Overfishing in Senegal: A Deep Dive into the Livelihood of Coastal Communities

by
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Abstract

Artisanal fisheries workers in Senegal have been witnessing the decline of their livelihoods for over a decade. Bilateral fishing agreements with the European Union have put great strain on marine resources to the detriment of local fishing communities. This thesis investigates the impact of overfishing on the livelihoods of artisanal fishery workers in Senegal, focusing on the intricate relationship between fishery management, unsustainable fishing practices, and the socio-economic conditions of small-scale fishery labourers. To address this, the study explores three key areas: the evolution of fisheries workers' livelihoods since the early 2000s to the present, the effectiveness of policies implemented by the Senegalese government to support artisanal workers, and the adaptive strategies these workers have employed in response to changes in the sector. Building on previous research that highlight the detrimental effects of foreign fishing agreements and illegal fleets on fish stocks, as well as the inadequacies of Senegalese fisheries management, this study seeks to deepen the understanding of how these factors manifest in the daily lives of artisanal workers. Through qualitative field research, including focus groups conducted in the regions of Dakar, Thiès, and Saint-Louis, the findings reveal that inadequate governmental policies, particularly the lack of surveillance mechanisms, have exacerbated the overexploitation of marine resources, forcing artisanal workers to adopt various (mal-)adaptation strategies to survive. The results also underscore the urgent need for more effective fisheries management and broader economic policies to safeguard the well-being of Senegal's artisanal fishery workers, whose livelihoods are increasingly threatened by the depletion of marine resources.

Key Words: Senegal, Overfishing, Artisanal Fisheries, Fishery Management, Sustainable Livelihoods Approach, Political Ecology, Blue Justice.

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quel sujet –, il a toujours des remarques positives à dire. Lorsqu'il est question de problèmes, il me propose systématiquement des solutions, parfois même sans que je ne les sollicite ! Sa vision positive de la vie est très encourageante et contagieuse. Je n'aurais jamais pu mener à bien ce travail de recherche sans sa supervision éclairée, sa générosité, son optimisme et ses encouragements constants.

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Chapter 1: Introduction

As I sat in a boat across from Ahmed, who was laughing at my expense and savoring my discomfort, I frantically wiped my legs, hoping to rid myself of any beach worms that might be crawling on me. Once I calmed down and joined in his laughter, I resumed my interview with him, asking, "Why are you and your family so far from home?" A wave had just washed over the shore as I posed my question to Ahmed, a fisherman. Unlike the previous waves, this one surged farther inland, causing people to scatter as the water reached our legs. I quickly jumped into a small boat, relieved that I had not dropped my notebook or pen. Ahmed, who was sitting on a tall and large rock, watched the scene unfold and found it amusing.

Earlier that day, I had visited the port of Yoff in Dakar, Senegal, to conduct a focus group with fish vendors. After completing the session, I took a stroll along the shore and noticed fishermen either sitting and talking or gazing out at the ocean. When I approached them with the intention of conducting another focus group, most of them seemed uninterested. However, Ahmed was willing to engage with me. After the first wave playfully tickled our feet, many people who had been on the shore retreated further into the fish market. Ahmed remained seated on his rock, continuing to answer my questions. He was a fisherman from the northern region of Senegal, specifically from Guet-Ndar, Saint-Louis. Raised in a family of fishermen, Ahmed had followed in their footsteps and brought his family to Yoff for work, though they often returned to Saint-Louis to spend time with their loved ones.

Ahmed's journey had not been without its challenges. His story echoed those I had heard in focus groups conducted in the days, weeks, and months leading up to our not so serendipitous meeting. He began fishing at the age of 11, learning the job from his father, brothers, and uncles. It was not easy, but he loved it then, and he still loves it now. In his youth, fishing was lucrative, but now, in his late 30s, Ahmed is less

enthusiastic about the profession. His fierce passion for fishing has been crushed under the weight of deceptions, false hopes, unfulfilled promises, and what he and his community perceive as abandonment. This was not my first time hearing a fisherman utter similar words. But exactly what or who is at the root of such grief?

Senegal's coastline is said to be rich in fishery resources, and many coastal communities, both urban and rural, have relied on the exploitation of these resources for centuries. In these communities, knowledge and equipment required for fishing and selling fish are often passed down from father to son and mother to daughter. After Senegal gained its independence from France in 1960, artisanal fishing became a significant source of revenue for the government, and led fishing communities to prosperity (Diedhiou and Yang, 2018). However, in 1979, Senegal signed its first fishing agreement with the European Economic Community (Standing, 2017), granting European trawlers from members of the community licenses to fish in Senegal's Exclusive Economic Zones (EEZ) (European Parliament, 2020). Despite the legality of their presence, these European vessels have been found guilty of illegal fishing, unregulated practices, and underreporting catch quantities (Okafor-Yarwood, 2022). Such actions threaten Senegal's economy and the livelihoods of its coastal communities. In addition to European vessels, other foreign ships fish in Senegalese waters without the mandatory permits (Stilwell et al., 2010). Both legal and illegal foreign entities use large vessels equipped with modern technologies and impressive nets that enable them to exploit maritime resources effectively (Mansfield, 2011), often leading to the overexploitation of said resources, also known as overfishing.

Overfishing is typically understood as the depletion of fish stocks due to fishing at a rate that exceeds the population's natural ability to reproduce and replenish. (Marine Stewardship Council, n.d.)

At the beginning of this study, I focused on the depletion of fish resources. Yet, as I delved deeper into the topic, it became clear that overfishing is also the result of different unsustainable fishing practices, such as "inadequate regulations, unreported fishing activities, mobile processing of fish, and harmful subsidies" (Perry, 2023: n.p.), some of which are prevalent in the Senegalese EEZ. The distinction is important and shows that overfishing isn't just an outcome but a symptom of broader issues in how fisheries are managed and exploited.

The issue of overfishing is not limited to foreign vessels. In response to the overexploitation of its maritime resources by foreign trawlers, the Senegalese government has encouraged artisanal fishermen to maximize their catches to combat food insecurity and support their declining activities (Dème and Thiao 2021). Overfishing negatively impacts the livelihoods of coastal communities and a large part of the Senegalese population. The main goal of my research is to identify connections between Senegalese fishery management and policies and their consequences on artisanal fishery workers. Hence, I aim to answer this essential question: How does the management of Senegalese fisheries influence unsustainable fishing practices and how do artisanal workers adapt in the face of changes in their livelihoods? To do so, I bring insight into three sub-questions:

1. How do artisanal fisheries workers perceive the impact of foreign fishing on their livelihoods?
2. What policies has the Senegalese government implemented to improve the conditions of artisanal workers and enhance their well-being?
3. What changes have these workers made, or attempted to make, to adapt to shifts in the small-scale fishing sector?

The structure of this thesis is as follows. In the second chapter, leveraging a literature review, I briefly analyze secondary literature on the evolution of fishery management policies and broader macroeconomic policies impacting the fishing sector since the year 2000. One of the purposes of this review is to uncover the government's decisions and reactions impacting small-scale fisheries and artisanal workers. Furthermore, I offer a brief overview of overfishing in Senegal and of its consequences on small scale fisheries , examining how the activities of artisanal workers have changed since the rise in foreign fishing. I chose the timeframe of the year 2000 until present day because it would be difficult to find respondents who have actively been in the fishing sector's workforce since before 2000. I wanted most of my respondents to be active members of the small-scale fisheries workforce.

I develop in the third chapter the theoretical framework upon which my research is based. Given that a central aim is to explore the changes in the livelihoods of coastal communities, the "Sustainable Livelihoods Approach" (SLA) has been chosen as the foundation of my study. This multidisciplinary approach integrates developmental, ecological, and economic concepts, and is designed to foster a deeper understanding of the various dimensions of poverty (Kébé and Muir, 2008). Moreover, SLA is widely applied to shape development initiatives, ensuring they focus on vulnerable populations, long-term sustainability, participatory management, adaptability, and public-private partnerships (Serrat, 2017). Building on this foundation, the second pillar of my framework is "Political Ecology". This perspective examines how power imbalances—whether between government agencies or between local communities and the state—affect resource management (Bryant and Bailey, 1997). Political ecologists argue that environmental changes are not neutral events but are instead influenced by political factors that shape political systems and perpetuate inequalities (Bryant, 1992; Bryant and Bailey, 1997). The final concept that completes this theoretical framework is Blue Justice. Coined by Moenieba Isaacs (2019), the concept of "Blue Justice" addresses the marginalization of coastal communities resulting from the negative

impacts of the “Blue Economy”. It emphasizes the need for civil society, non-governmental organizations, and practitioners to actively counteract these injustices. Together, these concepts emphasize the importance of distinguishing between institutions and stakeholders who hold power and those who, due to political structures, not only lack power but also face continuous threats to their livelihoods and futures from powerful actors. I believe that integrating these concepts into a unified theoretical framework greatly assists in structuring my thesis and addressing my research questions.

The fourth chapter introduces the methodology I utilized to collect primary data. I explain why the regions of Dakar, Thiès, and Saint-Louis, where most of the country's fishermen reside, are best suited for this researh (Ndao, 2021). More specifically I introduce the port of Yoff and the fish market of Pikine in Dakar, the ports of Mbour, Kayar and Joal in Thies, and the port of Guet-Ndar in Saint-Louis. I demonstrate that focus group discussions made the best data collection method for this research as they allowed me to meet and exchange with great numbers of individuals who have expertise in small-scale fisheries, primarily the members of the workforce.

In the fifth chapter, I relate the results of the data collection. Using responses from focus groups I led, I uncover answers to how the activities of artisanal fishing workers evolved since the year 2000 and the rise of foreign fishing during that period. Moreover, the research evaluates the government's responses to the overexploitation of fishery resources, particularly concerning artisanal fishery workers and changes in their livelihoods. Therefore, I detail data connecting to the policies that the Senegalese government has enforced specifically to provide support to artisanal fisheries workers and to promote their well-being? Finally, I examine the potential changes in the livelihoods of coastal communities, related by respondents, to understand how these workers and their communities are adapting to the decline in their economic activities since the increase in foreign fishing.

In the sixth chapter, I analyze the results of the collected data. That section aims at highlighting the significance of my findings. I will emphasize the key evidence, from both the primary data, the literature review and the theoretical framework, that enables me to answer the research question and its sub-questions.

Finally, in the seventh and last chapter, I discuss the implications of my findings and my analysis. I conclude with answers to my research questions, and the ways in which I believe the issues raised in this study can be mitigated.

Chapter 2: Literature Review

Introduction

In West Africa, for several decades now, overfishing has been increasingly alarming (Jönsson, 2019). In Senegal, the state of fisheries seems to worsen. The depletion of Senegalese waters caused by "pollution, the degradation of marine ecosystems, overexploitation, and illegal, unreported, and unregulated fishing" (Bousso, 2022, p.4) is detrimental to the Senegalese economy, the livelihoods of small-scale fishery workers and the marine ecosystem.

Research on this topic often focuses on macroeconomic and environmental policies and on the socioeconomic consequences of overfishing in coastal communities (cf. Salem 2009; Deme et al. 2012; Doumbouya et al. 2017; Diedhiou and Yang 2018; Jönsson 2019). One of the focal points of my research revolves around the declining state of fisheries in Senegal and the drivers thereof. Hence, I have decided to center this literature review mainly on articles exploring causes and consequences of this problem.

Two main perspectives on the roots of fishery decline emerge from the readings. The first argues that governments are the driving force of unsustainable fishing practices in their Exclusive Economic Zones through their inadequate management as argued by Stilwell et al. (2010). The second accuses foreign looters of being responsible, which joins Okafor-Yarwood (2022)'s stance.

Before looking into this thought-provoking debate, I will begin by providing an overview of Senegal's fisheries and a summary of the evolution of their management since the 1960s. Thereafter, I will examine the various forms of overfishing that occur in the Senegalese Exclusive Economic Zone. Lastly, I will explore the socio-economic impacts that overfishing has had on Senegal.

1.1. Small-scale fisheries in Senegal

In Senegal, fishing plays a vital role in both the economy and the livelihoods of communities along the country's approximately 500-kilometer coastline. Senegalese fisheries encompass both artisanal and industrial fishing, with the key differences between the two lying in the technologies they use and the annual catch volumes they produce. For instance, artisanal fishing practices dominating the Senegalese fisheries rely on traditional wooden boats called "pirogues" that may or may not use engines (Bousso, 2022).

Using numbers disclosed by the "Centre de Recherche Océanographique de Dakar Thiaroye" (CRODT), Deme et al. (2019) reported that the artisanal fishing sector operated with nearly 14,000 Senegalese pirogues, while industrial fishing sector counted a total of 140 vessels, including 105 belonging to Senegalese stakeholders and 35 owned by foreign entities. However, these numbers have drastically changed recently. A more recent report by Bousso (2022) shows that the artisanal fishing fleet has increased by nearly 78% with an updated number of approximately 25,000 pirogues (among which 80% are motorized), in contrast to industrial fishing vessels whose numbers have doubled, amounting to 280 boasts (with 158 of them being of Senegalese origin).

Statistics also highlight that fisheries combine a workforce of approximately 600,000 people, amounting to relatively 17% of the Senegalese workforce (Guillotreau et al., 2011; Dème and Failler, 2013). In contrast, the Environmental Justice Foundation (2023) reports that 75,369 fishers are active in small-scale fisheries, a figure that seems low given the number of registered pirogues. Nevertheless, the artisanal fishing sector presents a promising opportunity to reduce youth unemployment by contributing to the active workforce through direct employment in fishing crews and related activities, such as selling and processing (Dème et al., 2019).

In 2021, Senegalese fisheries' total catch amounted to 460,000 metric tons (MT) and yielded 400 million US dollars (Bousso, 2022). In 2019, it was estimated that Senegalese fish exports provided over

20% of the national export revenues (Dème et al., 2019). Artisanal fishing is particularly crucial to the Senegalese economy, providing 80% of the total annual catch and most fishery jobs (Bousso, 2022). Dème et al., (2019) state that the dominance of artisanal fishing in Senegal is evident from the large number of skilled fishermen endowed with knowledge, dynamism, and true mastery of several fishing techniques. Their skills are recognized and sought after by foreign fleets, which often show a preference for Senegalese fishers over other West African fishermen (Dème et al., 2019).

Fishing is as equally important to the sustenance of the Senegalese population. Fish represent 75% of the population's animal protein intake (Dème et al., 2019). For people with modest incomes, it is a good alternative to meat, which has become increasingly expensive (Dème et al., 2019). Bousso (2022) states that the annual consumption of fish exceeds production by 150,000 MT.

Beyond a mere economic activity, fishing carries a significant cultural weight in the country, which coastal communities hold dearly. Fish is a key ingredient in many Senegalese dishes, including "Thieboudienne" (also known as "Ceebu Jen"), a rice dish made with fish and vegetables (Bousso, 2022, Figure 1). Thieboudienne, regarded as Senegal's "national dish", was inscribed on the United Nations' list of Intangible Cultural Heritage of Humanity in 2021 (France 24, 2021).

Figure 1: Thieboudienne cooked by my cousin

Artisanal fishing is a tradition passed down through generations among various coastal ethnic groups, such as the Sérères, Lébous, and Peuls (Seck, 2004), including those whose social structures are rooted in kinship (Sall, 2012). The Lébous, who are mainly located in Dakar and the “Petite Côte”, and people from Guet-Ndar (a town in the Northern Senegalese region of Saint-Louis; see Figure 2 and Figure 3) are typically viewed as the “forefathers” of fishing in Senegal. They are seen as pioneers who have

extended their knowledge to other communities, such as the people of Joal (located on the Petite Côte) whose activities were once primarily focused on other means of sustenance, like agriculture (Sall, 2012).

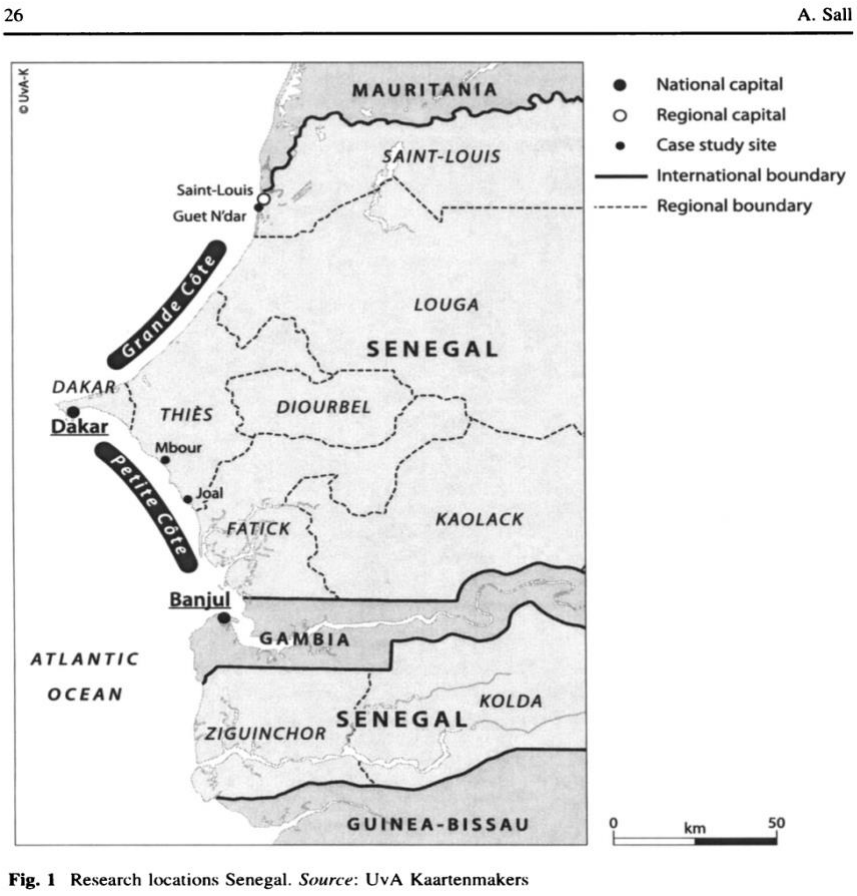

Figure 2: Map of the Senegalese coast (from: Sall, 2012)

Figure 3: Parked pirogues in Guet-Ndar artisanal port

(from UNESCO, 2021)

Sall (2012) reports that in Guet-Ndar, where the population is proud of their fishing-centered tradition, family members typically constitute fishing crews. Regardless of location, hierarchy within artisanal fishing crews is contingent on age, with the means of production (boat, motor, fuel, nets, etc.) generally owned by older fishermen, who also have decision-making power (Sall, 2012).

The fishing sector, much like other professional fields in Senegal, is characterized by a gendered division of labor. Harper et al. (2017) explain that gender roles in fishing communities are determined by social norms. Such a phenomenon is more of an unspoken arrangement coming from centuries of traditional values than it is a systemic issue rooted in gender inequality. Usually in Senegal, men fish, while women are involved in other activities, such as selling or processing (Soumare, 2006). About 40,000 women work as seafood processors, making up 90% of labourers in that sector (Bousso, 2022; Deme et al., 2012). They transform sardinella and other species into salted, fermented, dried, or smoked fish and other ingredients used in Senegalese and other African cuisine (Bousso, 2022; Figure 4).

Figure 4: Woman selling "guedj" (salted fish)
(Source: Benavides, 2018)

1.2. The role of the Senegalese government in small-scale fisheries management

Fishery management is a key stake in the Senegalese economy. Since gaining its independence in 1960, the Senegalese government has shown interest in managing coastal economic activities. According to Dème and Thiao (2021), the government has maintained exclusive control over the fishery sector from 1960 to 2000. The government's management strategy imposed the modernization of fisheries, and the purpose of this change was to stimulate economic growth (Dème and Thiao, 2021). Moreover, through policies such as free access to the sea and the abolition of taxes on marine resources or even the subsidization of fuel, the government wanted to encourage investments in the fishery sector (Dème and Thiao, 2021). Dème et al. (2022) note that this approach to artisanal fishery management led to an excessive rise of fishing units and stakeholders, which now is at the root of the fishery crisis in the country (see also Deme and Thiao, 2021). Conversely, during the 1970s, while the government was pushing for reforms to stimulate economic growth in the fishing sector, its workforce experienced an unexpected boom due to droughts that caused a massive economic crisis in rural areas, which in turn triggered a rural flight and drove a substantial number of agriculture workers to turn to fishing (Sall, 2012).

However, a shift in the management style of Senegalese fisheries occurred over two decades ago. The 1990s were a decade when the international community emphasised the need for a new development strategy, and began drafting the Millenium Development Goals (MDGs) (OCDE, 2004). The MDGs were specific goals, targets, and indicators, established by the United Nations that promoted sustainable development practices (OCDE, 2004). Subsequently, in 1998, the Senegalese government released a Statute Book for its fishery laws which echoed global sustainability and co-management discourses for small-scale fisheries (Belhabib et al., 2017). Deme et al. (2022) state that the government put this new management system into place through creating 27 artisanal fishery councils (CLPA) along the Senegalese coast with the intent of establishing a sustainable management system for local fisheries. The objectives

of the artisanal fishery councils were to encourage collective decision-making and promote local initiatives in terms of reasonable and sustainable resource management (Deme et al., 2022). Nevertheless, in the early 2000s, the government undertook another reform of the fishing sector, backed by the World Bank, which pushed for privatization and the introduction of territorial rights in the artisanal fishing sector (Sarr, 2012). A new program called Gestion Intégrée des Resources Marines et Cotières (GIRMac), was established and financed by the World Bank. While proposed policies such as the Territorial User Rights in Fisheries (TURFs), which would have confined fishers to specific marine territories, were not enforced, fishing permits were implemented in 2005 (Sarr, 2012). From then on, artisanal boat owners were required to apply for fishing permits and to renew them yearly. While the revenues from permit applications and renewal fees were set to finance the CLPA, this plan was never carried out (Sarr, 2012).

