

**Gender, Social-Ecological Regime Shifts and Governance in Small-Scale
Fishery Commons of Chilika Lagoon**

by

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AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

A social-ecological systems perspective can be used to analyze the connections between human and ecological components in complex and dynamic natural resource commons systems, such as fisheries. When fishery commons experience regime shifts, which are rapid changes in an ecosystem's structure and function that are often difficult to anticipate and either extremely costly or impossible to reverse, there are social and ecological consequences. A gendered lens is crucial in analyzing these shifts as gender roles in fisheries have been constructed by society, dictating the differences between men and women's tasks, responsibilities and resources thus, changes in the system impact men and women in different ways. Women are often seen at the receiving end of rapid environmental change without having much control over how these changes were triggered in the first place. The purpose of this research was to examine through a gendered lens, the social-ecological regime shifts (SERS) in coastal fishing communities in Chilika Lagoon in India. The objectives were to understand the processes of social-ecological regime shifts from the perspective of women compared to those of men, examine how women and men respond and adapt to the impacts of social-ecological regime shifts and finally, examine how the implications of a gender sensitive approach to understanding social-ecological regime shifts can contribute to novel governance approaches in dealing with SERS. Through the use of semi-structured interviews and focus groups, it is apparent that SERS have unique impacts on the women in Chilika Lagoon as they deal with the consequences of rapid change. There are some adaptations taking place to deal with these impacts but a more gender sensitive approach to the governance, which encapsulates the needs of women and focuses on women's empowerment, is necessary to create a more intersectional and holistic governance system that benefits both the men and women living in this fishery commons.

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Chapter 1 - Fishery Commons as Social-Ecological Systems Under a Gendered Lens

1.1 Problem Context

Elinor Ostrom (2009) defines complex social-ecological systems (SES) as a group of subsystems that include, the main resource system, the resource units, the users and the governance systems. These subsystems can be analyzed separately but they also interact to produce effects on the social-ecological system as a whole. In turn, the effects on the whole produce feedback loops onto the subsystems in addition to related SESs. Natural resource commons, such as fishery commons, can be considered as social-ecological systems.

Natural resource commons are a very well-known topic and have been studied for many years. The traditional resources like forests and fisheries are some of the most common resources under analysis. Elinor Ostrom's *Governing the Commons* (1990) is a defining piece of literature in the body of work associated with the commons. The common design principles outline what is necessary to achieve a successfully shared resource and circumvent Hardin's philosophy outlined in the Tragedy of the Commons (1968) that details when there is no external management in a commons system, people will act in their own self-interest and selfishly exploit the resource in question. Hardin's tragedy of the commons (1968) said that users of a resource are stuck in an exploitative system in which they would never invest in the sustainability of the resource as it would be much less profitable for them. Viewing commons as social-ecological systems and following this perspective contradicts this theory as the resource system, the resource units, the users and the governance systems are all deeply interconnected thus exploitation could be subverted by self-organizing (Ostrom, 2009). Self-organization would occur when the expected benefits of managing a resource outweigh the potential costs of rules that would place some restrictions on the use of the resource.

In a fisheries commons, the resource users of the social-ecological system are the men and women who gain their livelihood from fishing; therefore, gender can be a lens under which the social-ecological systems of fishery commons can be viewed. Many current natural resource

management development and research plans that exist in social-ecological systems are oblivious to social and gender-inequalities (Cohen et al., 2016). These types of development plans are designed to deal with the change and instability in that is embedded in these social-ecological systems and affect people's ability to benefit from the natural resource (Cohen et al., 2016) but there is increasing amounts of evidence that indicate that these plans do not have lasting impacts in dealing with changes to the system and that they do not benefit the marginalized peoples in the community, most often women (Slater & Tacchi, 2004; Sumberg, 2005). Thus, gender issues are integral to fisheries commons as social-ecological systems that are undergoing change.

1.2 Problem Analysis

A traditional commons system relies on its foundations of excludability and subtractability. This refers to the ability to determine who is a member of the commons and deal with the accessibility of the resource in question (Ostrom, 1990). Excludability specifically means that the common pool resource, in this case the resource being the lagoon, is large enough that it is possible to exclude potential beneficiaries from using the resource so that only the users or the 'in-group' receive the benefits (Ostrom, 1990). Subtractability is the idea that one user benefitting from the resource takes away some of the possibility of other users to benefit (Ostrom et al., 1994).

While Ostrom's work solidifies the structure of a commons and demonstrates how a resource can be shared responsibly in a group of people, the principles are not without their flaws. One of the principles is termed collective choice arrangements. This means that the people who are affected by the rules set in place in a commons, should be able to have a say in the determination of those rules (Ostrom, 1990). This principle gives the control of the resource to the users and consequently, they are more likely to follow those rules as they had a hand in their creation. Although due to societal structures, entrenched over decades of time, women who are members of the commons are not allowed this power. The position or role women play in these commons scenarios often threatens this foundation as gender roles, patriarchal rules and systems of governance have dictated that women are of less importance than men and do not have the same opportunities or rights. This also means that their contributions to social production are undervalued or not recognized at all. Women are quite often members of the commons but not

active participants in decision-making processes. In many cases, they are simply a marginalized group affected by the resource, the environment and its changes and have no say in the decisions and regulation of the system (Williams & Holt-Giménez, 2017). “[Gender] refers to the socially constructed characteristics of women and men – such as norms, roles and relationships of and between groups of women and men. It varies from society to society and can be changed” (WHO, 2018). This definition of gender was chosen to use in this research because of its inclusion of the various social attachments that have been historically associated with identifying as being male or female and entrenched across cultures. Using a gendered lens to analyze a commons examines this marginalization of women and the systematic silencing of women who are members of the commons.

Another issue with the design principles created by Ostrom is the lack of mention of drivers. Drivers can be anthropogenic or natural in origin and they create change, whether it is directly or indirectly (MEA, 2005). These drivers lead to rapid environmental changes that impact commons systems in a great fashion and can skew the pre-existing unbalanced power dynamic between men and women. These rapid environmental changes are termed Social-Ecological Regime Shifts (SERS). “Regime shifts are abrupt, long-term and often irreversible changes in social–ecological system structure and function, with possibly considerable adverse impacts for human well-being and ecosystem processes” (Biggs et al., 2009; Scheffer & Carpenter, 2003; Nayak et al., 2014). Nayak and Armitage (2018) define social-ecological regime shifts as abrupt, long-term and significant changes in the linked systems of people and nature with uncertain implications for ecosystem services and human wellbeing. This definition of SERS was used throughout the research project because of its consideration of the social-ecological systems perspective and for its depiction of the complexity of a critical transition in an environment. Using a social-ecological systems perspective is imperative as the natural and social systems present in a commons have critical feedback loops across spatial and temporal scales thus this interdisciplinary perspective is used (Holling et al., 1998) and any delineation between the two integrated sub-systems is artificial and arbitrary (Berkes and Folke, 1998).

The commons that this project focuses on is Chilika Lagoon (Figure 1) located on the East-coast of India just off the Bay of Bengal. Chilika Lagoon is home to over 400,000 fishers in small-scale fisheries in approximately 150 villages and the lagoon is a prime example of a natural resource commons. There are distinct drivers that have been identified to have contributed significantly to the occurrence of SERS in the lagoon and the fishers associated with it. The opening of the international shrimp markets in the 1970's resulted in a large surge in demand and brought with it many higher caste members and other non-fishers into aquaculture (Nayak & Berkes, 2011). This led to the exploitation of resources and caused accessibility and rights issues within the lagoon resulting in the suffering of regular capture fishing (Nayak, 2014). Another driver that caused significant changes in Chilika Lagoon was the opening of a new sea mouth that occurred in 2001 (Nayak, 2014). This increase in aquaculture and the new sea mouth development resulted in drastic changes in the natural landscape and ecosystem of the lagoon and created a large loss in the biodiversity and resources, ultimately leading to a decrease in the income of fisher households and an increase in outmigration (Nayak & Berkes, 2011; Nayak & Berkes, 2010). There is a current lack of recognition and understanding in this area (Khan, 2016) and these social and environmental changes all affect women in a unique manner as their fishing activities become more difficult and migrating spouses places a larger burden on women caring for children and their homes.

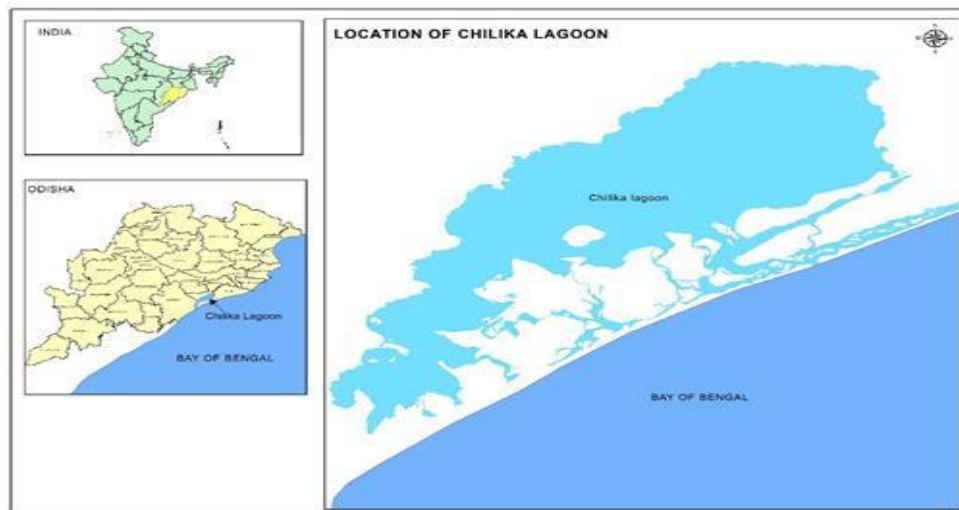


Figure 1. Map of Chilika Lagoon, India (Nayak & Berkes 2012)

Governing locally or allowing community self-determination is another design principle of the commons (Ostrom, 1990). This allows community users to create their own rules and regulations that are recognized by higher-level authorities. Where Chilika is concerned, there is a process of decommodification occurring which means that the excludability and subtractability elements associated with the fishery commons is being disturbed (Nayak & Berkes, 2011). The drivers of change in the lagoon are threatening the legal rights and customary livelihoods of the fisher people in Chilika and they are no longer being recognized or respected. Higher-level managers are infringing on the traditional practices of the communities in the lagoon thus the voices of the fisher people are being lost to a top-down style of governance (Donovan, 2012) that is taking over the lagoon (Nayak & Berkes, 2011).

1.3 Rationale

Fishing in general is viewed as a very male-dominated industry and has always been deemed a male occupation in society, this is most commonly seen in the popularity of the term “fisherman”. Journals such as Conservation Biology accept the use of the term “fishers” whereas others, such as Fishery Bulletin, require the use of the gendered suffix (Branch & Kleiber, 2015). This nomenclature can segregate women from the social-ecological system of the fishing commons, thus the contributions of women who are fishers or participate in fishing-related activities contributions are diminished (Koralagama et al., 2017). Additionally, if the commons are experiencing some form of transformation or shift based on anthropogenic or ecological drivers, such as is the case of the SERS occurring in Chilika Lagoon, the diminished position of the women in the community is further impacted as they are more vulnerable to change. By using a social-ecological systems perspective to examine the relationship between SERS, gender, commons and governance, this research aims to further extend the body of knowledge in this field and bring light to critical roles and voices of the fisher women in the commons that is Chilika Lagoon.

1.4 Purpose and Objectives

The purpose for this research is as follows:

To investigate and understand the connections between gender, social-ecological regime shifts and governance in a coastal fishery commons

The objectives to fulfill this purpose were identified as:

1. To understand the process of social-ecological regime shifts from the perspective of women, compared to the perspective of men
2. To examine how women and men respond and adapt to the social-ecological regime shifts within their lagoon environment
3. To understand how the implications of a gender sensitive approach to understanding social-ecological regime shifts can contribute to novel governance within a common pool resource like a lagoon

The main goal of this research is to contribute to the understanding of the interplay between gender and SERS in a commons that is governed by a complex multi-level governance system.

1.5 Summary of Literature Areas

Three distinct literature areas were used in this research: social-ecological regime shifts and their applications in fisheries commons, gender and fisheries and governance of fishery commons. These literature areas tell the story of how this project fits in to the already existing narrative of fishery commons as social-ecological systems. Fishery commons are complex social-ecological systems and when drivers of change occur, regime shifts impact the checks and balances that occur between the two systems. Social-ecological regime shifts as mentioned are rapid changes that have both natural and anthropogenic impacts and can very easily throw off the balance of a fishing commons, thus this is the first literature area that was investigated. Gender in fisheries being the second literature area speaks to how women are currently viewed in fishing commons and focuses on how often their contributions to the fishing industry are undervalued. Governance of fishery commons is looked to as the final literature area to highlight the current governance practices in fisheries and understand how gender and SERS may or may not fit in to these models of management.

1.6 Summary of Main Methods and Study Area

As previously mentioned, this is a case study of Chilika Lagoon in India and it will focus on qualitative methods to examine the proposed research purpose and objectives. This research aims to uncover the relationship between gender, fishery commons and social-ecological regime shifts, examine how governance is currently being implemented in these systems and analyze what methods are working and what could be improved upon to better regulate the fishery commons. In order to accomplish these objectives and fulfill the purpose of this research the research methods of document review, observations and scoping, semi-structured interviews and focus groups were employed in two villages of Chilika Lagoon (Gabakunda and Gola). These villages were specifically chosen based on their locations, caste, village sizes and other social factors that provide a view of the range of communities within Chilika that rely on the lagoon for their livelihoods.

1.7 Thesis Outline

This thesis will start with an in-depth review of the literature review in Chapter 2 surrounding gender, social-ecological regime shifts and governance within fisheries which tells the story of why this case study in Chilika Lagoon is useful in furthering the narrative. It then flows into Chapter 3 and the breakdown of the study area and research methods used to perform this case study and why they were implemented. Chapters 4 and 5 then present this data and discuss how women and men perceive SERS, what they do to adapt to these changes and how governance can better manage the fishery commons. Chapter 6 then summarizes the research objectives, highlights the key lessons and contributions and then provides some further research recommendations.

Chapter 2 - Social-Ecological Regime Shifts, Gender and Governance in Fishery Commons

2.1 Social-Ecological Regime Shifts and Fisheries

Fisheries as social-ecological systems was based on the idea that the two subsystems: the biophysical and human societies, are complex and integrally interconnected (Berkes, 2011; Nayak, 2014). The social processes, for example the cultural, political and economic sectors, interact with the biophysical and geological sectors of fisheries and influence each other to produce change in the social-ecological system as a whole (Nayak, 2014). Thus, conservation and management depend on dealing with both changes in the ecosystem and social reactive measures to the changes, as well as the feedback that this projects back on the ecosystem (Pinsky & Fogarty, 2012). The impacts of environmental change must be observed in light of the behaviours of the fishers in the region and the species of fish they exploit (Pinsky & Fogarty, 2012). If fisheries management were to focus on solely ecological factors, there would be a large amount of implementation uncertainty in regards to governance as human behaviours in response to management tools are not being considered, thus targets may be unreachable or irrelevant (Fulton et al., 2011). This means that both processes, the social and ecological, delineate and define the nature of change in the system as a whole with the outcomes of one subsystem relying on the dynamic nature of the other subsystem (Nayak, 2014). Additionally, fisheries, being common pool resources, often fall victim to overexploitation as defined by Hardin's tragedy of the commons (1968). So, when a defined group of users of the fishery is determined and the exclusion of other beneficiaries is costly in addition to when exploitation by one user reduces resource availability for others (excludability and subtractability, respectively) (Ostrom, 1990; Ostrom et al., 1999), it is possible to define fishery commons as complex social-ecological systems.

This dynamic relationship is then compounded by the issue of social-ecological regimes shifts (SERS) in coastal ecosystems, and creates an increasingly difficult challenge for governance (Lees et al., 2006; Kraberg & Wiltshire, 2014). This is why a social-ecological systems approach is taken to looking at the SERS that affect fishery commons. Social-ecological regime shifts, or rapid environmental changes, can be very destructive in a commons. They are rearrangements or

alterations in a social-ecological system's structure and function and they impact the ecosystem and its services, in addition to human wellbeing (Nayak et al., 2016; Crépin et al., 2012). These can have particularly damaging effects on a commons system as the impact on the resource affects everyone in the community. They are caused by both ecological and anthropogenic drivers which in turn results in impacts on both of the systems (Nayak et al., 2016). Social-ecological regime shifts consider the connection between ecological and social aspects with a focus on the social dimension as it is so often left out of the conversation regarding the literature on traditional natural resource management (Nayak et al., 2016). Disregarding this anthropogenic aspect inhibits one's ability to foresee and adapt to impending regime shifts or rein in humanity's impact on the thresholds of the planetary boundaries (Hughes et al., 2013). The current understanding of regime shifts does not focus on aspects such as poverty, power and institutions that are all social conditions that can drive change and must be analyzed in order to navigate regime shifts in coastal fishery systems (Nayak & Armitage, 2018). Nayak and Armitage (2018) also propose a framework to study regime shifts in coastal fisheries based on six core dimensions of SERS. These dimensions are: the drivers of change, the appropriate scales of intervention, the social-ecological units within the regime, the social equity of the regime shift or more plainly who wins and who loses based on the impacts or benefits of the change, the social power of the actors and the role of management and governance in handling the regime shifts.

A stressor such as a SERS will impact the social relationships of the commons system and can exacerbate the gender issues already facing the fisheries. Whether it is human impacts, ecological impacts or a combination of the two, these critical transitions create and expand upon existing social inequities, power imbalances and social environmental injustices within fishing communities (Nayak et al., 2016). Things like: the availability of fish, the breaking down of institutions, the quality of the water and loss of livelihood or wellbeing within the fishing industry can all be drivers of rapid and critical shifts (Nayak et al., 2016). All of these changes have unique impacts on women that fail to be addressed in management and adaptation plans concerning the commons. Often women who are a part of a natural resource commons are conceived to be more highly vulnerable to ecosystems shocks as they rely more heavily on ecosystem services, they have lower income levels, poorer health and more labour constraints than men (Shackleton et al., 2014;

Arora-Jonsson, 2011; Goh, 2012). There remains limited empirical work in the social realm of fisheries management that focuses on gender and gender inequities in fishery commons. These gendered implications of rapid environmental change fall under the aforementioned imbalances and inequities that are severely impacted and/or exacerbated by social-ecological regime shifts in fishing communities (Nayak et al., 2016). Thus, governance of commons that incorporates both gender and rapid change into its management strategy is imperative.

Chilika Lagoon is a fishery commons and a complex social-ecological system. The drivers of change in the lagoon are creating these SERS and impacting the livelihoods of the fisher people. Understanding SERS in fisheries provides information on how social-ecological systems experience change and how the complex social interactions of resource users must be explored in order to generate more complete understanding of the relationships between gender and governance in fisheries.

