# IN THE SHADOW OF FARMED SALMONS

## Fishing small pelagic fish for fish feed in Senegal: a critical analysis of a worlding practice

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# Abstract

Salmon aquaculture corporations sell or present their products as a panacea to improve general health and to fight global food insecurity. This discourse hides the necessity to catch small pelagic fish – mostly in developing countries – to produce fishmeal and fish oil required to feed farmed salmons. The fishmeal and fish oil industry is thus involved in a processing of worlding that shadows the existence of other worlds by reducing the ocean life to "marine ingredients." By doing so, wealthy consumers in the Global North become disconnected from food production processes involved in the food they eat. This dissertation aims at challenging that disconnect by embedding fishmeal and fish oil production geographically and historically inquiring thus the temporal and spatial underpinnings of fishing small pelagic fish for feed production. The shoreline of Senegal and the website of the International Fishmeal and Fish Oil Organization (IFFO) trade organization will be the empirical grounding of this research. This dissertation aims at illuminating spaces of shadows of the fishmeal and fish oil industry and its worlding practices in three moves. First, the French colonial past of the Senegalese marine fisheries participates in contextualizing a continued colonial relation to fisheries resources in Senegal nowadays. Second, a preparatory field trip concomitantly with a documentary analysis structure the use of liminality as a concept to cast light on spaces of shadows where women and men fish workers process fish for a livelihood. Third, the discourse expressed by the IFFO on its website is analyzed as a worlding practice that commodifies the ocean and marine lives, reducing them to ingredients. From this research stands out that by connecting contemporary problems historically and spatially, ethical concerns in food production are revealed. More, a critical stand is made possible against a totalizing and hegemonic discourse of the fishmeal and fish oil industry by pointing out to spaces of shadows that are produced in their worlding practices. Against this process of shadowing, liminality becomes a lens for other worlds to start unfolding.

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Kom ikkje med heile sanningi

*Kom ikkje med heile sanningi,*
*Kom ikkje med havet for min torste,*
*Kom ikkje med himmelen når eg bed um ljos,*
*Men kom med ein glimt, ei dogg, eit fjom,*
*slik fuglane ber med seg vassdropar frå lauget*
*og vinden eit korn av salt.*

Olav H. Hauge

Don’t Come to Me with the Entire Truth

*Don’t come to me with the entire truth.*
*Don’t bring the ocean if I feel thirsty,*
*nor heaven if I ask for light;*
*but bring a hint, some dew, a particle,*
*as birds carry drops away from a lake,*
*and the wind a grain of salt.*

Transl. by Robert Bly (Bly & Hedin, 2008: 12-13)

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# Introduction

"It matters which worlds world worlds." (Haraway, 2016: 165)

## I. Background to the study

I am in London (UK), at the Tate Modern Gallery. I am about to the enter a room called the Tanks. I hear deep, loud chants; a choir of women singing a traditional Greek lament song (*When I forget, I am Glad*, sung by the polyphonic Greek group Pleiades). The tank is in the dark, my whole body shaken by these chants and its echoes that reverberate against the round walls. Against a section of the wall, I see a long panel on which scrolls the quotes of stock exchanges; brights colors of letters and numbers that gives the financial value of things in real time. I am mesmerized by this art piece: I experience a sensory reduction of the view – reduced, in the darkness, to the view of the stock exchange – while the powerful emotions expressed by the laments resonate in my ears and deep within my body. Emeka Ogboh[1] has created this piece of art, *The Way Earthly Things Are Going* (Ogboh, 2017). Experiencing this installation, I could not help but think at what we are encouraged to focus on, and what is left in the shadows, which voices are we listening to, and whose are silenced.[2]

[1] Emeka Ogboh is a Nigerian artist living between Lagos and Berlin. His work is engaged with a multisensory approach, working on collective memories and histories. His interest lies in "capturing our connection to the world, [the] shaping our understanding of reality, and providing a platform to address critical issues such as migration, globalization, and post-colonialism." (https://emekaogboh.art/about/, accessed, March 25, 2024).

[2] But who is "we"? I acknowledge the challenge of using a generalizing "we." By using "we," I could run the risk of positioning myself as a god eye's view writer (D. Haraway, 1988). However, by specifying who is included in this "we," could I not forget some peoples or omit involuntarily others?
On the other hand, using the passive or the impersonal form runs the risk of disengaging the writer, and thus by extension the reader, from a positionality. In a sense, the passive or the impersonal form can be other instances of a god eye's view where the writer, and by extension the reader, are disengaged from any positionality.
My use of "we" has a purpose. Sometimes, I use it as a rhetorical instrument; sometimes to embed the reader within a larger group and force the reader to wonder if she/he is part of that group or not. By doing so, I do not only address myself to the reader, I wish to engage the reader to think with my text. For instance, in the Forewords section of chapter 1, I purposefully used "we" as to unsettle the reader as to its own positionality, and to encourage her/him to position herself/himself in relation to the pirogue, its fishers, and this specific context.

In this dissertation, I am playing here with the polysemy of the word “senses”: to come back to our senses, as in to think with better judgement, and to invite the role of senses, and in this instance mostly vision, in the way the world is perceived, described, and built. We live in a relational world where everything is connected in one way or another (an original image, and concept, is the one of the rhizome developed by Deleuze and Guattari,1980). However, Ogboh’s piece expresses how we are deprived of so many relationalities and how the world is for the most part reduced to financial value. To me, this installation represents the world built by the salmon aquaculture industry. It is a world where the attention is focused on specific elements (for instance, the nutritional values of omega-3s, or the ocean as a resource for food security) while other are shadowed from wealthy consumers in the Global North (for instance, the environmental consequences of producing fishmeal and fish oil, where small pelagic fish come from, or their central role in the ocean).

But why focus specifically on salmon aquaculture? First it is an expensive commodity that only wealthier consumers can afford. Second, it is a fast-growing commodity with ramifications that spread globally. In 2010, global production of farmed salmon was of about 1.4 million tons (Torrissen et al., 2011: 258) and by 2020, production had almost doubled to 2.7 million tons (Pandey et al., 2023: 2). Third, it is a big business industry. Farmed salmon has recently become, in terms of value, the highest traded fish commodity worldwide (FAO, 2022: 105)[3] and in 2022, it represented 20% of the total value of traded aquatic species (FAO, 2024: 96). Therefore, this growing industry requires increasingly more feed as inputs for its farmed salmons. Farmed carnivorous fish, such as Atlantic salmon,[4] is fed with pellets that

[3] However, in terms of quantity of farmed finfish, farmed salmon represents 6.9% of world production, the fourth most produced species. Carps’ species are the most produced species with 51.6% (FAO, 2024: 26).
[4] Other species such as trout, seabass, etc. are fed with fishmeal and fish oil, and omnivorous/herbivorous species, such as shrimps or tilapia can also be partially fed with fish feed pellets containing fishmeal and fish oil.

include small pelagic fish[5] that has been reduced to fishmeal and fish oil[6]. The farmed salmon industry initially relied on the bulk commodities fishmeal and fish for feed, but contemporary pellets are now highly technical, and marketed product (Martin et al., 2021). The manufacturing of fishmeal and fish oil is a complex process[7]. To produce about 20 kilos of fishmeal and 3 to 6 kilos of fish oil, a hundred kilos of raw fish must be processed (EUMOFA, 2021: 3). With time, the aquafeed industry has developed, from relying entirely on fishmeal and fish oil (to produce fish feed pellets) to pellets made of various ingredients (fishmeal and fish oil, soybean, wheat, vitamins, minerals, etc.) (Fletcher, 2019). Thus, the percentage of fishmeal and fish oil present in fish feed pellets has decreased over time with the substitution of alternative and cheaper commodities such as soy (Martin et al., 2021). However, the aquaculture demand has been increasing steadily and is forecasted to keep rising in the years to come (FAO, 2024: 208ss), consequently increasing the demand for fish feed as salmon production continues to increase (Turchini et al., 2019). Alternatives to fishmeal and fish oil are used (e.g. soy) and new sources are being developed (e.g. insects and algae) but for the time being the industry[8] still relies on small pelagic fish for its products (Martin et al., 2021: 53; Turchini et al., 2019).

In 2022, about 22% of marine capture fisheries were used for fishmeal and fish oil production (FAO, 2024: 69)[9]. The Peruvian reduction fisheries (the fishing of small pelagic fish in Peru for fishmeal and fish oil production) makes about 20% of the catch for the fishmeal and fish

[5] Small pelagic fish are, for instance, sardines, anchovies, mackerel, pratt, capelin, herrings, menhaden, etc. They are short-lived species, living in schools which makes them easier to catch with purse seiners (Alder et al., 2008; Pikitch et al., 2014).

[6] Between 2010 and 2020, the global production of fishmeal is about 5 million tons while the production of fish oil stands between 0.8 and 1.3 million tons.

[7] However, and simply put, the process involves separating solid elements, oil, and water. Commonly, it involves a process of heating which causes the separation of proteins, fat depot, oil, and water. Then pressing, or centrifugation, participates in removing water. Depending on the quality of the final product, oil and water can be separated. Then drying is performed to obtain a meal which will finally be grinded to the desired size (FAO, 1986).

[8] e.g. BioMar, Cargill, or Skretting, for farmed salmon feed.

[9] Cashion and colleagues (2017) have estimated that 27% of marine fisheries landings were used for other purposes than immediate consumption, i.e. reduction into fishmeal and fish oil.

oil industry[10]. Due to climate change variations, El Niño effects, and increasing demand for small pelagic fish for feed production, fishing vessels have turned to West Africa, for instance, to find new supplies of raw fish (Green, 2018). The main issue lies with the redirecting of small pelagic fish – as food for peoples in developing countries – into fishmeal and fish oil that will feed farmed salmon targeting wealthy consumers (Feedback, 2024; Golden et al., 2016, 2017; Green, 2018). For West Africa, it is estimated that more than 500,000 tons of small pelagic fish could be used for human consumption (feeding about 33 million peoples) but is instead directed toward the production of fishmeal and fish (Greenpeace, 2019).

Salmon is a migratory species. However, industrial development has trapped this fish in a pen. Instead of following salmon – that has become immobile while alive –, I suggest to look at its feed that remains in the shadow of peoples' knowledge and that travels extensively. Feeding farmed carnivorous fish, such as salmon, does not come without controversy (The Changing Market Foundation & Greenpeace Africa, 2021). They are fed with fishmeal and fish oil (as fish feed pellets) whose production requires the fishing of small pelagic fish such as sardines, anchovies, capelin, etc. (Cashion et al., 2017). Small pelagic fish is a keystone species in the food web that links planktons to larger fish (Cury, 2000; Pikitch, et al., 2012). In some cases, such as in Peru, small pelagic fish are not anymore consumed but exported (Christensen et al., 2014; Probyn, 2016). In other cases, they are essential to the livelihood of coastal peoples, for instance in Senegal, in Western Africa (Greenpeace, 2019).

Here lies a tension, it is a fish essential to human (and nonhuman) livelihoods, but it is also a fish prized by the booming aquaculture industry whose products are targeting mostly wealthy consumers in the Global North (Golden et al., 2016; Naylor et al., 2021). Many of these consumers are unaware that the farmed salmon that they will eat in sushi or club sandwiches

[10] Variations of landings, in Peru, vary due to El Niño effects, affecting reproduction cycles of the small pelagic fish in the Humboldt Current (EUMOFA, 2021: 4)

in an airport lobby or a gas station is the product of profound socio-environmental inequities (Belton et al., 2020; Golden et al., 2016; Naylor et al., 2021; Thilsted et al., 2016; Willer et al., 2022). This highlights how (i) many consumers in the Global North have become disconnected with the food they eat while (ii) many unequal connections exist within that food.

My aim is to perform a critical inquiry into a specific link in the salmon aquaculture production chain: the spatial and temporal contextualization of fishing small pelagic fish for fishmeal and fish oil production. Fishmeal and fish oil is a fascinating product. In such a trivial thing as a feed pellet hides an aggregate of stories and issues of socio-environmental inequity and injustices. They exemplify a process of commodification of life and nature itself as ingredients. A critical inquiry of the fishing for the fishmeal and fish oil production requires to position the act of fishing in time and space. I will use the following approach by Massey (2005: 9) to consider space (and time): space (i) is made of interrelations, from the large scale to the minuscule, (ii) it is made of the multiple and the heterogenous that enter into relations, (iii) it is a process always in construction. Massey adds that time should be thought together with space (Massey, 2005: 18). They exist concomitantly. It is in this space-time relation that food production takes places. However, this food production has socio-environmental consequences beyond the borders of its sites of production. Dauvergne (1997) develops the concept of "shadow ecologies" to point out to the environmental consequences that take place far away from the sites of consumption of a product. I would like to develop that notion of "shadows" to peoples, places, and spaces. Therefore, what is left in the shadow of salmon aquaculture production? And more specifically, what can we learn from a critical inquiry of the fishing of small pelagic fish for fishmeal and fish oil production?

To consider the world as constructed (and thus the possibility of other worlds to exist) allows to critically analyze processes and discourses at play. What if the world we live in was not "as

it is" but a represented construction (Escobar, 2017)? What if this world is not just a tank with a glowing panel in the darkness with scrolling quotes of stock exchanges? The world is not just an object to be described. It is a subject whose construction and representation will determine how we interact with it, what we think is doable or not. This perspective is an invitation to ask who is included in this world and who is excluded – who and what is shadowed? How can we learn to hear the laments and the voices in the background? By considering the world as built, I will create links spatially (with other regions of the world) and temporally (digging into the history of a region, for instance, to illuminate and give depth to how the ocean has been constructed through colonial practices). I consider a critical worlding analysis as a process of bringing back resonance (Rosa, 2021) into what has been silenced through discourses and representations[11] by powerful actors such as the salmon aquaculture industry and the fishmeal and fish oil industry (see, for instance, Barton et al., 2023). These industries have to be critically analyzed as they belong to an economy of the ocean that is largely aggregated in the hands of powerful transnational corporations (Virdin et al., 2021). They have the power and the capacity to build a world according to the needs of the industry. In this process, I will use fishmeal and fish oil production as a means to inquire into how a world is built around feed production, what the processes involved are, what the consequences of such processes are and for whom. To do so, I will analyze the discourse of the International Fishmeal and Fish Oil Organization (IFFO), the overarching organization representing the interest of the fish feed industry and its affiliated companies. The IFFO position itself as a global trade organization with the purpose to support all aquafeed related

[11] Worlding and representation of an observed world are in constant movements with one another. The representation of a world brings this world into being by drawing its contours, while an imagination of what a world is or should be encourages the production of practices and processes that will have this world come about. In other words, worlding and representation of a world are acts of co-construction.

industries.[12] Between 1960 and 1990, aquaculture was a niche for the feed industry. But from the 1990s onward, aquafeed became the main *raison d'être* of the fishmeal and fish oil industry.

This dissertation brings together the molecular, the human, and an international trade organization. By inquiring and connecting multiple dimensions, my aim is to illuminate existing links between humans and nonhumans, be it spatially (in this instance, in Senegal, Western Africa) or temporally (in the French colonial history of Senegal). It is to illuminate the spaces of shadows created by the worlding[13] practices of the IFFO and the colonial past along the shoreline of Senegal. My aim is, at the end of this dissertation, to have shown the many relations that exist and the necessity to build new ways of being and interacting with nature, specifically with the ocean and its creatures.

In the next section, I will present a literature review focusing on food (in)justices, and food in relation to a discourse on nutrition. Then, I will present the aims, objectives, and questions of this dissertation. Following this section, I will argue for the significance of this research as well as its limitations. Finally, I will summarize a short outline of each chapter to conclude this chapter.

[12] The IFFO is an amalgam of three organizations that date back to 1960. The IFFO, as it is today, was formed in 2001, and in 2012 changed its name from IFFO The Fishmeal and Fish Oil Organization to IFFO The Marine Ingredients Organization.

[13] This dissertation focuses on the worlding practices performed by the French colonial power and its colonial epistemologies, and on a trade organization, the International Fishmeal and Fish oil Organization. Noteworthy, the focus on these Western worlding practices may shadow the existence of other worlds, in Senegal and Western Africa at large, prior to the colonization. I wish to underscore that peoples in Africa were already worlding their world prior to the colonization, and that worlding processes can take place concomitantly to the presence of Western perspectives (Johnson, 2017); see, for instance, Akyeampong (2001)'s work on the environmental history of the Anlo peoples and their relation to their lands, sea, and lagoons, be it prior colonization or concomitantly to it.
The worlding practices regarding fisheries prior the colonization is beyond the scope of this dissertation; however, it would be a great continuity to this work by questioning the importance of worlding, (i) as a concept in itself, (ii) as a mean to illuminate other ways of living, and (iii) how Western ways relate to these other ways of worlding.

# II. Food in perspective

Food exists at multiple dimensions and is more than a nutritional act. It can be sharing with the other a moment and a presence, or it can be a set of traditions. It is the dish that I eat at specific moments during the year or at specific events. Food is also a moment that I share with my family, relatives, or friends. Food is therefore protean: social, cultural, nourishing, emotional, traditional, related to a folklore. Esteva makes a compelling distinction between the Spanish words *alimento* and *comida*: *alimento* is the "edible object" that is purchased and consumed, produced by professionals, and distributed by institutions while *comida* is to cook, to eat and to share, it is "food-in-context" (Esteva, 1994: 5-6). Food is relational in essence, relations that take place across scales, as Shostak (2023: 361) shows: from global food production to molecular considerations for health purposes, relationalities may reveal injustices and inequities. With regard to food production, the salmon aquaculture industry and its reliance on fishmeal and fish oil generates environmental and social justice controversies (Barrett et al., 2002; Barton & Román, 2016; Brugere et al., 2023; Golden et al., 2017; Lee & Cloutier de Repentigny, 2019). Fishmeal and fish oil production are entangled in (i) issues of social and environmental (in)justice, which are shadowed by (ii) a discourse on health and nutrition, as I show below.

*Food, justice, and space*

A critical inquiry into the discourse on food should not rest on the production process alone. It is also a matter of food distribution[14] and access to food. This entails questions about food justice (Herman et al., 2018) which is related to social justice (Gottlieb & Joshi, 2010). Social justice is understood as "the morally proper distribution of benefits and burdens among society's members" (Young, 1990: 15). However, by reducing social justice to theoretical

[14] Fish is among the most traded commodity worldwide (Bellmann et al., 2016; FAO, 2022) and essential as subsistence for many peoples (J. Murton et al., 2016).

concepts, or redistributive aspects, its political aspects are underplayed (Robinson, 2013); aspects of domination, oppression, and power relations should be considered when discussing social justice (Robinson, 2013; Young, 1990). Social justice should encompass discussions about justice at multiple scales (from the global to the local) and expanding questions of justice to the nonhuman (Coulson & Milbourne, 2021). Eventually, justice is a means to think about relations to the other, the power relations that are at play (Massey, 1994: 3), and the possibilities to think differently relations to the world (Robinson, 2013). It is the possibility to extend the discussion to ethical aspect of another type of relation towards humans and nonhumans (see Conclusion chapter of this dissertation on care ethic). Who pays the price for this food production and extraction of resources necessary to its production (for instance the production of farmed salmon requiring small pelagic fish as feed)? The ones paying this price are the most vulnerable, be they human (for instance the Western African peoples living on small pelagic fish) or nonhumans. Food is thus also related to issues of environmental justice as Agyeman and colleagues (2016) underline. Slocum and colleagues (2016) stress that food injustices cannot be fully understood without embedding them in space (see also Herman & Goodman, 2018). Food injustice should not merely be considered as happening at local sites; this type of injustice should also be linked to a whole set of relations (spatial or material) that allows them to take place. As Massey argues, space is a "continually practiced [sets of] social relations" (Massey, 2000 : 282); and these social relations can be close or faraway but they exist. In sum, food injustice (and food in general) should be considered as the consequence of many relations across scales, and can be situated within a larger process of worlding. What type of relations are created (or severed) by the fishmeal and fish oil industry? What type of world holds these relations together? And most importantly, what is shadowed or silenced from these relations?

As food is related to space, it enters the realm of the politics (Massey, 2000: 282). However, this aspect – the social, the political – disappears in the discourse of the fishmeal and fish oil industry and the whole world it builds (as will be shown in chapter 3). And the environment is reshaped and reframed to be fit for a product to be sold. The agrifood industry does not only hide the consequences of food production (Millner, 2017), it reframes what the world should be and how consumers are related to it (Martin & Mather, 2023). Eventually, as Shostak (2023) highlights, food production entails power relations producing inequalities across scales and sites. Food is not neutral; it is profoundly embedded in power relations where the dominant voice has the means to structure a world for its convenience. Food is thus embedded within societies, politics, and economics (Foley & Mather, 2018). In a different setting, Collard and Dempsey (2013: 2695), working on the commodification of life, encourage us to question "what market violences are tacitly accepted, and which become sites of interrogation and political movement?" Consequently, a central question can be raised: which socio-political issues hide behind what is tacitly accepted? In this instance, behind the message promoting the consumption of fish for a healthy life, what political issues (movements) are unheard or silenced? Therefore, food is not reducible to nutrition, it is social and political (Esteva, 1994).

This dissertation frames the imagining of food and its surroundings as a worlding process. It is a process that structures the perception and imagination of consumers (Hébert, 2010). Biltekoff and Guthman (2023) explore the role of imagination in relation to consumers' expectations. In turn, the role of imagination should be expanded to how agrifood industries build a world that makes sense for both companies and consumers alike. Salmon aquaculture and fishmeal and fish oil industries are large global agrifood corporations and powerful actors, and the powerful position of agrifood corporations influences the perception of, and the imagination around, their products (Clapp & Scrinis, 2017). For example, industries use

recommendations from health institutions and organizations to position their products concretely within the life of consumers. Biltekoff and Guthman (2023) have shown how the agrifood industry seeks to pinpoint what consumers want and encourage consumers acceptance of the industry's products; agrifood companies try to forge the appropriate answer to the imagination of consumers often in relation to larger questions such as food security or health. However, Biltekoff and Guthman (2023: 77-78) highlight that what matters most to agrifood industries is attracting investments rather than solving food-related health problems. Consumers may believe that they are entitled to free choices in markets that let them select exactly what they want to consume (Baumeister, 2008; Nestle, 2007). However, agrifood corporations' advertising, public relations, and communication technologies are powerful and influence what is believed to be free choices in free markets (Nestle, 2007). And the closer the industry gets to the consumer, the deeper the influence. This proximity has increased with the discourse on food as central for the nutrition and health of consumers.

*Food, nutrition, and health*

Sathyamala (2016) argues that the nutrition discourse has blurred the boundaries between science and commerce. The food industry is capitalizing on this confluence between food production, health, and medicine (Kurpad et al., 2021; Street, 2015; see also the "food is medicine" movement, Barnidge et al., 2020). The food industry's nutrition discourse has entered various fields and spreads from the health of wealthy consumers of the Global North to the food security needs of the Global South (Hayes-Conroy & Hayes-Conroy, 2013). Nutrition has become "nutritionism," an ideology defined as "the reductive focus on the nutrient level and the reductive interpretation of the role of nutrients in bodily health" (Scrinis, 2013: 28). It is a new discourse to address health-related issues available for the fishmeal and fish oil industry. For instance, the International Fishmeal and Fish Oil Organization (IFFO) mentions on its website how omega-3s are vital for a healthy life. In a

sense, nutrition – how the body metabolizes nutrients – is becoming more important for profits that the actual intake of food. In this discourse, nutraceuticals, a product that holds a blurry position between foods and pharmaceuticals, are increasingly connected to the image of a healthy body (Santini et al., 2017; Street, 2015; nutraceutical are also called "functional foods", see Katan & Roos, 2004; Mozaffarian et al., 2019). It is even argued that nutraceuticals could even participate in solving world hunger (Chaurasia et al., 2022); although, in the Global South, policies that are developed to fight hunger with projects based on nutraceuticals are only adding another layer of complexity (Kurpad et al., 2021; Street, 2015).

With a focus on nutritionism, agrifood companies have increased and strengthened their position in what consumers choose to eat and why (Clapp & Scrinis, 2017). But as mentioned above, food is political and entails power relations (re)producing injustices (Durocher & Knezevic, 2023). Indeed, food reduced to nutrients obscures other ways of eating, and other ways of existing in relation to food (Hayes-Conroy & Hayes-Conroy, 2013: 2). Hayes-Conroy and Hayes-Conroy (2013: 2-3) discuss what they coined "hegemonic nutrition". Hegemonic nutrition is defined as food that is standardized, reduced, and structured into a hierarchy of knowledge where Western science is placed on top. Food through this hegemonic nutrition discourse becomes decontextualized from geographies and histories.

The question arises as to what extent does the fishmeal and fish oil industry, in conjunction with the salmon aquaculture industry, create a hegemonic discourse that decontextualizes and alienates food production from consumption? How does the fishmeal and fish oil industry structure such discourse so it is effective? These questions that are related to the hegemonic nutrition discourse requires novel ways to think about food (Hammelman et al., 2020) in order to get distance for a more critical approach. As an example, Borghini et al. (2020) suggest a model called the Social View of Food (Borghini et al., 2020: 127). With their model, these

researchers (Borghini et al., 2020) propose to start thinking about the ontology of food, what food is. As Borghini and colleagues (2020) have shown discussion on food is influenced by the way food is initially considered. For instance, for the fishmeal and fish oil industry, a farmed fish is an artefact that can be manipulated and enhanced through technological fixes (Borghini et al., 2020). And these artefacts can only be understood and explained by scientific specialists, making consumers depend on the knowledge dissemination of specialists which they must trust on faith (Pollan, 2008). Discourse is thus dependent on an epistemology which in turn will build a specific ontology, a world of its own. In other words, the fishmeal and fish oil industry will work at presenting facts based on knowledge to structure a canvas, a world, that goes beyond the mere description of the commodity to be sold but that will build a whole new representation of this world and the consumers role in it.

## III. Purpose of this dissertation

The purpose of this dissertation is to unfold and make visible spatial and temporal relations that are present in such seemingly trivial thing as a feed pellet. It is to inquire the discourse of the fishmeal and fish oil industry – acting as a worlding process – that goes beyond selling its products but links it to other discourses such as health, climate change, and food security. The aim for this dissertation is to question a discursive process of worlding performed by the IFFO and bring forth spaces that are shadowed by such discourse. This dissertation will thus look at shadowed and silenced spaces through three angles: historical, regional as a lived space, and global as an imagined space. The aim is to highlight the context of fishmeal and fish oil production (be it spatial or temporal) and set it into relation with a discourse of the industry on nature and its "ingredients."[15]

[15] With its activities, the fishmeal and fish oil industry leaves behind a whole array, a whole web of connections made by, and existing in, the ocean. Essentially, it is the intrinsic life of the fish that is put aside. Although beyond the scope of this research, further research could be performed to link a capitalism with coloniality and liminality.

Although the following comment is beyond the scope of this dissertation, it is noteworthy to underline that colonization is not a historical segment lying in the past (Uzoigwe, 2019). Neocolonialism – engaging, among other elements, asymmetrical power relations – is very much present and pervasive through other forms such as neoliberalization (Harvey, 2007) or globalization (Lodigiani, 2020). Although the scope of this dissertation does not include a discussion on (neo)colonialism, its role and presence is acknowledged and certainly not downplayed, hence also the rationale behind using Mignolo's work (2018) on decoloniality, in chapter 3, as a conceptual framework to illuminate the worlding practices of the IFFO.

I will examine and analyze the discourse of the fishmeal and fish oil industry as well as their spatial and temporal contexts. In this endeavor, I will make extensive use of the work of feminist scholars on positionality and situatedness (Haraway, 1988). Positionality is where actors stand and it invites us to look at the place and space of actors' contexts[16]. I will consider positionality spatially but also temporally with a historical perspective, questioning the way past practices influences present situations. What matters is what – and who - is unseen, silenced, shadowed (Dauvergne, 1997; Farmery et al., 2021) and often unobserved in the (hi)story of food production (Hayes-Conroy & Hayes-Conroy, 2013: 5, have used the image of the iceberg, where hegemonic food discourse is the surfaced part of the iceberg, while a whole array of other aspects lies submerged). These actors can be humans, as for instance shadowed fish workers along the shoreline of Senegal during the colonial period or today with their role in food production and its dissemination in the subcontinent. It is

[16] If salmon aquaculture produces shadows, the existence of another type of shadow that can be casted must be acknowledged: my own positionality as a researcher produces its own shadows.
Intersectionality expresses and analyzes how categories, such as for instance, gender, ethnicity, nation, age, etc., mutually plays with each other and forms asymmetrical power relations and social structures (Hill Collins & Bilge, 2020). Thus, I acknowledge the role and the complexity that intersectionality plays in my very own positionality as a researcher. Although this aspect is discussed more lengthily in chapter II, I wish to underline that my positionality as a non-Senegalese person limits my understanding of the situation in Senegal along the shoreline and beyond. However, I may not have all the clues to understand the entirety of the situation in Senegal, but the person that I am – the plurality that forms who I am, my past experiences, my history, etc. – gives me a sensitivity to understand and feel the gravity of a situation.

myself, as a researcher questioning and observing and living in this world.[17]

I make the case in this dissertation that the fishmeal and fish oil industry is involved in a process of worlding, molding a world according to its needs. And due to this agrifood industry's powerful position, the world it creates has a totalizing effect (MacKenzie & Porter, 2021), erasing the possibilities of other existences, of other worlds in the "shadows" to emerge.

The dissertation's purpose is twofold. First, I will show that food is relational beyond what we imagine. It is related to humans that makes it and live out of it, it is related to an environment (an ocean) and its oceanic food web, and it is related to all that lies in the shadows. Second, I will start thinking about the type of relations we are engaging with this world through our relation with food. The way we build "a" world has effects on including or excluding certain actors. The way we structure "a" world influences how we are perceiving it. All our ways of being, of seeing issues, and the possible solutions stem from a worlding process. People with whom I talk are amazed when they learn that the farmed salmon they eat is fed with fishmeal produced out of small pelagic fish that come from Western Africa…and that they are related to Africa in some strange way. This dissertation belongs to these first steps that work at revealing connections between humans, and nonhumans, across time and space.

## IV. Research aims, objectives and questions

My research aim for this dissertation is to critically analyze – at different spatial and temporal scales (historical, local, global) – the relations created by the fishing for fishmeal and fish oil production and their consequences. Undergirding this research lies the necessity to challenge

[17] With the shoreline as a liminal space, small pelagic fish as actors makes visible a world of interrelations, meanings and exchanges that supports the life and livelihoods of millions in the West African region. Small pelagic fish as actors in themselves would require further research and conceptual developments by considering the shoreline as a liminal space of passage and transformation, and questioning what world do they participate into becoming?

discourses and practices of large agrifood corporations – in this instance, salmon aquaculture companies or fishmeal and fish oil companies – and their worlding processes to highlight what is left in the shadow of this discourse and the injustices created. The main research question is: What are the temporal and spatial underpinnings, and their consequences, of the fishing of small pelagic fish in Senegal for feed production? To answer this main question, I will start, with the first chapter, by delving into the French colonial fisheries of coastal Senegal. As Law (2004: 5) stresses: we cannot escape history. Present issues cannot be understood without looking at the past. As spatial issues (contemporary fishing for feed along the coast of Senegal) are bound to temporal aspects (the French colonialization of Senegal), it is therefore necessary to consider French colonial epistemologies that paved the way to contemporary fishing practices in Senegal and their repercussions on the livelihood of coastal peoples. The purpose is to highlight that time (history) and space (geographies) should not be severed and they should be understood considering each other. The main research question of this chapter is: How did the Senegalese pirogue fishery evolve at the contact of the French colonial administration and then the Senegalese national administration? By means of this question, present issues of small pelagic fisheries acquire a new scope, a temporal one, that creates connections with European colonizers.

Once this connection between space and time has been created, I will turn to the shoreline itself and look at the coastal context where fish work takes place. I will focus on the various positionalities existing on the beach and argue for the necessity to create space for the ones that are shadowed by a general discourse around small pelagic fisheries. With this focus on a geographical context, I will look at the beach, concretely, between Dakar and the Saloum Delta (Senegal), as a site of meeting and transformation. In this chapter, I will underline that the shoreline is a space of confluence between the ocean and the land, fishers, and fish workers. I will also show the diversity and liveliness of the shoreline, challenging a too quick

land-sea binary division. This binary – a too clear-cut division – limits possibilities of connections between the terra-worlds and the aqua-worlds. This binary also hides the diversity of human existences that live in-between multiple worlds and that participate in feeding the sub-continent through the processing and trade of small pelagic fish considered as a livelihood. The shoreline, I argue, should be considered as a liminal space where differences meet and transformations take place. The main research question for this objective is: In what way the concept of liminality creates a space and a position for women and men fish workers along the shoreline of Senegal?

With these two first chapters, my aim is to show the importance of including temporal and spatial aspects in the discussion of food production to highlight its many ramifications. I will then turn to the discourse of the fishmeal and fish oil industry that builds a specific world distant from the lived experience of people along the shoreline of Senegal. The third chapter is geographical at a global scale, and in a more abstract way as it will look at the imaginaries that are built by an industry. It inquires the worlding processes of the International Fishmeal and Fish Oil Organization (IFFO), the overarching fishmeal and fish oil trade organization. Such large corporate organizations have the communication means and the networks to shape their perspective of the world; this gives the IFFO – and similar agrifood corporations – considerable power. My objective for this chapter is to highlight the worlding process at play and the type of world that is built and for whom. The main research question is: In what way does the International Fishmeal and Fish Oil Organization's worlding practices seek to transform the perception of the ocean and its dwellers?

In sum, in the first chapter, I discuss the importance of connecting space and time for a better contextualization of contemporary issues regarding the fishing for fishmeal and fish oil. I underline, in the second chapter, the necessity to create new conceptual spaces for other shadowed existences to position themselves and I show the importance that small pelagic fish

has for livelihoods along the shoreline of Senegal. And in the third chapter, I analyze the worlding practices of the fishmeal and fish oil industry and how this construction changes the way we perceive and act with food as well as the ocean and its dwellers.

## V. Methodology

As a master and then PhD student, I learned various methods and methodologies to organize my work and do research. This worked well in a structured and secured environment of a young student within an institution, and I appreciated the certainty it brought. I felt secure in my practice and my work: I was setting up tracks along which my work would ride (more or less) smoothly. However, this model was strongly challenged when confronted to the contingencies of life. For instance, this dissertation has developed for a long period of time due to the many twists and turns that life can bring: the necessity to radically change subject during mid-course of the PhD program, the birth of my first son, the absence of any earnings, the necessity to move to another continent, a world pandemic, the birth of my second son. I have been facing uncertainty and blurriness during the whole process. I had to constantly adapt to new situations and issues of many kinds (Billo & Hiemstra, 2013). This blurriness and uncertainty challenged the belief I had in the structures I had been taught; teachings that sometimes were almost preached as necessary and unchallengeable dogmas by some teachers, along the course of my academic life. The more I was trying to organize my methodology along traditional teachings, trying to create certainty, the more I felt unsettled when these certainties were crashing against the reality of everyday life. This made me seriously question to which extent my academic work – and if the academy at all – could make sense of this world when methodologies and methods did not fit what was felt and experienced. What room did it leave for the world to express itself through my researcher's eyes? While reading Law (2004) I was struck how he underlined that methodologies and methods can create a sense of certainty which is eventually not in contact with the lived world; certainty is anything but

what is experienced in the world. I had this sense that with a clear methodology, my chapter would almost automatically take form (Law, 2004: 11). I would have the guarantee of the core of a text almost already written once the correct method was discovered. And this was a mistake.

Retrospectively, I have spent too much time on preparing and not enough on experiencing (a reality I had not been told). I concur with Law (2004) and absolutely do not dismiss methods and methodologies as intrinsically bad and unnecessary. On the contrary, they are necessary and required, however they are only means to an end, and not ends in themselves.

It is only when I decided to embrace the blurriness and the uncertainty that I felt a certain relief. A relief only too short: how was I to go about my researching and writing then? I knew I wanted to experience different methodologies and ways of researching for my own pedagogical purpose as a young researcher. I decided to draw a broad sketch of what I wanted to do and the way I wanted to do it for each chapter. This sketch would be very loose and would depend on the different conclusion of each of the previous chapters. In a sense, I would simply embrace messiness and the fluidity of a process. Eventually, I came to the partial conclusion that methods or methodologies would not make the world more understandable. It is even a grandiose claim to say that we can "understand" the world. Maybe, more humbly, we should embrace that fact that the world cannot be understood and we can only try to make some sense of certain aspects of it. And this is the road I took. It is thus a dissertation of constant adaptation and change, maybe messy in some aspects, but indeed a worldly thing.

This research started within the academic field of geography but it is interdisciplinary in practice and in spirit. Indeed, issues related to food and marine resources are at the crossroad between the environmental and social sciences; these issues require an interdisciplinary approach (Markus et al., 2018: 503; see, Koschinsky et al., 2018, for an example of interdisciplinarity on marine resources). More, as global issues are multifaceted, there is a

necessity to transcend disciplinary boundaries (Markus et al., 2018; Roy et al., 2013) and to integrate the many areas of expertise necessary to answer contemporary challenges (Morss et al., 2021). I decided to delve into other fields of the academy such as anthropology, sociology, history, political sciences, and philosophy, to answer the research questions of this dissertation. There are many ways of knowing (Miller et al., 2008) and it is by looking at an issue through multiple angles that thoughts and reflections can be cross-pollinated. Methodologically, Dauvergne's work (1997) on shadow ecology is eloquent and revealing of the consequences casted by the production and consumption of a commodity. Conceptually, the "shadow" can also open questions as to what is the narrative of an industry and, by extension, what is shadowed by this narrative. In addition, the concept of shadow could be further developed into an academic research methodology. It becomes an opportunity to question the shadow(s) casted by my own positionality as a researcher (an aspect answered mostly in the Limitations section of this introductory chapter). It becomes a self-reflexive exercise that encourages to deepen the relations between myself as a researcher and the knowledge created in relation with other peoples. Eventually, this self-reflexive exercise is a humbling endeavor that has two facets: the first is to develop a sense of responsibility toward what is inquired, and second, it strengthens a relation and a sense of care toward what is inquired.

For each chapter, I developed a methodology to answer to its research question. For the first chapter, I was interested in the historiography (the way history is presented and represented; Cheng, 2012) of the coastal region of Senegal from the French colonial period to the present to bring a critical analysis of fisheries development in this Western African sub-region. I wished to inquire how the French colonial administration considered the Senegalese fisheries as an object in need of development, its fishers as in need of modernization, and the purpose of their fisheries development projects. The period I inquired into spanned from the early 20$^{th}$

century to the present. History should not be reduced to a consideration of past acts. History is connected to the present in the repercussion of these past acts as well as in the way we read and interpret them (Tucker, 2009). Understanding present issues cannot be achieved without rooting them in history (Law, 2004). And without the past, how to be rooted in the present to build alternative futures in a rapidly changing world? In the second chapter, I use feminist frameworks and positionality (Billo & Hiemstra, 2013; England, 1994; Haraway, 1988; Haraway, 2008; Rose, 1997; Tsing, 2005, 2012) as well as documentary methodologies (Figueroa, 2008; Jewitt, 2012a) for what should have been, initially, the field research. The writing of this chapter required a lot of adaption and cognitive flexibility, and reflexivity, as the field research was canceled due to the restrictions imposed during the covid-19 pandemic and the only field material left where my meeting notes and journal written during a short preparatory trip to Senegal (Billo & Hiemstra, 2013). This chapter opened new ways of thinking and positioning myself in the academy. I also suggest future research directions on the importance for how to consider (i) the coast as a space (Horvath et al., 2015a; Thomassen, 2009; Turner, 1967) and (ii) relations to other worlds that can be very different from ours (ocean-world, Global North-worlds, Global South worlds, etc.). For the third chapter, I wanted, initially, to follow a more traditional methodology for performing an analysis of the discourse of the IFFO website. I considered this chapter more as a pedagogical means to train me in a research methodology. To answer my research question, I chose the grounded methodology and its situational analysis approach (Clarke, 2005). For this chapter, my purpose was to challenge a dominant discourse, which in the end became my main motivation to write it, more than discovering a methodology as I initially intended.