In 2015, a new Fishing Code was released. The examination of the 1998 and 2015 Fishing Codes highlighted minimal differences. Both share foundational similarities in their legislative approach to managing Senegal's fishery resources, emphasizing national sovereignty, the necessity of licenses for fishing, and strict penalties for violations (Law No. 1998-18, 1998; Law No. 2015-18, 2015). They also define the scope of the law, covering individuals, entities, and equipment involved in fishing within Senegalese waters, including the EEZ and inland waters (ibid). They uphold the principle that fisheries are national heritage, managed solely by the state, and require licenses for industrial fishing. Violations, particularly unauthorized fishing and the use of illegal methods, are heavily penalized (ibid). However, the 2015 Code introduces key differences, reflecting an evolution in approach. It strengthens sanctions, with higher fines and mandatory confiscation for serious offenses. For instance, the 2015 code more systematically imposes the confiscation of catches and gear in the event of serious violations, which was not as consistently enforced in earlier codes (Law No. 2015-18, 2015). Also, fines for illegal fishing by foreign vessels have significantly increased to amounts ranging from FCFA 500 million (over CAD 1.1

million) to FCFA 1 billion (over CAD 2.2 million), whereas the 1998 version mentioned lower amounts for similar offenses (Law No. 1998-18, 1998; Law No. 2015-18, 2015). There is also a greater emphasis on sustainability, incorporating precautionary principles and ecosystem preservation, marking a shift towards more eco-responsible management (Law No. 2015-18, 2015). The regulation of foreign vessels is also tightened, with stricter licensing criteria and alignment with national resource management goals. It imposes more stringent criteria for licensing foreign vessels, including specific requirements on international cooperation arrangements and compliance with local development plans (ibid). International agreements must now strictly align with national resource management objectives (ibid). Additionally, modern concepts and terminology are introduced, reflecting current international best practices, and there is increased regulation of marine aquaculture, highlighting its growing importance (ibid). In comparison to the 1998 Fishing Code, the 2015 code appears to significantly modernize its approach, focusing on sustainability, stricter control of foreign vessels, tougher penalties, and aligning Senegal's fisheries management with contemporary challenges (Law No. 1998-18, 1998; Law No. 2015-18, 2015).

The Senegalese government has shown concern for local fisheries for several decades. Its policies, whether aligned with the sector's priorities or not, have had great impacts on the economy and on fishing communities. However, its efforts in overseeing a thriving economic sector would prove unsuccessful in preventing the degradation of fish stocks along the Senegalese coast and its consequences on local fisheries.

1.3. Overfishing in West Africa

The global demand for fish has been increasing for centuries now. As a result, the fishing policies from economic powerhouses such as the European Union (EU), one of the most important economic partners of many African countries, have great impacts on West African fisheries.

The EU, recognizing that the Exclusive Economic Zones (EEZ) of its members could not meet the high demand for marine resources in a sustainable manner, decided early on to spend millions of European units of account (now the Euro) to send European trawlers beyond its territorial waters via international agreements with ACP (African, Caribbean, and Pacific) countries dating from 1979 (Kaczynski and Fluharty, 2002). Most of the EU fish trade partners are in the western part of the African continent, including Morocco, Mauritania, Cape Verde, Senegal, Gambia, Liberia, Ivory Coast, Guinea Bissau, and Guinea Conakry (European Commission, 2020). The EU bilateral agreements provided European trawlers with fishing licenses, allowing them to venture and fish legally in the exclusive economic zones (EEZ) of partner countries while reducing the exploitation of the seas surrounding the union (Kaczynski and Fluharty, 2002).

According to some critics, the EU does not respect some laws enshrined in international conventions, including those stating that international fishing agreements are only valid for the *surplus* marine resources left after a country has fished what it would have considered "enough" for its population (Salem, 2009). Hence, while the bilateral agreements authorize the EU's fleet to fish in the EEZs of their partners, those European trawlers at times engage in illegal, unreported, and unregulated fishing practices that contribute to overfishing (Okafor-Yarwood 2022). For example, between 2000 and 2010, the EU only reported 524,300 tons out of an actual total of 1,836,900 tons of its catches from West Africa (De Salamanca, 2022). This is because there is a lack of accountability for the actions of the commanders and crews aboard those trawlers who engage in illegal fishing, which is often combined with a lack of monitoring and surveillance from local coastal partners. EU fishers are known to engage in illegal activities on the West African coast, notably along the coasts of Senegal, the Gambia, and Equatorial Guinea (Okafor-Yarwood 2022).

Fishing beyond reproductive capacity in West African waters has become an alarming problem in several countries (Jönsson, 2019). Nevertheless, EU members' trawlers (and local fishermen) are not the only ones (over)fishing along the West African coast. Indeed, in Senegal and elsewhere, other foreign fleets fish legally and illegally – the latter having not signed an agreement prior to proceeding (Belhabib et al., 2014). Millions of people in developing countries, particularly in West Africa, depend on fishery resources to meet their financial and nutritional needs (Kaczynski and Fluharty, 2002). Thus, those illegal and legal foreign vessels contribute to the impoverishment of fishermen and the food insecurity of local populations (Jönsson, 2019). With fewer catches, fishing-related jobs are threatened, leading to fisheries workers facing unemployment (Ikechi-Uko, 2020). Finally, the overexploitation of fish stocks and certain fishing practices are extremely dangerous for marine ecosystems (Jennings and Kaiser, 1998).

In Senegal, the overexploitation of the coast is in full effect, and has led to devastating consequences. The next section will explore ensuing socio-economic impacts.

1.4. Overfishing in Senegal and its repercussions

According to Bousso (2022) Senegal is the second largest fish producers in West Africa, with catches reaching 460,000 metric tons (MT) yearly, while Nigeria and Ghana respectively hold first and third place with 530,000 MT and 344,000 MT per year (Bousso, 2022). However, due to several issues such as climate change, overexploitation of fish stocks, and illegal, unreported, and unregulated fishing, fish production has decreased tremendously in the country (Bousso, 2022). The literature on the overexploitation of Senegalese waters highlights many unknowns surrounding the place of origin of illegal trawlers. Among the places that are often mentioned are Russia, China, and various Eastern European and a few Asian countries (Vidal, 2012; Stilwell et al., 2010; figure 5).

Figure 5: Illegal Russian Trawler (frown: Voice of America, 2017)

Jönsson (2019) highlights the social and sustainability (environmental and social) challenges posed by the overexploitation of fish stocks in Senegal. According to the author, foreign vessels contribute to the impoverishment of fishermen and to food insecurity (Jönsson, 2019). Stilwell et al. (2010) claim instead that fishery policies established by the Senegalese government are to blame for the unsustainable fishing practices. These authors specifically challenge common views on the role and actions of the European Union and EU trawlers along the Senegalese coastline. According to them, the presence of European ships along the Senegalese coast is not detrimental to the country's fishing sector whatsoever (Stilwell et al., 2010).

Diedhiou and Yang (2018) rather focus on the evolution of the fishery sector and its effects on fishing and on the overexploitation of Senegal's coastline. First, the authors highlight decisions made by the Senegalese government, particularly its push for technological advances in local fisheries. Their article stresses the Senegalese government's focus on policies that govern artisanal fisheries and the insufficient focus on international fleets active in the Senegalese EEZ. As a result, according to the authors, the government has encouraged the expansion of artisanal fishing while also turning a blind eye to resource overexploitation and illegal, unreported, and unregulated fishing by foreign fleets (Diedhiou and Yang,

2018). Through its fisheries management policies, the government might have also attempted to remedy the problem of depleting resources (due to overexploitation by foreign vessels) in the Senegalese market by encouraging artisanal fishermen to maximize their catches using modern technologies (Diedhiou and Yang, 2018). Therefore, there is an excessive number of parties overexploiting Senegalese waters up to the capacity that their equipment allows for, including artisanal fishers, industrial Senegalese vessels, and foreign fleets. As Stilwell et al. (2010) inferred, weak public policies represent one of the causes of the overexploitation of fish stocks in Senegal. Nevertheless, unlike the latter authors, Diedhiou and Yang (2018) overtly denounce the squandering of these resources by holders of fishing licenses, particularly EU trawlers, and by illegal foreign vessels.

Jönsson (2019) rather emphasizes the historical and socio-economic contexts of Senegal to explain the factors responsible for overfishing and its consequences on local populations. Senegal is a developing country. Its poverty and colonial past make it an ideal destination for other, wealthier, countries with urgent needs for marine resources (Jönsson, 2019). Senegalese fisheries management strategies reflect the power imbalances associated with this context. Doumbouya et al. (2017) analyze the types of offenses, including unreported catches and the use of unsustainable fishing methods, committed by fishing license holders and illegal vessels, as well as the different penalties they incur in West African countries. Their article probes the strengths and weaknesses of the Senegalese government's management methods in the face of infractions committed in its exclusive economic zones (EEZ). These methods, the authors claim, contribute to perpetuating the negative/illegal actions of international fishing fleets. The same authors criticize the government for applying “light” sanctions, including the imposition of negligible fines (illegal Chinese fishing vessels are usually fined approximately $1,000) (Doumbouya et al., 2017). Adding to this is the fact that fish increasingly migrate northward towards cooler water as a consequence of climate change, which further worsens the state of fisheries in Senegal (Bousso, 2022).

Overfishing yields major development challenges, particularly in a low-income country like Senegal. For decades, fishing was an important source of revenue for the Senegalese government. Although bilateral agreements are also a source of revenue, the overexploitation of the fish stocks by treaty partners and illegal vessels leads to substantial losses for the government, amounting to $272 million annually (Bousso, 2022).

In addition, as mentioned above, fisheries employ around 600,000 people, representing approximately 17% of the Senegalese workforce (Guillotreau et al., 2011; Dème and Failler, 2013). The overwhelming majority of artisanal fishery workers partake in the informal sector, and many of them are self-employed (Environmental Justice Foundation, 2023). Fewer fish resources mean that fishery workers' activities and revenues decrease, and make it increasingly difficult for them to sustain themselves and their families. It can also lead to unemployment or the need to seek jobs either in other industries, in urban areas, or abroad. Jönsson (2019) reports the testimonies of members of a Senegalese coastal community according to whom the decline of artisanal fishing brought some families to consider emigration and threatened harmony within certain communities. Finally, as fishery resources constitute a significant part of the caloric intake of West African populations, overfishing becomes a food security challenge, especially at a time when meat prices are increasing (Deme et al. 2019).

Conclusion

Fishing is an essential activity in Senegal. With nearly 25,000 pirogues providing most of the country's catches, artisanal fishing dominates the fishing sector. Since independence, the government has implemented policies to modernize artisanal fisheries and improve their performance, as this sector provides the country with substantial revenues. However, it is important to note that fishing is not only an economic activity. Several people from coastal towns have grown up learning crafts and skills related to fishing and fish processing. As a result, fishery activities represent their way of life. Approximately

600,000 people work in the fishing sector in Senegal. And for decades now, their lives have been greatly impacted by the depletion of resources along the Senegalese coast. The EEZ of Senegal is not only shared among Senegalese fishers, as other stakeholders such as European and Asian trawlers also fish in these waters. Some of these trawlers acquired fishing licenses, which makes their presence legal, while others are illegally exploiting fish stocks. Nevertheless, legal vessels often partake in what is known as illegal unreported unregulated fishing, mainly due to the lack of monitoring from the Senegal government. All these different pieces put together have led to the overexploitation of Senegalese fish stocks. Hence, not only is the government losing revenues, but the local population is also bearing the consequences of that phenomenon.

There have been times when the government decided to cease granting fishing licenses to foreign trawlers, including in 2006 when the government chose to call off licensing agreements made with EU vessels (Vidal, 2012). Recently, the Ministry of Fisheries allegedly declared rejecting new license applications for foreign fleets, a decision applauded by Greenpeace (Niang and Sayeed, 2023). Nonetheless, copies of new licenses allegedly granted to foreign fleets and signed by the Minister of Fisheries just one day before this declaration were found on social media shortly after (Gorez, 2023; Figure 6).

REPUBLIQUE DU SENEGAL

MINISTERE DES PECHES ET
DE L'ECONOMIE MARITIME

Direction des Pêches Maritimes

N° de licence 144

Année 2023

LICENCE DE PECHE DEMERSALE PROFONDE

Nom du navire GUOJIN 901

N° d'immatriculation DAK 1371

Jauge brute 292.00 TJB

Longueur Hors Tout 38,31 m

Nationalité SENEGAL

Mode de conservation CONGELATEUR

Option de pêche CHALUTIER POISSONNIER

Zone de pêche: A/B/C/D/E/F/G/H

Ouverture des Mailles: 70 mm

Conditions spéciales

respect de la réglementation en vigueur

Figure 6: Fishing license signed by the Minister of Fisheries (Source: Gorez, 2023)

Given such actions (or lack thereof) and blatant deceit coming from the government and foreign stakeholders, is there hope for Senegalese fisheries or is the situation beyond repair? My impending research will focus on the experience of artisanal fisheries workers in the regions of Dakar, Thiès, and Saint-Louis. I intend to provide an informative portrayal of their adaptation processes and the evolution of their habits, customs, professional activities, lifestyle, and cohabitation, following the decline of the local economy which depends heavily on fish stocks. To do so, I will base my analysis on a framework drawing from political ecology, blue justice, and the livelihood approach.

Chapter 3: Theoretical Framework

Introduction

In this chapter, I will introduce the different concepts and frameworks that shape my inquiry and that I will use later to analyze my findings and to answer my research questions. For this study, I believe that the Sustainable Livelihoods Approach, Political Ecology, and Blue Justice are concepts that align with the themes that I have introduced in the literature review and the ones that emerge from the primary data. My research aims to explore the impact of fisheries management on the depletion of Senegalese fish stocks. Additionally, I seek to uncover the livelihood challenges that diminishing fish stocks pose for coastal communities, where fisheries play a vital role in their daily lives. Thus, I will first describe each theory and its relevance to my research. Then I will explain how they can be intertwined in one framework and help me answer my research questions.

3.1 Sustainable Livelihoods Approach

The sustainable livelihoods approach connects development as well as ecological and economic concepts. It is a multidisciplinary approach aiming to promote a "better understanding of the various dimensions of poverty" (Kébé and Muir, 2008, p.6). It is also a framework widely used to shape development activities and ensure that they prioritize poorer and vulnerable populations, long-term sustainability, participatory management, dynamism, and public-private partnerships (Serrat, 2017).

In the early 1990s, Chambers and Conway (1991) alerted their readers about the rapid population growth that the world was on the verge of witnessing. They believed that the world needed to evolve with the new generations and called for new approaches to development policies and practices (Chambers and Conway, 1991). Drawing from the World Commission on Environment and Development's concept of sustainability, Chambers and Conway theorized a new definition for sustainable livelihoods in 1991.

According to these authors (1991, p.6), a livelihood includes "the capabilities, assets (stores, resources, claims, and access) and activities required for a means of living", and, additionally, a livelihood is viewed as sustainable when it can "cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation" (ibid.). The authors were hoping for sustainable livelihoods to form the basis for an appropriate framework to orient a transition to new development policies and practices in the wake of the 21st century, and a forecasted growing demand for natural resources (Chambers and Conway, 1991). They affirmed that low-income countries would face the challenges of population growth most intensely, with the risk that rural populations' needs could be neglected, while urban populations could benefit from an abundance of resources (Chambers and Conway, 1991). Chambers and Conway's concept of sustainable livelihoods soon evolved into an approach applicable to all livelihoods and conceptualizing "policy-oriented livelihood frameworks, the description and analysis of driving forces, pressures, and impacts of all types of activities related to the local livelihood situation" (Knutsson, 2006, p. 90).

Tools such as the livelihood asset pentagon showcasing livelihood inputs are also central to the livelihood framework (see figure 7). Indeed, according to the United Kingdom's Department for International Development (DFID), "[t]he asset pentagon is the core of the livelihoods framework, 'within the limits' of the context of vulnerability" (DFID, 2001, p. 8).

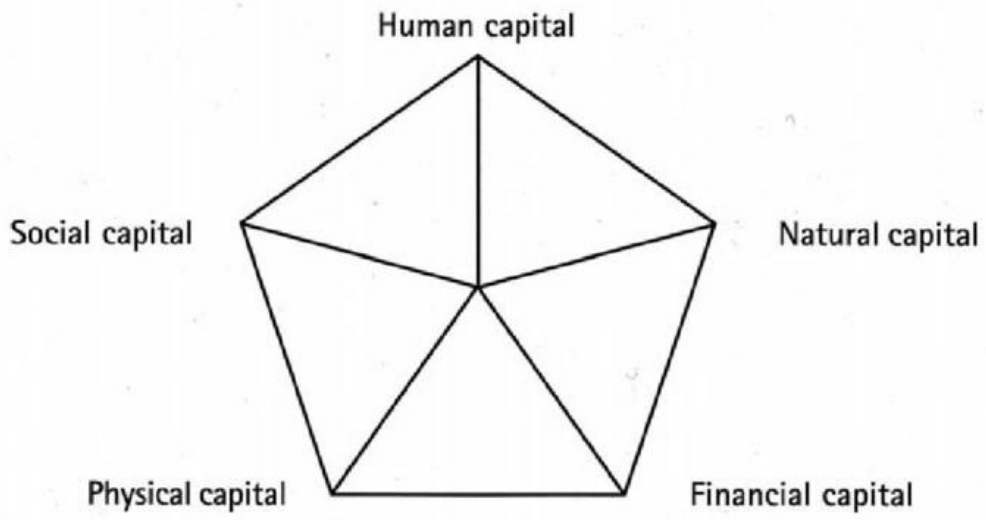

Figure 7: Pentagon of assets by the DFID 1999-2000 (source: Twigg, 2011)

The pentagon is helpful in assessing and classifying the assets individuals mobilize in their daily lives, establishing links between these assets, and measuring their livelihood resilience (DFID, 2001). Allison and Horemans (2006) have categorized livelihood capitals into the five following categories: physical capital, financial capital, human capital, natural capital, and social capital. For small-scale fisheries, there is a myriad of tangible examples of capital assets. Boats and access to fishing sites are included in physical capital; fish stocks represent a natural capital; examples of human capital are the skills and knowledge of labourers; savings are a prime example of financial capital; finally, networks of labourers would be included in social capital.

Allison and Horemans (2006) point out that policies may, however, enable or block access to these capital assets. They also assert that assets are essential to sustain livelihoods and can also be at the center of strategies by communities and institutions to improve livelihoods (ibid.).

In the context of artisanal fisheries, Allison and Horemans (2006) argue that the sustainable livelihoods approach allows for linking microeconomic and macroeconomic decisions, public policies,

social problems, and livelihoods. These factors have an incidence on the vulnerability and resilience of people's livelihoods in the face of changes (social, political, economic, and environmental) and on adaptive strategies formulation (Allison and Horemans 2001). For instance, fishing household livelihoods and income would greatly benefit from policies that prioritize the enhancement of social, human, and natural capital assets (Allison and Horemans, 2006), such as funding for labourers' organizations, universal healthcare, and worker's compensation to provide them with more accessible services and ensure their financial security in the face of work accidents, or biological rest which aims to preserve fishing stocks.

The vulnerability context in the sustainable livelihoods approach refers to external circumstances which impact livelihoods (DFID, 2001). More specifically, it refers to "shocks", "trends" and "seasonality", which are crucial factors that have a direct impact on people's livelihoods and the assets they build from (DFID, 2001). Trends constitute phenomena that have an incidence on households including, for those that rely on fisheries to sustain their livelihoods, the irregularities of market prices for fish, or irregularities outside of fisheries that can impact households (Allison and Horemans, 2006). Understanding the vulnerability context allows us to assess the extent to which different communities are exposed to shocks, trends, and seasonality, and the methods they use to sustain their livelihoods when facing them (Allison and Béné, 2011). Finally, understanding people's strategies when their livelihoods are threatened may lead to better policies and practices to help them cope with the changes (Allison and Horemans, 2006).

In the context of overfishing in Senegal, the scarcity of fish, due to macroeconomic trends such as bilateral fishing agreements, could lead to different issues, as mentioned in the literature review. Fishery resources have an important place in the economic activities and food security of the Senegalese population. More than a mere economic activity, fishing is also part of the country's culture. For many, fishing provides a source of income and food security and constitutes a vector of well-being (Béné and

Neiland, 2003). For others, fishing is the only economic activity that they engage in because no other activity is accessible to them (Béné and Neiland, 2003). Overfishing then becomes a multidimensional threat to the livelihoods of local populations. It could also constitute a cultural change since artisanal fishing is a particularly important activity for "the Lébous, the Sérères but also other ethnic groups of coastal origin, for whom the traditional fishing culture was transmitted from generation to generation" (Seck, 2004, p.6). Rural flight is one of the many drawbacks of overfishing on the livelihoods of fisheries labourers. People for whom artisanal fishing may no longer be lucrative enough can resort to rural flight or emigration as strategies to support themselves and their families. Furthermore, fishery resources represent 75% of the animal protein intake of Senegalese people (Dème et al., 2019); thus, if there are fewer fish, people will be forced to adapt to a new diet.

In the upcoming analysis chapter, I will explore the shifting socio-economic dynamics within artisanal fisheries using the sustainable livelihoods approach, to understand the nuances and consequences of overfishing on the livelihoods of coastal populations. But before that, I will analyze the next concepts of my theoretical framework, beginning with political ecology.

3.2 Political ecology

Early political ecology works emerged in the 1970s, partially to address changes in the working-class people's health caused by environmental factors, which Marxism failed to prioritize (Ajl, 2023). Bryant and Bailey (1997) argue that the scholars whose theories gave birth to political ecology as a field of research focused on the social and environmental disasters that they expected to result from population growth in the "Third World" and consumption in the "First World". Bryant and Bailey (1997) wanted to put to the forefront the political dynamics that connect different actors involved in ecological disputes in the so-called "Third World". Ajl (2023, p. 13) rather suggests that political ecology seeks to understand "ecology from the perspective of political economy".