2.2 Gender and Fisheries

The connection between gender and fisheries, especially the social-ecological system of a fishery commons can be very complicated. As mentioned previously, the fishing industry is very much a man's world and historically, aquaculture and fisheries development programs and other technical training systems have always been targeted to men in the industry (Choo et al., 2008). Gender analysis in the fields of community-based natural resource management and social-ecological systems continue to be understudied (Ravera et al., 2016) while it is known that understanding the complexities of gender can better inform local and higher levels of governance in social-ecological systems management (Kawarazuka et al., 2017).

The men of Chilika Lagoon and many other regions mainly partake in offshore fishing, which is viewed as the most important role in fishing culture (Williams et al., 2012). Women will often play less visible roles in fishing communities, but by no means are their contributions any less important than the roles of the men. Fish vending, net mending, cleaning of fish and equipment, dry fish processing and trading are the roles taken up by women and because these are less capital intensive, they have been deemed less important (Koralagama et al., 2017). These defined gender

roles have been constructed by society, dictating the differences between men and women's tasks, responsibilities and resources (O'shaughnessy & Krogman, 2011). In turn, this perpetuates a power dynamic between men and women in fishing communities. These gendered power dynamics affect women's decision-making capabilities, for example, on the types of activities they participate in, their time and labour investments, and how they utilize their incomes (Cole et al., 2018; Cole et al., 2020).

Women's contributions to the fishery enhance the social capital within the community. Without them, fisheries would not be able to function in a cohesive manner and by extension families would not be able to thrive without women's efforts as women are known to predominate the post-harvest sector of fishing whether it be retail, processing or distribution of fish (Thorpe et al., 2014). Their contributions extend beyond just fishing as they also contribute to the community's wellbeing. This speaks to the connections between productive and reproductive labour. Women work to combine their productive fishing activities with their reproductive tasks, such as child rearing and homemaking (Thorpe et al., 2014). Thus, a gendered, responsive approach to fishery commons is necessary when the goal is to achieve development objectives in marginalized resource-based communities like these small-scale fishing communities. "Gender inequality and discrimination challenges the social, economic and environmental sustainability of the global small-scale fisheries sector critically in achieving inclusive development" (Koralagama et al., 2017). Excluding women and disregarding their needs and the knowledge or work they can and do contribute to the commons, weakens the social aspect of the system and affects the adaptive capacity of the community as a whole (Aregu et al., 2016). This idea of ability to adapt is what connects the topic of SERS to gender. When an ecosystem begins to degrade, the natural resources that both men and women rely on in small-scale fisheries are reduced and impact their livelihoods but women in particular are left in a more vulnerable position as they are constrained by gender inequities and institutions that are biased towards men (Aguilar, 2008). It is apparent that women are often seen at the receiving end of SERS without much control on how these changes were triggered in the first place.

Gender theory and development is integral to reaching the goal of sustainable livelihoods in fishing communities (Bennett, 2005). By utilizing a gendered lens in this case study of Chilika Lagoon, it is possible to generate integrated knowledge on social-ecological systems that can enhance the sustainability of these types of small-scale fishery commons (Delgado-Serrano & Semerena, 2018). How women and men from Chilika form their perspectives on SERS and adapt to those changes in the fishery commons is based on gender roles and how one's role changes in order to maintain their livelihood (Bennett, 2005). Including gender analysis in this fisheries research combats the norm of gender neutrality that typically dominates the field.

2.3 Governing the Social-Ecological Systems of Fishery Commons

Governing locally is a design principle of the commons (Ostrom, 2000) and for a commons to be successful the community self-determination or the rules and norms created by the users of the social-ecological system must be recognized and respected by higher-level authorities. Thus, the commonisation of a resource is defined as the process through which a resource is turned into a jointly-used resource based on the excludability and subtractability and decommissioning is when the resource under these commons institutions loses those characteristics (Nayak & Berkes, 2011). The flow between commonisation and decommissioning is dynamic and drivers of change in the social and ecological subsystems of fishery commons impact the processes (Nayak & Berkes, 2011). In the social sector, when higher level governance institutions subsume the local communities' rules developed through customary use, decommissioning occurs. This can prove to have negative impacts on governance of the social-ecological system as a whole as they cannot handle the complexity, diversity, scale and dynamics that define fisheries and the ecosystems that they are a part of without the inclusion of governing actors beyond the state-level (Chuenpagdee & Sumaila, 2010).

In a commons, there can be *de facto* and *de jure* rights. *De facto* rights are decided upon by the community and are a typical form of governance in a commons (Ostrom, 2000). *De jure* rights are those that are recognized by higher-level forms of governance (Ostrom, 2000). The *de facto* rights developed by communities within the commons may not extend to women because of the societal constructs that enforce this tradition of gender inequality. This results in and contributes to the lack

of recognition of women and allow the men in the community to have the power and control over the system. It is well known that when the power dynamic is skewed within a commons, then the whole system is sure to break down (Nayak et al., 2016). In more formal governance and policy spheres, policy documentation and gender-neutral research on small-scale fisheries clearly outlines male contributions and either subsumes women's contributions or ignores them entirely (Lentisco & Lee, 2015; Branch & Kleiber, 2017; Kleiber et al., 2015). This omission in policy further enforces the separation between women and the community. Such a large group of members of the commons are being excluded because the policies fail to address the fact that women have different experiences, skills and relationships with the resource. So called "gender-neutral" regulations are damaging as they disregard the plight of women. This is why the inclusion of women in all aspects of governance of the resource is imperative in these fishery commons. Thus, a more inclusive and gendered governance plan that incorporates women and their voice is crucial to successful governance of a fishery commons.

How adaptation strategies are governed in the social-ecological system is extremely important. As mentioned before, adaptation is inherently necessary in dealing with social-ecological regime shifts as changes in environmental structures occur and require responses from the people who reside within the social-ecological system. In a study done by Novak Colwell et al. (2017), it was determined that adaptation strategies and coping responses are affected by power, class and gender; and men and women will favor different adaptive methods when dealing with critical transitions in their environment. Men were more likely to choose adaptations that resulted in long-term livelihood resilience because of the position they hold within society and the capabilities and tools they possess, whereas women would respond with more reactive coping measures because they lack the power and capital to make a long-term change (Novak Colwell et al., 2017). In regard to fisheries, the changing roles of women, along with the transitions of regime, are mainly adaptations to the environment, the market, responsibilities and the income generation of the family. Consequently, there is a lack of documentation of these specifically within the literature (Koralagama et al., 2017). Women are further inhibited in their adaptation efforts by their limited access to education, physical mobility (many women are tied to the land of their homes and are unable to migrate) and agency (Cohen et al., 2016). A lot of adaptation would also require

challenging the aforementioned current and historical social norms, which is a large barrier that women have to face. Adaptation strategies that are implemented in fishery commons via governance institutions must consider gender in their development as there are numerous social characteristics tied to gender that are pivotal in uncovering why people adapt to change in a certain manner (Novak Colwell et al., 2017). From this knowledge and resulting adaptation development, crucial natural resource management decisions can be addressed accurately having been subjected to a gendered analysis. This type of intersectional governance that crosscuts caste, gender and other societal constructs is necessary to govern a fishery commons. As women become more recognized within the fishing industry for their contributions and allowed a voice in strategic planning and the building of capacity there could be increased gender equality achieved in fishery commons.

Governance is a determining factor in the success of a commons. It can either help or harm women's relationship with their shared resource and the surrounding environment. It can dictate how effective a community is in dealing with SERS that impact their shared resource and so proper and effective governance that takes into account all of the resource users and the impacts they have on the resource is crucial to a successful commons. Thus, this project looks to taking a gender sensitive approach to analyzing the current governance systems of Chilika Lagoon and how this can translate to a potentially more inclusive and holistic governance process.

It is extremely important to recognize the nexus between gender, SERS and governance of the commons as all of these aspects are interconnected. The issues are complex and build upon one another, thus in order to address the overarching problem, all facets need to be studied. Too often governance approaches fail to consider some crucial component and result in maladaptive, ineffective governance of a commons. In the literature, it is apparent that gender has not been recognized enough in commons scenarios and needs to be addressed in order to depict more holistic sharing of resources, especially fisheries which are viewed currently as so heavily male dominated, even though this has been proven not to be true. On top of this lack of gender representation in fishery commons, it is identified that SERS can impact the commons itself and exacerbate the gender issues in the system as well. That is why adaptive and inclusive governance

and management of these fisheries is the overarching solution to these problems. Through proper regulations, women who are rightful members of the commons can be included, heard and represented accurately to deal with changes in the environment that affect the resource that they have an innate right to access and utilize.

2.4 Conceptual Framework

Figure 2 is a conceptualization of the proposed research question based off of the aforementioned background literature. The incorporation of these four elements (gender, social-ecological regime shifts, fishery commons and governance) and their relationships to one another is depicted in this hierarchical manner. While gender and social-ecological regime shifts are unique aspects that can be found within the social-ecological system of the commons, they are not independent of each other. The livelihoods of men and women are affected by regime shifts in unique manners but additionally, the gender roles that have been entrenched in society, impact the changes in the ecosystem. This highlights the social-ecological systems approach as both human and natural components can be found in both the cause and effect of the problems that reside in a commons. With fisheries being one of the oldest, and most well-known commons systems it provides a strong background to further explore and expand the knowledge of governance in these regimes. Proper governance has the power to regulate both SERS and gendered issues and should be used as a mechanism to promote positive change towards gender equality within fisheries commons as well as other commons systems.

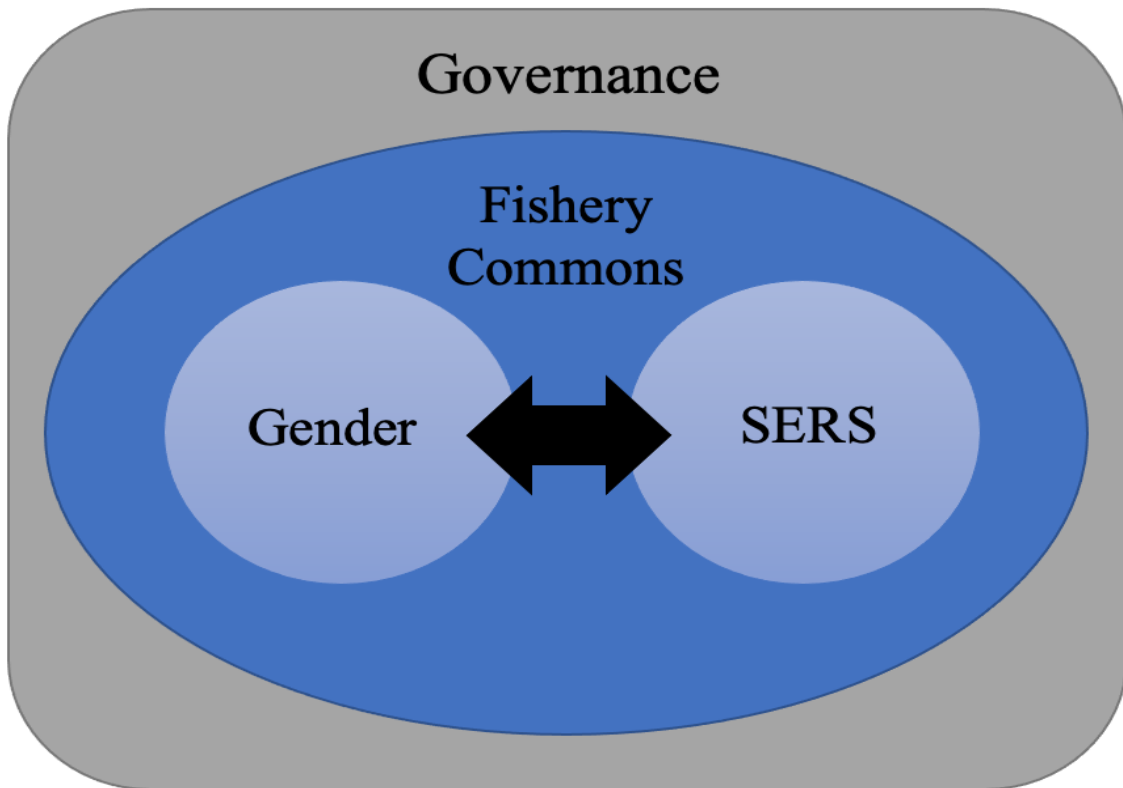


Figure 2. This conceptual framework depicts how governance regulates fishery commons as a complex social-ecological system (SES) and its various subsystems, specifically the gendered issues within the resource users of the SES and how social-ecological regime shifts interact with each other.

Chapter 3 – Study Area and Research Methods

The research conducted for this project was a case study in Chilika Lagoon located in Odisha within India off the coast of the Bay of Bengal. This chapter describes the study methods and the two village locations in Chilika Lagoon that were chosen, Gabakunda and Gola. A qualitative case study approach was taken with a strong focus on individual story telling through semi-structured interviews and group discussion between key members of the communities in a focused setting. This research uses grounded theory, as the data collected is made up of continuous observations and qualitative results to examine how the fishery commons, as a social-ecological system, operates and functions. In order to collect this data, specific research methods were employed and certain challenges and limitations of the methods are included.

3.1 Scoping and Observations

Chilika Lagoon is a Ramsar Site and its conservation achieved the Wetland Conservation Award in 2002 (Ramsar Sites Information Service, 2021). It is an important site for many species, supporting 33 species of waterbirds and 118 species of fish, many of which are very commercially important (Ramsar Sites Information Service, 2021). The biodiversity in Chilika Lagoon makes the region a large tourist attraction; featuring the Irrawaddy dolphins (*Orcaella brevirostris*) that can only be found in this lagoon and also having largest wintering ground for migratory waterfowl in India. (Nayak, 2014). Along with being so biodiverse, the lagoon is home to approximately 400,000 fishers and their families living in 150 villages surrounding the lagoon (Nayak, 2014). These fisher people belong to seven specific castes that define their vocation and make them traditional fishers (Nayak and Berkes, 2011). The most common fishing castes are Khatia with 68 percent of the fishing population followed by Kandara with 14 percent (Kumar and Pattnaik, 2012).

Upon arrival in Chilika Lagoon, a period of scoping and observations took place in order to familiarize myself with the surroundings, culture and societal norms. This time was used to decide which villages to include in the study based on the following criteria: the sub-caste within the fishing caste, the size of the village and the time it would take to travel to the village.

Observations were also made during this period of time in the field. The logistical aspects of each village were recorded such as the location of the village in relation to the lagoon, the approximate number of households within the village, physical descriptors of the locations, current environmental conditions and the general atmosphere of the village. From this it was determined that the villages of Gabakunda and Gola would be the focus of this research project. The number of interviews and focus groups was also decided during this process with the help of the local translator. The number of interviews and focus groups was based on the period of time available to be in the field and the typical schedules of the people living in the village. Another part of the initial scoping and observations was also used to have preliminary, informal meetings with the various community members in the villages involved in the study. These meetings took place with the leaders of each village where my translator and I would explain the research project and as a sign of respect, ask for permission to speak with the members of the community. Typically, once the village leader agreed, they would then ask for a period of time post-meeting to relay this information to others in the community before any proceeding research inquiry took place.

3.2 Study Villages

3.2.1 Gabakunda

Gabakunda was the first village to be studied in this project and it was chosen for a number of reasons. Gabakunda is termed a roadside village as it is able to be located by a main road and it is located approximately 11 km from Satapada, which is the main port in Chilika. The location of Gabakunda is also noteworthy as it is the closest village to the location of the new sea mouth that was created in 2008 (Figure 3). This driver of change had drastic impacts on the social and ecological systems of the village making it an important village to study. Gabakunda is a moderately sized village that contains approximately 300 households with more housing being developed for the future expansion of the community. The people who reside in Gabakunda are all fisher people and belong to the Khatia sub-caste. The Khatia people view themselves as one of the higher, more prominent sub-castes in fishing (Nayak, 2014). As previously mentioned, the majority of the fisher people around Chilika Lagoon are a part of this sub-caste (Kumar & Pattnaik, 2012).



Figure 3. Map of Chilika Lagoon identifying the locations of the two study villages, Gabakunda and Gola, as well as the location of the new sea mouth (Google Maps, 2021)

In the village, there are two recognized leaders, one older man and a younger village head. Both of these leaders were consulted prior to the start of the interview and focus group process. At the time this field research was conducted, one of the more active fishing seasons (May-September) for the *Jano* method of fishing was occurring thus many men were absent from the village during the daytime to go work in the lagoon (Kumar & Pattnaik, 2012; Nayak & Berkes, 2011). The main fishing methods used in Gabakunda were *Jano* and *Bahani*. The *Jano* style of fishing involves enclosures using bamboo and nets in shallower waters while *Bahani* involves casting handmade nets in deeper areas of the lagoon (Nayak & Berkes, 2011). At the time this field research was conducted, one of the more active fishing seasons (May-September) for the *Jano* method of fishing

was occurring thus many men were absent from the village during the daytime to go work in the lagoon (Kumar & Pattnaik, 2012; Nayak & Berkes, 2011) and the men's interviews had to be planned at specific times when the men returned from the lagoon. Gabakunda also supports a large tourism industry in which the government has provided infrastructure to enhance tourism and promote alternative livelihoods in the region. During the time of this research, the rainy season in Chilika was occurring, thus there was considerably less tourism happening. Due to the opportunities provided by the tourism industry, out migration of men is not as common in Gabakunda as in Gola where tourism activities are not possible. Women in Gabakunda, as defined by their sub-caste, are tasked with caring for the home by cooking, cleaning and taking care of the children. Because the Khatia sub-caste is one of the higher-ranking sub-castes, it is customary and societally appropriate for women to be only care givers and not take on any form of labour work outside of their homemaking tasks.

3.2.2 Gola

Gola was the second village studied in this project and it is also considered a roadside village. Gola is located approximately 14 km from Satapada and it is approximately twenty minutes away from Gabakunda by local transportation (Figure 3). Gola is in a precarious location as it is surrounded by non-fishing castes of people and thus their space within the lagoon has been subjected to invasions by non-traditional fishers, specifically from the Panasapada village, attempting to capitalize on the fishing industry (Nayak & Berkes, 2011). Gola is a smaller village than Gabakunda. In comparison, Gola is less developed than Gabakunda in terms of infrastructure and commerce. The majority of its residents belong to the Kandara sub-caste. This sub-caste is viewed as a 'lower' station than those in the Khatia sub-caste. There are two families living in Gola who are not fisher people and identify as bakers, providing food for the village.

The village is led by one younger village head who was consulted prior to beginning the interview process. A meeting was also held with a school teacher in the village who provided insight on who to interview within the village. In Gola, the Kandara sub-caste employ *Jano* fishing methods (Kumar & Pattnaik, 2012), thus at the time of this study many men were out fishing during the day and interview times were planned accordingly. It is also very common for men of

Gola to migrate for work. The lifestyles of the women of Gola are significantly different than those in Gabakunda as many women participate in the workforce and will take up daily labor jobs like housing construction across many villages in Chilika to help support their families and bring in additional income. Their lower sub-caste status means there is less societal pressure for the women to remain solely as caregivers. There is currently no tourism industry in Gola as their lagoon access is too far away from the village itself. ‘Gheries’ or shrimp aquaculture are common here and even though it is illegal, this aquaculture is still being done by non-traditional fishers and results in pushing the traditional fisher people out of their leased lagoon space. These two villages (Gabakunda and Gola) were selected to represent the whole of Chilika Lagoon as they are viewed as the high and low ends of the sub-caste system and the drivers of change that each village faces are very different but cover the whole of the changes experienced by all villages.

