Chapter 2

Climate Change, Weather and Perception

Fishing in Eastern Patagonia

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Today, coastal net fishing is practised in both gulfs of the Valdés Peninsula: Nuevo and San José Gulf (Figure 2.1). The great majority of net fishers lives in Puerto Madryn,[1] on the southwestern coast of Nuevo Gulf. To go fishing, they drive between a dozen and almost two hundred kilometres, depending on which fishing beach they intend to reach. They usually go fishing for one day (or night) at a time, and very occasionally spend a few days in temporary camps on the coast. For the sake of clarity, I focus on coastal net fishing, though the central themes of the chapter also apply to the other two local artisanal techniques: inshore harvesting and commercial diving. The origins of local modern coastal net fishing date back to the beginning of the twentieth century, when Italian and Spanish immigrants settled in Chubut Province. The immigrants designed the three-metre rowing boat – which is still in use, though the materials used at present to build the boats are much lighter (fibreglass or a mixture of fibreglass and wood) than those used in the past (only wood) – and began to fish, in the same way as they had already introduced on the northern coast of Argentina (Mateo 2015).

The quantity of fish caught, and the time needed to do so, vary considerably and depend on experience, season and weather conditions. In particular, choosing the specific place to cast the net can take several hours of rowing and walking in the shallow coastal water. Through experience of fishing, the fishers' perceptions and actions have been fine-tuned in relation to their environment. This relationship with the environment is underpinned by a knowledge that is, as analysed by anthropologists in different contexts (for example, Ingold 2005; Vannini et al. 2012), place-specific, relational, multisensorial, activity-related and narrative.

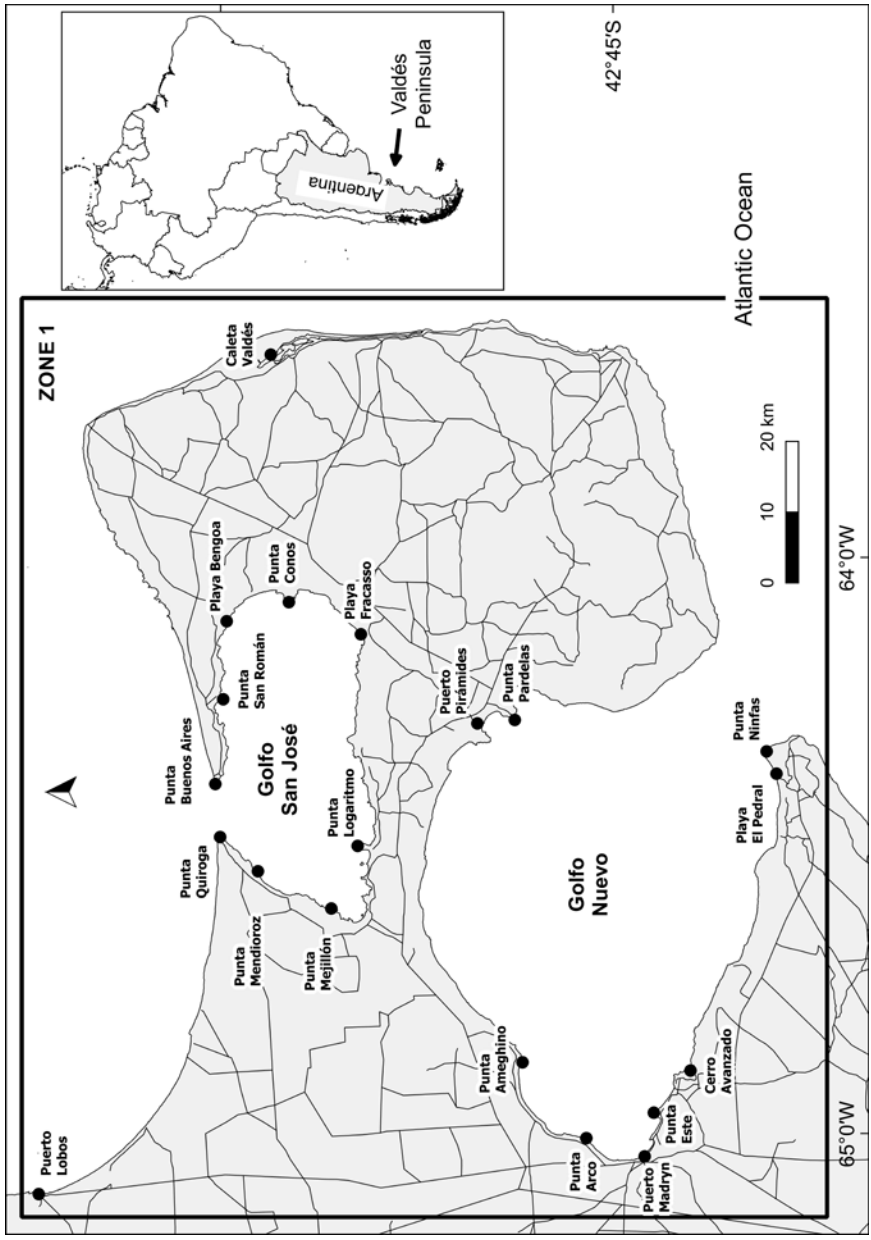

Figure 2.1. Valdés Peninsula map (thanks to O.P. Dell'Arciprete at CESIMAR-CONICET for producing it)

I begin this chapter by introducing the complexity of what are called 'seasons' in coastal net fishers' lives. In order to understand this fully, it is necessary to explain, as I do in the central part of the chapter, how fishers' skilled perceptions intermingle with algorithm-based weather forecasts. The combination of these two different ways of being attentive to weather events demands a certain amount of flexibility from fishers. In the concluding section, I explain how such flexibility can help fishers develop the ability of 'anticipating' (Nuttall 2010) the changes of the environment related to both weather and climate, and modifying the ways they fish.