Political ecologists believe that environmental changes are not neutral phenomena and that they are instead influenced by political factors that impact political systems and inequalities (Bryant, 1992; Bryant and Bailey, 1997). Bryant and Bailey (1997) also claim that environmental changes carry advantages and drawbacks that are unfairly distributed between stakeholders, which perpetuate cycles of socio-economic inequalities. The authors affirm that political ecologists believe that the socio-economic consequences of environmental changes connect with power imbalances between stakeholders, as changes can impact some actors' ability to control others while depriving the latter stakeholders' ability to resist other actors. (Bryant and Bailey, 1997)

Political ecology analysis focuses on the various ways in which power imbalances between government agencies or between local populations and the State impact resource management (Bryant and Bailey, 1997). This perspective is rather distinct from those that associate overfishing with overpopulation, a link made frequently in developing countries (Finkbeiner et al., 2017). Chambers and Conway (1991) have structured their arguments for sustainable livelihoods to avoid sparking any Malthusian ideas in readers' minds and policies designed to punish the populations of low-income countries. Political ecology scholars are relatedly proponents of the ideology that the responsibility for the unsustainable exploitation of natural resources must not fall on low-income communities.

Political ecology focuses on the discourses surrounding natural resource governance, in contrast to neo-Malthusian ideologies (Finkbeiner et al., 2017). Malthusian explanations of the overexploitation of fishery resources hold local fishermen responsible for overfishing in developing countries where economic growth rates are high while access to fisheries is not restricted (Finkbeiner et al., 2017). The political ecology approach to environmental degradation places great emphasis on the significance of government policies, including those that reinforce a central management mode (by the government), increased exploitation, and privatization of fisheries resources (Finkbeiner et al., 2017). Such policies have

negative consequences on the livelihoods of artisanal fishermen, who are among the poorest and most vulnerable populations in West Africa (Béné and Neiland, 2003). Therefore, political ecology not only challenges Malthusian and neo-Malthusian discourses but also contextualizes the overexploitation of fishery resources in broader political economies.

According to Mansfield (2011), the promotion of the industrialization of artisanal fisheries is part of a modernizing project where the Senegalese government encourages increases in artisanal catches while imposing low sanctions on illegal trawlers. Such policies, hence, foster overfishing, both by industrial and artisanal actors. As stated by Belhabib et al. (2015), this overexploitation of fish stocks compels artisanal fishermen to deploy maladaptation strategies in the face of declining fish stocks. Indeed, when macroeconomic policies lead to the destabilization of the resources on which the livelihoods of local populations are dependent, those communities often have no choice but to overexploit those resources to survive (Bassett and Peimer, 2015).

Political ecology scholars highlight the political dimensions inherent to environmental problems, but also, as Bryant and Bailey (1997) mention, they contextualize them regarding broader development problems. This fundamental principle of political ecology is crucial when considering the livelihoods of fishermen and fish vendors in Senegal. As Bryant and Bailey (1997) suggest, if livelihood patterns are strongly linked to the environment, any environmental change could jeopardize people's ability to sustain themselves. Thus, Senegalese fishery governance has a direct impact on the marine ecosystem which provides fishery-dependent populations with their main source of animal protein, income, and cultural identity. These environmental changes subsequently influence the livelihoods of coastal communities and a significant part of economically vulnerable Senegalese communities.

3.3 Blue Justice

Before analyzing Blue Justice, it is necessary to explore the Blue Economy, as the former has been theorized in response to the impacts of the latter. The blue economy concept refers to economic development driven by the exploitation of oceans (Bennett et al., 2021). Activities include, but are not limited to, fishing and aquaculture, oil extraction, tourism, marine transport, and marine biotechnology (Vierros and De Fontaubert, 2017). For instance, the EU considers the ocean as a key part of its economy (Bennett et al., 2021). In their report for the World Bank, Vierros and De Fontaubert (2017) claim that one of the blue economy's goals is to "move beyond business as usual" (p. viii) and bring together economic development and ocean health. The authors add that it is a continuous approach that must consider the current and predicted consequences of environmental changes on oceans (Vierros and De Fontaubert, 2017). Martinez-Vasquez et al. (2021) affirm that the blue economy and blue growth together are used worldwide as a conceptual framework and political discourse to emphasize the benefits that aquatic ecosystems can have on human well-being.

Theoretically, the blue economy encompasses several goals from an economic, social, and environmental standpoint. Vierros and De Fontaubert (2017, p. vi) state that it "seeks to promote economic growth, social inclusion, and the preservation or improvement of livelihoods while at the same time ensuring environmental sustainability of the oceans and coastal areas." Relying on scientific research, the blue economy recognizes the limited aspect of marine resources and the increasing fragility of marine ecosystems (Vierros and De Fontaubert, 2017). The World Bank report by Vierros and De Fontaubert (2017) states that activities must meet the following requirements to be considered as a part of the blue economy: "provide social and economic benefits for current and future generations"; "restore, protect, and maintain the diversity, productivity, resilience, core functions, and intrinsic value of marine ecosystems" and "be based on clean technologies, renewable energy, and circular material flows that will reduce waste

and promote recycling of materials." (p. vi) There has been a clear emphasis on the alleged sustainability dimension of the blue economy in the World Bank report, with the repeated use of words such as “sustainability”, “social inclusion”, “coastal protection”, “preservation”, that convey the objectives of respecting and protecting marine ecosystems and coastal communities whose security and livelihoods depend on oceans.

The blue economy has several socio-economic impacts both from a local and an international perspective. As mentioned, the activities comprised in the blue economy are diverse. Although their impacts are intertwined, I will mainly focus on fisheries and activities that have a direct incidence on fisheries and coastal communities. According to the UN, the blue economy is an important contributor to food security and poverty eradication as the exploitation of marine waters yields 80% of world trade and sustains the livelihoods of over three billion people (UNRIC, 2022). Vierros and De Fontaubert (2017) note that Small Island Developing States and Least Developed Countries' economies and cultures, and the 2030 sustainable development agendas alike all rely heavily on oceans and maritime resources. In these contexts, the blue economy yields a framework to follow a low-carbon and resource-efficient approach to economic growth. As a result, there may be an improvement in the livelihoods, professional opportunities, and economic status of coastal communities, which often face several challenges of "capacity, skills and financial support to better develop their blue economy" (Vierros and De Fontaubert, 2017, p. ix).

Nevertheless, the blue economy also carries its sets of social, economic, and environmental challenges. The exploitation of the seas carries risks for coastal communities, notably the exclusion or limitation of fishermen's access to the coastline, pollution, destruction of ecosystems, and reduction of fishery resources (Bennett et al., 2021). This economic model tends to privilege firms, multinationals, and economic growth, over the rights and livelihoods of coastal communities (Bennett et al., 2021). Bennett et al. (2022) affirm that the root cause of these challenges is an economic system that puts excessive

emphasis on economic growth while systemically showing little care for social sustainability and equity. International institutions constantly put subjects like environmental sustainability and productivity at the forefront of their agendas, yet they do not give equal attention to issues of social equity (Bennett et al., 2022). This paradigm within international institutions might have set a negative precedent. Indeed, the private sector likewise seems to dismiss social equity and to make corporate social responsibility a negligible matter (Bennett et al., 2022). The benefits of the blue economy can have a great impact on communities, yet ocean-based development often restricts their freedom and coastal access through the increased privatization of marine areas (Bennett et al., 2021).

The United Nations affirms that the blue economy should "promote economic growth, social inclusion, and the preservation or improvement of livelihoods while at the same time ensuring environmental sustainability of the oceans and coastal areas" (Vierros and De Fontaubert, 2017 p.vi). The reality, however, shows that it poses threats to marine ecosystems through the overexploitation of marine resources, the destruction of coastal landscapes, marine pollution, and the exacerbation of climate change, and it becomes a challenge for people's livelihoods and social inclusion through some of the aforementioned issues and unfair trade (Vierros and De Fontaubert, 2017). As injustices arising from the blue economy receive minimal attention from authorities at both local and international levels (Ertör, 2021), the concept of "Blue Justice" has emerged as a framework to address and mitigate these inequities.

Moenieba Isaacs (2019) coined the term blue justice and defines it as a concept that seeks to push back against the marginalization of coastal communities created by the negative impacts of the blue economy, through the involvement of civil societies, non-governmental organizations, and practitioners. The same author asserts that it is an approach to social justice that defends the right of local populations to access bodies of water, and more precisely those of people who rely on fishing to meet their needs and counter their marginalization through privatization and the creation of protected areas (Isaacs, 2019).

Blythe et al. (2023) also suggest that blue justice entails acknowledging coastal communities and fostering an equitable environment for them concerning the utilization and stewardship of coasts and marine resources. According to Bennett et al., (2020), ultimately, blue justice requires changing the ocean governance system and the vision of economic growth and development, which would lead to a change in management methods and the roles of actors concerned by the exploitation of maritime spaces.

As highlighted by different examples and case studies, blue justice-focused movements have existed long before the term "blue justice" was coined (Blythe et al., 2023). However, the concept has been increasingly emphasized in academic spaces and within international institutions, including those from the UN system. Like the concepts of sustainable livelihoods and political ecology highlighted in this chapter, it is on its way to becoming a conceptual framework that could shape policies and strategies.

Figure 8 : "Ten key considerations to advance blue justice in blue growth initiatives" (from Bennett et al., 2021)

Taking inspiration from different international laws and conventions, Bennett et al. (2021) highlight ten essential elements to advance blue justice (refer to figure 8), namely: food security, gender equity, small-scale fisheries, environmental justice, economic benefits, socio-cultural impacts, ecosystem services, human rights, inclusive governance, and tenure and access. Unlike the other concepts in my theoretical framework, blue justice was specifically theorized to remediate challenges that coastal communities face.

Conclusion

The three concepts that I have highlighted in this chapter, the sustainable livelihoods approach, political ecology, and blue justice, can be intertwined into one framework for my research because of the commonalities in how they approach environmental sustainability and resource management. As discussed earlier in this chapter, the sustainable livelihoods approach is essential to the identification of the positive and negative factors that influence people's livelihoods. The core principles of this approach include (but are not limited to) asset-based strategies and policies that focus on sustainability, equity, and empowerment to enhance the livelihoods of communities. Unlike blue justice, the sustainable livelihoods approach is not specific to an ecosystem. Therefore, it can be useful to approach policies and practices pertaining to the agricultural, fishing, forestry sectors, and many more. In my research, I view it as a broader approach that I believe must shape fisheries management. Senegalese fisheries are faced with the depletion of Senegal's fish stocks. That constitutes a major change in the vulnerability context of small-scale fisheries, and necessitates the implementation of policies to protect the livelihoods of the workers and coastal communities at large.

Political ecology is another concept that is important to my theoretical framework because of its focus on political, economic, and social structures and their incidence on environmental issues and environmental governance. Power dynamics, equity, sustainability, and participatory decision-making are

some of the beliefs and notions at the center of political ecology analysis and are also important topics within blue justice and the sustainable livelihoods approach. Understanding the factors that influence fisheries governance in Senegal will be necessary when assessing fishing agreements and their consequences on Senegalese coastal ecosystems and the livelihoods of small-scale fisheries labourers.

Finally, the main challenges about the blue economy that authors have denounced align almost perfectly with how Chambers and Conway understood the factors that create livelihoods' unsustainability. As mentioned in the literature review, West African fisheries are facing great dangers of depletion. Blue economy activities on West African coasts not only do not "maintain or enhance" the living marine resources, but they have negative impacts on the livelihoods of coastal communities. The sustainable livelihoods approach has had an important influence on development practices and policies aiming to enhance and protect livelihoods in general. Blue justice in contrast is a framework created specifically for the advocacy and promotion of ocean health and for the sustainable use of marine resources, with emphasis placed on justice, equity, and empowerment for coastal communities. It includes principles and practices that ensure the responsible and equitable governance of marine resources and ecosystems.

All the concepts in this theoretical framework stress the importance of differentiating between institutions and stakeholders who hold power, and people who not only do not hold power (due to political structures) but are also seeing their livelihoods and futures being threatened every day by powerful actors. This premise not only helps me structure my thesis and answer my research questions, but it is also one of the main political views (and biases) that I hold. Individuals must not be held responsible for the negative actions of institutions and corporations. Similarly, coastal communities in the global south (and their citizens) must not bear the negative consequences of the actions of richer foreign countries in their countries' EEZ. The next chapter will explore the steps that I have undertaken to collect primary data in such communities in Senegal.

Chapter 4: Research Methodology

The main objective of my research is to uncover the impacts of overfishing on the livelihoods of coastal communities in Senegal, particularly the communities whose economies rely primarily on the exploitation of marine resources. In this chapter, I will go into detail about the adventure on which I have embarked. In this field research, I explored the world of artisanal fishermen and fish vendors with the aim to uncover information that would allow me to answer my research questions.

In the first part of this chapter, I will introduce the research sites where I have collected data. In the second part, I will explain the research design for this field study. I will go into detail about the target population, as well as the sampling criteria and the process of collecting data. The following part will describe the steps that I will take to analyze information gathered in the field. Finally, the last part will disclose my positionality and how it might have impacted my research.

4.1 Research Sites

To gather qualitative data, I have decided to do my research in different artisanal ports in three different regions: Dakar, Thies, and St. Louis (see: figure 9) My choices were the result of purposive sampling. This method is non-probabilistic, and it requires establishing characteristics that the sample must meet (Marshall, 1996).

Figure 9: Map of Senegal (From: World Atlas)

The criteria I utilized for selecting research sites are their undeniable importance in the Senegalese economy, their accessibility (from Dakar, where I lived), their size and the high numbers of fishermen and/or fish vendors present there. Such attributes lead me to choose the following sites: the port of Yoff and the fish market of Pikine in city of Dakar, the ports of Mbour, Kayar and Joal in the region of Thies, and the port of Guet-Ndar in the region of Saint-Louis. (see: figure 10)

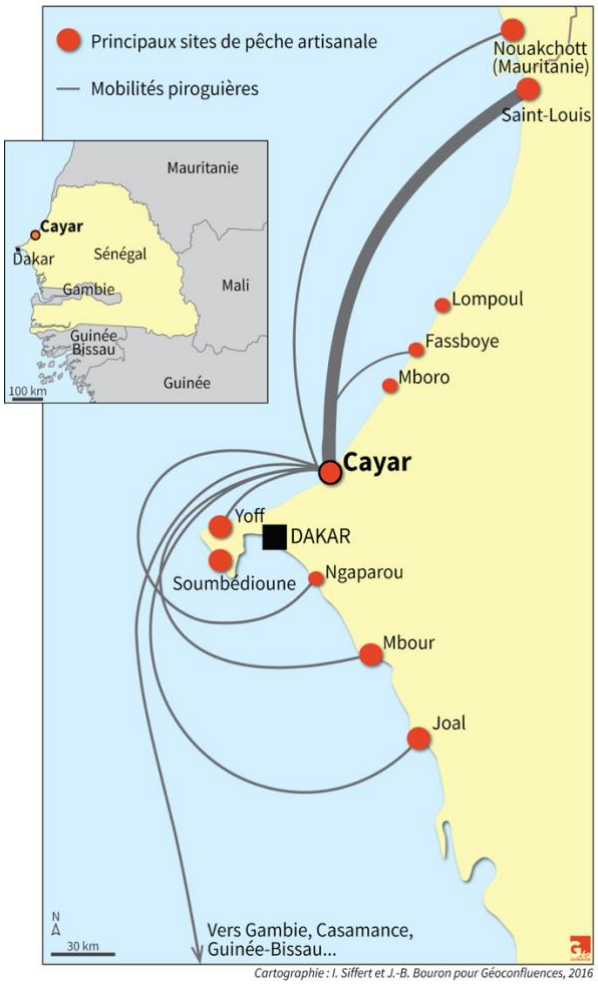

Figure 10: Main Artisanal Fishing Ports (Source: Siffert, 2017)

These ports are the most important in their respective regions in terms of captures and remain among the largest in the country based on the workforce that they host (Thiao and Ngom, 2014). Moreover, I believed that I would have more chances to meet fishermen and fish vendors in ports and fish markets since they are their primary places of business. My data collection kicked-off in the region of Dakar where I had identified two destinations. Soon after, I was to travel to the three ports located in Thies. My final destination was the Saint-Louis region.

4.1.1 Dakar

The region of Dakar is home to the capital of Senegal. The number of fishermen in Dakar is

approximately 21,839, with 3451 registered pirogues, and in 2018, total catches were estimated at 85,056 tons (Mbaye et al., 2018). There are several fishing ports in this region, and according to Thiao and Ngom (2014), in 2012, Yoff, which is located in the capital, was the most important in terms of monthly catches.

The largest fish market in the country, Marché Central au Poisson de Pikine (Pikine Central Fish Market), is also located in the capital. The Pikine Central Fish Market is a marketplace where wholesale vendors from all around the country, who are called "mareyeurs", reunite to resell to retail vendors. Some of the latter remain in the market to sell. Thus, it is both a wholesale and a retail fish market. Thousands of people go there daily to buy or sell seafood.

4.1.2 Thies

Thies is also central to the fishing sector in Senegal. The region hosts 26,447 fishers and 4294 registered pirogues, and yielded catches amounting to 178,240 tons in 2018 (Mbaye et al., 2018). In recent years, Thies' main ports, Mbour and Joal, have been considered the most important ports in the country in terms of yearly captures (Mbaye et al., 2018). With 2280 registered pirogues as of March 2020, Mbour is considered one of the largest ports in the country (Camara et al., 2023). According to the Senegalese Department of Marine Fisheries, Kayar is also a key location for small-scale fisheries. In 2018, monthly captures were only slightly lower than the total captures in Mbour (Mbaye et al., 2018).

4.1.3 Saint-Louis

In 2018 Saint-Louis was the fourth region with the largest volume of catches in Senegal, even though its fishermen population is significantly lower than Dakar, Thies and other regions (Mbaye et al., 2018). Indeed, Saint-Louis counts 674 registered pirogues and 4,877 fishermen (Mbaye et al., 2018). Guet-Ndar, also referred to as Saint-Louis port (see Figure 10), is the main artisanal port for marine fisheries in Saint-Louis, and the only site in Saint-Louis that I have visited for this study. The region

yielded 42,769 tons of catches in 2018 (Mbaye et al., 2018).

4.2 Research Design

For my research, I visited six sites: two in Dakar, three in Thies, and one in Saint-Louis. Fishermen and fish vendors are the target population. Using the convenience and snowball sampling methods, I had planned on conducting 2 focus groups in each of the 6 sites, for a total of 12 focus groups, in addition to focus groups and/or interviews with people from governmental or non-governmental organizations. However, I conducted a total of 18 focus groups (refer to table 2). I ended up conducting one focus group at the Central Fish Market of Pikine, two in Kayar, three in Yoff, three in Mbour, four in Guet Ndar, four in Joal, and one with an NGO. I believe that for this study, focus groups were the best data collection method as they are time efficient, allowing the researcher to hear multiple people's opinions at once instead of interviewing them individually. Franz (2011) argues that researchers who use focus group discussions do so because they can hear directly from the people whose opinions they seek and can collect extensive data in a short amount of time. My objective was to document the opinions, experiences, and hopes of individuals.

4.2.1 Population and Sample

Artisanal fishery workers are the primary population of my research. As people whose livelihoods are centered around artisanal fishing, I firmly believe that they are some of the best people from whom I can inquire about the state of Senegalese fisheries and its effects on the livelihoods of small-scale fisheries labourers. The fact that they work in artisanal fisheries is the main reason why I chose them.

However, the Senegalese small-scale fishery sector has a workforce amounting to 600,000 individuals (Guillotreau et al., 2011). Although I have only chosen six sites, their combined fisher population could amount to hundreds of thousands of workers. As Oppong (2013) states, the attempt to

study all the cases of a subject may be unrealistic or too costly for a researcher, making sampling a necessity. Therefore, I chose samples of four to six fishermen and four to six fish vendors in each site, which would allow me to hear 48 to 72 people. Four was set as the minimum number of participants because I had deemed it sufficient for a broad range of information and points of view to emerge from the focus groups. The maximum was set to six because I had limited time to complete each focus group in every site. Nevertheless, assembling groups of more than four people had proven quite challenging at times due to the dynamics of the participants' activities and the unwillingness of some people to speak to a stranger. Yet, there were times when these focus groups reached more than six participants, including people who did not all partake in the study simultaneously, but took turns instead. In total, I spoke to approximately 67 people (refer to Appendix A), including some who extensively discussed with me and others who simply interjected in between questions. That might have been due to some people's curiosity, their eagerness to share their grievances, and their availability at the time when I asked to conduct the focus groups. My shortest focus group lasted fifteen minutes, while the longest one lasted one hour and forty-four minutes.

Adding to fishermen and fish vendors, I had planned on conducting individual interviews or focus groups with members of a fishery union, employees from the Ministry of Fisheries, and members of local and international NGOs dedicated to Blue Justice. Such people possess a significant level of expertise that would enhance the value of my research. Moreover, although they are immersed in the fishery sector, I anticipated that their points of view would not be more diverse than those of artisanal fishery workers, for many of whom small-scale fisheries are their only option in terms of job opportunities, due to their lack of formal education or their personal ties to the coast and their community. However, I only conducted one focus group with a team from the United States Agency for International Development (USAID).

4.2.2 Sampling Techniques

In qualitative research, it is necessary to choose an appropriate sample from the population as it is more likely to yield more robust results (Asiamah et al., 2017). I intended to conduct focus groups, and the selection of participants is crucial as they can significantly influence the usefulness of the discussions (Franz, 2011).

Among the several sampling techniques I could have chosen, I have opted for the convenience and snowball methods. The former is a non-probability technique that allows the researcher to choose a sample based on "accessibility", "availability" and/or "willingness to participate" (Etikan et al., 2016, p.2). This technique is considered to be practical, and one of the least challenging sampling methods, particularly in terms of expenditure, time, and work (Oppong, 2013). Hence, at each site, I simply took a walk until I reached groups of fishermen or vendors. I introduced myself and the subject of my research; then I asked them if they were willing to take about an hour to discuss with me about their work and the trends that they have noticed in artisanal fisheries. However, proximity was not the only criterion on my list. I was mainly looking for adults who have been working in artisanal fisheries for a substantial number of years. Such individuals have more professional experience and knowledge of local fishery management than younger workers. When encountering retired workers, I included those who were not retired for more than five years. I presumed that their memories of their careers and their understanding of current management issues might be more recent compared to fishermen and vendors who have been retired for longer periods.