3.2.3 Study Village Comparison

Table 1 denotes some of the main comparisons between the chosen villages of Gabakunda and Gola.

Table 1. Chart of key village characteristics in Gabakunda and Gola

Village Characteristics	Gabakunda	Gola
~ Number of households	300	<300
Caste rank	Khatia (high ranking fishers)	Kandara (lower ranking fishers)
Roles of married women	Housewives/care givers	Housewives/ labourers
Roles of adult men	Traditional fishers	Traditional Fishers
Fishing methods	<i>Jano/Bahani</i>	<i>Jano</i>
Migration of men for work	Low/increasing	High/increasing
Aquaculture use	Low	High
Tourism opportunities	Available	Not available
Distance from new sea mouth/lagoon	Extremely close	Very far

3.3 Secondary Literature Review

The document review involved past research on gender and fisheries, social-ecological regime shifts in fisheries and governance of the commons through a gendered lens. The documents provide context for this research project based on previous studies and reports from the area or similar

ecosystems. The documents used range from peer-reviewed articles, framework reports, management training documents and other research projects such as theses. Using these qualitative and quantitative sources in the fields of literature selected, this research project was contextualized and is able to further the narrative in these fields.

3.4 Semi-Structured Interviews

Qualitative empirical research provides useful tools in understanding peoples perspectives, processes or worldviews (Caelli et al., 2003). Semi-structured interviews were employed in the study villages as a way to identify both women and men's perspectives on the social-ecological regime shifts that the village has faced as well as determine their responses and adaptations to the changes in a setting that relies on the storytelling of the local people. Semi-structured interviews provide the flexibility needed in small-scale, case study research such as this (Drever, 1995). Being able to consult with the people in this informal setting was important in order to determine if the changes being employed were successful adaptations in their eyes or if the changes were maladaptive. This method was also a key part in determining the people's relationship with the governance system and the management within the lagoon commons. The interviews were broken down in to some basic categories of 1) general questioning to build up a rapport and connection with the respondent, 2) their connections to fishing, 3) their perceptions of the changes in their surroundings, both social and ecological, 4) their perceptions of the governance of the commons and 5) a section at the end of the interaction was provided to allow for further suggestions or opinions (questionnaire from Appendix A). These categories were determined in order to provide a loose structure to the interactions and create questions that were open ended and could lead to a broader discussion.

These interviews were conducted using a snowball sampling mechanism. The process typically began with the village leader directing my local translator and I to one household where we would begin and from there, we went off of recommendations from that person of who else to include in the study. Snowball sampling works off of a trusted social network and provides confidence between marginalized populations and researchers (Cohen & Arieli, 2011). The interviews always

began with a discussion of what my purpose was for being there and informing the respondent of their rights within the interview process. The number of interviews conducted was decided in relation to the number of people in the villages and was limited by the time constraints of the project thus 50 interviews was deemed significant (Table 2).

Table 2. Semi-structured interview participant breakdown

	Number of respondents in village	
	Gabakunda	Gola
Semi-structured interview (Women)	n=15	n=10
Semi-structured interview (Men)	n=15	n=10
Village Total	30 participants out of 300 households	20 participants out of <300 households
Combined Total	50 participants total	

3.5 Focus Groups

Focus groups were also employed throughout the time spent in the field. Focus groups that focus on dialogue between community members bridges the gap between the researcher’s understanding of a problem and the respondent’s own perceptions and experiences (Kontogianni et al., 2001) This method of data collection helps overcome biases of individual opinions and creates a more robust view of people’s perceptions, their adaptations and the factors contributing or hindering the effectiveness of governance mechanisms in the fishery commons. It also increased participation from the respondents as they were encouraged by each other and could build off of what each person said. This type of setup also facilitated collaborations between different stakeholders in the village to acquire a range of perspectives all from within the same environment.

The questions asked in these focus groups were very open-ended in order to prompt discussion within the group (questionnaire from Appendix B). The groups were kept to a maximum of 8 participants but the numbers in the group fluctuated as some people would have to leave during the course of the session and others would join in part way through. A group of men and a group

of women from each village (Table 3) were chosen in order to perform some comparisons between both women and men in each specific village, as well as comparing the women between villages.

Table 3. Focus group participant breakdown

	Number of respondents in village	
	Gabakunda	Gola
Focus Group (Women)	1 group (n=6 participants)	1 group (n=7 participants)
Focus Group (Men)	1 group (n=8 participants)	1 group (n=7 participants)
Village Total	2 groups (n=15 participants out of 300 households)	2 groups (n=14 participants out of <300 households)
Combined Total	4 groups (n=29 participants)	

3.6 Data Analysis

Through data analysis of this qualitative case study, emerging patterns were discovered along with diverse opinions and the idea that people in the same communities can experience different realities (Pyett, 2003). Qualitative data analysis can be done by comparing conditions in various cases based on the form and degree that they are present and from there it is possible to develop the variation of conditions across the cases (Gläser & Laudel, 2013). The information gathered from the two villages of study in this research project (Gabakunda and Gola) can be compared to garner information about past and current conditions that impact Chilika Lagoon.

During the research process grounded theory was applied meaning that the process of data analysis was continuous from the start of data collection to the end of the research project (Charmaz, 2000). This grounded theory employs editing during the data collection process so that constant review is occurring and from the interpretive statements collected in the interviews and focus groups patterns and connections can be made (DiCicco-Bloom & Crabtree, 2006; Crabtree et al., 1999). Both the semi-structured interviews and the focus group discussions were voice recorded in addition to making hand written notes at the time of data collection. These interviews and focus groups were then transcribed in their entirety and further notes and ideas were made based on the reflections. This full transcription allows for a reduction in selection biases and

permits greater detail in the analysis of the collected information (Rowley, 2012). The transcribed information created a large amount of information based on the flexibility of the interview structures thus identifying and locating the relevant data from this abundance of information was one of the first steps in the data analysis (Gläser & Laudel, 2013). The parts of the text that were identified as relevant to answering the research objectives identified in Chapter 1 were then separated into categories based on which specific objective they were associated with. The content was also indexed to identify key words and themes that appeared multiple times across interviews and focus group discussions. These key words and themes were used to develop figures and causal relationships within the project.

3.7 Study Limitations

The challenges and limitations in this research project are derived from the qualitative data collection and the issues that are associated with semi-structured interviews and focus groups. The other limitations that this study faces are how my position as a researcher affects the results and the process of data analysis.

3.7.1 Challenges and Limitations in Semi-Structured Interviews and Focus Groups

Semi-structured interviews can be very useful (see section 3.4) and they are one of the most common qualitative research tools (DiCicco-Bloom & Crabtree, 2006) but there are also some pitfalls that can be associated with the research method. Interviews can produce demand characteristic effects (Orne, 2002) meaning that interview respondents may give the most socially-desirable answer or the answer that they believe the interviewer is looking for (Brink, 1989; Denzin, 1989). These effects can also be exacerbated when the interviewer is of a different ethnicity, gender, education level, socio-economic status or other social characteristics (Bailey, 1987). To overcome some of these obstacles, probing within the semi-structured interviews is employed. Probing allows for clarifications of issues and inconsistencies that arise when a question is answered. It can also maximize the interactions between the interview respondent and the interviewer to create a better rapport and more comfortability in answering potentially sensitive topics in an authentic manner as opposed to one that is more socially desirable (Barriball & While, 1994).

Focus groups are useful in allowing researchers to study how a group of people construct, defend and debate their views in a discussion setting with limited input from the researcher themselves (Wilkinson, 1998). The focus groups used in this research were helpful in generating discussion amongst the women in particular of Chilika as they felt more comfortable speaking to one another and building off each other's ideas. Some challenges that come with focus groups are the logistics associated with setting them up. The questions must be devised to produce meaningful discussion amongst participants, participants must be recruited and be available to meet in the same location at the same time and the recording and transcription of focus group discussions can be time consuming (Wilkinson, 1998). The focus group discussions that were held in Chilika involved a lot of pre-planning and meeting with participants multiple days in advance to ensure availability. This can be difficult as many men were fishing or engaging in other forms of work and so finding a large enough group to have a significant sample was challenging. The same is true for the women as participants had to agree to take time out of their busy days to join the discussion. This resulted in some flow in the number of people in the groups as some participants in both groups had to leave mid-session and others would join when they could. To promote comfortability and rapport between participants and myself and my translator Tapan, snacks or drinks were provided at these discussions to encourage a more relaxed environment.

3.7.2 Positionality as a Researcher

There can be challenges in conducting research in the field as a woman coming from Canada and as previously mentioned, can elicit some bias in the information collected in the field. My identity firmly placed me as an 'outsider' (Merton, 1972) and culturally appropriate methods and tools must be used in order to minimize this bias (Johnson, 2018). My not being able to speak the local language of Oriya was a challenge that necessitated the use of a translator. Tapan aided in the revision of interview and discussion topics initially to make them easily conveyable to participants and he was also able to review and reword phrases when participants were struggling to understand questions or concepts. Tapan is local to Chilika Lagoon and has many connections to the people and places that were chosen for this research. His expertise and the use of semi-structured interviews and focus groups allowed for reliable data to be collected via the use of careful word choices in the interview process (Barriball & While, 1994) and familiarity with local

culture and customs within the focus groups. It is also known that there are social pressures, restrictions and expectations created by social and cultural norms that affect women conducting field research (Johnson, 2018). When travelling through the lagoon region and to and from Chilika from Bhubaneswar, Tapan accompanied me and facilitated my access to places that otherwise not have been culturally acceptable for me to go to on my own.

Time was also a large limitation to this project. It could take years to fully elucidate the complex relationships between gender, SERS the fishing commons and governance in Chilika Lagoon. The three and a half months I spent in Chilika served to provide a small fraction of the information necessary to fully understand these complex relationships. Additionally, participation and observation tools that are commonly used in these types of qualitative case studies or true ethnographic qualitative research studies were not feasible due to the time constraints within the field.

3.7.3 Triangulation of Data

The triangulation of data between the document review, the semi-structured interviews and the focus groups was used to collect a varied range of information that informed the complexity of the research. The document review that occurred in the beginning of the process allowed a base level understanding from which the proceeding research methods were derived and built off of. The interview questions and focus group activities went through many iterations before they were employed in order to garner the best results. This triangulation aided in developing research findings that are comprehensive and well-developed as opposed to being used as a method to inform validity or verification of results (Guion et al., 2011). Using the multiple different research methods allowed for gaps to be filled by each other and for the comparing and contrasting of data.

3.8 Chapter Summary

This research project is a qualitative case study in Chilika Lagoon, specifically focusing on the villages of Gabakunda and Gola. This was done to identify and compare the perspectives of both women and men on social-ecological regime shifts, identify their respective adaptation responses

to these social-ecological systems changes and investigate how current governance manages the fishery commons. The research methods included, document review, scoping and observations, semi-structured interviews and focus groups in each of the study villages. Some limitations within this project were identified in this chapter along with some methods of mitigating these challenges to reduce the bias within the research. Data analysis during and after returning from completing field work was employed to parse the information into the research findings that address the research purpose and objectives identified in Chapter 1.

Chapter 4 – Identifying Gendered Perspectives and Adaptation Developments to Social-Ecological Change

This chapter will focus on the first two research objectives defined in the project. The first being what are the social-ecological regime shifts that are occurring in Chilika Lagoon and how do the women and men of the fishing villages perceive these changes in their social-ecological system. This is done by first examining their unique relationships with the lagoon, how they interact with the lagoon in terms of livelihood and how the drivers of change have specifically impacted women. These experiences provide women with gender-specific understanding of SERS and this local knowledge is pertinent to develop a fully realized discourse on SERS in Chilika Lagoon. Following this, the second research objective is brought in which looks to gender-specific adaptations to SERS and how women's adaptations influence the social-ecological system existing within Chilika Lagoon.

4.1 Relationship with Lagoon Commons

The focus of this chapter begins with the first research objective, understanding SERS from the perspectives of women compared to those of men. In order to understand the people's perspectives, it is imperative to look at the relationship that they have with the lagoon. Referring to the conceptual framework from Chapter 2 (Figure 2), gender is found within the commons thus the commons, in this case the lagoon, can influence how gender is defined. The people's history with the lagoon spans generations and their perspective of the region has been curated over this long period of time. When asked about their relationships with the lagoon, participants responses can be categorized into three main sections: their emotional connection, their environmental connection and their economic connection (Figure 4 and Figure 5). To fully comprehend the impact that SERS have had on women and men, their emotional, environmental and economic connections to the lagoon commons as its members are identified and compared to uncover how gender or how being male or female affects one's relationship with the lagoon. While each section is defined independently of one another, there are multiple instances in which responses can be categorized in multiple sections, thus increasing the complexity of the relationship that respondents have with the lagoon.

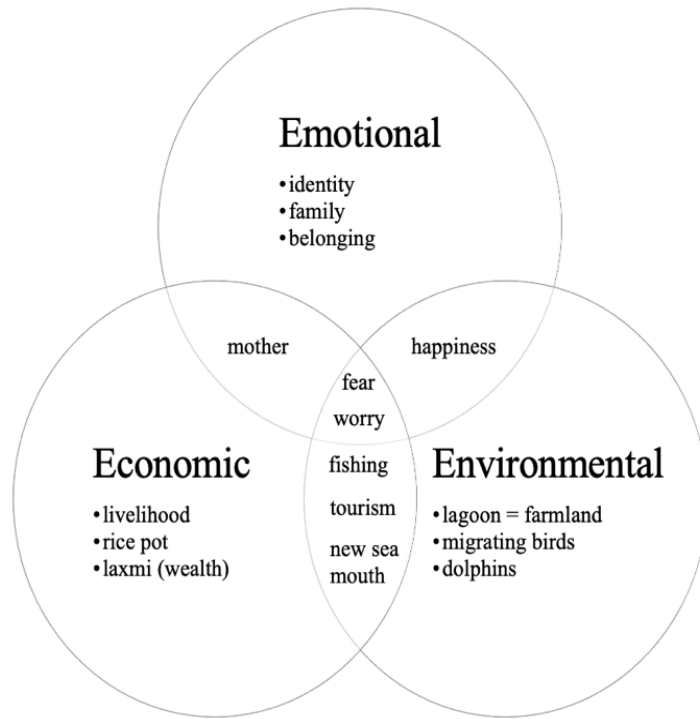


Figure 4. Gabakunda and Gola Women’s Relationship with the Lagoon Categorized into Emotional, Economic and Environmental Sectors.

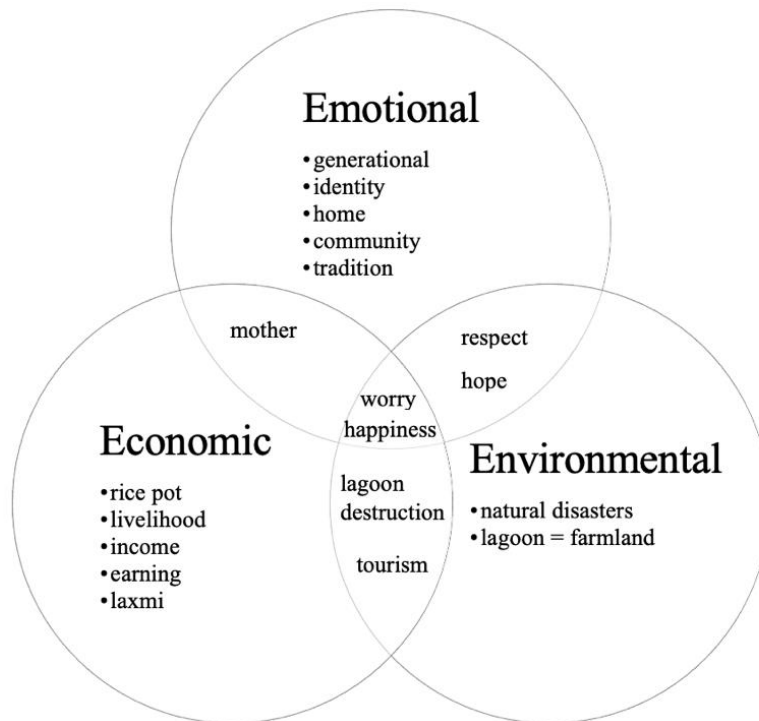


Figure 5. Gabakunda and Gola Men’s Relationship with the Lagoon Categorized into Emotional, Economic and Environmental Sectors.

The ideas highlighted in Figures 4 and 5 were the most common themes identified by semi-structured interview participants when asked the question “What is your relationship with the lagoon?” in the semi-structured interviews that were conducted. The proceeding sections compare and contrast the responses of the men and women interviewed.

4.1.1 How Gender Influences Emotional, Environmental and Economic Connections to the Lagoon

It is well known that emotions can be directly influenced by the status or conditions of the natural environment that a person resides in. There is a *stress reduction theory* that posits an individual will be less stressed and have improved positive emotions when surrounded by a natural environment that provides necessary resources for survival such as water, vegetation or shelter

(Ulrich, 1983). This is true for the people of Chilika Lagoon as well, “Chilika is my life, it has ups and downs and my feelings match the conditions of the lagoon.” (Gabakunda women’s focus group member, September 2018). Their emotions are directly tied to the lagoon as it is their provider and their home. When thinking about the lagoon as a natural resource commons, the subtractability principle can contribute to an emotional response from the users as well. When the lagoon is exploited, be it from over-fishing or non-traditional fishers invading the space, negative feelings can arise that are associated with this misuse of the resource. Thus, men and women will have an emotional response to the SERS of Chilika Lagoon and this section looks into the similarities and differences in emotional responses experienced by men and women respectively.

The most common responses from women categorized under emotional connection are identity, family and belonging (Figure 4). These responses all indicate a deep, personal relationship that they share with the lagoon. Being from Chilika is a significant part of their identities, it is where their families are based and where they feel at home, “Chilika is for us, and we are for the lagoon.” (Gola women’s focus group member, September 2018). The responses from male participants were similar to their female counterparts (Figure 5). The most common responses from men in this category are identity, generational, home, community and tradition. Many of these responses can be interpreted as the same emotional connection to the lagoon as women in terms of feelings of home and the self-identification as fisher people. These similarities are obvious as the geographical location of where one resides typically invokes these types of emotions in people. The environmental psychology concept of place attachment defined by Altman and Low (1992), speaks to the bonding of people to places in the context of both social and environmental perspectives. Where the emotions differ slightly between men and women is in terms of community and tradition. Men more often listed community as a part of their relationship with the lagoon and this may be due to the community they form while they are performing their fishing activities (Figure 5). They are gathering as groups of men to place their nets, operate their boats and collect their lagoon products. These activities are often done in collaboration with other men in the village. From observation and initial scoping in each village, it was not uncommon to find men who were off work from fishing playing cards together and spending time fixing fishing equipment in groups. Even the community that men describe uses gendered language, for example

“All of the people in the community of fishers are a brotherhood” (Gola men’s interview, September 2018). In a sense they are coworkers and this type of emotional relationship would be one less often experienced by women who typically do not go into the lagoon to fish or perform other stereotypically male designated fishing activity.