To a certain degree, this dissertation's methodology required some improvisation. Ingold and Hallam (2007) discuss the importance and the role that improvisation has over innovation. As stated above, the development of this dissertation faced many setbacks and required a lot of

flexibility on my part; in other words, I had to adapt and improvise. Improvisation is not understood as mindlessly doing whatever comes to mind. Improvisation is an art, the art of adapting to what emerges, to deal with the unforeseen (Lewis & Lovatt, 2013; Montuori, 2003). To improvise is to use techniques, tools, instruments at hand, and with them, create a coherent and sound structure in the moment on the spot. It is working with what I have in the circumstances that have been given to attain certain objectives. To improvise is going along in the shadows, it is walking in unknown territories with a map that is drawn from the experience of the territory at every step. Doing these steps of improvisation felt dizzying at times. This dissertation expresses my own queries, hopes and fears of what the future of the planet holds for me and my children. It touches subjects that are important to my heart. I did not want to fail these feelings and the care that have been the motivation behind this dissertation.

## VI. Significance

My initial motivation was to discuss the salmon aquaculture industry. When I was a child, eating salmon was a luxury reserved for special occasions. The first time I tasted it, I immediately loved the texture, smooth and velvety, the greasy taste, sweet and saltiness of this fish. It took some years before salmon started emerging in supermarkets, restaurants and diners, gas stations and airport lobbies. With time it has come to be compared to chicken and even referred to as the new “chicken of the sea” (for instance, a brand called Chicken of the Sea sells salmon products. See also, Torrissen et al., 2011): produced in industrial quantity, cheap, and easily palatable (Asche et al., 2018). There is a commonality between chicken and salmon: their environmental footprint stemming mostly from their feed (Kuempel et al., 2023). Fish feed creates unknown connections and can become a means to illuminate spaces and places of shadows that corporations produce. We may imagine a farmed salmon as some wild animal enclosed in a pen locally. However, the technology required to produce farmed

salmons and the many connections that exist span the globe. By delving into the socio-environmental issues of fishmeal and fish oil production, by looking at the granularity of feed pellets (a compressed mass of nutrients), it is the connections they create and the worlds they are shadowing that this dissertation seeks to illuminate. Fishmeal and fish oil is a means to say that in the act of feeding salmon to produce commodified food, we are producing injustices and inequities. And due to their dominant position, the hegemonic food discourse of the agri-food sector must be challenged for the many shadows they create. This research will participate in bringing to the fore responsibilities as wealthy consumers in the Global North towards other humans and nonhumans.

## VII. Limitations of the research

This dissertation has three main limitations. The first limitation has to do with its interdisciplinarity. The second with the data collection process. The third deals with cultural biases.

This research is rooted in the field of geography but it is interdisciplinary at heart. Interdisciplinarity is the art of making connections drawing from different branches of knowledge. However, I felt that interdisciplinarity was a double-edged sword for this dissertation. While it allowed me to gain a larger scope, it limited my ability to delve deep into the specificities of each academic field that I drew on. However, interdisciplinarity answered well the purpose of this research: to connect multiple dimensions to make original connections and relations. Indeed, this dissertation is not on fishmeal and fish oil *per se* but on the relations that are created by them and through them. Fishmeal and fish oil are means I have used to inquire into what is forgotten in a process of food production and the type of world that is built by agrifood corporations. My main aim was to acknowledge the many relations that are present but are most often hidden from our awareness (Deleuze and Guattari,

1980). As a young researcher, the use of multiple methodologies with different theoretical and conceptual fields, made this work truly interdisciplinary, but also more complex, challenging and time consuming.

The data collection, qualitative in nature, was limited in several ways. Geographically, and in the field, the study would have gained in encompassing in the analysis the Northern part of Senegal from Dakar to Saint Louis (at the border with Mauritania). Saint Louis is the main fishing harbor where fishers leave to fish, often illegally, in Mauritanian waters. Mauritania is a central country for small pelagic fishing and fishmeal and fish oil production (Corten et al., 2017). Gambia could also have been included in the research: many Senegalese pirogues sell their fish at fishmeal plants in Gambia; fishmeal plants that pollute Gambian waters (Urbina, 2021). However, data collected were limited to a two weeks preparatory field trip. Due to the covid-19 pandemic and then the birth of my second son another trip – the actual field trip I had initially planned – was not possible. Limitations forced me to find other ways to obtain information.

Another limitation related to data collection, is time. This dissertation had to be redrawn in its entirety, and re-started in the midst of its fundings. Without funding, and with one, then, two children under my direct care, lack of predictable time to work on the dissertation became an impediment to a quick completion.

Last but certainly not least, a limitation of this research has to do with my cultural biases. Part of this dissertation takes place in Western Africa. This dissertation is my first contact with West Africa and Senegal. I had no prior experience with this region of the world. I read and listened extensively to work describing the (French colonial) history, economy, politics, and culture of the region; be it academic or non-academic work. However, I acknowledge that I have come to a region with my own personal history and academic teachings that limit my understanding of what happens there. Nevertheless, I think these points should not deter me

from creating relations, and I worked at coming to this region with humility and care (Sultana, 2007).

In this frame of mind, feminist scholars helped me tremendously to find a space and place in the academy that resonated with the way I think and allowed me to start finding an academic voice that resonates with who I am (these are but a few central scholars among the many that accompanied me: Barad, 2007; Haraway, 1988; Mol, 2002; Puig de la Bellacasa, 2016; Tsing, 2005). They also accompanied me in accepting my position as a researcher, as queer as this research often felt and my existence on the fringes, or so I felt, of the academy. I discovered and embraced feminist scholarship (too) late in this dissertation and any misinterpretations or misunderstandings of the scholarship are my own.

However, some aspects participated in overcoming some of these limitations. First, my two masters in International Relations (Geneva, Switzerland) and then in International Fisheries Management (Tromsø, Norway) were designed as interdisciplinary. Interdisciplinarity is thus essential to my research practices. More, my upbringing between two cultures (European and South American) participated in making me attentive and curious to cultural differences. In addition, I traveled extensively prior this research which taught me the art of listening to other cultures, practices, and ways of being. This would have been perfect for field research in a foreign region. Second, as a native (Swiss) French speaker, I was in a position to have access to written and spoken sources only available in French (for instance, on colonial practices as well as fisheries development in West Africa) or that were initially written in French (e.g. Foucault, Deleuze and Guattari, Braudel, Derrida, Merleau-Ponty, etc.). I could translate them and connect them with English sources, this in a spirit of interdisciplinarity across linguistic borders.

## VIII. Dissertation's outline

In the first chapter, I will delve into the 20th century history of the Senegalese pirogue fisheries. I will consider how French colonial epistemologies have structured a way of relating to coastal populations and the ocean. I will first show that the way an activity is defined effects behaviors toward and the value of that activity. Second, I will connect the past and the present by discussing technology as a means that transforms relations to an environment and the relation between peoples. Finally, I will discuss issues of inequities shadowed by colonial and then contemporary fishing practices, suggesting how to better tighten the relation between time (history) and space (geography). Finally, by taking a step back, I will argue that the ocean is only a mirror to what people think about themselves and the other; the ocean is a powerful archetype that can play the role of receptacle for our projections and thus a means to reveal who we think we are.

Once the past and the present connected, I will in the second chapter, highlight the present situation along a geographical section of the Southern coast of Senegal (from Dakar to the Saloum Delta). With this chapter, I have two purposes. The first is to present some actors along the shoreline, myself as a researcher included. What is their role, their positionality, and their life along the shoreline. Second, I wish to challenges a too easy division of the land-world with the ocean-world. Thus, I propose to use the concept of liminality to think about the shoreline as a place of meeting and transformation. This conceptualization allows to create resonances with these emerging lives, be they humans or nonhumans.

Once that have been shown the many existences present along the shoreline and the many hands at work with small pelagic fish, I cast my attention on the global. The third chapter will focus on the IFFO fishmeal and fish oil trade organization and its role in building a world where the ocean becomes a pool of commodities and food defined as, and reduced to,

nutrition for wealthy consumers in the Global North with effective demand or an ability to pay. I will use two central concepts in this chapter. First, I will consider seeing as a learned skill (Zhong Mengual, 2021). Second, I will make use of the concept of worlding (Escobar, 2016). This perspective will allow a critical look at the object under study (fishmeal and fish oil) and engage with a whole corporate industrial context that justifies the extraction of small pelagic fish. Through a worlding practice, the IFFO is engaged in a process of refitting nature, changing the role of food, and repositioning the activity of the aquaculture industry within higher moral values and imaginaries. In sum, worlding is not merely describing, it is an act of spatial production. Through this practice of worlding is created the belief in the controllability (and manageability) of the world which in fact is profoundly uncontrollable (Rosa, 2020). Such a belief in controllability desynchronizes individuals and societies across the world. If the second chapter was an analysis of the local/regional scale, the third chapter will critically assess the large scale and its disconnection to other realities than its own, shadowing the many relationalities involved in the farming of salmon.

# Chapter 1: Historical developments of the Senegal pirogue fishery and its consequences, from the turn of the 20th century to the 21st century

"The past is not dead. It is not even past. All of us labor in webs spun long before we were born, webs of heredity and environment, of desire and consequence, of history and eternity." Faulkner (1951)

"Ce n'est pas la modernité qui nous a presque tués. C'est l'idée impossible qu'une race puisse être supérieure à une autre." / "It is not modernity that almost killed us. It is this impossible idea that a race could be superior to another." Fontaine (author translation; 2020)

## Foreword

*If I could see through time and space, my wandering gaze would settle along the coast of Western Africa, in Senegal, during the first half of the past century. Maybe I would see a pirogue – this long dugout canoe – with two or three people aboard. They paddle on a quiet sea toward a motorized vessel with French people aboard. They do not dare come ashore; their boat is not made to pass the bar; they do not know the way. Early in the morning, the pirogue left to catch fish, fish that will be sold to the French. The French have no idea how to fish here, nor where to fish; but they know, or at least believe they know, the correct way to fish! They keep on telling pirogue owners what to do and how to do it. And we keep our old ways and sell the fish we catch. The sea reflects the early rays of the sun on the hull of the French boat, rusty and decrepit paint; the sea caresses the wooden hull of the pirogue. One day, the French will come ashore. They will try to change the ways people work on land as they could not change the way people worked at sea. Work? Is it really work? Or is it more than that for the ones that have been living here by the sea, thanks to the sea, for so long? The relation between land and sea is tight; but foreigners, they have not seen that. Maybe because the ocean blinds them, with the sun reflecting on their metallic hulls. Maybe because they only see the surface and cannot fathom what lies deep within. Yes, one day, they will come on land and try to preach other ways, they will force their practices and there will be resistance. But coastal people know their ways, and will decide to embrace or reject what is offered. Until one day…until one day, when it is too late, when there is no more choice, when we are imposed new ways of doing, from people in air-conditioned offices, far away. This day, by*

*despair, more and more people will come to sea for hope; and they will pester, in their offices, that we are too much, us fishers, us fisherfolks, them the pirogues on the sea. And so, many will continue their journey toward Europe, braving the sea in search of work and hope. But until this day. The pirogue observes the metallic boat, both swaying on the deep blue sea, with smells of salt and sand in the air.*

# I. Introduction

Farmed salmon - produced for instance in Norway, Chile, or Canada – requires to be fed with small pelagic fish most often fished in the "Global South," for example Senegal (West Africa). This chapter is the opportunity to explore the colonial history behind the fishing of small pelagic fish. It is also a mean to acknowledge the colonial on-going legacy left by Westerners and a mean to question what seems evident today but that has a historical construction.

The history of humans and the natural environment cannot be considered separately; it is deeply intertwined in its construction and its representation (Merchant, 1980). But how to make sense of this entanglement? And what can we learn from it? The history of a fishery can serve as an instrument to illuminate the history of a region (Pavé & Charles-Dominique, 1997). Moreover, the history of a fishery, by enmeshing people, place, and human institutions (corporations, economy, gender, culture, etc.), can serve to contextualize contemporary issues related – in this dissertation – with fishmeal and fish oil production for the salmon aquaculture industry. Expressing the many histories at play will foster an analysis of contemporary issues that will not be univocal but welcomes many voices involved in the process of global food production. In this process, observing a relation to the natural environment can become a powerful tool to illuminate how a society considers itself and builds an alterity, an image of the other. In this chapter, the ocean is called upon as a mirror of people own strength and in the building of this alterity: the French and other colonizers as superior and Senegalese fishers as inferior.

Africa – because its historical recording habits differ from written European ones (among other reasons) – is too often considered as a place "without history"[18] (Coquery-Vidrovitch & Moniot, 2005). This has participated, argues Pavé (1997) writing on Western African fisheries, in considering fisheries in this region solely in bio-ecological terms. The colonial past of the continent must be clearly acknowledged and factored into historical and geographical study of fisheries and their developments. A specific focus will be put on Senegal in a time frame set from circa the turn of the 20th century to early 2000s.

Early 20th century, France started considering their colonies as a source of profit and decided to invest politically in them[19]. The improvement of the artisanal fishery, in their Senegalese colony, was not a goal per se; the transformation of the artisanal fishery had the purpose of transforming them into industrial ones to the service, and as a supplier, of Paris, the metropole, as will be shown in this chapter. But the success was not as intended, the artisanal fishery refused to be a passive object to be transformed at will; on the contrary, it was very active in embracing – or refusing – new techniques, technologies, and organizational projects (e.g., cooperatives) when they saw it was useful for their own interests and purposes.

Solutions to contemporary issues are mostly limited to technological interventions. Instead, the ability to observe and consider the past in order to make sense of the present matters in our time of profound ecological and societal changes. It also matters in order to highlight the role that colonialism has had on history and geography.

It is puzzling to see how central small pelagic fish have become in food policies – with the encouragement of omega-3s intake by international organizations and private companies –, and how, at the same time, so little is known about the socio-environmental relations – the

[18] For instance, former French president Nicolas Sarkozy provoked an outrage by stating in an official discourse in Dakar (2007) that Africans "did not enter sufficiently into history" (Coquery-Vidrovitch, 2009: 11-12). This sounds like a distant echo from Gautier's colonialist view, writing prior World War II, that Africans must have a past but have no history (Gautier, 1943: 85).

[19] The beginning of the colonial period (the *Scramble for Africa*), marked with the Berlin Conference (1885), started in the last quarter of the 19th century.

shadowed spaces – taking place in the distant countries where this fish is caught. Turning the gaze toward the colonial history of the Senegalese pirogue fishery will help cast light on present issues related to food consumption (in the "Global North" and the "Global South") and bring about issues of injustice and inequity at play. Subsequently, the leading research question is: How did the Senegalese pirogue fishery evolve at the contact of the French colonial administration and then the Senegalese national administration? The rational for this chapter is to (i) connect present issues of inequity and injustice regarding pelagic fisheries with French colonial projects in Senegal and later national ones, and (ii), with use of an analysis of colonial epistemologies, discuss how representations of a world affect what comes to be seen as necessary to be done and why.

In his book "Slow Violence and the Environmentalism of the poor," Nixon (2011) shows how traditionally violence has been considered in terms of immediacy and visibility. However, he demonstrates that violence can creep slowly, and deeply, that it is dispersed in space and time, and that is can happen out of sight (Nixon, 2011). What I propose in this chapter is to look at some features that create this slow violence, these inequities, and injustices. By doing so, the aim is to cast light on shadowed spaces, what happens out of sight. Dauvergne (2008) develops a concept of ecological consequences of consumption; consequences that are shadowed by their distance of production or extraction. Building on his concept of shadow ecology, I propose ways to highlight spaces that are being shadowed and where violence and injustice take place in the fishing of small pelagic fish for feed production. Lefebvre (1974: 48-49) argues that spaces are produced. But what if spaces are also shadowed? They none the less exist, but out of sight and therefore out of mind. And what if these shadowed spaces are tied to a past? Massey highlights (2005: 5) that space has been subsumed by time. What I suggest is to acknowledge and tighten the relation between space and time as Massey (2005) proposes. By doing so, I wish to show that slow violence is perpetrated but is unseen, actively

shadowed, but that opportunities for agency and resistance continue to exist. Resistance and adaptability exist in relation, and imbricated with, the forces that produce them, using the instruments they have been encouraged to use but to their own advantage. These sites of resistance and adaptability are not localized places or spaces at the margins (Massey, 2005: 103); they exist relationally with the power that formed them, which challenges polarizing binary concepts such as "global/local" or "center/periphery" (Tsing, 2005: 58).

To frame this chapter, four aspects will be discussed and connected. First, the construction of knowledge, in this instance set in a colonial history, requires that I discuss the colonial past of Senegal and the colonial epistemologies that encompassed it. This will set the pirogue fishery within a larger socio-historical context; indeed, fisheries are more than economy, ecology, biology, and the techniques of fishing. Looking at colonial epistemologies helps us question whose knowledge is in action. Second, and related to the previous aspect on epistemology, I will question the various issues associated with naming "non-industrial" fisheries, as knowledge construction, as an act of power, is tied to naming and redefining. Descriptions and definitions convey presuppositions and constructions of their own. The term "artisanal" as in "artisanal fisheries"[20] will have to be discussed and contextualized to challenge *a priori* constructions, and the word "vernacular" will be proposed and used as an alternative. Words used to describe the small pelagic fish fishery in Senegal can either describe it for what it can do (the perspective of the observer) or how it is lived (the lived experience of the fisher, their daily societal experience; the vernacular). In sum, for whom are "pelagic fisheries" described? The third aspect will focus on colonial, and later national projects, implying a transfer of fishing technology for improvements as defined by the colonizer. Technology is not considered as a neutral instrument. The relation between the use of technologies and the, often

[20] In this chapter, my aim is not to analyze artisanal fisheries, their role, and purposes. Instead, my aim is to underline how the use and usage of words may entail, sometimes, a skewed sense of what a fishery can be.

unseen (or shadowed), inequitable consequences that flow from it (for differently situated actors) will be examined.

The role of knowledge, economics and technology will be developed and tied together in the fourth aspect, called *spacetime* that will cast light on (i) these geographical and temporal shadowed sites of inequities and (ii) the presence of spheres of practice and existence that exist. In sum, colonial epistemologies and defining words will reframe a historical process; technology and spacetime will broaden and deepen issues of injustice and inequality but also show how sites of resistance also co-exist. The aim is to build a conceptual framework to analyze the historical evolution of the small pelagic fish fishery in Senegal. Colonial practices have – deliberately or not – generated (with their epistemologies, their wordings, and their transfer of technology) spheres of economies and influenced livelihoods with unintended consequences.

In this chapter, I will show that colonial epistemologies, vernacular[21] practices (that includes social, societal, cultural, economic, etc., aspects) and the transfer of technologies have generated a small pelagic fishery with unintended consequences. Thanks to spacetime thinking, I will show that issues of shadowed inequity and injustice are embedded not only historically or temporally but also spatially or geographically. Conceptually, I will propose to consider the ocean as a mirror of colonial epistemologies. The ocean reflects what colonizers think of themselves and how the "other" is built; but by doing so, this reflection also constrains their perception of the existence of the "other" and what they, the colonizers, are really doing in practice. While colonizing projects aimed at transferring resources from the sea back to Europe, the pirogue fishery, instead of turning to the ocean (as hoped by

[21] The term "vernacular" will be used as a mean to look differently at the world along the shoreline of Senegal. It will be a way to question the Western common definitions of "artisanal" fisheries and to try to imagine other ways to describe these fisheries in a more specific and localized way. In this instance, the vernacular becomes a means to world differently, by better localizing and positioning what a specific fishery is and how it has become so.

colonizers), tightened its relations between land and sea, increased the web of connections along the coast, and the pirogue became part of many sites of resistance.

# II. Conceptual matters

## 1. Colonial epistemologies: the tunnel vision of knowledge construction

In Senegal, people would tell me how small pelagic fish are part and parcel of their food tradition. I imagined thus small pelagic fish almost ever present as a coastal dish. To my surprise, I learned that small pelagic fish is part of the culinary tradition only since the 2000s. Up until this date, people would eat white fish (e.g. grouper), without much care for smaller pelagic fish (e.g. sardines or bonga shad); if caught it was thrown back into the sea or dumped onto the beach. But with the development of fish trade for export purposes, white fish has been exported for cash, and stocks of white fish have begun to dwindle, further reducing the supply for coastal peoples.

The term “tradition” is tricky though: it may give a sense of timelessness, of a mythological presence. However, as Friedmann (1999) argued, behind “traditional” food production lies a whole history, a whole societal context - in this case a French colonial one. Food production has a long colonial history: people, plants, animals have been transferred from one region of the world to another to fulfill colonial projects and their profit seeking activities (Friedmann, 1999). And the transfer of technologies also participated in transformation of food production and food consumption patterns in colonized regions. How was this transfer of technology performed? And with what success for whom? This calls to question colonial epistemologies at work within the colonial political economy and its reception by coastal populations and their vernacular epistemologies.

This chapter will first present how French colonial institutions have brought to the region technologies that increased the fishing capacity of fishers; a technological transfer further

expanded by the Senegalese national agencies once the country became independent. And, second, how these fishers have slipped out of the, so believed, managing hands of French colonial powers. Of interest is how the story is not one of passive acceptance of technology, but of deliberate choice by the colonized of including or refusing the technology, and this to their own advantage.

Colonial fisheries do not distinguish between “pure” science and “applied” technology, it is techno-science with a purpose and power (Bavington & Samuel, 2016: 58). In this instance, science is not merely an instrument useful for colonial projects, science is a praxis co-constitutive of colonialism (Seth, 2009). It allows for colonialism to happen as an ideology that reflects the frame of mind of its epoch; the epistemology is built by and for colonialism. The representations that are created by the scientific practice (through its various scientific techniques: naming, counting, precise identification, organizing, etc.) structure what deserves existence in scientific catalogues and its possible use for economic purposes. This colonial techno-scientific work has a final purpose: to benefit the metropole and generate profits. As shown in this chapter, the work of Abel Gruvel, fisheries scientist in the colonies, was not directed toward local coastal African people but toward Paris. His work was directed toward "colonial bioprospecting" (Schiebinger, 2007) which required "precise identification": in the instance of Senegal, species have to be identified, classified, measured, according to a language specific to the colonizer (Seth, 2009: 374). In sum, colonial epistemologies have worked at creating "landscapes of control and appropriation" (Scott, 2012: 34).

If technoscience has been critiqued as an instrument of "earth-flattening globalization" (Seth, 2009: 379), technoscience – and technology – can also be used as an exploring instrument to illuminate the creation of unequal worlds. The history of the development of the pirogue fisheries in Senegal will highlight the case that the confluence of colonial projects and vernacular epistemologies will merge in unsuspected ways and create unintended

consequences. By doing so, I build on Bonneuil (2000) observation that techno-science has been ordering the colonized worlds and has been also imbricated with vernacular epistemologies. In this ordering, the way the “other” and its fisheries practices are defined matter as much as the way the Western fisheries sciences define themselves (cf. section “the ocean as a mirror”).

## 2. Describing fisheries: artisanal, industrial, or vernacular?

The definition of small-scale fisheries (or artisanal fisheries), has always been a difficult conundrum and there is no agreement on a common definition (Johnson, 2006). The use of language to describe different types of fisheries is never neutral. Language is a projection of a society, its structure, and constructions. It is always more than mere representation and it is always tied to power (Foucault, 1966: 293) . Words like "artisanal" or "small scale" do not portray an accurate representation of these fisheries and their many related activities: "artisanal" gives a sense of low technology, time intensive activity and communitarian work. However, the term “artisanal” may suffer from some similar issues as the term “tradition(al)” (Friedmann, 1999). First, the term “artisanal” may convey a feeling of nostalgia and suggest a practice frozen in time and that has been perpetuated for generations. What is missed is the evolution of a practice embedded in history with actors who have agency; this missed aspect can be detrimental to the understanding of a context. Second, the term “artisanal” may create a spatial and temporal homogenization that allows one to equate heterogenous fishing practices (Coquery-Vidrovitch & Moniot, 2005): the term “artisanal” could shadow the many different practices that may exist depending on places, its many spheres of activities and relations, along the coast.

The aim of discussing the term “small scale” or “artisanal” is not to denigrate the existence of anything “traditional”. Instead, the aim is to challenge a too quick assumption of what is “traditional,” or “artisanal.” It seems therefore central to avoid the risk of reducing “artisanal”

with “traditional” and propose another term than “artisanal fisheries” in the context of this contribution.

Another approach has been to oppose small-scale fisheries to “large-scale”/industrial fisheries. The contemporary defining parameters stem from Thomson’s (Thomson, 1980) famous table that opposes the various qualities of each type of fisheries. If defining “large-scale”/industrial fisheries seems easier – focusing on capital-intensive, low in labor requirements, high in technology use –, the definition of small-scale fisheries proves harder; maybe because between both, purposes and rational for practices differ radically (Carvalho et al., 2011; Kinds et al., 2021; Rousseau et al., 2019; Smith & Basurto, 2019). In addition, a few but well-equipped small-scale vessels may be as efficient as an industrial one; it is thus not always a matter of scale but of technological efficiency and purpose of fishing (for food and livelihood or for exchange value to be exchanged as commodities on the global market). Defining "small-scale" or "artisanal" seems more about showing that it is not industrial fishing, instead of defining what small-scale fishing practices are exactly. It creates a false fixed binary that does not exist in practice. Instead, it allows the commensuration of many diverse fishing practices under the umbrella term of “small-scale fisheries.” But due to the high diversity of practices, cultures, habits, techniques, and technologies, how to find a common denominator in the multitude of fishing peoples, places, and practices? What if the "small-scale" uses industrial techniques and technologies among its practices? No clear definition has been agreed upon. However, I propose, in this dissertation, to turn instead to a more practical approach and define the Senegalese coastal fisheries by the technology used and its societal and historical embeddedness, namely the pirogue, which should be included within a larger social and societal framework. Fisheries should not be limited to the act of fishing, to a technique. Fisheries involves human relations that extend far beyond the shore. They involve activities ranging from the fishing to the processing and selling – sectors too

often left aside in research, management, and policies; a situation all the more detrimental as it involves the preponderant participation of women (Harper et al., 2013; Kleiber et al., 2015). But what could be said about the nature of the fishery?

Words and concepts structure a specific mindset circumscribing our thoughts, producing a "thought-space" (Samuel, 2016) that can limit the existence of other ways of thinking and doing. In a different context, Ivan Illich (1981) proposed the term "vernacular" to oppose to "industrial" and its consumerist premises[22]. If the "industrial" is turned toward commodity production and consumption, the former – the vernacular – is turned toward "unpaid activities which provide and improve livelihood" (Illich, 1981: 24). Illich's definition of the vernacular has the disadvantage of only considering unpaid activities, i.e. the radius of human activities is thus very localized and tied to subsistence, use value, fish as food. In the context of fisheries, this limits tremendously what fisheries activities brings to a population in terms of, for instance, subsistence, food consumption or financial livelihood (c.f. chapter 2). A too localized perspective would shadow the benefits that fishing-related activities bring to a population: for instance, women play a central role in processing, selling, and trading fish; only focusing on fishing hides the role of these activities. Still, I argue that the term "vernacular" represents a fair alternative to the term "industrial", in order to recenter humans – and nonhumans – at the heart of relations, and in order to show that human activities cannot be reduced to one purpose (produce a commodity), but are multi-purposed (Scott, 2012: 43). However, the definition should be refined to fit the role and geographical span that fisheries, and its related activities have. I argue that vernacular activities are about spatial relations that may start in the local household but are connected broadly. The vernacular opens the horizon

[22] However, "industrial" and "vernacular" are not opposed poles without contacts. Instead, they should be considered opposed along a spectrum where one can be found in the other. For instance, someone may work in an industry on an assembly line, but the machine although highly technical may require some form of "common sense" knowledge, a vernacular way of knowing the machine (Scott, 2012).

and connects one radius, one vernacular sphere (Sloterdijk, 2010) of activities with another. These vernacular spheres of activities are localized and contextualized but also connected and exchanging. This forms a spatialized relational tree transporting the fish further inland or along the coast. Each of these spheres of activities are linked by agents that passes fish from one sphere to another. In my proposition, economic aspects are not left aside, they are part and parcel of human relations. They highly matter because, in the present case, women are central in the production processes, selling, transport of fish, trade, and in the financing of fishing campaigns. To leave economics aside is to leave women and their role in society aside; it is unacceptable. As Johnson and Robert (2016) have shown, cash exchanges do not have to be excluded from vernacular considerations. Trade is part and parcel of human relations. Graphically, an industrial economic system could be considered more akin to a vertical system of connected industries and companies that deliver a specific product to a final consumer; the purpose of the enterprise is set by actors at the top. The main concern is not so much where the activity takes place than the final product produced. A vernacular economic system could be described as a horizontal structure of individuals, organized or not, that passes a product further away according to the needs, possibilities, and opportunities. It is a type of activity that is very dependent on the space and place where interactions and relations occur. This opens paths to recognize the existence of many rationales for diverse economic processes (livelihood, subsistence, survival, profit, etc.) (cf. chapter 2). In sum, my proposition of the vernacular is not an opposition to *homo economicus* or *homo industrialis* as imagined by Illich (1981). Instead, in this dissertation I use the term vernacular as a descriptive instrument that embeds the economic within a social, societal, cultural, environmental, and historical context and a set of intersecting processes. As such, the vernacular is not in the past and is not tied to tradition; it is firmly embedded in the observation and analysis of the present and the specificities of the language that is used

(Illich, 1981). If the industrial economic system is presented as a chain, the vernacular economic system could be considered as an entanglement, like roots growing around the links, a mesh of activities.

## 3. *Spacetime*: time differential and shadowed spaces

Time and space are social, cultural, and economic constructs, and lived experiences. Time is much more valuable if – instead of being considered as absolute or abstract – it is considered as socially and culturally constructed (Rifkin, 2017), and so is space. Space and time must be understood as relational and as plural, spacetime*s* (Massey, 2005; Awâsis, 2020). Different societies – different worlds (Escobar, 2020) – can live at different spacetimes, and thus different rhythms. These differentials can create unintended frictions spreading to unintended geographical spaces.

History should not be read as sequences of events that have temporal boundaries (Karla, 2021) and that linearly and sequentially lead to the present. What is done in a specific place and at a certain moment in time will have repercussion beyond that place, in space and time. But whose time and which space are we talking about? First, the construction of time can be an instrument of power in its linear, historical, representation: the construction of a linear historical time is essential to represent the colonizer further ahead on the time's arrow than the colonized, justifying colonial and, later, development projects by international organizations and development agencies (Bonneuil, 2000; Fent & Kojola, 2020: 821). This linear and single perspective creates a past depoliticized, that little recognizes injustices and inequities created; no actions are mere "facts" (Seth, 2009: 377). By turning away from considering history critically, imbrications, connections and responsibilities are disregarded. Second, time can also be an instrument of power when institutionally structured. Awâsis has called the temporally built infrastructure, the "colonial matrix of institutional temporal principals"

(Awâsis, 2020: 832): measurement of time is set by institutions, used to structure a society and help managing it (Huebener, 2015). These two temporal constructions (time as an arrow and institutionalized time) have been used by colonial powers to support a colonial economic system (Mentan, 2017).

Therefore, time and space are not separate, they form a unit influencing each other in favor of a production system, before colonialism, now capitalism. In the capitalist social system (Fraser & Jaeggi, 2018), time and space have (i) an "organic connection", and (ii) they have a contingent role in this mode of production (Castree, 2009: 52). Space and time are not anodyne, their construction and representations are structures of power. Although capitalist and neoliberal practices work at enhancing the role and importance of time over space (Harvey, 1990). Space and time work together and can only be understood relationally (Massey, 2005). Without proper consideration of both, some spaces will remain shadowed and this to the disfavor of the most vulnerable.

Spacetime itself is not absolute and depends on societies and cultures. For instance, while colonial temporality is linear and single, indigenous temporalities can be multiple and cyclical, and these temporalities are closely interconnected with the land, i.e. space (Awâsis, 2020: 831-832). These differences in living and representing time and space can create unexpected consequences in time (time lags) with consequences that may spread far away in space (space lags). In practice, these lags could shed light to links between past colonial technoscientific decisions regarding fisheries with contemporary social and environmental issues.

Therefore, it is not the History but Histories of Western African fisheries that should be considered. Although narrating the plural Histories regarding the fisheries of Senegal is beyond the possibility of this chapter, the aim is nevertheless to show that colonial fisheries is not a past event but a temporal and spatial process with ongoing legacies. The pirogue is not

an instrument "stuck in the past", a "tradition" of the region that has to be developed, because it was highly adapted to its spatial environment and it has resisted to forced changes and persisted through time. In this context, time and space have different meaning for the ones living it: for colonizing practices, space and time is a way of thinking and considering the other, for vernacular practices, it is a way doing and resisting.

Why does it matter to consider time differentials and shadowed spaces? Spacetime discussion is not just about philosophical aspects or abstract considerations, it has very concrete and practical consequences related to environmental justice, political ecology, and human-nonhuman relations (Awâsis, 2020; Fent & Kojola, 2020). Presently, economic and financial systems are embedded in a temporality that goes ever faster (e.g. high frequency trading exchanging stock shares within seconds). Speed and velocity are normalized to the detriment of space. To scrutinize time differentials between different temporalities offers a view on multiple spatial frictions that can take place (Tsing, 2005). Considering time as non-linear and multiple challenges the totalizing and reductive view of time and history as contiguous sequences. It opens up to the possibility of other temporalities, be they human or more-than-human (Fitz-Henry, 2017).

It is indeed high (space)time to consider the existence of other spatialtemporalities related to nonhuman worlds (be it geological or animated), all the more in a crisis of anthropogenic climate change. More, to scrutinize shadowed spaces is challenging the neoliberal discourse of a world as a 'one-space' place (a global village). It also gives space for the nonhuman to exist, not merely as a resource or as a holder of a resource, but as an actor in that space.

# III. Colonial epistemology and the history of the Senegalese pirogue fishery

In this section, I will first deploy the ocean as a mirror revealing colonial epistemological frame of mind. Then I will assess the role of language in performing different fisheries in Senegal. Finally, I will present and discuss the history of the Senegalese pirogue fishery from the colonial period to the early 2000s.

## 1. The ocean as a mirror

The ocean is a powerful archetype[23] and a receptacle of human's projections of awe, fear, and hope. The ocean can reveal how we think about ourselves. It can also serve to build an image of "the other" as totally different from us (the construction of an alterity) which, in echo, will offer an image of who we think we are.

European nations measured their strength and competencies in light of their capacity to perform long-distance travels on high seas. Their ships were used as a benchmark to evaluate the sailing (i.e. technological) capacities of other peoples, and, maybe more importantly, as a way to confirm their own superiority. The perception colonial powers had of the ocean – and their mastery of it – was a way to position Western African populations as radically different from them. European sailors described the Atlantic Ocean as, for instance, a frontier (Gautier, 1935, cited in Chauveau, 1986) which Europeans were capable of crossing. The ocean was also a space of danger devoid of life and the limit of life itself, a "dead end of the ecumene" (Richard-Molard, 1952, cited in Chauveau, 1986). Braudel describes, for West African coastal populations, the Atlantic not just as a frontier but a "watertight/hermetic wall" [24] (Braudel,

[23] "Le milieu de la mer es trop « archétypal » pour que rien n'en transpire dans la sphère de la connaissance elle-même. " / « Sea environment is too « archetypical» for none of it transpires in the sphere of knowledge itself» (author translation, Chauveau, 1986: 188).
[24] Author translation, "cloison étanche" in original.

2022), coastal populations squeezed between sandy and liquid deserts. These representations meant that the ocean was also perceived as a "confining force" which justified for Europeans the lack of transoceanic travels of West African societies (Hargreaves, 1985, cited in Chauveau, 1986).

Colonial powers justified the absence of maritime history in Africa (Ray & Rich, 2009) with ecological and historical arguments. The ecological argument: the coastal landscape of Western Africa is a long frontal coast facing the Atlantic. The absence of bays, internal seas (such as the Mediterranean) or gulfs makes it impractical to start oceanic travels; so goes the argument. Europeans had a fearful apprehension of the African coast, due to its deadly diseases (for instance malaria, and its high death toll on explorers and colonizers), the coast was considered even more hostile than the interior lands (Chauveau, 1986). Therefore, Europeans concluded that nature had kept African populations away from the sea, in some sort of natural determinism. The second argument – historical – posits a socio-geographic determinism: Occidental Soudan[25] was considered as the economic, social, cultural, and migratory epicenter, the epitome of African civilization. The coastline was seen a border zone, and the ocean was not the beginning of something but the confine of a civilization. West Africa was the place where the Soudanese sphere of influence ended against the Atlantic Ocean. Coastal populations of West Africans, this geographically deterministic story went, existed because of a centrifugal force starting from Soudan and the Sahara and stranding along the Atlantic coast's impassable ocean (Chauveau, 1986). These preconceived ideas have paved the way to the role Europeans thought they should have in "unblocking the continent" and opening it to the sea (Chauveau, 1986).

[25] Historians have delimited Occidental Sudan, during the African medieval period, as the Sahel region, South of the Sahara Desert, in Western Africa (Coquery-Vidrovitch, 2015, see footnote 5; Conrad, 2016; for a geography of Occidental Sudan in the 11th century, see Hunwick et al., 1979).

On the other hand, Western Africans did not live their lives according to the European colonial division between land and sea. Traoré (2009) showed that between 1500 and 1800, Senegambian rulers considered the coast and waterways as under their sovereignty and granted certain limited rights to European traders. European traders knew that trade relations could not be established without diplomatic ties. In other words, between the 16th to the 19th century, and paraphrasing Traoré (2009), the caravel did not win over the caravan. Senegambian rulers dictated the terms of trade to European traders, and had a sense of their sovereign territory extended from the land into the sea.

Europeans, with their technological capacity to sail the high sea, created a hierarchy of knowledge with themselves and their maritime technologies standing on top. From this European colonial perspective, the coast was the premise to modernity and the high seas its accomplishment showing the development of maritime technoscientific capacities and abilities (Pélissier, 1990). It confirmed in their own eyes their superiority over Africans. Considering high sea travels as the pinnacle of maritime techno-scientific development and competences, it pushed littoral navigation skills to the bottom of a hierarchy of knowledge and proficiency, and valued long distant trade to advance maritime and economic development (Chauveau, 1986). With these chauvinistic assumptions, Europeans did not care to notice that locals had integrated maritime technologies since their first encounters with the Portuguese in the 15th century (for instance, the use of the sail since the 17th century); that the local knowledge was appropriate for the local seascape; and that the integration of foreign techniques and technologies were only done when deemed useful to them in their specific context (Chauveau, 1986). Pitifully, due to these European colonial assumptions the maritime history of Western Africa continues to be a relative lacuna in the academic literature of the region (Chauveau, 1986); research that was reaffirmed by Ray and Rich (2009). Although literature on trade to and from Africa is plentiful – and work exists on the history of Africans

working *for* Europeans –, there continues to be a Western-bias toward European technologies and European development that shadows West African historical geographies. This colonial past, and present, hinders the possibilities for unique African-centric maritime histories and geographies to exist, yet another legacy of colonialism (Ray & Rich, 2009).

The perception of the effectiveness of fishing practices and habits have been influenced by what Europeans considered degrees of modernity (following stage theories of development that place the Euro-American world on top, such as Rostow's stages of economic growth, see for instance, Willis, 2023). This requires further comment on what the term "artisanal" can possibly mean in a Western African setting highly influenced by Eurocentric colonial development.

## 2. The pirogue: versatile, flexible, and resistant

To find a definition for the 'artisanal' fishery is not as straightforward as it initially seems as Rousseau and colleagues (2019) observe when discussing the definition of "small-scale" fisheries (c.f. also Johnson, 2006). The adjective *artisanal* comes from the noun *artisan*. Etymologically, *artisan* has a Latin root meaning *skilled*. The Merriam-Webster dictionary describes *artisanal* as a product made in a limited quantity by traditional methods and the Cambridge dictionary describes *artisanal* as something skillfully made by hand. Colloquially, the artisanal is also understood as the opposite of the industrial, the mechanized. In the context of Senegalese marine fisheries, the use of the term "artisanal" sediments a practice – in time and space – in such a restrictive way that it fails to depict the fishery historically and contextually. The word "artisanal" also proves to be contentious when two culturally different fishing practices meet that are both considered "artisanal": between 1906 and 1946 (Pavé, 1997: 3), some European vessels (mostly French and Spanish) that came to fish in Senegal were – according to European standards – artisanal but their fishing potential was closer to a

semi-industrial activity in Western Africa. Or in another instance, and ironically, the fishing capacity of Senegalese *artisanal* boats has become nowadays closer to a semi-industrial one (Pavé, 1997) considering i.e. the size of the fleet, origins of fishers, its migration patterns, and its fishing capacity.