For members of unions, NGOs and the ministry, the sampling method was once again straightforward, with the only criterion being their association to their relative organizations. I used the contacts of relatives who personally knew people who fit the description. Unfortunately, due to scheduling conflicts and occasional lack of communication, I was unable to have members of the Union of Fishers or employees of the Ministry in my sample. I met someone at the Ministry who worked for the Industrial Fishing Division but that interview did not provide answers relevant to this study. However, I was lucky

to collaborate with one NGO. A relative referred me to the project “Dekkal Geej” (Restoring the Sea) launched by the United States Agency for International Development (USAID). Luckily, their headquarters were located near my home in Dakar. One morning during a weekday, I decided to go to their offices, hoping that I could make a first contact with someone. Once I arrived, I told the receptionist who welcomed me that I wished to have a conversation with someone who works there about certain aspects of my research. She handed me a piece of paper where I wrote my name, email and a brief description of my project. The next day, I was contacted by a member of the coordinating team of Dekkal Geej who offered to meet me, with a few of his colleagues.

Even though convenience sampling is relatively simple, it does present certain flaws. In fact, some scholars argue that this sampling technique can be biased (Etikan et al., 2016). The resulting samples are not statistically representative of the overall population, the data collected from such samples may be unreliable and might lead to poor-quality research (Oppong, 2013). However, in the context of my research, this issue will not affect the rigor of my sample and the data that I have collected. Indeed, I have conducted focus groups with individuals who have common occupations, socio-economic status, and a certain level of expertise. Dilshad (2013) highlights that holding focus groups with participants who share similar traits can yield optimal conversation where all may engage equally.

Snowball sampling involves the researcher identifying a first set of participants to whom he or she can ask to identify other people, generally acquaintances, with whom they share similarities, to participate in the study (Berg and Howard, 2017). When convenience sampling did not yield enough participants, I asked the ones who had already agreed to participate in the research to lead me, or call on, to other people who would agree to participate and be able to answer some questions. Each time, they brought some of their friends and/or coworkers who agreed to participate. The same method was employed by the person from Dekkal Geej who contacted me. He reached out to his colleagues who agreed to have a conversation

with me, which turned into a focus group like I intended.

I believe that these sampling methods have made the data collection process less tedious than if I had chosen other sampling techniques. The convenience and snowball sampling methods, unlike purposive sampling for example, do not require the researcher to establish a list of specific criteria (such as age, gender, or social status) for participants, which can also reduce the size of the population (Marshall, 1996).

4.2.3 Data Collection

According to Moser and Korstjens (2018), observation, interviews, and focus groups are the most common methods used to collect data in qualitative research. In this study, I have opted for focus group discussions. They are efficient as they have allowed me to listen to several people in a short time. Thus, I was able to record in-depth information and different opinions while following a time-sensitive schedule.

4.2.3.1 Focus Groups

For this method, groups of people are gathered to discuss a topic, and the conversation is led by a moderator who asks them questions throughout the discussion (Moser and Korstjens, 2018). These conversations are meant to understand the knowledge of participants, and they can be recorded and transcribed later (Bussetto et al., 2020). Rosenthal (2016) makes a distinction between what he calls "in-depth interviews" and focus groups. According to the author, for in-depth interviews, researchers may rely on open-ended questions and follow-ups to acquire a better sense of respondents' "experiences, perceptions, opinions, feelings, and knowledge." (Rosenthal, 2016, p. 510) In contrast, the data collected in focus groups rely heavily on the dynamic between participants as this shapes how people answer the researcher's questions. Hence, Rosenthal (2016) adds, that focus groups should be regarded as a data collection strategy whose practicality goes far beyond merely being an efficient interview with multiple

people. For my focus groups, I have opted to lead discussions with a guide that included open-ended questions only. I wanted to give respondents the freedom to answer in as much or as little detail as they wanted, knowing that if I were not satisfied with the amount of information given, I could always ask follow-up questions.

The focus groups were rather informal. Often, the people who were willing to partake in my research were busy in some way: some were knitting nets; some were scaling fish; and others were selling fish. Therefore, to make it easier for them and myself, I simply sat down next to them: on a boat, on a rock, on a bench, and sometimes I stood up. These focus groups were, for the most part, easy for me. They allowed me to engage with multiple individuals at once and gather diverse opinions without having to conduct multiple interviews. They were efficient as participants often shared similar opinions, avoiding repetitive viewpoints. Busseto et al. (2020) mention that one of the downsides of focus groups is the fact that the researcher has less control over the discussion (compared to one-on-one interviews). However, I did not see this as a complete disadvantage. In fact, often participants derailed the conversation from the question at hand to another topic that I was planning to ask about. I saw this as a sign that they knew more about the topic than I did, which is great already. Most importantly, this also testified to their passion for the topic we discussed and to their eagerness to contribute to the conversation. Before the beginning of each focus group, I disclosed the fact that the sessions were recorded. Unfortunately, there were people who, albeit present and showing non-verbal signs of their interest, communicated their discomfort regarding the fact that I was recording, and therefore, abstained from joining the conversation. As argued in the literature review, the state of Senegalese fisheries is closely tied to the government's decisions. Therefore, it is understandable that one would be uncomfortable sharing his/her grievances about the way the government handles the fishery sector with a stranger. I had a few instances of participants asking "where will this recording go?", in reference to where I will publish my findings. There were other times

when people refused to talk because they knew that I was recording. Nonetheless, that did not become a roadblock, and it certainly did not stop me from collecting extensive and valuable data.

As mentioned above, I had planned on conducting individual interviews or focus groups with members of a fishery union, members of the Ministry of Fisheries, and members of local and international NGOs dedicated to Blue Justice. However, due to timing and scheduling issues, I was only able to conduct a focus group with a team at the United States Agency for International Development (USAID) that works on the project Dekkal Geej (Restoring the Sea). That single focus group was significantly different from the previous ones. Firstly, the participants spoke French; so, the focus group was conducted in French rather than Wolof. It was easier for me since I did not need to translate my questions, nor pause to think of the best Wolof words to refer to certain concepts. The interview environment was more appropriate, as we were in a conference room where I had the ability to use my laptop. Finally, since I knew that I would not need to translate the interview, I opted not to record it, but instead to type the answers as I was hearing them. I thought it would allow me to save time that would have otherwise been spent transcribing at a later date. That was one of the most enjoyable focus groups I have led during my research. The quasi-totality of participants, in every focus group, was engaging, even though some were more withdrawn than others. Thus, I believe that these focus groups have allowed me to gather rich information from several people.

The eighteen focus groups were conducted during different time frames (refer to Appendix A). Due to some health issues that emerged during the data collection window planned initially, some focus groups had to end abruptly, and others were canceled. Months later, after coming back to Ottawa, my thesis supervisor encouraged me to conduct new focus groups in places where I had already been and where I could not go to collect as much data at first as I expected. Because we were both doing research in Senegal during the same time frame (I was his research assistant then), he accompanied me during

further trips to Joal and Guet Ndar, and kindly offered to take notes for me during that field research (one could say he was then my research assistant); so, once again, I did not need to record those focus groups. I used the same population and sampling techniques.

4.3 Positionality

Our socioeconomic and physical characteristics influence the way we perceive the world and are perceived by it. Therefore, one's positionality is an important element in a study, particularly when it involves interacting with other people and asking them personal and/or professional questions.

I am a young Senegalese woman who grew up in the city of Dakar. I come from a family that may have been considered "upper middle class" compared to the average Senegalese household. Being an only child has been regarded as an anomaly by several members of my community over the years. Most of my relatives have received formal education, with the majority holding at least one university degree. While my surname is of Pulaar origin, my mother tongue is Wolof. Although I am not fluent in advanced Wolof, I can engage in daily conversations with any Wolof-speaking individual. Initially, I was unfamiliar with the Wolof terminology related to fishing and fisheries, as I did not grow up around fishery workers and had limited interaction with them until recently. Their vocabulary thus seemed different from the Wolof that I speak, with certain specific terms (for instance: "fisher", "industrial boat", and "fishing season from December to April") not being part of my vocabulary before this research. However, much to my surprise, this did not hinder the communication between the participants and me in any way. In fact, they have taught me a few words, whether they were aware of it or not.

I was fearful that if people realized that I was not from their hometown, they might not want to talk or that they would keep their answers short. I was greatly mistaken. The fisherfolks did acknowledge the fact that I was an outsider. Nevertheless, they did not make an issue out of this, and they kindly agreed to talk to me. Some have even given me positive feedback about my attitude, while others have light-

heartedly teased me for not being familiar with their vocabulary. I never encountered harassment or disrespect for being a young woman, which had been a concern prior to visiting each site. Even the group of fishermen who were about the same age as me were respectful. When I felt sick during focus group discussions, which happened twice, they were kind and understanding. They offered me water, and a place to sit or lie down, and one group of fishermen in Yoff even escorted me back to my car, although they were reluctant to allow me to drive home.

The same cannot be said about all interviews, as I unfortunately had a notably unpleasant experience with a group of women fish vendors. The first time I went to Mbour to conduct focus group discussions, I first discussed with fishermen. Once I was done, I headed towards the vendors, who were all women. They declined to speak with me because they believed I had been "rude" to them before initiating contact. This was based on the moment when I exited my car and proceeded directly to the shore where men were seated in and near their pirogues. I arrived in Mbour late in the afternoon, close to the time when fishermen were returning from their afternoon fishing trips. Given that sunset was approaching, I anticipated that it would be challenging to find fishers willing to participate in a focus group discussion for an hour or so, as most were preparing to return home. Knowing that vendors tend to sell fish even during nighttime, I decided to meet with them later. According to those women, I "ignored [their] presence because [I] was trying to act high and mighty" (Interview 8). That could not have been further from the truth, but it reminded me that in Senegal greeting strangers is not only normal but, it also is expected. However, I never knew that we were *also* expected to walk *all the way* to a group of people and greet them before tending to our business (!). After what felt like 10 minutes of apologizing and explaining that I was not "ignoring them on purpose", they *begrudgingly* agreed to talk to me. That focus group unfortunately lasted for *15 minutes* only because their answers were rather short and devoid of any detail. This was kind of a cultural shock for me.

Surprisingly enough, days later, I had a strikingly opposite experience in Guet-Ndar with one vendor, a woman. At first, the focus group comprised three vendors, but the number was reduced to two, and ultimately, only one agreed to participate in a recorded discussion. To my surprise, the discussion lasted nearly 40 minutes, including the few breaks my interlocutor had to take to sell her fish and talk to other vendors. When I was done asking her questions, I pointed out how beautiful the fish she sold was (she only had one variety of fish in her basket). The fish was a dark blue color, similar to a mackerel, and had very few scales. She told me its name in Wolof and the kind of recipes that I could use it for. Then, she gave me one. When I asked her the price of the fish so that I could pay her for it, she refused and simply said that it was a gift. I am a firm believer that while it is nice to receive gifts, the intention of the person gifting them are more important. After telling me about the financial strains she and many vendors and fishermen are experiencing, she still gave me a fish, knowing that she could sell it instead. That was a heart-warming moment and one of my favorite memories during the research, and in general!

Engaging in fieldwork and gathering data was an entirely new experience for me. Overall, conducting field research was a highly valuable and positive experience. Most people were pleasant and passionate about the subject. They also seemed to appreciate my interest in their line of work and small-scale fisheries. Needless to say, learning about raw data collection from the comfort of one's class (or home) is different from being at the center of the process in the field. I conclude from my experience that fieldwork was an enlightening and humbling adventure. In the next section, I will go into detail about the steps that I will undertake to code the data from the focus groups.

4.4 Data analysis

To convey the results of my field study effectively, I must analyze the findings. Data analysis involves rigorously studying one's collected evidence, applying a method of interpretation to break down said evidence, and synthesizing the subsequent information into a simplified version of the initial records

(Green et al., 2007). The need for an analysis stems from the fact that the reader may encounter difficulties grasping the social sphere studied in a perspective similar to the participants' (Basit, 2003).

Analyzing qualitative data can prove to be arduous as it is "not fundamentally a mechanical or technical exercise", but rather a "dynamic, intuitive and creative process of inductive reasoning, thinking and theorizing." (Basit, 2003, p.143) Moreover, it may be challenging for the researcher to choose which segments of the data represent valuable units of analysis (Chenail, 2012).

There are several purposes for qualitative data analysis and various analysis techniques. Some of its purposes include: testing hypotheses and explaining social phenomena. When it comes to the latter, thematic analysis seems to be a commonly chosen method in the academic sphere (Jamieson, 2016).

4.4.1 Thematic Analysis

Qualitative data analysis entails a methodical scrutiny of the information collected, through various systems of classification (Green et al., 2007). Its main objective is to highlight certain social phenomena through a meticulous examination of participants' accounts (Campenhoudt et al., 2011). Thematic data analysis, in particular, may be done by using an inductive approach, a deductive approach or by combining both (Jamieson, 2016).

Looking at studies on thematic data analysis, most authors seem to agree that it requires some of (if not all of) the following steps: the transcription of the collected information, the thorough engagement with the data, the selection of codes, the categorization of said codes, the selection of themes and, finally, the conception of theories (Green et al., 2007; Jamieson, 2016).

4.4.2 Data Preparation

This phase refers to processes undertaken to prepare the findings for coding, particularly transcription (Sandelowski, 1996). In the case of my research, I prepared the raw data by transcribing the

audio recordings of every focus group. It is necessary to listen to them and read the transcripts more than once to verify the accuracy of the transcription (Moser and Korstjens, 2018). It is also important to note that the transcripts must include non-verbal cues as they add context, thus simplifying the analysis (Moser and Korstjens, 2018). Once I was done transcribing the focus group interviews, I proceeded with data immersion.

4.4.3 Data Immersion

Green et al. (2007) stress that familiarity with the data and its context adds value to the process of data analysis. It is suggested that conducting the interviews/focus groups or being present during them can be the first step for a researcher to familiarize himself/herself with the data (Jamieson, 2016). Green et al. (2007) firmly believe that when the analyst is not the one collecting the data, it may be difficult for him or her to fully understand and decipher them. The authors assert that understanding the context of an interview may bring "depth" to data immersion and enable the analyst to interpret his/her findings beyond the scope of the transcribed data (Green et al., 2007, p.547). In other words, grasping the context in which the data were collected is not only important to comprehend them, but it also allows the researcher to interpret them beyond the scope of the information received.

It is during the process of immersion that the analyst can foresee new ways to portray a clear image of the subject explored; it also simultaneously helps illustrate the roles that both the interviewer and the participant(s) have had during the data collection (Green et al., 2007). Being the sole interviewer for my research, I am quite familiar with the information that I have gathered. Hearing most of them from 18 different groups of people, who have at times phrased them similarly or differently, has also been helpful.

The next crucial step of my analysis is coding. It encompasses the selection of codes and themes as well as their categorization, which is an essential part of the analysis.

4.4.4 Coding methods

Coding is a necessary process that I have tackled in my data analysis. Bassit (2003) reminds her readers that coding is an important step in the data analysis process; nevertheless, the two concepts are not similar and cannot be used interchangeably.

Coding involves the analyst transforming raw data by identifying ideas within them that he or she will code and categorize with reference to different themes to enounce a theory (Point, 2018). In other words, the researcher will first look through the data in search of ideas that will be coded into his/her chosen terms. Then, those generated codes will be categorized according to their similarity. Finally, each category of codes will be attributed to the theme chosen by the analyst. Saldana (2009) stresses that generating themes is as demanding as coding itself. Nonetheless, as stated above, knowing, and understanding the context of data collection is necessary. Green et al. (2007) argue that coding is an operation that goes beyond labeling data and that it requires an awareness of the context within which the data emerged. Furthermore, according to Point (2018), during the coding process, non-verbal cues must not be omitted in favor of transcripts. Indeed, tones, emotions, gestures, silences, and other subtleties are essential elements that help with the interpretation of the transcripts (Point, 2018).

The researcher may choose the codes and themes to be used in the analysis. To determine his/her choices, the analyst must first decide whether they will use an inductive, deductive, or a mixed approach to coding. While using the inductive approach, the researcher must identify ideas in the raw data, code them, and uncover underlying themes and concepts, before theorizing them (Point, 2018). Deductive coding requires generating themes and codes before gathering qualitative data. The researcher will code and categorize the data using those pre-established codes that were sourced from the "conceptual framework, list of research questions, hypotheses [...]" (Basit, 2003, p.145) before proceeding to synthesis.

Point (2018) suggests that this approach may be more convenient for researchers in the early stages of their careers. As an inexperienced researcher, I have chosen to use a hybrid technique: a combination of both inductive and deductive coding. I have relied primarily on themes that I have identified in the literature review and in my interview guides. For the latter, I have received the help of my thesis supervisor who was present during my last focus groups. Nonetheless, there is a plethora of new codes and themes that have emerged from my field recordings. Mixing both approaches could prove optimal to provide a thorough analysis of my findings and ease the process simultaneously.

4.4.4.1 Manual Coding

I opted not to use any software to code the collected data. As Linneberg and Korsgaard (2019) state, for small-scale research, such as mine for example, color coding may suffice, while larger projects might require the help of a coding software. Moreover, as mentioned above, being exposed to written data facilitates data immersion, particularly when the analyst was the one conducting interviews (Jamieson, 2016). I am fond of the idea of familiarizing myself with the data that I have collected. Manual coding may be slower than software coding, but I wanted to use this technique at least once, and felt that my first field research journey was the right moment to give it a try.

Conclusion

The processes of obtaining and analyzing qualitative data are methodical, and a lack of rigor on the researcher's part may yield flawed results. This chapter detailed the methodological steps I undertook, including convenience and snowball sampling techniques, as well as focus group discussions and data-gathering strategies.

Using the purposive sampling method, I have chosen the following locations to conduct my study: Yoff, Pikine, Kayar, Mbour, Joal and Guet-Ndar. Not only were these sites chosen for their role in the

Senegalese marine economy, but also for their proximity to my home in Dakar. After identifying the target population, I have opted to combine convenience and snowball sampling methods. Adult fishery workers were the constituents of the sample. My approach has made it easy for me to reach out to individuals and conduct focus groups. Subsequently to data collection, I conducted a thematic analysis using a combination of inductive and deductive coding approaches. The next chapter will uncover the results that emerged from the focus groups and subsequent coding and thematic analysis.

Chapter 5: Results

Introduction

In this chapter, I will present the findings of my focus group discussion. I have led 18 focus group discussions totaling 67 participants in Pikine, Yoff, Mbour, Kaya, Joal, and Guet Ndar. As mentioned in the methodology chapter, I have opted for a thematic analysis for my research. Four major themes have emerged from the coding phase, namely: “economic strains”, “accessibility to fish stocks”, “fishery management”, and “adaptation strategies” (see Table 1). I have uncovered the themes emerging from the results during the coding phase; therefore, it is somewhat of a coincidence that this chapter more or less follows the same sequence as my interview guides. At the beginning of each of the focus groups with fishery workers, I asked participants questions about their daily lives. Then questions shifted to their professional duties. Subsequently, I gradually transitioned to questions related to fisheries management. Finally, close-out questions were centered around the coping strategies that they use when faced with hardships.

Thus, this chapter will be structured around the major themes that emerged from the coding process see Table 1) and literature review. I will begin by presenting the results centered around economic strains. The following section will be dedicated to the accessibility to fish stocks. Then I will present the data connecting to the theme of fishery management in Senegal. Finally, the last section of this result chapter will detail the strategies that fishery workers adopt when their livelihoods are threatened.

Table 1: Thematic Analysis table

Themes	Categories	Codes
Economic strains	Daily Expenses	Utilities; Food; Health care costs; Children's school expenses; Large families
	Capital and Professional expenses/investment	Fuel; Pirogues; Engine; Nets; Food; Permits/Licenses; Transportation; Ice; Fish
	Low revenues	Low pay for fishing crew members; low revenue from selling fish
Accessibility to fish stocks	Depleting Fish stocks	Overfishing by foreign permit holders; Illegal fishing; High number of Senegalese fishermen;
	Environmental issues	Seasonal changes; Wind; Tide
	Inaccessibility of fishing sites	Oil and gas exploration; Small boats
Fishery Management	Macro-economic policies	Fishing agreements
	Management policies	Lack of regulations for foreign fleets; Lack of efficient initiative from the government; Lack of control and inability to enforce regulation
	Environmental policies	Lack of mandatory biological rest periods
Adaptation Strategies	Independent strategies to ease financial burden	Tontines within the community; Community savings groups; Loans; Solidarity; Longer fishing trips
	Systemic strategies to ease financial burden	Legal and illegal international fishing; Professional contracts on foreign boats; State funding/subsidizing of capital

5.1 Economic strains

The primary focus of my analysis revolves around the economic challenges confronted by fishery workers on a daily basis. While this theme surfaced during the literature review, it was further

substantiated through the coding process, as respondents highlighted numerous financial obstacles they encountered. During the interviews, participants were asked about their roles within their families and at work, as well as how they generated income. It became apparent that all respondents were grappling with economic strains. Some were expected to be the primary breadwinners in their families, while others shared this responsibility with other family members. Although certain individuals were not obligated to fulfill this role due to other family members taking on the financial burden, they still felt compelled to contribute to the family's income. Additionally, depending on their professional positions, some respondents incurred higher expenditures than others. The coding process revealed three distinct categories of economic strains: personal expenses, professional expenses, and low revenues. Despite their differences, all three categories are intertwined. Both personal and professional expenses were deemed essential by the participants. They expressed that professional expenses were vital for sustaining their livelihoods, while personal expenses were crucial for their survival and the well-being of their families. Because personal and professional expenses are essential to their livelihoods, generating sufficient revenue to cover these expenses is equally crucial. Consequently, constant low revenues further exacerbate their financial challenges.

