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Reflections from Chilika - V2V Field School: A Glimpse into the Policy and Governance of the Chilika Lagoon Social-Ecological System

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V2V Working Paper Series

V2V Global Partnership “Working Paper Series” aims to facilitate the exchange of ideas, mobilize knowledge and generate broad-based discussions on vulnerability-viability themes within the context of small-scale fisheries. The Working Paper Series will provide a collaborative and interactive platform for academics, practitioners, representatives of civil society, and individuals interested in making written contributions to the theoretical, methodological, practical, and policy aspects of small-scale fisheries, both locally and globally. To contribute to the V2V Working Paper Series, please contact v2vglobalpartnership@gmail.com.



Reflections from Chilika - V2V Field School

Small-scale fisheries (SSF) are important social-ecological systems across all parts of the world. Strongly anchored in local communities, SSFs reflect a way of life, and they provide critical contributions. Yet, their efforts and their existence are often overlooked as many SSF communities remain economically and politically marginalized, are highly vulnerable to change, and remain invisible in policy debates. Nonetheless, the continuity of many SSFs suggests certain strengths and forms of resilience. A holistic understanding of what causes vulnerability, as well as what makes fisheries social-ecological systems viable and through what processes is required. This understanding needs to be place based and situated within the SSF context, and the processes surrounding it must be long-term, collaborative and iterative.

The Chilika - V2V Field School aims to provide a creative platform for graduate students and early career scholars and practitioners to deliberate and learn about concepts, approaches and methods helpful to achieving transitions from vulnerability to viability within SSF social-ecological systems. The Field School takes place every year in the Chilika Lagoon, Bay of Bengal, India, where participants gain firsthand experience and creatively engage in furthering their understanding and knowledge of vulnerability to viability transitions, and experiment with concepts and approaches that are novel, transdisciplinary and problem-oriented. The Reflections from Chilika - V2V Field School is part of the V2V Working Paper Series that exclusively focuses on documenting the main learnings, insights, reflections gained by the Chilika - V2V Field School participants during their weeklong journey with the fisher communities of Chilika Lagoon.

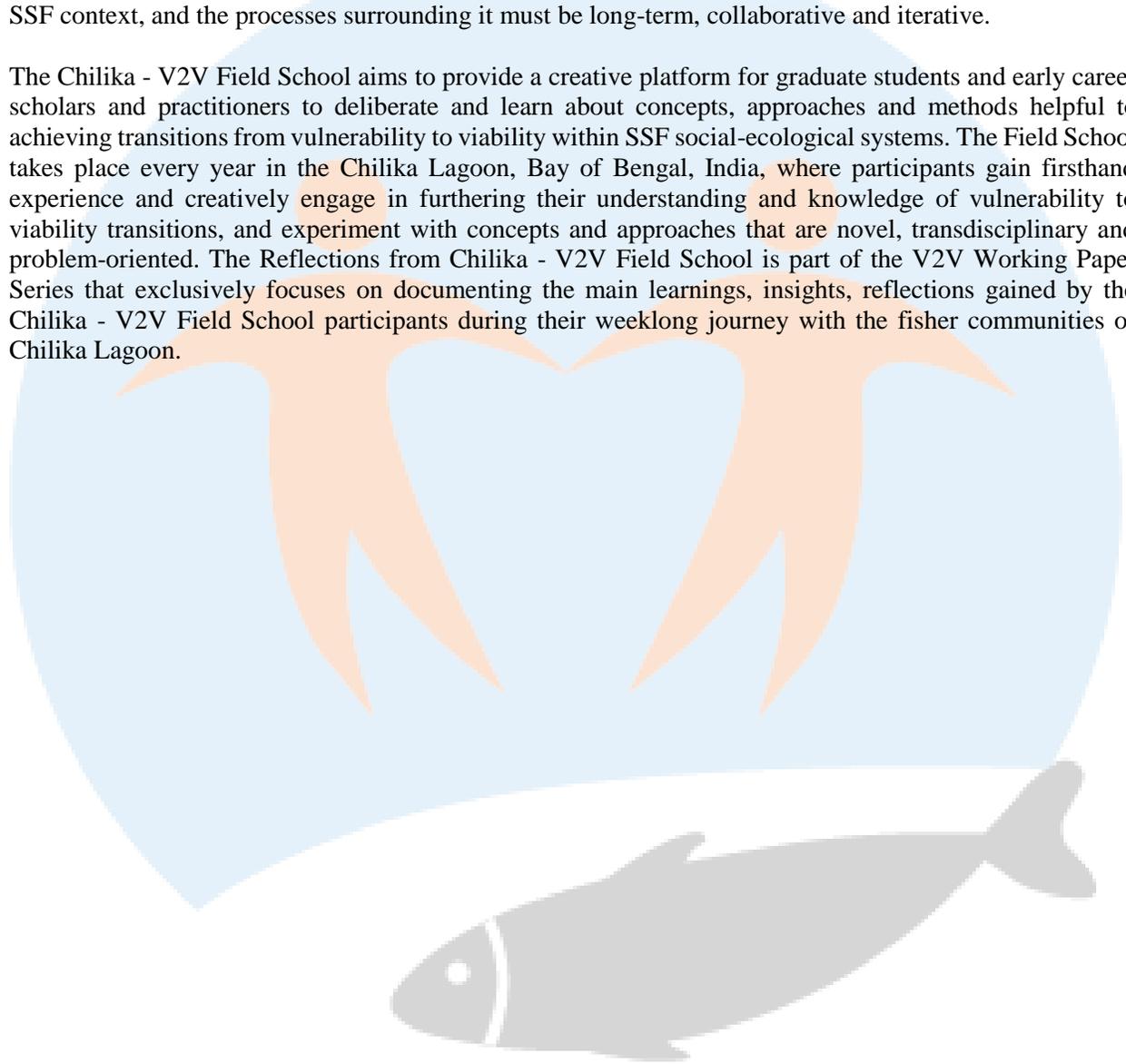


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Reflections from Chilika - V2V Field School: A Glimpse into the Policy and Governance of the Chilika Lagoon Social-Ecological System