The Seasons

> While we watch the sea and wait for the weather to improve, Tomaso[2] comments, 'Here we have cast some good nets. But it's been two or three years since we have had a good catch, as good as before. I don't know why. Before the wind used to keep from north, or from south, for seven and even up to fifteen days. Now there are three different winds per day. That's why we don't camp here anymore. It's senseless. Even before we did not stay here for a whole month; we used to go to [Puerto] Madryn at weekends. But it made sense to camp here because we had the same wind for many days.' He explains that it used to be different. During winter, it was cold and they fished silverside and Patagonian blenny. During summer, in the heat, they fished juvenile silversides. 'There used to be seasons [*temporadas*].' (Fieldnotes: 9 June 2015, Playa Villarino, San José Gulf southern coast)

> Tomaso: 'There are no seasons [*temporadas*] anymore. We need to learn again.' (Fieldnotes, 31 January 2016, Puerto Madryn)

When Tomaso talks, he seems to jump from one meaning of the word 'season' to another without specifying whether he is using it in the sense of the fishing, biological, commercial or even climatic 'season'. In Spanish there are two terms for 'season': 'estación', when referring to the climatic seasons,[3] and 'temporada' for the other three meanings mentioned above. Nevertheless, the features of the different meanings intermingle to the point of the two Spanish terms merging. At first, listening to Tomaso may appear slightly disconcerting, but the point is that he does not consider the different meanings to be separate. Once the activities, knowledge and skills needed in coastal net fishing are understood, the complexity of the term 'season' – as a combination of 'estación' and 'temporada' – becomes understandable. This became apparent during the fishing days in which I took part. Artisanal coastal net fishing is practised by a team of two to four fishers, with a seine net of between 70 and 100 metres in length, and, as mentioned, a three-metre rowing boat, which can also be occasionally

used with a little portable outboard motor. Fishing mainly targets silversides (*Odontesthes spp*.) and Patagonian blennies (*Eleginops maclovinus*) (Ré and Berón 1999) during the day or, more rarely, at night. Made up of sand or pebbles (Figure 2.2), protected by promontories or exposed to the strong Patagonian winds, fishing beaches differ in size, ranging from a few hundred to thousands of metres long. At the back of some beaches are cliffs, while others merge into the Patagonian steppe.

Watching and Listening

On every fishing trip, the choice between dozens of available beaches is itself the result of knowledge acquired over many years. Fishers are particularly attentive and responsive to a variety of factors. Some of these concern the recent weather:

> Alfredo justifies his decision of reaching the beaches several hours before the right time for fishing by saying he wants to see whether there is seaweed on the shore. If there is much seaweed, the net would become very heavy. He thinks there might be seaweed because there have been many windy days and seaweed might have washed ashore. The first beach we go and watch, we get off the pick-up truck to get closer to the water. We walk for a while on a hard surface covered by *mejillín* (a tiny mussel), an intertidal reef, I suppose.

Figure 2.2. A pebbled beach partially protected by a cliff, on the coast to the north of Puerto Madryn (photograph taken by Francesca Marin)

> We can see neither young nor adult silversides. Alfredo suggests getting back to the vehicle and going to check other places. At the second beach, we do not even reach it by vehicle, since from the main beaten earth track (which is elevated here compared to some of the other beaches) we see the shore is 'dirty'. Alfredo makes me notice the different colours of wet and dried seaweed. The third beach is more protected from the wind and 'cleaner'. At the fourth beach, the sea is rough again. We have to wait: fish are not approaching the shore yet. (Fieldnotes, 15 December 2014, Puerto Madryn and beaches northward)

Additional factors are related to the presence of fish and other animals. For example, 'terns[4] that are diving' is interpreted as a sign that fish are swimming closer to the coastline. However, terns are not always present, nor are they the only factor to consider. A beach is often chosen due to it being sheltered from the wind, not having too much seaweed, being where there are no other fishers, especially if the beach is not too large, or presenting easy access. Most importantly, though, the presence of fish should be verified before starting fishing. When a beach satisfies all these requirements, the fishing team get out of their vehicle and subject the beach to a deeper inspection from elevated land formations, if these offer a view of the beach, or by standing close to the seashore. The fishing team observe the sea in silence for some minutes. They try to find out if and where there is a shoal they can reach. Concretely, they look for a slight change in colours: a spot, a darker area in the seawater. The darker the spot, the higher the density of the shoal underneath it. Sight is fundamental in this task and is carefully trained by fishers any time they pass close to the sea, even when they are not planning to go fishing. Fishers train their sight in relation to different types of light, particularly at night, when, in order to see, fishers use a handheld torch. As I was taught, when it was my turn to use the torch, the beam of light has to hit the water at the appropriate distance: neither too close, as the fish rarely stay very close to where the waves break, nor too far away, where light disperses in the darkness. The movement should be neither too fast, when it would be impossible to see any fish, nor too slow or of long duration, when fish would be disturbed and possibly flee. Similarly, so as not to disturb the fish, as soon as the hand movement is completed, the light must immediately be switched off:

> I try to simulate the semicircle I saw Alfredo doing, from left to right and back, but the result clearly does not satisfy him. Even after the catch, when I am asked to point the beam onto the net, I am criticized for lighting up the water: 'You mustn't do that! Only when we are looking for a shoal.' He explains that the light is not simply meant to make us see whether there is a shoal of jumping