Another word commonly used, often as a synonym to describe a local fishery, is the word "small-scale" fishery. But what does small refers to: the number of boats? The number of fishers? The quantity of fish caught? In the Senegalese case, the term seems inappropriate: although small at first during colonial times, Senegalese local/regional fisheries became more numerous and fishing vessels were getting larger and faster and more efficient at catching fish. Until the end of the Second World War, the Senegalese "small-scale" fleet was much more efficient at catching fish than the European "(semi-)industrial" fleet. Therefore, the "'small-scale" vs "industrial" polarization does not allow either for a clear representation of coastal fisheries within historical context.

The quantitative description in terms of size (small-scale) is therefore problematic: individually speaking a Senegalese pirogue might be less efficient than a European boat. But collectively, in terms of number and collective work of individuals, in terms of know-how of the region and species, Senegalese pirogues can be much more efficient than industrial vessels. The qualitative description in terms of tradition – "artisanal" – is also problematic as it rests on cultural presuppositions: the term "artisanal" can be ladened with hopes of what should be or of a better past, or archaism. It is a subjective bias based on cultural appreciation of the other. In this section, in order to better understand contexts and contingencies - and in order to better follow the historical evolution of the coastal fleet – the term "pirogue fishery" will be favored (Pavé, 1997). The term "pirogue" has the advantage of keeping as a focus a vessel specific to the region that has been used with multiple transformations adapting to new technologies to satisfy an evolving fish trade.

The earliest European accounts of Western African's fisheries date back to the 15th century with the Portuguese sailing along the coast. To come ashore required skillful sailors to cross the bar[26]. Early adventurers and traders were dependent, for access and transport of goods, on the skills of local sailors to cross it[27]. Since the encounter with European traders in the 16th century, local fishers started integrating new techniques and technologies in their sailing skills (Chauveau, 1986). Pirogues were looked down upon by colonizers as primitive and less technical than their high sea vessels. But the purpose of pirogues was not to cross oceans but to navigate along the coast. They have shown – throughout the 20th century – to be the most efficient and fitted vessel for the region; versatile and adaptable to spatial, historical, and technical contexts. During the colonial period (starting circa. at the turn of the 20th century), the pirogue fishery, paradoxically, was both praised for its ingenuity and at the same time described as outdated and archaic (Pavé, 1997); but the conclusion always remains that, as ingenuous as it might be, European fishing practices was the only way forward (Chauveau & Samba, 1990). What colonial authorities, and later the Senegalese government (and development specialists), did not perceive was that the pirogue fishery had a "self-transformation capacity" as will be shown below (Chauveau & Samba, 1990). It is only since the 1980s that the pirogue fishery was considered a positive asset and a source of economic development. But all issues and failed development projects have been diagnosed by national and international development specialists as the consequence of the "traditional" state of mind of fishers and their conservative attitude (Chauveau & Samba, 1990).

Each pirogue is adapted to the specificities of the coastal seascape (NGuyen Van Chi-Bonnardel, 1980). Evolution went from smaller pirogues, built in one tree trunk, boarding 3-4,

[26] In oceanography, a bar is an accumulation of sand or silt creating an underwater ridge. Due to the effects of winds, water currents, waves, tides, etc., a bar can be a difficult environment to predict.
[27] With no sheltered harbors, Portuguese caravels had to anchor ahead of the bar. African sailors will start working as carriers to cross the bar onto the shore. The Krumen were the most renowned sailors. In 1753, they successfully organized a strike at the fort of Anaba to obtain a raise of their wages (Coquery-Vidrovitch, 2018; Gutkind, 1989).

or 7-8 fishers to longer contemporary ones boarding 20 fishers. It is a means of fishing that has evolved through the contact of colonizers and has adapted to modern fishing methods. Fishers were selective in choosing the technology to integrate and have had their reasons for refusing specific modern vessel technologies. For instance, they disliked the use of fiber glass for the hull: if a fisher falls into the sea, it is much easier to get back on board with a wooden hull (Marfaing, 2005). In addition, fiber glass pirogues have a higher production cost and did not sail better than wooden ones (NGuyen Van Chi-Bonnardel, 1980). Participation in the pirogue fishery also evolved over time. Many fishers, considered "traditional fishers," entered the fishery in the second half of the 20th century. The development of the pirogue fisheries is due, among other causes and most importantly, to the peanut agriculture[28] [29], the apparition in the 19th century of salt as a new mean of conservation allowing to keep fish for longer, the diffusion of pirogue building, or motorization (Chauveau, 1985). And in its colonial history, the growth of the pirogue fisheries sector was mainly the doing of colonial presence in which Abel Gruvel was a central figure.

## 3. Abel Gruvel and the colonial fisheries science

The aim of this section is to outline, with the person of Abel Gruvel (1870-1941), the work and state of mind of colonial fisheries projects. Beginning of the 19th century, empires and nation-states developed commercial relations with Africans by remaining along the African coast. The end of the slave trade (mid-19th century), in conjunction with the European industrial revolution, gave an impulse to explore and spread into the continent (Coquery-Vidrovitch & Moniot, 2005). The last third of the 19th century was marked by the *scramble for Africa*. The Berlin Conference (1885) was organized between colonial nation-states to

[28] that existed prior the colonization but was strongly incentivized since then.
[29] The peanut agriculture was influential in two ways: its production stimulated the economy which increased consumption, created infrastructures facilitating communication and transport, attracting thus workers and new fishers, or because the peanut agriculture economy decreased and people required alternative livelihoods, turning then to fisheries.

clarify the sharing of Africa and to agree on the "rules" related to the colonization[30] of these new territories (Coquery-Vidrovitch & Moniot, 2005). Empires desired colonies for prestige and geo-political reasons. They also represented a means of acquiring goods at a lower price than if bought from other imperial nation-states. Colonies were to be a source of profit for the metropole (Coquery-Vidrovitch & Moniot, 2005). However, the French metropole was reluctant to subsidize their colonies; they had to be financially self-sufficient. Paris voted the *law of 1901* putting a stop to any subsidies to their African colonies (Coquery-Vidrovitch & Moniot, 2005). Thus, colonial development was not ultimately for the sake of local populations but for the benefit of the metropole; henceforth pirogue fisheries had no intrinsic value for the metropole.

Until the 19th century, there is little information on fisheries in West Africa (Pavé & Charles-Dominique, 1997). For the Atlantic side of Western Africa, Gruvel's missions, early 20th century, are the first to present regional fishing practices (Pavé & Charles-Dominique, 1997). Gruvel studied zoology and worked as a researcher and teacher until 1905 at Faculty of Sciences of Bordeaux University (France). He then left the public education and obtains a permanent mission in the colonial region named French Western Africa[31] (*Afrique Occidental Française*). In 1919, Gruvel acquired the title of Technical Adviser to the Colonial Ministry (*Conseiller technique du ministère colonial*). He has in parallel the chair of Colonial Fishing and Animal Production (*Chair de pêche et de production animal d'origine colonial*) at the Paris Museum of Natural History. Between 1905 and 1940, Gruvel performed, on average,

[30] Colonization implies more than the presence of colonizers on a land. It involves to redefine and reframe this "new world" in which the colonizer stands. The means and models of describing the "world" allows for a colonization process of this Earth under the terms and conditions of Western ontologies with a naming process under Western epistemological praxis (Ferdinand, 2015; Ferdinand & Opperman, 2023). Colonization is thus a process that embeds humans, an environment, and the nonhuman as well (Gosh, 2021); colonialism is a process that is still perpetuated today and not just an event of the past.

[31] A federation formed by 9 West African French colonies: Mauritania, Senegal, French Soudan (today: Mali), Guinea, Ivory Coast, Togo, Niger, High-Volta (today: Burkina Faso), and Dahomey (today: Benin).

one mission per year in Africa or Europe[32], except during World War I (Debaz, 2012). Early 1930s, Abel Gruvel hypothesized that the rarefaction of fish in Europe would call to the development of new fisheries in the colonies, specifically in Morocco and West Africa (Pavé, 1997).

During the colonial period, science, economy, and politics were strongly intertwined (Bonneuil, 2000) structuring a colonial political economy working in favor of the metropole. Science was used as an instrument of power to get control of resources through surveys and inventories and the resulting maps and infrastructure oriented toward extraction for export (Pavé & Charles-Dominique, 1999). Early in his colonial career, Gruvel wanted to make a scientific inventory of the seas and rivers, but in 1930, he justified his work by the necessity to feed local populations to decrease child mortality and economically develop the colonies (Bavington, 2010a). However, care for the local peoples' health did not come from a humanitarian impetus but expressed the necessity to curve a mortality rate that "threatens our colonization depriving it from an essential labor force" (Debaz, 2012). For Gruvel, securing the appropriate nutrition of West Africans was to increase the "human capital" or the "human livestock of our colonies" (author translation; "le cheptel humain de nos colonies," Gruvel, 1930: 49-50, cited in, Pavé, 1997). In other words, it was necessary to feed this population for economic purposes and not favor peoples' foodways. When it comes to the natural environment, Gruvel considered protecting nature as a "moral necessity," however not for its intrinsic value but for its rational and economic exploitation (Debaz, 2012). In the 1920s, Gruvel sees the necessity to strike an equilibrium between fishing and protecting fisheries resources. Although fishing was minimal in the 1930s, the colonial administration, to take greater control of the fisheries, waved the risk of fisheries decline and the necessity to protect the natural environment to encourage economic benefits for France (Pavé & Charles-

[32] Fisheries research in the colonies was the work of 5 to 10 persons (Pavé & Charles-Dominique, 1999: 7).

Dominique, 1997). However, any responsibility for the decline of fish stocks is either placed on local fishers or other European fishing nations entering French territory and is never considered the responsibility of the French fishing fleet (Pavé, 1997).

Colonial projects were not easy to set up and many contingencies hindered their completion. Until World War II, the port of the city of Port-Etienne (re-named Nouadhibou after the independence of Mauritania) was the only large-scale project that was completed in French West Africa – and with mixed results for France (Pavé & Charles-Dominique, 1999). Gruvel's first mission was to explore fisheries exploitation possibilities on the Arguin Bank off present day Mauritania. The double objective was to set up fisheries that would supply the metropole (France thus avoiding dependency on buying fish from rival empires) and set up commercial relations with local nomadic populations in order to pacify the region (Debaz, 2012). Gruvel encouraged and supported the creation of a fishing port and a military fort. The construction of Port-Etienne begun in 1906. This new fishing site – the Arguin Bank – was also considered as an answer to the crisis of the French sardine fisheries in the Brittany and Vendée regions (Durand, 1991) as well as changes in fishing rights in Newfoundland[33]; Port-Etienne was presented to fishers as the "new Newfoundland" (Debaz, 2012). However, Port-Etienne was riddled with issues be they financial or technical. Transfer of fish to the metropole was also problematic at this time as no satisfactory means of fish preservation had been found. After the Great War, interest for Port-Etienne dwindled and Gruvel's work turned to the general challenges of the development of profitable colonial fisheries throughout French West Africa.

[33] Newfoundland, with its cod fisheries, was a pivotal fishing region for French fishers. Until 1904, French fishers had a right to fish along the Northern coasts (between Cape Bonavista and Pointe Riche) of Newfoundland (an English territory then), the "French Shore". Diplomatic tensions between France and Great Britain led to the end of specific fishing rights for French fishers along the "French Shore" (Korneski, 2014; Thompson, 1961).

## IV. The pirogue fisheries: a colonial development project

In this section, I chronologically synthetize and comment on how administrations, both pre- and post-independence (1960), considered the pirogue fishery and how it envisioned its development. I show how the French colonial administrations missed to see the nature of the pirogue fishery and its capacity to adapt and change, a mistake that was repeated later by the independent Senegalese administration.

Dahou (2002) argues that colonial projects oriented toward creating a modern pirogue fishery failed because of the colonial focus on maximizing production or catch. By doing so, the colonial administration missed the complex and intricate web of social and economic relations that connected the coastal fisheries extensively inland. However, and as mentioned above, the objective of the French colonial administration was not to develop a pirogue fishery *per se*, but to develop a profitable system of fisheries production, financially independent of the metropole, and working to the benefit of it. If projects were implemented, they were done in relation to colonial economic interests at sea (French fishing vessels) or on land (French fish processing factories). However, as French colonial fisheries projects repeatedly failed to succeed, a *laissez-faire* approach to their development was adopted. These failures were justified by the "stubborn mindset" of "traditional-minded" fishermen (Chauveau & Samba, 1990). The relation between the colonial administration and the pirogue fishery embraced both short-sightedness and disinterest until the end of the Second World War.

*Early 20$^{th}$ Century to World War II*

In the late 19$^{th}$ into the early 20$^{th}$ century, fisheries started changing due to the development of a small domestic economy caused by colonial agriculture projects and the development of urban areas (Chauveau, 1985). Early 20$^{th}$ century, Gruvel describes the practices of the pirogue fishery and underlines its importance for the population as well as its great fishing

techniques. Nevertheless, he concludes that the only viable future is its modernization. Industrialization (of fishing and fish processing practices) was to be performed always with the interest of the colonizer in mind, i.e. European boats were to be used with a European crew or a mixed one with local fishers (Pavé & Charles-Dominique, 1997: 605). The colonial administration then tried to have the pirogue fishery evolve to modern European boats, adopt European styles of fish processing (salt, canning, etc.), and supply the European market with processed fish (Chauveau, 1985).

Colonies represented economic and trade opportunities for the metropole as well as an outlet for its own goods. Shortly before World War I, France notes that the crisis of its Britany sardine fisheries is the consequence of the increasing number of fishers (an increase from 200 to 800-1000) and that the solution to this crisis is to send the excess of fishers to the French colonial fisheries (Pavé, 1997). Fishing vessels, striving to find new fishing prospects after the sardine stock failure, took advantage of colonial subsidies[34]. Noteworthy, the fleet is closer to an artisanal fleet than an industrial one (Pavé & Charles-Dominique, 1997).

During World War I, the French government becomes more directive to support the war effort. To supply the metropole with fish products, the administration sets up fisheries and export projects. But Senegalese fishers show little interest for the export market as the administrative requirements are too cumbersome. Their participation will not meet the goals of the French administration (Chauveau & Samba, 1990).

During the interwar years, the colonial administration notes its failure in modernizing the pirogue fishery and its integration into European markets and production systems. It will attribute the cause to fishermen's "independent spirit" and "archaic" methods. This

[34] However, this project failed due to a lack of preservation techniques to bring back the fish to Europe and the absence of a market for industrial fish products on the West African coast. The only fishery that carried on was the green lobster fishery (Pavé & Charles-Dominique, 1997).

condescending attitude from the colonizers will persist until World War II. Until then the French colonial administration will embrace a *laisser-faire* attitude regarding the pirogue fishery (Chauveau, 1985). It will focus instead on export fisheries products and on modernizing fish processing and conservation techniques for export purposes, training local workers in European techniques; both development projects fail. Export fisheries remain extremely limited as the supply of fish is dependent on the pirogue fishery, and fish freezing techniques are not efficient. As for the fish processing industry for export purposes, French investors are reticent, and the ones that invest are of small size, far from the industrial scale initially hoped (Pavé & Charles-Dominique, 1997); in addition, and once again, the fish processing industry depends on the pirogue fishery for fish supply (Chauveau & Samba, 1990).

Noteworthy during the interwar period, is the correlation between peanut agriculture – an *economie de traite*[35] – and fisheries; the former influencing migration patterns and becoming an important vector of expansion of the pirogue fishery. The development of peanut export-oriented agriculture required the construction of new harbors along the coast for its export abroad. These harbors created new job opportunities for Senegalese and other Western Africans, and the main peanut export harbors also became the most important harbors for fishing. With the development of peanut agriculture infrastructures (transportation,

[35] A possible translation in English could possibly be *colonial trading economy*. However, the term *économie de traite* rests less on a historical colonial perspective and more on an economic structure that could still be valid after the colonial period. Coquery-Vidrovitch (2015: 191-192) describe an *économie de traite* as transactions between non-harmonized production systems, i.e. manufacture goods from a modern economy are exchanged against raw goods from a traditional production system (agriculture type economy). For Dresch (1952: 232-233), an *économie de traite* is oriented toward an export market according to the needs of the international commodity market. Badouin (1967) underlies that imported products need not be of manufactured nature only but can also be raw (such as rice); and that an important feature of the *économie de traite* is the middleperson, between the producer and the buyer, that acts as buyer, seller and "banker" of the producer. For additional information on the *économie de traite* in Africa in relation with underdevelopment, with a Marxist economic approach, see Amin (1972).

communication, harbors) small urban areas started to grow mainly along the Cap-Vert and Little Coasts.

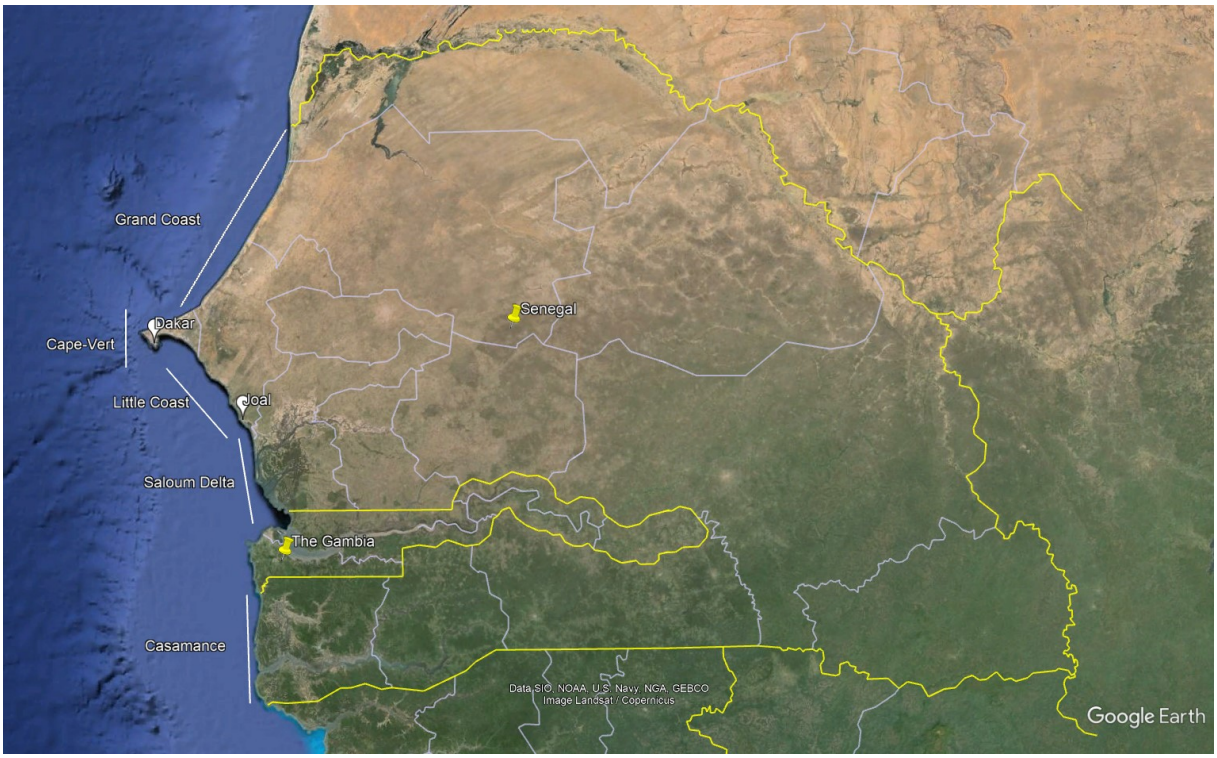


*Figure 1: map of Senegal, with the cities of Dakar (capital city) and Joal, and the coastal regions of the Grand Coast, Cape-Vert, the Little Coast, the Saloum Delta, and Casamance.*

These factors stimulated a local demand for fish. Conservation and consumption of fish changed too: the practice of braising fish for its preservation spread with the use of peanut shells and straw (Chauveau, 1985). Thus, the development of a local market for fish was connected to the development of export peanut agriculture: the price of fish followed the price of peanuts (Chauveau & Samba, 1990). Droughts in the 1970s (Carré et al., 2019; Wittig et al., 2007) strongly affected peanut growing – the main cash crop economy of Senegal – and caused rural outmigration to the coast for employment in fishing activities (multiplication of fishers by 3 to 4 times; Binet et al., 2012).

During World War II, the colonial administration becomes interventionist once again developing various means to support the fish export to the metropole (subsidies, infrastructures, cooperatives, pirogue construction, etc.). The French administration encourages the coming of French fishing vessels that are “industrial” in name only. The number of French fishing vessels in West Africa increases, but they remain purely speculative and circumstantial - they take advantage of the metropole subsidies: export guarantees and war subsidies. They produce at the lowest price and sell high to the administration. In parallel, they depend on the pirogue fisheries for fish supply as they have no knowledge of the sea and their ships are inappropriate for the region (Pavé & Charles-Dominique, 1997). As for the pirogue fisheries, they take advantage of the technical support from the administration, and supply fish for export and local markets. Pirogue fishers will be very selective in what they accept to follow (rules, regulations, recommendations, techniques, etc.); the adoption of new technologies will depend on if it serves their purposes or not. In this process, they will learn how to use a bureaucratic, economic, and colonial system to their own advantage (Chauveau & Samba, 1990). The administration tries to set up a fishers’ cooperative in Saint-Louis (in 1941) but the project fails as fishers are more interested in selling directly to European companies. A consequence of all these measures is that the price of fish will increase during the war; with a decrease at its end. In sum, the war’s incentives to supply the metropole increased the pirogue fisheries in size, knowledge, techniques, and technology. And it had the opposite effect of transforming the pirogue fishery into a modern European style fishery (Chauveau & Samba, 1990). At the end of the war, the European fleet leaves the region. With the end of war subsidies and the reinstatement of world trade competition, the European vessels are simply not competitive enough.

*Post-World War II*

Starting in 1948, with a conference in Dakar convened to discuss the future of Senegalese marine fisheries (Chauveau & Samba, 1990; Pavé & Charles-Dominique, 1997), the 1950s mark an important turn in the history of the pirogue fishery (Pavé & Charles-Dominique, 1997). Infrastructures costs to create an industrial fishery were deemed too expensive, therefore it is decided to intensify the pirogue fishery under an *économie de traite*. The service in charge of colonial fisheries decides to motorize[36] the pirogue fleet with the hope that first the use of motors will incite fishers to quickly switch to modern boats, second that it will increase the fishing capacity and thus the supply of fish for the local processing industry (held by Europeans and Syrio-Lebanese), and third that it will stop migrations of fishers along the Senegambian coast and settle them on the Grand Coast[37]. The motorization is indeed a success, but the other goals are not met; quite the opposite happened instead. Instead of supplying local colonial export-oriented industries, pirogues start supplying local markets, and instead of settling on the Grand Coast, fishers migrate further away to larger fishing harbors, trade sites and sail to more remote fishing locations (Chauveau, 1985). In sum, the introduction of the motor increased the web of connections and the distances of these connections, while at the same time invigorating local markets. When it comes to the modernization of the fleet, motorization does not have the sought-out modernization effect. Fishers adapted the technology to the pirogues, allowing new fishing practices and techniques and increasing rather than decreasing the importance of the pirogue. This process will repeat itself later in the 1980s: pirogues although larger are not quite different from the ones before World War II (Chauveau, 1985).

It is in the 1950s that the pirogue fishery starts changing to become what it is today. Fishing becomes an activity based on the supplying of a local market made up of (i) women involved

[36] The motorization was not subsidized but done with credit and commercial incentives (Chauveau, 1985: 160-161).
[37] The Grand Coast is the coastal region spanning from Saint-Louis to Dakar.

in fish transformation (up to 1985 mainly along the Grand Coast), (ii) fishmongers (mainly on the Little Coast) and (iii) the supplying of European export companies. Fish trade changes from a "surplus production" activity – where only the surplus is sold – to a "merchant production" activity. This has had the effect of specializing fish related activities (Chauveau, 1985). Fish trade increases and offers better work and income opportunities. People leave agriculture (mostly peanut) due to the expansion of trade, fisheries, and urban activities.[38] Fishers themselves also migrate within the country: they move southward to the Little Coast (the coastal region between Dakar and Joal), the Saloum Delta and Casamance; continental fishers start moving toward the sea teaching beach seine techniques to the coastal sea peoples of the Saloum region (see Figure 1 above). In the Saint-Louis region, North of Senegal, the population largely quit agriculture because of the intensive peanut production impoverishing lands, and completely turned to fishing activities (Chauveau & Samba, 1990). As for the Casamance region (which is not a peanut producer), it supplied fishers with wood, pivotal for pirogue construction (Chauveau & Samba, 1990)[39].

Until 1955, the colonial administration considered fish trade in the African society as an informal activity. The French colonial government fails to see that fish trade is well anchored and part of a socio-economic structure. This structure goes well beyond commercial relations and involves social and cultural ties and relations which makes fishing a strong and organized activity capable of defending its interests (Chauveau, 1985). Fishing has ramifications with fish processing and fish trade activities on land. Fish trade related activities involve, among others, credits, loans, support for elder fishers, buying schemes, etc. The colonial

[38] For instance, Guet-ndarians (Saint-Louis region) leave agriculture, so too do the Lebu (Cape-Vert Coastline, i.e. Dakar region), the Serer (Little Coast), and the Niominkas (Saloum region) which leave the peanut agriculture and move to fishing and sea transport in Gambia and Casamance (Chauveau, 1985).
[39] Mid-19th century, wood for pirogue construction came from forests behind the Little Coast. At the end of the 19th century, Casamance was the main supplier, then Guinea-Bissau had to supply wood and today the Ivory Coast is the main supplier (Chauveau & Samba, 1990). Nowadays, deforestation is an important social and ecological issue in Senegal (A. M. Lykke, 2000; Solly et al., 2020). It shows the integration that fisheries activities have with the coastland and that land and sea cannot be considered separately.

administration becomes wary of the importance that is gaining fish trading and the role it can have on fish prices. To channel and control fish trading activities the colonial administration creates a Cooperative – Coopmer – in 1952, under its own management. This trading cooperative is supposed to regulate prices and flows of fish. However, Senegalese fish traders are not in favor of it. Due to their strong ties and organization, fishmongers can offer high prices when buying fish from fishers and dump prices when selling to fish retailers. Under the financial pressure of fishmongers' practices, Coopmer closes its activities in 1954. Other non-commercial cooperatives were created but their initial purposes were bypassed: they were used opportunistically as informal instruments to create and reinforce networks between fishers, fish traders and buyers.

*Post-independence*

In 1960, Senegal became an independent country. Despite being critical toward colonial practices, and recognizing the importance of pirogue fisheries, the new government's fisheries policies follow the same lines as the colonial ones: modernization of pirogue fisheries and development of an industrial export-oriented fishery. However, like interventions from previous administrations, it fails to grasp the vast network of relations that forms the profession and will implement project without consultation of the population and with no clear vision of what the project should accomplish (Chauveau & Samba, 1990). The new government wants a tuna fishery, a project that will fail due to administrative difficulties, management issues and financial mismanagement (Chauveau & Samba, 1990). In the 1960s and 1970s, Senegalese industrial fisheries have difficulties to develop: little capital is attracted to it; little added value is created due to increasing import costs for equipment, fuel, and tin; foreign markets fix prices of exported goods making it hard for the Senegalese industrial fishery to compete worldwide (Pavé & Charles-Dominique, 1997). In parallel, the motorization of the pirogue fisheries continues, and the purse seining technique is introduced

in 1973 with the support of the United Nation's Food and Agriculture Organization (Stequert et al., 1979). Purse seine landings are absorbed by fish processing workers and fishmeal plants (primarily the Sopesine fishmeal plant in Djiffer, in activity from 1977 to 1981; NOAA, 1983: 27). When the Sopesine plant closes because unprofitable (Chauveau, 1985), purse seines' material is bought and set up on pirogues in Joal and the Cap-Vert peninsula to supply local markets (Chauveau & Samba, 1990).

From the 1970s onward, the pirogue fishery keeps on changing due to three main factors. First, national programs and international aid encourage the further motorization of the pirogue (Binet et al., 2012). Second, new fishing techniques (e.g. Drift nets, purse seines) and ice mean catching more fish and conserving it longer until returning to the harbor is possible: one can fish further away and for longer periods of time. And thirdly, the Yaoundé convention (1963) and Lomé Convention (1976) liberalize export trade, reducing the attractiveness of developing a domestic market. Fishers leave low value fish to the subsistence fishery and non-motorized boats, and instead seek higher value species for export. These factors act as incentives for more people to migrate and enter fishing and fish working activities (Binet et al., 2012). Early in the 1980s, Senegal had to face a peanut agriculture[40] crisis (decreasing production due to droughts and poor land quality due to extensive use of chemicals since the second World War; Cochrane, 2016). And yet again, people seeking food and money revenues turn to fisheries as a safety net and supplier of economic opportunities. In 1986, the participation of pirogue fisheries in supplying industries and the export sector is estimated at about 46%. In 1990, 250,000 tons of fish are landed yearly of which 2/3 is supplied by the pirogue fishery of which 10% of the population gain their livelihood directly or indirectly (Chauveau & Samba, 1990).

[40] For a history of the peanut agriculture in West Africa, see Péhaut (1992) and for its inclusion in a colonial economy, see Brooks (1975). And on the effect of the Structural Adjustment Policies on the peanut agriculture, see Hathie and Lopez (2002).

In the 1980s and 1990s, two landmark macro-economic revolutions drastically increase the integration of Senegal into the global economy. The first are the Structural Adjustment Policies[41] Programs (SAP)[42], in 1984, required by the World Bank and the International Monetary Fund (IMF). The SAPs required a dramatic reorientation of national economies to focus on exports to obtain foreign currency. The World Bank and the IMF also requested that the Senegalese currency, the *CFA Franc* (*Franc de la Communauté Financière d'Afrique*[43]/Franc of the Financial Community of Africa), be unpegged from the French Franc[44]. The CFA Franc is thus devaluated by half its value. Consequently, Senegalese households see their purchasing power cut in half [45] and prices increase affecting food security for the people (Dahou, 2002). Because of these programs, the Senegalese government, to increase its currency stock, incentivized export projects and foreign markets, neglecting national ones. If the Senegalese administration showed little interest in the pirogue fisheries in the early 1980s (Dahou, 2002), the situation partially shifts with the macro-economic changes associated with SAPs. For fisheries, the focus is put on the volume exported instead of developing fish processing capacities to produce higher quality and higher value exports. In retrospective, the Structural Adjustment Policies did not meet initial expectations. Instead, they reinforced the *économie de traite* of the pirogue fishery (i.e. uneven exchanges between production systems of different nature, Coquery-Vidrovitch, 2015: 191-192). A type of economy that is still practiced in the early 2000s (Dahou, 2002) and which reduces incentives to limit pressure on fishery resources (Dahou, 2002) as fish

[41] On the consequences of the Structural Adjustment Policies in Africa, read Oya (2007).
[42] Structural Adjustment Programs have been described as another form of colonialism (Osabu-Kle, 2000). Expanding on the idea of "Structural Adjustments", Ndlovu-Gatsheni (2024) built a compelling historical analysis of how Africa how has been "structurally adjusted" by colonial powers through time.
[43] The CFA Franc was born in 1945 and used to stand for "Colonies Françaises d'Afrique"/ "French Colonies of Africa". Today, 14 African countries use the CFA Franc.
[44] Noteworthy is how the CFA franc policies, driven by French authorities, allows the perpetuation of a colonial system (Pigeaud & Ndongo Samba, 2020).
[45] For a journalistic overview of the political and diplomatic process of the CFA devaluation in 1994, see Faes (2016); for the consequences on urban food consumption, read Diagana and colleagues (1999), and also Creevey and colleagues (1995).

embodies a commodity to be traded instead of a living being integrated in a socio-economic fabric.

In this new economic setting, and in the light of dwindling fish stocks and an increase in the factors of production, a vertical integration starts to take place in the pirogue fisheries' structure and organization. New fishing pirogues are bought to secure a steady fish supply (Dahou, 2002). Importantly, this concentration and accumulation of capital does not create rents but a capitalization in the factors of production (Dahou, 2002). This increased capitalization will change the relations of production (between workers as well as with the sea) as well as increase production costs (Dahou, 2002). Fishmongers have become increasingly pivotal in this socio-economical process (Dahou, 2002). Although the colonial administration may have described fishmongers as a source of social and economic instability, it appears that relations between fishers and fishmongers is not as antagonistic as portrayed by the administration. Fishmongers participate in the financing of fishing activities in a more flexible way that banks offer (Dahou, 2002). Since the pirogue fisheries were barely supported by the government, this financing system, specific and endogenous to fisherfolks, has its advantages as it may have reduced the impact of the economic crisis on them (Dahou, 2002). Nevertheless, this concentration increased the dependency of fishers and fish workers on fishmongers (Dahou, 2002).

*The geopolitics of fishing migrations*

Although fishers' migration is part of the history of West African fisheries (Pavé & Charles-Dominique, 1997), with the acquisition of new technologies, the scope of activities of the pirogue fishery has broadened far away from coastal areas. In the second half of the 19$^{th}$ century, north Senegalese fishers started seasonal fishing migrations to Casamance (Chauveau, 1985). In the second half of the 20$^{th}$ century, the motorization allowed fishers to move further away to new fishing sites and trade locations, with increased back and forth

movement, mostly in the Casamance region. In the 1980s, seasonal migrations increased within domestic waters. In the 1990s, migrations to Mauritania, The Gambia, Guinea-Bissau, Guinea started (Binet et al., 2012).

Migration (cf. figure 2 hereunder) is the consequence of technological changes, social constraints, ecological exhaustion, export market incentives, and regional politics (Binet et al., 2012). Before the 1980s, fishers used to migrate for a season and then come back to harvest the land. But migration rationales changed, and instead of seasonal fishing migrations shared with time at home and agricultural activities, migrant fishers spend increasing time away from home and sometimes in precarious dwellings (Binet et al., 2012)[46]. Fishing migrations create problems of their own: (1) Lack of information on species and quantity fished, (2) illegal fishing or in unregulated areas, (3) Conflicts with local communities and their traditional fishing zones (Binet et al., 2012).

[46] For instance, camps can be set up in a foreign country, fishers bringing back fish home and coming back with goods for fishing and processing fish. Fishers can stay at sea usually for about 10 days (maximum amount of time before the ice melt totally), two boats going together at the same time. Since the mid-1990s, industrial vessels started 'subcontracting' fishing to pirogue fishers: they would take up to 40 pirogues and their crew to fishing sites (Guinea-Bissau, and sometimes as far as Gabon); this is mainly performed by the Korean fleet but very little information are available (Binet et al., 2012). Binet and Failler (2012) call it *pêche au ramassage*, a somewhat loose translation could be *charting fishing*. This is not without reminding the dories carried on the Grand Bank for the cod fisheries.


*Figure 2: "Map of Senegalese migration dynamics in 2008"* (Binet et al., 2012).

Relations with Mauritania expresses all the complexity of fishing for small pelagic fish in the Western African region. It exemplifies the problems of reducing small pelagic fisheries to a dying "tradition." Small pelagic fishing is instead a highly political and transnational issue. Mauritania's waters are rich with small pelagic fish, a bounty for the development of the fishmeal industry (Corten et al., 2017). Until the 1970s, Mauritania's government had little interest in its coasts. In the early 1990s, the country realized the importance of its fish stocks and decided to tighten its borders to fishing from non-Mauritanian migrants from the rest of the region (Marfaing, 2005). With a tighter management of foreign fishers and of its small pelagic fishery, Mauritania changed its view on Senegalese fishers: once considered skillful fishers, with great mobility, Senegalese fishers today are considered as contracted waged

labor[47]; described as indentured labor and sometimes as far as being in the bondage of modern slavery (Marfaing, 2005).

The pirogue fishery has proved through time to be flexible and adaptable to species to be caught. It is capable of changing fishing gears quickly, working collectively or individually (Dahou, 2002). And its structure makes it much more efficient than the industrial one: in 1997, the former lands 450'000 tons against 130'000 tons for the industrial one (Dahou, 2002).

## V. Concluding comments

In this chapter, the aim was, by use of the past, namely the historical evolution of the Senegalese pirogue fishery, to illuminate contemporary issues related to fishing small pelagic fish for fishmeal and fish oil production. This has been done by means of exploring the development of the Senegalese pirogue fishery from the early 20th century until the year 2000s. However, it is a past that is still vibrant today as expressed through the socio-environmental issues caused by the fishing for fishmeal along the coast of West Africa.
To discuss the meeting of colonial practices with the vernacular pirogue fishery, four aspects have been considered: the vernacular as a way of naming, the importance of spacetime as a connecting concept, and the role of colonial epistemologies. The following paragraphs will be used to sum up these ideas.

*The vernacular*

The way the world is described influences its perception and by extensions the actions that can be performed within it. Thus, words matter, and to describe in a more focused and comprehensive manner the Senegalese coastal population and their knowledge, the word

[47] Marfaing (2005: 92-93) develops on the different type of contracts that can exist between Senegalese fishers and Mauritanian fish traders.

"vernacular" is favored to words such as, for example, "local" or "small-scale." The term local presented two problems. First, what should be the geographical scope of the "local"? What are its limits? Second, the pirogue fishery involves numerous people from many regions, localities, places with different purposes and motivations; the term local is too reductive and static. In this instance, "local" does not show either the multitude nor the existing relations between the many people involved in the fishery. The other word, "small-scale," does not fit either in this context. It places the fishery on a quantified vertical ladder where the "large-scale" is the industrial, at the top. This can, for instance, obscure the potential fishing capacity of what is considered "small-scale." Vernacular seemed appropriate, describing practices embedded in specific spaces and adaptable to change. This word implies *another way of knowing* or *another way of living* and does not have to be opposed to modernity (the pirogue fishery is a perfect example of a modern vernacular practice). In this dissertation, the vernacular is not considered as an end in itself; rather in this work, I use the term as a means to describe other ways of existing. In this chapter, the vernacular proved instrumental in creating space for other types of definitions – and thus existence – to emerge. In this instance, it pushed sideways the "small-scale" or the "artisanal." The main role of the vernacular, in this chapter, was to create a space for the pirogue (its history, its embeddedness in technologies and societies) to emerge.

*spacetime*

Spacetime is understood in this chapter as a concept that is lived, multiple, and where space and time cannot be dissociated or clearly separated (Massey, 2005). Space and time can be discussed in the abstract, metaphysically; it is also a reality that is lived. For instance, there is a colonial spacetime construction that has its own logic based on production purposes and capital investments, and refuses to consider the existence of alternative – vernacular – times and spaces (Awâsis, 2020; Huebener, 2015). Regardless of the efforts of the colonial

administration, the pirogue fishery has shown resistance to colonial projects seeking its replacement and, later, national projects of economic development that framed the pirogue as located in the past. The various administrations and coastal peoples seem to live at different times, different rhythms. However, time alone is not enough to clearly understand the significance of the colonial and then national decisions regarding the development of fisheries; space must be factored into the reflection. Space may be imagined as localized and contextualized spheres of action. There is a colonial space with two specific segmented spaces: the metropole and the colonies. And there is the Senegalese shoreline space where many vernacular spheres of activities and lives connect with each other. Each sphere is in contact with one another with people interacting and exchanging with one another. Together these spheres, next to each other, create a geographical scope that brings further away the fish for consumers far within the country or in landlocked countries within West Africa. Spacetime is thus a concept that can be actively and concretely integrated in socio-environmental relations and issues of injustices and inequities. Spacetime is therefore a concept that connects the colonial past of a region, to contemporary (neo)colonial practices in this region with the current fishing for feed production practices linked to countries in the global North.