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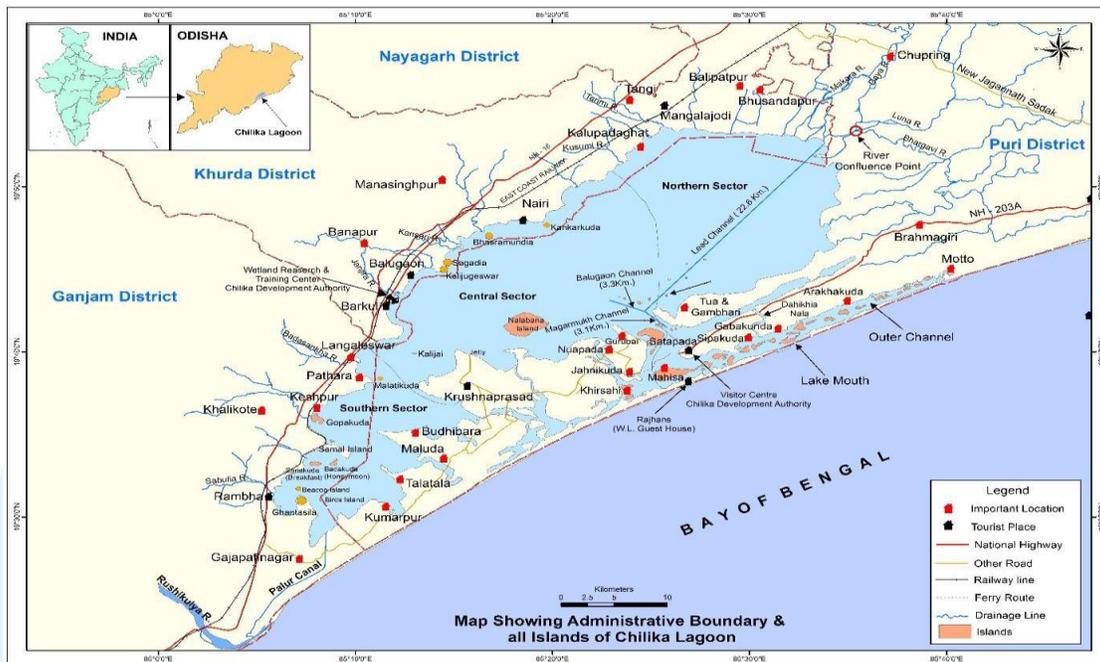
1. Introduction

Chilika Lagoon (Figure 1), the largest brackish water lagoon in Asia, is spread over a 1000 sq. km. area across Puri, Khorda, and Ganjam districts in Odisha along the Bay of Bengal on the eastern coast of India. About 0.3 million fisher populations in more than 120 villages directly depend on Chilika Lagoon for their small-scale fisheries-based livelihoods. The fishery consists of traditional fisher groups whose vocation is identified by their membership in certain Hindu castes, of which there are seven in the Chilika area (Nayak & Berkes, 2011). The lagoon ecosystem also indirectly supports villagers of non-fisher castes, including some relying on farming and forestry activities for their livelihoods (Nayak, 2014). The formalisation of fishermen's access and use rights occurred as early as the late 1500s, and later on the king and the zamindars (landowners in charge of collecting taxes) required "bheti" or "salami," which are tributes or presents in kind, before fishers may exercise their rights to fish in the "sairats," or fishing grounds (Nayak, 2014). This custom started in 1790 and persisted until the British colonial administration gained control of fishing in Chilika in 1930 (Nayak, 2014).

The government of Odisha took a generally supportive approach towards Chilika fishers up until the 1980s. Beginning around that time, a centrally administered umbrella body began exerting a more top-down approach towards the fisheries, taking control of fisheries governance and regulation decisions, which infringed upon the power of the local-level fishing cooperative societies. Such centralised management continued with the arrival of central bodies such as FISHFED and CDA (Chilika Development Authority). As a result, the weakening of grassroots institutions like traditional village committees, "Jati Panchayats" or Caste Assemblies, and the Fisher Federation, challenged fishers' access and commons rights and impacted their economic activities related to fishing (Nayak, 2014).

Figure 1

Map of Chilika Lagoon



Source: Adapted from Chilika Development Authority (www.chilika.com).

In the 1980s, shrimp aquaculture began in Chilika Lagoon in an illegal and unregulated manner, including in areas to which fishers had traditional rights. In 1991, the State Government of Odisha instituted a new leasing policy that authorised shrimp aquaculture in Chilika and permitted villages from non-fisher castes to practise aquaculture. Apart from the regions already encroached, 6000 hectares of traditional fishing grounds were transferred from the fisher castes to non-caste fisher villages in conformity with the lease policy (Nayak & Berkes, 2011). These changes sped up the decommunization process by encouraging incursion and legalising aquaculture (Nayak & Berkes, 2011). Several court decisions, including those from the High Court in 1993, the Supreme Court of India in 1996, and the Odisha State Legislative Assembly House Committee in 1997, prohibited shrimp aquaculture while simultaneously recognising the customary access and use rights of caste-based fishers in Chilika (Nayak, 2014). Despite the rulings, substantial swaths of leased areas are still being encroached upon, and illicit shrimp cultivation continues unabated.

Cyclone Fani, which hit Satapada Island in Chilika Lagoon in May 2019, was the most devastating extreme weather event in recent years. It had significant impacts on the socio-economic and ecological systems of Chilika Lagoon. Losses caused by the cyclone included damage to and loss of homes, fishing boats, and gear. As the fishing communities were gradually recovering from the devastating impacts of the cyclone in Chilika Lagoon, the COVID-19 pandemic struck in March 2020. The pandemic further exacerbated the existing vulnerabilities of the marginalised fisherfolk, as it put small-scale fisheries-based livelihoods under even greater pressure, and communities continue to deal with the impacts on food security and public health even today (Mishra, 2022).

Our objective in this paper is to critically reflect on important policy and governance issues in the context of Chilika Lagoon and understand how major drivers such as illegal shrimp aquaculture, the opening of the new sea mouth, and the centralised management regime have affected the overall ecological health of the lagoon and the lives, livelihood and well-being of fishing communities relying on it. This paper is based on

the collective learning and insights gained by the authors during their participation in the Chilika - V2V Field School during 22 - 29 August, 2022. We have organised our reflections under five key themes: Ecological and Environmental Attributes, Economic Development, Governance and Management, Socio-cultural Influences, and Emerging Issues.

2. Reflections on policy and governance aspects of Chilika SSF

2.1 Ecological and environmental attributes

This section highlights the key ecological and environmental transformations in the Chilika Lagoon over the past few decades that have negatively affected the ecological health of the lagoon, with significant implications for its biodiversity and the socio-economic conditions of the marginalised fishing communities in the region. The scenes in Figure 2 depict various aspects of fisheries in Chilika Lagoon, India.

2.1.1 Changes in ecology

Chilika Lagoon is home to a variety of aquatic animals including multiple species of fish, shrimp, and crabs. This species diversity provides a crucial food source and income for most local fishing communities. Irrawaddy dolphins, protected under the Wildlife (Protection) Act, 1972, CITES (Appendix-I), and IUCN Red List, are also found in the lagoon. The fishers are generally aware of the norms and regulations in place and we learnt that they took measures to avoid harming the dolphins, such as releasing dolphins back to the sea alive if caught during fishing. There has also been a noticeable decrease in fish catch over the last ten years. This is in part due to change in habitat characteristics in the lagoon, which is linked to multiple factors, including poorly managed aquaculture activities, increased siltation as an impact of the opening of an artificial sea mouth and deforestation in the catchment area, and the presence of waste such as sewage discharge and single-use plastic disposal by the tourists. All of this has negatively impacted the biodiversity, abundance of marine species populations, and fish stocks in the lagoon.