> fish. The light makes the fish jump; it modifies their behaviour. (Fieldnotes, 15 December 2014, the coast to the north of Puerto Madryn)

Light is used sparingly, and fishers develop skills that combine hearing and sight. Hearing helps compensate for the limits of vision. Fishers stop moving, remain silent and listen to the fish jump. The stronger the sound, the higher the shoal's density. Once this has been heard, the light can be switched on to confirm the direction the shoal is moving. By checking the dimensions of water movements caused by the jumps, fishers deduce the dimensions of the fish themselves. Nevertheless, this technique works well only when the wind is light and allows the sound of the shoal to emerge. In northeastern Patagonia, fishing activities have often to contend with winds of at least nine knots. Such a wind, together with the waves, covers the sounds of the fish. Moreover, there are often medium to strong winds (15–25 knots). On these days, hearing is of no help and eyesight is significantly disenabled. Fishers only go net fishing in these conditions if they are in urgent need of money.

Forecasting and Perceiving

To avoid the problems presented by strong winds, fishers put in place a number of strategies. They listen to local radio and television, and consult internet forecasts on their smartphones (or call relatives and friends who have access to these devices). Forecasts from these media are useful tools, but three aspects have to be kept in mind: they can be wrong; they are of a different scale compared to the fishers' forecasts; and they can never replace fishers' perceptions.

I use the term 'scale' in the sense of spatial scale and do not intend to draw a parallel with the concept of time scale often invoked by climate scientists. Most of them point out that climate is out of reach for ordinary people whose climate experience is based on the senses and does not go beyond the short time scale of weather. Such researchers emphasize that they instead operate on a long time scale, the climate scale. This distinction between weather and climate allows the researchers to underline the limit of people's knowledge, including indigenous peoples, who lack instruments, methods and technology to step outside everyday present experience (Simonetti 2019). By contrast, the difference in spatial scale between media forecasting and fishers' anticipation suggests that fishers' knowledge is not lacking in terms of broad vision, but rather is enriched by their ability to understand not only atmospheric phenomena but also their relations with the environment (beaches, bays,

headlands) and with the fishers themselves. This should appear clearly in the conversation excerpts I analyse below:

> Alfredo: Hi Francesca, how are you doing?
>
> Francesca: Hi Alfredo, good. And you?
>
> Alfredo: Could you check the forecast for me?
>
> Francesca: Sure, for where?
>
> Alfredo: Have a look at the area round here, Cerro Avanzado.*[5] For today in the afternoon.
>
> Francesca: It's bad, 20 knots at three, 25 at six and 24 at nine.
>
> Alfredo: And where's the wind from?
>
> Francesca: South at three and six. Then at nine, it's southwesterly.
>
> Alfredo: Oh, that's not bad. It's hitting the beach OK.
>
> (Fieldnotes, 8 January 2015, Puerto Madryn, phone call)

Such forecasts are indeed far from being the only way to foresee what the weather will be like before going to fish. Asu Schroer explains that for the falconers with whom she worked, the local media forecasts can only vaguely predict 'the weather that will actually prevail in the hawking location' (Asu Schroer 2014: 183). Fishers, when they can, also try to verify whether the internet forecast is correct. When they check the forecast for the southwestern coast of Nuevo Gulf, where Puerto Madryn lies, they go out and have a look at tree branches, flags and anything else waving in the wind. Nevertheless, it can be worthwhile approaching the coast and observing the colour of the seawater. When there are plenty of white horses, the sea is evidently rough. In such circumstances, fishing might prove rather difficult, as the only way to find fish is by walking back and forth along the shore, while stopping from time to time to fix your gaze on the water's surface. The rougher the sea is, the longer this search takes.

Despite the different strategies put in place, sometimes fishers are there, in front of the sea and potentially close to their catch, and yet obliged to admit their momentary inability to see and hear because the sea is too rough. This may happen when wind direction changes unexpectedly or because fishers have to rely on media forecasts only, as is the case when they decide to go fishing on a beach far away. When they are in front of the sea but 'unable to see', they decide to wait until the wind calms. They stop and have a *mate*[6] or chat about the weather, the latest extraordinary catch, the problems having their catch accepted in processing plants and other work-related topics. The more impatient ones go back to their vehicles and move towards more sheltered beaches. The point is that, by their

very nature, these forecasts give no more than an indication of what the weather might be like in a certain area. Indeed, there is a significant difference of scale between internet forecasts and fishers' forecasts:

> Francesca: I think I understand the wind. If it comes from the coast…
>
> Tomaso: Always from behind, to not have waves.
>
> Juan: It has to hit you from the back. Here, at the Indio,* for example, you need wind from the west.
>
> Tomaso: This wind now would be good for Colombo,* let's say.
>
> Juan: Colombo,* Pardela*.
>
> Francesca: And why didn't you go?
>
> Tomaso: Because it is a 30 km wind. That is the only beach where you need a wind less than 18 km.
>
> Francesca: Why? Because there isn't any cliff?
>
> Tomaso: It is a long way back and the tide goes out a lot. I don't know why wind speeds up so much there. But when it is over 20 km, it knocks the shit out of you. Instead, here you can go fishing with 25, 27 km.
>
> (Recorded conversation, 12 March 2015, Puerto Madryn)