*Colonial epistemologies*

What consequences had the colonial projects through time? Temporally, the colonial administration was a driver of change as it allowed local markets to develop. However, changes were not as anticipated (toward industrialization) and were mostly unintentional. The European fleet neither was adapted to the region nor did it have the appropriate (vernacular) knowledge of fishing sites. For the pirogue fishery, supplying the European fleet in fish[48] represented an added revenue to the supply to a local market which, at first, remained low due

[48] For instance, shark fishing for vitamin A, sardinella fisheries for a fishmeal factory in the town of Djiffer, etc. (Chauveau, 1985).

to the low income of the population (Chauveau, 1985). Consequently, the "modern" European fleet was supplied by the "artisanal" Senegalese fishers. These relations had the effect of increasing the number of pirogues in activity.

And what about space? The colonial and, then national, administrations did not see, for instance, the structuring role that fishmongers had in trade and finance practices. Considered as a source of instability, they instead appeared to be a means to absorb economic and financial shocks. Due to the presuppositions of the various administrations, fishmongers belonged to a shadowed place. Two other shadowed spaces of importance are, first, the presence of women in post-fisheries processes (a role that will be presented in the following chapter), and, second, the spatial relations between land and sea, for instance, deforestation to obtain wood for the building of pirogues, and later for the drying of fish, plays a role in the movement and migration of fishers as well.

Examining colonial epistemologies and practices in Western Africa shows how the totalizing gaze of the colonial administration rendered them blind – or to the least short-sighted – to the lived reality of the pirogue fisheries. The purpose of the colonial administration was not to adapt their projects to the coastal population under their rule. Instead, French colonial administrators forced fishers into a colonial economic practice to the advantage of the metropole. To justify their actions, colonizers used techno-scientific arguments and abilities to create a hierarchy of knowledge: the pirogue was at the bottom of a techno-scientific ladder, their "modern" boats were at the top. The litmus test being the capacity to sail on high seas which colonial vessels could do and the coastal pirogues were never designed to achieve. And for the purpose of this chapter, the ocean has been considered as a mirror of (i) what colonizers thought of themselves, their internal gaze, and of (ii) the image set upon the *other*, an external gaze – an image of archaic practices in need of modernization –, that has persisted throughout the colonial period and beyond the independence of Senegal. Contemporary

development projects encouraged pirogue fishers to enter modernity by trading their pirogues for modern vessels. This techno-scientific perspective made the various administrations in charge of fisheries partly blind to changes and missed the "self-transformation capacity" of the pirogue fishery (Chauveau & Samba, 1990: 7). Throughout time, these administrations missed the adaptability, flexibility, and resistance of the pirogue fishers. In addition, colonial epistemologies reduced fisheries to linear and unidimensional technical activities, and missed the multidimensional involvement of fishers with people on land and sea. The ocean as mirror showed three aspects of colonial epistemologies: first, it reflects the way colonizers see themselves; second, it blocks other ways of being and doing; third, it constrains spatial and temporal hegemony to the sea. For the latter point, colonial development projects were turned toward the sea and back to the metropole; instead, the pirogue fishery tightened its connections with the land, developing its web of relations along the coast and inland throughout West Africa.

The observation of the colonial epistemologies was a mean to analyze how structures of power through knowledge construction create blind spots, shadowed spaces. What happened in the past is not dead but lives on in various legacies of colonial and capitalist rule. The way the oceanic natural environment is portrayed today by large transnational organizations creates the same totalizing description that leaves many blind spots and creates further injustice (cf. chapter 3 on the discourse analysis of the International Fishmeal and Fish Oil Organization). In sum, there is a world to be uncovered by a careful analysis of the history of the pirogue fishery. What I proposed was to start disentangling the intertwined historical constructions and representations of people with their milieu (Merchant, 1980) and project them to nowadays. The Senegalese pirogue fishery allowed to show how fishing for fishmeal and fish oil is tied to a colonial past and that it is reminiscent of colonial practices of

extraction for commercial purposes. In essence, the farmed salmon that is produced – and consumed – worldwide is constructed with a (neo)colonial legacy.

# Chapter 2: The Senegalese shoreline as a liminal space: revealing spaces of actors in the shadows

"We are all now creatures of the edge, mentally as well as physically" (Gillis, 2012: 1)

## I. Introduction

The feeding of farmed salmons requires the fishing of small pelagic fish which takes place far away from wealthy consumers eyes. This fishing can take place, for instance, in Senegal where small pelagic fish[49] is also part of the livelihood of this country and plays an essential role far beyond its borders.

Small pelagic fish find themselves globally at the center of a battle ground between two main groups of interests. On one side, there are industrialists that consider small pelagic fish as "trash fish" (Matthiessen, 2004; C. J. Shepherd & Jackson, 2013; Tacon et al., 2006) of which its best use is reduction into fishmeal and fish oil. On the other side stands environmentalists that defend small pelagic fish as "forage fish," or a keystone species in the oceanic food web and ecosystem (E. K. Pikitch et al., 2014). But what lies in-between? Are there other lives that live on this fish, and thanks to this fish, and that are left out of international debates? In Senegal, in 2012, the number of pirogue fishers was estimated at 60,000, of which 12,000 were involved in small pelagic fisheries (Deme, 2012: 7; in 2018, the number of artisanal fishers is estimated at 70,041 with 11,912 pirogues in activity, Ndir et al., 2020: 248). And these numbers do not include all the fish workers (carriers, processors, traders, etc.) that are

[49] Species of small pelagic fish mostly caught in Senegal are the round sardinella (*sardinella maderensis*), the flat sardinella (*sardinella aurita*), the ethmalose (*ethmalosa spp.*), the horse mackerel (*trachurus trachurus*), and the mackerel (*scomber scombrus*) (Deme et al., 2022: 2-3). The round and flat sardinellas are the main targeted species (Failler, 2014: 2).

active on the shoreline and beyond. It is however estimated that about 40,000 persons (mostly women) work at processing fish (Deme, 2012: 7). Small pelagic fish should not be reduced to the perspective of industrialists or environmentalists; women and men fish workers are living thanks to this fish on the beach and beyond. To illuminate their existences, the shoreline could be conceptually considered as a liminal space, as will be developed in this chapter.

In this chapter, I argue, first, that women and men fish workers are seldom, if ever heard, their stories hidden by discourses of environmentalists or fishmeal industrialists. For women and men fish workers, fish has multiple meanings, and create multiple connections in their lives, and in their livelihoods. The harm posed by fishing for fishmeal and fish oil threatens their meaningful worlds. Second, I argue that the world is polyphonic, complex, blurry, and fluid, and that it cannot be apprehended as a singularity but only as a multiplicity. This fluidity and diversity can best be seen at the shoreline – at this space in-between the land and the ocean. Third, I argue that the ocean and the land are not an opposed binary but live together, relationally. These relationalities are best embodied if the shoreline is considered as a liminal space, and not reduced to a place of contact "establishing ongoing relations" (Pratt, 1991; 2008) or a border between two extremes. Conceptually, liminality should be considered as a dynamic space where processes of becoming take place (Turner, 1967: 93-94). In this dissertation, liminality is a space of meeting, of passage, of transformations, and frictions, between humans, and nonhumans. In this space, small pelagic fish takes various meanings according to fish workers involved.

In this chapter, my aim is to use the concept of liminality to show the interconnected diversity that lives on the shoreline and the dynamic processes of transformation at play. This chapter has three objectives. The first objective focuses on women and men fish workers. I will (i) present the ramifications that are created by the processing of small pelagic fish, and (ii) show how the lives of fish workers are being affected by the fishing for fishmeal and fish oil

production. The second objective focuses on the shoreline as a fluid and dynamic space of transformation. I will highlight that this space is a dynamic one, of meeting between humans and nonhumans, national and international institutions, vested interests, etc. The third objective focuses on liminality as a concept. I will develop an analytical framework placing the shoreline as a new thinking space that brings out the many existences at play and that challenges the land-ocean binary. This reconceptualization will help positioning women and men fish workers and men fishers – as well as the ocean-land relation – in a new frame more cognizant of the multiple existences involved while discussing the development of the fishmeal and fish oil industry.

I built this chapter with this main research question in mind: In what way the concept of liminality creates a space and a position for women and men fish workers along the shoreline of Senegal? In order to frame this research, I set out a literature review considering first the shoreline as a liminal space and, second, fish as a plural entity. The first aspect synthetizes discussions on liminality as a geographical concept and its use in this present research. The second aspect underlines that fish is not singular; it is multiple and plural in its use, existence, and meanings. The chapter will then continue with different experiences of the meaning and importance of small pelagic fish for women and men fish workers living in Senegal, as well as my own experience as a researcher. Finally, I will return to reflect on the concept of the shoreline as a liminal space to conclude the chapter.

## II. Literature review, methodology, and method

### Literature review

*The shoreline as a liminal space*

Considering the magnitude and importance of the ocean for the Earth, relatively little research has been performed to better understand human-ocean relations (Peters, 2010). This chapter seeks to contribute to that knowledge gap by focusing on the space where land, ocean, and people meet. If research has been performed it is mostly by considering the ocean as "the other" and purveyor of useful resources (Satizábal & Dressler, 2019). However, there is more to the ocean; a sense of being and relation can be created by a proximity to the sea (Satizábal & Dressler, 2019). Researchers have worked to develop a relational approach to the ocean for example in geography (Bear, 2017; Steinberg & Peters, 2015) or in another instance in what has been coined the blue humanities (DeLoughrey & Flores, 2020). Steinberg's work has been central in showing that the ocean is not just a resource but a constructed space of societies (Steinberg, 2001). And Steinberg and Peters (2015) have developed the "wet ontology" conceptual framework to think differently about space and the ocean, inviting to more fluid relations toward the ocean or the land (Peters & Steinberg, 2019). Campling and Colás (2018) builds on this idea of social construction by considering the interaction between capitalism and the ocean where capitalism tries to "transcend the land-sea distinction" (Campling & Colás, 2018). In their argument, they develop the concept of "terraqueous territoriality"[50] to discuss how a capitalist mode of extraction invades the ocean-space and works at transforming it in its favor by redefining it as a "new land." Building on this their work, and pushing the ocean grabbing argument in new directions, Foley and Mather (2019) have proposed new ways to articulate the notion of ocean grabbing inquiring the possibilities for local users of "grabbing back" resources. All these developments are indeed timely as the ocean is facing a wave of commodification processes (Mallin & Barbesgaard, 2020a), the

[50] The terraqueous territoriality concept looks at the way the ocean is being made as a new land, whereas the purpose of this chapter is to create space in-between the terra-world and the aqua-world.

ocean being this new frontier that needs to be mastered (Peluso & Lund, 2011; Steinberg, 2018).

My focus will not be on the extension of the land to the ocean (the coastline) but on the meeting of the ocean with the land (the seashore, the shoreline), and to bring the human into this relation. To think differently about the ocean invites a different relation, in more fluid ways (Peters & Steinberg, 2019), not only to the ocean itself but also to people and the land as well (Lambert et al., 2006). Kanngieser and Todd (2020: 386) stress how the land should not merely be considered in terms its physical aspects. It is also an entity to enter in relation with, implying a co-creation between land and people. This position should be applied to the ocean, and more precisely to the shoreline. The shore has always played a central part in human's history of development, and Gillis urges us "to learn to live with our shores, not just on them" (Gillis, 2012: 6). I am interested in understanding what is happening at the superposition of the margins of environmental worlds that are the land and the ocean; what happens at the *in-between*, on the liminal space that is the shoreline. Here, the shore is not the line that divide, it is this liminal locus that connects and where transformations happen.

In anthropology, the concept of liminality describes a process of passage, a space, or time, of in-betweenness, punctuated by different rites of passage (d'Allondans, 2011; Turner, 1967). In this dissertation, liminality will not be considered in relation to the possible existence of rites of passage along the shoreline with regard to small pelagic fishing. Instead, I will focus on the spatial and geographical aspects of liminality, considered as a space of encounter. Concretely, these two titanic masses – land and ocean –, often (wrongly) considered as absolute, may shadow the existence, and role, of an in-betweenness, the shoreline as a liminal space: who and what lives in this liminal space? Who is shadowed? By what? How? What are the relations of the ones present in this liminal space? Instead of focusing on *rites of passage*, I will in this dissertation focus on this *space of passage* that liminality represents: I will

question what lies in this in-betweenness and what becomes in this space. In other words, I will use liminality as a sense-making space (Carlson et al., 2020), contributing to developing this concept in geography; a field that little used this spatial concept (Banfield, 2022).

Banfield (2022) reflects on the development of the use of the liminal as a concept. She underlines some of its challenges mainly to avoid it to become a portmanteau concept. For instance, liminality should not be used to avoid binaries but serve as an instrument that questions and reflects on the existence of binaries or, possibly, relations between these binaries. In this instance, considering the shoreline as a liminal space is, first, a means to observe relations taking place, and second, a means to critique oversimplifying discourses related to fishmeal and fish oil production. In this chapter, liminality is not considered as a concept that can explain things (Thomassen, 2009: 5). Instead, liminality is the acknowledgement that something is happening at this place of particular importance. It is a prism to uncover, to observe, and develop an understanding of transformations at play (Horvath et al., 2015: 1). Conceptually close to liminality, Pratt (1991) developed the notion of the "contact zone" as a space of encounters of different peoples that create ongoing relations (Pratt, 2008). I draw however a difference between the contact zone and the liminal. The contact zone focuses on the ongoing relations that contact creates, while the liminal focuses on a space of in-betweenness. In this chapter, I am primarily interested in the idea of in-betweenness and the shadowing of actors that live in this space. The concept of liminality has been used in a wide array of settings such as diplomacy and international relations (McConnell, 2017), the relation between cyberspace and geographical space for new mothers (Madge & O'connor, 2005), or de-extinction projects as a liminal state of being and not being at the same time (Searle, 2020). Trimbach (2022) and Leyshon (2018) use a liminality concept to discuss a relation to the coast in terms of management and governance. This chapter takes a different current: it cares for the meeting and transition of fish from one liquid

world to a solid world, and the many actors that meet there. The shoreline becomes a place of friction (Tsing, 2005). By observing frictions that are taking place, the aim is to show that small pelagic fish are more than either a forage fish or a raw material for fishmeal production. The aim is to show how the shoreline radiates an intricacy of relations, sometimes spreading far inland.

*Different fish*

Considering the shoreline as a liminal space helps to illustrate how fish can have multiple meanings and purposes; that it is not a singular entity merely reducible to a single profession (Hobson, 2007; Satizábal & Dressler, 2019; Schroer, 2021). Fish can have social, industrial, commercial, or managerial meanings (Schwermer et al., 2021). However, these meanings are often constrained within a managerial framework that reduces fish to a natural resource. As a researcher, I can participate in (re)producing a certain fish following the academic episteme. In a lab, the small pelagic fish becomes a variable in a table or a graph; it is a projection built through the interface of numbers, figures, and computer programs. Biologists may be interested in their rate of reproduction (Peck et al., 2021), and the ecologist embeds them within an ecosystem (Chouvelon et al., 2022; P. M. Cury et al., 2011; Peck et al., 2014; Sydeman et al., 2017). For fisheries specialists, the battle is around the state of stocks: those showing that the situation is not as grim as thought (Hilborn, Buratti, et al., 2022a), and those who think overfishing of small pelagic fish is already happening (Pikitch, et al., 2012). For development purposes in developing countries, fish can be part of a system for the improvement of human life (Heilporn et al., 2010). For the manager, it has to be managed according to diagrams of relations and a representation of systems (Charles, 2001; King, 2007). Noteworthy, is the fact that management can be a lure of the human capacity to master the world, and with dire consequences (Bavington, 2010b). For the ones versed into economics and finance, fish stocks become money in the sea, investments that need to be

protected to secure returns on value (World Bank, 2017). However, Telesca (2017) comments on the use of the word "stock" in fisheries science as a homonymy with the *stock* market. She highlights how words can produce an effect of distancing with the fish and the life that it is. Small pelagic fish can also be considered as a sum of nutritional values (Kawarazuka & Béné, 2011; Khalili Tilami & Sampels, 2018) for low-income people (Robinson et al., 2022; Roos et al., 2007). Fish as food can also be part of international discussions on food security (Béné et al., 2015). And, more generally, fish can even be considered as some sort of a "crop" to be "cultured" for human consumption after harvesting from aquaculture operations (Tacon et al., 2020).

In each of these examples, the meaning of small pelagic fish is embedded within a profession and a practice. The fish is external to the life of these researchers and practitioners. For none of them, the small pelagic fish is part of a larger world with multiple ways to know them and define them (Todd, 2014). Haraway (2003), when discussing human relations with companion species, argues that humans "become with" their companions. I argue that in all these previous examples, the fish is "becoming from" a profession; a singular fish due to its initial definition. The relation is unidirectional: the fish is structured and mediated through a profession and not through daily life. I cannot help to wonder then what this singular fish that comes from a unilateral perspective, transforming lives into commodities, is transforming us into. What are we becoming with this singular fish?

What is missing from the professional fish stories is the experience of women and men fish workers and the stories they tell about fish that are often thrown into the shadows and silenced. Small pelagic fish can become a prism that showcases a whole spectrum of existences; these women and men fish workers "becoming with" through their relations with small pelagic fish. Instead of a singular fish, this chapter involves presenting the plural facets of small pelagic fish and to discover the fish as "intimately woven into every aspect of

community life" (Todd, 2014: 225). More, fish processing is, for most, an activity performed by women. It represents, for women, a way of earning money and forms a societal role that extends beyond the care of the household. However, women – due to their role and responsibility to the household – cannot geographically move and migrate as easily as men do, and thus makes them more vulnerable when changes brought about by the State or international development projects take place. The fishing of small pelagic fish for fishmeal and fish oil puts women in a precarious situation, as will be shown further in this chapter.

## Methodology and method

### *Research aims, objectives and questions*

In this chapter, I aim at using the concept of liminality to illuminate the dynamic processes that take place at the shoreline. To do so, three objectives have been designed: (1) to show the ramifications produced by the processing of small pelagic fish, and the consequences on women and men fish workers of fishing for fishmeal and fish oil; (2) to highlight that the shoreline is a dynamic space of transformations and frictions between multiple interests; (3) to develop a conceptual framework placing the shoreline as a new thinking space of meeting and transformations. The aims and objectives are led by this leading research question: In what way the concept of liminality creates a space and a position for women and men fish workers along the shoreline of Senegal? The aim is to challenge the ocean-land polarization where the shoreline becomes a place of meeting and transformations, and not just a space of contact between opposed worlds.

### *Methodological groundings*

In this chapter, the focus will be on women and men fish workers (carriers, smokers, processors, traders, handlers, etc.), the meaning that small pelagic fish have for them and the transformations that are brought about by fishing for fishmeal and fish oil. In other words,

how multiple relations with small pelagic fish are severed by the fishing for fishmeal and fish oil and with what consequences. Liminality will be used to highlight these aspects.

I was inspired to use an inductive approach to gather information in the field and then build a unique conceptual framework. During my field research, I had intended to perform qualitative research and I initially devised interviews with semi-structured questions. The focus was on subjective experiences in order to grasp how present issues related to fishing for fishmeal resonate in interviewees. Second, I was inspired by ethnographic research design to gather information and be self-reflexive during the field trip with a field journal on thoughts, ideas, descriptions, and self-reflexive analysis. As much as possible, unobtrusive observation and listening were to be core components of this bottom-up approach.

As I had never been to a Sub-Saharan country, I opted for a preparatory field trip to have a first contact with the region and its inhabitants. My aim was to create some preliminary contacts in Senegal, and possibly The Gambia where men fishers and people at large face social and environmental issues due to the presence of fishmeal plants. I did not intend to gather information *per se* during the preparatory field trip, but to lay some foundations for the organization of the field trip itself. For the preparatory field trip, I planned to stay about 10 days in Senegal and the actual field trip was planned to have lasted about three weeks.
I was able to complete the preparatory field trip to Senegal, however the Covid-19 pandemic and the measures put in place restricting travel meant that I was unable to complete the field trip portion of my research. Therefore, I had to devise other sources of information. And as life keeps on inviting adaptation and creativity, the birth of my second son challenged any possibility of a trip back to West Africa after the pandemic restrictions were lifted.

In this new confined world of the pandemic, I was forced to imagine ways to build around the information obtained during my preparatory field trip to Senegal. I started to look into the role

documentaries can play in academic research. Similar to academic research, a documentary is not a purveyor of truth, it is situated, and an artefact (Jewitt, 2012b). The documentary as an artefact can be used in different ways for research purposes. Figueroas (2008) suggests two approaches: the documentary as a mean to observe a social phenomenon, and the documentary as a way to analyze the representation - or construction - of a social phenomenon. In this chapter, documentary film is used as both a way to observe lives on the shoreline, and to analyze the consequences of fishing for fishmeal. Therefore, in the middle of a pandemic lockdown and confined at home with my family, I decided to use more extensively the award-winning documentary "Golden Fish, African Fish" (Grand & Diop, 2017). The documentary presents and give voice to men fishers and more specifically women and men fish workers in Senegal, to talk about their work and their thoughts concerning fishing for fishmeal. I was struck by one scene at the very beginning of the documentary[51] which made me realize that (i) there were human aspects that I would not have been able to access in the limited time of my planned field research, and (ii) grey literature and academic work decomposed the situation according to their purposes, but they could not render an embodied sensation of how the fish is plural according to who is in contact – in touch – with it. The documentary offered a visual experience that words could not express. Thus, I was able to weave the documentary, and discussions with its producer, Thomas Grand, during my preparatory field trip, into other written sources, (academic texts and grey literature) and observations gathered during my preparatory field trip to Senegal. I was able to test the

[51] *It is night in the open sea, men fishers on a 20-meter-long pirogue start hauling the purse seine net back into the pirogue. They work together, in unison, and to keep the rhythm, they chant songs. The first one is a message to the viewer: it sings men fishers' preoccupation of a sea with less fish, it sings their irritation to be accused of emptying the sea while trawlers are the cause of it, they lament in being forced to go always further away to find fish. The chant expresses how the sea is their life, their only hope. Sardinellas appear, caught in the net, and fishers chant together "the fish is finally here!," they keep on pulling and the fish cascades into the belly of the pirogue. The purse seine has been set for another catch and chants begin again. This time, the master of chant calls each fisher individually, by his nicknames, and the crew repeats rhythmically, for each nickname, "he does everything as told!." Later, another chant expresses how hard and tiring fishing is, and after each sentence, the crew answers "tired!"* (Grand & Diop, 2017, 1:29-4:45).

authenticity of accounts by triangulating with multiple sources of information and looking for patterns.

Grey literature, although plenty, posed four challenges. First, the focus is mostly on small pelagic fish as a resource considered in biological and ecological terms. Second, governmental statistics are only partially reliable due to low financial means of these institutions, lack of uniformization between agencies, outdated technologies, and few employees (Deme, 2012: 26). Kébé and colleagues (2015: 38, 40) also note the scarcity and low reliability of sources in stock assessment for species considered as low industrial and commercial importance (despite its high importance for local populations, c.f. also Corten et al., 2012). The third challenge is related to the agendas and mindsets of institutions (NGOs, foundations, etc.). These institutions often have a narrow view of the situation and carry their own specific agendas (e.g., liberalization, conservation, etc.) that shapes the information and perspectives emphasized. Fourth, Deme (2012) underlined already in 2012 that academic work was often outdated; information on job, food security, and changes in social structures are mostly obsolete by the time they are published requiring new studies that are lacking; an observation I observed a decade later in 2023.

During the writing process, I decided to use – as I always do – the gender-neutral term "fisher" instead of "fisherman." However, fishwork activities are not genderless (Johnson & Robert, 2016: 201). By using "fisher" instead of "fisherman," was I not creating some subtext suggesting that the word "fisher" is always masculine and thus specific gender identities for fishing people did not need to be added? And what about the word "fish workers"? Did I imply these workers are men, women, or both? These questions became more relevant with the word "women fish processors": by emphasizing women, was I not making women an exceptional category, standing outside and above? And could this be considered a patriarchal way of looking at women's work on the shoreline and beyond? This is far from my intention

(England, 1994). My aim is to cast light on the active presence of women on the shoreline; a presence too often shadowed with a focus on men fishers. Women are part and parcel of a whole societal life, be it for better or worse. And if the presence of women has to be acknowledged, then the constant and unquestioned presence of men – this evidence – has to be acknowledged too. This evidence has to be made visible; even if it is positive such as for instance, Thomas Grand, a man, that makes a documentary on women and men fish workers and putting forth women fish processors. Therefore, I decided to gender the profession as much as possible to show and acknowledge the presence of each gender on the shoreline and show the specific places that women occupy. More specifically, I decided to write "man fisher" so as to mark the gendered profession instead of "fisherman" that put forth the profession first. And in this process of acknowledgement and gendering, I have to acknowledge my own presence as a man researcher that supports and works with feminist theories and frameworks and try to live according to feminist values and frameworks (Billo & Hiemstra, 2013; Rose, 1997).

In the process of situating the research, I hesitated where to include the sections "*What is a fish?"* and "*Olivier Randin, academic researcher*." I could have included them in the methodology section: the section *What is a fish?* discusses my own constructions of the representation of a fish, and *Olivier Randin, academic researcher*, is a self-reflexive discussion of my (re)presentation of knowledge as a researcher. However, I was puzzled by including myself in the methodology. I was in Senegal, I was present on the shoreline, talking with men fishers, women fish processors, men leaders, and many other actors; I am an actor in the production of knowledge and not merely a passive conveyor of truth (England, 1994). Therefore, I decided to position these sections – and thus myself – not remotely in a methodology section, but among Senegalese in the field section of the dissertation. By doing so, I want to express that I am not an abstraction, that I am not remote from what I find

puzzling and troubling about fishing for fishmeal in Senegal, and I am not remote from what I wish to understand.

*Footnotes vs finnotes*

While watching the documentary "Golden Fish, African Fish" (Grand & Diop, 2017), I took careful written notes on what I saw and what people said. In the first iteration of this chapter, I wrote a sub-section describing the documentary. But this felt odd – too descriptive – as if actors in the documentary were "squared" into a section and barely in contact with other actors discussed in this chapter. Then, I thought of including impressions and voices from the documentary within the core of the text; but the chapter felt too heavy and messy. Finally, I imagined including them in footnotes. Why footnotes? isn't it 'a bit' belittling to include them at the bottom of the page? Yes. But isn't this exactly what researchers exploring men and women who work with fish often reduce their informants too? Footnotes in the grand schemes of – let's say – ocean conservation? To address this reduction and attempt to fill in the context, I have renamed my footnotes *finnotes*. There are three purposes in finnotes replacing footnotes. The first is a reminder that men fishers and mostly women and men fish workers are often forgotten about, placed in the margin of academic research on fisheries; they are also too often footnotes in Western agendas on the necessity to *protect the ocean* or the necessity *to eat fish for healthy lives*. The second purpose is, paradoxically, to give them a special space for them to be acknowledged. They are not drowned in the affluence of information in the core of a text. They are given a specific space for them to exist differently. And third, in a playful way, I wanted to create a physical link from the reader with workers in Africa; when looking for a finnote, one has to bow one's head. Perhaps, symbolically, bowing one's head looking for a finnote, a certain sense of humility to the hardship of their work might be more deeply acknowledged. Finnotes expresses the undercurrents that go unseen in Western lives and discourses about the ocean and its sustainable development. They are also a space of

possible conversation, of deepening of the relation between the reader and myself; a liminal space between the academy and the reader. Why fins and not feet? Because I do not think we ever stand on firm ground for long. Life is movement, life is fluid and it requires constant adaptation (Bauman, 2000). In this instance, fins seemed a more appropriate image to swim between multiple dimensions (Europe, North America, West Africa, colonizers and colonized, lives, hopes, etc.) (For an original, creative, and insightful use of footnotes, c.f. Liboiron, 2021).

*Method*

Initially, I designed data collection in the field involving field observation, open-ended and semi-structured interviews, and journaling for thoughts, ideas, and self-reflexive writing. I devised the preparatory field trip to get in touch with key informants and consider the feasibility of visiting certain fishing sites (for instance, traveling to The Gambia where Senegalese men fishers sell small pelagic fish to fishmeal plants). During the Covid-19 lockdown, I looked for alternative sources of information. I decided to use what I collected during the preliminary field trip and combine it with other sources. I turned more extensively to grey literature, peer-reviewed papers, and the documentary "Golden Fish, African Fish" (Grand & Diop, 2017).

Prior leaving for the preparatory field trip, I had e-mail and telephone contacts with Thomas Grand who agreed to meet in Senegal. Once, in Senegal, Thomas Grand spontaneously offered to show me different fishing sites and introduce me to key persons involved with small pelagic fisheries. Considering this opportunity, I decided to forego a trip to The Gambia. Once in Senegal I got in touch with other possible informants (NGOs workers, development practitioners, academics, fisheries activists, etc.) for further meetings. It is while in Dakar that I contacted Afric'Azote, a Senegalese fishmeal plant. I was able to meet with

the plant's woman director a few hours before having to return home to Switzerland. The preparatory trip was prepared by reading extensively on coastal fisheries in Senegal and West Africa, and on the history of the country and region. The official language of Senegal is French as it was a former French colony. My ability to speak and read French allowed me to broaden my sources from both English and French sources.

## III. Different small pelagic fish

In this section, my aim is to present how different women and men fish workers enter into relations with the sardinella and how different meanings are created through these diverse relations. I will first present the perspective of a woman fish worker and what it means to her to face declining small pelagic fish stocks. Her name has been anonymized as she was not talking as a public representative in function. I will then echo this with my initial experience of small pelagic fish in Senegal from the perspective of a researcher, a.k.a. myself. Then, I will turn to the documentary producer Thomas Grand, and his take on fishing for fishmeal in Senegal. I will then relate two meetings Thomas Grand and I had with Mor Mbengue, local artisanal fisheries leader, in Kayar, and with Karim Sall in Joal, leader of the Joal-Fadiouth Marine Protected Area. Finally, I will present my meeting with, Mrs. Ngom, the director of the Senegalese fishmeal plant Afric'Azote.

### 1. Mother Satou I

Mother Satou sits under a Mbaar, a shelter, its roof offering some shade against a warming sun as morning hours pass. She stares into space; motionless, silent. Around the Mbaar lie dozens of drying grids. They are built with concrete feet and atop of them a perforated black plastic welcomes – or should welcome – small pelagic fish; only a few of these grids are used, and on them fish is scattered here and there. This emptiness and the regularity of the alignment of grids conveys a feeling of abandonment. No more than a few dozen of women

are slowly walking between the grids, arranging fish. The heat increases, but the sea air offers some coolness amidst this feeling of dereliction.

“Catastrophe”, “qu’allons-nous faire maintenant!” laments Mother Satou in French. Then switching to Wolof (the main vernacular language of the region) she explains that although it is April – close to the end of the fishing season –, the number of women working here is very low; normally there would be 500 women drying and selling fish but only about 250 remain. Mother Satou has a soft voice and a kind gaze; she naturally commands respect and one feels compelled to listen to her. She knows everyone, and is respected by everyone; hence the deferential title “Mother.”

A woman in a flamboyant purple and mauve dress approaches. She looks at some darkish sardinellas drying on a grid: this *kethiakh* has been braised on the ground with straw, then salted and left to dry on a grid. The woman, a Togolese, exchanges some words with Mother Satou and slowly leaves to inspect another grid. This kethiakh is too dark, certainly cooked for too long, and apparently not to her taste. Mother Satou explains that she is a working migrant, a woman trader, that buys processed fish and sends it back to Togo. She explains that fish connects people and integrates them where they live. In the region, it is normal to migrate to find work.

### 1.1. Women and fish processing

Fish processing is an attractive activity as it can be started with little money and basic skills[52]. Once set up processing fish, there are opportunities for growth in income (M. Deme, 2012). The processing of fish was and remains an activity largely performed by women, alone or in a

[52] *Small pelagic fish – the beach – is an opportunity to improve one’s life. A woman from Guinea Conakry after losing her business in her home country came to Kafountine (Casamance region, Senegal)* (35:51). *There with little money she managed to increase her capital and, now, owns two smoking ovens and employ about 20 persons* (Grand & Diop, 2017, 38:05).

group, although men have been increasingly present in the activity either as waged workers or owners (Ndoye et al., 2002: 19). In 1974, in Mbour, only about 4 persons were processing sardinellas into kethiakh in order to deal with catch surpluses, and this was done for subsistence purposes (Ndoye et al., 2002: 51; for the various ways of processing kethiakh, see Ndoye et al., 2002: 40). In the 1980s, fish landings increased and women started setting up processing sites at the beach: from three boxes of fresh fish per day, today women can process up to 40 boxes of fresh fish daily, depending on the season (Ndoye et al., 2002: 36). In 2002, kethiakh represented half of the production of Senegalese processed fish and the earnings of about 40,000 women contribute, partially or entirely, to household incomes[53] (Deme, 2012: for different small pelagic fish processing styles, see Ndoye et al., 2002: 15; Fall et al., 2014: 2524; Deme, 2012: 7).

In the 1980s the World Bank and International Monetary Fund's Structural Adjustment Program began being applied to the Senegalese economy. By the 1990s the SAP program had required the devaluation of the Senegalese currency and this coincided with major droughts in the sub-continent that triggered men migrating in search of work. Men then began processing fish, preferring to process sardinellas using smoking ovens which requires less know-how and allows a larger quantity of fish to be processed (Ndoye et al., 2002: 40). In this process of inclusion of men into fish processing practices, two aspects have worked in favor of men. First, the generalization of smoking ovens, through international cooperation/development projects, has been detrimental to women processors. The ovens' construction costs were prohibitive, their use and maintenance required a lot of physical strength and their use did not require women's traditional technologies and practices (be it in production, sales, and consumption) (Ndoye et al., 2002: 52). Second, women have lacked the financial resources to

[53] *A woman fish processor explains that she needs to participate in the financial livelihood of the family. Her work and earnings represent a safety net in case of her husband losing his work* (Grand & Diop, 2017, 20:12). Processing fish is thus a food safety net, but also a financial safety net.

adapt to new governmental regulations (regulations requested by foreign importers and development agencies[54]) requesting improved hygiene and traceability, regulations that are hard to apply to a braising on the ground technique that was perfected by women. Sometimes women were asked by the public administration to move to new processing sites farther away (as was the case in Mbour), but women could not move and had to abandon their fish processing sites as the new sites were too far away from their households (Ndoye et al., 2002). Although women are still dominant in fish processing activities, their activities were affected by official regulations and international cooperation projects. Pitifully, too little information is available on these aspects.

Women's role is also central in the trading of processed fish, and thus in its dissemination as food along the coast and inland, be it within the country or across borders (ICSF, 2002: 11): Low value fish species (i.a. small pelagic fish) are the most traded species within Africa (AU-IBAR, 2018: 50; ICSF, 2002: 15). This informal trade (Afrika & Ajumbo, 2012: 1; Yusuff, 2014: 133-134, 136; The World Bank Group, 2020: ix, x, 4; Bouët et al., 2020: 128) is pivotal for food security within the sub-continent (Ayilu et al., 2016: 6, 9). However, official figures do not always show accurately the extent, depth, and ramifications of this informal trade network (Ayilu et al., 2016: 6). In terms of research, informal fish trading and the role of women is an unmapped area, understudied, underreported, and lacking in basic information (e.g. on flows, magnitude of trade, role of women, life, and experiences, etc.) (Ayilu et al., 2016; Karkare et al., 2021; The World Bank Group, 2020; Yusuff, 2014).

[54] *To an interviewee "development" has to involve the local population and should not mean "changing path" from local customs and habits* (Grand & Diop, 2017, 55:55, 58:22).

## 2. Mother Satou II

I ask Mother Satou why over these last few years less women are present at the processing site. She answers, less and less sardinellas are brought back from the sea and women are lacking raw fish to process. But she is quick to add that the return of sardinellas would not solve the problem. There is a hidden aspect going on as over time women involved in fish processing activities have had to increasingly rely on dwindling savings. If sardinellas should ever return, many women will not have the financial capacity to start processing and trading again as they have no savings. In addition, even if the fish comes back, they will have lost their customers who by now have found other fish suppliers. "C'est une catastrophe ! On fait quoi maintenant ? (*It is a catastrophe! What do we do now?*)," repeats Mother Satou; a litany to a gloomy changing world with unknown horizons.

### 2.1. Sardinellas as food

Fish as food is essential for feeding West African peoples as well as in the socio-cultural fabric of Senegal (Thiao et al., 2018). In Senegal, in 1993, the average person would eat 36.5kg of fish per year (Thiao et al., 2018: 3). In 2002, the national average consumption of fish per person was evaluated at 26kg (Ndoye et al., 2002: 67), and in 2018, this percentage rose to 29kg of fish per person (Derrick et al., 2020; Ndir et al., 2020). In terms of consumption per person in West Africa, Senegal comes first in fish consumption, then The Gambia (23.2%), Ghana (17.5%) and Nigeria (14.5%) (Lam et al., 2012: 107).

However, people do not consume numbers, they eat food. The Senegalese national dish is the *ceebu-jën*. Variations of the dish depends on household recipes, traditions, and income. The ceebu-jën used to be a staple dish eaten daily at noon (Ndoye et al., 2002): 64). In 1980, a survey in Dakar showed that the interviewed population consumed ceebu-jën about 6 times per week (Sankale et al., 1980). With the Structural Adjustment Plans in the 1980s and the

devaluation of the CFA Franc in 1994, food prices increased and purchasing power decreased, drastically changing food habits (Ndoye et al., 2002: 65). Responses to the economic crisis have varied according to household incomes (Ndoye et al., 2002: 64–66). Some households have chosen to reduce their consumption of vegetables to afford buying fish, and for the poorer, one meal (breakfast or dinner) had to be forfeited. Although consumption of meat (beef, chicken, and eggs) has increased in the country since the 2000s – due to higher national production and increased imports –, meat prices are still expensive and considered a luxury (in 2002, 1kg of beef/mutton costs 2,500-3,000CFAF vs. 500-1,000CFAF for fresh sardinellas) (Ndoye et al., 2002). The Structural Adjustment Plans have fostered a fish export industry based on Senegal's demersal species (grouper, emperor fish, seam bream, etc.) usually used for traditional dishes such as the ceebu-jën. The main destination for export is Africa, however in terms of value, Europe is the most important destination (Ndir et al., 2020). Consequently, access to demersal species for the population has become difficult due to increasing prices, sometimes more expensive than meat. Wealthier households reduced their consumption of ceebu-jën following the Structural Adjustment Program, while poorer households had to substitute fresh white fish for fish of lesser quality: fresh or smoked small pelagic fish (e.g., kethiakh) (Ndoye, 2001, 19, 27; Ndoye et al., 2002: 11, 68). Thus, while the purchasing power fell and the diversity of food available decreased, the importance of fish only grew: in the 1980s consumption of fish represented 60% of the population's protein needs in Senegal, and by 2002 this figure rose to 75% (Ndoye et al., 2002, 67; Deme, 2012: 6). As fish became increasingly an export industry, fish has become also the most important source of animal protein for the local people (Ndoye et al., 2002: 66). However, small pelagic fish consumption in Senegal fell from 18kg in 2009 to 9kg in 2018, caused by using this fish

for fishmeal and fish oil production, the increasing exports of frozen or whole small pelagic fish, and a growing Senegalese population (Deme et al., 2022)[55].

## 3. Mother Satou III

I stand there, looking at the sea, looking at these women and wondering what it was like when the place was full of people working, talking, exchanging, and interacting. Glancing around, I turn my back to the sea and look at a small one-storied building. A metal board outside the building graciously proclaims that the building is the result of the generous "work" of the United States development agency (USAID) and the World Wildlife Fund (WWF). I am told it is a fish processing building built for women to process fish in a more hygienic environment. But the plant is barely used – if at all – as women find it inconvenient to work in it: too small and not built according to their needs and technological capacities. However, to showcase their own work in Senegal, USAID made an institutional movie describing the fish processing building project. The building had to be reopened to make the film and women pretended to work there and fish had to be bought at a high price to be on display for the cameras as it was not the fishing season (anonymized informant, *pers. com.*).[56]

I turn my gaze on the right and behind the drying grids, along the coast and facing the sea, some kind of plant has been built. What is it, I ask? A freezing plant? A processing plant? No one can answer for sure. I wish to take some pictures but I am strongly advised not to. The situation is tense due to the increasing and problematic construction of fishmeal factories along the coast. My taking pictures could be misunderstood by men fishers and plant owners alike. Waves lick the walls of the plant, the concrete is crumbling, slowly, inevitably; the

[55] *A man trader and man producer of smoked sardinellas explains that dried fish is cheaper that fresh fish; thus, many people rely on smoked fish for food. Building fishmeal plants would mean reducing cheaper fish for people* (Grand & Diop, 2017, 47:14, 47: 21).