5.1.1 Personal expenses

Responses regarding personal expenses were generally similar among fishery laborers, with some exceptions. Participants commonly cited utility bills and other household contributions as significant expenses. The primary sources of expenditure for every participant included electricity, water, butane tanks, and food. However, due to the heterogeneous nature of the sample, some variations in responses were observed within different focus groups. In Kayar, fish vendors specifically highlighted the high cost of food, noting that bread costs CFA 75 (approximately CAD 0.17), while onions cost CFA 2000 per kilogram (approximately CAD 4.50) (Interview 6). Conversely, in Guet-Ndar, fish vendors mentioned

other increasingly expensive items necessary to feed their families, such as rice and oil (Interview 16). The diversity among respondents, which included older individuals with grandchildren, middle-aged parents, younger childless individuals, and participants in polygamous relationships, contributed to the variety of responses. For example, respondents with children from Yoff, Joal, Kayar, and Guet-Ndar frequently cited school fees as an additional household expenditure.

All participants reported living in large households. None resided alone or in a "small" nuclear family at the time of the focus groups. Instead, they lived with various combinations of parents, spouses, siblings, siblings' spouses, and other relatives[1]. One polygamous participant, a wholesale fish vendor (*mareyeur*) I met at the Marché Central de Pikine during the first focus group, mentioned living with his two wives, his two brothers, and their wives. However, he did not specify the number of wives his brothers had. Although his brothers contribute to the household's expenses, he is the main contributor, and he called himself "*soutien de famille*"[2] (Interview 1). Among the fishermen, I observed that the majority of those who claimed to be the main financial contributors in their households were middle-aged or older. However, some younger men also assumed this role.

In Yoff, all the fishermen in the focus group were younger. Due to cultural sensitivities[3], I refrained from asking their exact ages directly. Instead, I asked questions to estimate their age groups. By inquiring about their number of years of experience in the field and when they began learning, I determined that three participants had not yet reached "middle-aged"[4] status, while one was middle-aged. Despite their

[1] I have chosen not to ask participants the exact number of people in their household because such a question is often frowned upon in Senegalese culture, especially if it comes from a stranger who is much younger than the respondents.
[2] Someone whose financial contributions are necessary in a household or someone who brings in most of the revenues in a household.
[3] Once again, I have chosen not to ask participants how old they were because such a question is often deemed rude in Senegalese culture.
[4] Between 40 and 60 years old

youth, all of them identified themselves as the primary financial supporters in their households. In Mbour, during my first focus group discussion with fishermen, all participants were significantly younger than those in other locations. None identified as the main financial contributors in their household, but they still acknowledged their duty to provide for their families. Responses among fish vendors, who were primarily women (with Pikine being a notable exception), were relatively homogenous. While none of them self-identified as the main financial contributor in their household, they affirmed that they provide substantial financial support, which is sometimes crucial for their families' survival. All participants mentioned that other household members also contribute financially to daily expenses. Women unanimously reported that food prices have been steadily increasing, making it unaffordable for large families like theirs. "We often have to spend more than CFA 5,000 (approximately CAD 11.25) daily to feed our families [...] Oil, rice, meat, vegetables [...] have become too expensive" (Interview 6). Finally, in Guet-Ndar, respondents from a focus group with fish vendors asserted that healthcare costs constitute an additional expense category in their lives. According to one of them, “Medicine used to cost CFA 100 (approximately CAD 0.23) [...], now it is very expensive [...] When you go to the hospital, you are expected to pay before being taken in [...] sometimes we pay only to be told to come back later.” (Interview 16) Their testimonies on their financial hurdles were put into greater perspective when they also listed their professional expenditures.

5.1.2 Professional expenses

Professional expenses encompass the expenditures necessary for workers to maintain their jobs. When asked about these costs, fishermen in every site reported expenses for boats, fishing nets, fishing gears, fuel, engines, fish bait, fishing permits, and even food and butane tanks that are brought on board during fishing trips. However, these expenditures are spent differently between fishing crews.

The cost of fishing garments has significantly increased over the past decades. In Yoff, fishermen reported paying CFA 30,000 (approximately CAD 68) for fishing garments, a typically one-time purchase that might need replacement if damaged. In Guet-Ndar, fishermen noted that raincoats have become very expensive, costing up to CFA 40,000-50,000 (approximately CAD 90-113.35). Life jackets are also reportedly costly, which likely explains their scarcity on the boats. Among the respondents, boat owners reported that they bear the expenses for fishing tools such as boats, nets, engines, and fuel out of pocket.

Those fortunate enough to inherit at least one pirogue from a family member did not have to buy a boat or pay for access to one. However, those who did not inherit a boat or wished to acquire an additional one expressed the need to save money over a long period before affording a pirogue, though they did not specify a precise time frame. According to various respondents across different sites, the price for a mid-size pirogue was approximately CFA 800,000 (approximately CAD 1,816.80). The prices of pirogues are not fixed, so respondents provided approximations and ranges. Larger boats were reportedly more expensive, costing at least several million CFA for a used one. Fuel costs approximately CFA 500 per liter (approximately CAD 1.14). The price of engines varies with horsepower; large pirogues require bigger engines costing around CFA 3 million (nearly CAD 6,900). Engines for mid-size pirogues are subsidized by the government but still impose a significant financial burden on boat owners. Fishing permits cost CFA 15,000 (approximately CAD 34) per year for mid-size pirogues, with all pirogue owners reporting that they pay this amount annually to renew their permits. Additionally, on top of the cost of their individual garments, crew members pay a percentage of their revenue to pirogue owners as a fee for the use of the pirogue, the fuel, the engine, and the nets. In such cases, upon the crew's return from a fishing trip, their captures are sold, and the owner deducts the crew's percentage for the use of tools before paying them their share of the revenues.

In every focus group, respondents reported owning a pirogue or being related to someone who does, except for the fishermen in Mbour. This might be attributed to the fact that the latter group was much younger, new to the field (meaning that nobody in their families was in the fishing sector), and came from different regions. One reported coming from Dakar, while his colleague sitting next to him stated that he was from Diourbel. In Guet-Ndar, a fish vendor mentioned coming from a family of fishermen and fish sellers, similar to nearly all fish vendors I encountered during the focus groups. She owns a pirogue that her sons use. Another respondent reported that some of her family members own a pirogue, and she sells the fish her sons and nephews bring ashore, as all her brothers are deceased. A fish vendor in Yoff also reported owning a boat that her brothers use.

Fish vendors' expenses primarily include fish, ice, and transportation. According to the respondents, most vendors, whether retail sellers or *mareyeurs*, must purchase fish to resell. However, those with close family members who fish (such as fathers, sons, brothers, husbands, nephews, or in-laws) may receive fish to sell on behalf of these fishermen, as exemplified by one respondent who sells the fish that her nephews bring. Vendors also need ice to keep the fish fresh. Since most do not own large-capacity freezers to produce the necessary amount of ice, they must purchase it. Additionally, those who buy fish from fishermen or fish markets to resell in other locations must bear the costs of transportation.

5.1.3 Low income

Generating consistent revenue is a challenge for both fishermen and fish vendors, stemming from the disparity between expenses incurred (such as professional costs) and income generated from selling fish. A fish vendor in Kayar lamented: "Sometimes you see a boat spending CFA 15,000 (~ CAD 34), CFA 25,000 (~ CAD 56), CFA 50,000 (~ CAD 113) on fuel, even CFA 100,000 (~ CAD 227) for large boats, only to return with no fish. All those expenses bring nothing, yet they have to go fishing again. But

sometimes, by God's grace, they manage to sell enough fish to cover the fuel costs" (Interview 6). Echoing similar struggles, a fisherman in Yoff expressed: "Sometimes you spend CFA 90,000 (~ CAD 204) on fuel, CFA 50,000 (~ CAD 113) on bait, and other fees, totaling CFA 150,000 (~ CAD 340) or more in a single day. Then you come back with fish worth less than CFA 150,000" (Interview 2).

Fish vendors have also reported declining revenues over recent decades. In Kayar, one vendor shared:

> For a long time now, during profitable periodes, we might make CFA 5,000 (~ CAD 11), CFA 4,000 (~ CAD 9), CFA 1,000 (~ CAD 2), CFA 500, or even CFA 100 (~ CAD 0.23) daily [...] But earning CFA 50,000 (~ CAD 113), CFA 25,000 (~ CAD 56), or even CFA 15,000 (~ CAD 34) from selling fish—that's rare [...] it hardly happens anymore. If you make CFA 10,000 (~ CAD 22), you'll feel like you've won a prize (Interview 6).

Another respondent in the same group added:

> Sometimes we're here from morning until night, and we return home empty-handed. The next day, if we earn CFA 3,000 (~ CAD 6), CFA 2,000 (~ CAD 4), or CFA 1,000 (~ CAD 2), we accept it. We thank God. A believer [referring particularly to someone who believes in God] must have faith, praise God, and be grateful for what they have (Interview 6).

According to them, fish supply increases during the cold season (December to April), making it the most lucrative time of year for selling. They recalled that selling fish was more profitable decades ago, whereas nowadays, they often experience more losses than gains from their sales efforts. Figure 11 shows multiple fish vendors from Guet Ndar gathered around a single basket of fish that was brought back by a pirogue, waiting to buy.

Figure 11: Vendors buying fishing from fishermen in Guet Ndar (photographed by Jean-François Rousseau)

In Mbour, fishermen reported not owning a boat and not being part of established fishing families in the area. As mentioned previously, they were not native to Mbour, unlike most respondents in other sites who reported belonging to the community where they worked or having integrated it through marriage. They were rather migrants looking for better professional opportunities and had turned to fishing. Like the overwhelming majority of respondents, they mentioned attending Quranic school rather than a "French school". According to them, pirogue owners do not compensate them adequately or fairly.

One stated: “The pirogue owner does not pay that much. Sometimes, when we come back from a fishing trip, we can tell that we have brought enough fish and should make a substantial amount of money, yet after deducting all the professional expenses, the boat owner will give us sometimes less than CFA 5,000 each (approximately CAD 11)” (Interview 7). Such experience was not universal among respondents. Fishermen in Guet-Ndar mentioned that revenue distribution among fishing crews is relatively equitable, although the boat owner typically receives a larger share for fuel and maintenance. Similarly, in Yoff, fishermen believed that the distribution of revenues among crews was fair. One fisherman stated:

> Fishing is hard and it [involves sharing revenues]. If you make CFA 5000 (~ CAD 11), you will have to share it with others [family, friends, or relatives who come to you with financial issues]. That CFA 5000 can help a lot of people. We fish so we don’t have to beg for money […] If we come back [from a fishing trip] with CFA 10,000 (~ CAD 22) we share it amongst us, and everyone gets CFA 2000 (~ CAD 4) […] Revenues are not consistent; it is all about God’s mercy (Interview 2).

5.2 Accessibility to fish stocks

The topic of accessibility to fish stocks, or lack thereof, was the main theme in several articles in the literature review. The depletion of fish stocks was the main focus of most authors.[5] However, in addition to this concern, two distinct categories emerged from the focus groups regarding fish accessibility: environmental challenges that hinder fishermen from carrying out their activities, and difficulties in accessing fishing sites. Therefore, I will begin by presenting the data on the state of fish stocks, followed by an exploration of environmental issues, and conclude with an examination of the challenges related to accessing fishing sites.

[5] Examples include: Diedhiou and Yang (2018) or Mansfield (2011).

5.2.1 Depletion of fish stocks

When questioned about their views on fish stocks and their impacts on their livelihoods, all fishermen and vendors except fishermen in Mbour who are new to the activity unanimously affirmed that there has been a steady decline in the fish stocks along the Senegalese coast. According to them, the depletion of marine fish stocks has been an issue for the past two decades. They attribute this decline to the overexploitation of fishing resources by industrial vessels, which they claim leave "almost nothing" for Senegalese pirogues. Respondents did not specify if they were referring to licensed foreign fleets, Senegalese industrial boats, or illegal foreign vessels. They used the word "*bateaux*" (boats in French) to refer to all industrial boats. However, it was established in the literature review that there are industrial vessels owned by both Senegalese and foreign people that fish in the Senegalese EEZ. Respondents affirm that industrial fishing boats capture significantly larger quantities of fish than the largest artisanal pirogues. Moreover, they employ fishing nets with small mesh sizes that indiscriminately catch young and small fish, preventing them from reproducing. These unsustainable practices, repeated over the years, are identified as a major contributor to the steady decline in fish stocks.

Another issue highlighted by all fishermen and the Dekkal Geej team is an unethical practice employed by foreign vessel crews. According to these participants, foreign boats erect the Senegalese flag to pass themselves off as national vessels. Participants did not elaborate on the rationale behind this practice. Specific cases were highlighted by respondents from Dekkal Geej. They mentioned instances where boats owned by Spaniards have used the Senegalese flag or have been registered as Senegalese. Some of these boats also employ Senegalese fishermen within their crews. The respondents noted that while these practices are viewed as unethical, they remain legal because the captains may claim they are operating under what they refer to as a "*société mixte*", implying a joint venture involving Senegalese assets or personnel (Interview 18).

Fishermen also pointed out the large number of Senegalese fishermen. However, most respondents amongst them did not hold their Senegalese peers responsible, either partially or completely, for the depletion of fish stocks. Instead, they conveyed the opinion that it is unsustainable for all Senegalese artisanal fishers and industrial vessels (legal and illegal) to fish in the Senegalese EEZs, especially because industrial boasts have the capacity to capture more resources than the largest artisanal boasts. One fisherman in Joal stated: "[L]ook at this shore only [gesturing towards the multitude of pirogues moored there], can you imagine how many fishermen there are? If we all fish, and industrial boats also fish, it will surely impact fish stocks" (Interview 12) (see Figure 12).

Figure 12: Artisanal boats on one side of the Port of Joal (source: France 24)

Respondents at Dekkal Geej, however, have pointed out that Senegalese artisanal fishermen bear some responsibility for this phenomenon. They noted the large number of Senegalese fishermen, explaining that due to the adverse effects of climate change on agriculture, some farmers have transitioned to fishing as a new livelihood (Interview 12). The expansion of the fishery workforce has placed a significant strain on resources.

According to fishermen, free access to the sea is a problem unless it involves coastal people only, as farmers who become fishermen allegedly tend to show less respect for the sea and marine resources than coastal people. Respondents from Dekkal Gejj confirmed that in smaller-scale fisheries, such as those in the Saloum delta in southern Senegal, fishermen demonstrate greater motivation to preserve resources. The same respondents added that overfishing is exacerbated by the modernization of fishing gear, which enhances fishing efficiency and increases catch sizes, allowing fishermen to bring more fish. Additionally, as the population grows, the demand for fish increases, both nationally and in neighboring countries. Because of the increasing demand, fishermen also increase their captures, leading to overexploitation. Both Senegalese and foreign fishermen overexploit the same species: including sardinella, shrimp, and ethmalosa. “Senegalese fishermen are the first harmful actors”, noted one informant (Interview 18), attributing this to expanded fishing capacities, including the use of fine-meshed nets (which catch smaller fish as well) and larger pirogues, as well as the growing number of fishermen resulting in increased fishing pressure and larger catches. Nevertheless, respondents at Dekkal Geej clarified that small-scale fishery workers bear the brunt of the consequences of overfishing, emphasizing their vulnerability in this scenario.

5.2.2 Environmental conditions

According to all respondents, various environmental factors significantly impact fishermen and their access to fish stocks. One critical factor is seasonal changes. Respondents noted that fish stocks fluctuate seasonally, with abundance typically observed during colder months (December to April) and reduced availability during hotter months (May to November). However, respondents did not provide specific reasons for why these seasonal changes affect fish stocks.

Winds and high tides are other conditions that impact fishermen's access to fish, and subsequently vendor's activities and revenues. According to respondents, on windy days, most fishermen opt not to venture out to sea, often dissuaded by authorities due to heightened risks. Similar caution is exercised during high tides, as the risk of drowning increases. This threat is always present, but it is higher on windy days and during high tides. In Guet-Ndar respondents mentioned that the national navy patrols along the Saint-Louis coast, preventing pirogues from venturing out in unfavorable weather conditions. On the day of focus groups 16 and 17, which was windy, fishermen did not go out to fish because the sea was deemed dangerous. The local fishing committee has flags of different colours (green, yellow, and red) at the port. That day they erected the red flag, which signals that fishermen must not go out at sea because the conditions are dire. Sometimes, when some fishermen on the beach notice unfavorable conditions, they communicate warnings among themselves.

Drownings at Guet-Ndar frequently occur at the mouth of the Saint-Louis River. In the past, large pirogues could 'park' on the seaside of the Langue de Barbarie peninsula, but due to the narrowing of the shore, this is no longer feasible. Hence, large and several medium pirogues park along the river's shore, while medium and small pirogues can remain on the beach (refer to Figure 13).

Figure 13: Artisanal boasts in Guet-Ndar on the river shore (photographed by Jean-François Rousseau)

This arrangement is primarily due to the constraints fishermen would encounter when moving those large and very heavy boats to the sea. It is much easier to push and/or pull smaller pirogues from the beach to the water than it is to move larger pirogues. So, a vast number of fishermen in Guet-Ndar have expressed that navigating through the mouth of the Saint-Louis River poses a constant danger, often leading to tragic drownings. However, they have no other choice but to go through the mouth of the Saint-Louis River to debark. Unfortunately, the government has not taken sufficient action to address these challenges and to foster a safer environment for the fishermen of Guet-Ndar. One of the fish vendors poignantly remarked: "[I]f it were the President's children who were involved [in fishing in Guet-Ndar], the government would do something." (Interview 16).

5.2.3 Inaccessibility to fishing sites

Fishermen in Joal and Guet Ndar reportedly have faced significant challenges accessing the ocean during periods when the government conducted feasibility studies for oil and gas extraction projects. Senegalese navy boats patrolling around those targeted sites forced fishermen to change their usual routes, forcing them to seek alternative fishing grounds. In Guet Ndar, a newly constructed platform near the shore, intended for fossil fuel extraction - respondents were uncertain whether the platform was designated for oil or gas extraction -, is monitored by navy boats. These boats ensure that fishermen do not approach the platform during hazardous weather conditions.

As mentioned above, fish stocks are increasingly diminishing, prompting fishermen to venture farther from shore each year in search of marine resources. All fishermen and some fish vendors among respondents across all sites have observed that fishermen now fish beyond local waters. That contributes to the increase in fuel consumption and, therefore, an increase in professional expenses. Additionally, larger and medium-sized pirogues frequently extend their fishing activities beyond Senegalese waters. During every focus group discussion, several fishermen reported that they had been fishing in the Gambia, in Guinee-Bissau, in Guinea Conakry, and Liberia quite often. In contrast, small vessels cannot withstand long fishing trips. Therefore, their access to fishing sites is limited. Combined with diminishing fish stocks, this situation intensifies the economic challenges faced by fishermen.

5.3 Fisheries Management

The theme of fishery management was a pre-established theme that emerged from the literature review. Through this theme, I aimed to know the opinions of respondents on the state of fisheries and the management methods they witnessed throughout the years. The questions for this theme were centered

around policies related to fisheries. Therefore, I have chosen three categories for fishery management: macroeconomic policies, fishing policies, and environmental policies.

5.3.1 Macroeconomic policies

When asked about fishing agreements between Senegal and foreign countries, respondents expressed indignation. They referred to the agreements as “selling the ocean”. The phrase "They [the government] sold our ocean" was a common sentiment heard at every site and during every focus group, except during the discussion with members of Dekkal Gueej. Opinions on foreign fleet fishing in the Senegalese Exclusive Economic Zone (EEZ) were unanimously negative across all focus groups. Fishermen and vendors alike accused foreign trawlers of "destroying the sea." To emphasize the gravity of the situation, several respondents provided numerical comparisons. One fisherman in Yoff stated, "If there were 60 industrial foreign boats along the coast years ago during Abdoulaye Wade's presidency, there are at least 120 now under President Macky Sall" (Interview 2). A fish seller in Kayar stated “Sometimes, when you're on the beach, you can see the trawlers taking what the pirogues should catch. They fish everything and take it away” (Interview 6) Interestingly she added “We are black people, we are here, we know nothing, we do not know what is going on out there [referring to foreign trawlers’ actions and the government’s agreements with foreign entities], we just stay here waiting for God” (ibid).

5.3.2 Fishing policies

Beyond the high number of foreign vessels on the Senegalese coast, respondents also called out the lack of regulations that apply to them. Respondents expressed that the issue was not just the excessive fishing by foreign boats but also the destructive methods they employ. Trawlers drag their nets across kilometers as they catch fish, which destroys the natural habitat of the fish population, and forces them to migrate. Earlier in the chapter, it was mentioned that trawlers also use fine-meshed nets, capturing smaller

fish and hindering adequate reproduction. Senegalese industrial vessels also use illegal practices such as fishing in prohibited zones. Respondents allege that the government is aware of these practices, but does not enforce policies and regulations to overcome such activities. All fishermen interviewed expressed that the Gambia and Mauritania have more effective policies and regulations regarding foreign vessels in their EEZs. More specifically, they asserted that there are fewer foreign vessels along the Mauritanian and the Gambian coasts compared to Senegal. Also, in Mauritania for instance, Senegalese pirogues need to hold a Mauritanian fishing permit in order to venture in their northern neighbor's EEZ. When talking about Mauritanian and Gambian EEZ, informants said: "They [in reference to the Gambian and Mauritanian governments] have organized their oceans very well."

The lack of proper regulatory policies is also paired with a lack of proper surveillance. According to participants at Dekkal Gejj, illegal vessels capture approximately 250,000 tons of fish but do not report their catches. Often, even foreign operators that hold valid licenses are prone to illegal or unethical practices, such as the deliberate choice to debark their captures in their home countries instead of Senegal. This is a major obstacle to accurate monitoring and reporting and hinders the implementation of effective policies to regulate Senegalese fisheries.

Overall, respondents have expressed disappointment in the Senegalese government for its lack of initiatives to enhance surveillance and enforce regulations which would improve the lives of small-scale fishery workers. According to their responses, such lacking initiatives extend beyond fishery-specific policies and encompass broader governance issues. Some participants mentioned that their lives would improve if they did not have as many financial burdens, including the steep cost of food, utilities and health care. In Kayar, all of the fish vendors from the focus group firmly stated that if the prices of rice, oil, meat, and vegetables decreased, it would mitigate the financial stress that they face to a certain extent.