Fishers and other people accustomed to the coastal environment know that a wind blowing strongly from, for example, the south does not prevent fishing activity, which still remains feasible in most of the north-facing beaches. In particular, fishers develop the skill of perceiving wind and tides as 'made up of forces, changing, opposing each other' (Howard 2012: 135). Indeed, they explained that any kind of obstacle (including sand dunes, small bushes and buildings) is good for easing the encounter, along the shore, between water and earth. Thus, moderate to strong winds might not be a problem if one can go fishing in coastal areas protected from those particular winds. Moreover, beaches of the protected coast may still be exposed to winds, while beaches of the coast facing a particular wind can escape from it due to the morphology of the coastline. Like the kayakers Senior got to know for her research, fishers 'need to pay attention to how the shape of the land might interact with the wind to produce micro-conditions along the coastline and how different wind strengths and directions may combine to produce different results' (Senior 2015: 119). Thus, the knowledge about what winds each beach is individually exposed to, and protected from, is only available to those familiar with the shallow waters and seashore, a knowledge and familiarity that characterize the artisanal fishers' life and work. Furthermore, changes to coastal and urban morphology are sufficient to suddenly expose a previously

protected area (for instance, when some coastal sand dunes disappear) or, on the contrary, to give it shelter (for example, when wind-breaking edifices are built behind a beach). Therefore, regularly visiting different sites is essential. 'Knowledge of wind acquired in other contexts is certainly germane, but is not sufficient. It needs to be qualified and adapted in relation to this place, to this activity' (Senior 2015: 112). More generally, the fishers' experience confirms that 'the scale of any element is proportional to its effects on other elements. These properties are not given prior to specific relational engagements' (Leach 2006: 159).

Finally, beyond the potential inaccuracies of forecasts and the matter of scale, there is a key difference between the information given by a weather forecast based on a mathematical model and knowledge resulting from a combination of such a forecast and the weather experience as lived. Generalized weather forecasts can give wind strength and direction, but cannot take into account how winds and sea waves interact with the different boats, nets and fishing manoeuvres. Media provide information that people can communicate, as I did myself when I gave information about the forecast on the phone. However, according to Ingold (2000: 21), information does not necessarily form a basis for knowledge; rather, 'knowledgeability' consists of being able to situate such information and understand its meaning. For example, fishing boats are all slightly different in terms of shape, weight and levels of maintenance: faced with a rough sea, they behave differently. So do fishers. Each fisher knows his boat's reaction to waves, its weight when it gets stranded, how far he and his fellow fishers are willing to let the boat sink, or how ready they are to throw away the catch to avoid this. Such knowledge informs concepts such as 'strong wind' or 'bad weather' and helps draw a line between 'choppy' and 'rough' seas. There is no pre-established threshold beyond which net fishing is not practicable, and acceptable risks differ from team to team. In effect, weather can be considered in isolation from activities, such as fishing, only theoretically. In real life, we are continually subject to the fluxes of weather (Ingold 2010), in which we are immersed, and that transform all our activities and perceptions (Senior 2015: 100–34).[7]

Preparing, Casting, Hauling and Boxing up

The most common boat amongst the fishers is a 2–3-metre fibreglass one. It is equipped with two wooden oars and a fishing net, accurately placed over the stern so that it can easily be dropped into the water, without getting tangled, when the moment comes. During the casting of the net, one fisher stands in the water up to his knees or hips near the shoreline,

holding one end of the net. The second fisher stays on board and rows so as to make the net fall from the stern in a curve (Figure 2.3), the ends of which are the first fisher and another point along the seashore up to 50 metres away. Although fishers tend to fish in familiar environments, what they do is similar to wayfinding:

> 'Finding one's way' is not a computational operation carried out prior to departure from a place, but is tantamount to one's own movement through the world … we know as we go, not before we go. Thus the operation is not complete until one has reached one's final destination: only then can the traveller truly claim to have found his way. The notion of 'finding' has here to be understood in its original sense of exploratory movement, at once improvisatory and assured, guided by past experience and by a continual monitoring of fluctuations not only in the pattern of reflected light but also in the sounds and 'feel' of the environment. (Ingold 2000: 239)

The manoeuvre ends when the boat reaches the shore again. If there is a third or fourth fisher, they help by grabbing the second end of the net while the person on board gets off the boat and anchors it. They will then all haul the net out of the water, through slow and regular movements of their arms, counterbalancing it with their whole body through a skilful but taxing movement. One or two fishers haul the net from one end, and one or two haul it from the other end. Simultaneously, they walk towards one another in order to close the loop (Figure 2.4). While hauling the net,

Figure 2.3. Fisher rowing to cast the net (photograph taken by Francesca Marin)

fishers observe the fish, to check that they have gone into the bag of the net, where they will not be able to escape.

Usually, the net is cast in waters up to 6 metres deep (corresponding to the maximum height of the net). One edge of the net has weights on it and lies on the sea bottom, while the other has floats and remains on the surface. The fish have practically no way out. Nevertheless, if the water is moving a lot and lifts the lower edge, fish might be able to escape. In these circumstances, fishers lift the floating edge and beat it a few times on the water. The noise is meant to scare the fish, make them gather in the middle of the net and enter the bag. Only a detailed knowledge of the place allows the fishers to cast and haul the net efficiently, as underlined in Juan's tale:

> Juan: 'How strange', I said one day [to Ortiz], 'how strange that you don't catch what you should catch given that you have been fishing for so many years.' Once, we [two fishing teams] were fishing. We were doing alternate casts. There were fish in an area, we had seen them but didn't cast the net because we knew that in that area the beach has small waves underneath the surface, a whirlpool that turns over the bag [of the net] and prevents you from fishing. Ortiz cast the net and caught nothing. I told him: 'Man, a knowledgeable fisher cannot make such mistake! Like that you are making your men work for nothing.' (Fieldnotes, 9 June 2015, Puerto Madryn)