2.1.2 The artificial sea mouth

The location and morphology of the sea mouth are an important features of coastal lagoons because they balance the salinity and manage tidal flushing. According to Chilika's oral tradition, the lagoon's distinctive features, which include marine, freshwater, and brackish water conditions, were influenced by seven river and sea openings. Sea mouths do naturally close, however, major shifts in the location of the sea mouth in the 1980s were observed, causing serious concerns about its impact on the structural and functional aspects of the lagoon. Chilika had also lost the majority of its sea mouths by the 20th century. There was just one operable entrance to the Bay of Bengal, according to Bengal District Gazetteers printed in 1908 (O'Malley, 1908). In 1992, the CDA was set up by the Odisha government to 'serve as a coordinating body between a wide range of institutions and people with a stake in the lagoon and its basin' and 'to execute multidimensional and multidisciplinary developmental activities' (CDA, 2008, Dujovny, 2009). Between 1991 and 1999, the CDA funded more than 25 technical studies by government research institutions to study the lagoon ecosystem between 1991 and 1999 (CDA, 2008). The agencies involved in the studies concluded that siltation due to longshore drift in the Bay of Bengal was the main factor causing a shift in the location of the sea mouth, which resulted in the lengthening of the Outer Channel, reduced tidal flux, decreased salinity levels, weed infestation, a decline in fishery resources and an overall loss of biodiversity and productivity (Rajawat et al., 2007). They recommended the construction of a new sea mouth closer to Sipakuda village, which would increase the tidal flux of the lagoon (Ghosh et al., 2006). However, the

fisher communities were not adequately consulted in decision-making regarding the opening of the new sea mouth, and their concerns and suggestions were not incorporated (Dujovny, 2009). Local fishers view the creation of the new sea mouth as a mistake because, due to its location, it has led to an increase in the intensity of water inflow and outflow during daily tidal shifts. The new sea mouth, which was effectively built to flush out sediments, permits too much sea water to enter, in contrast to the previous sea mouth, where the presence of channels and islands tempered daily inflows and outflows. This has had a number of unintended consequences, such as changes in species composition and abundance, which directly impacts fishing-based livelihoods (Nayak & Berkes, 2010).

Figure 2

Scenes depicting various aspects of fisheries in Chilika Lagoon, India



Note. (A) Fishers activities in the landing centres after returning with their catch; (B) Reduced amount of catch by a group of several fishers that are close to no catch per individual fisher; (C) Sorting and post-harvest handling of catch after landing; (D) Face to face interaction with fishers on the beach adjacent to sea mouth; (E) Fishers involved in *Penaeus monodon* tiger shrimp Post Larvae (PL) collection that destroy many other aquatic biotas and cause loss of lagoon aquatic biodiversity; (F) Placement of multiple mosquito nets (fine mesh size net) - close to the sea mouth for PL collection; (G) Fisher collecting molluscs shell on the beach adjacent to sea mouth; (H) Building a structure for facilitating tourism activities in the lagoons areas; and (I) Ubiquitous pollution of the lagoon waters by plastics, debris, nets, and other wastes.

Source: Photos were captured during the Chilika - V2V Field School 2022 by Mohammad Mosarof Hossain and the V2V Global Partnership.

2.1.3 Pollution and habitat degradation

Pollution from anthropogenic sources acts as a driver of change in Chilika Lagoon, impacting both the ecology - the aquatic environment and its biota - and associated socio-economic components such as livelihoods and well-being of fisher communities. Single-use plastics such as water bottles, food packets, general debris, and discarded fishing nets are ubiquitous in the lagoon (Figure 2-I). According to some fishers, irresponsible tourism activities, such as littering and discarding oil and wastes from engine boats, have led to habitat degradation in the lagoon. The impact of noise pollution from tourist boats can also negatively impact the movements of dolphins (De Soto, 2016).

The prevalence of shrimp aquaculture in the area is also responsible for several environmental changes, e.g., changes in water quality and species composition. Effluents from shrimp farming activities, including wastewater and water-containing chemicals, such as antibiotics, contaminate the lagoon water. Many fishers in the lagoon area are also involved in the collection of shrimps (mostly tiger shrimp) post larvae (PL) (Figure 2-E). One of the shrimp PL collectors noted that shrimp PL from natural sources was in high demand by shrimp farmers for their stability, high survivability, and production. However, shrimp PL collection further reduces biodiversity, because eggs, larvae, and fries of many other marine fish species are also entangled in the PL collection net and die during the sorting process. Mud and silt carried by upstream waters have also led to increased turbidity in lagoon waters, which reduces water clarity and light penetration, hindering photosynthesis by chlorophyll-bearing algae and macrophytes. Suspended sediment particles can also cause suffocation of biota, obscure vision, hinder food searching and chasing abilities, clog fish gills, and reduce growth rates of organisms (Gao, 2006; Wetzel, 2001). Heavy silt loads may also reduce boat navigability and decrease the depth of the lagoon basin.

2.2 Economic development

This section discusses how major drivers, such as declining fish stocks, debt cycles, market fluctuations, and the growth of shrimp aquaculture have impacted the economic development, particularly the livelihoods of fishers in Chilika Lagoon. Figure 3 addresses environmental and economic development aspects concerning the livelihoods of fishing communities of Chilika Lagoon.

2.2.1 Declining fish production and catch, and changes in species composition

Changes in species composition and decreases in fish catch, species abundance, and size of fish over the past several years, have been reported by fishers in Chilika and in the literature (Nayak, 2014). It is commonly understood that only small-sized crabs are available to catch as the huge demand for crabs, including internationally, and attractive market price means that fishers are harvesting crabs before they reach maturity in terms of size. The influx of saline water into the lagoons is beneficial for the cultivation of tiger shrimp aquaculture. Prior to the opening of the sea mouth, Chilika Lagoon was composed of brackish water (freshwater-dominated brackish, mild-brackish (low salinity), and salty brackish (mild salinity) ecosystems. However, the fishers reported a change in salinity after the opening of the new sea mouth along with changes in the flow of water with massive saline water inflow into the lagoons, making this freshwater-dominated habitat into saline water-dominated habitat (more suitable for coastal brackish-water shrimp aquaculture). The influx of saline water into the lagoon has also caused the disappearance of many freshwater species as the habitat has been destroyed or damaged. In the face of these challenges, the economic viability of fishing-based livelihoods is increasingly threatened, though tourism activities offer some potential alternative income options.