Other respondents have shared that subsidies did not make significant changes in their lives and instead advocated for radical policy changes in the fishing sector, such as the abolition of fishing agreements with foreign actors. In Guet Ndar, fish vendors stated that “the government is not helpful” (Interview 16). Governmental initiatives not only are sparse, but they are also ineffective, and therefore, do not change their situation. The vendors for instance pointed out their experience during the Covid-19 pandemic. During that time, the government provided food supplies ("rice, oil, and macaroni"), but the vendors claimed that it did not significantly improve their situation. They hope that the government will eventually put forth simultaneous policies to regulate and decrease the number of trawlers, decrease the costs of daily expenses and health care, and implement policies to make the mouth of the Saint-Louis River safer for fishermen (Interview 16). They have stated that the president is not the source of the problem. Instead, the issue lies in the capacity of the officials whose responsibilities are to enact policies. The vendors affirmed that officials took advantage of their power during the pandemic to take money from the aid packages meant for communities, triggering comments such as: “They do not help the population as the government asks them to.” (Interview 16)

Still in Guet Ndar, one of the fish vendors told us about a pirogue that had gone fishing in Mauritanian waters, but sank on its journey back to Saint-Louis. She then stated: “[s]everal fishermen die at sea. When such a thing happens, the government sends authorities to offer condolences to the deceased family” (Interview 16). She has no confidence in the government, as it does not provide much help beyond this. However, given the presence of the national navy in Guet Ndar, if a boat is in difficulty nearby, it will receive some assistance.

All fishermen across every focus group agreed that if the government provided even more subsidies for their fishing tools, it would help easing their financial burden. Engines and fuel are subsidized (refer to Figure 14), which seems to please them, but it is not enough to offset the financial strains that come with the lack of revenue and the unaffordability of daily expenses.

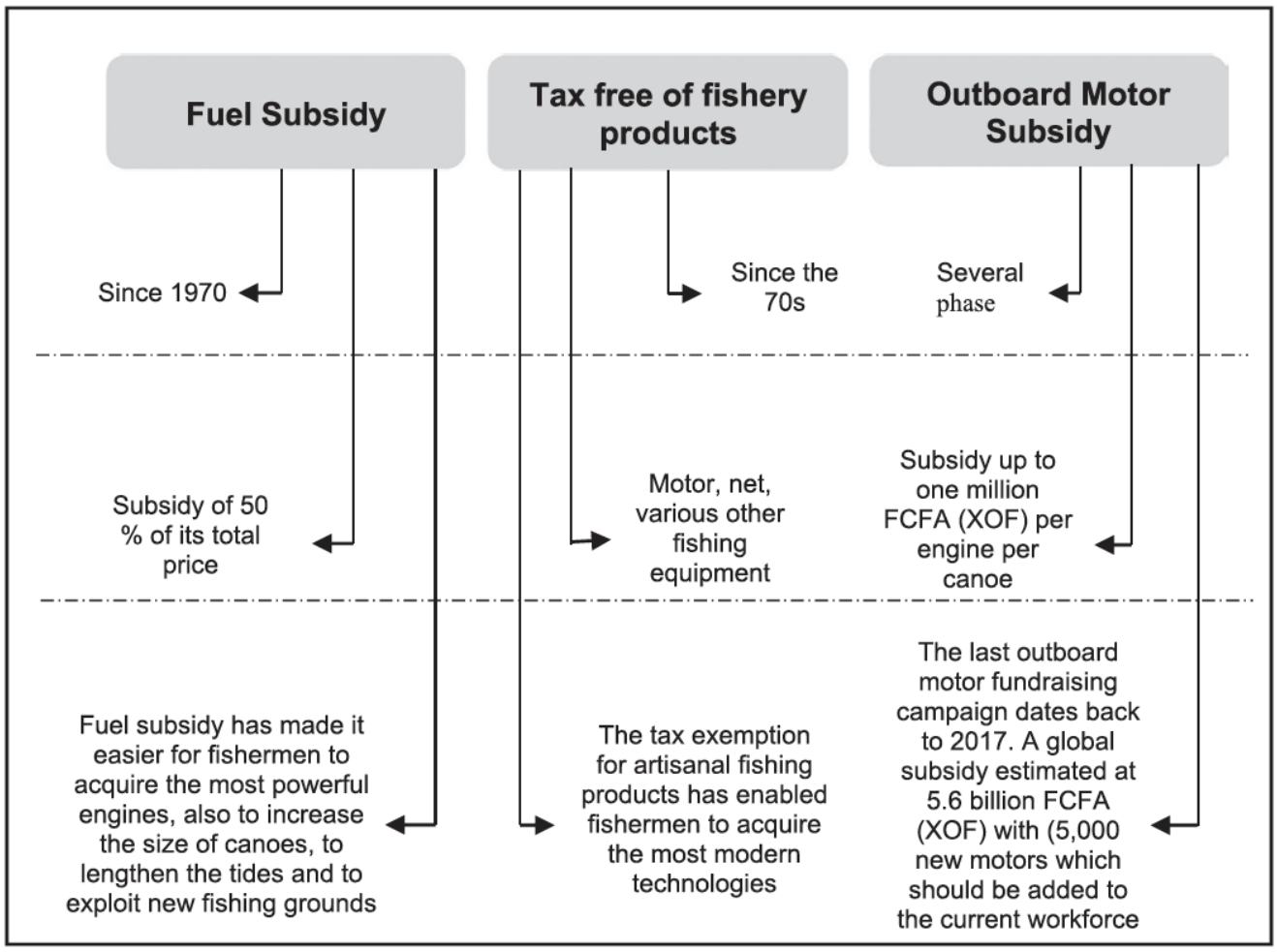

Figure 14: Subsidies in support of artisanal fishing by the Senegalese government (source: Dème and Failler, 2022)

Respondents from USAID's project Dekkal Gejj stated that details on local management tools are missing from the Law No. 2015-18 establishing the Maritime Fishing Code. The Ministry of Fisheries has implemented national plans both for marine fisheries and aquaculture but neglects local activities, a sector that needs optimization. The respondents highlighted the need for devising local climate change adaptation

strategies and setting up local artisanal fishing councils, for instance. They have also asserted that the government would need external help (from NGOs) for the efficient implementation of such plans. Finally, they have proposed the following strategies to better manage the resources: the reduction of the size of fishing nets and the size of pirogues, and the promotion of dialogue platforms to foster exchanges between different actors involved in small-scale fishing.

5.3.3 Environmental policies

Participants were asked about their opinions on the environmental health of the Senegalese coast and its relation to management policies and their livelihoods. Across all focus groups, respondents have expressed that the health of the Senegalese marine ecosystem has been declining over the last two decades. When asked about their opinions on biological rest periods, answers were divided, contrasting with the earlier discussions when individuals overall agreed with other participants from group. All fish vendors and some groups of fishermen seemed to question the repercussions of eventual biological rest guidelines on their livelihoods. One person, referring to biological rest as "closing the ocean" stated: "Close the ocean? If they [referring to the government] close the ocean, how are we supposed to survive?" (Interview 7) Another interviewee mentioned: "Then are they [the government] going to give us money to sustain ourselves and our families?" (Interview 6) These respondents, although skeptical, reported that they would positively welcome biological rest policies under the condition that the government provides them with social assistance to mitigate the financial stress that would occur if they paused or slowed down their professional activities.

Still, most fishermen seemed open to biological rest periods. They believe that overexploitation, without allowing time for fish to reproduce, is a key reason for the decline in stocks. They also criticized foreign vessels for capturing smaller and younger fish. Fishermen all expressed that Mauritania has more

effective biological rest regulations than Senegal. They argued that such rest periods would benefit their livelihoods by allowing fish populations to reproduce and increase. Fishermen and the members of Dekkal Geej reported that there are no clear biological rest policies for marine fisheries in Senegal. Respondents from Dekkal Geej stated that there is a policy that bars people from fishing shrimp during the night in the Saloum delta, in southern Senegal, for two months during the warm season (between July and September), prompting fishermen in that community to farm during that period. Such practice has long been adopted in that area. Participants from Dekkal Geej have also recommended the establishment of designated spawning areas.

In Kayar, fish vendors mentioned that they set local fishing committee responsible for monitoring fishermen's catches. One of the respondents observed: "Our fishing committee is strict about capturing small fish. When our fishermen capture small fish, they must return them to the ocean. If they insist on bringing them ashore, they risk being fined. Our community is committed to protecting the ocean" (Interview 6). She continued, noting: "This policy is not enforced in every fishing community, but authorities should ensure its implementation. What drives a country forward is better than what holds it back" (Interview 6).

5.4 Adaptation Strategies

The increasing cost of living is a major cause for concern. As one respondent stated: "When there are not enough fish, we have to make do" (Interview 16). To address the challenges posed by the decline in the artisanal fishing sector, respondents identified several strategies adopted by fishery workers. Some of these strategies are community-based and independent, while others are systemic, and implemented on a larger scale.

5.4.1 Independent strategies to ease financial burdens

Some fishery workers have turned to local community savings groups to meet their financial obligations. Fish vendors in Saint-Louis have expressed their reluctance to borrow from banks due to high interest rates. As one person explained: "For example, for a loan of CFA 500,000 (approximately CAD 1,133), you may have to pay up to CFA 100,000 (approximately CAD 226.60) in interest" (Interview 16). With the local community saving groups in Guet-Ndar, participants make monthly deposits for 11 months, also contributing a small amount towards social development or assistance for people who are in need. After 11 months, individuals may withdraw their money at a low interest rate. If no community member has utilized emergency financial assistance from the savings group, the amount designated for social contributions is refunded to the clients.

The fish vendors also reported that they established a '*tontine*'[6] system in the past. However, they dismantled it temporarily due to an influx of women facing financial difficulties who were borrowing from the *tontine*. Additionally, the borrowing limits were restricted. Nevertheless, according to the respondents, *tontines* are still considered a better alternative than the banks that impose high interest rates.

The concept of solidarity frequently emerges from my dataset. The fishermen at Yoff affirmed that the relationships they maintain are not solely professional. They help each other during dire times. Some of them are boat owners who stated that if their crew does not catch enough fish for the members to earn substantial revenues, they may decrease the percentage retained to cover the cost of fishing tools, allowing crew members to take home more money than they would otherwise. Borrowing and lending money is also common. Across most sites, participants reported that when they do not make enough income some

[6] Usually comprised of women (although men have begun establishing their own), these systems are informal arrangements for saving and/or lending. Participants make regular, equal contributions, and at the end of a predetermined period (such as a month, two months, or more), a different member of the group withdraws the total amount contributed by all members.

days, they borrow from one another, and some among them spontaneously offer to lend money to their peers. One fisherman in Yoff stated: “If you are lucky, some days you make decent amounts, but other days you barely make anything. So, you’ll go to someone close and borrow money, and next time you make enough, you’ll pay them back. That is our way of life” (Interview 2). Those testimonies were staggeringly different from what I heard in Mbour. The fishermen in Mbour reported not having any sense of community. They were strictly treated as employees. The type of solidarity seen between fishermen is also extended to fish vendors.

During the second focus group with fish vendors in Guet-Ndar, respondents did not have any fish, or only had a small amount to sell because pirogues did not go out fishing due to strong winds. Only a few small pirogues went to sea despite the unfavorable weather, and they caught very little fish. Vendors mentioned that when they have no fish to sell, fishermen or *mareyeurs* might give them a small amount of money to help bring some income home. These amounts can be as little as CFA 100 (approximately CAD 0.23). On days when the fish catch is insufficient, vendors who manage to sell some fish often share their earnings with their less fortunate counterparts. This camaraderie extends among fish sellers as well. The same group of women in Guet-Ndar stated that if one of their peers or friends does not make enough revenue, they lend her or offer her money. In Kayar, fish sellers expressed the same sentiment. Fish vendors also added that on days when they lack money to buy fish for resale, they combine their limited funds to buy fish, sell it, and share the proceeds among themselves.

5.4.2 Systemic strategies to ease financial strains

According to fishermen and fish vendors across all focus groups (except fishermen from Mbour who were new to the profession), decades ago fishermen did not need to venture far away from the shore to fish. The fishermen in Yoff recalled that in their youth, during the late 1990s, they could see fish in the

water close to the shore, indicating that fish stocks were once abundant. Back then, fishers did not need to travel far to catch substantial amounts of fish. As fish stocks have dwindled, fishermen now have to venture further and stay longer at sea to bring back enough catches to support themselves and their families. One of them recalls:

> Around 1999, it [fishing] was great. We used to fish for only short periods. Now, we go to sea from 6 a.m. to 6 p.m., and our catch isn't even the equivalent of a basket. Previously, we could catch enough fish in just 10 minutes, but now that's impossible. Now, we have to go further and further to fish. Previously, we didn't go beyond 5 kilometers, but now we venture 60 kilometers into the ocean, and sometimes into areas like Cap Vert (Interview 2).

However, only crews in large pirogues have the capacity to fish at sea for weeks. Smaller pirogues are not equipped nor suited for such long fishing trips. In Guet-Ndar fishermen also sell fish caught in the Saint-Louis River, though it is not as flavorful as sea fish, according to them. Prices also vary: some river fish can be more expensive than certain marine fish, and vice versa.

Additionally, a high number of fishermen choose to fish both inside and outside of the Senegalese EEZ. Several pirogue owners based in Guet Ndar have obtained a Mauritanian fishing license. Fishing in nearby Mauritania is lucrative because fish stocks are more abundant there than in Senegal. As previously mentioned, some fishermen venture to neighboring countries' EEZ, going as far as Guinee Conakry and Liberia. Respondents only mentioned the need for fishing permits when traveling to Mauritania, with no such requirement stated for The Gambia or other neighboring countries.

Some respondents have also reported knowing fishermen who were hired to work on foreign vessels and others who migrated illegally to European countries. When asked if they also considered

immigrating illegally, they responded in the negative, with one person arguing that it was dangerous, even for “experts who know the sea” (Interview 2).

Respondents also discussed government subventions. Fishermen in Yoff and Joal expressed gratitude for the engines and fuel subsidies they receive, even though that particular policy has not significantly improved their financial conditions in the long term, it has eased their financial burden at times.

Another strategy that helps mitigate the challenges workers from the fishery sector face is the support from private organizations such as Dekkal Geej. As mentioned in the methodology chapter, Dekkal Geej is a project funded by USAID, aimed at supporting the government's initiatives in the fishing sector. Filling in for the lack of government support, the Dekkal Geej team provides assistance in achieving government priorities, conducting research, evaluating resources, co-managing daily activities, and monitoring. According to the respondents from the team, while state decision-making was ineffective at the local level, USAID has played a crucial role in reinforcing state plans. Several advocacy cases have yielded positive results, with many still pending. Respondents reported at the time of the focus group that one of Dekkal Geej’s priorities was to encourage the government to halt the signing of a potential fishing agreement with China. Another objective aims to foster cooperation between private organizations, members of parliament, and fishery workers.

Conclusion

This chapter presented the results I gathered during 18 focus group discussions involving 67 respondents. The first section explores the respondents’ experiences with economic strains related to daily expenses, professional expenses, and low revenues. While most responses on these matters were similar, certain differences emerged due to the heterogeneity of the sample, influenced by factors such as the

respondents' age range and family structures. The second part delved into the issues regarding respondents' access to fish stocks. In that section, three main categories of circumstances affect the access: stock depletion, environmental conditions, and inaccessibility of fishing sites. The third section presented data on fishery management, including macroeconomic policies, management policies, and environmental policies related to the fishery sector in Senegal. Finally, the last part focused on participants' answers about the strategies they deploy to overcome the livelihood stressors they must cope with.

Overall, respondents conveyed a great sense of pride in their work and the (financial) independence that steady and sustainable revenues provide. The level of solidarity evident in their responses was also remarkable. Despite often living in poverty, these individuals, along with countless others, seek to help one another. While they express discontent and even helplessness toward the government and foreign trawlers, they seem to possess an infallible faith in God and unwavering hope. In the next chapter, I will analyze the data and demonstrate how they answer my research questions.

Chapter 6: Analysis

Introduction

In this chapter, I synthesize and interpret the key findings from my research. As highlighted in the introduction, this study aims to answer the following research question: How does the management of Senegalese fisheries influence unsustainable fishing practices and how do artisanal workers adapt in the face of changes in their livelihoods? In order to achieve this, I concentrated my inquiries along three main sub-questions, namely: 1- How do artisanal fisheries workers perceive the impact of foreign fishing on their livelihoods?; 2- What policies has the Senegalese government implemented to improve the conditions of artisanal workers and enhance their well-being?, and; 3- What changes have these workers made, or attempted to make, to adapt to shifts in the fishing sector? This analysis aims to provide a nuanced understanding of the dynamic interplay between fisheries management, the presence of foreign trawlers, and the livelihoods of Senegal's artisanal fishery workers. The insights gained from this analysis are intended to provide answers to the research question and sub-questions, and to inform both policy and practice, contributing to the sustainable development of the artisanal fishing sector and the well-being of coastal communities. My analysis draws on information from the literature review, theoretical framework, and data collected from respondents.

In the first section, I detail the main issues surrounding fisheries management, including the depletion of fish stocks, environmental challenges, and access to fishing sites, which emerged as a central source of dissatisfaction among respondents. Frustration with fishing agreements between Senegal and foreign countries was consistently expressed across all focus groups. Criticisms centered on increased foreign fishing activities under different presidencies and the perceived lack of government action to address these issues. Participants noted a decline in the health of the marine ecosystem over the past two

decades, which they attributed to ineffective regulations and insufficient surveillance of foreign vessels, often involved in destructive fishing practices. There was also disappointment in the government's failure to support small-scale fishers, with many advocating for radical policy changes and stricter enforcement of existing regulations.

In the second section, I explore the economic challenges faced by fishery workers, focusing on three main areas: personal expenses, professional expenses, and low income. Fishery workers, including fishermen and fish vendors, reported significant financial strain due to the high costs associated with essential household and professional needs. Personal expenses often include utility bills, food, and school fees, and these financial burdens are commensurate with the number of household members. Professional expenses are equally demanding, covering the cost of fishing equipment for fisherfolk, and the cost of fish and ice for fish vendors. The income generated from fishing and fish vending is often insufficient to cover these costs, leading to financial instability. Despite their efforts, fishery workers frequently encounter low revenues, with some days yielding little to no income, making their financial situation precarious.

Finally, in the last section, I outline the adaptation strategies employed by fishery workers in response to the economic challenges posed by the decline in the artisanal fishing sector. These strategies are divided into independent, community-based efforts and systemic, larger-scale initiatives. Respondents have turned to local savings systems to meet financial obligations, with these community-driven approaches offering lower interest rates compared to banks. Solidarity also plays a crucial role, with fishermen and fish vendors helping each other during difficult times. The relationships between workers extend beyond professional ties, fostering a strong sense of community, though this varies by location. On a larger scale, fishermen are increasingly forced to venture further from shore due to dwindling fish stocks, with some even fishing in neighboring countries. Additionally, they benefit from government subsidies, although respondents declared that they only provide short-term financial relief. Finally, the fishing sector

benefits from external support provided by non-governmental organizations, such as Dekkal Geej, funded by USAID.

6.1 Fisheries Management Issues

As highlighted in the previous chapter, fishermen and vendors are discontent with fisheries management in Senegal due to the decline of marine resources, which they largely attribute to industrial overfishing, environmental challenges, and restricted access to fishing sites. They criticize the government for ineffective policies, lack of enforcement, and inadequate support.

Fishermen and vendors report a significant decline in fish stocks along the Senegalese coast over the past two decades, attributing this primarily to the overexploitation of resources by industrial vessels. Industrial boats, including both Senegalese and foreign vessels, capture large quantities of fish, often using small-mesh nets that indiscriminately catch young fish, contributing to the steady decline in fish populations. Fishermen and vendors reported being discontent with the government's fishing agreements with foreign countries, which they perceive as "selling the ocean" and allowing foreign trawlers to overexploit resources. A lack of effective regulations and enforcement against destructive fishing practices by both foreign and Senegalese industrial vessels exacerbates the problem. There is a perceived need for clear biological rest policies, local climate adaptation strategies, better management tools for small-scale fisheries, and strategies known to enhance fish resource availability (Interview 18). While some fishermen support the idea of biological rest periods to allow fish populations to recover, others express concern about the financial impact on their livelihoods.

However, the outcry regarding fishery management is not limited to macro-economic and micro-economic policies. Indeed there is also a lack of policies that aim to ensure the safety of fishermen. The narrowing of the shore in Guet-Ndar poses a danger to fishermen, leading to frequent drownings as they

navigate through the mouth of the Saint-Louis River. Respondents highlighted the lack of initiative from the government to remedy the issue. Overall, the government's failure to provide sufficient support, including financial assistance and better surveillance, leaves small-scale fishery workers both financially and physically vulnerable. Respondents reported that while they benefit from government subsidies, they are not sufficient to alleviate their financial burdens.

Fishermen recognized the unsustainable nature of current fishing practices within Senegal's EEZs, where both artisanal and industrial vessels compete for dwindling fish stocks. While artisanal fishermen do not entirely blame their peers for the depletion of resources, they acknowledge that the sheer number of fishers, coupled with the industrial sector's capacity to capture larger quantities of fish, exacerbates the strain on marine resources. This perspective is further supported by respondents at Dekkal Geej, who pointed out that the influx of farmers transitioning to fishing, driven by climate change's impacts on agriculture, has significantly expanded the fishery workforce, contributing to the current overexploitation of marine resources. This statement is supported by Sall's (2012) analysis of rural flight during the 1970's, which was prompted by the decline of farmer's livelihood. Many of the farmers who felt forced to transition to other sectors turned to fishing, which increased the workforce of the fisheries sector. A new such wave is now ongoing.