After hauling in, fishers stand in shallow water 30–100 cm deep, emptying the net while making sure that the neither it nor the boat gets stranded

Figure 2.4. Fishers hauling the net (photograph taken by Francesca Marin)

(Figure 2.5). This is partly achieved by estimating the available time before the tide goes out, based on the tide timetable and the knowledge of the formation of the beach and seabed as the water recedes. An estimate is a useful tool of anticipation, but not much more than that. Far more important is the relationship between fishers, a boat's movement and the movement of the water, the 'fine-tuning of perception and action' (Ingold 2000: 37). While the fishers empty the boat, it is floating in water that is as shallow as possible, normally a few dozen centimetres (Figure 2.6). Deeper water would mean more movement of the boat, complicating the boxing-up. During a falling tide, it is not sufficient to make this evaluation once, because wind strength and direction can influence the tide, increasing or decreasing its levels; rather, fishers must pay continuous attention to the movements of the boat. This attention is multisensorial. Through sight, fishers can establish how much the water is diminishing under the boat. Actually, thanks to the tightening and freezing (during cold months) or cooling (in summer) sensations of water, fishers can feel whether they are submerged up to their waist, knees or ankles without the need to look at the seawater. Finally, leaning against the boat with their bodies, or pushing and pulling it to stabilize or move it, they feel how responsive the boat is to their solicitations. If the boat reacts slowly, this means that

Figure 2.5. Fishers carrying a boat at low tide (photograph taken by Francesca Marin)

it is getting stranded and has to be pushed towards the open sea before it is too late.[8]

While determining the logistics of emptying the net, fishers also have to take into consideration the weather, the temperature of the air, the brightness of sun and the behaviour of fish and seagulls. When the sun shines high in the sky, fishing manoeuvres have to be realized more speedily, for the heat can easily spoil the catch. When it is hot, the catch must remain in the boat. If the catch is put in stacks of boxes (Figure 2.7) while the team keep casting the net, these are left close together, all along the beach. This is because in order to keep the catch fresh, they should have seawater poured over them by someone going back and forth. A piece of thick cloth covering the stacks of boxes is good additional protection from the sun. The cloth is also useful against seagull attacks. It only takes a few minutes to have a flock appear, apparently from nowhere, once fish are left unattended. While bird attacks can be seen and heard from far away, the effect of the sun on the catch is less easily visible from afar. The physically demanding activity makes fishers sensitive to solar heat, but they are also partially submerged in water that cools them down. As any mistake in assessing the temperature could mean the catch spoiling, fishers pay particular attention to it through touch. By passing a hand through

Figure 2.6. Fishers emptying the net (photograph taken by Francesca Marin)

the juvenile silversides or by grabbing a bigger fish, an expert can easily gauge whether they are getting hard from the heat of the sun.

The fishers' multisensorial perceptions of the environment, weather and animals' behaviour, and their interaction, have to be augmented by a cautious anticipation of the forthcoming weather influences. Fishers interpret weather changes as rapid as a gust of wind, and respond promptly to them, by changing the ongoing activity or concluding it, if necessary.

Practising Forecasting Flexibility

Fishers become skilled at making last-minute forecasts, their combination of the public forecast heard on the radio or checked online, personal forecasts realized by observing the colours of the sky during the previous day or hours, and their perception of weather on the spot. While working on the seashore, fishers pay attention to the colour of seawater, to animal attitudes and to how the sky looks. When seawater turns dark – dark green according to some fishers, black according to others – strong wind is approaching:

> Valeria: Later it will all be north [wind], you'll see, because the breeze has come. When people say 'the breeze is coming', it means that you see the sea becoming darker, greener far away and whiter closer to the coast. There was a woman in

Figure 2.7. Fisher resting in the shade of stacks of boxes (photograph taken by Francesca Marin)

> [Puerto] Madryn who used to say: 'the breeze is coming'. All people went out to see, but did not know what she meant. (Fieldnotes, 12 May 2015, El Riacho)

Animals are also good indicators of upcoming weather. The uncommon presence of dragonflies signals approaching rain. 'When seagulls [and other birds] go out [inland] it is a sign of an upcoming sea storm' (Antonio, 24 February 2016). Fish leave the coastline long before the storm comes. Unlike birds, which fly inland, fish move towards the open sea:

> Tomaso: Fish know everything. They know when the tide is about to fall and when the weather is bad. You may be fishing very well when all of a sudden the fish disappear. What happened? You did not notice it, and if you don't pay attention, the wind comes along. Instead the little guys have gone, before the bad weather starts hitting them, before the waves start breaking.
>
> Francesca: And what does the bad weather do to fish?
>
> Juan: It hits it a lot. Therefore, the little guys go 'inside' [out to sea].
>
> Tomaso: Instead of staying near the shore and eat, they look for depth and salvation.
>
> Juan: It's just like us. You say: 'How far can I go inside the sea? At what point does it start being dangerous for humans?' Well, for our guys it's the same. When is it dangerous for them to remain near the shore?
>
> Tomaso: It's like us. We know when rain is coming and it's the same for them.
>
> (Recorded conversation, 12 March 2015, Puerto Madryn)