2.2.3 The growth of illegal shrimp aquaculture in Chilika Lagoon

Shrimp aquaculture inside Chilika, mainly practised by the non-fishermen, started in the 1980s and has continued in both legal and illegal forms since then (Samal & Meher, 2003). Following an increase in global market demand for shrimp and their high prices at the international level, many non-fishers with powerful networks started investing in aquaculture in Chilika Lagoon through the construction of illegal *ghers* (pond-like structures that house the traditional shrimp culture unit) during the 1980s (Nayak, 2014). Encroachment by the non-fishers in customary fishing areas of caste-based fishers has become a prominent issue in Chilika Lagoon, creating conflicts with the fishers cast for their fishing rights and livelihoods (Nayak & Berkes, 2011). Some of the non-fishers engaged in aquaculture and capture fisheries are from communities around Chilika that have traditionally relied on farming and forestry for subsistence and livelihoods. As environmental degradation throughout the lagoon has impacted such activities, the pressure for those communities to turn to fishing as alternative sources of income has increased, in turn putting pressure on Chilika's caste-based fishers.

The Odisha government decided to actively promote aquaculture in Chilika Lagoon in the early 1990s. Following the 1991 law allowing the lease of waters to private companies while partially safeguarding fishers claimed customary rights of access, the government launched a joint venture with one of India's biggest multinationals, the Tata Corporation, with the aim of establishing shrimp farming export activities (Adduci, 2009). However, the project was never implemented as it met fierce opposition from small-scale fishers, and the government had to roll back the policy after receiving confirmation from upper courts. Under the auspices of the fisheries organization *Chilika Matsyajibi Mahasangha*, a broad social alliance was created to oppose aquaculture practice. The creation of this alliance and their effectiveness in opposing the project demonstrates that fisher groups are not helpless and can work together with other groups to achieve common goals and influence decisions.

The consequences of a lack of entitlements and rights of land ownership for fishers were evident in the many stories we heard while in Chilika. Community members noted how the promotion of shrimp aquaculture practices by non-fishers leads to a reduction in fishing areas for fishers.

2.3 Governance and management

This section explores how local fisheries laws and community management in Chilika have recently been more susceptible to market forces and policy changes. Therefore, finding a balance between resource utilisation needs and sustainability of the social-ecological system becomes crucial from a governance perspective. Figure 4 explains the issues affecting the policy and governance of small-scale fisheries in Chilika Lagoon.

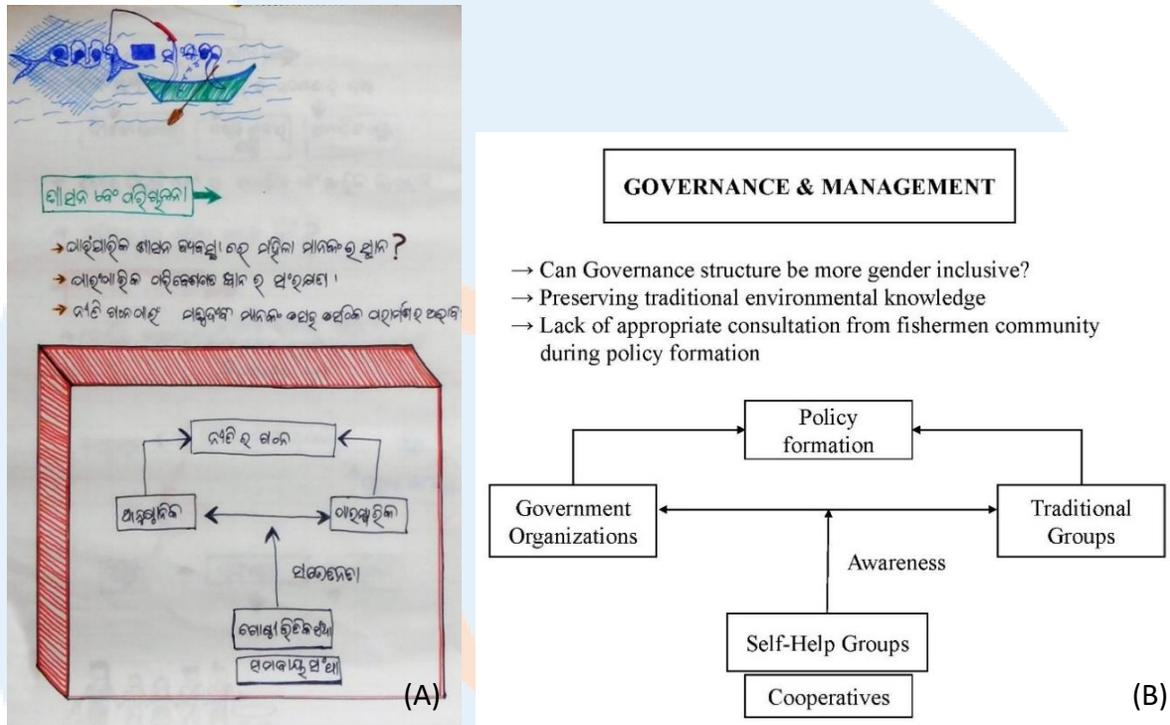
2.3.1 Fisheries and coastal management

Since it is widely acknowledged that humans have significant impacts on ecosystem dynamics and processes, it is important to value both their power to influence environmental change and their susceptibility to it (Steffen et al., 2004; Halpern et al., 2008). This kind of view offers a way to see small-scale fisheries as complex systems (Mahon et al., 2008). In fact, some experts claim that fisheries and coastal management together represent a "wicked" challenge (Jentoft & Chuenpagdee, 2009; Khan & Neis,

2010). Due to the severe forest and soil degradation in Chilika Lagoon, the amount of subsistence that depends on agriculture and forests is declining. As a result, an increasing number of members of the non-fisher caste have turned to aquaculture as a means of subsistence. This is a manifestation of a bigger pattern in Indian fisheries, as new groups are putting pressure on areas that were formerly dominated by traditional fishers, their communities, and caste organisations (Nayak & Berkes, 2010).

Figure 4

A poster designed by the authors of this paper that explains the issues affecting the policy and governance of small-scale fisheries in Chilika Lagoon



Note. A) A poster in the Oriya language for knowledge dissemination among the local community members; B) The English translation of the original poster for knowledge dissemination among a border audience

2.3.2 Knowledge and governance

Traditional ecological knowledge systems held by the fishing communities of Chilika have enabled the sustainable use of fisheries resources for generations. Such knowledge systems and associated practices offer valuable information to inform governance solutions for the long-term security of the fisheries. They could be documented and shared among wider audiences, e.g., researchers, agencies involved in fisheries management, and other small-scale fisheries communities internationally. This exchange of information could help highlight viable solutions for similarly vulnerable coastal communities. The centralised institutions governing Chilika Lagoon and the processes of policy formation need to duly recognise and incorporate the traditional and more sustainable forms of fishing that has been employed by these fishing communities for generations; this would better equip all the stakeholders to take a more sustainable approach to protect the commons of Chilika Lagoon.