[56] Although it is not the purpose of this chapter, and this dissertation, it is noteworthy to underline that the anecdote on the USAID plant and the manicured institutional movie is representative of a shadowed neo-coloniality (see, for instance, Dimier & Stockwell, 2023).

persistent hits of waves herald a relentless sea-rise. Walking around the plant, I zigzag between piles of straw slowly burning, producing an acrid smoke. Garbage litters the ground and a dog sniffs the piles in hope of some quick food to steal. Hidden under the straw, ground braised kethiakh is being smoked.

What I see and hear in this village of Kayar epitomizes a fair share of issues that faces coastal Senegal. International aid politics, the development of industrial fish processing plants for export, the ocean as a resource, the fading presence of fish, and people – women – caught in-between. It is as if various rhythms (different lives) were beating, each with a different tempo (with different meanings and purposes). And the only consistent beat is given by the sound of waves that crash, some hundred meters away from Mother Satou; this ocean from on which so many lives depend. If the common denominator between all is fish, then I wonder what is a fish for each of them? And what is a fish at all?

## 4. What is a fish?

Lykke (2010) highlights that the "object" of the research emerges with its description. There is not one truth, one representation, but a multitude of perspectives built on individual and social values, interests, and education. If the multiple is the norm, then this implies the following question: how do I personally consider a fish? And how are fish presented in our Western world? The question seems obvious, too obvious to be asked. But because it appears so, isn't it a good one? I was trained in interdisciplinary fisheries studies following mostly a biology and ecology episteme. Thus, to me, the general "parameters" of a fish would have been: an animal with fins living in water; an animal to be integrated in population graphs and tables. However, outside the realm of academic buildings, I often pondered and wondered what it felt for a fish to live in the sea. Is it a dark and cold place for them? Are they scared? Do they feel bliss in swimming in open waters? This was a totally different fish in my

wandering mind! Thus, in my own experience, a fish would take on different forms. The first is the fish that I imagine living in the ocean, a construction of my mind, and stemming from my wish of being able to feel other ways of being alive. The second fish is what I could call the 'landed' fish: either that I indulge in fish restaurants or that I admire in beautiful aquariums. The third fish is a "scientific" one. The one that I dissected, saw described in taxonomy books, the one that I grouped into cohorts into an Excel file to create population graphs and curves, in order to become an extractable resource. Three fish in one (at least). And all expresses, in this instance, – well – death and imagination (I imagine a fish swimming in the ocean; I eat a dead fish skillfully prepared; I imagine a fish as a figure). Suddenly the question of "what a fish is" ontologically takes on depth and shows that a fish can have multiple meanings and biophysical expressions. And for Mother Satou? What is a fish to her then? Or rather what is *the meaning* of a fish to her? Listening to Mother Satou and her distress at the disappearance of sardinellas, I feel emotion in her voice: sardinellas are not merely "a fish." It is not just an abstraction, be it imaginary (in a wandering mind), delicious, numerical (in an Excel table) or extractable. For her, sardinellas are part of extensive social, economic, cultural, and historical relations. Sardinellas tell the story of connections and relations between land and sea. Mother Satou lives in Kayar, meaning in Wolof "come to these two things"; it is an invitation to think relationally between the land, the ocean, and what happens in-between. The following sections will continue to present other ways of being in relation to small pelagic fish.

## 5. Olivier Randin, academic researcher

I wish to reflect on the writing of an initial draft for this chapter and choices I made for the structure of the present text. Initially, I wrote an introductory section on the "natural environment" of the coast of Senegal and the three main targeted species of small pelagic fish in the country. After reading this section, I came to realize that I was (re)producing an

environment devoid of humans. I was splitting “nature” in one section and “societal processes” in another, which goes against the purpose of this work. The map I used depicted Senegal with dots and labels as if a country could be grasped with just one map. I do not dismiss the necessity and the importance of such maps, but in this instance, I was merely reproducing a traditional way of presenting the situation as I was taught: nature on one side, humans on the other. Even in my presentation of “nature,” three small pelagic fish species, I normalized their existence into the Western scientific lingo and imagery: dead fish, out of the water, on their flank, next to a ruler, with a Latin name for a label (c.f. figure 3, as an example; Balde, 2019: 10, 17, 22).

*Figure 3: sardinella aurita* (Balde, 2019: 10*), sardinella maderensis* (Balde, 2019: 22) and *ethmalosa fimbriata* (Balde, 2019: 17).

Eventually, I decided to forego this “natural environment” section. I decided to keep a very light presentation of key (Western) facts. For the three central small pelagic fish species, I will limit their introduction to their names: the vernacular one in Wolof (one of Senegal national language, used as the trade language along the coast), the English common one (used by English speaking Westerners) and the Latin one (used by Western taxonomy). Geographically, I will shortly give the name of the most important fishing harbors, and finally say why it is hard to “trust” official statistics.

The most important small pelagic fish for the population are the yaboye mereg/round sardinella/sardinella aurita, the yaboye tass/flat sardinella/sardinella maderensis, and the

cobo/bonga shad/ethmalosa fimbriata. Geographically, Kayar, Saint-Louis, Mbour and Joal represent the highest concentration of pirogues in Senegal with 85% of the total number present in these four harbors. And these four harbors jointly land 75% of the total small pelagic fish catch (Deme, 2012: 5). Small pelagic fish is caught using either purse seines or gillnets (Deme, 2012: 9-12, 27; Thiao et al., 2018: 27).

Official fisheries statistics have to be considered with circumspection (for issues posed by the difficulty of estimating stocks due to the "artisanal" aspect of the fishery, representing 74% of domestic catch, see Belhabib et al., 2013: 18). Differences in methods, definitions, technical and financial means, and also the desire to present sound fisheries management capacities, results in numbers that may be far from accurate. For instance, between 1950 to 2010, Senegal has reported to the United Nation's Food and Agriculture Organization a total catch of 14,4 million tons. However, Belhabib and colleagues (2013: 18) have shown that the reconstructed total catch is equivalent to 45 million tons of fish caught between that period. The round sardinella represent about 70% of landings by the pirogue fishery and is overexploited (Palomares et al., 2020: 61).

However, fish are not just *stocks* (Telesca, 2017); too often, numbers end up having a life of their own and although their importance should never be put aside, their generalizing characteristic may sometimes steer us away from the individual and his/her daily life. It is these lives that documentary producers, Grand and Diop, portrayed in "Golden Fish, African Fish" (Grand & Diop, 2017).

## 6. Thomas Grand, documentary producer

Thomas Grand is a French documentary producer living in Senegal. I got in touch with him after discovering his award-winning documentary "Golden Fish, African Fish" (Grand & Diop, 2017). I meet Thomas Grand in Senegal, at the fishing harbor of Ouakam (suburban Dakar). It is late in the morning and the beach displays little activity when we meet. Some

people are setting 10-meter-long pirogues out to the sea, maybe to bring back fish or men fishers from larger pirogues which cannot come close to the shore. Two pirogues are approaching, filled with fish. Men carriers run to it, dragging a box into the water, to have it filled with fish[57].

In his documentary "Golden Fish, African Fish" (Grand & Diop, 2017), the main focus is not on fishing but on the women and men who make their living "with their hands," the "hands that transform fish", an important aspect to Thomas Grand, because "working with hands slows down time" (*pers. comm.*). Fishing creates hundreds of jobs beyond the actual fishing. How many jobs does one fisher create? Ten, maybe fifteen. This world of fish processing work is essential because it feeds a whole sub-continent; it is a wide and extensive fabric, but a fragile one.

Small pelagic fish are therefore a crucial means for many lives to exist. However, post-fishing activities are too often left in the shadows, forgotten, even though these fish workers are the most vulnerable. A men fisher's life is hard but there is a possibility for men who fish to earn good money, and there is the prestige of the activity that should not be left aside, notes Thomas Grand. The situation is quite different for workers on land. For instance, for men carriers unloading fish, the price of the box remains the same, whatever the quantity and quality of the catch[58]; the situation is similar for women and men who smoke fish[59]. Thomas

[57] *Pirogues are returning to Kafountine (Casamance region, Senegal). On the beach wait dozens of men and women expecting their return. Men fish carriers run to them, enter the sea, half walking half swimming, the water up to their torso or shoulders, and their head hidden behind the gunwale. In the water, pushed by the waves against the hull, men carriers are holding the gunwale with one hand and with the other shoving their box (1meter long, 50cm width, 30cm deep) on it. They shake their box to attract the attention of men fishers and have it filled with fish. Once the box is full, they return to the beach - the crate on their head -, get out of the water, run - one behind the other - to unload their box to a smoking oven, maybe, or transfer it to a middleman. Once the box is empty, they run back to the sea, to the pirogue* (Grand & Diop, 2017, 7:58).

[58] *A man carrier talks about the hardship of their work and how, according to him, people have more consideration for the fish than for a human* (13:53). *According to him, men carriers are the most marginalized; they are not organized in groups or associations* (Grand & Diop, 2017, 18:46, 18:58).

[59] *A man fish smoker explains the health toll his activity represents on his health: the smoke hurts the eyes and lungs which forces him to ingest lots of paracetamol pills against pain and to drink a lot of milk; after 4 or 5 hours in the smoke, "the smoke takes your eyes"* (28:42) *and in the evening any lights (sun, traffic) will be*

Grand tells me that men carriers are seldom affiliated with a pirogue; It is each one for its own, in difficult conditions, and they "fight" to get access to the catch. These are the people, ascertains Thomas Grand, that need to be cared for and centered: for the strenuousness of the work, and for their role in the construction of a social and cultural fabric. Of course, post-fishing practices require modernization. For instance, new preservation and smoking techniques that enhance the quality of the processed fish and that are less detrimental to workers. However, there should not be a "one size fits all" development strategy. Processing practices are multiple with various preferences according to species and regional consumption preferences. Different smoking techniques will give the fish different flavors: in Senegal, traditionally, straw of filao (a local tree) is used, whereas Cameroun processors, for instance, prefer to use wood[60]. Thus, smoked-dried fish is not reducible to simply removing water from the fish with whatever technology is made available. Thomas Grand explains that fish drying systems that rely on the sun (favored by sustainably oriented international development projects), are not ideal as they lack the different flavors that come from using straw or wood to dry and cure the fish.

On our way to the village of Yoff-Thongor, a few kilometers north of Ouakam, Thomas Grand tells me how the situation in Kafountine (Casamance region, Senegal), welcoming people from all the West African sub-continent[61], exemplifies how small pelagic fishing is truly a regional trade that extends from South Morocco to Guinea. Small pelagic fishing cannot be understood, neither considered – let alone managed – correctly if it is not grasped in

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*painful* (28:25). *To him, smoking fish is not an occupation, it is a job that allows getting by* (Grand & Diop, 2017, 26:58).

[60] *To feed smoking ovens requires wood and a man officer of the Dioloulou Water and Forests Services regrets that too many trees are cut down which reduces the only source of energy for the local population* (Grand & Diop, 2017, 30:50).

[61] *A man street seller explains* (23:27) *that it is the sea that attracts foreigners to Kafountine because fish is missing everywhere else; there are Guineans, Ghaneans, Sierra-Leoneses, Liberians, Malians, Bissau-Guineans, Burkinabes. Is the presence of migrants from other Western African countries problematic? A Senegalese woman, processing fish, does not think so. If they come it is because there is not enough work in their own countries* (Grand & Diop, 2017, 23:34).

its regional setting, asserts Thomas Grand.

We arrive at the beach of Yoff-Thongor. Large pirogues – stranded leviathans – are waiting on dry sand; colorfully painted, huge, and massive. The mist of sea air blurs the view in the distance and gives a surrealistic mood to the beach. Flags on pirogues are flapping in the wind and two kids are wrestling – the Senegalese national sport – in front of the vessels.

Sardinellas are more than mere subsistence, they are food for the people. It is part of a culture and "everything starts here" Thomas Grand points out. He regrets that the media reduce sardinellas to the generic term of "small pelagic fish" and that the cultural importance is barely presented. There are two types of sardinellas (he uses the term *yaboye* meaning 'sardinella' in Wolof): the flat one and the round one, and their feature (size, amount of fat, taste, color) – as well as their processing styles – will influence their market price. The "life" around small pelagic fisheries should never be reduced to export activities. Yaboye is also food, be it a food safety net or part of a culinary tradition; there is a true dependency on this fish. Thomas Grand underlines that the culinary culture of yaboye is recent, 20 years maximum. Before the 2000s, sardinellas were not fished for food purposes. Food, he underlines, is the focal point: one should not just *feed* oneself but *eat* with all the social relations that it implies. To him, discussion about fish catch surpluses that could be sold to fishmeal plants is a false debate: stocks of fish are low, there is no more surplus. Thus, sardinellas should go to feed people not markets.

I ask Thomas Grand if the population at large is aware of issues with fishmeal plants? According to him, yes, but it is a very sensitive subject. Thomas Grand recalls that the last ten minutes of his documentary were difficult to shoot. Although in possession of all the necessary authorization by the Ministry of Culture and the Department of Fisheries, police forces were present while filming scenes of fishmeal plants, and gave the crew "a hard time"

(*pers.comm.*).[62] The sequence he just described (Grand & Diop, 2017, 52:33–53:17) shows how one fishmeal plant was built in the Marine Protected Area of Abéné, a village 5km away from Kafountine. The plant was built and started its activities without any environmental and social impact study. The population organized and protested, and the plant had to shut down for a public hearing. Another plant was built on the beach where the documentary took place. More than 1,000 fish processor (about 1,500, *pers. comm.*) workers were forced to move away (Grand & Diop, 2017, 53:18). They have been relocated inland about one mile away from the sea, in rice fields. It is an unsanitary zone to process fish, prone to floods during the rainy season. Among other things hygiene issues, there is no wastewater drainage and wastes remain in the field to rot.

However, if the issue of fishing for fishmeal is understood as a problem, the correlation with aquaculture is not always understood. In Nianing, we meet with Gilbert Sarr, leader of the Artisanal Fisheries Local Committee. He tells us about the new project of the Japanese development agency: an aquaculture project with pens of about 15-20 meters of diameter and 8 meters deep. Fish to be bread are "French species" as he tells us, he thinks red tilapia maybe or sea bream. Gilbert Sarr finds the idea attractive. We tell him about the issue of feeding farmed fish with fishmeal made of small pelagic fish. He is surprised, he has never thought about that and finds himself puzzled.

Thomas Grand tells me that each region along the coast of Senegal has its specificities, its histories, and problems. This was only an introduction to the Little Coast (from Dakar to the Saloum Delta), much more has to be said about the Grand Coast (from Dakar to Mauritania, and its main harbor Saint-Louis) or Casamance (from The Gambia to Guinea-Bissau; where

[62] This anecdote shows how wary is the State (represented by its police) of the image that is given abroad of its coasts and the issue of fishing for fishmeal and fish oil in Senegal. It also shows the relations that the industry has with the Senegalese State. These relations – between public institutions and private companies – in Senegal, regarding fishing, would require further research, research that did not fit the scope of this dissertation.

Kafountine is located). Meeting with Thomas Grand has allowed me to have better view of the many interconnections that exist between people, institutions, natural environments, practices, and issues. The next three sections highlight the voices of Senegalese in relation to fishmeal plants.

## 7. Mor Mbengue, artisanal fisheries local leader in Kayar

After our initial meeting in Ouakam, Thomas Grand proposes to visit some important fishing sites along the Little Coast and meet with people involved with fisheries. We thus meet again a few days later in Kayar for an appointment with Mor Mbengue, leader of the Artisanal Fisheries Local Committee and member of a collective opposed to the construction, in Kayar, of a fishmeal plant from a Spanish company called, Barna (c.f. figure 4: Barna fishmeal plant in construction). I am told that the plant has three shareholders from Spain, Russia, and Korea.

*Figure 4: Barna plant in construction (Kayar, Senegal) (source: Olivier Randin).*

The building of the plant was made possible due to the personal interests of local politicians according to Mor Mbengue: the mayor of Kayar sold some of his own land to the company. The construction started but the population complained and strongly protested against its

presence in the village and construction stopped. The ministry of fisheries got involved, came to Kayar, and said that he never agreed to this plant. Construction was stopped; it was right before the national presidential elections. Local associations and the population were clear that if the plant was to be built, the outgoing president, Macky Sall, would never have the vote of Kayar for another term. A few months after the election, Macky Sall reelected, the construction started again, still without environmental impact study. Barna company presented the argument that they have plants in Spain, implying that they would apply the same standards in Senegal as in Europe. But Mor Mbengue does not believe it: people here are not duped and they know that regulations in Europe are much more restrictive and stringent than in Senegal.

The company has tried to gain the consent of the population by offering clothes to people, and money to individuals, to associations or to the mosque (but the imam is against the plant), and visits are paid to influential marabouts to have them side with the company. Mor Mbengue adds that the company even came to visit her mother to convince her to change her son's mind. Thomas Grand adds that in Abéné the owners of the fishmeal plant did the same thing, and to convince men fishers of the importance of the plant they invited them – all expenses paid – to Dakar, which impressed them a lot. Fishmeal plants offer financing for fishing trips and fishing material in exchange for the exclusivity of the catch, it is of course very hard to resist.

Mor Mbengue stresses that he, and the population of Kayar, are not against modernity. For instance, they have nothing against a modernization of processing practices and sites as it gives work to people. But he is against fishmeal plants: they do not create jobs (16 jobs are to be created, it is said by hearsay), they take all the fish, and they create conflicts within the population. "And anyway," he stresses "can you manage a resource when you have a fishmeal plant so opaque with its quantities processed!" Many men fishers and fishing associations are

against the fishmeal plant: the men artisanal fisheries local committee, the men line fishers' associations, and women processor associations. Among other associations, the men purse seine association is against the plant, which came to a surprise for the population as they are the ones to gain most from the presence of a fishmeal plant as the latter offers higher prices for fish than the local market. How to explain that? Maybe a strong sense of belonging and a strong tie to the community to its village and its seashore. These ties to a place are not as strong in Kafountine or Joal, where men fishers migrated from other regions, and are much less bothered by the presence of fishmeal plants. However, in Joal the leader of the local Marine Protected Area is strongly against fishmeal plants. We will meet him next.

## 8. Karim Sall, leader of Marine Protected Area

Further down the road, we reach the municipality of Joal-fadiouth (shortened to "Joal"). We meet with Karim Sall, the president of the management committee of Joal's Marine Protected Area. He is a well-known figure, a vocal man, deeply engaged in marine protection projects. We are welcomed in his office; 4 or 5 bystanders are present, listening carefully to our discussion. Karim Sall's words are as much for us as an exhibition of his presence to the crowd.

To his knowledge, the Thiès Region (representing most of the shoreline of the Little Coast) has 11 fishmeal plants, and the rest of the country has 17 of them; according to him, there are no clandestine plants. His is adamantly against fishmeal plants, the most destructive activity to the sea with many disruptive effects[63] on local people. Environmentally, they are built without any concern to the harm they can cause to the marine environment: in Joal, a fishmeal plant has been built in the Marine Protected Area and discharges its waste waters straight into

[63] *A man trader and producer of smoked sardinellas and grinded scales says that he comes from Joal and used to work there. The fishing of juvenile fish for fishmeal plants has decreased the quantity of fish. Thus, he had to come to Kafountine: it is the only place where there is still plenty of fish. Although there is no plant here, some are already present in Gambia and fishers are selling their fish over there* (Grand & Diop, 2017, 45:06-46:02).

the ocean. Socially, it is disruptive, as it offers prices that women and men fish processors and other actors cannot compete with (e.g., fishmeal plants can buy a box of fish at 5,000CFAF when it is normally sold at 1,500CFAF). Fishmeal plants have "other tricks" says Karim Sall, to acquire fish. For instance, they can finance fishing trips to gain the exclusivity of the catch or they can possess what he calls "dummy artisanal pirogues": a pirogue owner pretends to be independent but in fact works exclusively for the fishmeal plant. In any case, for men fishers it is a great bargain as their catch is guaranteed to be sold at a top price. And what can be done against them? It is dangerous to fight against fishmeal plants says Karim Sall, "because to fight against them is to lay into the government." Furthermore, fishmeal companies have their way to get what they want: they buy silence. They have given gasoline as "gifts" to men fishers, money to the city hall, to influential people, they have even tried to bribe Karim Sall several times.

Karim Sall says that if the country is stable, it is thanks to the yaboye. But it is troubling to observe fish landings decrease, even more so when one learns that a third of the country's fish landings happen in Joal. This tells us a lot about the state of small pelagic fish stocks in the region and the impact of fishmeal plants on access to food. For example, when Karim Sall hears arguments made by some that only the yaboye surpluses could be sold to fishmeal plants, he dismisses the idea. He believes that "if there is no war, it is because there is food" available. If people eat 28kg of fish per person per year, what will be the impact if there are none? He estimates that the two fish processing sites of Joal have about 2,000 workers and 3,000 workers respectively, and surrounding villages supply straw for the smoking procedure that adds further employment. Without the yaboye, there would be at least 5,000 people that participate in providing food that become jobless.

To Karim Sall, what is happening with these fishmeal companies is another form of neocolonialism, "and maybe something even worse than that"[64]. And he noticed a move from the sea to the land: as international fishing agreements, allowing foreign companies to fish in Senegalese waters, are harder to acquire, companies set up offices on land and make deals with Senegalese fishers to fish for them as subcontractors. However, the issue cannot be adequately understood if the yaboye is not considered as a true transregional resource, insists Karim Sall. Fishers land a lot of fish in The Gambia where fishmeal plants buy the yaboye at high prices. Where do they fish small pelagic fish? According to Karim Sall, almost no pirogue larger than 20 meters fish in Senegalese waters (for "artisanal" catch outside of Senegal, see Derrick et al. 2020: 135; and Belhabib et al., 2013: 18). They either fish in Mauritania or in Guinea-Bissau (for illegal catch in Mauritania, see Belhabib et al., 2012: 66). If either of these countries close their borders, it will be a catastrophe. The main problem, he continues, is that the stock is assessed only based on landings, not where the fish was caught (on the difficulty to estimate stocks due to differences between catch sites and landing sites, see Derrick et al., 2020: 135; Belhabib et al., 2013: 18; Deme, 2012: 26). However, the State itself can be problematic: for instance, Senegal subsidized the buying of more than 2,000 pirogue motors right before the presidential elections[65]. "How can you protect a resource when the opposite is done!" bursts Karim Sall.

After listening to all the issues surrounding fishmeal plants, I wonder if I could visit one and arrange a discussion with managers or workers at the plant. Foreign owned plants would be harder to visit but I was told of the existence of two Senegalese-owned fishmeal plants:

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[64] *A man processed fish trader in Kafountine, is outraged that plants take fish, "our food", to be fed to "pigs, horses and other cattle" (41:29). To him, it is a blow against Africa: fish is appropriated, transformed and shipped under their own eyes, and, in this process, the water is polluted with toxic wastes. Africa is left with no means of development* (41:44). *Fishmeal plants "deprives us of our food; it is a sabotage!"* (Grand & Diop, 2017, 41:29).

[65] In 2017, the public administration subsidized 2,079 motors in favor of the pirogue fishery (Ndir et al., 2020: 246). If fuel subsidies amounted to 250 million CFAF in 1981, in 2017, the government paid 10 billion CFAF to the pirogue fishery (belhabib, 2019: 27–28).

Senegal Proteines and Afric'Azote. What are these plants like to work in? What are the plant's positions on the situation of diminishing small pelagic resources? I had only a few days left in Senegal before I had to leave and I was skeptical that anyone at the plants would speak with me but I contacted them asking for a meeting.

## 9. Afric'Azote, Senegalese fishmeal plant, Dakar

I found out that Senegal Proteines closed; I was left with Afric'Azote. I sent an email explaining who I was and what was my project about. The director of the plant answered and invited me the following day for a meeting. I thus met with Afric'Azote director, Mrs. Ngom, on the last day of my stay in Dakar. In the morning, I take a cab that drives me through Dakar's industrial harbor. We drive along stretches of high walls from which masts and funnels stick out. Entrances are well guarded and trucks go in and out with large puffs of black smoke from their exhaust pipes; the air smells a mix of exhaust gas, sand, urine, and garbage. I wonder where the sea is among all these smells and blocked views. We reach the plant and Mrs. Ngom welcomes me warmly. We enter in her spacious but rather empty office but for a couple of cupboards and she sits behind a voluminous desk with only a telephone on it.

Mrs. Ngom is genuinely glad to welcome me to her plant situated just outside of the harbor. Small pelagic fish and fishmeal plants regularly make national and international newspapers' headlines, but seldom, if ever, reporters and researchers come to ask fishmeal producers for their views on the problem. Mrs. Ngom regrets that the media focuses only on Senegal as the problem when Mauritania is much more active in the fishmeal and oil trade.

Mrs. Ngom explains that 95% of Afric'Azote raw material comes from fish offal and discards. Independent workers collect these offal and discards and bring them back to the plant with their horse carts. Supply is also secured with boxes left at fish shops and canning

industries. Fresh fish can be bought in two instances: (i) during the peak of the fishing season, catch surpluses are bought ("sometimes there is so much fish that is thrown away straight into the river of Saint-Louis, it makes you cry" says Mrs. Ngom), and (ii) sometimes prices are too high for local fish processors and the plants buy this fish.

She mentions that several challenges are on the horizon. Environmental regulations are getting increasingly stringent and require large financial investments for which foreign corporations are better positioned than the Senegalese businesses. Resource wise, it is getting harder to acquire raw material. Companies that did not use offal have now started collecting them out of necessity. However, Mrs. Ngom says that Afric'Azote's lines of supply are strong and she is confident in the future. They are mainly turned toward export and target the livestock and aquaculture industry. When it comes to competition, she feels that there is a rush to produce fishmeal: she increasingly receives offers – always declined – from foreign companies to buy the plant or enter as partial owners. Some fishmeal companies do not pay export taxes which is not the case of Afric'Azote. This is problematic when it comes to reach international markets. Some companies are also located within the harbor and will offer a higher price for a box of fish than the market price. She tells me that this is of course detrimental to men and women fish workers, mostly women, that cannot buy fish anymore. There is of course the existence of artisanal fishmeal processors, and a coexistence with industrial fishmeal plants is possible as they do not reach the same clients. But she sees that things are changing: foreign fishmeal companies used to buy raw material in Africa and sell it abroad, now they have started selling their products to livestock and aquaculture operations in Africa.

When leaving, we thank each other and I look forward to come back as she offers to show me the plant during my upcoming trip. I leave Senegal full of memories of smells, thoughts, and

ideas, and I look forward to my future field trip, little knowing the covid-19 pandemic was looming.

## IV. Discussion: Making space for the liminal

*Liminality*

The term liminal originates from the Latin word *limen* meaning "threshold." Turner, based on the work of van Gennep (d'Allondans, 2011), developed the concept of "liminality" considering it, temporally, as "a period of margin" that should rather be considered as a process, a "becoming", than an objective fixed state (Turner, 1967: 93-94). Liminality is presented as a concept "to think with" for an "interpretative analysis of events and experiences" (Thomassen, 2015: 42). It embraces a heuristic approach toward research and conceptualization. Liminality can be viewed spatially – as a threshold, a space where transformation occurs, and a place between two worlds – as well as temporally – a time where changes occur (Gadoin & Ramel, 2013:5; Thomassen, 2015: 48). Liminality is a space and a moment at the border of other events or places. However, it is not to be understood as a no-(wo)man's land "betwixt and between" (Turner, 1967: 93) moments, nor as a state of limbo – of suspended time and movement. It is a dynamic space. Meyer and Land describe the liminal space as a liquid space that involves transforming and being transformed (Meyer & Land, 2005: 380); it is a space that is very much alive.

In this chapter, I do not consider liminality is as a demarcation (as the word "threshold" may suggest), nor only as a zone of contact (Pratt, 2008). Instead, I use liminality as the broader sense of "passage" and movement through space. It is also a space-making concept that allows to illuminate what has been left in the shadow. Of interest is what lies in this space of passage and the meanings that can be found therein. The shoreline should be considered as a liminal space where geophysical entities (ocean and land), humans, and nonhumans meet. The

liminal is the location where dynamic social processes take place and where conflicts arise. By using liminality to think with, my aim is to break free of thinking in terms of clear-cut boundaries (Horvath et al., 2015b) that the binary of land and sea suggests at first sight, and show that there is space in-between where people meet, transform fish, and create food and work for the whole West Africa.

Turner (1967: 95) in the context of rites of passages and liminality, presents the person subject to such rites as "invisible". The idea of invisibility is telling in the context of this chapter: in a liminal space, peoples may remain shadowed such as women fish workers for instance. Liminality makes space for the acknowledgment of the existence of such shadows. Therefore, I use the liminal as a concept to observe and illuminate the changing relations caused by the growing presence of fishmeal plants. It is also an invitation to consider all the ramifications that starts at the shoreline and spread inland[66].

In the remainder of this section, I will thematically explore some aspects of transformation, conflicts and connections that arise on the shoreline as a liminal space, and finish with some concluding comments.

*The Multiple Meanings of (small pelagic) fish*

Along the shoreline, fish is plural – its meaning is plural – as it creates, among other things, work, food, and currency. The shoreline is also a place that connects and where a societal existence is created: Mother Satou and women fish workers have a place to exist as workers, to finance the life of the household, and to foster good human relations. In this liminal place, fish "connects people," it "integrates them where they are" as stated by Mother Satou. Connections are created with people from other countries and these relations see the smoked fish travel far inland. Thus, the meaning given to the small pelagic fish is not contained in a

[66] Gillis uses the concept of ecotones to discuss the relation between land and sea, however with the ecotone, the focus is on ecosystems (Muthyala, 2023).

single purpose—like maximizing export earnings for example. It is a nexus of possibilities and opportunities. This is what Thomas Grand rendered so well in his documentary as lives linked and interconnected in a constant movement at the shoreline. And to him, small pelagic fish should never be considered unilaterally and singularly.

Somewhat opposed to Mother Satou's view, was my own initial understanding of fish. The division between "nature" and "social processes" was evident in the (re)presentation of the fish that I had which could be multiple (number, food, ornament, etc.) but not plural. By multiple, I understand several different types of fish separated by their use, purpose, and practices. My meaning of this type of fish was influenced mostly by an episteme that has separated the thing that I observe from my own life. For Mother Satou, small pelagic fish is interconnected with her life, this fish to her is ontological; for me, small pelagic is another life, distant from my own livelihood, it is remotely observed. However, my position changed when I started reading the work of researchers encouraging to relate, and to be, differently with the world (Barad, 2007; Haraway, 1988, 2015; Haraway, 2008; Tsing, 2005, 2012, to cite a few). They formed, in the development of my thoughts, an academic liminal space. This in turn allowed to start thinking differently about the shoreline of Senegal. Prior to this realization, I used maps in this chapter where the land took most of the image and the sea was represented as a thin margin, on the border of the page. Thinking about in-betweenness and liminality made me question this way of pushing the sea to the side; and made me wonder: what are we pushing to the side with our reading of present issues regarding the ocean? Hence, the role that a liminal thinking may have in giving texture and existence – and different meaning – to the many lives lived on the seashore.

*Work, food, and international cooperation*

Men fish carriers are the workers that symbolize most clearly the shoreline as a liminal space of movement and transformation. Men fish carriers pass the fish from one state – a liquid one – to another – the solid; from the sea to the land. And they do so half-running, half-swimming; yet again an image of the in-betweenness of this work situation. And as liminality is uncertainty, in this action of passage, men carriers are the most vulnerable. Physically vulnerable, due to their close contact to the pirogues with risks of injuries and death. Socially vulnerable as they work alone, with payment tied to whatever the quantity or quality of fish brought back to the beach commands that day. What is paid for is the work of movement from sea to land, not the fish per se or the value that can be obtained later in the process of transformation. Through their work, men carriers create relations be it in the processing of fish, its trade, and the work opportunities for the region. They are the first act of transfer from the sea to the land.

Mor Mbengue states that no one is against modernity, but shall be done with small pelagic fish is a choice that belongs to coastal people. It should not be imposed by foreigners. The transformation into fishmeal and fish oil has consequences on the work of many people, and mostly the work of women. Women's fish work is essential in the social process of (i) transforming raw fish into processed fish and (ii) disseminating it as food in West Africa. And in this process, food is about social relations – cultures – and not just feeding oneself (e.g., ceebu-jën). These processes can be affected by the presence of the inadequate international cooperation projects, such as the fish processing plant in Kayar where women had to pretend to work for the promotional video. This exemplifies how the beach and the men and women who work where the sea meets the land can easily be sidelined due to a naive assessment of what is done at the beach and how it is done and by whom. Through international cooperation and development projects, the seashore becomes understood as a coastline—this transforms a dynamic living space of social processes, into an enclosed space where a single (managerial)

problem has to be solved. Furthermore, the seashore is a space that becomes increasingly gendered in favor of men as the subjects of fishery development projects, such as fish ovens, tend to favor men to the detriment of women, favoring maximizing export value for those with effective demand rather than regional food cultures. Similarly, to encourage the use of solar panels for drying fish misses the subtleties of taste and culinary habits in the region. Thus, oven smoked fish should not be merely considered as an act of passing from raw to smoked, it is a fragile process that has ramifications for work, society, and culinary taste.

*Fishing for fishmeal*

Harvesting fish for fishmeal and the presence of fishmeal plants has been shown to disintegrate social relations in Senegal. It empties the sea of its fish and consequently empties the beach of its people, notices Mother Satou. Without fish to process, it is connections that are severed, and the shoreline stops being a liminal place for fishworkers. The drying grids are empty and there are much less women than usual, states Mother Satou. Thus, the liminality of the shoreline is also dependent on temporal aspects. Time plays a role in this disintegration process: women are living on their savings and as such, they risk not having sufficient funds to re-enter the fish processing business. With the leaving of women from the beach, another relationship with the ocean disappears with consequences for human and more-than-human lives.

Another development that has flowed from the presence of fishmeal production processes – strong in its symbolism – is the push of women and men fish workers away from the beach and into the land. A direct connection to the sea is severed for a transfer into unsanitary zones, prone to floods, says Thomas Grand. It is a contact – a presence – to the ocean that is hindered through a delocalization of fish workers from the shoreline; the shoreline as a liminal space becomes erased. Thus, the presence of fishmeal plants plays an active role in the production

of a binary relation between land and sea. Fishmeal plants, with the direct movement of fish from the ocean to the plant, bypasses the shoreline as a liminal space and reduces the shoreline to a place of landing fishy biomass, a place where fish has not been fished but harvested (Sajay & Bavington, 2012); in this instance, there is no relation with the sea, it is the land that is extended to the sea. The ocean and the land enter in a binary relation where the ocean provides the essential element to produce fishmeal and fish oil. This process of binary production is expressed in Karim Sall's example where fishing and fishmeal companies move away from the ocean as it is becoming increasingly difficult to obtain fishing licenses. Instead, they set up structures on land and make fishing contracts with men fishers that deliver their biomass directly to fishmeal plants in Senegal or The Gambia.

With the presence of fishmeal plants, small pelagic fish have transformed into a political entity and political-economic statement. For the political, Mor Mbengue's fight against the Barna fishmeal plant has shown how the seashore has become a space of conflict between political actors and economic entrepreneurs. The shoreline has become a space of political frictions, shown by the difficulties that Thomas Grand had in filming shots of fishmeal plants although in possession of all the necessary authorization. As a political-economic statement, Karim Sall shows how fishing for fishmeal is the expression of an undercurrent, neo-colonial in nature, that (re)structures relations at the shoreline. Neo-colonial attitudes erase the seashore as a liminal space and fosters a polarized relation between land and sea with the land and its developed property boundaries and notions of work, and even the notion of harvesting fish as opposed to hunting wild species comes to the fore.

The sense of disconnection and a forced split between the land and sea, I felt it while driving by the harbor to reach Afric'Azote. The sea along this stretch of the harbor is enclosed and cut off from the land, it is barred by walls around the harbor. I cannot see anything, let alone the sea. At the plant, the fish is not whole, it comes from canning industries or fishmongers

already disemboweled, in the state of offal and discards. Whole raw fish is the exception, not the norm. In this instance, what matters is not the fish in itself but either its pieces (offal and discards) or its sum as it can be bought in bulk. The fish is not multiple or plural, it is a summation represented quantitatively as a price per kilo; it becomes an ingredient.

*Concluding comments*

The liminal expresses the existence of a "fluid space" (Law & Mol, 2001) where things change, evolve, and are transformed. The fluidity of this in-betweenness shows how the shoreline should be considered as a space of "[topological] multiplicity rather than uniformity" (Law & Mol, 2001: 644). It is a call against oversimplification be it for managerial or business purposes. The acceptance of a liminal space might be destabilizing as things are neither "this" or "that." However, it lets emerge other existences and relations that might not have been considered. The shoreline as a liminal space may be a starting point to look differently, to listen differently to the many stories, and to think differently, cognizant of the many relations that take place and the resonances we are not used to listening for. The concept of liminality may help create a space to think reflexively between things, people, and entities, but also self-reflexive of our own relations to what is observed and lived (Turner, 1988: 102-103).

Neo-liberal calls for the ocean to become a space of business for the betterment of (Western) humankind must be challenged. Discourses on the necessity to produce fishmeal and fish oil for the health of (Western) societies, enters into conflict with the life of people along the coast of Senegal. Observing the shoreline as a liminal space is a challenge to the creation of absolute positions. The latter being the univocal, the absence of nuance, that which has no relation with other things. How can we position ourselves toward polarizations? Is it ever possible to enter into resonance with the absolute? The absolute is an abyss, it is a one-world

world (Law, 2015) that leaves no space for difference. It hinders the ability to grasp the incredible diversity that exists in other worlds. There is a necessity to create a space for the plural, the multiple, in order to understand causes and consequences of actions; and to develop a sense of care for other worlds with which we are, although from far away, connected. As shown in this chapter, farmed salmon is the product of a vast array of relations and connections, and wealthy consumers (mostly in the Global North) are in some peculiar ways linked to Western Africa.

*In the open sea, the night has fallen, the net was cast a while ago. Men fishers pull on it, chanting: "wake up and let's go to sea, I want to go to sea. Wake up and let's go to sea! No riches will turn me away from the sea."* (Grand & Diop, 2017, 51:25).

# Chapter 3: The worlding practices of a trade organization (the IFFO) and its commodification of marine lives into marine ingredients

"You cannot manage what you cannot measure" IFFO website

"Thought is nothing "inner," nor does it exist outside the world and outside of words."
(Merleau-Ponty, 2012 :188)

## I. Introduction

The production of farmed salmon is embedded in a discourse representing the ocean as a provider of resources for industrial aquaculture production. In this instance, the shoreline of Senegal disappears, what remains is the nutritional value of small pelagic fish for farmed salmon. In this discourse, the ocean is increasingly presented as a source and a new frontier for economic growth and the potential for the expansion of trade, a commodification discourse that has been dubbed the Blue Economy (Mallin & Barbesgaard, 2020b; Schutter et al., 2021). The aquaculture industry is an example of this commodification process with its reliance on small pelagic fish for fishmeal and fish oil production and the expansion of fishing to new geographical territories. The International Fishmeal and Fish Oil Organization (IFFO) is the organization in charge of producing, collecting, and disseminating information on fishmeal and fish oil to affiliated companies. Representing the interests of an industry, it presents itself as an international trade organization. The IFFO works at building a coherent and structured discourse and common front in the industry. On its website, the International Fishmeal and Fish Oil Organization (officially "IFFO, The Marine Ingredients Organization," www.iffo.net) explains how "marine ingredients" come from marine organisms (fish, krill, algae, shellfish). These ingredients can be used to the benefit of human and livestock health.