Listed here, out of context, these signs may seem to leave no space for alternative interpretations. In reality, the tricky aspect of the continuous attention paid to the weather, before and during the fishing, is that there are contradictions. More precisely, there are difficulties when the weather perception does not match what the fishers themselves have seen earlier in the sky or the previous forecast coming from communication media. Eastern Patagonia, flat and swept by strong winds, is known for sudden weather changes. And yet, the signs of forthcoming wind or bad weather may or may not make it possible to understand in advance the intensity of a weather event and when it is going to occur. Dragonflies forewarn of rain, but not the intensity of the rain. The sea turns dark far away, when the 'breeze' is coming, but will it be so strong as to impede fishing? Birds and fish protect themselves, but how long before the situation becomes dangerous for fishers? These are delicate questions to answer, as to stop the fishing activity due to a false alarm would lose an opportunity for a good catch. So, the tendency of some fishers is to hope that an internet forecast of good weather is correct, despite appearances – like Rodrigo, who, facing a sea full of white horses, told me: 'Do you see this? It was

supposed to be nice weather, and now a south wind is blowing. But nice weather will come later!' Nevertheless, the consequences of ignoring a sign or bad interpretation may be much worse than missing a potential catch. They could include abandoning one's boat and returning on foot, as Tomaso and his father told me:

> Juan: The forecast said it would be calm. You trust it and then, you see?
>
> Tomaso: We went there confident, it was flat. Suddenly, we saw a cloud. But you see, it may make some drops fall and then go away. You know how it is, the peninsula attracts all storms passing close to its edge. We thought it would pass and go away. No way. The cloud left and the wind remained. A strong one!
>
> Juan: We had to come back on foot [leaving the boat on the beach].
>
> Tomaso: We walked almost two hours. It's incredible how far the tide goes out. (Recorded conversation, 12 March 2015, Puerto Madryn)

In the worst cases, vehicles might get stuck on the beach when the high tide reaches them. Then, fishers might have to go back on foot, walking distances of dozens of kilometres just to find a place where mobile phones work. In a few hours, the damage caused by seawater to their vehicle could be very serious. Rather than preferring the personal and direct fisher's capability of forecasting over the internet or radio forecasting, or the other way around, fishers think they need to mix both and be ready to change their own forecast rapidly. Bearing in mind what they learn from the internet, they arrive at the beaches ready for sensations – on their skin, ears and eyes – that will confirm their expectations. They are not merely discovering the weather, hour by hour – they are, above all, checking with their bodies estimations they have already made before leaving home: that it will be a nice and calm day with light winds. If they perceive something contradictory, fishers will need to decide whether to rely on their perception and ignore the previous forecast, or whether to call their own perception into question.

Changes in weather are not the only reasons why the fishers modify how they are working in a particular moment. After throwing the net once or twice, all decisions have to be put to the test. When the net is emptied, the fishers understand whether their expectations will be satisfied or not. They check what is in the bag of the net before emptying it in the boat. For instance, is it a shoal of juvenile silverside of the correct size (normally 5–10 cm), as they thought, or are the fish too big? If it is a shoal of Patagonian blennies or adult silverside, then the fishers hope they will all be the same size. If the catch does not correspond to what they were looking for, the fishers begin their evaluations. If the weather

forecast for the following day is good enough to go fishing, a choice has to be made between a not-so-good but guaranteed catch today and a potentially better catch tomorrow. The problem is that the market for fish is mostly determined a long way from the coastal fishing beaches. Fish-processing plants are highly selective when it comes to buying products from coastal net fishing. This is because the plants earn their main income from processing and selling prawns, a product of industrial and larger-scale artisanal fishing activities. Consequently, what they are willing to receive from small-scale fishers is strictly related to the room available and processing staff they have after processing the prawns. So, the choice between releasing the catch and going to look for a better one becomes harder. They could go looking for shoals of younger fish in those beaches where 'fish come in later' ('coming in' is used as a synonym for 'approaching the coastline'). The shoals approaching the coastline to these beaches, compared to those approaching other beaches, are normally made up of younger (and smaller) fish. But it seems that more and more young fish get mixed up with older fish in single shoals, and the reproductive cycles are no longer what biologists found locally in the 1980s and 1990s (Elías, Ré and Gosztonyi 1991; Ré and Berón 1999). Tomaso explains how this apparent reproductive change intertwines with the way in which the processing system functions, resulting in a situation that is difficult to manage:

> What happens is that young silverside is good till this size [indicating a size of 10 cm with thumb and index finger]. If you don't catch it, it grows and does not suit [anymore]. Silverside born in September or October does not suit you now [in March]. And young ones get mixed up with adults. A real mess. You are not sure it will be all the same size. And when it is mixed, you have to kill a lot uselessly. Whilst if you knew there is a plant buying young silverside in October, you would know you can start fishing for it, although it is never a full boat at that time of the year. And you do not need to hurry to fish later on. Imagine you go for adult silverside and find ten boxes of young silverside. There would be no need for wasting it. I have frozen fish at the new small plant, from last year. Big plants should do that as well, give room to keep our frozen products. But they don't give a damn about us. (Recorded conversation, 12 March 2015, Puerto Madryn)

From Practical to Conceptual Flexibility

So, what is Tomaso referring to when he says 'there are no seasons anymore'?

He is referring to the juvenile silversides, which no longer only approach the beaches from January to March. Now, they 'come in' later and, what is

more, can come over the whole year. As a result, there are small amounts of juvenile silverside approaching the beaches throughout the year, and the distinct and massive presence that once started in January – until recently considered normal according to biological studies (Elías, Ré and Gosztonyi 1991; Elías et al. 2011; Ré and Berón 1999)[9] and to the experience of fishers – no longer occurs. Again, from a biological point of view, this means that there is no longer only one reproductive cycle in the year, but several, and the primary cycle begins later than it used to. Hence the expression 'we have to learn again' (Tomaso, 31 January 2016): the fishers need to change the attention they pay to beach features. They have to behave as an apprentice, testing new techniques, looking for new places or going to the same beaches as before, but in different periods of the year. They have to accept that they are learning and they will, probably more often than before, go fishing in vain. Tomaso speaks about the way in which juvenile and adult silverside are mixing together in the same shoal. These catches are particularly difficult to manage, as fish of different ages have different purchasers and preparation processes. Tomaso suggests that due to the increased amount of prawns in the local processing plants, the summer months are not as lively as they used to be for the juvenile silverside market. On the other hand, buyers tend to appear towards the end of the summer, when the prawn fishery is temporarily closed to allow biological reproduction. Tomaso also mentions that the winds are changing more frequently, making fishing more difficult. Moreover, like his father, he thinks that climate change (a term he and other fishers sometimes use),[10] water contamination and human-made changes to the coast are modifying fish life cycles, contributing to this change of meaning of the word 'season':