The perspective that one has towards an environment can be predicated on where the individual grew up and can also influence their motivations towards protecting the space. It is known that children who grow up in rural areas or those who have positive experiences in natural environments will exhibit pro-environmental behavior (Finger, 1994). The people of Chilika Lagoon have a generational relationship with the region as their forefathers began fishing in the lagoon many years before this current generation. This type of growth entrenches the people in a deep connection based on their history and would inspire this type of motivation to protect the space they have grown up alongside. Women’s environmental connection with the lagoon is focused on viewing the lagoon as their farmland and their appreciation of the native wildlife, the Irrawaddy dolphins and the migrating bird populations. Men also view their environmental connections with the lagoon as their farmland as they are the stewards of the lagoon, caring for the conditions and reaping the benefits of the ecosystem via their fishing activities. Men view natural disasters such as monsoons and flooding as an environmental and economic issue, women were more likely to list their fears of natural disasters as a combination of all three categories (Figure 5). This shows that while men understand the non-monetary aspects of the lagoon and appreciate their surroundings, their appreciation is centered around the monetary value of the lagoon and how it provides for them fiscally whereas women see the lagoon for its monetary value but also as potential threat to their family members when dangerous lagoon conditions arise.

The economic connection to the lagoon is the most straightforward relationship for both men and women. The lagoon fuels the economy of Chilika Lagoon, whether it be the fishing industry or the tourism industry, the people of Chilika rely on the body of water to provide for them financially. The lagoon is their livelihood, it is where their incomes are derived from. The lagoon is their rice pot, meaning it is their source of wealth and sustenance. This concept is also highlighted by Nayak & Berkes, (2010). Another word that was commonly used by both men and

women when describing the lagoon and their relationship with it was the term *Laxmi*, which translates to Goddess of wealth. An interesting finding is the idea of the lagoon as a mother in both the economic and emotional categories for both men and women. A mother will provide for its children with both emotional and economic support just like the lagoon provides both feelings of peace or happiness as well as generate an income for the people.

A major difference between men and women that crosscuts all three connections, is their perceptions of the danger associated with SERS. Although women's fear and worry can be placed in all three categories they will mainly focus on the emotional component. Where women will fear for the safety of their family members when faced with threats such as unpredictable tides and weather or invading non-traditional fishers, men will focus more on how these changes impact their livelihoods and how they will be able to provide for their families. Men place a larger focus on the economic repercussions of change and their safety will be secondary.

Gender is a major defining characteristic of an individual and lends itself to creating a certain positionality and view that any one person has on a topic. Men will very often view situations from a different perspective from women based on both biological disposition and societal structures. This is why it is imperative to understand how both men and women interpret SERS while also looking at how SERS are created or influenced by men and women. The women of Chilika Lagoon prove to have just as strong of a relationship with the lagoon as the men of the village who fish.

4.2 How Men and Women Perceive Specific Social and Ecological Changes in their Lagoon Environment

Understanding how women and men connect to the lagoon leads to the main portion of this research objective of how they perceive the SERS that affect their relationships and interactions with the lagoon. Tables 4 and 5 have identified the main social and ecological changes in the lagoon respectively and provide insight into how both men and women feel about them via responses from individual interviews. It is also imperative to the understanding of SERS in Chilika Lagoon that the social and ecological regime shifts are not exclusive from one another. The changes in social realm have impacts in the ecological realm and vice versa. Some examples from

tables 4 and 5 are the invasion of non-fishers taking up space in the lagoon for the aquaculture but also changing the landscape of the lagoon because of the use of aquaculture. This practice of illegal aquaculture impacts the community’s ability to fish and also damages the ecosystem in the lagoon. Another example is the tidal changes in the lagoon impacting native species abilities to reside in the lagoon and fisher people’s ability to place nets or even venture into the lagoon due to unpredictable tides and safety concerns.

Table 4. Perceptions of Men and Women from the villages of Gabakunda and Gola on the social regime shifts faced in Chilika Lagoon.

Social Regime Shifts:	Gabakunda Men’s Perceptions	Gabakunda Women’s Perceptions	Gola Men’s Perceptions	Gola Women’s Perceptions
Invasion of non-fishers	<ul style="list-style-type: none"> • Infringement of rights and space of native fishers • Non-fishers have farmland to work • Lack of government regulation 	<ul style="list-style-type: none"> • Infringement of rights causing conflict between fishers and non-fishers • Non-fishers have land for cultivation 	<ul style="list-style-type: none"> • Non-fishers doing aquaculture changes lagoon depth and takes away prawn seeds • Taking up space and causing fear • Benefitting from lagoon changes • Community cannot enforce rules upon invaders 	<ul style="list-style-type: none"> • Creates a negative perception of lagoon • Have altered the conditions of lagoon • Infringing on their rights • Lack of government regulation • Performing illegal aquaculture that takes up space
State support of shrimp commercialization affecting the access and rights of fisher people	<ul style="list-style-type: none"> • CDA is working on eliminating aquaculture • Abolishing aquaculture means more space for fishing • Aquaculture creates an inhospitable environment for fishing 	<ul style="list-style-type: none"> • Government is doing a good job eliminating aquaculture 	<ul style="list-style-type: none"> • Non-fishers have control over the lagoon because the government is allowing aquaculture to occur 	<ul style="list-style-type: none"> • Government is removing it and once it is gone, income and happiness will be restored • Has a negative impact on the fishing community • Impacts soil depth

Food insecurity	<ul style="list-style-type: none"> • Caused by opening of new sea mouth • Government has been providing food subsidies 	<ul style="list-style-type: none"> • Government has been providing food subsidies • Used to be able to buy enough food from fish profit • Have turned to alternate income sources to feed children 	<ul style="list-style-type: none"> • Used to have food from lagoon but now there is less fish and food costs more 	<ul style="list-style-type: none"> • Lack of food to feed family due to lagoon changes • Husbands are migrating resulting in a lack of income for women to feed their children
Loss of livelihood	<ul style="list-style-type: none"> • Losing relationship with the lagoon • Equipment is too expensive in comparison to their profit • Have to adopt new livelihoods 	<ul style="list-style-type: none"> • Most people in the village have adopted tourism • Cost of living is increasing while fishing income is decreasing 	<ul style="list-style-type: none"> • Equipment is unaffordable, cannot pay back loans or afford daily life 	<ul style="list-style-type: none"> • Forced to take up alternative livelihoods in labour • Livelihood is tied to identity

(Source: 50 Semi-structured interviews in Gabakunda and Gola)

The main takeaways from this table are: that men women perceive these social changes in very similar manners. They both see the invasion of non-fishers as an infringement on their right to fish in the lagoon. For the state support of shrimp commercialization and the government’s response to eliminating aquaculture in the lagoon, the women believe it is being eliminated and thus happiness will be restored while the men feel like increased governmental pressure on removing illegal aquaculture is needed. For food insecurity, men and women both feel the impacts of not being able to support their families due to the changes in the lagoon. And for the loss of livelihood, the identity of both men and women is tied to their livelihoods of being fisher people thus they feel this loss emotionally (Figure 4, Figure 5) as well as financially.

Table 5. Perceptions of Men and Women from the villages of Gabakunda and Gola on the ecological regime shifts faced in Chilika Lagoon.

Ecological Regime Shifts:	Gabakunda Men’s Perceptions	Gabakunda Women’s Perceptions	Gola Men’s Perceptions	Gola Women’s Perceptions
Depth and salinity changes	<ul style="list-style-type: none"> • Caused by sand infiltration from new sea mouth 	<ul style="list-style-type: none"> • Opening of new sea mouth dried parts of the lagoon 	<ul style="list-style-type: none"> • Caused by aquaculture • Monsoons draw sand and 	<ul style="list-style-type: none"> • Depth is reduced in areas caused by new sea mouth

	<ul style="list-style-type: none"> • Has destroyed fish habitats • Increase in saltiness because of proximity to new sea mouth 	<ul style="list-style-type: none"> • Saltiness has increased over time because of close proximity to new sea mouth 	<ul style="list-style-type: none"> plants into the lagoon • Affects ability to place equipment • Lagoon species dying via salinity changes 	<ul style="list-style-type: none"> and use of aquaculture • Water is not as brackish or salty in areas
Loss of habitats	<ul style="list-style-type: none"> • Heavy tides and sand infiltration affect fish habitats • Creates issues placing nets in lagoon • Opening of new sea mouth destroyed many habitats 	<ul style="list-style-type: none"> • No information 	<ul style="list-style-type: none"> • No information 	<ul style="list-style-type: none"> • No information
Introduction of invasive species	<ul style="list-style-type: none"> • No information 	<ul style="list-style-type: none"> • After opening of new sea mouth, lagoon has been filled with barnacles • Barnacle increase because of salinity increase 	<ul style="list-style-type: none"> • Increase in barnacles creates dangerous working conditions • Barnacles attach to boats and destroy equipment 	<ul style="list-style-type: none"> • No information
Tidal changes	<ul style="list-style-type: none"> • New sea mouth means heavier tides and washes away the fish • Fear for village safety because of proximity to new sea mouth • Shifting tides can sometimes be favourable 	<ul style="list-style-type: none"> • Opening of new sea mouth causes tidal changes that affect lagoon production 	<ul style="list-style-type: none"> • Tides are affected by the opening of the new sea mouth and aquaculture 	<ul style="list-style-type: none"> • No information
Sand infiltration	<ul style="list-style-type: none"> • Cannot place nets because of increase in sand levels 	<ul style="list-style-type: none"> • The sand brought in affects ability to place bamboo sticks 	<ul style="list-style-type: none"> • Sand entering lagoon during storms affect depth 	<ul style="list-style-type: none"> • Aquaculture requires sand to be shallow

(Source: 50 Semi-structured interviews conducted in Gabakunda and Gola)

The ecological regime shifts present some different views of how men and women perceive the changes in the lagoon. The sections that are listed as no information do not necessarily mean that the men and women of the lagoon do not have opinions or experiences with these issues, they may

just not be as important or were not directly addressed in the limited interview process. But from the information that was given it is notable that, both men and women have thorough understandings as to what drives the changes in the depth and salinity of the lagoon. Both women and men mention the introduction or influx of barnacles in the lagoon and the threats that they pose to both the safety of fisher people and the ability to use fishing equipment. While women have less direct contact to the lagoon as they do not go on the boats to fish, this does not mean that they do not understand the ecological changes that have occurred to the ecosystem.

4.3 Traditional Gender Roles in Small-Scale Fisheries

Men and women traditionally have very different roles in fisheries. These roles can be segregated into 'primary' and 'secondary' fishing activities. These terms primary and secondary are used to differentiate between work within the fishing industry. Primary describes the work that in the sequential order of activities, is the first step in the life cycle of the small-scale fisheries in the lagoon, often these activities are performed by men. Other activities in the lagoon can be termed secondary, not because they are of lesser importance but because in the sequence of events, the jobs typically occur after the initial fishing event, these jobs are most often performed by women. Primary fishing activities in this context performed by men include the acts of preparing and mending equipment, placing the nets in the lagoon and collecting the catchments. The secondary fishing activities in this context primarily performed by women are: sorting daily catch, cleaning fish for sale and personal consumption, selling fish at local fish markets, preparing food for husbands while on their trips and drying fish. This is not to say that some women do not engage in primary activities and men do not perform secondary activities. Women will also assist in bringing fishing equipment to the lagoon site, bailing rain water out of fishing boats and helping to repair fishing equipment, these jobs will occur before men head out on fishing trips and thus could be termed a primary fishing activity. Some women, when necessary, will even participate in helping place poles and nets in the lagoon and even going in the boats to help their husband's fish.

Secondary fishing activities are vital to the life cycle of the fishing industry and the women of Chilika play a large role in success of the fishery (Table 6). The percentage of women interviewed who indicated that they performed any of these secondary fishing activities was 92%. Almost all

of the women from Gabakunda and Gola who participated in this study performed these secondary fishing activities which goes to show the level of involvement these women have in the fishing space of Chilika Lagoon.

Table 6. Women’s fishing activities and number of women performing each activity.

Fishing Activity	Number of Women Performing Activity (out of 25 interview participants)
Sorting Daily Catch	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\ (12)
Cleaning Fish for Sale/Personal Consumption	\\ (13)
Selling Fish	\\\\\\\\\\\\ (5)
Preparing Food for Fishing Trips	\\\\\\\\\\\\\\\\ (7)
Drying Fish	\\\\ (2)
Bringing Equipment to Lagoon Site	\\\\\\\\\\\\\\\\\\\\ (8)
Bailing Rain Water from Boats	\\ (1)
Repairing Fishing Equipment	\\\\\\\\ (3)
Placing Nets/Fishing	\\\\ (2)

4.3.1 Impact of Secondary Fishing Activities

It was very common for women to make statements saying they are not a part of the fishing industry and that it is the work of men, but when asked if they performed any of these secondary fishing activities, the overwhelming response was yes, they were involved and this work was important in their day-to-day life. This shows that while women recognize the importance of the work they are doing, they don’t see the impact that it has on the fishing industry. They view the importance of their work in a domestic fashion. This is typical as women’s economic and societal contributions via fishing are constantly overlooked (Chuenpagdee et al., 2006; Harper et al., 2013), despite the fact that women in fishing have integral and differentiated impacts on the social, economic and environmental stability of small-scale fisheries (Rohe et al., 2018). These secondary fishing activities are mainly performed by women and thus their importance is diminished solely based on the fact that women perform these jobs, when in reality, without these jobs being done, the fishing system as a whole would fall apart. Women are just as involved in fishing in Chilika Lagoon as their male counterparts. They are in tune to all the changes that are experienced by the environment and the people as the changes make themselves known by the shifts in their work load and their interactions with the men who perform the primary fishing activities. Because of

women's involvement in these secondary fishing activities, they too feel the effects of the SERS in their work. A large portion of the women's work day is dedicated to these activities thus when the production in the lagoon is low, they feel the effects acutely and are impacted in similar ways to the men performing the primary fishing activities.

4.4 Gendered Perspectives on the Drivers of Regime Shifts

The SERS occurring in the region (Table 4 and Table 5) directly impact the economic connection that is formed between the people and the lagoon. The entities driving those changes are the opening of the new sea mouth that brings about changes to the marine life, the influx of non-traditional fishers and finally the continued use of illegal aquaculture in the lagoon.

When asked if the current condition of the lagoon is enough to support their needs, both men and women resoundingly answered no (Figure 6). Men and women identify food insecurity and loss of livelihood via lack of income from fishing and increasing prices of daily staples and equipment costs as contributors to why the current condition of the lagoon is not enough for them. (Table 4). This is indicative of the knowledge that women possess about their current social and ecological standing with the lagoon. On many occasions, men would say that women do not know what is happening with the lagoon because they are not fishing. This is proven to be untrue because they see the effects of the changes in their own daily activities. They understand that the less fish coming into the home means less activity in the lagoon and thus less income or profit for the family. Their involvement in the secondary fishing activities (Table 6) provides them with the experience and knowledge. Figure 6 shows that a resounding majority of women in both villages understand that the lagoon has changed and the conditions are not benefitting the lives of the fisher people. These results are comparable to the responses of men in both villages who also believe the current condition of the lagoon is not enough to support their needs.

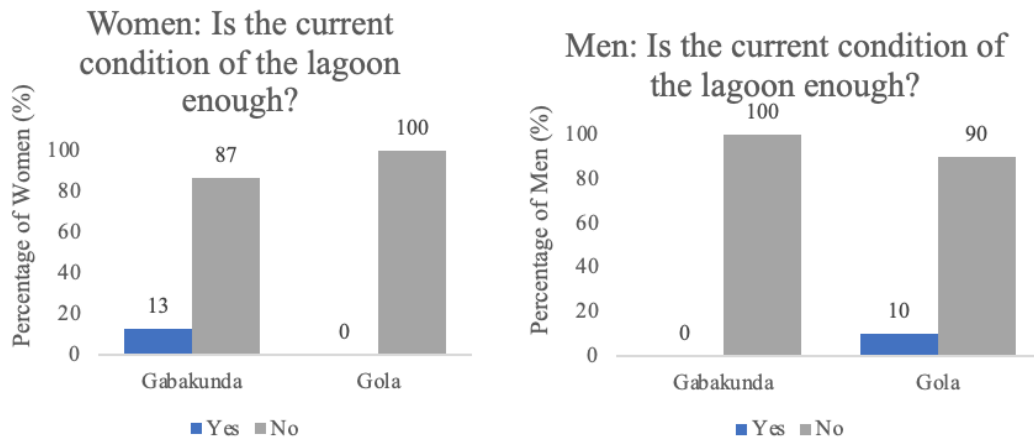


Figure 6. Responses to interview question “Is the current condition of the lagoon enough to support your needs?”

The next question to ask is what are the perspectives of men and women on the three drivers of SERS that are being experienced in Chilika Lagoon; the new sea mouth, the influx of non-native fishers and aquaculture invasion as defined in previous sections. These drivers cause the changes in the lagoon and initiate the social and ecological consequences that the people of Chilika face such as the loss of lagoon space, food insecurity, depth and salinity changes in the lagoon, loss of habitats and introduction of invasive species for example identified in tables 4 and 5. Are the perceptions of these drivers of change different or the same between men and women?

4.4.1 The Opening of the New Mouth

The new sea mouth opening was supposed to solve the issue of pollution within the lagoon but has led to drastic changes in the ecosystem and to the societal structures that the lagoon is a part of. The men in the village see the opening of the new sea mouth as an environmental change that has disrupted their economic flow. “Because of monsoons and the opening of the new sea mouth, plants are coming in through the rivers and affect the depth of the lagoon making it so we cannot place nets in the water” (Gola men’s focus group member, September 2018). This particular driver of SERS affects men mainly in the economic space as they are typically the providers for their family and by caste the way they provide is via fishing. Thus, if they cannot place their nets in the water, they cannot catch product and sell it to gain an income. Women comparatively, were more likely to associate the opening of the new sea mouth with the danger of the changing tides, thus it

produced a more emotional response in them because of the environmental change. Women have an emotional response to this particular driver because there is the possibility that their family members who participate in these primary fishing activities are at risk due to tidal changes from the opening of the new sea mouth. That isn't to say that they do not experience or feel the economic impact that this driver creates as well. Women understand the relationship between the lack of fish production in the lagoon and their financial income. The effects of this can be seen in the decrease of secondary fishing activities they perform such as cleaning, sorting and selling fish. They understand that the condition of the lagoon is changed (Figure 6) and that this has not been beneficial to them.

The responses by both men and women show that the opening of the new sea mouth is a SERS because of the impacts on human well-being, whether it be financial fluctuations or emotional strain, plus the impacts the change has on the ecosystem processes of the lagoon. Both genders perceive the regime shift in similar ways and different ways. These differences are important and need to be recognized in order to create a holistic view on SERS.