Two aspects of the IFFO are puzzling to me. First, marine life is reduced to “ingredients.” Second, the IFFO builds a discourse that ties the efficacy of fishmeal and fish oil to the necessity to care for an aging wealthy population and to care for global food security related to a growing human population. By describing their activities and embedding them within a larger frame (be it nutritional or global), the IFFO builds a reality that broadens its activities beyond extracting fishmeal and fish oil and embeds these commercial activities in social, development, and nutritional discourses. To critically inquire into these discourses, extraction needs to be considered as more than an act but also as "a way of acting, and being – in and within a world" (Chagnon et al., 2022). Extraction is thus "a way of positioning oneself in the spaces, relations, and surrounding one is in (Willow 2018)” (Chagnon et al., 2022: 13). Therefore, the IFFO is not just involved in a specific extraction industry, it is positioning its activities in a space of its construction for a specific commercial purpose. It is involved in a worlding practice.

The practice of worlding is a process of making visible certain things, and consequently obscuring other things. It is a practice of performing the world instead of considering the world as something people are contained within (Law, 2015). It is a process of teaching, and learning, to see. Indeed, to see is something that is learned through education, and through the requirements posed by the environment we live in (Zhong Mengual, 2021: 15). Some features are given value while other are left aside (Zhong Mengual, 2021: 10). Although felt as a sense of spontaneity, seeing is always mediated through two characteristics, a physical one that allows perception, and a mental one specific to a culture (Zhong Mengual, 2021: 10). Zhong Mengual (2021: 10) describes the mental characteristic as made of (a) the categories used to classify, (b) knowledge used to interpret what is seen, and (c) the attitude toward what is seen. To what extent can the extraction of a resource be justified, explained, and supported by making visible certain things and obscuring other things?

The purpose of this chapter is to highlight how the IFFO, through its discourse, is structuring something little known, such as the ocean and small pelagic fish, into a more familiar discourse built around scientific and health discourse. The purpose of this chapter is to analyze this discourse and its participation in influencing the perception of the ocean. The aim is to challenge a human-centric worldview by analyzing its discursive practices using, as part of the analytical framework, a (de)colonial analytical concept (Mignolo, 2018).

*Worlding*

With its narrative involving social, economic, nutritional, development, and environmental aspects, the IFFO is engaged in a process of complicated worlding. It structures the contours and interior of a world that, in this instance, redefines some of its dwellers in a specific way as "ingredients." Worlding is an imaginative process structured around a narrative. Imagination should not be separated from reality; both interact and construct each other mutually (Stépanoff, 2019: 30-34). The act of imagining, and thus of representing, is powerful; it structures human relations to an environment (Stépanoff, 2019: 34). Therefore, worlding is an act of making real what is imagined through a discourse. The discourse of fishing for fishmeal and fish oil structures an image of the ocean as a world of ingredients that is put to work for a specific purpose: to produce profitable commodities.

But why care for the process of worlding performed by an international fishmeal and fish oil trade organization such as the IFFO? The core of the issue lies when such large organizations, with its communication capacities backed with authoritative scientific discourses, have the means to crowed out other worlds to co-exist. Narration builds beliefs; and these beliefs will influence the reality – issues, solutions, opportunities – that will be produce. In a time of profound climate changes, and rising injustices and inequalities, it is essential to ask what world is being built, by whom, for whom and with what consequences.

This process of worlding, depicting a certain reality built by a dominant power is what Law (2015) describes as building a one-world world. Law underlines that reality is not singular but multiple. Realities are not merely described, they are thought, organized, and built through practices that enact specific worlds (Law, 2015: 5). Instead of considering one world in which all live, the existence of various political ontologies – called the pluriverse – has been proposed (Blaser, 2014). The pluriverse is made of "partially connected unfolding of worlds," and political ontology is therefore concerned with this reality-making (Blaser, 2014: 55). In this pluriverse, divergent worldings enter in contact, cross, or challenge each other, and enmesh with one another (de la Cadena & Blaser, 2018: 6). The main concern is when one world is powerful enough to present itself as the exclusive representative of the world, cancelling the existence of any other (de la Cadena & Blaser, 2018; Law, 2015). Thus, Escobar underlines the necessity to consider the world as a pluriverse to counter globalization of the one-world neoliberal framework (Escobar, 2017: 245). In this one-world world, dominant structures of power, through specific discourses, seek to position their views as the truth, hence a reality, and with their powerful position, their discourse has greater chances to be enacted as reality (Hutchings, 2019). These messages have the power to silence other existences. For instance, Ehrnström-Fuentes and Böhm (2023) have discussed how Corporate Social Responsibility can become an instrument that builds a world where conflicts between trade companies and local actors are silenced by the very existence of this commercial discourse. Or, for example, the IFFO uses the case study of the Peruvian anchovy to explain that feed production does not divert fish away from human consumption. This might be true in the context of Peru, but it is not in the context of West Africa (Greenpeace, 2019; The Changing Market Foundation & Greenpeace Africa, 2021).

The idea of realities – worlds – produced through practices (discourses and rhetoric producing imaginaries) is particularly useful to give depth to the discourse of trade companies and

organizations such as the IFFO, and to realize that other worlds are indeed possible despite the calls that the only viable alternative is a neoliberal one. What environment is built around the fishmeal and fish oil commodity? If realities are multiple, what are the features with which the IFFO is building this reality? What other worlds, what other realities, are being shadowed in this process? Of interest to me is the nature of the reality that the IFFO is building and the means it uses to enact the veracity of its world of marine ingredients. Some actors benefit from a position that allows them to take advantage of a system to their favor while at the same time participating in (re)structuring this system, working for this in the shadow of their own role, a "shadow elite" (Wedel, 2009). To some extent, the IFFO belong to this group: through their involvement with fisheries/nutrition sciences, management and evaluation means, and policy development, the IFFO uses – and produces – knowledge and information in favor of, *in fine*, the aquaculture and fishmeal and fish oil industry. In this worlding practice, the IFFO can play with representational elements to position themselves as an entity other than trade-related. For instance, the URL of the IFFO website references the organization either as iffo.com (clearly setting it as a trade-related organization) or as iffo.net (the ".net" present the organization in a more neutral status than its ".com" counterpart).

My aim, in this chapter, is to perform a critical analysis of the discursive worlding practices of the IFFO. My main research question is: In what way does the International Fishmeal and Fish Oil Organization's worlding practices seek to transform the perception of the ocean and its dwellers? This matters as the IFFO does not just participate in selling a commodity (fishmeal and fish oil), it creates ingredients out of a whole ocean of sea life. Worlding involves to redefine and to reframe the ontology of this world (i.e. what the world is and how it is made) and this is performed through an epistemology. I will consider the process of worlding using Mignolo's work (2018: 139) on modernity and (de)colonialism, constituted as a set of three interrelated domains: a field of representations, a set of rhetorical discourses,

and set of global designs. Each of these domains contribute in a worlding process. The first shows what is to be seen and how in this world by drawing its contours, the second deals with the discursive structure that is organized, and the third connects to a greater common good beyond the core issue. Drawing from his division, the main research question will be supported by three correlated research questions on the IFFO's worlding practices. The first objective is to draw the general representations of the natural environment built by the IFFO as a worlding practice. The related question is: *in what way is the natural environment described in such a way to fit the purposes of the feed industry?* The second objective is to outline the rhetorical discourse specific to fishmeal and fish oil production. The aim is to understand how the initial representation of a natural environment is normalized through a discourse to justify the represented nature and the actions of the fishmeal and fish oil industry in this world. The related question that flows from this is: *what is the underlying structure that grounds the rhetoric that enables the industrial production of fishmeal and fish oil?* The third objective is to explore the way the IFFO embeds its activities within larger set of global issues (climate change, global food security, etc.). The aim is to inquire into how and why the IFFO positions the activities of the feed industry within a global design. The finale question I ask is: *how does the IFFO integrate its activities within global imaginaries and with what consequences?*

In the next section (Methodology), I will present the conceptual framework grounding the analysis of this chapter. I will then present the main aspects of the data collected from the IFFO website. Then, in the subsequent section, I will discuss the information I obtained in a discourse analysis of the website – following a grounded theory approach – and the significance of my results. However, prior to moving to the methodology section of this chapter, I will briefly present the IFFO and its historical evolution from its post-World War II inception, when fish catches were raising exponentially (Pontecorvo & Schrank, 2012),

through the development decades (Koehler, 2015) and the Great Acceleration of the Anthropocene (Steffen et al., 2011, 2015).

*A short history of the IFFO*

The IFFO was formed in 2001. It defines itself as an international trade organization representing the fishmeal and fish oil industry and its related industries. It is an amalgam of three organizations dating back to 1959. In 1959, fishmeal producers, fishmeal producers' associations and scientists created the International Association of Fish Meal Manufacturers (IAFMM) to organize its annual conferences and coordinate their interests. In 1964, the IAFMM expanded its reach and invited representatives from agents, importers, and brokers of fishmeal and fish oil into the association. In 1993, the organization expanded its structure to become the International Fishmeal and Oil Manufacturers' Association (IFOMA) and to become a scientific research-based organization, to benefit and to access national and international research grants. Conjointly, in 1960, major fishmeal exporters and scientists decided to set up the Fishmeal Exporters' Organization (FEO) to analyze consumers' markets. In 1999, the presidents of the IFOMA and the FEO met to consider merging the two associations in order to rationalize costs and efficiency, which resulted in the creation of the IFFO in 2001 (J. Shepherd & Barlow, 2009).

By 2022, the IFFO had 239 members from 40 countries and its mission is to help "progressing the industry; providing a meeting point; being the main source of information; ensuring that the vital role of sustainable marine ingredients in the global food system is recognized" (accessed August 25, 2023: https://www.iffo.com/about-us). In order to perform its missions, the IFFO, among other tasks, creates market reports, events (webinars, conferences, meetings), press engagement (writing articles in industry media and answering media requests), developing projects for the industry, lobbying activities, and reputation

management activities and support (accessed August 25, 2023: https://www.iffo.com/annual-report-2022; Shepherd & Barlow, 2009).

The scope of activities of the IAFMM/IFOMA, FEO, and the IFFO, has evolved over time. From 1959 to the 1990s, the IAFMM/IFOMA and the FEO worked at networking, researching, and disseminating information among its members. With time, the fishmeal and fish oil industry, that was supplying the pig and poultry industry, saw the emergence of aquaculture as its leading demand industry. From the 1990s to the 2010s, the IAFMM/IFOMA and the FEO, and then the IFFO, focused on concerns about sustainable fisheries management and has supported sustainable supply chain projects. It works increasingly looking at international organizations' recommendations, such as the United Nation's Food and Agriculture Organization. Between the 2010s to 2025, the IFFO aims at participating in feeding a growing population "sustainably and responsibly", integrating its activities within the global food industry (accessed August 25, 2023: https://www.iffo.com/about-us). The organization developed its presence geographically too. The IFFO's head office is situated in London. It has a sub-office in Lima (Peru), a central site for the fishing of small pelagic fish. And in the 2010s, an office was opened in Beijing (China) following the high demand for fishmeal and fish oil in this country.

The IFFO is thus engaged in a worlding process by, for instance, producing, or participating to, the production of evaluation projects or metrics for the fishmeal and fish oil or the aquaculture industry. This worlding includes disseminating information to the press or to answer to controversies related to feed production. Activities of the IFFO goes beyond a communication or facilitating organization. It is actively involved in structuring information and knowledge around fishmeal and fish oil, and the aquaculture industry.

# II. Methodology

## 1. Conceptual framework

The extraction of small pelagic fish for fishmeal and fish oil is underpinned by a specific narrative, designed, and enacted, around the ocean and its creatures. This process of worlding – a process of reality-making – can be performed through discursive practices. These discourses will structure ways of seeing. This conceptual framework is therefore based on two central ideas: worlding as an act of reality-making and seeing as a taught practice. With this, I want to question how the death and extraction of small pelagic fish is normalized through a redefinition of their existence (as wild feed ingredients for other industrially domesticated forms of life with effective consumer demand), and how a worlding process participates in this redefinition.

Worlding is a creative act. By considering the discourse of the IFFO as a creative worlding process, the analytical scope expands from the mere description of a specific commodity to a whole worlding discourse in which this commodity is embedded. This allows a broader analytical scope of the study. Discourse becomes more than the expression of a thought, it becomes an instrument for a representation of a specific perspective on a world, not *the* world but *a* world. By presenting information, facts, and knowledge, the IFFO is doing more than distilling tools for its affiliated industries. The IFFO describes their marine ingredients as a reality. In this worlding process, the IFFO works at creating a whole imaginary that holds this world together. It works at creating a resonance in the public on topics of importance for consumers (e.g. nutrition, food security, etc.), and teaches the public, a.k.a. wealthy consumers in the Global North, to see the world according to the IFFO's values and interests. In the following paragraphs, I will first show that for a worlding process to take place, it has to rest on sense, and mostly vision. The work of Zhong Mengual (2021) will show that seeing

is a learned practice, that if some things are seen other are obscured. But worlding requires also an onto-epistemic construction which will be developed with Mignolo's categorizations (Mignolo, 2018).

To be able to see is not innate, it is a practice that is taught and learned (Zhong Mengual, 2021). Attention is brought on some aspects when one sees something, while other things are obscured, consciously or unconsciously.

To see is therefore the act of making visible within a space and to make sense of what is seen. To see rests on two characteristics as argued by Zhong Mengual (2021). The first one is physical allowing a physical perception of the surrounding. The second one is mental, that is taught by a mediator or learned, and that is supported by three main features. The first feature is related to the organization of knowledge (to see). This feature holds the epistemological arguments and practices that are used to ground knowledge and trustworthiness (who says it and how). The mediator will teach where attention needs to be focused, and why this knowledge can be trusted. It is a space of epistemology: knowledge is justified and transferred with reasonable arguments as to why things have to be seen in a certain way (Zhong Mengual, 2021: 10). For instance, the IFFO call upon authoritative academic researchers to support their position on the state of stocks of small pelagic fish.

The second feature refers to the creation of categories (to describe). These categories will be used to classify and give order to the world that is seen. This is the space of discourses, images and symbols that will serve to describe that world in a meaningful way. For instance, the IFFO make use of various medium to support their discourse: pictures, diagrams, symbols, flowcharts, mental representations, even metrical systems as long as they produce a mental representation (e.g. recycling, trash fish, circular economy, footprints, etc.; Martin & Mather, 2023). This feature is about the message, its content, structure, and form. The third feature deals with the attitude toward what is seen. This attitude depends on how things are

interconnected with one another. It involves the connection of discourses to larger narratives. For instance, for the fishmeal and fish oil industry, it is about connecting the discourse of a product within larger issues or values, such as aging population, global food security, or general health.

Therefore, to see a world and to internalize its existence is as much an external practice (to see it) as an internal practice (to learn how to see it). The way the individual is taught to see will be integrated in such a way, that they will then use that grid to perceive and analyze other aspects of the world that surrounds them. For instance, the IFFO changed its official name from IFFO The Fishmeal and Fish Oil Organization to IFFO The Marine Ingredients Organization. In this instance, the IFFO went from showcasing the type of industry it is to showing readers how the ocean world should actually be seen: for example, if small pelagic fish are reduced to an ingredient, then it follows that any other living organisms can also be reduced to ingredients. In sum, to see is not innate. It is a taught practice. And if some things are illuminated to be seen, other things are obscured. It matters then to understand what the IFFO considers are worthy to be seen and how it is defined and represented, and what is obscured in this process.

The analysis that follows will demonstrate the extent to which the IFFO is involved in a process of worlding. This process will be analyzed and discussed by using Mignolo's (2018: 139) categories about the construction of a rhetoric on modernity. Mignolo's (2018) categorization is embedded in an analysis of modernity as a colonial process and the onto-epistemological relations that creates this rhetoric. Although this chapter is inspired by thoughts on modernity and coloniality, it is his categorization that is of interest and that will be used to articulate the discussion section on the worlding processes of the IFFO. Mignolo's categorization is made of three interrelated domains: a field of representation, a set of rhetorical discourses, and set of global designs. The first domain deals with how the world is

represented and the signs that are used to represent it. To name and to have the power to disseminate what is named allows one "to manage knowledge, understanding, and subjectivity" (Mignolo, 2018: 139). The second domain is involved in instilling and persuading people that the world is as it is represented. These two domains are to support the third one which aim is to "secure well-being and happiness for everyone on earth" (Mignolo, 2018: 139). The aim is to create a world of possibility and opportunities that the industry can offer with its scientific practices and sound management of small pelagic fish resources. These three domains form the core of a worlding process involving what is to be seen, how, and its interconnectedness. In order to answer the main research question, Mignolo's three domains will be used a framework to inquire how the IFFO's worlding process takes place.

## 2. Research methodology

I performed a discourse analysis of the IFFO website to explore into how this organization builds a world around fishmeal and fish oil and how it structures this world. I contacted the IFFO to participate as an observer to their web-conferences and webinars but my proposition was rejected by the organization. I decided thus to explore their website instead (Figure 5).

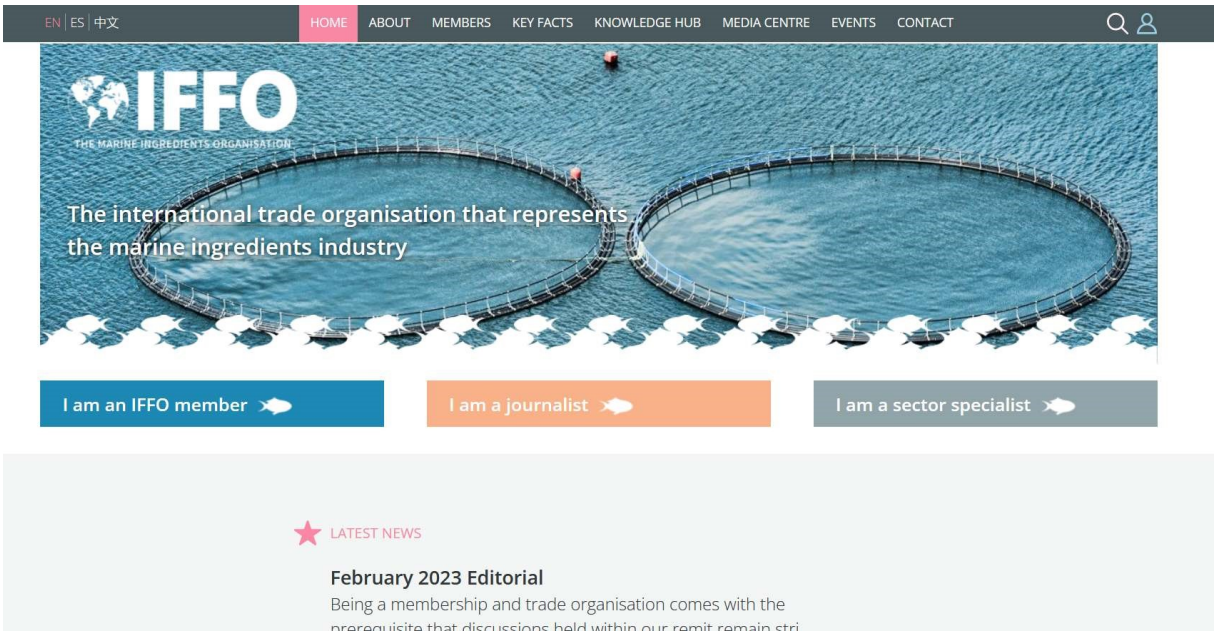



Figure 5: IFFO's home webpage (www.iffo.net: accessed March 15th, 2023).

The IFFO website represents the public face of the organization. It is the expression of what they believe in and want to appeal to wealthy consumers in the Global North. Comparatively to other trade organization, the IFFO may not be the largest one. However, its role is to produce and disseminate information. It is a nexus organization that sets the public tone of an industry. Moreover, it plays a central role in the construction of the representation of the ocean and its dwellers as marine ingredients. Finally, the IFFO can be invited as aquafeed experts in international forum, such as the Committee on Fisheries of the Food and Agriculture Organization, which makes the IFFO a representative of feed and aquaculture corporations, but also a specialist these various fora. These elements allow the IFFO to participate in spreading a certain worlding of the ocean and its creatures as commodities in a blue economy. I decided to use Mignolo's domains (2018) as the analytical framework to inquire the worlding practices of the IFFO.

My aim was to "swim" through this world of the IFFO. The grounded theory approach presented itself as the most appropriate methodology for the analysis of the IFFO website as this theory implied an iterative practice between theory building and empirical experience. This constant self-reflexive approach paired with the idea of "swimming" into a world and trying the make sense of it while discovering it (the environment, its limits, its highlights, its shadows). Grounded theory methodology was born in the 1970s, developed as an alternative to positivist approaches to social science research (Flick, 2018). The aim of grounded theory is to build theory by a constant movement between empirical data and conceptual development (Clarke, 2019: 6). Originally developed by Glaser and Strauss in "The Discovery of Grounded Theory" in 1967, various developments have been created since (Flick, 2018). My development of the data collection process for this chapter is largely inspired by Clarke's grounded theory methodology called situational analysis (Clarke, 2005). Four reasons have motivated me to choose this methodology. First, Clarke underlines that researchers are always situated in a specific position. They are not remote from what they study and the knowledge produced is not neutral situational nature of researchers and the knowledge they produce (Clarke, 2005: 66). More, Clarke's post-modern and feminist approach (Clarke, 2014), with a focus on relations, aligns with the spirit and practice of this dissertation. Second, her research methodology uses various types of maps to make sense of the data collected. I found this mapping approach appealing as I saw the analysis of the worlding process of the IFFO as a way of building connections, of mapping, the presence of small pelagic fish within an industry by embedding it in a specific world. Third, and most interestingly, she mentions the importance of what is silenced or unseen in the analysis of any situation (Clarke, 2005: 46 and 85). I was deeply struck by this as an underlying aspect of this chapter is to cast light on how the construction of a world necessarily shadows (or silences) other lives. And fourth, according to Clarke's research perspective, a methodology should fit

the need of the research (Clarke, 2005: 83-86) instead of forcing itself on the research (for another view, c.f. Holton, 2007). Clarke's focus on the situation and a construction of the surroundings (through, for instance, the uses of maps, or discussion on shadows) was the most appropriate approach to unpack a research question centered around worlding practices of the fishmeal and fish oil industry and all its promises made to wealthy consumers in the Global North.

I used two somewhat different methodologies for the Key Facts section (figure 6) and the Knowledge Hub section of the IFFO website.

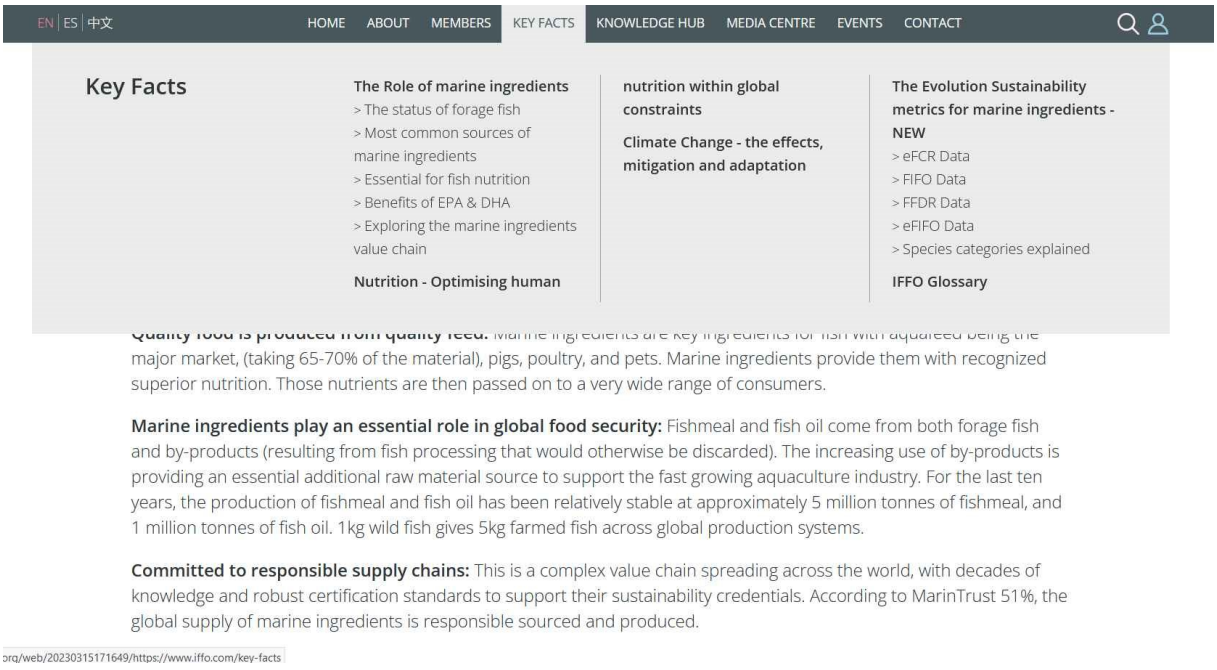



*Figure 6: IFFO Key Facts section with scrolled down menu (www.iffo.net: accessed March 15th, 2023).*

For the former, I used an adapted coding practice (Clarke, 2005: 84); however, for the knowledge hub (figure 7) I had to change strategy.

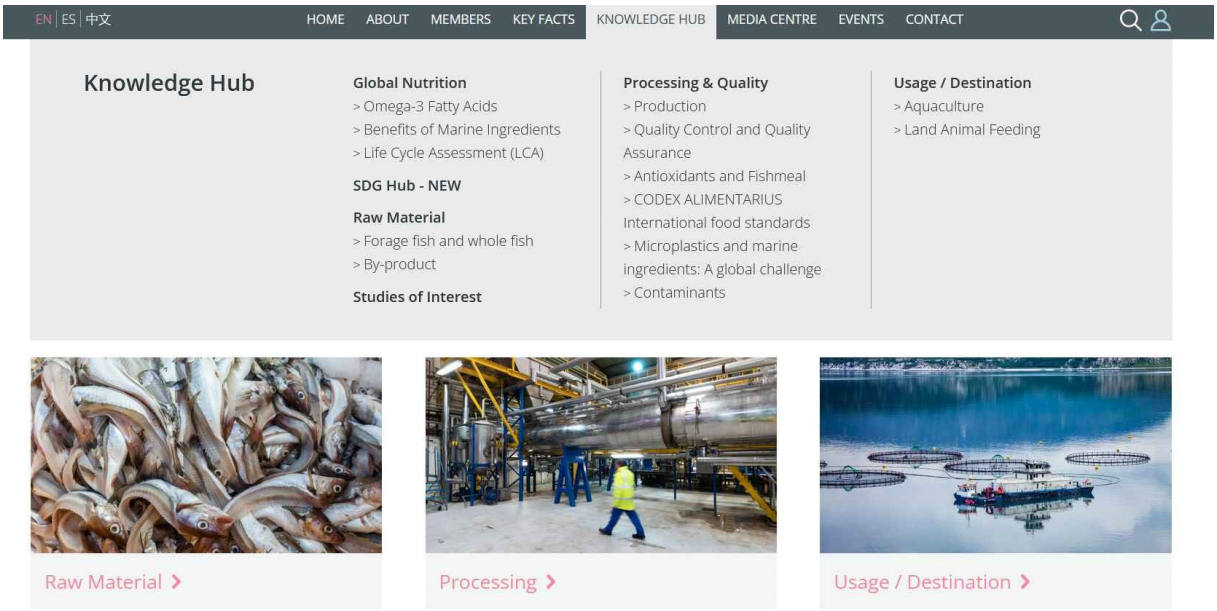



Figure 7 : IFFO Knowledge Hub section with scrolled down menu (www.iffo.net: accessed March 15th, 2023).

Initially, I started coding as I did for the Key Facts section but I quickly ended up with the same codes. I changed approach and decided to adapt the conceptual toolbox developed by Clarke (Clarke, 2005: 112) as I was more curious about the relations between elements that mattered to the IFFO. From the original 22 concepts of Clarke's conceptual toolbox to study social actions (Clarke, 2005: 112), I kept four that seemed most relevant to this study: Knowledge and Information, Technology, Concerns, and Actors. The *Knowledge and Information* section of the website contains the discursive claim-making activity of the IFFO. This feature builds what is considered as elements that matter and that form the world they want; it is creating connections and boundaries. The *Technology* section is understood as the means to an end, and it projects the imaginary of the world that is being built. Here, technology is understood broadly as the applied use of knowledge in a structured and organized manner for production purposes. In this broader sense knowledge itself – through

the participation of academic actors for instance – can be become a technology. I analyzed the *Concerns* section as representing the specific issues that are raised by the IFFO; the type of concern raised – and the solutions suggested – have much to say about the worlding processes, notably: who is considered central and who is left aside in the margin? The *Actors* feature is more of a way to observe who is mentioned and who is left aside out of the worlding process of the IFFO. I used each of these features to analyze the Knowledge Hub webpages. For each webpage of the Knowledge Hub section, I built a table with each of these concepts for which keywords, thoughts, and ideas were stored. Then I used these tables to write down a description of the webpages and critically analyze them.

The Knowledge Hub section required some organization for analytical purposes. This part of the IFFO's website is divided into six topics (Studies of Interest, Raw Material, Processing, Usage/Destination, Global Food Security, Sustainable Development Goals). I have decided to separate these 6 topics into two groups for data collection and analysis purposes. The first group is only made of one topic – Studies of Interest – which sum up what the IFFO considers of importance in terms of academic papers and grey literature (see paragraph below). The second group is made of 4 topics (Raw Material, Processing, Usage/Destination, Global food security). I integrated the 6$^{th}$ topic – SDG (the United Nations' Sustainability Development Goals) Hub – into the general comments about Global Food Security topic. The SDG hub tries to collect actions made by fishmeal and fish oil industries that would be relevant with specific SDGs. Although it would have been interesting to critically analyze how these private companies try to fit their actions within the canvas of an international organization (the United Nations) working to the improvement of humankind, it would have been to go beyond the scope of this chapter.

For the Studies of Interest subsection, I had to adapt the process of data collection. Data collection using the adapted conceptual toolbox (see previous paragraph) made little sense as I

was more interested in the content and the general direction of the articles. The Studies of Interest subsection is a collection of, mostly, academic articles on five themes (Environmental Impacts, Fisheries Management, Feed & Nutrition, Human Nutrition, Plant & Additional Raw Materials). For each theme, I created a Word document table with columns indicating a personal reference number for the article, its title, author(s), year and publication, its main concerns, the original keywords of the article, my own keywords, my own comments, and the URL of the article. The Environmental Impact theme required an additional step due to its important number of articles (31). I sorted the 31 articles into 10 groups of similar thematic. Due to time constraints, only abstracts were considered; also, my aim in this process was not to acquire a deep understanding of the articles but their general role within the IFFO worldview, what type of brick does it add to the general structure of the world IFFO is trying to build.

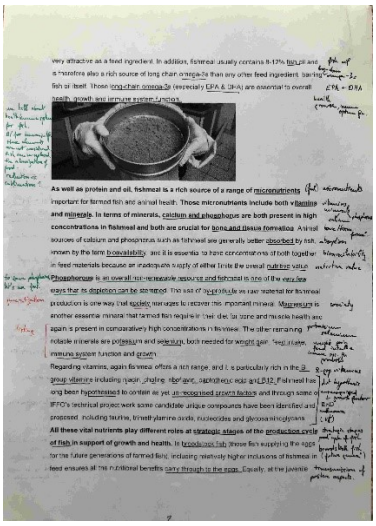
## 3. Method

The IFFO website is divided into eight headings: *home*, *about*, *members*, *key facts, knowledge hub*, *media center*, *events*, *contact*. Only the Key Facts section and the Knowledge Hub section have been kept for my analysis because they are the most important aspects in their worlding process. The other sections often repeated information from the Key Facts and Knowledge Hub sections. Analyzing the repetitions would have congested the data collection process with innumerable redundancies and thus were set aside. In addition, the sections on what the IFFO considers as facts and knowledge worthy of transmitting are the essence of their worlding process. For the Key Facts section, I reviewed 12 webpages (text, images, and infographics), and for the Knowledge section, I reviewed 20 webpages and 66 articles (47 peer-reviewed articles, 14 grey literature reports, 5 works commissioned by the IFFO).

The word ‘fact’ is understood as a piece of information that is considered as evident and known as ‘true’ either because it has been proven or is commonly accepted as such. The Key Facts section helps to draw a general image – the contours - of what the IFFO consider self-evident; these key facts are the dots, the coordinates, that form the world it tries to build. The *Key Facts* section has four main categories (*i. The role of marine ingredients, ii. Nutrition – Optimizing human nutrition within global constraints, iii. Climate change – the effects, mitigation, and adaptation, iv. The evolution of sustainability metrics for marine ingredients*), plus a glossary. My interest is as to what enters as facts in the discourse of the IFFO.

A fact is understood as a piece of information that is considered evidence (either commonly accepted or proven). Facts are structuring knowledge; they are pillars of certitude seldom questioned and always justified. The word ‘knowledge’ is understood as the construction of relations between these ‘facts.’ As a *hub*, the Knowledge Hub intends to concentrate and disseminate information. By observing the concerns that matter to the IFFO and its proposed solutions, the boundaries of the IFFO’s world can be delimitated. Although more of a descriptive nature, data collected on the *Knowledge Hub* have been kept as a section in this chapter to give a general representation of the boundaries of the world of the IFFO.

Starting with the Key Facts, I decided to download each webpage under a html format and print them as Word documents. As it was the first time I was following a grounded theory methodology, I wanted to avoid the distraction that can be caused using a computer, and thus favored the use of paper (for an example, c.f. figure 8).



very attractive as a feed ingredient. In addition, fishmeal usually contains 8-12% fish oil and, is therefore also a rich source of long chain omega-3s than any other feed ingredient. Sparing fish oil itself. Those long-chain omega-3s (especially EPA & DHA) are essential to overall health, growth and immune system function.

As well as protein and oil, fishmeal is a rich source of a range of micronutrients important for farmed fish and animal health. Those micronutrients include both vitamins and minerals. In terms of minerals, calcium and phosphorus are both present in high concentrations in fishmeal and both are crucial for bone and tissue formation. Animal sources of calcium and phosphorus such as fishmeal are generally better absorbed by fish, known by the term bioavailability, and it is essential to have concentrations of both together in feed materials because an inadequate supply of either limits the overall nutritive value. Phosphorus is an overall non-renewable resource and fishmeal is one of the very few ways that its depletion can be arrested. The use of recyclable raw material for fishmeal production is one way that society manages to recover this important mineral. Magnesium is another essential mineral that farmed fish require in their diet for bone and muscle health and again is present in comparatively high concentrations in fishmeal. The other remaining notable minerals are potassium and selenium, both needed for weight gain, feed intake, immune system function and growth.

Regarding vitamins, again fishmeal offers a rich range, and is particularly rich in the B-group vitamins including niacin, choline, riboflavin, pantothenic acid and B12. Fishmeal has long been hypothesised to contain as yet un-recognised growth factors and through some of IFFO's technical project work some candidate unique components have been identified and assessed, including taurine, trimethylamine oxide, nucleotides and glycosaminoglycans.

All these vital nutrients play different roles at strategic stages of the production cycle of fish in support of growth and health. In broodstock fish, these fish supplying the eggs for the future generations of farmed fish, including relatively higher inclusions of fishmeal in feed ensures all the nutritional benefits carry through to the eggs. Equally, at the juvenile

*Figure 8: example of initial coding of Key Facts section.*

I decided to code almost line by line, although not forcing myself to code if I did not see it fit. I feared I would miss something if I was too restrictive with the number of codes I allowed myself to write. I also wanted to have sufficient codes to create a significant aggregation of words that, together, would make sense. I allowed myself to be descriptive in my codes (Holton, 2007: 9); conceptualization and theorization would come at a later stage, when grouping codes together into clusters. My aim was thus to extract key words, indicators of elements to be conceptualized. While coding, I used three colors: on the right-hand side of the paper, I used black for the codes, on the left-hand side, I used green for my own comments and red for textual aspects (e.g.: list, syllogism, generalization, metaphor, paradox, etc.). Then, I extracted on a piece of paper what I called an "initial code" (what is called an open code in grounded theory methodology). I attributed to each initial code a reference number to know from which webpage it had been extracted (for an example, c.f. figure 9).

I ended up with 236 initial codes.

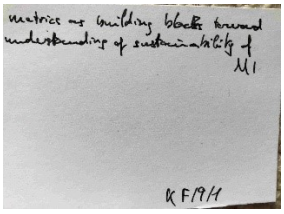


*Figure 9*: *example of initial code with own reference number at bottom right.*

I then worked on the focused codes. For this process, I took each initial code and laid them on the ground in my room. I chose to work on the ground to give myself conceptual space through a physical space. Ideas and thoughts were not constrained by a screen or a sheet of paper. Papers could be moved around following my ideas. I created stacks of papers, trying to find a more conceptual, abstract, description, creating thus 28 focused codes (c.f. figure 10).

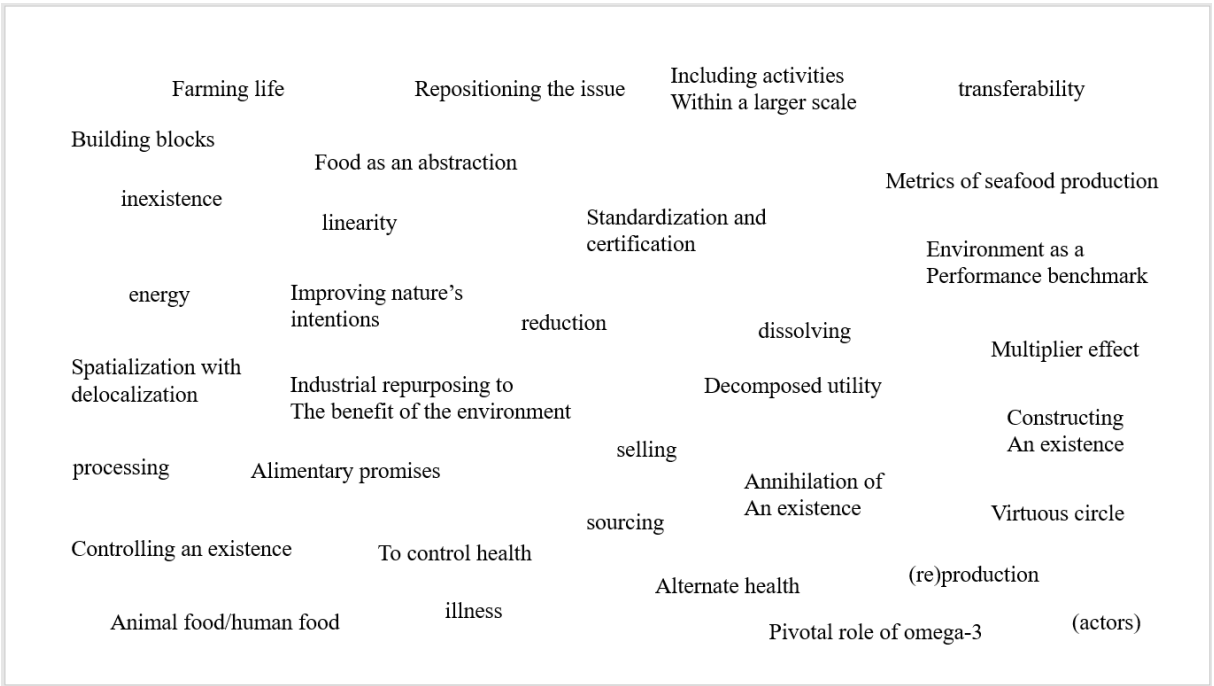



*Figure 10*: working on some focused codes on a PowerPoint sheet.

Once all initial codes were distributed into new focused code groups (28 in total), I went through each group and checked if each initial code fitted within its assigned group. There

again, ideas and thoughts were kept in a journal with a specific entry for the focused codes. I grouped the focused codes into clusters of common interest (what I called thematical codes), there again trying to be more abstract, and ended up with 8 thematical clusters. Once this was done, I grouped them into three theoretical codes. These 3 theoretical codes represent the essential features that structure the world built by the IFFO and gives the tone of its underlying discursive currents. From these three codes, I created one overarching code. While coding, I kept a virtual journal on my computer to keep track of thoughts, ideas, and questions. More specifically, I wrote what I called *ripple thoughts* which were meant to connect and create relations between codes, sections, and ideas. Analysis of the data collected have been inserted in the Discussion section as well as the table of codes.