However, the current trends of encroachment and degradation in the lagoon are contributing to the erosion of the traditional ecological knowledge systems and associated fishing practices in Chilika. These unsustainable and, in some cases, illegal practices are directly related to governance failures, such as the failure to enforce fishing community rights or to meaningfully include fishers in decision-making related to the lagoon commons. Empowering fishing communities through greater representation at higher levels of governance and through opportunities to apply their traditional ecological knowledge to identify critical spaces that require protection, for example, through participatory mapping, could counter this. Legalising customary rights to such spaces and proper enforcement is also crucial. For this, targeted capacity building to develop greater awareness and knowledge about formal legal structures among village institutions could equip the communities to advocate for and represent themselves within formal governance structures. Developing "co-management" regimes or stronger ties between fishermen and government organisations in charge of fisheries regulation would allow greater involvement of fishers, who possess extensive local knowledge, towards ensuring better management outcomes.

2.4 Social and cultural influences

Two major themes of gender and migration were identified that have an influence over the socio-ecological system of Chilika Lagoon. The reflections are based on the sharing and storytelling by women of the Berhampur and Aloopatna villages, observations made during informal interactions with other community members, and the panel discussion during community policy workshop on the last day of the field school.

2.4.1 Gender

As undervalued and under-represented actors in the socio-ecological system of Chilika Lagoon, women bear the brunt of the burden of inequality in this area. In Chilika, men are involved in the capture side of the fisheries sector, and fisherwomen are active in post-harvest activities, mainly segregation and selling to nearby villages. The activities of men are seen as demonstrative of the capability and skill to catch fish in the sea, while women's roles are restricted to roles that are perceived as less skilled. Governance systems at the local level are not inclusive in terms of gender, even when women fishers contribute significantly to the household's income. Besides this gendered division of labour, there are other disparities such as differential access to resources, family roles and responsibilities, levels of political participation, and influence on decision-making. This exclusion and marginalisation of fisherwomen has negative implications for individual women and the community's overall well-being and coastal management outcomes, as it leads to an underrepresentation of the needs and concerns faced uniquely by women of the community.

Some women in Chilika have been able to increase their involvement in village governance and expand their social networks through participation in self-help groups (SHGs). SHGs are neighbourhood groups that serve as a platform for women to share their concerns, discuss possible solutions, and overcome social limitations, including financial dependency on men and lack of access to local decision-making. They provide direct support and empower women to improve their lives and their children's well-being. It is a form of self-governance for their communities and households, giving agency to the women involved by educating them on financial management and the possibility of starting alternate livelihoods by utilising existing skills and resources. It was evident during our visit to the communities that SHGs had leaders or representatives who spoke for the group, displaying a clear governance structure internally.

Women face different challenges than men in these communities, although initiatives to empower women, such as SHGs, are in place for some communities around the lagoon. Women play a smaller role in decision-making and influencing local policy than men. Despite governing their SHGs and controlling some decisions, e.g., on household finances, the men control all major decisions for their villages and households.

However, there do appear to be differences between communities with respect to the roles and agency of women, which may be related to contextual socio-economic factors such as caste. In our reflections, we noted how the women in one village only spoke with us after the men had spoken and in a group separate from men. In another village, women were more forthright in their interactions with us, were involved in conversations from the beginning, including alongside men, and had some knowledge of English, demonstrating a higher level of education.

Overall, engrained gender norms are prevalent, with women restricted to the type of work they do (primarily responsible for household work and caring for the family) and having relatively little representation at higher levels of governance. However, it is also important to note that there are likely differences between communities in the extent to which women control family decisions and engage in local decision-making, as well as in the level of education. This underscores the need to account for heterogeneity between communities with respect to women's roles in the design of gender-relevant policy.

2.4.2 Migration

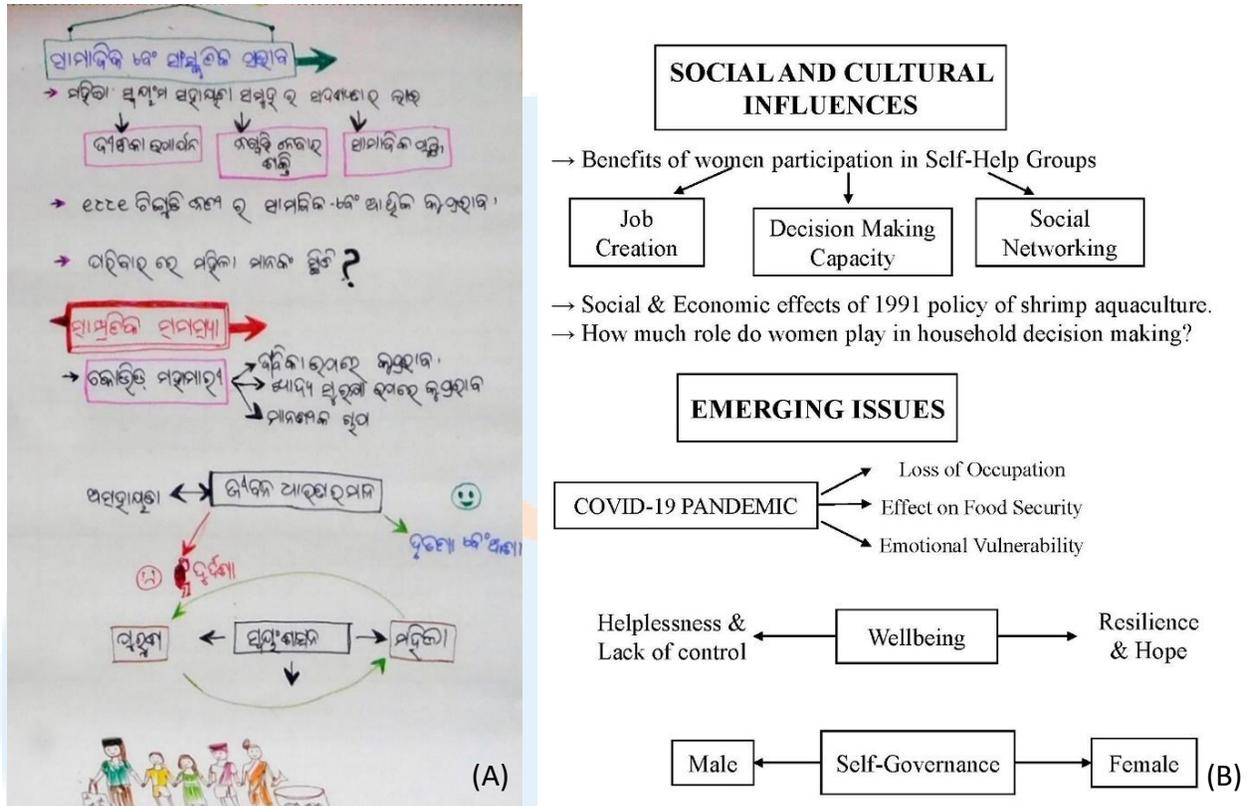
To the fishers of Chilika Lagoon, fishing could be seen as a way of life. However, reductions in fish stocks and resource conflicts with non-fishers related to access rights in Chilika Lagoon have forced many male fishers and youth to migrate to cities in other states in search of seasonal work. There they engage in a variety of types of work, including fish processing, farm labour, and construction work. While migration enables the men to supplement household income, it also means a halting of fishing activities and, therefore, a loss of traditional livelihoods, which is an integral part of the fishing communities' identity. Though this is true for fishermen as well as women, who engage in post-harvest activities, such as collecting, sorting, and cleaning catch, there may be some positive implications of migration for women's roles and responsibilities and gendered power dynamics within communities. For example, a lack of fishing activity may drive women to identify and pursue other income-earning opportunities, thereby empowering them toward greater financial independence. Additionally, in the absence of men, women may also need to take greater responsibility in household- and even community-level decision-making. While the migration of men from the communities may have some unintended positive consequences for women, whether the potentially greater autonomy of women during such periods translates into the empowerment of women at a larger scale or over the longer term, and how it intersects with the negative impacts of migration, such as the loss of traditional livelihoods and impacts on community and family cohesion would be important avenues of future research.