4.4.2 The Invasion of Non-Fishers

The influx of individuals from non-fishing castes entering the lagoon to take advantage of fishing opportunities has driven much of the change that is occurring in Chilika. This has created problems for the fishing caste as they are being systematically forced out of their jobs and their space by the higher caste individuals who have more power over them and sometimes more control over the governing bodies of the lagoon. Men feel the direct impacts of this driver as they are physically being pushed out of the spaces that they are allowed via their government leases. These non-native fishers are usurping the space and greatly contributing to the over-fishing that is evident in the lagoon. This lagoon is as previously defined, a natural resource common and both the excludability and subtractability principles are being affected by this change. The excludability principle is not being enforced as there are outsiders entering the lagoon who are not a part of the designated in-group. Which leads to the subtractability principle, the outside individuals are not part of the in-group and their over-exploitation of the resource is diminishing the abilities of the rightful users to benefit, which in this case are the caste-based fisher people.

Women feel the effects of this disturbance because they are members of this fishing caste and it is in their vocation as much as men to take care of the lagoon. “We are proud to live near the lagoon but also feel sadness because the lagoon has been taken from us forcefully by non-fishers and we feel helpless to save it. We have no strength or stamina left” (Gola women’s focus group member, September 2018). Though they may not be physically in the lagoon themselves, they are just as connected to the lagoon as it is their home, their livelihood and their history. They are also not exempt from the more violent conflicts with the incoming non-fishers as “in one revolution, the men coming in have broken a woman’s arm” (Gola women’s focus group member, September 2018). This driver has caused not only drastic environmental changes to the fish populations of the lagoon but has created societal conflict and caused harm to the women of the communities. Again, both women and men feel the effects of this driver of SERS as the condition of the lagoon now is not as it once was and is not enough to support their needs and the needs of their family or community (Figure 6).

4.4.3 Continued Practice of Illegal Aquaculture

It is known that aquaculture is a great driver of change. Bodies of water where aquaculture is introduced have been documented to experience both ecological and social changes. Aquaculture requires a lot of space to be able to function properly. Aquaculture is also known to create a large amount of pollution due to the eutrophication of the water and the increased levels of nitrogenous compounds that are released during production (Cao et al., 2007; Troell et al., 1999). One male interviewee indicated that approximately 10 years ago, the lagoon was not in a good condition and they lacked the funds to support their daily lives, but this year there has been an improvement in the lagoon and he contributed this to the removal of the illegal aquaculture activities in the lagoon. The depth of the water had been drastically changed by aquaculture due to the sand infiltration and since they have been removing them, the lagoon is recovering.

When interviewing the men of Gola, they stated that when their fathers were fishing, they could fish close to their village and but now the men who fish have to go approximately 5 kilometres away to place their nets and this is due to the introduction of aquaculture in the lagoon. Not only

are the men having to travel great distances to find space for their nets but the lagoon itself is also changing ecologically as aquaculture requires much shallower water than the traditional fishing methods. This change impacts women just as greatly. Women, particularly those from Gola, stated that they will help their husbands transport fishing equipment, food and other supplies to the lagoon site as it is such a great distance away from their homes. This takes time out of their day, extends the workday for both men and women and reduces the amount of time spent in lagoon collecting product. Although the women of Chilika are not helpless as they have demonstrated some power in the face of this aquaculture invasion. The women's focus group in Gola told a story about how years ago women protested and were able to stop a large company by the name of TATA from putting in place a large aquaculture development in their part of the lagoon. This demonstrates the power that women can have when they are able to assemble and use their collective voices to create change.

On the outside, aquaculture might look like one issue that only affects the men of the village and their ability to fish in the lagoon, but there are cascading consequences from aquaculture that affect women on just as grand a scale. Their work is impacted just as greatly, albeit in different ways and this proves that the SERS have gendered repercussions.

4.5 Gendered Consequences of Change on the Commons

When asked, "Do you receive any benefits from the changes in the lagoon?" 92 percent of women and 96 percent of men answered no, there are no benefits received from the changes (Figure 7). There is an equal understanding between men and women concerning the changes that are happening and have happened to the lagoon. Thus, when men say the women are not involved in the on goings of the lagoon or when women say they do not concern themselves with the work of men, these statements are based on societal structures of gender and not what is actually occurring. Women have much more knowledge about their situation because of their connection to the lagoon and their relationship with their community than even they chose to believe. They are very aware of the consequences that occur from the changes experienced and how they are not beneficial to their livelihoods. This demonstrates the fact that women possess a great deal of local knowledge because of their experiences in dealing with SERS.

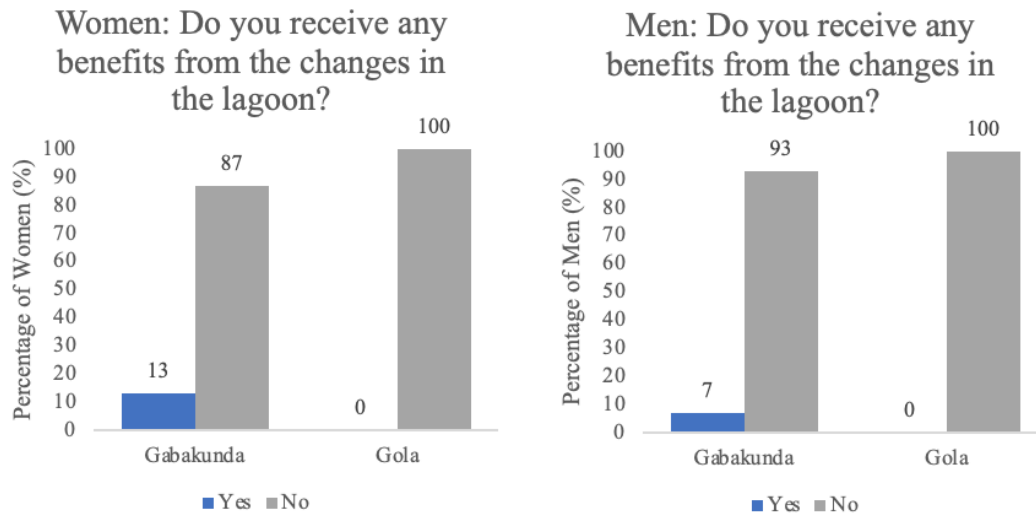


Figure 7. Responses to interview question “Do you receive any benefits from the changes in the lagoon?”

4.6 Local Knowledge of Women Experiencing Change

Women recognize and understand the SERS of the lagoon regardless of whether they are actually doing the primary fishing activities of placing the nets in the water and collecting the day’s catch. Their roles are directly tied to the lagoon and its changing nature. They experience the effects of the changes in every facet of their lives. Whether or not they can cook for their families and support their needs is based on the success of fishing in the lagoon. Humans create change in this case via overfishing, aquaculture and non-traditional fisher invasions and changes influences humans earning potential and happiness. These affects are felt by both men and women in the villages and it is imperative to learn from the local experiences of women to create a holistic image of the lagoon commons. Women understand the changes and feel the effects but are hesitant to speak when questioned because societal structures have deemed that this is not their concern and that this is the work of men. Women have valuable knowledge as seen in tables 4 and 5 of the fishing supply chain due to their work in both the selling of the fish in markets which is one of their main jobs and even their own consumption of fish when they are cooking for their families. These contributions must be included in the way that the communities govern the lagoon commons. The local knowledge that women have gained via their history with the lagoon and their

contributions to the social and fishing activities they partake in is visualized in both their responses and adaptations to SERS.

4.7 Responses and Adaptations to SERS

To address the second research question of how women and men respond and adapt to SERS within their lagoon environment, the most common mechanisms of response or adaptation must be identified, then compared and contrasted between men and women. Some of the responses mitigate the SERS while others are adaptations. An adaptation is defined as a human or natural response to expected or actual stimulus or effect that reduces harmful impacts or increases beneficial outcomes (IPCC, 2007). Adaptations are also considered a more long-term response to the changes being experienced. Mitigation is different from an adaptation in that mitigation is reducing the impact of the SERS whereas adaptation is as stated previously any adjustment to the human or natural systems in response to change in order to moderate harm or exploit any beneficial consequences (Klein et al., 2005). The three most identified mechanisms from participants were migration, turn to alternate livelihoods and non-adaptation or non-response. Migration in this case is a mitigation effort as the migrations are usually on a temporary basis. Meanwhile, alternate livelihoods are an adaptation to new streams of revenue resulting in a more long-term response to the change. The final mechanism of non-response falls in neither category but can be considered a short-term solution because it will not be feasible if the SERS occurring in the lagoon continue. The way men and women respond and adapt to SERS is crucial in understanding the relationship between gender and SERS from the conceptual framework depicted in Chapter 2 (Figure 2).

4.7.1 Migration Impacts on Men and Women

Migration was the most common response by men to the question of “What have you changed or done differently in response to the shifts in the environment?” that was asked in the semi-structured interviews of this project. Men will be the ones to migrate to other regions in order to find work while their wives will remain at home to care for the children and the household. Figure 8 shows that out of all the participating males, 36 percent have migrated for work in the past. Further questioning on migration determined who from the community has migrated. Figure 9 depicts three different categories of migration: family, other and none. *Family* means that a

member of the interviewed person’s immediate family has migrated for work or is currently out of the state working. The *other* means that no one from their immediate family has left for work but they know of one or more people from their community that have left to find work elsewhere. The last denotation of *none*, indicates that no family members or acquaintances they know have migrated to find work presently or in the past. In Gabakunda, 40 percent of women said that a member of their immediate family has migrated, 40 percent of women said other members of their community have migrated and 20 percent said no one they know has migrated. The Gabakunda men differed in that 53 percent of men said a member of their immediate family has migrated and only 7 percent of men responded that no one from their family or community has migrated. Figure 9 depicts that the situation in Gola is relatively the same. All of the women from Gola either know someone from their village who has migrated or one of their immediate family members have migrated. In Gola, 40 percent of men know someone from their village who has migrated and 60 percent of men have either migrated themselves or a member of their immediate family has migrated.

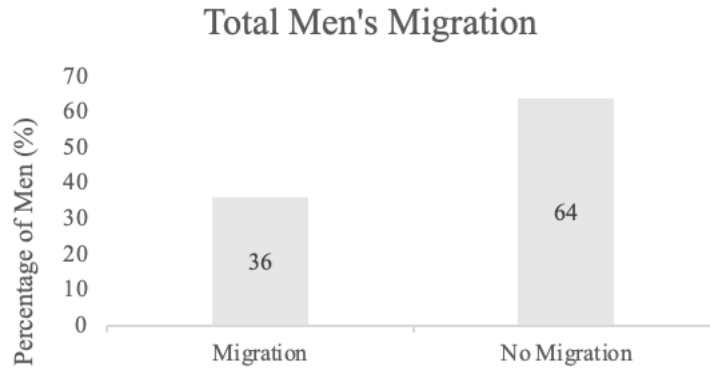


Figure 8. Total percentages of men migrating from both Gabakunda and Gola.

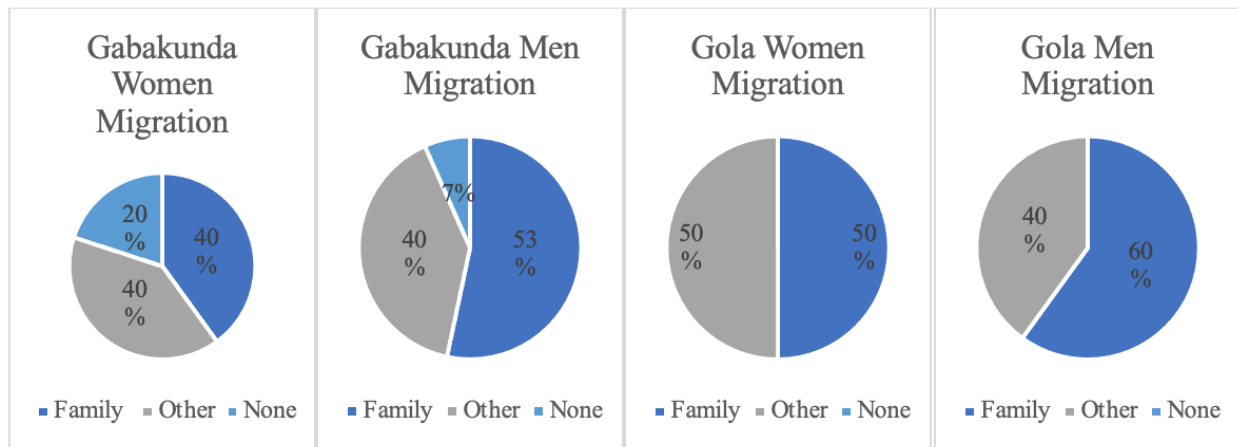


Figure 9. Migration percentages of men and women from Gabakunda and Gola.

The type of migration experienced here can be defined as ‘involuntary migration’ (Murthy, 1991). This is when landless or land-poor labourers experience extreme economical setbacks or social hardships. The people of Chilika Lagoon are not land owners, they rely on fishing to provide for them and when this is not possible, they have little to no opportunity for farming. It is typically men traveling to neighbouring states to perform construction work or other manual labour when migrating and then they will then send money back home to their families. This work has become quite commonplace in these two villages as fishing can no longer be the people’s primary source of income. Migration is known to have drastic effects on the physical health of the people who are traveling for work. Migrant workers will usually be put in more precarious or risky situations making them more vulnerable because of the lack of regulation and the nature of the available jobs. There can also be limited access to health and safety equipment, welfare schemes and sanitation infrastructure (Bharti, 2018; Deshingkar & Start, 2003; Dev, 2002). There is a large concentration of migrant workers in labor intensive and informal work where their wages are unregulated and vary greatly (Bhattacharyya & Korinek, 2007). When interviewed, one man indicated that he had to return to his home because the weather conditions were so different and affecting his health so greatly that he was unable to stay in the location. Migration can also affect the mental health of both the person travelling and their family members back home. It is here in the mental health realm where the effects of migration differs between genders.

Women fear for their husbands or relatives and community members when they are away in other states for migrant work. They feel emotionally drained by the absence of their people. When asked how it felt to have her husband traveling to Bangalore for 2 years for work, a woman responded, “It does not make me feel good, the money doesn’t matter to me, if he was closer, I would feel better.” (Gabakunda women’s semi-structured interview participant, 2018). Men also feel this loss of connection to their home but they feel more inclined to go out and make money for their families. While migration may be an adaptation performed primarily by men in the villages, the effects of the transition impact both men and women. Women are also very aware of the fact that the men of the community are having to leave because the fishing industry is failing in the lagoon. They understand the situation that is occurring in the lagoon and that migrating for work may be a temporary solution but the fear and worry they experience when their loved ones are away supersedes their financial worries. This may be a reason as to why there is so much diversity in the alternative work that women do in order to help supplement for their families and possibly diminish the need for their family members to migrate for work.

4.7.2 Alternative Livelihoods

It is natural that when one’s source of income is threatened or taken away; an alternate source of revenue must be identified. In Chilika, due to the SERS that have ravaged the lagoon and its ability to provide for its residents, there is a shift towards alternate streams of income. The main alternative livelihood that has become prevalent is tourism. The lagoon is famous for specifically the Irrawaddy dolphins and many residents have taken advantage of this in order to provide for their families. This avenue is possible for many fisher people as they already own the boats and most of the equipment necessary for the job but in many villages, the distance from the lagoon is too great and they do not have this opportunity. This turn to alternate livelihoods looks different for the women who by caste designations, do not typically work apart from daily household chores and raising children. But with the economic strain coming from the changing lagoon fishing industry, women have also found ways to provide for their families. In fact, when interviewed, women indicated a greater variation of alternate income sources than men that they turn to when necessary. Tables 7 and 8 show the ways that women have generated income for their families. This can be compared to the men who mainly focus on tourism when it is available to them (Table

9). The men in Gola do not have access to tourism as the village is not directly connected to the shoreline of the lagoon as previously mentioned in the location descriptions of Chapter 3. Thus, the men in Gola turn their efforts mainly to labour work as an alternative source of income (Table 10).

Table 7. Alternate income sources mentioned by the women interviewed in Gabakunda.

Alternate Income	# of mentions by women interviewed (n=15)
Chicken farming	/ (1)
Cashew gardening	/ (1)
Farming patty rice	/ (1)
Planting trees	/ (1)
Taking care of goats	/ (1)
Selling vegetables	/ (1)
Interest off of loans	/ (1)
Government work (building roads/digging water tanks)	/ (1)
Sewing	/ (1)
No adaptation	//// (4)

The women interviewed in Gabakunda presented the most diverse list of alternate sources of income that they partake in to support themselves financially. These jobs range from government work via planting trees or community improvements to farming food or crafting garments to sell. There is a creativity and resourcefulness to the jobs that women have taken up in order to utilize their skill sets in a fiscally beneficial manner.

Table 8. Alternate income sources mentioned by the women interviewed in Gola.

Alternate Income	# of mentions by women interviewed (n=10)
Labour work	/////// (7)
Selling vegetables	/ (1)
Collecting wood	/ (1)
Farming patty rice	// (2)
Crafting/home decorations	// (2)
No adaptation	// (2)

The same creativity in finding alternate sources of income is demonstrated by the women residing in Gola via their selling of crafts and home décor. Additionally, the women of Gola also participate in labour work which is extremely atypical for women in this caste.

Table 9. Alternate income sources mentioned by the men interviewed in Gabakunda.

Alternate Income	# of mentions by men interviewed (n=15)
Tourism	////////// (14)
Cashew gardening	/// (3)
Labour	// (2)
Planting trees	/ (1)
No adaptation	/// (3)

Due to the proximity of Gabakunda to the lagoon’s shoreline, tourism is an extremely viable option for the men to turn a profit from. This was the most common response from men when asked about what they do to provide for their families when fishing was not enough.

Table 10. Alternate income sources mentioned by the men interviewed in Gola.

Alternate Income	# of mentions by men interviewed (n=10)
Labour	///// (6)
Loan to collect cow milk	/ (1)
No adaptation	/// (4)

The men of Gola are not a part of tourism because of their distance from the shoreline thus like the women of the community, labour work is the most common source of income when fishing is not enough.