> Juan: We knew in that beach a lot of fish would come in. And now, it is not coming. You ask yourself: 'What's happening?' Every time you need to go farther, going back. It drives you crazy because you think, 'If I used to fish in this beach, in this season, in this period of the year, why isn't it so anymore?'
>
> Tomaso: But you see how things are. Climate is changing a lot. Here, in [Puerto] Madryn beach, with all the dunes that have been broken,[11] the beach is completely different.
>
> Francesca: What have been broken?
>
> Tomaso: Here, there were dunes everywhere.
>
> Juan: [Puerto] Madryn beach is becoming all rock, because sand doesn't come in anymore.
>
> Tomaso: There isn't the restoration that used to be.
>
> Juan: There is no sand restoration anymore.

Tomaso: Sea has always eaten the beach and the dunes have always had the job of…

Juan: Wind had the job of taking sand backwards to the sea.

Francesca: When it gets uncovered during low tide?

Tomaso: It has always been the work of nature. Taking away and bringing back sand. But now, without the dunes…

…

Francesca: And when there is sand, why is it good?
Juan: Because it keeps the beach clean. The fish can manage its food.

(Recorded conversation, 12 March 2015, Puerto Madryn)

Conclusion

All the above aspects are inevitably turning fishing practices upside down. Yet, I maintain that having to deal with fast-fluctuating weather conditions, the changes in nonhuman animals' behaviour and tiny daily environmental transformations – cyclical, like the tides, or not – is actually helpful experience for fishers. Indeed, the experience increases the fishers' ability to anticipate the big changes that are typical of many commercial fishing activities. The ability to anticipate is fundamental for fishers. Indeed, the notion of adaptation that authors (for example, Acheson 1981; Endter-Wada and Keenan 2005; Smith 1988) have often used to analyse the way fishers cope with such changes can be enriched with the notion of 'anticipation' particularly as developed in the relationship with, and perception of, weather variations and climate change. 'Anticipation' is described by Nuttall as fundamentally different from adaptation:

> While adaptation is largely about responses to climate change, anticipation is about intentionality, action, agency, imagination, possibility and choice; but it is also about being doubtful, unsure, uncertain, fearful and apprehensive. Anticipation … emphasises that people make the future, at least the immediate one. (Nuttall 2010: 23)

To put this in the terms of my research, we can refer to the first question in this chapter. What does Tomaso mean when he says 'we need to learn again'? What kind of knowledge is weather-related knowledge, so fundamental in fishing practice in general and artisanal fishing in particular? It can be 'sensitivity to critical signs in the environment and an intuitive understanding of what they mean for the conduct of practical tasks' (Ingold and Kurttila 2000: 192). It can be knowledge that undergoes

continual generation and regeneration as people interact (observing, learning and anticipating) with the environment; that is, a knowledge based on a continuing relationship with the environment, not a one-off learning experience. In the words of Jane Lave, it is the 'knowledge-in-practice [that], constituted in the settings of practice, is the locus of the most powerful knowledgeability of people in the lived-in world' (Lave 1988: 14). Indeed, fishers acknowledge that changes occur from one year or month to the next, sometimes even day by day, because conditions are always changing. Due to rain, for example, access to beaches can be worn away little by little, and fishers who do not go there often enough to perceive the ongoing change may not realize that these entrances are about to become impassable. Therefore, they may find themselves in the situation of having a boat full of fish that they are unable to approach with their vehicle so as to load it quickly. Something similar is happening due to the action of the seawater constantly eroding the coast at each very high tide, and thus modifying the ground fishers practise their manoeuvres over.

Lending such importance to observation, continuous learning and anticipation suggests that 'the expert fisher' is not merely somebody who has been working at sea for many years, but is also a person who will continue to do so. Only through an assiduous presence 'on the coast' can they perceive the tiny changes of the environment, such as a beach becoming soft, solid or muddy, and seawater reaching further inland. Over time, they get to know even those beaches that change more often than others, like those that host wetlands.[12] By regularly going to these beaches, they learn about the continuous changes and so can predict a range of alternative conditions they will have to face at each fishing trip in those places. Furthermore, it is important to understand that fishers' expertise is local, but not in the sense that it is in the heads of local people or that all local fishers share the same knowledge. It is instead local due to the strong link between each person and each place, beach, cliff or track. It is knowledge that goes deep into the details of those places where the activity is practised. The experienced fisher, like the experienced craftsman described by Ingold and Kurttila, 'can respond creatively to the variations [of the raw material or the environment], and is ever alert to the possibilities these afford – and the hazards they present – for pursuing different kinds of tasks' (Ingold and Kurttila 2000: 186). Knowing a beach means being able to foresee its features during all the different stages of the tide's cycle. During high tide, an expert fisher can say where rocks are situated underwater. They also know whether those rocks are likely to be visited by Patagonian blennies and whether it is a place worth trying to fish when it is time to cast the net. They know where the sea bottom may have hook-shaped protuberances that have to be avoided in order not to tear the