For the Knowledge Hub section, I chose not to print out the webpages. For my own pedagogical purposes, I wanted to practice working directly on the screen. I started the same procedure as for the Key Facts section but very quickly I found out that no new codes were coming up; I feared that these high repetitions would be too redundant, not adding anything substantial to the process. As mentioned above, I therefore decided to adapt my methodology. For each subsection, I built a table in a Word document (c.f. figure 11) with a column for each of the conceptual tools (Knowledge/Information, Concerns, Technology, Actors) adapted from Clarke's conceptual toolbox (Clarke, 2005: 112).

Main page

Knowledge Hub/Raw Material/1. Main page

| | **Knowledge and information** | **Technologies/imaginaries** | **Concerns** | **Actors/actants/other worlds** |
|---|---|---|---|---|
| | - Raw material is the **source** of everything.<br>- Made of **three sources**: fish, fish trimmings, by-catch/by-products.<br>- **Management + technology** = instrumental in fisheries<br>- "best managed globally", **however** fluctuations due to environmental conditions<br>- "no real demand" for source fishery that supports global protein production | - Rules/regulations/monitoring framed by government.<br>- Mesh sizes, area/time control, tracker, sattelites, checks at landing, monitoring fish caught.<br>- | Accusation/misinformation of poor management. | SPF (word never mentioned) are: small, short-lived, fast-growing. |
| **Keyword(s)/key point** | Source fisheries/excellency in management | Sustainability through regulations and technologies | Misinformation | Time compressed existence |

**General comments**: there is an absence of species or place. Generalization is the norm. Quality is based on the existence of rules and regulations, not on their case-specificness.
The fish is not the raw material, it is even less than that. It is not at the beginning of a chain. It is a secondary link. It is a mean to produce a raw material. Raw fish is not raw material.

They have barely no existence at all if for a purpose, to produce a good.

*Figure 11*: example of the adapted conceptual tool (Clarke, 2005: 112) used for the data collection and analysis of the Knowledge Hub.

And for each, I wrote information related to each of these four concepts that I found on each of the four webpages related of the IFFO's Knowledge Hub. I then used these tables to structure my own comments and thoughts on worlding and boundary production, and to reflect on what lies below the surface of the IFFO's discourse regarding knowledge creation.

These clusters and groups of facts do not navigate on their own. They relate to ideas and are organized within a knowledge framework. In the next section, I will present the themes and positions (the knowledge) on which the IFFO builds its world.

## III. Presentation of the IFFO's *Knowledge Hub* section

Knowledge (in Western culture) is an act of cognition and the organization of information and facts. It represents the grounds on which the IFFO builds its arguments and communication. In this section, I will make use of Mignolo's first domain, (Mignolo, 2018) the field of representation, structured with knowledge and facts which highlight what is to be seen, and by

the same token obscures other aspects. The knowledge hub section is divided into two main parts: the Studies of Interest section and four other sections (*Raw Material, Processing, Usage/Destination, Global Food Security*). The studies of interests gather academic papers and grey literature, organized in 5 topics (*Environmental impacts, Fisheries management, Feed and nutrition, Human nutrition, Plants and additional raw materials*). I will first give an overview of the articles of the section *Studies of Interest* and then discuss the four remaining sections.

*Studies of interests*

The Studies of Interest section of the IFFO website is divided into five topics (*Environmental impacts, Fisheries management, Feed and nutrition, Human nutrition, Plant and additional raw materials*). The IFFO has collected 66 articles in total, covering what the organization consider as relevant to the fishmeal and fish oil industry, and thus its worlding process. I present below a table (table 1) where I categorized what I found out as specific interests in each of the mentioned five topics.

*Table 1:* categorization of the IFFO's studies of interest.

| IFFO's themes | Own categorization | References |
|---|---|---|
| **Environmental impacts** | Fishing for fishmeal | Malcorps et al., 2019; Napier et al., 2020; Naylor et al., 2009; Newton et al., 2023; Oosthuizen et al., 2020; Ruiz-Salmón et al., 2021; Winther et al., 2020 |
| | By-products | Friends of Ocean Action & World Economic Forum, 2022; Stevens et al., 2018 |
| | Reconceptualizing nature | Pounds et al., 2022 ; Cottrell et al., 2021 |
| | Representation and public outreach | Olsen et al., 2021 ; IFFO, 2020b; Kok et al., 2020 |
| | The ocean as an opportunity | Costello et al., 2020 |
| | Global warming | IPCC, 2019; Barange et al., 2018; Oyinlola et al., 2020 |
| | Fisheries management | Duarte et al., 2020; Hilborn et al., 2020, 2021a; Sparholt et al., 2019 |
| | Socio-economic issues | Leadbitter, 2019 |
| | Miscellaneous | Erni-Cassola et al., 2019; A. Kelly et al., 2020 ; SINTEF, 2020 |
| **Fisheries management** | Fish stocks and assessments | Hilborn, Buratti, et al., 2022b ; Hilborn et al., 2020b; Sparholt et al., 2019 |
| | Fisheries management | Hilborn, Agostini, et al., 2022; Hilborn et al., 2021b; Ovando et al., 2021; Mossler, 2021; Hilborn, 2020 |
| | Fisheries development | CEA Consulting, 2015; Levine et al., 2020; SustainableFisheries-UW, 2022 |
| **Feed and nutrition** | Feed production | Tacon et al., 2022 ; Saito et al., 2021; Malcorps et al., 2021; Lund, 2013 |
| | Evaluation parameters | Kok et al., 2020 |
| | Nutrition | Moxness Reksten et al., 2022 |
| | Aquaculture as development | Beveridge et al., 2013 |
| **Human nutrition** | Nutrition | Hamilton et al., 2020; Gephart et al., 2021 ; Lund, 2013 |
| | Health | Bernasconi et al., 2021 |
| | Developing countries | Belton et al., 2018 ; Beveridge et al., 2013 |
| **Plants and addition al raw** | Plant-based feeds | Glencross et al., 2020; McKuin et al., 2022; Malcorps et al., 2019; M. Carvalho et al., 2022; Fountoulaki et al., 2022 |
| | Feed improvements | Quang Tran et al., 2022; Zhu et al., 2021 |

In the following paragraph, I will present the perspective of what the IFFO considers to matter in terms of "environmental impacts" with, in italic, the categorization that I created. Noteworthy is how little is said about what is meant with "environmental impacts": is it about effects of the environment on the industry? Or the impacts of the industry on the environment? Be that as it may, at the core of the worlding process of the IFFO stands the idea of a *reconceptualized nature* where ecological trophic levels are to be redesigned to better represent the transformations brought about by the aquaculture industry in the organization of trophic levels and food systems. In this new setting, the farming of fish becomes the focal point around which other elements revolve. When it comes to *fishing for fishmeal*, the IFFO underlines the importance of modeling the world to reduce environmental impacts of the seafood industry. It also shows that the future of the feed industry does not lie in plant-based feed but indeed in fish-based feed. The aquaculture should also learn from the agriculture industry to improve its production. However, fishing for fishmeal will benefit from sound and efficient *fisheries management* practices which, by the same token, will allow to recover depleted fish stocks. Nevertheless, with decreasing fish landings, *by-products* use, a.k.a. waste, should be improved to continue supplying a rising demand for fishmeal and fish oil, sustainably and with minimal environmental impacts. And as the environmental impacts matter to wealthy consumers in the Global North certifications schemes and indicators for *representation and public outreach* should be developed.

The relation to environmental impacts is sometimes not very clear. For instance, aspects of *socio-economic issues* in developing countries are presented. Or the *ocean as an opportunity* is the source that will feed a growing population if technological developments, new management instruments, and policy reforms are implemented. The issue of *global warming* is mentioned very generally with its consequences on fisheries and aquaculture. The last

category, *miscellaneous*, presents articles, for instance, on plastic as pollutants, fish trade in general, or how improved knowledge on ecosystems will benefit commercial purposes. It is thus a very eclectic choice of articles that represent what the IFFO considers as "environmental impacts."

While reading the studies of interest of the "Fisheries Management" section, three aspects stood out. First, the category *fish stocks and assessments* presents a fish stock situation not as grim as often portrayed. And if the situation is difficult, sound and effective *fisheries management* may allow fish stocks to be rebuilt. In addition, *fisheries developments* may stem from improved private-public partnerships projects. Management is thus an essential instrument for a long-lasting and efficient extraction of fish for feed production.

The "Feed and Nutrition" studies of interests present the challenges but also the benefits of *feed production* for fish health. However, the IFFO points out that in terms of *nutrition* the use of plant-based feed can be detrimental to carnivorous farmed fish. Be it for production processes or for public relations, it is however essential that *evaluation parameters* (such as the Fish In:Fish Out ratio) be improved. Finally, feed and nutrition are discussed in terms of benefits for developing countries, an article that seems out of context as the next section presents articles in relation with *Human Nutrition*.

I sorted the articles of interests of the "Human Nutrition" section into three groups. The IFFO underlines the importance of omega-3s and micro-nutrients for *nutrition*, and its *health* benefits to fight cardiovascular diseases. The IFFO underlines the role that aquaculture can have in improving human nutrition in *developing countries*.

The last group of studies of interests is related to "Plants and Additional Raw Materials." The IFFO presents the disadvantages of *plant-based feeds* in aquaculture (negative effects on land-

use; detrimental to fish health) and the *feed improvements* that are being developed to complement fish-based fishmeal and fish oil.

In sum, it is an eclectic choice of articles, mostly of academic nature, that forms part of the field of representation of the industry, i.e. what are the elements attention should be focused on. Some papers are of a broad nature and are not really contextualized in its relation with fishmeal and fish oil (such as some articles on global warming). However, they may express the wish of an industry to project itself on broader global issues. Noteworthy is how human nutrition is discussed in terms of nutrients and nutrition but little is said about the role aquaculture could play in developing countries as food and for livelihoods, and not just as an economic and production developments.

*Raw Material, Processing, Usage/Destination, and Global Food Security*

In this section, I will present and briefly discuss what is considered as knowledge following the four topics found on the IFFO knowledge Hub section (*1. Raw Material, 2. Processing, 3. Usage/Destination, 4. Global Food Security*). The subtopic titled SDG (Sustainable Development Goals) on the website is discussed within the fourth subtopic Global Food Security.

1. *Raw Material*

When it comes to fish extraction, one of the main concerns of the IFFO is to answer critics that point out that fishing for fishmeal and fish oil redirect fish to an industry that could have been used as food for people's subsistence; one of the many "unfounded criticisms" according to the IFFO. The IFFO ascertains that forage fisheries are among the "best managed globally" and underlines that catch fluctuations are mostly due to environmental conditions. The IFFO claims that without a stable market for direct human consumption, forage fish is often "unused" or "wasted" and it is much more efficient and effective to be used for industrial

farming purposes. To confirm this position, the IFFO uses the Peruvian anchovy, fished along the coasts of Peru, as an example; a position supported by the work and authority of some academic researchers. Small pelagic fish is excellent as feed as it does not require "additional anthropological inputs," i.e. all the beneficial nutrients are already present in the fish itself. These nutrients can also be recycled with a better use of fish by-products creating a so-called "virtuous circle."

2. *Processing*

Fishmeal and fish oil production is "highly technical" (production, handling, transportability, etc.) and must abide by strict quality regulation measures following "strict procedures." In this production process, the IFFO underlines that the production of fishmeal and fish oil only produces "steam as a by-product." The two main concerns in production are (i) to retain nutritive qualities of the product, and (ii) avoid contaminants, for which "best practices" and "traceability schemes" are essential. The industry acknowledges the issue of plastic pollution in the ocean – although quick to mention that as short-lived species, forage fish is less prone to plastic accumulation in their bodies.

Fishmeal and fish oil, being a "natural product", faces two main issues: its decomposition resulting in its rancidity, and the risks of self-combustion produced by its oxidation. Antioxidants are thus used to stabilize fishmeal and fish oil. However, a balance has to be found between two competing regulations dealing with antioxidants: transportation regulations that favor the presence of antioxidants to avoid combustion, and food and feed safety regulations that favors a minimum presence of antioxidants. Be it for transportation safety reasons or for quality reasons (to retain "physical aspects," "organoleptic properties," and "nutritional values"), the role of quality control is essential in structuring the life of the product. And in these processes of certification, agreed upon international standardization is necessary to guarantee universality and global conformity. In this endeavor, international

instruments such as the Codex Alimentarius – setting food standards – are essential, and the IFFO supports specifically the development of the Codex Standards for fish oil, and the Codex Nutrient Reference values for omega-3s.

The existence of fishmeal and fish oil – a "natural product" – exists as much in fishmeal plant processing tubes, or chemistry labs, as in the regulations of agencies, written standards and protocols, and international organizations (three broad types of technology are thus involved: industrial, chemical, engineering), management (quality control schemes, regulations), and diplomacy (policy advocacy).

3. *Usage and destination*

The main concern of the fishmeal and fish oil industry is to feed consumers, a processed product that retains its nutritive qualities as much as possible. The IFFO makes sure to present its products as "approach[ing] the content of [a] wild diet" for the fish they feed. It is as if the connection (as tenuous as it may be) with the "wild" was a sign, a guarantee, of quality for consumers (when there is nothing left of wilderness in farmed fish). However, what the industry markets is protein, "energy" for their consumers; be they human, livestock (fish, pigs, poultry, cattle, etc.) or pets.

The IFFO follows the argument that with increased consumption of fish globally, aquaculture is bound to play a major role in food security. Therefore, demand for fishmeal and fish oil will increase; hence the necessity to better use by-products. The IFFO assumes scarcity of fish is the problem in a world of growing population and declining wild stocks and implies that the development of by-product reduction technologies and complementary feeding technologies can solve the problem through more production of protein. In this production process, developing countries are centered by the IFFO as actors set to play a growing role. The IFFO

divides aquaculture production system into two main types: fed and unfed aquaculture[67], with an increasing demand for fed species which promises a "bright future" to the aquafeed industry. However, there is a contradictory element of arguing in favor of global food security and at the same time, feeding fish (already eaten by a many peoples) to fish.

*4. Global food security*

The IFFO stresses that with growing and aging populations, new sources of fish supply are necessary for healthy diets; aquaculture is here to fill that gap as capture fisheries are either dwindling or stagnant in their landings. Fishmeal and fish oil is a "strategic ingredient" that "support production," and can be used for livestock, consumers, and pets. The intake of omega-3s participates in the prevention of chronic disease and is beneficial for general health including mental and physical health. The IFFO supports that the fishmeal and fish oil industry participates in "return[ing omega-3] to the human food chain" with its extraction activities.

Therefore, the ocean represents a fantastic pool of "marine ingredients" for purposes ranging from animal feed, to human supplements (nutraceuticals) to cosmetic business opportunities (e.g. fish skin used for its collagen and gelatin); thus the "potential for nutritional, therapeutic and functional ingredients are endless". Noteworthy is that even in a situation of declining fish stocks, it is an endless world of possibilities that is depicted by the IFFO.

Of course, fishing for fishmeal and fish oil does not go without controversies. To clarify and answer to "misinformation," the IFFO presents their case study of the Peruvian anchovy. The Peruvian anchovy has a low rate of direct human consumption. Incentives have been developed to foster a market for its direct consumption but with little success as eating small

[67] Noteworthy is how the worlding practices of the fishmeal and fish oil industry nature is divided into fed and unfed species while in other worlds a difference is made between wild and domesticated species.

pelagic fish is not anymore in the food culture of the country. Therefore, this small pelagic fish is better off used for the industry of fishmeal and fish oil as "people don't want to eat it."

## IV. Discussion

The IFFO is involved in a process of reality-making which rests on building a coherent world. Mignolo's (2018: 139) categories on the rhetoric of modernity and (de)colonialism (field of representations, set of rhetorical discourses, and set of global designs) have been renamed using the three theoretical codes (see table 2 below) developed during the process of data collection and analysis of the IFFO website. The category "field of representations," that deals with how the world is represented, have been renamed as "representations of nature." The category "set of rhetorical discourses" have been renamed "industrial production" as it works to persuade critics that the world is as it is told or sold by the IFFO. The category "set of global designs" have been renamed "global spaces and its imaginaries" aiming at persuading readers that the industry is working for a greater common good for humanity as a whole. Thus, *representations of nature* structure the frames of the world of the IFFO, while *industrial production* create rhetorical coherence to this world focusing on the activities of the fishmeal and fish oil industry. They are synergistic working to support *global spaces and its imaginaries* displaying the many advantages to global health and well-being for humanity that the industry has to offer. Ultimately, the IFFO spins a world that assumes the *transferability of things* made commensurable with metrics and renaming. *The transferability of things* involves the reduction of the world into commodities for commercial purposes. With this reduction, the source of the commodity – the small pelagic fish – does not matter so much in itself as what it holds – omega-3s for instance. It is a subtle shift in perception: what matters is less the source of the commodity as its decomposed aspects. This has the effect of reducing the source of the commodity – the fish – to a mere container: the fish becomes alienated from its very existence. In other words, the *transferability of things* requires the further alienation of the

commodity – in this instance omega-3s – from a social, environmental, societal, and historical context.

*Table 2: 1 overarching code, 3 theoretical codes, 8 cluster codes, 28 focused codes.*

| **Over-arching code** | **Transferability of things** | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Theoret-ical codes** | **Representations of nature** | | | | **Industrial production** | | | **Global spaces and its imaginaries** |
| **cluster codes** | **Food and health** | **Metrics of an industry** | **Copying nature** | **Visualization of spaces and relations** | **Movement and flow** | **Production and dissemination** | **Inclusion within an economic system** | **Broadening the scope of an industry** |
| **focused codes** | illness due to lack of adequate alimentation | standardization and certification | linking industrial activities with global issues | chains of production and value | energy | sourcing the fish | creating production and economic virtuous circle | global concerns of an industry |
| | pivotal role of omega-3s | metrics of seafood production | multiplier effect as strength of industry | managing controversies | creating production and economic virtuous circle | fishmeal /fish oil production and strategic use | the market creating existence | |
| | nutritional building blocks | decreasing environmental impact of an industry | | renaming nature | allocating elements according to their utility | selling products | giving value to by-products (waste) | |
| | supporting human health with O-3s and other nutrients | environmental performance of an industry | | | giving value to by-products | | | |
| | nutritional value of fishmeal for farmed fish and humans | multiplier effect as strength of industry | | | commensurable nature of nutrients | | | |
| | food as a system | | | | | | | |
| | improvement of food | | | | | | | |

Assumptions about the transferability of things illustrates the work that the IFFO does to make the elements of this world prone to flow encountering as little friction as possible and while doing so decomposing inputs (small pelagic fish) to elemental building blocks (omega-3, nutrients, minerals, etc.), allowing the industry to break free of the form. This decomposition procedure allows the IFFO to create a world where these blocks can be combined (like ingredients in an experimental lab) into much larger sets of goods (food/nutraceuticals/pet food) and services (health/strength/immunity/growth). However, spatial relations and entities of this world have to be redefined in order to favor the transferability of things through a cartesian space (a worlding process structured through coordinates) as opposed to a lived space (with its many worlds, differences, and unknowns). In the following sub-sections, I will discuss how these three categories (representation of natures, industrial production, global spaces and imaginaries) participate in the IFFO's worlding process. Discussion on these categories have been built on the clusters codes and the focused codes extracted from the data analysis which, when used, have been highlighted in italic in the text.

### *1. Representations of nature*

As Mignolo (2018: 135) underlines, epistemology supports an ontology. This epistemology is made of representations (signs, symbols, texts, narratives, etc.) that are used to define and structure the world that is built. To build a world requires (re)naming things and the power to disseminate these new names that have been given. To name is thus a form of power to define and to highlight certain aspects while leaving others aside. It allows the IFFO "to manage knowledge, understanding, and subjectivity" (Mignolo, 2018: 139) through its online and real-world representative practices.

In the forthcoming two sub-sections, I will consider the IFFO's representations about "nature" and "food" as they form the core of the world built by the organization and sold to customers.

I will show the importance of the *metrics of an industry* which becomes the vocabulary and grammar used to describe nature. The cluster *copying nature* describes the proclaimed capacity of the IFFO to mimic – and even improve upon – wild nature. In this worlding process, the representation of nature involves a *visualization of spaces and their relations* that is specific to the needs of the fishmeal and fish oil industry. These evaluation practices and considerations on nature influences then what is *food and health*, and this to the advantage on an industry that knows – so they argue – how to make use efficiently of that nature. However, nature has first to be redesigned to fit the use of the fishmeal and fish oil industry.

***Nature***

The building of a world requires a process of naming and defining the role of each actor and their surroundings. In this instance, the *metrics of an industry* describes with numbers, figures, and metrics the ocean and its dwellers and their purpose. The IFFO states the often quoted managerial “fact" that “you cannot manage what you cannot measure.” And you cannot be managed if you do not exist in a specific, accountable, way. Existence is thus attributed to what is measurable, to be a parameter is to exist. Metrics are thus used to define the oceanic environment and all its lifeforms. In this setting, the oceanic environment is not considered as an actor with its own existence. It only exists in relation to an industry.

Metrics can be used to evaluate this relation with two main purposes: either to evaluate production processes and the *environmental performance of an industry* (in other words, how efficiently the industry make use of this environment, for instance with the use of Fish In:Fish Out ratios), or to evaluate and *decrease environmental impact of an industry*. For instance, for the latter, the IFFO argues that the fishmeal and fish oil industry can decrease impacts on the ecosystem with an efficient use of by-products or the non-use of land-based feeds.
But in this worlding process, metrics is also used to standardize the ocean and its dwellers and to create an imaginary. Standardization is implemented via a rationalization of ocean use

requiring administrative practices of *standardization and certifications*. Practically, this is performed with evaluation models, certification schemes or various other metrical tools (*metrics of seafood production*) such as Fish In:Fish Out ratio, economic Fish In:Fish Out ratio, Life Cycle Assessment, etc. What these models create is a commensurability of life where the value of one can be exchanged for the value of the other with little concern of possible side effects[68]. Metrics also play an important role in the creation of an imaginary with, for example, the "multiplier effect"; a capacity to multiply food with efficient and strategic management and technologies.

These metrics – and its associated imaginaries of efficient management – allow for the redesign of space (for instance, farmed salmon can be grown anywhere, even in the Swiss Alps by the company Swiss Alpine Fish AG) and restructure time (growth rate of farmed fish can be affected, for instance, Reimer et al., 2017; Valente et al., 2013). Thus, the *metrics of an industry* creates a numerical coherence of its world. And this coherence is supported by calling on the expertise of academic researchers such as, for instance, fisheries scientist professor Ray Hilborn to scientifically explain and justify the continued fishing of small pelagic fish. Numerical and statical fisheries science is used as a means to represent a specific image of the world, a world that can be understood, managed, and exploited with numbers and figures (Bavington, 2010a).

Therefore, these metrics are more than mere numbers. They participate in a process of *visualization of spaces and their relation*s where even the relation to small pelagic fish is transformed. The fish is decomposed into nutritional building blocks (that becomes the main commodity in itself). In this instance, the whole (fish) is not even worth the sum of its parts; what matters truly are the parts with a specific market and that will allow an idealized healthy

[68] For example, it has been argued that the culling of whale could increase fishing yields, but this with little concern with ecological repercussion on surrounding web of life (Gerber et al., 2009).

life (and this aspect is to be linked with the role of the third category, *global spaces and its imaginaries*). These ingredients then become essential for life; malleable and transferable constitutive parts that can be processed and sold according to their utility for wealthy consumers with effective demand.

Metrics are thus an essential component that give the relational lines that draw the world of the IFFO. Concomitantly, the elements that make up this world are renamed reducing the ocean and its dwellers as providers of resources for an industry. Small pelagic fish become the "raw" bounty that represents nature's "materials," and how "marine ingredients" participate in the wellbeing and health of the global human population. In this ocean, the fish becomes merely a container of ingredients; it does not exist anymore *per se*. Existence is granted according to the value – the market value – an entity holds. Without entering a market and thereby becoming a commodity, pelagic fish are considered as waste(d)[69]. To fit into that process, fish gains value by being reframed as "raw material."

These metrics and renaming allows a retrofit of the ocean, transforming it into a fantastic pool of "marine ingredients" whose uses are only limited by the human imagination and can range from animal feed, to human supplements (nutraceuticals), to cosmetic business opportunities (e.g. fish skin used for its collagen and gelatin). Conceptually, in this world that is built, the IFFO separates the nonhuman – small pelagic fish – from its environment (Sinclair, 2018: 91). Once separated, it embeds small pelagic fish within a complicated industrial system. Small pelagic fish become a "static noun" for a static purpose (Sinclair, 2018: 91, citing Cordova): the fish has one existence for one purpose, to become a commodity for sale. In other words, it becomes a standing reserve (Heidegger, 2003: 61-62), a thing ready to be disposed of. And this becoming into a standing reserve requires "the systematic ordering of a space within a

[69] Sometimes colloquially called "trash fish."

general planning, directed toward future exploitations" (Heidegger, 2003: 61). Thus, in its worlding process, the IFFO orders with metrics and rename ocean's dwellers within a logic of consumption, ready to be called upon when necessary and disposable. This world of theirs contains no use values only exchange values. And in this renaming process, the ocean loses its meaning as a relational place of encounters (Sinclair, 2018: 91). Eventually, this process of renaming alters the representation of nonhuman lives in such a way that any lives become quasi permutable, replaceable (Heidegger, 2003: 62), some may have more value than other (for instance small pelagic fish), but what matters are their exchange value and the building blocks that compose them; what they hold as ingredients that can be sold for a profit.

The redefinition of nature through metrics and through renaming of things (Lien et al., 2018: 22; Tsing, 2018: 232) allows the IFFO to build a world where *copying nature* is said to be possible, and that this world can even possibly be improved by the industry. The IFFO states that it is almost capable of feeding farmed fish as they eat in the wild (and thus to *reproduce nature's intention*). Nature has intended to feed larger fish with smaller fish, which the industry already does, hence naturalizing their technological interventions. The IFFO even says that it is outperforming nature's intentions thanks to the multiplier effect (e.g. expressed through the Fish In:Fish Out ratio): more fish is produced through farming than is captured and killed through fishing. In this world of theirs, wild life can thus be farmed and multiplied, and the fish pen becomes an improved natural microcosm – similar to what Hine (2023: 200) coined a fish tank world, a monitored and managed artificial system. It works at setting farmed fish as indistinguishable from wild fish and creates a narrative where nature is enclosed within a fish pen replicating how they exist in a wild ocean. By doing so the IFFO reorders the "wild" as enclosable and manageable in a fish pen.

But what is left of wilderness in a farmed fish? Is a farmed fish similar to a wild fish because their feeding habits share similar nutrients? To eat, to feed or to be fed, invites a context.

Although similarities exist between the feeding of a wild fish and a farmed fish, the life and feeding habits of a farmed fish has nothing to do with the feeding context of a wild fish. Farmed fish are not hunting, they are not eating; they are being fed (corporations decide what they eat, when and how). While a wild salmon travels hundreds of miles, that hunts to eat, that changes seascapes and salinities to lay eggs, a farmed fish is corralled into a pen, fed regularly, with little space for movement, and forced to grow as fast as possible. Farmed fish – in opposition to wild fish – are reared, produced, and made to become a thing fit to be sold profitably.

In this farming process, three essential aspects are shadowed. First, to produce a farmed fish involves various artefacts, as for instance, the use of antibiotics to keep diseases at bay (Miranda et al., 2018) or the use of colorants to satisfy the visual preferences of customers (Viera et al., 2018). Eventually, this is not without consequences on the body integrity of the fish itself: more than 50% of farmed salmon have lost 50% of their hearing capabilities due to abnormal fast growth (Reimer et al., 2017). Second, the IFFO presents small pelagic fish as the feed panacea requiring no "anthropological inputs" for added nutritional value. However, the presence of corporate bodies is very much present in the production process: an extensive and far-reaching web of corporate activities (fuel, fishing vessels, crews, harbors, workers, technologies, transportation means, logistics, chemists, industrials, plants, etc.) is required – from the capture of the small pelagic fish to its selling as fishmeal or fish oil – to produce that fishmeal and fish oil "free" from any "anthropological inputs." And third, if the IFFO states that farmed fish are fed "as nature intended to," the question rests open as to whether nature intended to feed piglets with small pelagic fish feed, and pets with omega-3 supplements as recommended by the IFFO?

Hence, from the discourse of the IFFO emanates the idea that there is, on the one side, the ocean that provides pure and perfect feed resources (raw material) and, on the other side, the

land that sells a finished product where the best of what the ocean has to offer has been extracted for profit.

***Food***

Once the IFFO has reframed how nature should be considered, and farming opportunities developed, the "food" benefits of the use of fishmeal and fish oil must be unpacked for consumers. Human health benefits through food is at the center in the worlding processes of the IFFO where *food and health* are reformulated and redefined. *Illness caused by a lack of adequate alimentation* is a central argument in IFFO's nutrition discourse, be it for farmed fish or humans alike. *Omega-3s* are explained *to have a pivotal role* in maintaining – or restoring balance – to a diet brought to imbalance by an over consumption of omega-6s (found in plant-based aliments). Omega-3s – among other nutrients – are thus a *nutritional building block* necessary to *support human health* in an optimal way.

The most adequate fishmeal (*nutritional value of fishmeal for farmed fish and humans*) is made of small pelagic fish and its extraction from the ocean and other people's mouths must be justified by the IFFO. The IFFO makes clear – through its Peruvian anchovy case study – that the strong flavor of forage fish is "unpalatable" for direct human consumption. This pertains to a certain *visualization of spaces and their relations* where the IFFO works at reframing the socio-environmental description of the small pelagic fish as a resource. However, thanks to the fishmeal and fish oil industry, once processed, forage fish becomes "balanced, digestible and palatable" to the mouth of the farmed fish, and to the benefit of seafood consumers. If fish as food is not to the taste of the consumer, supplements (also called nutraceuticals) are available to capture health benefits. Food is thus deconstructed *into a system* made of building blocks but with different qualities (e.g. fish as feed has more value than soya as feed). In fact, the IFFO is more concerned with alimentation that actual food (Esteva, 1994).

The IFFO works at building a world where food is reduced to nutritional blocks. This can be related to what Scrinis (Scrinis, 2013: 2) has called "the ideology of nutritionism" (or nutritional reductionism): food reduced to its nutritional aspects and its role on individual and population health. Scrinis underlines that nutritionism is an ideology as it involves political, social, and economic dimensions (Scrinis, 2013: 13).[70] Thus, hidden behind numbers, tables and diagrams rests a view of what the world should be. And with this view, the reduction of small pelagic fish to nutrients erases all its socio-political aspects. On the one hand, what matters to the IFFO is not food as a social and cultural practice (the vernacular "comida" as mentioned by Esteva, 1994), but food as feed to increase bodily performance. In the worlding practice of the IFFO, food is alimentation and it becomes a holder of nutritive qualities that are sold to wealthy consumers in the Global North as a necessity for a healthy life and preventing illness. And the discourse on omega-3s and protein participates in blurring this distinction between nutrition and food or rather collapsing the later into the former. On the other hand, Esteva (1994) makes the difference between alimentation (*alimento*), or nutrition, and the socio-cultural act of food-preparing-eating-sharing (*comida*) as a difference in behavior and practice: the former is produced by professionals and institutions. It is purchasable "edible objects" (Esteva, 1994: 5). The latter is context-specific, it is to cook, to eat and to share (Esteva, 1994: 5-6).

Therefore, food is embedded within something, be it a human culture, an environment, a manner of being made. Instead, feed is reduced to a nutritional abstraction for various forms of highly managed life – human and otherwise. And this abstraction has two effects. First, it de-naturalizes food as it is recomposed into a series of compounds, a.k.a. ingredients with

[70] Nutritionism represents a fundamental conceptual critique of the food production and consumption. However, in the conceptual framework of this chapter, nutritionism will not be used as a concept to analyze a situation. Instead, nutritionism is used as a means to express and to represent how food has been appropriated and redesigned to fit the purpose of the agrifood industry.

energy content (calories) and nutrients (protein) (Meima et al., 2023). Food is no longer embedded in social processes or to be put in relation with other foods (*comida*, Esteva, 1994) that are tied to specific places and times (Cuevas et al., 2021; O'Kane, 2016). Instead, it is reduced to a series of ingredients that have a linear and singular purpose with increasing superlatives: from superfoods (Liu et al., 2021) to hyperfoods (or "gastronomic medicine", Veselkov et al., 2019: 2). Second, this abstraction of food erases its geographical provenance and existence as living beings (O'Kane, 2016). Food does not come from anywhere anymore; it is becoming a construct, fit for the capitalist economic system – such as the "blue economy" (or euphemistically called "blue food" when coming from the ocean). This abstraction goes so far that, while reading about food and feed quality, it is puzzling to read the same words and descriptions used be it for farmed fish's feeds and human's nutrition. Are humans being reared as farmed fish are? In this worlding process, the perception of food as a complex practice and its rich social aspects is being shadowed by a nutrition discourse. Eventually, to buy food from an aquaculture corporate industrial company equates to being fed a highly processed aliment, hence it can be argued that people buying farmed fish do not eat it, they consume[71] it.

### 2. *Industrial production*

With this second category, Mignolo (2018: 139) stresses the importance of discourses and rhetoric to convince that the world we live in is just as it should be naturally. Similarly, in the context of food production, Jacobsen (2004) underlines the importance of discourse and rhetoric for creating a hegemonic image of reality. Rhetorical tropes are thus fused to a specific message that can feed an imaginary.

In this category, the underlying element is the rhetoric built around the *movement and flow* of goods and services. Movement and flow are necessary for the *production and dissemination*

[71] Noteworthy is the etymology of the word "consume" as the act of "destroying" through eating of burning (Esteva, 1994: 3).

of fishmeal and fish oil as well as *inclusion within an economic system*. Essential for an efficient *movement and flow* of goods and services is the idea of the *commensurable nature of nutrients* and the renaming of small pelagic fish to facilitate its rhetoric. For instance, to talk about fish, the IFFO uses the verb "to fish" sometimes the verb "to source," or describe fish as a "raw material." These words immediately set the fish within an industrial production strategy, and by extension an economic system, where fish is reduced to "stocks" (Telesca, 2017) of "manageable" populations (Bavington, 2010a). The IFFO is also keen on showing that the industry knows how to make a *strategic use of fishmeal and fish oil* as the industry is aware of the finite supply of forage fish within a growing demand for aquaculture products. And with its discourse on strategy, the IFFO tries to convince its target audiences that the aquaculture industry can supply food sustainably[72]. Sustainability may refer to production where the IFFO develops its discourse on the capacity of the industry to create a *virtuous production circle* with, for instance, the use of by-products as an additional source of omega-3s – the so-called circular economy (Campanati et al., 2022; Fraga-Corral et al., 2022). By tackling by-products, the IFFO is *giving value to* what was once considered *wastes*. Therefore, it is the *market that creates existence*: the IFFO make clear that without a direct human consumption market, forage fish would go to waste. Thanks to the fishmeal and fish oil industry, forage fish has an exchange value and can therefore be channeled into existence as a marketable product.

The fishmeal and fish oil industry is therefore developing an imaginary of a virtuous circle of production with the following rhetoric of (a) aquaculture being capable of producing more food than nature does, (b) producing partially from by-products (recycling), (c) and producing a healthy food similar to the wild, that (d) participates in global food security.

[72] Issues with the word "sustainability" is discussed in Hébert and colleagues (2018) and (Johnson et al., 2018b).

In its worlding practice, *production and dissemination* balance between simplicity and complexity. Simplicity is described at the input and output of the production process: quality feed is made with small pelagic fish that has all the nutritive advantages, without any "anthropological inputs", while – at the output stage – the "by-product" (a euphemism for waste) of fishmeal and fish oil production, is only "steam and water", i.e. "natural" innocuous waste.

But in-between the simplicity of the input of pelagic fish and the output of fishmeal and oil stands a complicated highly technical production system that requires industrial infrastructure in facilities (plants, cookers, driers, mills, centrifuges, decanters, etc.) and a bureaucratic structure (quality control, evaluation processes, regulations, etc.) that allows these products to exist within a larger global trade network. Finally, fishmeal and fish oil are discussed at international negotiation tables for the creation of internationally agreed upon standards. And once production and bureaucratic existences have been constructed, a whole logistic and transportation apparatus is necessary to move the resulting products around the globe. So, if feed is partly produced by papers and logistics, is it still a "natural" product? And behind the polished image of water and steam as the only "by-products" (a.k.a. waste), other realities of pollution are eclipsed. For instance, in Senegal, villagers of Abéné complained against wastes discharged straight into the ocean from the fishmeal and fish oil plant. Olfactive pollution was also criticized in Nianing (Senegal) where people complained of the pungent smell of the fishmeal plant (*pers. comm.*). And issues of fishmeal and fish oil pollution is similar in The Gambia, the coastal country surrounded by Senegal (Amnesty International, 2023: 9).

*Transferability and the production of virtuous profitable circles*

In the rhetoric of *movement and flow*, the idea of *transferability of things* is essential for the IFFO worlding practices and for which commensurability is made possible with metrics and renaming. By focusing on the nutrient content of the wild fish, the IFFO displaces attention

from fish as living beings. The decomposition of life into building blocks is a feature that allows the IFFO to get rid of the constraining aspects of actual places, living beings and things. This focus on the underlying substances or building blocks has two advantages for the IFFO. First, if one form – here small pelagic fish – dwindles, the substance may possibly be found elsewhere (krill for instance can supplement the lost fish, see Ziegelmayer, 2014, or fish waste can be used to maximize efficiency gains). Although, possibilities for product developments may be presented as an endless frontier by the IFFO, sea creatures and the ocean have natural limits. With a diminishing supply of small pelagic fish, other means of production of fishmeal and fish oil are required to continue growing the industries represented by the IFFO. By considering only the underlying substance or building blocks, production practices can free themselves from reliance on small pelagic fish if necessary since it is only the underlying nutrients or ingredients they are after. Second, this decomposition into building blocks is beneficial as it allows the IFFO to create more lines of connections for the selling of products (it is not just about fish, it is about omega-3, vitamins, nutrients, minerals, etc.). The substance acquires a transferable fungible nature making the commodity much more flexible for growth and expansion into new areas. For instance, the IFFO is developing a rhetoric where nutrients sourced by their industry can become an added value to all food as these blocks can be easily redistributed into other products (for instance, omega-3s added to butter, mayonnaise, or orange juice with associated health claims). It is a molecular dialectic (form vs. substance) that the IFFO is developing in its discourse that makes up its worlding practices. This smooths the imaginary around its flow of production and it increases the adaptability and resilience of the fishmeal and fish oil commodity to environmental and social change, flux, and disruption.

However, the fishmeal and fish oil industry is also acutely aware of the dwindling resources of small pelagic fish which poses problems for *production and dissemination* of their products

as demand for aquaculture is growing exponentially. To palliate this rising demand, fish waste – colloquially called by-products – is looked at as a new source of opportunity. If Pauly and colleagues (1998) developed the concept of "fishing down the marine food web" to describe the practice of fishing species ever lower in the food web, an analogy could be created with fishmeal and fish oil production with an industry that starts "producing down the food waste," using by-products as new sources of "raw material" and including them within a capitalist commodity producing economic system. By-products are transformed from waste into a resource that can be re-used and sent back into the cycle of expanding commodity production (the transferable nature of things).

Thus, the rhetoric of the fishmeal and fish oil industry is one embedded in an economic system within which the commensurability of things allows first to partially get rid of the form and focus on the nutrient aspects. This allows to transfer into new commodities, or create new commodities, much more easily, reducing frictions within the system.