Tourism is one of the main adaptations people have made in response to the SERS that have affected Chilika Lagoon and it is a large part of the lagoon’s social-ecological system, but not every village has the geographical capabilities to support this opportunity. Gabakunda is able to rely on tourism when the fishing prospects are not good because they are in close proximity to the water, but in places like Gola, where the village is inset from the lagoon and fisher people must travel great distances to get to the lagoon, tourism is not a feasible option. Tourism is also seasonal work and the money made during that time is not enough to provide for the people throughout the year. Additionally, villages will become part of a tourism association and the earnings from each

village have to be split evenly between the members of the association. This means that when other places do not do as well, there are insufficient funds to go around. When looking at the tourism industry through a gendered lens, there are some similarities and some differences in people's perceptions. When interviewed, some women indicated that tourism disturbs the fish population of the lagoon and has a negative effect on biodiversity because of the mechanical boats polluting the water. Conversely, when asked how tourism affects the lagoon some men say that it does not affect the fish population as fish are more active during the evening when there is no tourism happening and that the dolphins have actually been re-populating in recent years. There are also mixed feelings on whether tourism is beneficial to the people or not. Some men indicated that tourism provides them with a more formal job where they dress more professionally, they get to meet and socialize with people from all over India and gain more knowledge from these interactions. But there are some men with differing opinions, "Tourism does not help the fishers here; it only benefits the government." (Gola men's focus group member, September 2018). The government has invested in the tourism industry by constructing jetties, buildings and providing the people with life jackets but they have not supported the fisher people in other ways. Women also see a hazardous work environment as tourism increases, "In the tourism season, more boats are in the lagoon and this increases the chances of accidents in the lagoon, people can be injured." (Gabakunda women's semi-structured interview, September 2018). Most commonly though, both men and women see some benefit in tourism as an alternative livelihood with the majority of women interviewed in Gabakunda mentioning it as an alternative source of income and 93 percent of men interviewed listing it as a main source of their income (Table 9).

4.7.3 Non-Adaptation as a Response to SERS

No adaptation or no response to the changes experienced is the last mechanism that was more commonly mentioned. This reliance on the hope that the lagoon will return to its normal state and be enough to support the people again is quite common. It is natural to resist change (Westley et al., 2013) especially to the SERS that are as complex and all-encompassing as the one's occurring in Chilika. Some men and women mentioned that they had not made any changes to their daily lives since the lagoon production has decreased (Tables 7-10). "We have no agricultural land, so no space to grow crops and we cannot make any changes to our sources of income." (Gola men's

focus group member, September 2018). This relates back to the initial reason for migration; there is no land for the men to work as the lagoon is their caste dictated occupation, so when that is taken away from them, they have to look elsewhere for economic gain. It would make sense that the women would not make changes to their daily lives or to their streams of revenue because most of the time they are not the breadwinners of the family. Because of their caste and their traditions, women do not have traditional jobs or are not a part of the regular workforce. Although, due to the changes occurring to the lagoon and its people, women have shown through their varied skills (sewing, growing and selling vegetables and cashews and creating home décor) they do have the capabilities to become a larger part of the work force. Multiple women interviewed also indicated that if they were given more opportunity, they would like to be more involved in providing financially for their families while the lagoon is unable to. Thus, the mechanism of non-adaptation or non-response to the SERS for women may be a combination of both a lack of opportunity to diversify their income potential further and the traditional caste dictation that women are to remain as housekeepers and mothers first, not a part of the workforce. Both men and women when interviewed likened the lagoon to their mother and this non-response is usually coupled with a strong faith in the lagoon and belief that the lagoon is like a mother figure and will provide for her children accordingly.

4.8 Chapter Summary and Conclusions

In this chapter, the two research objectives of understanding SERS from the perspectives of women compared to men and examining how women and men respond and adapt to the social-ecological regime shifts within their lagoon environment are explored. In order to understand the gendered perspectives of SERS both men and women's relationships with the lagoon is examined through their emotional, environmental and economic ties to the lagoon. Here it was determined that women feel a stronger emotional connection to the lagoon while men are more drawn to the economic possibilities. Both men and women see the value in the environmental aspect and receive the ecosystem benefits that come with living near the water and the biodiversity that they are surrounded with. Then the focus was shifted to the distribution of the workload in the fishing industry. Women may not be involved directly in the process of getting on the boats, placing the nets in the water and collecting fish, but they are involved in every part of the process that follows,

such as the sorting, drying, selling and cooking of the lagoon products. This connection to the fishing industry means that they understand and experience the drivers of the regime shifts that have occurred in the lagoon. The shifts are reflected in the work that they do, because of the opening of the new sea mouth, the influx of non-native fishers and the prevalence of aquaculture in the lagoon, there is less product coming in and less work for them to do. While many women may say they do not concern themselves with what goes on in the fishing industry because this is the men's work, they do have a wealth of knowledge based on their secondary fishing activities that could be utilized in the governance of the SERS.

For the second research objective, the most common mechanisms of response were identified and examined under a gendered lens. Migration for work, the switch to alternative livelihoods and no adaptation were the three most common responses. Although migrant workers are most typically male, both men and women are impacted by the need for people to leave the village for lengthy periods of time. Men feel the effects of migration in their physical health and women feel their mental health is more affected when their family members are away. The transition to alternate livelihoods as an adaptation effort is mainly seen in the development of the tourism industry of Chilika Lagoon. Men have adopted tourism as an alternate source of income but this is dependent on both government funding and the proximity of the village to the lagoon. While this has been a male dominated response in the shift to alternate income sources, women have begun transitioning into jobs that help support their families as well. The diversity of the jobs that women have held is quite large and demonstrates the various skills that the women of these villages possess. Particularly in Gola, many women have taken up labour work along with their husbands as a source of income which is uncommon for women of this caste to do. The final response to the SERS identified was no adaptation. Many men and women in the villages have chosen to not diversify their streams of revenue and rely solely on fishing because they have faith that the lagoon will provide for them and that they are traditionally fishers so they must remain in this vocation.

Chapter 5 – Analyzing Governance Approaches for Gender Sensitive Responses to SERS

The focus of this chapter is on the third research objective identified in Chapter 1. The objective is to understand how a gender sensitive approach to understanding social-ecological regime shifts can contribute to novel governance within a social-ecological system, specifically the commons of Chilika Lagoon. There have been many valuable contributions from the studies of social-ecological systems that integrate social dimensions into policy practices on natural resource management but gender equity in these social considerations is often overlooked (Kawarazuka et al., 2017). This chapter looks into the intersectionality, or lack thereof, of the existing governance structures in Chilika fisheries and the influence of social power in SERS by way of gender and caste. This influence of social power affects both the framing of and the response to SERS (Nayak & Armitage 2018). In the conceptual framework identified in Chapter 2, governance is shown encapsulating the commons and the idea that gender and rapid changes act on each other within the setting of a commons. The chapter will first delineate how the lagoon is currently being governed and the traditions associated with this type of governance. It is imperative to understand the current governance in order to identify the gaps in the understanding of how to deal with the changes that are occurring in the lagoon system. It then transitions into women's views on the current governance and their level of involvement or participation in governance scenarios. It then moves into how a more intersectional form of governance can better handle the regime shifts occurring in the lagoon and what the future of that governance could look like.

5.1 Traditional Lagoon Governance

The commonisation of Chilika Lagoon was based upon customary fishing activities derived over many generations that were then legally solidified. The excludability and subtractability of the resources of the lagoon were defined by these normal fishing practices and rules that were developed via these ancestral fishing traditions. The lease system that was introduced into Chilika Lagoon was based on the caste sanctions in 1942 to allow fishers exclusive access to the lagoon via their fishing village and exclude non-caste individuals from entering the lagoon to fish for profit (Nayak & Berkes, 2011). There is a system of nested enterprises that governs the fishing in the Chilika Lagoon and these levels of governance all play a role in managing the lagoon. The

enterprises currently at play are, the village committees of each respective fishing village, the Primary Fisherman Cooperative Societies or PFCS, Odisha State Fishermen's Cooperative Federation or FISHFED and *Jati Pachayats* or Caste Assemblies. With the introduction of certain upper-level governmental organizations like the FISHFED and the Chilika Development Authority (CDA) (which was created to take control of administrative aspects of the lagoon) a process of decommissioning has occurred and has taken away the ability of villages to make their own decisions and interfered with their ability to self-govern. (Nayak & Berkes, 2011).

Fishing processes are male dominated in all of the levels of governance in Chilika Lagoon, with the majority of all these enterprises or groups of people being made up of men. Additionally, there are caste dictations compounding this gender bias as women are traditionally tasked with homemaking and child raising tasks and for them to divert from this would be seen as inappropriate or wrong. There is little to no opportunity for women to expand upon their power in terms of governance. The subsequent decommissioning of the lagoon has impacted women in a much more nuanced manner. Initially, women were involved in lagoon governance via their husbands who were involved in their respective village committees. With the loss of power within these committees and the interference of upper-level governmental institutions, the voices of women are further buried as the village committee input into managing the lagoon becomes less impactful. In figures 10 and 11 a question concerning the word 'rights' was asked in the semi-structured interview process. It was a general question to gauge what sort of agency the people of the two villages feel as though they have. Having rights is part of what makes one a legitimate user of the commons and knowing one's rights is crucial in terms of managing what people can and cannot do within the system.

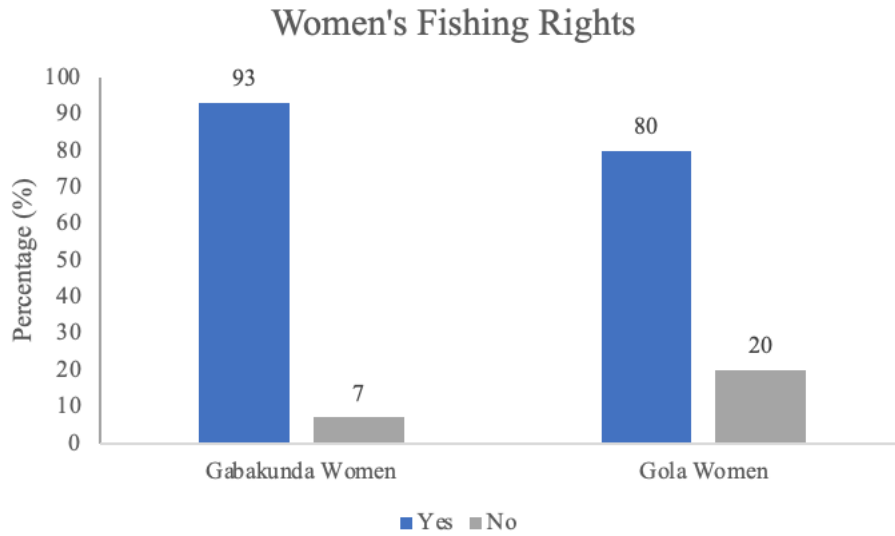


Figure 10. Female respondents to the prompt “In terms of fishing do you have rights?”



Figure 11. Male respondents to the prompt “In terms of fishing do you have rights?”

The majority of men and women from both Gabakunda and Gola when asked “in terms of fishing, do you have rights?”, whether it be the right to fish in the lagoon in a location at a specific time, the right to own equipment etcetera, responded yes. Although, for 32 percent of female semi-structured interview participants their answers of ‘yes’ were qualified with, through my husband,

or through my father or through whoever is the eldest male of the household. Their rights are afforded to them through their male connections. These men have taken a lease from the government to be able to fish in the lagoon and are instructed to follow rules in place by the Chilika Development Authority. These rules are mainly things like not fishing too close to the channel and leaving small fish in the lagoon to mature to ensure some level of ecological stability in the ever-changing ecosystem. This delineates part of the nested system of governance in the lagoon. But on a local scale of governance, the power is in the hands of the men and only through their association do women have the same rights. This unequal distribution of power is contrary to the rules identified in a typical commons defined by Elinor Ostrom (1990), which dictates that legitimate users of the resource are identified and should be of equal status within the system. Feminist political ecology also recognizes that issues of power stem from how women's and men's everyday practices shape their understanding of environmental change and how this interacts with complex power structures that define their vulnerabilities and capacities to respond to change (Bee, 2016; Iniesta-Arandia et al., 2016). This ties into one of the six core dimensions of SERS that speak to the influence of social power in relation to the change (Nayak & Armitage, 2018). There is a complex network of actors in the social-ecological system at play. The local men and women of the villages within Chilika are just one voice in the chorus of stakeholders managing the regime shift and depending on whether or not their knowledge or experiences are deemed relevant will their voices will be heard. This choice of political scale identifies who holds the power in the governance of the regime shift (Nayak et al., 2016; Reid et al., 2006).

In both figures 10 and 11, it is notable that both men and women from Gola have an increased percentage of the answer no to the question. For the women, this answer is not significantly different as determined when a one-tailed, two sample equal variance t-test provided a P value of 0.168, whereas the same t-test performed on the men's responses provided a P value of 0.012, thus the P value is less than 0.05 and is significant. This significant difference between the men and even the slight difference between the women of Gabakunda and Gola can be attributed to the driver of SERS of non-native fishers invading the fishing locations of the people of Gola. This issue is less prevalent for the people of Gabakunda as their village is located adjacent to the lagoon and there are fewer non-fishing caste villages surrounding them whereas the opposite is true for

Gola. The village of Gola as described in Chapter 3 being set in from the lagoon itself and surrounded by neighbouring non-fishing villages lends itself to this conflict of space. The people of Gola feel that their rights are being violated or even taken away by the influx of outsiders taking over their space in the lagoon. “My husband had gone to a different part of the lagoon and taken a lease from non-fisher people to fish there. He left the village location because the non-fisher people were breaking his equipment.” (Gola woman, semi-structured interview, August 2018). The people of Gola have to combat these additional actors in their network of power. These outsiders have more resources and a higher status that provides them with more influence than the fishers and give them the ability to damage their equipment and even forcibly remove them. During the focus group in Gola, it was revealed that one women had suffered a broken arm from a conflict between the members of her community and the people intruding in the lagoon to exploit the fishery. This presents additional danger for the women of Gola as they have an increased vulnerability to this violence. This is not to say that women are simply born vulnerable, an intersectional approach views vulnerability in relation to participation in decision-making, access to resources and other things that are awarded based upon one’s position in their community (Iniesta-Arandia et al., 2016).

The current system of governance is based on male-centric experiences and only provides solutions to the problems of social-ecological change from this limited group. There is a power imbalance in the political scales both at the local and higher up levels. The traditional methods of governance have not afforded much relief in the way that the SERS are managed and leaves vulnerable a large portion of the population that is integral to the functionality of the lagoon’s social and ecological systems.

5.2 Women’s Positions in the Governance of the Lagoon Commons

Positionality is defined as the social and political context that situates one in a specific identity based on things such as gender, caste, race and sexuality. It goes on then to inform how one’s identity will influence or bias one’s understanding. Women and men in Chilika Lagoon have distinctly differentiated positionalities based on all of these factors and they influence their relationship with the governance system of the commons. While women may have some rights in

terms of fishing in the lagoon via their male familial connections, the vast majority of women from both study villages believe they do not have a say in the decisions made by the community about how to manage the lagoon (Figure 12). 8 percent of women interviewed indicated they did have a say in the decision-making process compared to 100 percent of men who were interviewed. One of the main design principles of the commons is to decide inclusively so that all those who were previously defined as legitimate users are also included in the decision making. This disparity further depicts the distribution of power and influence in the SERS favours male members of the community; thus, any governance is solely derived from a male’s perspective. This is then further confirmed when asked directly if women are consulted in the governance of the fishery (Figure 13). It is interesting to note that a larger percentage of men believe that women are being consulted than the women themselves. This may be due to the fact that men believe their methods of governance are more inclusive and intersectional than they are in reality.

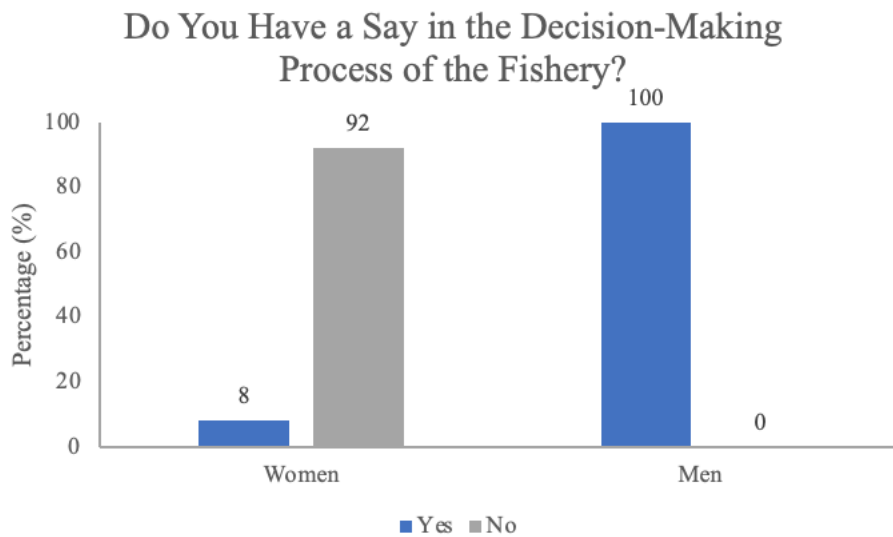


Figure 12. Men and women on whether they have a say in the decisions made by the community.

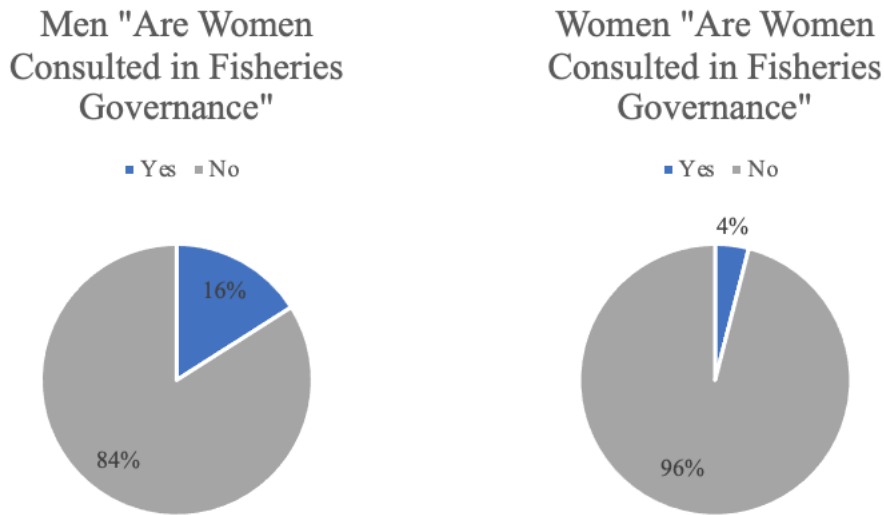


Figure 13. Men and women on whether women are consulted in fisheries governance.

Men’s knowledge and experiences are being placed at the center of the problem and the solution of SERS. There is little to no regard for gendered impacts of change in the social aspect of this social-ecological system. This blatant bias leaves women vulnerable to emotional, economic and environmental stressors as described in Chapter 4. This also leaves them powerless to provide knowledge, share their experiences and create meaningful change when they are not being consulted in any capacity by the nested governance system of the lagoon.

The reason most cited as to why women are not involved the community’s decision-making process or consulted in fisheries governance was that this is the work of men and because women do not do the work, they do not understand how to manage it. This identity bias that men believe about women and women themselves often reinforce could not be farther from the truth. Women recognize and understand the issues that the fisher people are facing, particularly in instances where larger actors are reacting to the shifting regime in ways that create losses for their people. The Chilika Development Authority is one of those institutions that has power over the local authority in Chilika. “The woman from the CDA says some things but then is actually doing other things. She abolishes aquaculture but then she also burns our people’s fishing equipment.” (Gabakunda women’s focus group member, September 2018). When asked specific questions

about the governance of the lagoon, many women had informed responses. They recognize the power structure that is in place and how there is often an abuse of this power that negatively compounds the impacts of SERS as seen in this example. There is a system of top-down governance run by institutions such as the Chilika Development Authority and the fisher federations that overwhelm the local level institutional arrangements and create policies that solely favour their own interests. These interests are often at odds with the interests of the community decisions (Nayak and Armitage, 2018). Figure 14 depicts both male and female responses to this idea of whether the actions of the government are either helping or hurting the local communities.