The respondents also emphasized that the modernization of fishing gear and the growing population have contributed to overfishing, with both Senegalese and foreign fishermen targeting the same species, leading to overexploitation. The findings highlighted the vulnerability of small-scale fishery workers, who bear the brunt of the consequences of overfishing despite being among the least responsible for the crisis. Trawlers' fishing capacities are much larger than artisanal boats'. These findings align with the perspective of Bryant and Bailey (1997) that the disadvantages (and benefits) of environmental issues are unequally shared among stakeholders, leading to ongoing cycles of socio-economic inequality. The

data also support Deme and Thiao's (2021) assessment of the government's unsustainable management strategy that focused on the modernisation of fisheries. Indeed, the authors affirmed that government policies inadvertently fueled the overfishing crisis. The government's push for modernization in the fishing sector, aimed at stimulating economic growth, led to the expansion of fishing units and stakeholders. Policies such as "free access to the sea", tax abolition on marine resources, and fuel subsidies were intended to attract investments but instead created conditions for overfishing (Dème et al. 2022; Deme and Thiao, 2021).

Another significant issue raised by respondents is the lack of effective biological rest periods for fish populations, which they identify as a key factor in the decline of fish stocks. Overfishing, driven by the absence of adequate rest periods, prevents fish from reproducing at sustainable levels. The fishermen across all focus groups contrasted Senegal's situation with that of Mauritania, where more effective biological rest regulations have been implemented, resulting in more abundant fish stocks. Since 1991, Mauritania has implemented an annual biological rest from August 1 to September 31 to protect marine ecosystems and support sustainable fisheries (FAO, 2006). In 2004, the resting period was extended by an additional month in May, resulting in a total of three months of biological rest each year (ibid). The primary goals of this initiative are to reduce fishing efforts to allow fish stock regeneration, preserve marine ecosystems, and promote the sustainable management of fishery resources (ibid).

The absence of clear biological rest policies in Senegal aggravates the overexploitation problem, underscoring the need for targeted interventions such as establishing designated spawning areas to help sustain fish populations and support the livelihoods of those who depend on the fishing industry. Respondents and the authors aforementioned highlighted the unintended consequences of expanding the fishing workforce, whether through government policies or environmental shifts. They illustrate how economic incentives and environmental pressures have converged to create a situation where the

sustainability of fish stocks is severely threatened. Similarly, inadequate management from the Senegalese government was the premise of Stilwell et al. 2010's analysis which argues that the government's policies foster an environment that favours unsustainable fishing practices in Senegal's EEZ.

These observations only highlight the unsustainability of marine resources in Senegal's EEZ because of the manner in which they are exploited. Chambers and Conway (1991) stated that a livelihood encompasses the skills, assets and activities necessary to sustain one's living. Additionally, a livelihood is considered sustainable when it can withstand and recover from stress and shocks, preserve or improve its capabilities and assets, and offer viable livelihood opportunities for future generations. The bilateral agreements allowing foreign trawlers in the EEZ, illegal foreign vessels, and the large number of senegalese fishermen (artisanal and industrial) allowed to fish, all represent stresses and shocks that the resources cannot withstand.

Additionally, Senegal's marine resources are being exploited at unsustainable rates, making it increasingly difficult for them to recover from shocks and stress by reproducing at a rate that matches or exceeds the rate of exploitation. This steady depletion of marine resources, driven by destructive fishing practices, particularly those involving foreign actors, directly threatens the sustainability of livelihoods dependent on these resources. The artisanal fishing sector is facing immense challenges recovering from the stresses and shocks that lead to the depletion of marine resource. Workers in this sector struggle to secure the necessary assets to sustain their livelihoods, largely due to the high costs associated with professional expenses. These combined challenges cast doubt on the ability of future generations to continue practicing artisanal fishing as a viable livelihood. As long as the marine resources continue to dwindle, fishing cannot be considered a sustainable livelihood.

However, unlike some authors and respondents who seem to hold small-scale fishers as equally responsible as industrial trawlers for the issue, I do not blame them. The main goal of my research is not to put blame on an entity, but I have to state my opinion that among all stakeholders involved, artisanal fishers should be the last one to blame. Some stakeholders remain distant from the immediate consequences overfishing in Senegalese waters. Small-scale fisheries workers are the first to experience the sector's decline, facing economic, social, psychological, and physical challenges. As discussed in Chapter 5, most of these workers lack formal education and possess skills and knowledge primarily within their field, limiting their opportunities to find employment in entirely different sectors. Small-scale fishers need to fish more than any other party because of their lack of safety nets. They are aware of the depletion of fish stocks and what causes it. But they keep fishing – i.e. adding stress on the resources – because their options are limited. Most importantly however, small-scale fisheries cannot exploit resources at the same intensity as industrial fisheries. They do not have the necessary resources, including technology, to achieve the same results as industrial vessels.

6.1.1 Policies to Support Small Scale Fisheries

Although small-scale fishery workers benefit from subsidies, the 1998 and 2015 Fishing Codes do not directly address specific subsidy strategies for small-scale fisheries labourers (Law No. 1998-18, 1998; Law No. 2015-18, 2015). The 2015 Fishing Code, for example, mentions several support mechanisms, such as the development of artisanal and industrial fishing, with particular attention to combating poverty and ensuring food security (Law No. 2015-18 , 2015). Yet, they are not specifically described as direct subsidies to workers. Article 24 states: “The State promotes the development of artisanal fishing given its vitality and its socioeconomic importance, particularly its contribution to poverty reduction, food security, and growth” (ibid). While it does not specifically mention subsidies, State support could include financial or institutional assistance for artisanal fishing workers which may translate to reserving specific areas for

artisanal fishers for instance. Article 6 states that the government promotes the co-management of fisheries with professional organizations and communities (ibid), which may also include financial support to facilitate this participation. Respondents reported that while they benefit from government subsidies on fuel and engines and tax free fishery products, additional subsidies for their fishing equipment would alleviate their financial burden, as the current support does not adequately compensate for their low income and high daily expenses.

Additionally, participants have stated that fishing was more lucrative decades ago. According to the fishermen, marine fish stocks have been depleting for the past two decades. They blame this decline on the overexploitation of fishing resources by industrial vessels, which they claim leave "almost nothing" for Senegalese pirogues. Fish vendors in Kayar illustrated the decline in revenue over recent decades, recalling that selling fish was once more lucrative. Today, however, they often end their workdays with little to no earnings. All respondents reported that there have been more trawlers in Senegal's EEZ during Macky Sall's presidency (2012-2024) than under Abdoulaye Wade's (2000-2012). Additionally, over the past decades, the cost of fishing gear has risen sharply. A woman in Kayar mentioned that Abdoulaye Wade [referring to the government's management strategies] was "more empathetic" (Interview 6).

Surprisingly, as stated in the literature review, the 2015 Fishing Code imposes stricter criteria for granting licenses to foreign vessels, including specific requirements on international cooperation. International agreements must now "strictly align with national resource management objectives" (article 29). Also, the 2015 Code imposes stricter penalties compared to the 1998 version, with much higher fines for illegal foreign trawlers, ranging from FCFA 500 million (over CAD 1.5 million) to FCFA 1 billion (nearly CAD 2.4 million). Given the stricter regulation, one would expect less infractions in Senegal's EEZ.

Subsequently to the publishing of the 1998 Fishing Code, the government implemented its new management approach by establishing 27 artisanal fishery councils (CLPA) along the Senegalese coast, aiming to create a sustainable management system for local fisheries (Deme et al., 2022). The 2015 Code seems to encourage the replication of that initiative. The ultimate objective of those councils was to foster collective decision-making and support local efforts toward sustainable resource management (Deme et al., 2022). As mentioned in the results chapter, in Kayar a local fishing committee was established to monitor catches and enforce regulations, such as prohibiting the capture of juvenile fish. This committee reflects the community's commitment to ocean conservation. However, the respondent pointed out that this policy is not uniformly applied across all fishing communities and urged that authorities should enforce it more broadly, as progressive measures are crucial for national advancement.

Although the 1998 and 2015 Fishing Codes share common legislative bases concerning the management of fisheries resources in Senegal, the 2015 version conveys a stronger emphasis on sustainability, on the regulation of foreign vessels, and more severe sanctions for infractions. However, respondents insisted that decades ago, there were much less foreign trawlers and more marine resources. Additionally, the information in the literature review reveals critical gaps in the Senegalese fishing sector, particularly concerning local management and regulatory frameworks. Respondents from USAID's project Dekkal Gejj highlighted that the national fishing code (of 2015) lacks specific provisions for local management tools, which are crucial for sustainable fisheries. Despite the Ministry of Fisheries' efforts to implement national plans for marine fisheries and aquaculture, local activities (particularly small-scale fisheries) remain sub-optimal.

6.1.2 Lack of Surveillance and Sanctions

There was, among respondents, a significant concern regarding the illegal and unethical practices of both foreign and Senegalese vessels, particularly in prohibited zones, with little to no intervention from the government. The detrimental practices of foreign trawlers include the use of fine-meshed nets and destructive trawling methods, which not only deplete fish stocks but also devastate marine habitats. These practices force fish populations to migrate, exacerbating the already strained resources available to local fishermen. The issue is often pointed out by authors highlighting that illegal industrial boats (with no valid licenses) of Chinese, Russian and other unknown origins, are not the only ones guilty of it (Okafor-Yarwood 2022; Belhabib et al., 2014; Vidal, 2012; Stilwell et al., 2010). Indeed, valid permit owners such as Senegalese industrial vessels and European trawlers have also carried out illegal, unreported, and unregulated fishing (IUU) practices (Belhabib et al., 2014; Okafor-Yarwood 2022).

Another recurring issue is the lack of reliable data and inadequate surveillance, which hinder the implementation of effective fishery management policies. The respondents from the Dekkal Gejj project, for instance, note that illegal vessels often go unreported, and even legal operators sometimes engage in unethical practices, further complicating monitoring efforts. This lack of accountability is also observed in the broader context of international fishing agreements, where foreign fleets, particularly from the EU, are accused of overfishing and violating international conventions (Salem, 2009). Moreover, authors like Doumbouya et al. (2017) criticize the government for imposing only minimal penalties on the rare occasions when illegal practices by vessels are detected. They report fines as low as $1,000 (Doumbouya et al., 2017).

Respondents from Dekkal Gejj, emphasized the necessity of developing and implementing strategies that are tailored to the specific needs and conditions of communities, highlighting an urgent need for localized climate change adaptation strategies, better resource management, and significant policy reforms. These strategies include reducing the size of fishing nets and pirogues, establishing

artisanal fishing councils, and promoting dialogue among stakeholders involved in small-scale fishing. However, such measures, according to them, require external support from entities like NGOs to ensure their success, as local communities and the government may lack the necessary resources and infrastructures to implement these changes independently.

A parallel can be drawn between Senegal's regulatory shortcomings and the seemingly more effective policies of neighboring countries like Mauritania and The Gambia, highlighted by respondents. Fishermen pointed out that these countries have better-organized regulatory frameworks that limit the presence, and subsequently the impact, of foreign vessels in their Exclusive Economic Zones (EEZs). Respondents reported needing a valid Mauritanian permit to fish in Mauritania's EEZ. In December 2018, Senegal and Mauritania signed a (new) fishing agreement allowing 400 Senegalese pirogues to fish in Mauritanian waters with a valid license, for a total 50,000 tons of pelagic fish, which must be unloaded under the supervision of Mauritanian fishery experts (RFI 2018). Mauritania has long had rigid regulations for its EEZ. In 2017, Mauritanian authorities launched operations of control on artisanal fishing boats, following the introduction of a legislation that required foreign shipowners to employ Mauritanian fishermen, unless exempted (RFI, 2017a). Additionally, Mauritanian authorities often confiscate clandestine artisanal boats. In 2017, over a course of days, over 220 pirogues were confiscated, making several hundred Senegalese fishermen unemployed (RFI, 2017a).

This comparison between Senegal's and neighboring countries' surveillance of their respective EEZ underlines the perceived inefficacy of the Senegalese government in safeguarding its marine resources. The focus groups' findings revealed a clear consensus among respondents regarding the harmful practices of foreign fishing fleets, the inadequacy of Senegalese regulatory and enforcement mechanisms, and the broader socio-economic implications of these issues. The comparison with neighboring countries further underscores the need for more effective governance and international

cooperation to protect Senegal's marine resources and improve the livelihoods of its fishing communities. For developing nations, enforcing regulations and sanctions on more powerful actors (governments or private firms) can prove difficult due to unequal power dynamics. That is one of the premises of political ecology, which explores how power imbalances between government agencies and local populations influence resource management practices (Bryant and Bailey, 1997).

The European Union appears to be taking advantage of the difficulties faced by low-income countries to promote a hostile political environment that benefits its own economy at their expense. Salem (2009) argues that the EU pressures some of its African partners by threatening not to sign trade agreements or preferential tariff deals to gain disproportionately large access rights relative to available fishing opportunities (p. 27). The author further notes that during renegotiations of fishing agreements, the EU applies various forms of pressure on countries exporting to Europe, such as withholding unused aid, imposing more rigorous health inspections, and enforcing stricter standards (Salem, 2009). The EU is also accused of negotiating "cheap" compensation in exchange for access to the Exclusive Economic Zones of low-income countries. This can be explained by the fact that various groups sign these agreements: the European Commission, the governments of the partner countries, the trawler owners, and rarely the representatives of local fisheries in the partner countries. However, each party seeks to negotiate advantageous terms at the expense of the others (ICSF, 1991). Thus, when countries sign unfavorable agreements, it is often because more powerful parties have been able to exploit other parties' "weakness."

These observations of power dynamics between developing countries and the EU closely align with the statement that more powerful countries in need of resources view Senegal as an optimal target due to its low economic power and colonial past (Jönsson, 2019). Senegalese fisheries management strategies, including its bilateral agreements or minimally enforced sanctions for illegal practices, reflect the power imbalances associated with this context. However, Mauritania and the Gambia are also

developing countries. If their governments established clear regulations that are effective to a certain degree, what stops the Senegalese government from following their footsteps? Developing countries are not homogenous, and their differences, along with their similarities, go beyond languages and cultures, resulting in potentially vastly different governance systems.

However, I firmly believe that the Senegalese government is capable of enforcing strict mechanisms to protect its EEZ and coastal communities. One respondent, a fish vendor, said during a focus group: “We [referring to the community or entire population at large] are black. We do not know what happens over there [gesturing to the ocean]” (Interview 6). Her statement reflects a sense of powerlessness. But towards whom? Overall, the analysis reveals several recurring themes, with a particular emphasis on the destructive impact of foreign fishing vessels, the lack of adequate regulatory and enforcement mechanisms by the Senegalese government and the uneasy and multiscalar power plays that shape Senegal fisheries and the fates of its workers.

6.1.3 Accessibility of Fish Stocks

In addition to the depletion of marine resources due to foreign actors fishing in Senegal’s EEZ, respondents highlighted significant challenges in accessing fish stocks, driven by various environmental and external factors. Seasonal fluctuations play a major role, with fish stocks typically more abundant during colder months (December to April) and less available during the hotter period (May to November). Fishermen's access to marine resources is also heavily influenced by weather conditions, particularly winds, and high tides, which can render the sea too dangerous for fishing. Additionally, respondents pointed out that access to fishing sites has become increasingly difficult due to government activities related to oil and gas exploration. Fishermen in Joal and Guet-Ndar reported that navy patrols around these sites forced them to alter their usual routes, pushing them to seek alternative fishing grounds. This

disruption, combined with the diminishing fish stocks, has forced artisanal fishermen to venture further from shore, often beyond Senegalese waters, leading to higher fuel consumption and increased operational costs, along with higher risks of death.

These challenges illustrate the criticism of the blue economy by Bennett et al. (2021). The authors affirmed that the exploitation of the seas poses significant risks to coastal communities, including restricted access and depletion of fishery resources because in a blue economy, corporations and economic growth are prioritized over the rights and livelihoods of coastal populations (Bennett et al., 2021). Yet, some experts placed great hopes in the capacity of the blue economy framework to enhance artisanal fisherfolk livelihoods. According to the United Nations, one of the goals of the blue economy framework was to contribute to food security and poverty eradication (UNRIC, 2022). In the World Bank's report by Vierros and De Fontaubert (2017), it is stated that activities within the blue economy must fulfill three key criteria: generating social and economic benefits for current and future generations, ensuring the protection and restoration of marine ecosystems, and adopting clean technologies that minimize waste and promote recycling. This particular perspective on the blue economy closely aligns with Chambers and Conway's (1991, p.6) argument that a livelihood is considered sustainable when it can "cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, and provide sustainable livelihood opportunities for future generations." Nevertheless, respondents' experiences and experts' analysis have shown that the exploitation of marine resources in Senegal carries several drawbacks that greatly affect coastal communities, particularly fisheries workers.

6.2 Economic Strains and Their Consequences of the Lives of Small-Scale Fisheries Labourers

The analysis of respondents' answers and the literature review reveal the significant economic strains faced by fishery workers in Senegal, highlighting their precarious livelihoods and the impacts of both domestic and foreign fishing practices on their financial stability. Respondents consistently expressed concerns about the diminishing returns from their fishing activities, which have led to a cycle of increasing expenses and decreasing revenues. The costs associated with maintaining their livelihoods as artisanal fisheries labourers are significant. These include expenses for boats, fishing nets, garments, fuel, engines, and permits. Fishermen often face high costs for essential equipment like raincoats and life jackets, which have become increasingly expensive. Fish vendors also incur professional expenses for purchasing fish, ice, and transportation. Many vendors must buy fish from fishermen or markets to resell, and those without adequate storage equipment must purchase ice to keep their fish fresh.

The disparity between high expenses and low revenues exacerbates the financial difficulties of fishery workers, almost all of whom are part of the informal sector. Fishermen often spend considerable amounts on fuel, only to return with insufficient earnings to cover their expenses. Vendors face similar challenges, with declining revenues over the years making it increasingly difficult to sustain their businesses. Many vendors now even consider earning larger amounts of money as a rare occurrence, reflecting the diminishing profitability of the artisanal fishery sector. The seasonal nature of fish availability further exacerbates these challenges, with respondents pointing out that the cold season (December to April) is the only time of year when they can expect a slight increase in fish stocks and sales.

The analysis of respondents' testimonies highlights the other pervasive economic challenges faced by fishery workers. Personal expenses, including utility bills, food costs, and school fees, were universally acknowledged as burdensome. The high cost of living, particularly food prices, was a common theme across sites. For instance, fish vendors in Kayar emphasized the rising prices of basic food items like bread

and onions, while those in Guet-Ndar highlighted the escalating costs of rice and oil. The diversity in respondents' household compositions (ranging from large, multi-generational families to polygamous relationships) further illustrated the varied but substantial financial obligations they face. Notably, all respondents lived in large households, with no one residing alone or in a small nuclear family, which added to their economic strain. The analysis revealed that even younger fishery workers, who were generally not the main financial contributors to their households, still felt the obligation to support their families financially. In contrast, older or middle-aged respondents often identified as the primary household breadwinners, bear the heaviest financial responsibilities.

While the data reveal a complex web of economic pressures that fishery workers face daily, the economic strains that plague the lives of small-scale fisheries workers are not rooted solely in flawed fisheries management. The financial hurdles that they experience stem from the combined impact of high personal and professional expenses, coupled with low and inconsistent revenues. These challenges are further aggravated by inflation and the rising costs of essential goods and services, and create a precarious financial situation that threatens their livelihoods and the well-being of their families. Respondents have assessed that the rising costs of food, healthcare, and other essential items make it increasingly difficult for these large households to meet their basic needs. Respondents express frustration over the government's failure to alleviate their financial burdens.

Indeed, all respondents across focus groups voiced their dissatisfaction with the Senegalese government's handling of the fishing sector, particularly in the context of economic support and policy implementation. They expressed that government subsidies and aid have not significantly impacted their lives. This dissatisfaction extends beyond fisheries management to encompass broader governance issues, including the cost of living and access to essential services. They argued that the government’s failure to implement meaningful policies – such as regulating and reducing the number of trawlers, decreasing the

costs of daily expenses and healthcare, and ensuring the safety of fishermen has left them in a precarious situation. This, combined with alleged mismanagement by local officials has led to a deep-seated mistrust in the government, with the vendors and fishers feeling that they are not being adequately supported or protected by those in power. They advocate for more substantial government interventions, including the reduction of daily expenses and more stringent enforcement of fisheries regulations. The government fails to tackle different issues simultaneously. As respondents suggested, social security benefits or a lower cost of living could possibly alleviate the economic strains that coastal communities face.

As proposed by Allison and Horemans (2006), policies that enhance social, human, and natural capital could significantly improve the livelihoods and income of fishing households by providing more accessible services and ensuring financial security. The literature review replaces these economic challenges in a broader context, notably through highlighting the role of foreign vessels in exacerbating the situation. According to Jönsson (2019), the depletion of fish stocks by illegal and legal foreign vessels contributes significantly to the impoverishment of local fishermen. This pressure, combined with already strained economic conditions, makes it increasingly difficult for fishery workers to sustain themselves and their families. As a result, some may face unemployment or be compelled to seek jobs in other sectors, in urban areas, or even abroad. These challenges not only threaten their livelihoods but also contribute to broader issues of food insecurity, social inequality and instability in the region.

Conflicts between fishing communities have happened. For instance, a violent conflict between the fishermen of Kayar and Mboro, two Senegalese towns, erupted in April 2023, leading to clashes and resulting in several injuries (Sarr, 2023). Mboro is a small rural town located in the North of Thies, the same region where Kayar is located. The dispute allegedly stemmed from the use of monofilament fishing nets, which are illegal but still employed by the fishermen of Mboro, sparking the anger of their counterparts in Kayar (Sarr, 2023). During the incident, boats were set on fire, and several injured

individuals had to be rushed to hospitals. In response to this tense situation, local authorities intervened in an attempt to calm the tensions (ibid.).

As it turned out, that incident was not the first dispute between those two communities. In 2003, a conflict erupted between fishermen from both towns after the military police in Kayar seized and destroyed a bottom-set gillnet installed by Mboro fishermen (JICA, n.d.). In retaliation, Mboro residents took four outboard motors from Kayar fishermen. The next day, Kayar fisherfolks escalated the dispute by seizing 156 additional gillnets belonging to Mboro fishermen in an area designated solely for line fishing (ibid.). The recurring use of prohibited tools by fishermen from Mboro aligns with Freduah et al.'s (2019) argument that fishermen often rely on the resources that are readily available to them, due to a sense of urgency, rather than those that would be most effective for achieving sustainable adaptation.