2.5 Emerging issues

In addition to the major themes outlined in this working paper, we identified several emerging issues impacting communities, including the pandemic, food insecurity, and natural disasters, as well as the impacts of these challenges on well-being within the community. Figure 5 explains the socio-cultural influences and emerging issues concerning small-scale fisheries in Chilika Lagoon.

Figure 5

A poster designed by the authors of this paper that explains the socio-cultural influences and emerging issues concerning small-scale fisheries in Chilika Lagoon



Note. A) A poster in the Oriya language for knowledge dissemination among the local community members; B) The English translation of the original poster for knowledge dissemination among a border audience

2.5.1 Pandemic and food insecurity

The communities of Chilika were already struggling to maintain their livelihoods in the face of declining fish catch when the COVID-19 pandemic hit. Though food was one of the largest functioning industries during the pandemic, being an essential commodity, there was still a disruption in the market for fish. Government policies supported the trade and marketing of seafood by announcing fisheries as a part of the essential activity and allowing fishing operations to continue during lockdown periods as long as social distancing protocols were maintained (Das et al., 2021). Nevertheless, the communities reported that restrictions related to the COVID-19 pandemic in 2020-2021 affected fishing practices. Initially, fishing was not allowed at all; later, the restrictions eased and it was declared an essential activity, but the supply chain of fish trading was disrupted due to issues of transport and access to markets. Difficulties in engaging in fishing activities and access to markets impacted the ability of fishers to feed themselves and their children, despite the provision of rice from the government. The ways in which the COVID-19 pandemic has exacerbated challenges faced by small-scale fishing communities points to the urgent need to find viable solutions to reduce existing vulnerabilities.

The pandemic indeed took a major toll on the overall well-being of the fishers – physically, emotionally, and financially. There were health issues faced by the Chilika community, with some fatalities and casualties during the pandemic. Access to healthcare facilities in the village is poor, and individuals must travel long distances to receive treatment. Along with the loss of regular income, the increased expenditures for healthcare due to the pandemic were an additional burden. The experience of the community during the pandemic demonstrates the need for better healthcare facilities and healthcare policies informed by the lived experience of community members in Chilika. Several fishers who migrated to other cities before the pandemic were forced to travel back to the village due to a lack of income caused by restricted movement during the lockdown. The return of the men to the villages exacerbated the impact of food shortages. Multiple vulnerabilities have challenged the entire socio-ecological system (Nayak, 2022).

2.5.2 Well-being

We learnt during our time in Chilika that the combination of declining fish and the impacts of the pandemic was emotionally overwhelming for the communities of Chilika Lagoon. Tourism, which is an alternate or additional source of income, also disappeared during the pandemic. Villagers shared that they had experienced emotions of contrast - a sense of helplessness, inability to influence their situation, and little support from the government. However, there is also some hope that viable solutions could be reached, as communities made efforts to interact with government officials to share their concerns. Problems of declining fish catch, limited access to decision-making, and limited power to influence policy continue to exist, yet, there was an undertone of hope in the stories and experiences the communities shared, with the belief that they can impact local policy and, in turn, improve their lives. Their openness and positive attitudes throughout our interactions, and their sense that the interactions themselves were a way to make their voices heard, are also signs of hopefulness about the possibility of an improvement in their situation.

2.5.3 Natural disasters

Cyclones are not unknown to the state of Odisha, but communities reported that they have become more prevalent in recent years. This sense of an increase in cyclones on the part of the community is confirmed by the Power Dissipation Index for Cyclones, which has been much higher in recent years as compared to the past (Sahoo & Bhaskaran, 2018). Cyclone Fani in 2019 directly impacted communities in a number of ways, including through a reduction in the number of fish and shrimp in the lagoon and the destruction of fishing gear and housing. Following Cyclone Fani, communities were left struggling to meet the basic needs of food, shelter, and income. There were some policies to support communities in the aftermath of Fani, including funds to compensate for lost fishing gear or boats and food rations, but the community reported that these were inadequate and did not cover all family members. This suggests that policies for cyclones are in place and delivered, but the speed and effectiveness are far from perfect. The lack of food and income security following Cyclone Fani also resulted in the migration of fishers to other cities to find work, a trend in which inadequate response from the government could be implicated.

3. Conclusions

The small-scale fishing communities of Chilika Lagoon face significant challenges from a governance perspective, including through the impact of policies that favour private actors' interests over their own, and that reflect a lack of understanding of their needs and lived experiences on the part of decision-makers. Anecdotal evidence from our conversations and observations within the communities also suggests a lack of information dissemination from the government to the communities of Chilika Lagoon, for example, about government initiatives and loans, coupled with a lack of power on the part of communities to

influence government decision-making at local, regional, or national scales. In a vulnerable socio-ecological system like Chilika Lagoon, this lacuna between local people and other governance actors could have troubling consequences for the ecological health of the lagoon and the communities dependent on it.

A number of factors, such as commercial aquaculture, increased siltation due to the construction of the artificial sea mouth, and disposal of untreated waste and plastic pollution due to increased tourism activities, have negatively impacted the biodiversity, marine species populations, and fish stocks in Chilika Lagoon. The neoliberal economic development trends in and around Chilika Lagoon have remained non-inclusive and have primarily benefitted private entrepreneurs, moneylenders, traders, and middlemen engaged in fish value chains, to the detriment of small-scale fishing communities. A faulty lease policy of the state government, as well as the failure to enforce customary rights of fishers, has led to significant growth of illegal shrimp aquaculture in the lagoon, and the resulting illegal encroachment has given rise to intensive resource conflicts between the powerful non-traditional groups and the marginalised fisher communities in Chilika. As illegal shrimp aquaculture continues in the lagoon despite legal orders, the socio-economic conditions of the local fishers have further deteriorated over the years.

