
<tr>
<td>c. នេះពេញ ឬ ច្រើន់ Senior caretaking</td>
<td></td>
</tr>
<tr>
<td>d. នេះពេញ ឬ ច្រើន់ Livestock rearing</td>
<td></td>
</tr>
<tr>
<td>e. នេះពេញ ឬ ច្រើន់ Crop production</td>
<td></td>
</tr>
<tr>
<td>f. នេះពេញ ឬ ច្រើន់ Aquaculture</td>
<td></td>
</tr>
<tr>
<td>g. នេះពេញ ឬ ច្រើន់ Managing businesses</td>
<td></td>
</tr>
<tr>
<td>h. នេះពេញ ឬ ច្រើន់ មកឱ្យមកប្រើ តែឬទេ Other, please specify</td>
<td></td>
</tr>
</tbody>
</table>

#### 7.2.0

<table>
<thead>
<tr>
<th>លោកសកមមភាពអ្វើែេេះដរស្រសតី</th>
<th>What other activities do you think women participate in other than their activities? (circle all that apply)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. នេះការង្ហរផាេះ</td>
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<td></td>
</tr>
<tr>
<td>h. នេះពេញ ឬ ច្រើន់ មកឱ្យមកប្រើ តែឬទេ Other, please specify</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** The text above is a translation of the original content in Khmer.
| 7.3.0 | What do you think is the greatest challenges that men face in conservation areas? | a. Little/no time to participate in conservation areas  
b. Negative community perceptions towards men fishing  
c. Transportation challenges to conservation areas  
d. Family does not allow them to participate in conservation areas  
e. Men do not face challenges in conservation areas  
f. Other, please specify: _______________________
| 7.4.0 | What do you think is the greatest challenges that women face in conservation areas? | a. Little/no time to participate in conservation areas  
b. Negative community perceptions towards women fishing  
c. Transportation challenges to conservation areas  
d. Family does not allow them to participate in conservation areas  
e. Women do not face challenges in conservation areas  
f. Other, please specify: _______________________
| 7.5.0 |  |  

YES_______ NO_______ DON’T KNOW_________
<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you think working in fish conservation can create an alternative livelihood for fishers?</td>
<td></td>
</tr>
<tr>
<td>7.5.1 គឺបានប្រការឱ្យថ្មី ឬមិនបានប្រការឱ្យថ្មី? Why or why not?</td>
<td></td>
</tr>
<tr>
<td>7.6.0 គឺបានប្រការឱ្យថ្មី ឬមិនបានប្រការឱ្យថ្មី? Do you think the opinions fishers about fish conservation activities are heard?</td>
<td>មិន ឹង</td>
</tr>
<tr>
<td>7.6.1 ឆ្លើយ ៖ ឈ្មោះ និងនេះមានទិន្នន័យនៃការប្រការឱ្យថ្មី ឬមិនបានប្រការឱ្យថ្មី? If yes, when and where are their opinions heard?</td>
<td></td>
</tr>
<tr>
<td>7.6.2 ឆ្លើយ ៖ និងនេះមានទិន្នន័យនៃការប្រការឱ្យថ្មី ឬមិនបានប្រការឱ្យថ្មី? Does this differ between men and women fishers?</td>
<td></td>
</tr>
</tbody>
</table>