net. And, of course, they can say what kind of ground will be uncovered with the falling tide: sand, pebbles, intertidal reef or mud. This does not mean that fishers' moves are the execution of preformulated decisions, but rather that theirs is 'a skilled performance in which the traveller [or the fisher], whose powers of perception and action have been fine-tuned through previous experience, "feels his way" towards his goal, continually adjusting his movements in response to an ongoing perceptual monitoring of his surroundings' (Ingold and Kurttila 2000: 220). When fishers find themselves on a beach that they have not been to for a while, or perhaps have never been to, they need to learn (again) how to perceive the 'affordances' – to use Gibson's term (1979) – of the new environment. It is not surprising to hear fishers remarking that: 'We do not like that beach, because we don't get along well. Alfredo does, but we never find fish.'[13] The fact that fishers accept that a beach is good for someone and bad for others does not diminish the value of this kind of knowledge. This knowledge works within the framework of a relationship with the environment that is personal. This should not be taken as a dangerous synonym for non-objective knowledge, because it is indeed the best kind of knowledge: one that is suitable to what fishers are looking for; a pleasant and durable relationship with the places that provide them with fish. This knowledge is as detailed and adaptable, as is required to cope with changes in weather (e.g. winds), in the fishing environment (e.g. headlands, beaches and bays) and out of it (e.g. processing plants and the market for fish). No general, universal knowledge would serve the fishers equally well. Therein lies the profound difference between the *prediction* of algorithm-based forecasts – 'which is about calculating, on the basis of present information, a state of affairs that will obtain at some determinate point in the future' – and the *anticipation* made by fishers – 'which is about sensing the way things are going, and attuning the course of one own's ongoing activities to that sensed movement' (Ingold).[14] Fishers draw on the media forecast, as the *predictive foresight* allows them to yield a plan, but they rely on their own *anticipatory foresight* to carry on with their activities (Ingold 2013: 69–72, 110). The fishers maintain the same anticipatory attitude towards the fish market and wholesalers' requests as well. In this way, market needs, the environment, weather conditions and fishers' personal working preferences are intermingled in a perpetually renewing equilibrium that results in the ability to face changes as they appear.

However, this equilibrium might be jeopardized by factors external to the fishing world that undermine precisely the freedom and flexibility fishers have always experienced when choosing the right moment and place to fish. Although change and adaptation (Endter-Wada and Keenan 2005: 225) or anticipation (Nuttall 2010) are hallmarks of

commercial fishing (Endter-Wada and Keenan 2005: 225), there are particular circumstances that may cause fishers to worry about the resilience of their activities. As in many other places, a major source of change, and therefore of concern for the Valdés Peninsula fishers, is the urbanization of the coast, and its reorientation towards recreation and tourism (Gale 1991). The relationship between the fishers and the environmental-management institutions, such as the Chubut Province Secretariat of Tourism and Protected Areas, is often difficult. Fishers tend to be excluded from the management of the protected areas, including the important fishing beaches located on the Valdés Peninsula coast. It is in this sense that the equilibrium that fishers have been able to maintain between environmental changes and commercial fluctuations is jeopardized by increasing government interest (evidenced both in planned policies and unscheduled actions) in 'nature' and tourism.

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Notes

1. Puerto Madryn has 120,000 inhabitants. There are three tiny settlements on the coast of the San José Gulf (each of them with 10–20 inhabitants) and one small town (500 inhabitants) on the northeastern coast of Nuevo Gulf.
2. Pseudonyms are used for all people in the text.
3. As pointed out by Orlove (2003), it would be wrong to assume there are four seasons everywhere. In South America, for example, this is not always the case. However, in the specific ethnographic context of this chapter, fishers and other people living there divide the year into four climatic seasons: autumn, winter, spring and summer.
4. In the area, there are three different species of tern: the South American Tern (*Sterna hirundinacea*), the Cayenne Tern, (*Sterna eurygnatha*) and the Royal Tern (*Sterna maxima*).
5. * indicates the name of a beach.
6. A traditional caffeine-rich infusion of dried leaves of yerba mate (*Ilex paraguariensis*).
7. For a relevant discussion on the different perceptions of 'air', see Dan Rosengren, Chapter 1 in this volume.
8. During a rising tide, stranding is obviously not a risk. Nevertheless, in beaches that are fully covered by water at high tide, the danger is of finding oneself caught between the sea and a cliff (when there is one at the back of a beach).
9. Local studies described the net-fishing resources as markedly seasonal. This is the case in particular with silversides, because they are migratory. According to the studies, adult silversides were caught mostly during autumn and spring, and juveniles during spring and summer (Elías et al. 2011, drawing on Elías, Ré and Gosztonyi 1991; Ré and Berón 1999).
10. Fishers speak of 'climate change' in different ways. For example, when Eduardo explains that the 'ecological transition we are living in has an influence on fishing' (13 April 2015), he refers mainly to changes related to climate.
11. Sand dunes were progressively removed to build hotels and houses along the seafront.
12. The above-mentioned Colombo beach and some other beaches host wetlands protected by the Ramsar Convention on Wetlands (Ramsar site 'Valdés Peninsula', declared on 20 July 2012). Fishers are very interested in these beaches, where they can find a species of silverside (Escardón o Pejerrey de tosca, *Odonthestes argentinensis*), on which the market places a greater value compared to the more common silverside (Pejerrey cola amarilla o manila, *Odonthestes smitti*).
13. Fieldnotes: 'Juan', 20 January 2015, Puerto Madryn.
14. Personal communication with the author, 2020.

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