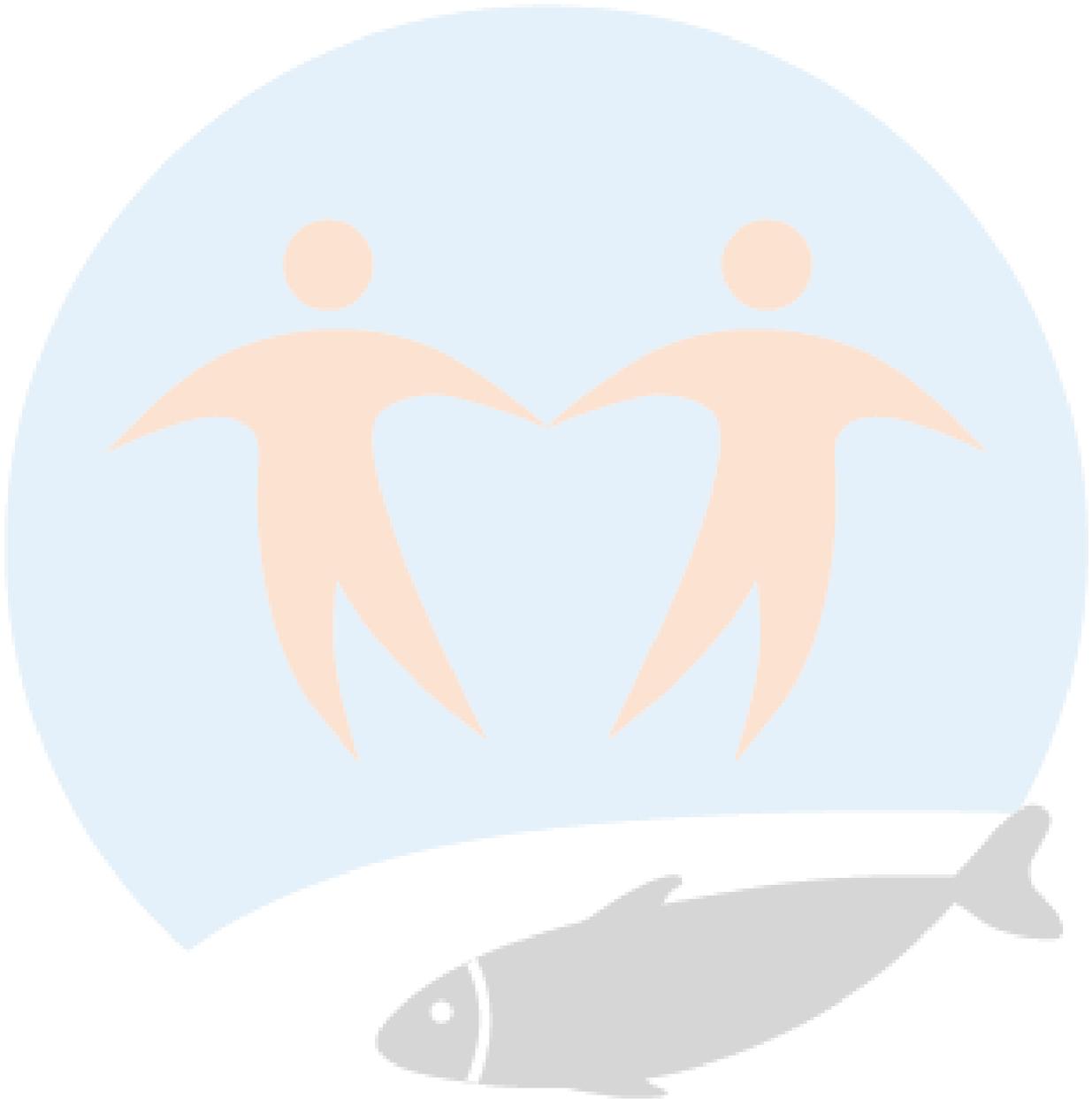
Regarding socio-cultural considerations in Chilika, gender and migration are interrelated and impact both community livelihoods and relationship dynamics within the fishing communities. As the economic viability of fishing livelihoods becomes increasingly tenuous, men from the communities migrate in search of other livelihoods. Migration likely has detrimental impacts on fishing communities, including on the socio-cultural identity of fishers; however, the trends have thus far received inadequate attention from the government. The drivers that lead to migration and the implications for the well-being of villagers could be an important area of future research, while policy that fully considers these drivers and impacts could better support local livelihoods. The migration of men from the village also impacts the roles and responsibilities of women in the villages, and may foster greater involvement in decision-making, though future research is required for a fuller account of these complexities. Despite gender inequality in the communities, our observations did indicate signs of change with respect to the participation of women, who are increasingly expressing their needs, wants, and challenges, including through SHGs; and who expressed a desire for their voices to be heard and represented in governance systems.

Our interactions with the villagers revealed concerns about the risks posed by emerging issues such as natural hazards and the COVID-19 pandemic. The increasing prevalence of cyclones and the impacts of the pandemic have exacerbated the social and economic challenges experienced by the communities, including food and income insecurity and inadequate healthcare infrastructure and services. While the impacts of the pandemic have exposed existing problems, extreme weather is expected to worsen in the coming years, representing a major threat to the viability of small-scale fishing communities. Though the government has supported communities in the face of such challenges to some extent, the responses have generally been inadequate and again reflect a lack of understanding of the actual needs of the communities.

The growing challenges in Chilika Lagoon cannot be solved by governments alone. Giving local institutions legitimacy and giving fishing communities the power and responsibility to improve management outcomes are two ways to strengthen Chilika Lagoon's governance and management. A policy environment in which legal rights and traditional means of subsistence are protected would also support the long-term viability of the socio-ecological system of Chilika Lagoon.