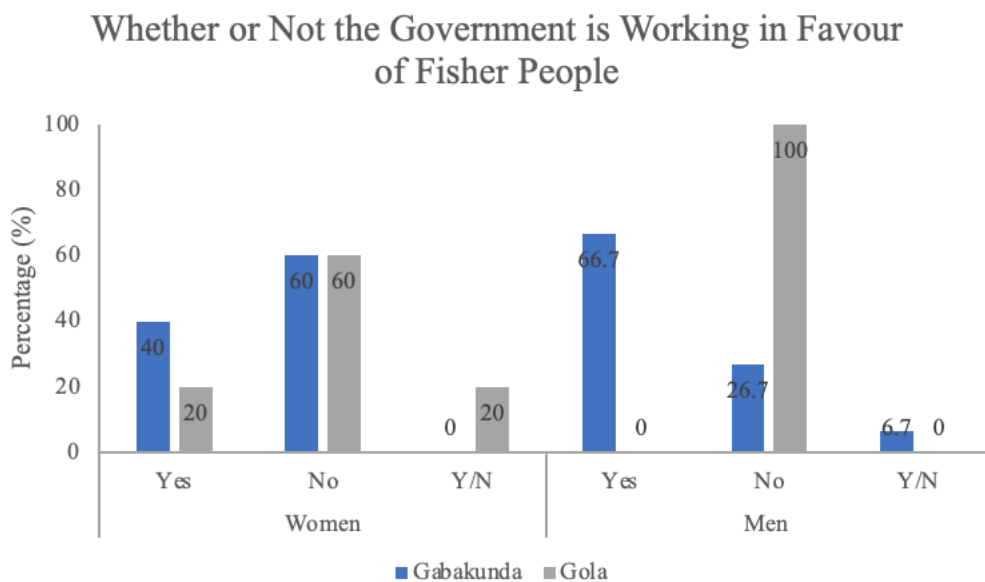


Figure 14. Male and female respondents to the prompt “Do you think the government is working in your favor?”

The majority of women from both villages indicated that no, the government is not working in their favor. All of the male interviewee from Gola also believe that the government is not working with their best interests in mind but the same cannot be said for the men of Gabakunda. As previously noted, the people of Gabakunda are of a slightly higher caste position which could afford them more favour with upper-level governing bodies. Additionally, the tension in Gola between the fisher people and the non-native invasive fishers is a large source of the strife between the local people and the government. The government is allowing this invasion because the people

are from a higher station and hold more social power than those of the fisher people in Chilika. There is also some evidence to indicate that the same sort of invasion is happening in Gabakunda but possibly at a less frequent intensity. “If we have rights to catch fish in the lagoon and some other people are coming in to try and catch fish illegally, the district collector or the administration will not do anything to stop it and will not cooperate with the fisher people” (Gabakunda woman, semi-structured interview, August 2018). This lack of rule enforcement is evident to the women of the communities but because of women’s positionality, they do not have the agency to push back against the wrong-doings of the higher governing bodies.

Despite the fact that women are not involved in the local decision-making system in their communities and they are not considered or involved in the development of top-down governance systems, women have been increasingly involved in the protests and rallies that occur in Chilika. The people of the villages in Chilika use these protests and rallies as ways to gain attention from institutions like the CDA. The presence of women at these events provides not only a larger crowd to put more pressure on the government and gain more attention but also gives the women visibility in the sense that they can be seen and heard by people in power. Women taking the initiative to show up to these events shows that they are directly invested and affected by the governance practices of the lagoon and that the current handling of the changing social-ecological system is harmful to them.

5.3 How Governance of the Commons Can Better Manage SERS

How can alternative forms of governance better manage the interactions between the commons of Chilika Lagoon as a natural resource, the SERS occurring and the gender bias or disparity that is engrained in the fabric of the society? It is clear that the current governance situation is not meeting the needs of the people. “Leases have increased in price by 10% each year and the fisher people cannot afford the cost, and so non-fishers are taking over the lagoon.” (Gola men’s focus group member, September 2018). The inflation of lease prices on top of the diminishing returns on investment of fishing have created grave problems for the local fisher people. They are being systematically forced out of their own vocation. There is also very little regulation in the lagoon and enforcement of specific rules like the abolition of aquaculture has only been enacted in theory

and not in practice. “Aquaculture should be stopped; it is only on pen and paper that aquaculture has stopped in the lagoon.” (Gola men’s focus group member, September 2018). It is known that an adaptive form of governance is necessary when dealing with social-ecological regime shifts (Nayak & Armitage, 2018, Selkoe et al., 2015). It is also known that the marginalization of women, the poor or other vulnerable peoples contributes to less robust decision making and the perception of unjust natural resource distribution (Malla, 2001, Agarwal, 2001). Thus, an adaptive form of governance that takes an intersectional approach to regulating a rapidly shifting social-ecological commons is necessary in Chilika Lagoon. Improving engagement in governance is one step forward in reaching this goal.

Engagement in governance that is framed as people (1) making an effort for their views to be known and exercising their rights to challenge the dominant power, (2) taking leadership roles and (3) integrating their voice and opinions into group decision-making (McDougall et al., 2013), implemented in community-based natural resource management is necessary in order to contribute more equitable results. These three facets of engagement align with the design principles that require a commons to decide inclusively, share knowledge and govern locally (Ostrom, 2009). This looks at the communities as not a homogenous unit, but a make-up of independent actors with unique goals and vulnerabilities that must be considered when designing a governance system for the lagoon at both the local and state level. Figure 15 shows the opinions of semi-structured interviewees on whether women should be consulted in fisheries governance. This was posed as a follow up question after asking whether or not women are consulted in fisheries governance.

Should Women Be Consulted in Fisheries Governance?

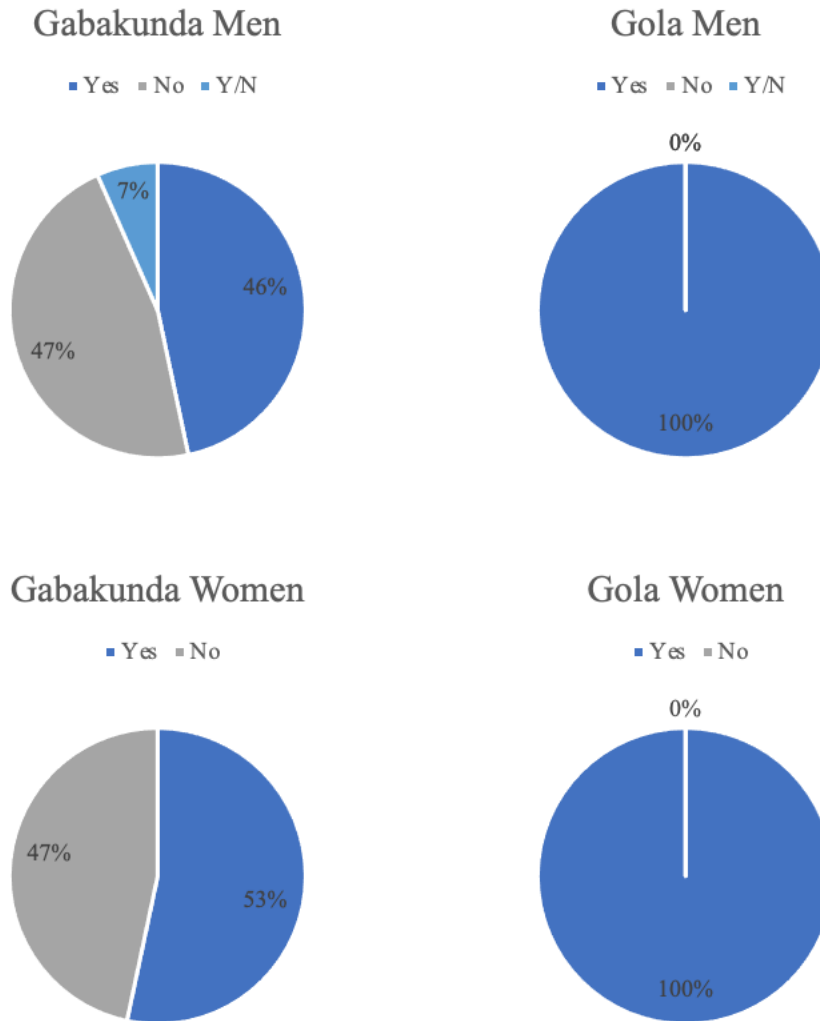


Figure 15. Men and women on whether women should be consulted in fisheries governance.

The response disparities between the women and men are very apparent in figure 15. All of the women interviewed in Gola agreed that they should be involved in some capacity in fisheries governance but only a little over half of the women of Gabakunda felt the same way. The reasoning behind this may be due to the caste positions of the women in Gabakunda. With these women being of the Khatia sub-caste, they are stationed above the women of Gola who are identified as Kandara and they may feel more inclined to remain in their station and in a sense be more complacent with their involvement in fisheries governance. The women of Gabakunda may also

feel that the costs of speaking up and attempting to involve themselves in fisheries governance may outweigh the potential gains they may receive from systemic changes within management structures (Osmani, 2007). The women of Gola, who are from the lower sub-caste may feel more need to make change as they had less of a variety of alternate livelihoods than the women of Gabakunda but overall, a larger number of women taking up these fewer sources of alternate income (Chapter 4) as they may be in a more vulnerable position, both economically and socially, than the women of Gabakunda. Overall, of the total number of women interviewed, 72 percent of the women do feel that they should be consulted in the governance of the lagoon and the fishing industry that they so heavily rely on to provide for them. Many women stated that the community should have the right to manage the lagoon themselves, enforcing the design principle of governing locally. One woman from Gola stated “Women should join because that is our wealth. I want to go with my husband to fight for that wealth.” These women feel their connection to the lagoon and what it provides them with and want to work to protect that relationship via the governance practices of the lagoon.

There is also a large disparity between the villages themselves. Less than half of the men of Gabakunda are willing to include women and give them a metaphorical ‘seat at the table’ as only 46 percent of men agreed that women should be consulted. Similarly, only 53 percent of women from Gabakunda agreed that they should be consulted. In Gola, there is no stark contrast between the opinions of men and women. The men of Gola firmly believe that women should be consulted and 100 percent of women interviewed feel they should be included as well. This is not surprising as it was determined in the previous chapter that women are very involved in secondary fishing activities in Gola, even more so than the women in Gabakunda, with some women even going on the boats with their husbands to aid in the fishing process. The men of Gola have adopted already a more holistic view of what the local governance of the lagoon should look like. When asked, “Why should women be consulted?”, one man said “Because they have rights and it is our rice pot, they should join and fight to make changes to save the lagoon.” They understand that women make vital contributions to the fisheries system and the work is done much more efficiently when they are involved so they should have a say. The problems that are facing the social-ecological system affect the livelihoods of women as well and every member of the community must come

together to share their knowledge and use their combined power to face the larger governing bodies. This echoes what is delineated in three facets of engagement in governance that was mentioned previously. The men and women of Gola may not have put these ideas in place but they believe it is possible. They feel that women can be involved in challenging the dominant powers that govern them by knowing their rights and making their views be known via their attendance at the protests alongside men.

A more adaptive collaborative approach to governing the commons could bring together the issues that intersect gender and the SERS that are occurring in Chilika Lagoon. When the commons are governed in a way that takes into account all of its unique members and their relationship with the rapidly shifting regime, a more equitable and holistic result can be produced. Having all of the members of the commons engaged and responsive to the changes, amplifies the power that group of people hold and allows them more agency to make meaningful changes within the system.

5.4 Future Governance Possibilities

5.4.1 Adaptive Collaborative Governance

This chapter has identified the current system of governance occurring in the lagoon, what women think about this system and how a more intersectional approach to the governance of the system could better manage the SERS of the region. So, what could this future governance system look like? One approach that could be expanded upon across multiple levels and scales of governance is adaptive collaborative governance. This type of governance has been implemented in community forests; another type of community-based natural resource commons that is similar to the natural resource commons found in Chilika Lagoon thus this type of governance could be adapted to fit the needs of Chilika. Adaptive collaborative governance aims to engage more women in governance and this engagement is defined by being able to express their opinions in addition to challenging the existing dominant power structures, taking leadership positions and having their voices heard in group-decision making schemes (McDougall et al., 2013). This approach focuses on actors basing their decision making in social learning and critical reflection, emphasizing that at the forefront of governance there must be inclusion and equity and reaching for balanced and

strategic interactions between actors to manage conflict effectively (McDougall et al., 2013; Prabhu et al., 2007). This type of participatory governance could be beneficial in Chilika to manage the social-ecological changes of the commons in an intersectional manner. Because adaptive collaborative governance involves learning and reflecting on how governance processes unfold, this flexibility could be useful in dealing with SERS that are rapidly changing the social ecological system of the lagoon. This method does not necessarily bring a solution to all of the issues the communities faced, rather it provides a framework for better understanding between the actors and allowed them the space to learn and grow in their own ways towards better equity and inclusion in their governance systems (McDougall et al., 2013).

Implementing learning in the community level of governance that engages and empowers women has been proven to improve governance of small-scale fisheries and could be useful in Chilika to manage SERS in way that is inclusive of all in-group members of the commons. This learning can be either accommodative or transformative. Accommodative approaches fall under the idea of engaging women via a set of strategies that is implemented to facilitate participation. An example of this accommodative approach is moving meeting times to ensure all groups of people can attend and participate (Cole et al., 2020). A transformative approach utilizes a communication tool in the research process that helps to empower women and build critical consciousness or the shifts in norms and behaviors in community governance. This approach looks at gender constraints and instead of trying to work around them like the accommodative approach, faces them in hopes of overcoming them (Interagency Gender Working Group, 2017). This is done by making men and women aware of the gender roles and norms they enforce, promoting the position of women, reviewing the resources and duties that are assigned to men and women and addressing the power relations between women and the rest of the community (Rottach et al., 2009). Examples of these transformative exercises have been skits performed on gender-related issues in fisheries such as gender roles and responsibilities, decision-making, teamwork and power structures. These skits were then followed up with a guided discussion which was turned into a manual on how to respond to these situations (Cole et al., 2020). Exercises like these could be used to demonstrate the importance of women's active participation in fisheries governance to men and also show women that governance of the lagoon is not just the work of men.

Cole et al. (2020) has identified that both accommodative and transformative approaches elicit changes to gender perceptions in small-scale fisheries but the transformative methods create more significant change along with greater outcomes in terms of women's empowerment. The inclusion of these accommodative or transformative approaches in an adaptive collaborative governance system in Chilika would be beneficial in dealing with SERS in a gender sensitive manner.

5.4.2 Sustainable Livelihoods Approach and Co-Management

The Sustainable livelihoods approach was created based on the ideas of institutional economic growth and development and the ability for ecological systems to bounce back from stressors or shocks to its systems (Allison & Horemans, 2006). Its principles are based on placing people's social and economic activities at the center of analysis, addressing the scale of issues by linking the local level policy with the state level and working in a responsive and participatory way to address management priorities (Allison & Horemans, 2006; Kebe & Muir, 2008). Sustainability in this approach is viewed as a dynamic entity that takes into account the economic, institutional, social and environmental aspects of the management within a fishery. This intersectional approach takes into account the complexity of a fishery and focuses on the people's livelihoods and the way they interact with the economic, ecological and social systems around them (Kebe & Muir, 2008). This approach has the capability of integrating women's knowledge and experiences into fisheries governance because of its design and participatory methods and has been implemented in similar small-scale fisheries as an innovative form of co-management that is based on local power structures (Ngwenya et al., 2012). Integrating this type of governance into Chilika Lagoon could be a way to make the upper-level governing bodies within the lagoon, such as the FISHFED and the CDA, work in collaboration with the self-regulation of the fisher communities.

The future of governance in Chilika Lagoon requires a framework that duly incorporates the relationships between gender and the SERS occurring in the lagoon environment due to women's increased vulnerability to the impacts of SERS. The power imbalances between men and women at the local level and between the upper levels of governance and the local communities create a difficult governance landscape to navigate and exacerbates the vulnerabilities of women when they

are not included in the decision-making landscape. It is important to recognize the strong connections between the improvement in the quality of people's lives and effective user participation in fisheries management when a sustainable livelihoods approach is implemented (Ferrol-Schulte et al., 2013). An approach to governance that takes into account each unique actor and affords them equitable power and agency within the system is the only way to move towards a more just and holistic social-ecological system.

5.5 Chapter Summary and Conclusions

In this chapter, the third objective of understanding how taking a gender sensitive approach to social-ecological regime shifts can contribute to creating a novel governance system in Chilika Lagoon is explored. The current lagoon system is identified at both the community and state levels and how the power structure plays a role in the relationships between these different actors. Women as a unique group of individuals are marginalized and overlooked in this current governance system because of their caste positions and their social identities within the community. Both women and men feel the impacts of a government that does not have their best interests in mind but only the men have some power to let their opinions be known and taken into account. This is why a governance system that engages all actors and has the capacity to adapt to the shifting regimes in the social-ecological system is necessary to create a just and equitable fishery in Chilika Lagoon. This is explored in the future governance possibilities of an adaptive, collaborative governance approach and a sustainable livelihood approach.

Chapter 6 – Summary

This concluding chapter begins with a summary of the purpose of this research and the conceptual framework that directs the project. It then summarizes the methodology and the tools used to analyze the three research objectives that were explored in Chapters 4 and 5. The key lessons and contributions derived from these objectives are identified and some recommendations are made to accompany the results of this project. These recommendations lead up to the further steps that can be made in this field and the final conclusions of this research.

6.1 Summary of Research Purpose, Concepts and Methods

This project was developed based on the need to further explore social-ecological regime shifts (SERS) in a small-scale fishery commons setting. The project does this by using a social-ecological systems perspective in a case study of Chilika Lagoon, the largest brackish water lagoon in Asia. The fishery commons of Chilika Lagoon is a complex social-ecological system that is experiencing multiple drivers of change. These drivers create impacts that affect both the natural and ecological subsystems of the commons.

The fisher people of Chilika are considered the resource users in this social-ecological system and thus the in-group members of the commons. Though, because fishing is a typically male-dominated industry, women in fishery commons are often marginalized and are afforded less social power in the social system. This marginalization makes them increasingly vulnerable to the negative impacts of both social and ecological change. By using a gendered lens to analyze the social-ecological system of the fishery commons, a more intersectional view of change is developed. This gendered lens can improve our understanding on SERS which deals with the drivers of change, the social-ecological units of measurement, the levels and scales of intervention, the social equity and power of change and the management and governance in rapid social-ecological (Nayak and Armitage, 2018) Using a gendered lens in analyzing the social-ecological system of the fishery commons in Chilika Lagoon as a case study, we can create a more holistic understanding of change in a commons. Thus, the purpose of the research and the objectives designed to fulfill that purpose are as follows.