### *3. Global space and its imaginaries*

The third and last category (2018: 139) I analyzed aims at showing that the IFFO is embedding its activities in a rhetoric that *broadens the scope of the industry*'s activities by connecting them to a discourse on global concerns such as food security. Within this new discourse, the fishmeal and fish oil industry is not anymore producing a (feed) commodity for industrial meat production. Instead, the industry is embedding itself in food production and distribution processes at large. It works within the "global food system" and participates directly in "global food security" with a specific role in "global protein production." Protein is presented as a mean to feed the world, although critics have highlighted that this discourse on protein can be a mean to avoid socio-environmental issues related to livestock as well as position protein production as new business opportunities and rebranding (Guthman et al., 2022). In this new global positioning, the IFFO presents the *multiplier effect* as its greatest

strength – the capacity to have a larger quantity of farmed fish produced as output than fish given as input. This new positioning allows for an instrumentalization of small pelagic fish presented as positive for the greater good and not just a commodity to be captured by the first round of industrial aquaculture production.

For the rest of this sub-section, I will discuss two processes deployed by the IFFO to justify their position and focal role at the global level, one based on exclusion of other users, and the other of inclusion within a larger set of values. Finally, a discussion on the building of global spaces in the worlding practices of the IFFO will be presented.

*Exclusion*

To justify the exclusive access to small pelagic fish resources, the IFFO circumscribes access to this resource and excludes (or at the least minimizes) the existence of other users. It is argued that small pelagic fish are central for the livelihood of local populations, for the oceanic food web, and that the use of small pelagic fish for industrial purposes should be banned (Pikitch, et al., 2012; Probyn, 2016). This perspective is directly tackled and managed by the IFFO through the use of experts and academics. The main case study that is used by the IFFO is the Peruvian anchovy fishery (representing about 30% of the extraction of small pelagic fish for fishmeal and fish oil purposes). From this case, the IFFO generalizes about the absence of alternative use for small pelagic fish other than for feed. The IFFO explains that the Peruvian anchovy has a low rate of direct human consumption and that incentives have been developed to foster a market for its direct human consumption but with little success. One of the challenges of marketing forage fish directly for human consumption, according to the IFFO, is the strong flavor of forage fish (in this instance, the Peruvian anchovy) that is "unpalatable" for consumers. However, once processed forage fish becomes "balanced, digestible and palatable" for farmed fish, it can then become a desired commodity for human consumers. Thus, this small pelagic fish, according to the IFFO is better off if used for the

industry of fishmeal and fish oil. However, when it comes to small pelagic fish (dis)taste, the Peruvian anchovy case cannot be generalized. As shown in a previous chapter, small pelagic fish has a central role in the livelihood of the whole West African subregion. And in Latin America, archeological researches have uncovered evidence that small pelagic fish used to be part of the diet of coastal peoples in what is known today as Peru (Probyn, 2016: 141). In their world, the IFFO works at proving that their use of small pelagic fish is the best use that can be made and that no alternative exist to their world.

*Inclusion*

The second process involves a practice of inclusion of industrial activities within a higher set of moral values. In its globalizing discourse, the IFFO displaces fishmeal and fish oil from a discourse centered around industrial production and sets it instead as a "strategic ingredient" for global food security. The discourse argues that with a growing and aging population in need of healthy diets, aquaculture will be called on to fill the protein gap as capture fisheries either dwindle or remain stagnant preventing profitable growth. Fishmeal and fish oil is thus a nexus commodity that "supports production" and helps to "return[omega-3s] to the human food chain" tackling multiple issues at the same time. Then the IFFO inserts this discourse within global projects in favor of world sustainable development. In this way, the IFFO has been able to directly link and works at aligning fishmeal and fish oil production with the United Nations' Sustainable Development Goals.

Is the IFFO involved in some sort of bluewashing? The United Nations has set up a voluntary initiative – the United Nations Global Compact – that encourages companies to develop and support corporate socially responsible practices and policies. Initially, bluewashing involves a critique of companies that affiliated themselves to this voluntary initiative but did little to act upon it (Berliner & Prakash, 2015). But the term "bluewashing" has expanded to any companies that says to support Environmental, Social and Governance (ESG) and Corporate

Social Responsibilities (CSR) aspects but with little transparency on these activities or paying lip service to their development (Heras-Saizarbitoria et al., 2022; Macellari et al., 2021). The purpose of this dissertation is not to discuss if the IFFO – and its members – are involved in bluewashing. However, further research would be required to critically analysis the use of the SDGs in the context of the fishmeal and fish oil industry and the aquaculture industry.

*Worlding as a spatial production*

Globally, the IFFO positions the production of fishmeal and fish oil on a higher scale of moral values. These values are related to global issues and concerns on health, environment, food security, climate change, feeding a growing population, feeding aging populations, and so on. With this new positioning, the industry presents its activities within food distribution discourses and processes (its central role on "global protein production" and its greatest *strength being the multiplier effect*) and partly shadows its participation to livestock production. In sum, the industry has been changing its discursive positioning and the relationality of its discourse: from a horizontal positioning (feed for livestock) to a vertical relationality (i.e. feed for nutrition, health, food security).

At this global scale different levels are interacting directly: the extremely small (food nutrients) meets the extremely large (transnational trade). However, remaining at the global scale, without considering other dimensions, silences other spaces of smaller scales with their own realities and relationalities. This bias of conceptualization when considering global issues at this specific scale has been pointed out by Biermann and colleagues (2016, criticizing the concept of the Anthropocene). It has the effect of flattening reality to a single scale, a single dimension allowing for universalizing technocratic market-based solutions to appear like the only alternative available.

A discourse on global food security, to be fully relevant and insightful, must be multidimensional. Indeed, the existence of other relationalities, and their complexity, may not appear if not considered according to their own specific scale, and in their relations with one another (Biermann et al., 2016). Without these relations across multiple dimensions, the term "global" is reduced to an abstract flat Cartesian plane, elevated high above the ground, severed from the very existence of the other, but facilitating the appropriation of these others as they barely exist outside of their specific space. The world built by the IFFO becomes a one-dimensional world, a flattened one-world world (Law, 2015) with the rhetoric of an industry producing a hegemonic reality. Eventually, in this process, the ocean itself becomes spatialized along Cartesian coordinates. The ocean, considered as a global unit, runs the risk of becoming a space without places, a one-dimensional world hiding local lives, local effects, and local consequences of any activities driven by global projects; a mere holder of marine ingredients awaiting improvement by the IFFO. And in this world, Senegal disappears, the work along the shoreline is shadowed as well as all the many interrelations that are formed by the work, for instance, of women fish processors; it is a world that is emptied from the fish that will be served on restaurant's plates.

## V. Concluding thoughts

Zhong Mengual (2021: 10) has stressed how the capacity to see is related to physical as well as mental features. The mental aspect is made of (a) the categories used to classify, (b) knowledge used to interpret what is seen, and (c) the attitude toward what is seen. This mental aspect is not a given but something that is made. To learn to see is essentially a process of worlding. I consider worlding as a concrete act of making visible and shadowing at the same time.

In this chapter, the aim was to inquire into how the IFFO influences perception by building a world on specific categories grounded on specific knowledge. It is with and through these features (categories, knowledge, perception) that the IFFO builds its world. And to inquire into the worlding practices of a trade-related organization invites one to critically discuss a world built exclusively to be sold for profit. In this world, imagination is limited to the exchange value of life reduced to a resource or stock (Telesca, 2017). In the profoundly fluctuating uncertain times we are living in, we should not abstain from developing an *ecology of imagination* (Stépanoff, 2019b: 414) to create new ways of being with each other and nonhuman life. In other words, new ways to see and observe the world that is built around us.

I am puzzled and troubled at how the world is reduced to elements interchangeable with one another. The plural and multiple nature of things is reduced to material bits and pieces for a commodification in favor of human health for those wealthy consumers with effective demand. From small pelagic fish, it is not only fishmeal and fish oil that is extracted, it is their very existence that is negated. The IFFO talks about the necessity for people to consume omega-3s and other nutrients to be healthy, but these people are mostly wealthy consumers in the Global North and not the ones suffering from undernourishment. International organizations call for the increased consumption of fish for the benefit of human health. However, I find it problematic when transnational companies start building their discourses on development projects and directly affiliate their activities with these development projects that are framed as in the interests of the common good. It creates a confusing discourse: the purpose of development projects can be aimed at the betterment of human life, while the purpose of transnational trade companies is to sell products for a profit.

What is even more troubling is how large corporations with tremendous power – due to their size – have the means, capacity, and ability to transform the image that wealthy consumers in

the Global North have on the world itself, to build a world to fit their commercial purposes. In the instance of the IFFO, the ocean is built as a large pool of commodities.

What emerged and stood out in the analysis of the IFFO's website discourse, is the core idea of the transferability of things, through commensurability and renaming, as a mean to control the production and dissemination of products. In this worlding process, the world is reduced to a one-world world. It is a cartesian plan where wealthy consumers in the Global North end up alienated from the things they consume and their provenance. They end up living in a massively reduced world as the existence of other worlds have been shadowed by a specific representation of nature, a rhetoric justifying industrial practice, and its inclusion within higher global moral values. In this worlding process, the ocean, vast, with many unknowns, is reduced to a mere holder of marine ingredients. To question this "world" that is built around us is definitely food for thought. Worlding is not an act of description, it is a practice of creating an environment with purposes and aims. Worlding practices should be challenged if they entail the creation of a one-world world that shadows any other existences.

# Conclusion

*Philosophy does not take the context for granted, it faces it to seek the origin and the meaning of questions and the answers and the identity of the one asking*
(author translation, Merleau-Ponty, 1964: 142)

*Eating brought humans down to earth and entangled them with other creatures.*
(Mol, 2021: 126)

*The world is vast, but within us it is as deep as the sea.*
(author translation, Rilke, 1992)[73]

## I. Introduction

It is in the semi-darkness, with only the powerful visual of the stock exchanges passing by (structuring our world), and, as an echo, a Greek traditional lament resonating in a tank that the core of this dissertation started; mesmerized by Emeka Ogboh's installation *The Way Earthly Things are Going* (2017). This installation was created as a critique of the financial crisis and its impacts on world populations. In 2008, the financial crisis saw the price of nutritious food increase sharply (Brinkman et al., 2010). Should it still be mentioned how food is essential for livelihoods and cultural as well as social lives? However, the choice of what we eat, why and how is increasingly dictated by large agrifood corporations. Thus, it is their hegemonic discourse that must be looked at and critically analyzed (Hayes-Conroy & Hayes-Conroy, 2013). This analysis should not only focus on the produced food itself. The analysis should embrace the world – the whole context – that is built around the specific issue. Emeka Ogboh's installation was the opportunity to feel the many tensions at play and the injustices created between (not so) distant worlds. This installation questioned what was left

[73] Original text : "le monde est grand, mais en nous il est profond comme la mer" (Rilke, 1992).

in the shadow of production. It was also the opportunity to question my positionality as a fisheries, geography, and interdisciplinary researcher. In a sense, Emeka Ogboh's piece of art has participated in fostering in me what Stépanoff (2019: 20) calls an "ecology of imagination". Stépanoff calls for us to remember forms of imagination we have not experienced since our childhood (Stépanoff, 2019: 20). Art, for instance, can be used as a means to transcend traditional categories and barriers to develop new directions, relations, and concepts to make sense of this world and to imagine a different one. It is this invitation to go beyond the traditional, and question the taken-for-granted, that motivated the inquiries of this research.

My initial and main motivation was to question: what is required to build a world where humans enter in resonance (Rosa, 2021) with their natural environment? Through this question my goal was to start paving the way for the development of a conceptual framework whose aim would have been to "think with nature." However, this first aim was too large a project for this dissertation, and was impossible given the many challenges and contingencies that I have faced during its writing. However, the possibility to build such a framework requires one to analyze what the present situation is regarding the dominant way nature is perceived and built. It requires to inquires what is shadowed (Dauvergne, 1997, 2008) and how shadows are created through worlding practices. And this is what has been done using the fishmeal and fish oil industry as an empirical grounding. Eventually, this dissertation has highlighted aspects of two concomitant processes: (i) alienation from relations (in food production) and (ii) processes of appropriation of an industry (Jaeggi, 2014), through the IFFO's worlding discourse.

This dissertation has focused on food production. Questioning fishmeal and fish oil production was a great way to give perspective to what it entails to produce farmed salmons. There are extensive ramifications that exist in food production and consumers in the Global

North – as distant as they may be – are relationally connected with fish workers in Senegal in unsuspected ways. The purpose of this dissertation was to bring out of the shadows these relations. Through fishing for fishmeal and fish oil for feed production, it is relations between humans (and nonhumans) and their responsibility toward nature that I have focused on understanding. This research is a contribution to fill a gap in academic research on the relation between food production, nature, and worlding. This research is thus an invitation to participate in developing new ways of being in the world, of relating to fish, and by extension, of being with nature.

The rest of this concluding chapter is dived into two parts. The first part reviews each of the three chapters of my dissertation highlighting their significance. In the second part, I will develop on ideas stemming from these three chapters and suggest directions for possible further research. My initial intention was to include a theoretical chapter on possible directions to relate differently to nature and the nonhuman. The general idea was to think in terms of resonance with the other, and not just consider the other as a resource. However, due to time constraints and other contingencies of life, this aspect could not be included in the dissertation. This second part is the opportunity to reflect on some general themes guided by – and guiding – this dissertation.

## II. Main findings, reflections, and further research

The main research question was set out in the introduction as: What are the temporal and spatial underpinnings, and their consequences, of the fishing of small pelagic fish in Senegal for feed production? To build an answer to this question, three axes were constructed using fishmeal and fish oil as an empirical instrument. The first axis I explored was historical, the second axis was set on the shoreline of Senegal, and the third axis inquired into the global reach of the discourse of a fishmeal and fish oil trade organization. Why fishmeal and fish oil?

Contemporary industrial food production practices – and in this instance the salmon aquaculture industry – have a way of disconnecting consumers in the Global North from what is required to produce their food. Fishmeal and fish oil, produced with small pelagic fish, hide within themselves a whole aggregation of issues and stories; they hold connections unbeknownst to consumers. They hold issues of socio-environmental inequity and injustice. Small pelagic fish is a sad – and fascinating at the same time – example of the commodification life and nature itself. Through a discursive process from the fishmeal and fish oil industry, the very existence of small pelagic fish (their *animality*) is erased (Stibbe, 2012). Worse, small pelagic fish are not even food *per se*; they are the first step in the decomposition of nature into ingredients; small pelagic fish are reduced to a marine ingredient to produce fishmeal and fish oil (as stated by the International Fishmeal and Fish Oil Organization). Other nonhumans have been commodified for food (pig, poultry, trout, salmon, etc.). However, small pelagic fish holds a different fate. It is not commodified for its direct consumption but for its multiple use for health and feeding purposes. The salmon aquaculture industry, by building a whole world through its discourse, reformulates what eating is and, by the same token, shadows the extent of the relations and ramifications that exist in food production.

## 1. Chapter 1: Historical developments of the Senegal pirogue fishery and its consequences, from the turn of the 20th century to the 21st century

This chapter discussed the temporal aspect of food production. It is related to socio-environmental historical construction that structure the perception of contemporary issues. The setting was grounded along the twentieth century in Senegal from the colonial era to the early 2000s. The chapter's main research question was: How did the Senegalese pirogue fishery evolve at the contact of the French colonial administration and then the Senegalese national administration?

This chapter showed how colonial practices of describing the world influenced its perception as well as actions taken. Words matter and have the possibility to connect – or disconnect – individuals from their environment. The perception and construction of reality by the colonial administration shadowed a whole world to their eyes. However, the purpose of the colonial administration was not per se the improvement of local livelihoods, but a transformation into colonial economic practices developed in favor of, and subsumed to, the metropole. The totalizing gaze (through its practices and purposes) of the colonial administration, informed by its own epistemologies, made the colonial power blind – or at least short-sighted – to habits, customs, and practices specific to the West African coast that were much more adapted to the region than European practices. Western techno-scientific practices were argued as the way forward for the economy to flourish, barely considering that the technologies specific to the region were the most appropriate for this region, such as the pirogue. This partial blindness to difference, using science and technology to assert its own colonial position, is to be found in the French colonial administration of Senegal and later in the discourse of the fishmeal and fish oil industry (and by extension the salmon aquaculture industry).

This chapter underlined the strong relations between space and time that should not be severed (Massey, 2005). By considering temporality (history for instance) and spatiality, a critical stand can start to unfold against a totalizing and hegemonic discourse (Hayes-Conroy & Hayes-Conroy, 2013) as the agri-food industry may have done so far. For instance, the aquaculture industry often uses the Peruvian anchovy as an example of a fishery that is not used as food by humans and thus would be a wasted resource if not fished. But the industry does not disclose that it was an important human food source in the past or that it is essential for an ecosystem (Probyn, 2016) or that elsewhere in the world small pelagic fish are crucial for human lives. A generalization is quickly made with the Peruvian anchovy fishery; however, this dissertation has shown that in West Africa small pelagic fish is far from just

something to be reduce to feed. Time (History) is thus a necessary component in any socio-environmental analysis, and much is still to be discovered. Further research would be needed to understand the relation between colonial administrations and the continuation of neo-colonial practices within independent States by integrating a spacetime lens. The concept of spacetime (Massey, 2005) would need further development in practice. For instance, in what way does spacetime may help uncover the socio-political history of a region? Or, in what way spacetime may help showing the perpetuation of colonial practices from the colonial period to nowadays? As Massey (2005) underlines space (as well as time) is not something abstract, it is relational and thus concrete and lively. These aspects are essential to connect past to present, and the far away to here.

## 2. Chapter 2: The Senegalese shoreline as a liminal space: revealing spaces of actors in the shadows

After an analysis of the colonial history of how France attempted to develop the coastal fisheries in Senegal in the context of losing access to earlier colonial possessions (such as access to fishing sites in Newfoundland), focus was brought onto present issues along the coast of Senegal. However, my interest was in surfacing the unseen and unheard, and most importantly how to create space for the shadowed and silenced. For this chapter, the main research question was: In what way the concept of liminality creates a space and a position for women and men fish workers along the shoreline of Senegal? This chapter developed a conceptual space between the land and the ocean, two features that are often opposed in a binary relation. Bear (2017a) has underlined the necessity to go beyond such a binary and to think in terms of relationality between both land and sea (c.f. also Wang, 2023). The development of a space in-between – discussed in terms of liminality (Gadoin & Ramel, 2013; Thomassen, 2009, 2015) – allowed the creation of a passage, a meeting space, between these two worlds (aqua and terra) and the recognition of their relationality. Another purpose of

applying the concept of liminality to the shoreline was to cast light on the many lives that are shadowed in the fishmeal and fish oil discourse. What is seen (in the media) is mainly the men who fish, what is seen is the plant that transforms the small pelagic fish into fishmeal and fish oil; little is said of the many hands at work between the sea and land, women and men, in the processing of small pelagic fish and its importance as a crucial food source for the subcontinent (Grand & Diop, 2017). Liminality becomes an instrument to underline what is shadowed along the shoreline and beyond, and with a specific focus, in this dissertation, on the work of women in fish processing.

Bennett and colleagues (2023) have underlined that coastal populations have received little focus in the literature on environmental (in)justice. Fishing for feed is not only destructive of fishers' possibility to fish. It also destroys or puts into jeopardy the livelihood of thousands of workers, both women and men. This livelihood is as much related to work (in the processing and trading of small pelagic fish) than to food, as fish is part of a food culture in West Africa. Eventually, the fishing of small pelagic fish for fishmeal and fish oil production poses environmental justice issues of reduced access to vital resources, such as fish, that become enclosed to coastal people (Larrère, 2017: 9).

Conceptually, by opening a liminal space, worlds become multiple, and fish becomes plural and multiple in its many connections with work, practices, exchanges, and food habits. Liminality shows the spatial fluidity (Law & Mol, 2001) of relations along the shoreline, as shown, for instance, by the presence of a Togolese women fish traders looking for kethiakh to buy. As such, the concept helps illuminate the many lives at play in this space. The shoreline as a liminal space is thus an invitation to think, listen, and feel differently; a space for reflexivity to foster a resonance with other lives. However, further research is needed regarding women fish workers and their central role along the shoreline. In addition, an intriguing research direction regarding liminality would be to develop the concept of

liminality as a passage between worlds and how liminality may foster deeper relations between seemingly opposing worlds – land and sea.

## 3. Chapter 3: The worlding practices of a trade organization (the IFFO) and its commodification of marine lives into marine ingredients

After an inquiry, along the shoreline, of the consequences of fishing for fishmeal, attention turns to the large scale, the fishmeal and fish oil industry itself and its discursive practices (more specifically an analysis of the International Fishmeal and Fish Oil Organization, IFFO, a fishmeal and fish oil trade organization). These discursive practices have ways of building a world where the ocean is reduced to a pool of resources for the industry and food reduced to nutritive components for seafood consumers and other domesticated life.

The main research question was: In what way does the International Fishmeal and Fish Oil Organization's worlding practices seek to transform the perception of the ocean and its dwellers? This chapter participates in answering the main research problem in a three-pronged way, making use of Mignolo (2018: 139) categorization of the construction of modernity: representations, rhetorical discourses, and sets of global designs. Through its discourse, the IFFO participates in transforming the perception of consumers in the Global North of the ocean, sea life, and food.

First, in terms of representation, the IFFO's website and public messaging reframes nature as made of elements to be used as ingredients, and markets granting these elements an existence as commodities. In this space, the ocean is not a relational space or put differently a space of encounters. The ocean is represented as static, passively waiting for market opportunities to arise. What becomes lively is the pen in which the farmed fish is corralled. There, technology makes possible the copying of nature, and even its improvement. The farmed fish is not

presented as wilderness domesticated, but as a “wild” animal that is produced and reproduced under expert human control. Concomitantly, the representation of food is transformed and reduced to nutrients (Scrinis, 2013). Nutritional value of food is used as a discursive strategy to ascertain the new food/feed world defended by the IFFO, and, as Jacobsen (2004) stresses: hegemonic reality is created through this discourse and rhetoric. The nutritional discourse erases relations between humans and a natural environment (the ocean), and erases as well the social dimensions of food. In this space, food is reduced to a holder of nutritive values, it is reduced to feed for a healthy life (for the wealthy ones).

Second, the IFFO make use of a rhetorical discourse to convince consumers in the Global North that fishmeal and fish oil production is a “natural” product. Doing so, the IFFO has a dialectical approach that opposes, but have working together, simplicity over complexity: simplicity in the fact that small pelagic holds everything that is required to produce a healthy farmed fish, but also complexity in the processes (industrial, administrative, logistic, etc.) required to produce fishmeal and fish oil. Eventually, the discourse of the IFFO reduces eating to nutrition. This reduction to nutrition frees the discourse from specific food forms as nutritional aspects can possibly be found in many provenances (sources). In sum, the fishmeal and fish oil industry focus attention on the transferable nature of the “ingredient” at hand. The interchangeability of things gives the impression of controllability and ever possible improvements on what is given by nature. However, the interchangeability of things (if everything is replaceable) alienates consumers in the Global North from a relation with what they eat (alienation as “a relation of relationlessness”, Jaeggi, 2014: 1).

The third element in Mignolo’s categorization (2018) is global design. In this dissertation, this category has been retitled “global space and imaginaries.” This category shows how the IFFO tries to position its activities within global contemporary issues, discussions, and discourses (for instance, global food security, or climate change). Doing so, the IFFO sets its activities

not anymore in the field of food production but in the realm of food distribution. In its process of world-making, activities of the fishmeal and fish oil industry are set within higher moral values than before when it was supplying the livestock industry. By producing a reality at the global level and by remaining there, the IFFO silences the existence at smaller scales and their own specific realities. For instance, the IFFO uses the Peruvian anchovy case study arguing that small pelagic fisheries do not take away food from humans and avoids discussing the importance of this fish in this specific ecosystem, eventually arguing that small pelagic fish is better off used as fishmeal and fish oil. In sum, the IFFO, through its worlding discourse, flattens reality into a single space; it produces a one-world world where the ocean is a unidimensional space managed for trade purposes.

In the wake of this chapter, further methodological and conceptual research are needed. Conceptually, it would be fascinating to see how the idea of worlding and its practices could be applied to international companies and their messages. To which extent the concept of worlding can be used to trade organizations? With what consequences? This concept would become an instrument of critical inquiry on hegemonic discourses and practices (Escobar, 2017). Theoretically, the use of situational analysis and grounded theory on website and trade companies could be updated and refined.

## III. Concluding comments

*"Philosophy does not take the context for granted, it faces it to seek the origin and the meaning of questions and the answers and the identity of the one asking"* (author translation, Merleau-Ponty, 1964: 142)[74].

[74] Original text : "La philosophie ne prend pas pour donné le contexte, elle se retourne sur lui pour chercher l'origine et le sens des questions et celui des réponses et l'identité de celui qui questionne" (Merleau-Ponty, 1964: 142).

Following Merleau-Ponty's invitation, this dissertation uses a specific context to think through how it came into being and the consequences that has this built context. This dissertation is a first step toward looking differently at the ocean and entering in relation with it. In this second section, I will develop links and perspectives, and propose new directions to think about relations to the ocean for further research. It follows the imperative to act drastically considering the rapid transformation the world is facing due to the anthropogenic climate change and the crisis of world fisheries; and actions start with understanding the way we think and perceive.

The ocean is sometimes imagined as a space of awe and wilderness, almost exempt of human presence; a place that needs to be conquered, mastered, and its commodity frontiers advanced. However, the presence of humans on, and in, the ocean is undeniable (fisheries, mining, sand extraction, windmills, underwater cables, transportation, pollution, etc.). More, the ocean is increasingly considered as the engine of a blue economy, the place that makes up for declining resources on land; this rush to the ocean has been coined the "blue acceleration" by Jouffray and colleagues (2020). Virdin and colleagues (2021) have shown how a large share of the economy related to the ocean is increasingly aggregated in the hands of large transnational corporations. The ocean is thus increasingly conquered by extractive motivations and is enclosed by a handful of powerful corporations (Virdin et al., 2021).

The ocean is not this distant other. On maps, land and sea are clearly delimitated. However, Jouffray and colleagues (2020: 46) present a map that shows nations' jurisdiction over the seabed. If land and sea are considered as national territories open for exploitation, then what remains as a "free" common ocean is drastically reduced. The ocean has already been colonized with, for instance, pollution that can be considered as "an enactment of ongoing colonial relations to Land" (Liboiron, 2021: 6). The ocean is not a pristine territory remote

from the land. However, these two representations are competing: the image of a pristine ocean that needs to be protected opposed to an ocean that is increasingly colonized, commodified, transformed and divided between nations for geo-political and economic extractive reasons. In the first case, the ocean is a remote entity, and in the second, the ocean is used for economic purposes. But what is left in-between? Certainly, all the nonhumans that exist in this ocean, all the other worlds (ontologies) that exist outside of the Western canvas, and coastal peoples as well, that are too often left aside or clearly forgotten when discussing the ocean (Bennett et al., 2023). What if we started considering the ocean differently? Something that would be neither protection nor extraction, conservation nor development?

New relationalities between humans, land, and ocean should be developed. Inquiring critically into the blue economy, Germond-Duret and colleagues (2023) underline that issues of environmental and social (in)justice should be included when researching the blue economy. The ocean and the land are not two radically opposed entities that do not interact with each other. Similarly, Wang (2023) shows how land and ocean must be considered together and relationally. In this dissertation, the concept of liminality was a way to begin to create a conceptual connection that would make space and let emerge the many lives that are often forgotten in ocean-land policy discussions.[75] But what if we started to think differently about our relation to the ocean? And most importantly, what about the way different actors with different levels of power create worlds, understand, and create these relations?

*Thinking differently, thinking with*

Escobar (2016: 15) stresses that modern problems cannot be solved by modern solutions as it is this very modernity that has created these problems. Other creative means to answer to

[75] Further conceptual research regarding liminality and the shoreline could be performed by considering the role that rising seas may have on this concept and the land-ocean relation.

contemporary issues must be found and developed (Montuori, 2023: 158). These new ways of thinking should not avoid the importance of context, nor to the point that they are disjunctive of the many relations that exist; undoubtedly a challenge of thinking, and imagining, complexity (Montuori, 2003: 239; Morin, 2015b, 2015a). In the frameworks that guide thinking there are always things that come into focus and those things that are hidden, outside the frame. Escobar (2016: 15) stresses that in worlding there is a social production of non-existence, "what doesn't exist is actively produced as non-existent or as non-credible alternative to what exists". Bachelard (1980) observed that the epistemology of the rational scientific mind is not something innate to human beings, it is something that must be learned and acquired. We are taught to think in a certain way and to see (or not) certain things. It his however difficult to change: we tend to use the most frequently used idea(s), and there is an inertia that slows down an ability to change (Bachelard, 1980: 14-15).

Thus, the way we think produces presences and absences. This dissertation has had two main purposes: to highlight that the non-existent is produced, and to bring to light what was is shadowed and how this is accomplished through framing. As Bachelard underlines "knowledge of the real is a light that always project shadows somewhere"[76] (1980: 13). A further research step that I would like to examine would be how one can creatively co-develop ways to imagine another world (or other worlds) to counter voices that hinder alternatives to the one we live in. Without dismissing all that modernity has brought, and can still do, how can we increase the range of possibilities in a world full of challenges?

To think differently, we undoubtedly will need to develop an "ecology of imagination" (Stépanoff, 2019b: 414). By ecology of imagination, in the context of this dissertation, I mean an imagination that is set and inspired in relationship with humans, more-than-humans, and

[76] Original text : "La connaissance du réel est une lumière qui projette toujours quelque part des ombres." (Bachelard, 1980: 13).

multiple environmental surroundings. It is an ecology that works relationally, in conjunction with and is inspired by what is observed and felt from an environment, in this instance the ocean.

Some think that more governance and more management will improve the situation, mentioning with reason, the importance of equity and justice in governance and management (Claudet, 2021). But what if we started elsewhere? Flemming and colleagues (2019) underline the importance of the ocean for our health, and not just for extraction purposes, but they point out that there is no clear view of what the ocean should look like. Maybe management and governance should not come first (Pereira et al., 2023). How could we ever manage or govern if we do not know what is to be governed and managed and where we want to go? There is a strong faith in the ability to create worlds that are controllable, even when uncertainty, complexity and the very belief in a controlled world is profoundly misguided (Rosa, 2020).

There is a necessity to recognize that the history of humans and "nature" is deeply intertwined in its construction and its representation (Merchant, 1980). The reduction of nature to a set of biological and ecological factors is – in itself – a construction, primarily from Western scientific practices. This construction has repercussions far beyond a circumscribed moment in the past or a specific geographical location.

How do we thus situate ourselves in relation to nature? For Larrère and Larrère (2022: 18-19), we can either be within or outside of nature and these authors outline three positions. Larrère and Larrère (2022) argue that one can be inside nature and at the center observing it. We can be outside of nature in a detached position of experimentation and mastery. And finally, humans can be in nature without any specific position. The last point is inviting. Eventually, to share spaces is the art of inhabiting this world, from the minuscule to the gigantic (see, Bachelard, 1957), all have an existence to be acknowledged. To live with, and to think with is an art, with no precise position but one's very own positionality. It is an art to learn to enter in

relation with these other positionalities. And it is in this space of multiple scales in which we live and construct ourselves that lie our responsibilities as being in relations with one another (Massey, 2004). What if, instead of thinking about, we started to think with?

I propose to start thinking differently in terms of a relational ontology that connects humans and more-than-humans together (Daly, 2016, 2022). The aim is to challenge the modern view of humans as mere consumers as the center of the world, an image fostered by corporate companies. Instead of this human-centered ontology, I suggest developing an ontology were humans think in companionship with nature and build in relation with nature. In light of the profound ecological and social changes that are here we need to find new ways to think creatively (Montuori, 2003) not only about the planet but about our relation to it and where we stand in this relation. What if this relational ontology was considered under an ethics of care (Lawson, 2007)?

*Care ethics, or how to deal with complexity*

Complexity cannot be dealt with by only simplifying (Morin, 2015a). Maybe complexity could be embraced with another angle such an ethic of care (Daly, 2022). It is indeed difficult to have the public be sensitive for distant and unfamiliar spaces such as the ocean and its coastal peoples (Schuldt et al., 2016). An ethics of care (Hamington & FitzGerald, 2022) may be a starting ground to develop an alternative conceptualization of our relation to the ocean and its issues of environmental and social injustice. Daly (2022) stresses how the bottom-up approach (Held, 2005) of a care ethics is relational and "begins with the particular, the first-person perspective, the body, situatedness, affectivity, and relationality or intersubjectivity" (Daly, 2022: 4). Instead of considering the large scale, what if what was embraced first was the positionality of the individual? And Lawson underlines that a care ethics is not only for the local but should be extend to distant others (Lawson, 2007: 6). Indeed, the idea of a "distant other" is central in these global issues. Distance affects a capacity to think a change is

possible. Many Westerners are too often severed from the idea that relations exist and that eventually connections are many more than they think (people are amazed when they learn that fishmeal is made of small pelagic fish that come from Western Africa…and that they are related to Africa in direct material ways).

A care ethics has the advantage to be embedded in the here and now. To care should not be reduced to caring for a resource for future generations. This type of care – this attention – has the downfall of projecting ourselves into the future whereas it is the here and now that truly matters; the present space and the present time. It is harder to enter in resonance with what has not yet happened (all the more when this thing to come is depicted as negative); it is certainly easier to enter in resonance with what is in front of our eyes. But it is also more painful because we are faced with our own responsibilities (past, present, and future). However, a care ethics is a positionality of thoughts and these thoughts should be directed toward the construction of a different present and future world.

Care ethics have also a way to bring forth political dimensions of environmental issues and to force solutions to be found at that specific level (Larrère & Larrère, 2015: 392). For instance, if environmental issues are of private companies doing, then it is this perspective that should be first analyzed. Care ethics and environmental ethics (Hourdequin, 2021) have much to work together to offer new and original pathways (Flower & Hamington, 2022). The meeting of both may spur creative conceptualization of questioning our relation to the environment, and proposing alternative ways of perceiving our relation to the (socio-) environmental, suggesting practical directions to engage with present and contemporary issues in a way that moves us toward multispecies justice. What if care ethics was a starting point to be playful with worlding processes?

*Worlding: to be playful with the oceanic world*

Contemporary issues require one to think and consider multiple dimensions at the same time. In inquiring into specific issues, analysis would improve if we considered the context that has been created in which specific issues manifest. The "world" could be considered as something constructed which means it could be constructed differently. Thus, instead of focusing on "nature" or the "environment" the focus should be put on the world itself, or more specifically the discursive processes that are structured to give existence to that world. This worlding approach has the advantage of decentering the human and embedding it within something larger and co-constructed. Instead of looking at "nature" or the "environment" from an external standpoint, it is the construction process that is analyzed. It forces one to consider the positionalities and relationalities at play. It creates a lot of space to play with and in which to position various actors. For instance, fishmeal and fish oil production is not reducible to the world of salmon aquaculture and feed production corporate companies. Fishmeal and fish oil is related to small pelagic fish that also belong to the world of the Senegalese shoreline peoples.

Worlding can become a process of imagination and creation. It can be used as a means to imagine scenarios for the future. Merrie and colleagues (2018) have for instance worked on creating future credible science-fiction scenarios to sensitize the public to oceanic issues. In a similar vein, Kelly and colleagues (2022) acknowledge the necessity to develop, in co-creation, alternative scenarios about the ocean, with artists for instance. There is a call and an understanding of the necessity to imagine differently a relation to the ocean. This resonated with me as this project was initiated after experimenting Emeka Ogboh's installation *The Way Earthly Things Are Going* (2017) at the Tate Gallery (London, UK).

However, these approaches I am describing above are speculative in nature. They set humans in the future to stir an emotion and a response today. But then? What to do now? In which direction to go and how? As stated above, thinking in terms of care ethics implies positioning

oneself in the present, here and now. The aim is not to imagine a utopian future. The aim is to be attentive to what is happening right now (Daly, 2022) and from this present situation, to develop other worlds relationally. And to work relationally, this requires to ask where we stand: are we observing or participating in this world? And are we outside of it or in it (Montuori, 2003)? What if we started developing applied care ethics to be connected to that distant other? And what if we played at building a world in relation with natural features such as the ocean?

*Thinking with the ocean*

What if a methodology was inspired by the ocean and thus helped us *think with* the ocean? By thinking with, I mean the ability to invite features of natural elements to creatively help us think or build a world. The use of a natural feature, such as liquidity to think modernity and society, has already been proposed and implemented earlier by Zygmunt Baumann (2000). The aim would thus be to borrow key oceanic features and then forge these elements together to think about and give context to a subject. The ocean has been a mirror of the pride of our technological feats, as shown in the first chapter. But what if the ocean stops being a reflection to become an alterity that challenges what we think we know (DeLoughrey & Flores, 2020: 138)? DeLoughrey and Flores (2020) have shown how the ocean can highlight the complexity and the tight relationality between the global and the local with a "tidalectic" approach, a process they include within what has been coined the blue humanities or critical ocean studies. Another possibility proposed by Bear (2017) stresses the necessity to consider more strongly the relationality between the ocean and the land as two features that are not separated from each other but co-constitutive. Finally, Steinberg and Peters (2015: 248) have invited researchers to embrace a "wet ontology", taking into consideration the verticality and volumetric nature of the ocean, its immanence and fluidity as a means to reimagine the world we live in. Fascinating in this instance is how natural features help us think beyond our

traditional categorizations. With the ocean, we embed ourselves within that feature and we challenge the academic detachment of the "god eye trick" as Donna Haraway has pointed out (Haraway, 1988).

Practically and as an example, to think in terms of oceanic volumes offers original ways to develop a thought process. What about using the water column to conceptualize our thoughts? The deeper, we go, the higher the pressure is, hence the more compact should be our ideas. However, the deeper we go into the ocean, the darker it becomes. This darkness leaves space for the unknown, for what lies in the shadows. In water, our perception is blurred, a reminder that vision – thoughts – can be altered, and that our world is a visual construction (Zhong Mengual, 2021).

Eventually, haven't Deleuze and Guattari (1994): 85) suggested that "thinking takes place in the relationship of territory and the earth"? It is this invitation – to think with the earth – that is enthralling, all the more so in these times of profound ecological change. If the ocean is a social construction (Steinberg, 2001), then what if the ocean became a participant of our very own social construction and transformation of just oceanic relations?

## IV. Final (and opening) wor(l)ds: a message to my children

Rosa (2021) stresses the possibility of being differently in the world and invites his readers to think in terms of resonance to that world. In his analysis, he invites us to inquire into the type of relations to the world that are built. What types of relations to the ocean-world are built and with what consequences for whom? This inquiry is what this dissertation strived to do. It is but a first, small, step toward building another world with which to enter into resonance. By resonance, I understand the ability to listen to oneself as well as the other. To be in resonance with this world and firmly grounded in oneself is an art that I wish for my children.

Food should not be reduced to feeding oneself. Food is more than food, it is worlds within worlds. Food brings us back to planetary issues and to a relation to this natural environment and eventually to our very survival as a species. Food binds us together be it around a fire, a table, a plate, close or distant. Food – *comida* (Esteva, 1994) – is an invitation to a multi-sensorial act of being and sharing. It is a knowledge, a gift, I wish to offer to my children.

This dissertation aimed at showing that since worlds are created, they can be recreated differently. It is not technology that forges the world, technology is only a tool for a specific vision. And in profound times of ecological and social changes, we require new visions for another, better, future. Humans should position themselves not against nature or above it but in it, amidst of it. Whatever is done, it is done concomitantly with it. The idea could be pushed to the point that nature itself can become an actor that helps us reflect on who we are and where we go. In this process, we are required to embrace the unknown, the not yet seen, and the impossibility to foresee, predict and control everything. Spaces of shadow exist and they must be acknowledged so we can learn from them. In sum, I have learned that it is important – and that it is an art – to accept to be surprised and unsettled. This art should teach us to be flexible, reflexive, creative and imaginative in all the challenges to come. This dissertation participated in teaching me that at times we should just stay quiet, listen, observe. And feel with our body.

Other worlds are possible. They are ours to build. I wish to tell to my children that doom and gloom is but a message, a construction. Hope and beauty are still possible. They, in themselves, are the expression of it. It all starts here, now, and within oneself. I wish for them to embrace a poetic of space and time (Bachelard, 1957) and be the creators of a new ecology of imagination (Stépanoff, 2019b).

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