Acknowledgements

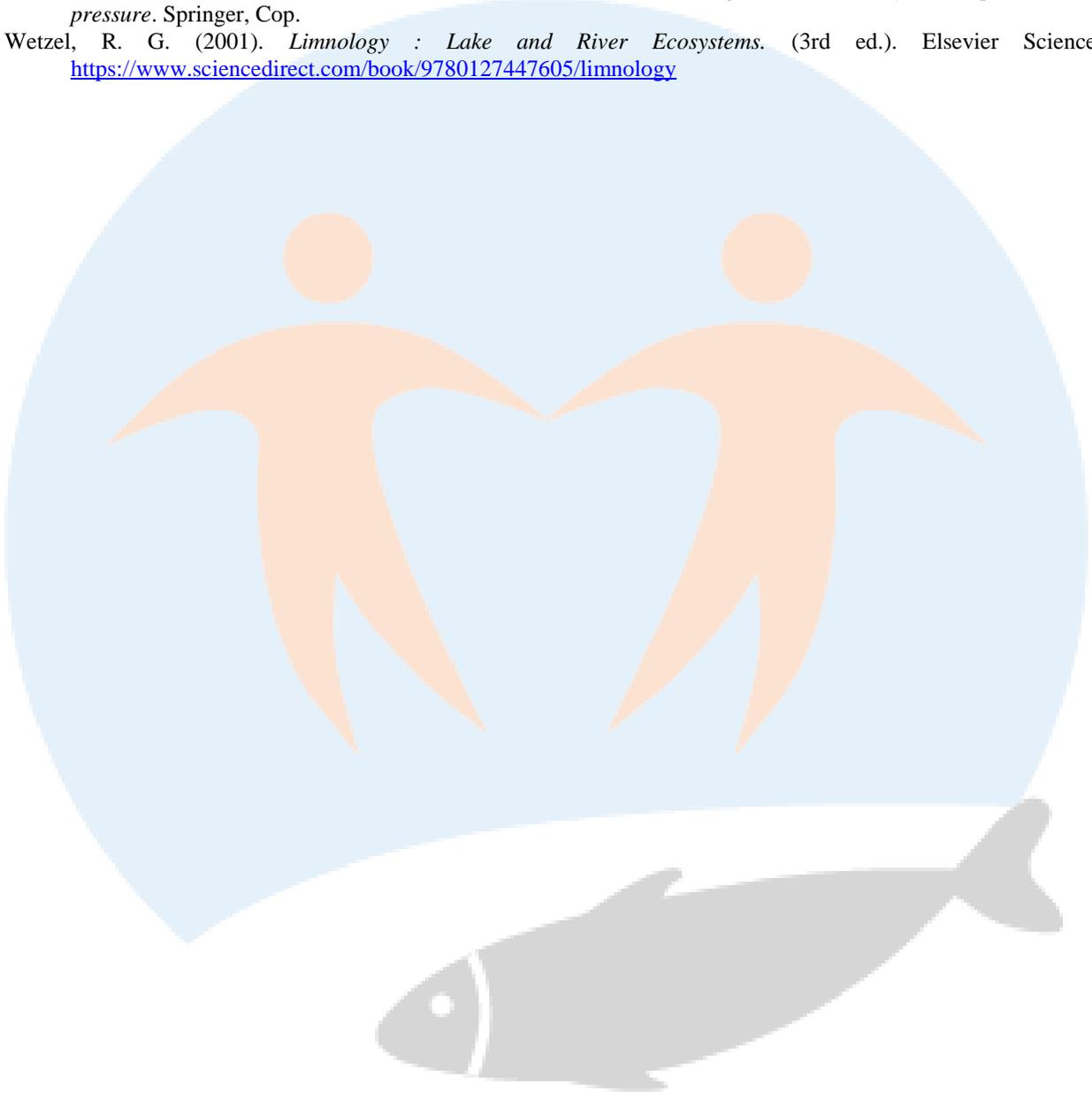
We are extremely grateful to the Chilika lagoon fishing community for their time and support throughout the field visit. They have chosen to share with us their stories of vulnerability, the challenges faced to progress towards viability, without which the experience would have been incomplete. We have learnt in this process not only about a lagoon but about the emotions and experiences of those who belong there.



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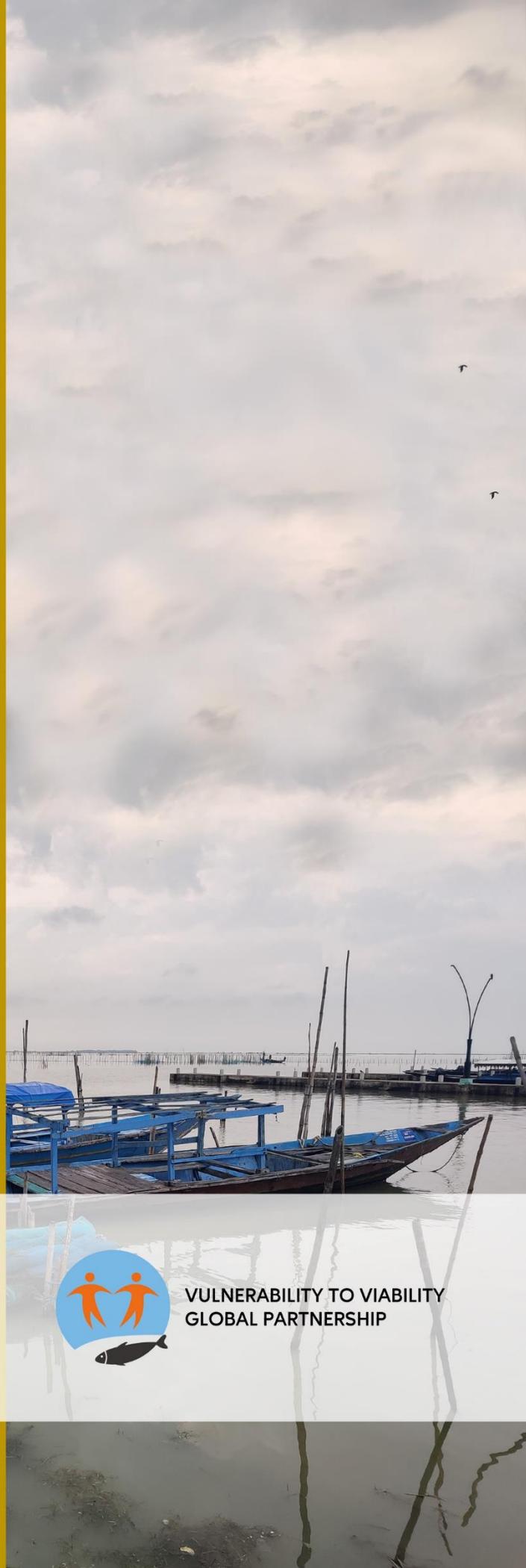
Vulnerability to Viability (V2V) Global Partnership

The Vulnerability to Viability (V2V) project is a transdisciplinary global partnership and knowledge network. Our aim is to support the transition of small-scale fisheries (SSF) from vulnerability to viability in Africa and Asia. Vulnerability is understood as a function of exposure, sensitivity and the capacity to respond to diverse drivers of change. We use the term viability not just in its economic sense but also to include its social, political, and ecological dimensions.

The V2V partnership brings together approximately 150 people and 70 organizations across six countries in Asia (Bangladesh, India, Indonesia, Japan, Malaysia, Thailand), six countries in Africa (Ghana, Malawi, Nigeria, Senegal, South Africa, Tanzania), Canada and globally. This unique initiative is characterized by diverse cultural and disciplinary perspectives, extensive capacity building and graduate student training activities, and grounded case studies from two regions of the world to show how and when SSF communities can proactively respond to challenges and creatively engage in solutions that build their viability. Further information on the V2V Partnership is available here: www.v2vglobalpartnership.org.

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