The main research purpose of this project is:

To investigate and understand the connections between gender, social-ecological regime shifts and governance in the coastal fishery commons of Chilika Lagoon.

The relationships between these topics have yet to be explored and by doing so there is much to add to the conversation on how a community can respond to SERS. This project aims to continue reframing the dialogue on SERS in a commons towards more intersectionality.

The objectives used to fulfill the research purpose were:

- 1. To understand the process of social-ecological regime shifts from the perspective of women, compared to the perspective of men*

This objective aimed to look at how similarly or dissimilarly the women and men of Chilika Lagoon perceive the changes occurring in their environment. It focused on identifying their relationships with the lagoon and their involvement in the lifecycle of the fishery commons.

- 2. To examine how women and men respond and adapt to the social-ecological regime shifts within their lagoon environment*

This objective focused on the mechanisms of adaptation that men and women use in response to SERS in the fishery commons. Social-ecological systems experience many changes and fluctuations and the ability for the users of the resource to respond to those changes is dependent on many social and ecological factors.

- 3. To understand how the implications of a gender sensitive approach to understanding social-ecological regime shifts can contribute to novel governance within a common pool resource like a lagoon*

This objective was employed to look at current governance in the lagoon and evaluate how gender plays a role in the proceedings of the commons system. It also looks to what both the women and men of Chilika feel is necessary to create a better functioning and more inclusive system of governance.

The conceptual framework was designed to clearly delineate the pathways between the topics identified in the research purpose and guide the research in a logical manner (chapter 2, section 2.4). Figure 2 was constructed to connect gender, rapid change, the commons and governance in a way that flowed with the research purpose. Gender and rapid change influence one another within a commons and governance could be used as a tool that organizes and manages these actors within the commons setting.

6.1.1 Research Methods

This research project was a case study of Chilika Lagoon based in two local villages (Gabakunda and Gola) and focused on qualitative methods to examine the research purpose and objectives. This research aimed to uncover the relationship between gender, fishery commons and social-ecological regime shifts, examine how women and men are reacting to SERS and how governance is currently being implemented in these systems to analyze what methods are working and what could be improved upon to better regulate the fishery commons. The research takes a grounded theory approach in that it is mainly based off of observations and qualitative results to examine how society operates and functions and develop insights or learning from these findings. In order to accomplish these objectives and fulfill the purpose of this research, several research methods were employed as follows.

The methods employed in this research began with a literature review to cover the existing information on gender and fisheries, social-ecological regime shifts and fisheries and governing of the commons. These three sections were identified in the literature review as they tell the story through the conceptual framework of how gender and SERS in fisheries both impact each other within a natural resource commons and how governance can tie these things together (see chapter

2). From the literature review, more practical methods followed during the 3-month field visit to Chilika Lagoon. Initial observations and scoping of the communities in Chilika were performed and Gabakunda and Gola were chosen as the villages to be studied as they provided a balance of perspectives from the fisher people of Chilika. The range of caste, location, social-economic status and village size were taken into account and the differences between the villages provide a wide range of experience to be examined within the research (chapter 3, section 3.2) This then allowed for the semi-structured interviews to take place in these villages after consulting with the respective village leaders. An equal number of men and women were interviewed in each location to be able to get a balanced view of how gender plays a role in the SERS in Chilika (chapter 3, section 3.4). Focus groups of men and women in both villages were also done in order to enhance the perspectives of each group (chapter 3, section 3.5). The research findings that were procured from these methods are explored in the proceeding section.

6.2 Summary of Research Findings

As previously stated, the research objectives were designed to fulfill the purpose of this research and create a place for the criterion for SERS to fit into each objective. The research findings support the query of the objectives in relation to the conceptual framework (chapter 2) identified for this project. The findings from the analysis in chapters 4 and 5 are summarized in the following subsections.

6.2.1 Objective One

To understand the process of social-ecological regime shifts from the perspective of women, compared to the perspective of men.

This objective was set in place to explore how similarly or dissimilarly women and men perceive change in the social-ecological system that they are a part of. The drivers, whether they be human or ecologically induced, initiate the process of SERS thus examining the perceptions of women and men on these drivers is imperative for this objective. The drivers of change in Chilika Lagoon being the opening of a new sea mouth, the influx of non-native fishers and the increasing use of illegal aquaculture in the lagoon are all tightly linked to gendered causes and effects of

change within the commons. These drivers are created by both ecological and anthropogenic actions and in turn drive change in both realms as well (chapter 4, section 4.4). These events have driven changes in both the ecological and social subsystems of the lagoon and can be measured by the social-ecological units which in this case would be the physical boundary of the lagoon itself. The ecological changes experienced are fluctuations in depth and salinity of the lagoon, loss of habitats, introduction of invasive species, tidal changes and sand infiltration. The changes to the social system have been felt in the encroachment of non-fishers on the lagoon, support from state on the commercialization of shrimp that affects use rights and access of local fisher people, food insecurity and loss of livelihood. These social changes all contribute to the marginalization of the already disadvantaged community of fisher people in Chilika Lagoon highlighting that the social equity, or who wins and who loses in the face of change, does not favour the working fisher people of Chilika and their agency or power is limited to ameliorate their status.

The effects of the drivers create impacts that affect men and women differently. These drivers thus influence perceptions of change in a gender-specific manner. Women were shown to have a more emotional response to change and men leaned more towards an economic response. Women fear for their relatives who fish as the tidal changes and invasive species in the lagoon have posed safety issues while working. The fluctuations in depth have also created flooding issues in some coastal communities which triggers an emotional response from women as well. The economic issues that come with the changes in the lagoon are what frames the male perception of social-ecological change. Their identity as a fisher person is decided by caste and tradition, thus, when they cannot provide for their families via their prescribed vocation, they perceive change negatively. Both the men and women have negative perceptions of SERS and the changes themselves but the root cause of those negative perceptions is derived from different sources.

6.2.2 Objective Two

To examine how women and men respond and adapt to the social-ecological regime shifts within their lagoon environment.

The methods in which a person will react or adapt to changes in a social-ecological system depend on many social constructs, such as age, socio-economic status and caste. Gender is one of these constructs and it is proven to play a part in the decision-making process in response to change, whether it be a subconscious choice based on preconceived views or based on the position that one's gender affords them in the social status of their community. This is where social power and equity come into play in SERS in Chilika. Recognizing the similarities and differences in women's and men's adaptations to change are crucial to the understanding of how the positive or negative effects of the changes can disproportionately impact various members of the community. There were three main mechanisms of adaptation identified and explored in the research. The mechanisms are out-migration, transfer to alternate livelihoods and non-adaptation (chapter 4, section 4.7). Both women and men were recorded in the study as having participated in each of these mechanisms but some were favoured over others by particular groups. Generally, men are the main practitioners of migrant work and only in rare cases will women travel with their husbands to work as well. The social-ecological changes are forcing men out of their vocations and into often dangerous and unprofitable labour jobs that impact both their mental and physical health as well as their relatives who remain at home. This out-migration is practiced by men but women feel the effects of the adaptation in their emotional and economic struggles to care and provide for their families while the head of their household is away. The second mechanism, the turn to alternate livelihoods, is practiced by both men and women in Chilika Lagoon. Women are involved in the life cycle of the fishing process and because of the lack of production in the lagoon, they feel the effects in their duties. For example, women will see less fish coming in the home for personal consumption, they will have less work in terms of drying fish and less time spent sorting and selling fish as these are all tasks commonly performed by women. Thus, women are in fact having to transition to alternative livelihoods and in many cases have much more varied avenues of earning income than men who mainly partake in the tourism industry to supplement their earning.

Tourism of the lagoon has long been introduced in regions with coastal access which is part of the social-ecological unit of change, the physical lagoon boundary. The fact that not all villages, for example Gola in this study, have this availability to adopt tourism, adds to the vulnerability the fisher people face due to SERS. While men participate in tourism work, women have looked to a

variety of other ways to provide for their families. These avenues include but are not limited to, creating lending groups, tree planting, cashew collection, farming patty rice, taking care of goats and selling vegetables. Women find avenues to produce revenue for their families in much more diverse industries than men and this demonstrates the local knowledge that the women of the village pertain. They are able to find ways to provide for their families in the absence of men but these alternatives are not usually enough. The lack of recognition, agency and support that women receive by doing these jobs is severely lacking and does not allow them to advance past the bottom line. This lack of power for women and the failing lagoon fish production is what contributes to the popularity of the final mechanism of adaptation, no adaptation.

A number of men and women from both of the villages of study do not perform any other work to provide for their families, and solely rely on fishing from the lagoon. The instances of this non-adaptation are similar between the villages although the number of women Gabakunda that indicated no adaptations was higher than the women of Gola, who are of a lower caste and bear less of the stigma that comes with women in the workforce. There is a strong belief amongst many residents of Chilika Lagoon that the lagoon is considered their mother and a mother always provides for their children. Thus, this faith in the lagoon and its bounty is what drives the men and women to continue on their same path of fishing in hopes that the SERS will rectify themselves on their own and the lagoon will provide for them.

Men's and women's adaptation mechanisms in the face of change are different and the reasons as to why one group chooses a certain mechanism over the other is different as well. There are social constructs and environmental constraints that limit what one can do in response to change. This is why a one size fits all approach to managing changes and how people respond to them will never work. Women perceive the SERS differently than men as determined in objective 1 and thus it makes sense that they will resort to different measures in order to deal with the changes. This leads to the final objective where governing the changes in a way that considers both men and women's unique perceptions and responses comes into play.

6.2.3 Objective Three

To understand how a gender sensitive approach to social-ecological regime shifts can contribute to novel governance within a common pool resource like a lagoon.

In Chapter 2 of this research, governance was visualized in the conceptual framework as a tool that could be used to monitor or regulate the complex interactions between SERS and gender within the commons setting. Management and governance are also characteristics of defining SERS and so this objective looks towards how incorporating gender considerations into a more intersectional form of governance could impact a small-scale fishery undergoing SERS.

Governance is defined here as the larger institution that deals with the big picture elements, goals, direction and limitations of the lagoon whereas management is defined as the day-to-day operations and allocation of resources. Thus, governance comprises the nested system of governing bodies within the lagoon, like the Chilika Development Authority (CDA) and FISHFED, while also including the community level management that happens within each village in Chilika. In terms of governance, women believe they have rights through their husbands or other senior male members of their family. But at the local level of governance within the community, their social power is lower than the men and they are only afforded a place in community meetings by their male representatives. The process of decommissioning that is occurring in the lagoon in which the community management of fishing is being shut out from the decision-making process by higher-up management like the CDA and fish federations compounds these issues.

A large number of women feel that they do not have a say in the decisions made by the community on fishing because they feel that this is the men's work and they are not involved directly in fishing so they cannot make decisions. A very few number of women feel that they are consulted in fisheries governance practices but all of the women from Gola and the majority of women from Gabakunda interviewed believe that they should be. This disparity highlights the fact that women are not being considered in the current governance structures dealing with SERS that are impacting them in a negative fashion. Women are not exempt from the negative impacts of the changes occurring and in fact have proven to be more vulnerable than the men of the communities,

thus they feel they need to be consulted and given some consideration when the decisions are being made within the communities.

Although the men and women feel they do have rights afforded to them via governmental institutions such as the CDA and Fisherman's federations, the majority of participants in this study do not believe that the government is working in their favour. The three drivers of change in Chilika Lagoon are all linked to governmental decisions that have negatively impacted both the fisher people and the lagoon environment. The opening of the new sea mouth was a decision made by the government to solve a siltation problem in the lagoon but it has had drastic impacts on the fishing conditions and the livelihoods of the fisher people that the government has not dealt with. The intrusion of non-fisher caste members taking up space and fishing in the lagoon is not being handled appropriately by the government and is in some cases even being encouraged by providing the people with leases at prices the fisher people cannot afford. Finally, the government has said on paper that aquaculture in the lagoon is illegal and has been stopped but in reality, this is still occurring and is not being regulated properly by the government. This top-down method of governance is not working for the fisher people of Chilika and makes them vulnerable to the negative impacts of change. Both the men and women of Chilika have been uniting in protest against the CDA for their unfair treatment of the fisher people. The inclusion of women in these events has provided them with visibility and some semblance of power to make change within the system. It is also beneficial for the men to have women participate as it provides a larger force to put pressure on the government and make their demands heard by upper-level institutions.

Neither the community-based management or top-down governance is working to ameliorate the lives of the fisher people in Chilika. Women especially are disproportionately affected by the negligence of both institutions. Future governance must be adaptive and be able to incorporate women at all levels of the decision-making process. The bottom-up method of community governance must recognize the importance of women in the lifecycle of the fishery and top-down institutions must work on listening and collaborating with the local power structures to ensure a more resilient and holistic approach to governing SERS in Chilika Lagoon.

6.3 Key Lessons

Chilika Lagoon is often equated to that of a mother, and often referred to as mother Chilika, a symbol of someone who will provide for her children. That role of mother is revered and denotes the importance of women in the community and shows that women should be recognized as unique actors within the social-ecological system of Chilika. Taking the time to provide women with the space and time to share their views and perspectives on the SERS in the lagoon is necessary to formulate a full picture of the social-ecological system in the commons. From there, taking the knowledge that the women have provided and understanding what role they currently play in the system and what potential opportunities can be created from that to ameliorate the current system is the next step.

It is important to recognize that women do adapt to change in the lagoon, their adaptation strategies are valid and in fact more diverse than those of men. These alternate livelihoods could be an avenue of progress in which women can be empowered and given more agency to help support their families monetarily. Women have also shown to be disproportionately impacted by the negative aspects of SERS. Based on the position they hold in society women are often the 'losers' in terms of who benefits and who suffers losses when SERS occur. They do not hold enough social power in order to stop this marginalization. This is where the power of the men in the communities should be used to amplify the voices of women and aid in protecting the vulnerable peoples in their community.

Both men and women do not believe that the current governance of the lagoon is effective and women vie for the opportunity to assist in the governance of the lagoon at the community level. This is another avenue that men can use to empower the women by lifting them up in community meetings and providing space for more representation for women at the local level. Then by continuing to include women in movements protesting government actions that harm the fisher people more power is given to both men and women at the community level in order to make change and be heard by upper-level governance institutions.

6.4 Recommendations

These research outcomes provide information for potential recommendations. Overall, there needs to be more consideration for women involved in small-scale fisheries in terms of impact of change. A one-size fits all narrative in terms of how change affects fisher people is damaging as it disregards the unique needs of marginalized social groups. There also must be further research into investigating the alternate livelihoods employed by women in these communities and how providing them with the agency to expand these ventures could impact the well-being of families in Chilika. And finally, alternate, inclusive forms of governance such as adaptive collaborative governance or the sustainable livelihoods co-management approaches (chapter 5, section 5.4) could be utilized where adaptation and social learning is employed to combat change and make fisheries more resilient to the effects of SERS.

6.5 Final Conclusions

The social-ecological system of the fishery commons in Chilika Lagoon does not lack complexity. There are many different stakeholders interacting at various levels of management and governance. The roles that women play in this system have proven to be crucial to the flow of the life cycle of the fishing community but their voices have not been given any power or have been silenced in public forums. Women interpret SERS in both similar and dissimilar ways to men as their perspectives have been shaped by their unique position in society. They share some common struggles in dealing with change due to their economic status but their marginalization is compounded by their gender and the lack of agency it allows them to deal with rapid change. Women have dealt with change in a more varied way than men. They have extended their opportunities and livelihood capacities beyond that of what society or their caste dictates but face pushback on multiple fronts. There is a limit to what they can create to ameliorate their financial and emotional situations placed on them by the social construct of the gender they were born into. This idea of Chilika Lagoon being a commons is being challenged in that women are supposedly members of the commons but based on their level of inclusion, they are actually part a of a pseudo-in group of people that may be members in theory though not in practice. This is where the governance of the lagoon has failed the women of Chilika. The nested system of governance

discriminates against women at every level. The top-down system of control has stripped the fisher people of their rights and has further disenfranchised the women of the communities on all fronts. Looking to the future, a governance system that relies on a bottom-up approach that is inclusive and provides a full picture of all the stakeholders involved in the fishing processes of the lagoon is the only way forward.

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Appendix A

Semi-Structured Interview Questionnaire

Introduction

Are you ready to begin?

Background questions:

1. Please tell me a bit about yourself and your connection to this village and lagoon.
 - a. Example: your family, how you spend your time, your community involvement
2. What do you do for work? What is your main source of income?

Differentiating Drivers of Regime Shifts:

1. How would you describe the current condition of the coastal ecosystem/landscape? Compared to years prior?
2. Is the current condition of the region/coast/aquaculture system sufficient for your needs/suitable for your livelihood?
3. Who is involved in fishing activities in your household?

Levels and Scales of Intervention

1. Has the change in the ecosystem impacted you personally and to what extent?
2. Has it impacted the community and to what extent?
3. Have you altered any behaviours or methods of fishing because of these changes in environment?

Equity and Social Justice Concerns

1. How often do people migrate because of the environmental changes?
2. How often do you feel you have benefitted from the changes?
3. How often do you feel you have lost income, happiness etc. because of the changes?
4. Do women and men have the same rights in the fishery?

Power and politics

1. How often do you feel that your local government is properly representing you?
2. Do you feel that you have a voice or opinion on the decisions that are made with respect to the community?
3. Do you believe that women are adequately consulted in the management of the commons?

Social-Ecological Units

1. Do you rely on fishing and fish products for your livelihood?
2. How often is fishing involved in the conflicts that occur within the community?
3. How often are the benefits you receive from the coastal ecosystem impacted by the changing environment?

Governance to Navigate Regime Shifts

1. Do you believe that the current system governs the ecosystem adequately?
2. Is the government doing enough to manage the changing environment associated with your coastal livelihood?

Post Interview

1. Is there anything else you would like me to know about what we've discussed today?
2. Who else do you know that you think I should talk to?

Appendix B

Focus Group Questionnaire

Objective 1: understanding the nature of social ecological regime shifts from a gendered perspective

1. As a group I would like you to come up with a list of the biggest changes that the Lagoon ecosystem/environment has faced over the last ten years.
2. Which of these changes have resulted in a benefit to your or the community and which have been harmful?
3. Now please rank the beneficial changes from most beneficial to least beneficial as well as the harmful changes from most damaging to least damaging.
4. Have these changes affected men and women differently?

Objective 2: examine gendered adaptation processes in response to rapid environmental change

1. Have you had to alter your everyday life in order to deal with these environmental changes?
2. As a group, list the ways that men adapt to these environmental changes. Then do the same for women.
3. What is the reasoning behind these similarities and differences?

Objective 3: gender sensitive approach to governance of the fishery commons

1. List the current management tools or systems used in the fishery
2. Are women involved or included in the implementation of these systems?
3. How often are women given leadership roles in these systems?
4. Do you believe it is necessary that all members of the community be a part of the management of the fishery?
5. As a group I would like you to describe the ideal management of the fishery to include all integral members of the community.