The fishing community of Kayar has had issues with other Senegalese "migrant" fishers. According to (Le Roux and Noël, 2007), in June 2005, Kayar residents targeted pirogues from Guet-Ndar, setting some on fire. Faced with this violence, law enforcement intervened, but Kayar residents attacked the gendarmes, who responded with force. The fight resulted in approximately 20 injuries and the death of a young fisherman in his twenties (ibid.). Surprisingly (or not!), a similar conflict between the same two communities had erupted in 1991 after 20 fishing boats from Guet Ndar engaged in gillnet fishing, which was prohibited within a 14 km radius off Kayar's coast; subsequently, the Kayar Fisheries Directorate intervened, retrieving and confiscating the gillnets at sea, escalating tensions between the two groups. (JICA, n.d.).

According to Le Roux and Noël (2007) the conflicts between Kayar residents and migrant fishermen stem from the increasing settlement of migrants and are further aggravated by local disputes, power dynamics, and the influence of agitators. The rivalry has been heightened by the dwindling availability of valuable fish species, prompting Kayar residents to unite in defense of their territory (ibid.).

Upon reading about these conflicts, one could wonder if the enforcement of Territorial User Rights in Fisheries (TURFs, see literature review chapter) proposed by the Gestion Intégrée des Resources Marines et Cotières (GIRMac, see literature review chapter) program funded by the World Bank (Sarr, 2012) in the early 2000s would have prevented or further fueled them.

Interestingly, respondents did not mention such conflicts, even though I asked them questions about the state of social cohesion in their communities. However, they mentioned the tensions between Senegalese fishermen, particularly the ones in Guet Ndar, and Mauritanian authorities, which have been going on for decades. Fishermen, among the respondents in Guet-Ndar, have reported that when Senegalese artisanal boats that venture in Mauritanian EEZ without a valid permit are caught, Mauritanian authorities confiscate all their equipment. The fishers are then responsible to find transport back to their towns. Tensions between Senegalese fishermen and Mauritanian authorities have a long history, particularly over illegal fishing in Mauritanian waters. Despite the risks of equipment confiscation and heavy fines, many Senegalese fishermen continue to exploit these waters, arguing that fish is more abundant, underutilized by local fishermen, and host migratory species along the West African coast (Le Roux and Noël, 2007). It was reported in early 2017 that Guet-Ndar fishers expressed dissatisfaction with a new policy requiring foreign fishers in the Mauritanian EEZ to unload their catches in Mauritania (RFI, 2017b). That policy resulted in Senegalese artisanal boats being stopped in Mauritanian waters or ceasing their fishing activities altogether (ibid.). The discontent was further exacerbated by recurring incidents between Senegalese fishermen and Mauritanian authorities, including cases where Mauritanian coast guards opened fire on Senegalese fishers (ibid.).

In 2020, the capture of two artisanal boats by Mauritanian coast guards also prompted protests in Guet Ndar (Les Observateurs, 2020). Again, these reports slightly contrast with the responses I collected. Respondents have voiced their admiration for the Mauritanian government that enforces strict regulations

of its waters, and wished that the Senegalese government could follow suit. Some of them even declared holding valid permits to fish in Mauritania. I believe that fishers should stay within permitted and safe boundaries, however when governments confiscate fishing tools to address the stress on marine resources, it impacts fishers by (temporarily) taking away their primary means of livelihood (Freduah et al., 2019). Nonetheless, fishermen are aware of the consequences of clandestine fishing in Mauritania, and the reasons why those regulations are implemented. Unfortunately, the confiscation or destruction of fishing gear is not the highest form of punishment inflicted on clandestine Senegalese fishermen in Mauritania. Sadly, Senegalese fishermen have lost their lives as a result of such infractions. In January 2018 a fisherman from Guet Ndar was fatally shot by a Mauritanian coast guard officer who opened fire on their boat while they were pulling their net (Maillard, 2018). Mbaye Dieye Sène, president of the "Collectif Pour la Sauvegarde de la Pêche et du Littoral de Saint-Louis", argued that the incident was not an isolated one, as Mauritanian coast guards had reportedly killed three to four Senegalese fishermen each year over the past since 2018 (Maillard, 2018).

Tensions between fishing communities primarily arise from the use of practices that violate community rules (Le Roux and Noël, 2007). However, one cannot ignore that the use of those practices is fueled by distress and desperation stemming from the ongoing decline of artisanal fishers' livelihoods. Fishing in foreign waters is one of the many adaptive strategies that Senegalese fishermen adopt in the face of dwindling fish stocks. There are other methods that other fisheries labourers employ to mitigate the effects of the decline of their livelihood and its consequences on their economic state.

6.3 Adaptative Strategies

Artisanal fisheries workers have faced significant financial challenges due to the rising cost of living and declining fish stocks, prompting the adoption of various adaptive strategies to cope with the decline of their livelihood. Nelson (2011) makes a distinction between "adaptive capacity" which refers to the resources and processes that enable a system to maintain its function without compromising future options, and "adaptation" which is the process through which individuals and societies make and implement decisions about using adaptive capacities to manage risks and reduce harm from anticipated or perceived changes. According to Freduah et al., (2019), fishers, whose strategies are highly influenced by urgency, rely on the available cultural, social, and human capitals to cope with the effects of stressors on their livelihood, which is essential in lessening the immediate impacts of said stressors, although the strategies may fall short. In Senegal, the adaptive strategies employed by fishery workers range from grassroots community efforts heavily leveraging social capital, to broader systemic and more technical responses, all aimed at mitigating and coping with the financial strains they face due to declining resources and increasing costs. However, as pointed out by Freduah et al. (2019), some strategies can be maladaptive.

Some grassroot strategies include local savings groups, *tontines* (a form of rotating savings and credit association) and mutual aid. Fishery workers, especially in Saint-Louis, have used local savings groups to avoid high-interests imposed by banks. These savings groups allow members to save money, providing low-interest loans and even social assistance. This system helps workers meet financial obligations while avoiding the prohibitive costs associated with traditional banking. Fish vendors have also utilized *tontines* as a financial strategy to save money. *Tontines* remain a preferred alternative to banks nationwide because of their communal support structure and lack of interest rates. The sustainability of these strategies is, however, debatable. They help individuals, and communities cope with the challenges of inconsistent and declining revenues. Nonetheless, *tontines* for example do not seem like a

durable strategy that can create long-term positive effects. A respondent in Saint-Louis mentioned that a *tontine* they had organized was dismantled because too many members were in need of financial help. Also, *tontines* are in nature informal, especially in rural areas, which adds an element of insecurity and makes this strategy questionable if it were to be implemented in the long-run and to involve more participants. Local saving groups seem to have a stronger structure because they are more formal and may involve more members than *tontines,* although both are limited to individual communities.

My criticism of tontines is not prompted by biases that perceive formal institutions managed by people with a formal education as more trustworthy and yielding better results. My reservations are brought on by the belief that one cannot and should not trust anyone with their money without a contract in place as a form of guarantee. And respondents did not mention using IOUs[7]. In fact, the spirit of community and trust seems strong among fishermen and vendors, which is at the root of the next strategy that they employ: mutual aid and solidarity. Respondents reported frequently lending and borrowing money from each other to cope with inconsistent earnings. For instance, as mentioned in the results chapter, boat owners may reduce their share of the revenue from a fishing trip to allow crew members to take home more money, especially when catches are low. This mutual aid extends to fish vendors, who share profits or lend money to peers on difficult days. A trend among several of these fishing sites is the networks founded on kinship. As mentioned in the literature review, even fishing crews are often organized based on kinship. Some respondents highlighted the close relationships they have with each other, either as relatives or long-time neighbors. Therefore, these grassroots strategies, based on solidarity, do not seem out of the norm in some sites but instead are naturally integrated into people's daily lives, fostering a strong sense of community and mutual support among workers.

[7] IOU= I Owe You, an informal acknowledgement of debt

In the absence of government support, fishers rely on local innovations, including new fishing practices and technologies, to address challenges such as declining fish catches (Freduah et al., 2019). In Senegal, other more technical and systemic strategies are being implemented either by the fisheries workers themselves or by other stakeholders. These are typically long-term, and include government subsidies, assistance from non-governmental organizations, prolonged fishing efforts and foreign fishing. Fishermen expressed gratitude for government subsidies on engines and fuel, though these have only marginally eased their financial burden. These subsidies have not significantly improved their long-term economic situation but often provide some short-term relief. This observation is concerning considering the fact that subsidies have been implemented for decades, since the 1970s (Deme, et al., 2022). However, because those subsidies were part of the government's strategy to attract investment and expand the fisheries sector, they may not have been designed or reformed specifically to provide sustainable relief to such a large community of fisheries workers.

Thus, support from non-governmental organizations can prove beneficial in the long-run. The role of organizations like Dekkal Geej which provides financial and human capital, has been crucial. This project supports the government's initiatives in the fishing sector, particularly in research, resource evaluation, and advocacy. Dekkal Geej's efforts have included opposing potentially harmful fishing agreements with foreign countries, thus playing a pivotal role in reinforcing state plans and protecting local fishery workers' interests.

Due to declining fish stocks over the past decades, fishermen have been venturing further out to sea, sometimes up to 60 kilometers away, and staying out longer to catch enough fish. It can be argued that the abrupt additional exploitation in some fishing grounds would constitute a new stress on the resources. After long periods of time, adaptation can threaten resilience, as short-term strategies can have unintended consequences for the system's overall resilience (Nelson, 2011). Hence, extended fishing trips

in different zones could be viewed as a maladaptive strategy. In fact, Freduah et al., (2019) state that some responses to the decreasing fish catches, including extending the duration of fishing trips, are indeed examples of maladaptation as such strategies entail significant socio-economic or environmental costs, which ultimately increase fishers' vulnerability to the combined impact of stressors.

The combination of local savings groups, solidarity among peers, and support from both governmental and non-governmental organizations reflects the complex, multi-layered approach employed by artisanal fisheries workers to alleviate the drawbacks of depleting fish stocks and the decline of their livelihoods. Some strategies are more suitable for short-term relief, while others can be more beneficial if implemented in the long-run. Unfortunately, the literature on the adaptive capacities and strategies of artisanal fisheries workers in Senegal is quite limited. Therefore, it is harder to portray an accurate picture of the efficacy of coastal communities' adaptations to the overexploitation of marine resources.

Conclusion

This chapter presented an in-depth analysis of the challenges facing Senegal's artisanal fisheries sector and their impact on the livelihoods of small-scale fisheries workers. The renewal and signing of bilateral fishing agreements with the EU since 2000, along with a rise in illegal fishing activities, have led to a significant depletion of marine resources, severely affecting those who depend on these resources for their livelihood. The research highlights widespread dissatisfaction among fishermen and vendors with the government's fisheries management strategies. Ineffective regulation enforcement, inadequate support, and a perceived prioritization of foreign trawlers over local fishers have exacerbated the issues facing the artisanal fishing sector.

Although some measures, such as subsidies and stricter terms introduced in the 2015 Fishing Code, have been implemented, the existing regulatory framework remains insufficient to adequately address the overexploitation of fish stocks and the socio-economic needs of small-scale fisheries workers. As a result, the economic decline of the artisanal fishing sector has led to significant socio-economic challenges for coastal communities. Reduced incomes due to dwindling marine resources, rising professional costs, and a steep increase in daily living expenses have heightened the financial insecurity of fishery workers. Furthermore, the lack of alternative employment opportunities and safety nets has left these workers increasingly vulnerable to the ongoing crisis.

Yet, in the midst of the storm, these artisanal workers have devised strategies to adapt to the steady decline of their livelihoods. From short-term grassroot strategies to long-term large-scale systemic responses, coastal communities are showing resilience. However, some of their adaptations must be re-evaluated due to the threat of drawbacks in the long run. The findings indicate that without substantial reforms in policies, enforcement, and support mechanisms, the livelihoods of artisanal fisheries workers will continue to deteriorate, threatening the sustainability of marine resources and deepening socio-economic inequalities.

Chapter 7: Conclusion

The sounds of seagulls still echo in my mind, gradually overtaken by the rhythmic crashing of waves against the shore. I can almost picture myself again, seated in that small pirogue, watching Ahmed perched on a massive rock. It was a windy day, and the waves danced, tall, energetic, and powerful. We both stared at the vibrant blue waters rising and falling, transforming into white foam as they met the wet sand. The ultimate goal of this research was to offer a nuanced understanding of the intricate relationship between fisheries management, the presence of foreign trawlers, and the livelihoods of Senegal's artisanal fishery workers. Now, months after speaking with Ahmed and his peers, I can confidently say that I have gained a deeper understanding of the lives of artisanal fishers and vendors. I have come to appreciate their passion, their hopes, and their fears. I am filled with emotions and questions. I wonder, when Ahmed and I gazed at the ocean, did it bring him the same serenity it brought me, or was the beauty of the horizon overshadowed by the turmoil in his heart? His future, and the future of his community, is filled with uncertainty, and the government, the only entity capable of addressing these challenges, fails to provide adequate solutions.

The detailed results and thorough analysis of this study answered my central research question that inquired "How does the management of Senegalese fisheries influence unsustainable fishing practices and how do artisanal workers adapt in the face of changes in their livelihoods?" To reach the answer, I first analyzed the changes in the livelihoods of coastal communities as described by respondents to answer the sub-question " How do artisanal fisheries workers perceive the impact of foreign fishing on their livelihoods?". The unsustainable exploitation of marine resources by foreign partners and illegal fishers has significantly harmed the livelihoods of artisanal fishers. The depletion of fish stocks in their fishing

zones leads to declining catches and, consequently, reduced income. In response, fishers have independently sought new fishing grounds, in other parts of Senegal and abroad. However, this approach only exacerbates the strain on maritime resources in the Senegalese EEZ, further depleting fish stocks as multiple parties compete for them, often leaving artisanal fishers empty-handed. Fish vendors are also severely impacted by the dwindling fish stocks. With fish becoming increasingly scarce, their incomes have plummeted. On some days, they have little or nothing to sell. This situation raises the question "What policies has the Senegalese government implemented to improve the conditions of artisanal workers and enhance their well-being?"

In the literature review (Chapter 2), I found that the Senegalese government's Fishing Code has remained largely unchanged for over two decades, since 1998. The management of fisheries lacks effective surveillance mechanisms to curb unsustainable and destructive practices, such as overfishing, by both legal and clandestine industrial vessels. Foreign trawlers operate in an environment where sanctions are not consistently enforced, and when they are, they are often too lenient to serve as a deterrent. Infractions are common, while arrests and penalties are infrequent. As a result, it can be inferred that the government's management of its Exclusive Economic Zone fosters conditions conducive to unsustainable fishing practices by both foreign and national industrial fleets, which jeopardize the livelihoods of artisanal fishery labourers. To address this issue, the government has encouraged artisanal fishers to increase their fishing efforts in an attempt to boost their income, inadvertently perpetuating the problem. Indeed, as mentioned in the introduction, the incentive to maximize catches is part of unsustainable fishing practices and, combined with other harmful fishing practices, leads to overfishing. Chapter 5 (Results) and Chapter 2 highlighted that the government has implemented subsidies to alleviate the economic burdens faced by workers in the artisanal fisheries sector. However, several obstacles prevent these subsidies from achieving their intended goals. Workers also face additional economic challenges resulting from what

could be seen as mismanagement in other sectors. As discussed in the analysis, subsidies are insufficient when inflation persists, while revenues continue to decrease and remain inconsistent. Just as there is a lack of surveillance and prevention mechanisms, there is also a significant absence of economic policies designed to ease the lives of the population. Respondents reported that the cost of living and services often exceeds what their incomes can cover.

Finally, to address the question, "What changes have these workers made, or attempted to make, to adapt to shifts in the fishing sector?" I analyzed the strategies that these workers and their communities have implemented to cope with the decline in their livelihoods. Chapter 5 and Chapter 6 (Analysis) presented a range of adaptive (and maladaptive) strategies that small-scale fisheries workers employ to withstand the depletion of marine resources and the decline in their revenues. The data revealed that respondents and their peers often leverage financial and social capital to preserve their income, with many of their strategies heavily relying on networks and relationships within their communities. Small-scale fisheries professionals also often resort to larger scale adaptations. As previously mentioned in the analysis, fishermen frequently travel to different fishing grounds in search of resources, with some exploring various parts of the Senegalese EEZ and others venturing into foreign waters. Additionally, the government has implemented subsidies and facilitated support from NGOs, which fisheries workers leverage and benefit from.

Unfortunately, I do not have the power to enact changes, at least not at this moment. However, in the hope that those in positions of power read this study, I strongly recommend implementing drastic changes before the situation becomes irreversible. For the fishery sector to improve and become more profitable for artisanal workers, the government must implement better policies. A good starting point would be to establish a management framework with a clear and specific objective. This overarching goal would help determine which policies should be prioritized. For example, if the government chooses to

focus on restoring marine resources, introducing fishing quotas would be a crucial step. The Fishing Codes of 1998 and 2015 do not currently address quotas, which presents an opportunity for meaningful reform. Setting quotas for foreign vessels could be a viable option if abolishing bilateral fishing agreements proves too risky or impractical. The government could also enhance its management tools, especially in prevention and surveillance. The national navy has already shown effectiveness in protecting zones designated for oil and gas exploration. With additional investment and training, it could be better equipped to safeguard Senegal's EEZ more efficiently. I want to emphasize that while artisanal fishers may play a role in the overexploitation of fisheries, their impact is not comparable to that of foreign fishers, whether legal or clandestine. Nevertheless, the marine ecosystem could greatly benefit from biological rest periods, that local fishermen would also abide by.

I also believe that the government needs to rethink the framework of its relationship with foreign actors. While it is understandable that power dynamics between foreign entities and the Senegalese government may complicate decision-making, the government has a duty to prioritize the well-being of its population. Policies should be designed to reflect the interests of the local people. It is clear that the people of the European Union, China, or Russia will not face famine or severe economic hardship by refraining from fishing or adhering to strict quotas within Senegal's EEZ. As highlighted in the literature review, one of the main reasons the EU seeks foreign fishing grounds is to protect the health of its own oceans. Why should other countries not adopt a similar approach? Why is it acceptable to degrade the ecosystems of so-called developing countries while preserving those of so-called developed nations?

Finally, fisheries are not the only sector that must undergo a change of policies that prioritize the well-being of the population, particularly the lower-middle class. New policies ought to be enforced to ensure the financial stability of economically vulnerable populations in the country. A combination of a

lower cost of living and subsidies could tremendously improve the financial situation of artisanal fisheries workers, and put them in a much less vulnerable situation.

As I reflect on the completed study, I feel a deep sense of satisfaction in having taken on this challenge. It is rewarding to know that I embarked on a journey to understand an issue that directly affects my people. This experience was different from learning about it in a classroom or solely through secondary sources. Conducting field research allowed me to gain a richer and more personal understanding of the topic. Nevertheless, I can identify some limitations. I wish I had asked more follow-up questions during my field study. I found myself somewhat restrained by cultural norms that discourage delving too deeply into people's personal lives, including their work and finances. For instance, I could have asked respondents to be more specific about how much they spend on various essential items. This hesitation is connected to the broader issue of the lack of up-to-date resources detailing the costs of necessities like water, electricity, transportation, rent, and food in Senegal. There is a significant scarcity of such information, especially from national sources. Many government agencies' websites lack meaningful and comprehensive data, and some units do not even have functional sites. This not only poses challenges for academic research, but it also reflects a lack of transparency from these agencies and the government as a whole. Recognizing this barrier, I realize I could have gently pushed the boundaries of our cultural norms to obtain the answers I needed. Additionally, given that my research is situated within the framework of blue justice, it would have benefited from more resources on blue justice initiatives in Senegal or other parts of West Africa. While blue justice is currently more of a concept, it has the potential to be developed into a practical framework of actions that could be beneficial for several developing countries. This is also true for the state of adaptive capacities and strategies in Senegal’s artisanal fisheries sector; there is a need for more extensive literature to be developed in this area.

This research primarily aimed to shed light on the issues that artisanal fisheries workers in Senegal face. However, millions of small-scale fisheries workers face challenges to maintain their livelihoods throughout Africa, Asia, Oceania and the Americas. Some are in a much worse predicament than their Senegalese counterparts. For instance, Palestinian fisherfolk in Gaza are denied access to the sea by the Israeli occupation, which has significantly reduced both the income from fishing and the availability of fish in the Gaza Strip (UNISPAL, 2007). For small-scale fishing communities to sustain their livelihoods, there must be a global shift in fishery management aimed at preserving marine ecosystems and the communities that depend on them. In some cases, this also requires global movements advocating for decolonization, justice, and equity.

Appendix A: Interview Chart

Site	Reference	Number of Participant	Professions	Age Groups	Recording Method
Marché Central de Pikine	Interview 1	4-5	Vendors	Middle Aged	Recording Device
Yoff	Interview 2	4-5	Fishermen	Young, Middle Aged	Recording Device
	Interview 3	1	Fisherman	Middle Aged	Notes
	Interview 4	3	Vendors	Middle Aged	Recording Device
Kayar	Interview 5	4-5	Fishermen	Middle Aged	Recording Device
	Interview 6	4	Vendors	Middle Aged	Recording Device
Mbour	Interview 7	5-7	Fishermen	Young	Recording Device
	Interview 8	4	Vendors	Young, Middle Aged	Recording Device
	Interview 9	4	Vendors	Middle Aged	Recording Device
Joal	Interview 10	2	Fishermen	Middle Aged	Recording Device
	Interview 11	2	Vendors	Middle Aged	Recording Device
	Interview 12	4-5	Fishermen	Young, Middle Aged	Notes
	Interview 13	2	Vendors	Young	Notes
Guet Ndar	Interview 14	4	Fishermen	Young, Middle Aged	Recording Device
	Interview 15	2	Vendors	Middle Aged	Recording Device

	Interview 16	4	Vendors	Middle Aged	Notes
	Interview 17	4-5	Fishermen	Middle Aged	Notes
Dekkal Geej	Interview 18	3	USAID Employees	Middle Aged	Notes

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