Chapter 2
Changing Tides: Temporal Dimensions of Low-Cost, High-Skill Fisheries in the Central Visayas, Philippines

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Abstract At the southern mouth of the Tañon Strait—the body of water that separates the islands of Cebu and Negros in the Visayas region of the Philippines—small-scale fishing has always been challenging. Strong and complex sea currents make it difficult for fishers to utilise certain fishing gears. With a significant decline in the resource base and new regulations of the fisheries in recent decades, only fishers with advanced skills and fine-grained place-specific and calendric knowledge of the marine environment are able to catch enough fish, and the right kind of fish, to secure a decent return. Drawing on insights from cultural ecology, the chapter examines the skills and knowledges that fishers draw on to catch fish in this challenging environment. It gives particular attention to the temporal dimensions of the biocultural knowledge complex, showing how fishers' knowledge of the links between sea currents, the lunar cycle and monsoon winds play into their decisions about where, when and how to fish. In addition to its direct livelihood significance, calendric knowledge also serves as a resource in the formation of identity as *mananagat* (fisherman) and authority and status within the fishing community. To further explain why some fishers are able to use their knowledge to make fishing a viable and legitimate livelihood and others are not, the last part of the chapter uses insights from political ecology to address issues of power and dynamics of exclusion in the fisheries.

Keywords Small-scale fishing · Calendric knowledge · Cultural ecology · Resource decline · Coastal resource management · Political ecology · Tañon Strait · Philippines

2.1 Introduction

The Tañon Strait, the body of water that separates the islands of Cebu and Negros in the Visayas region of the Philippines, is approximately 160 kms long and, for such a narrow body of water, very deep, reaching depths of around 500 m (Baez et al. 2015).

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F. M. Franco et al. (eds.), *Case Studies in Biocultural Diversity from Southeast Asia*, Asia in Transition 19, https://doi.org/10.1007/978-981-16-6719-0_2

The Strait is at its narrowest in the south. With intricate geological and topographic features, a mix of coral patches, sand and rock, and depths varying between 30 and 140 m halfway between the two islands, the southern mouth of the Strait is a place of exceptionally strong and complex sea currents. When the currents are strong, many fishers find it difficult to navigate small outrigger canoes and utilise certain fishing gears. Drawing on insights from cultural ecology, the chapter examines the skills and knowledges that fishers draw on to catch fish in this challenging environment.

Cultural ecology is the study of human–environment interaction. Focus is on human uses of and adaptations to the natural environment, and how people perceive, classify and know that environment (King and Wilder 2003: 231). Adaptation is here understood as an active and innovative process. People learn and adapt by putting their knowledge to use (Mangahas 2001). How a community or a particular group of fishers adapts to its environment must also be understood in light of its interactions with other communities within a wider socio-economic and political context (Barth 1956; Hviding and Bayliss-Smith 2000).

In tropical regions of Southeast Asia and the Pacific, ecologists and anthropologists have conducted detailed studies of the resource use patterns, material culture and knowledge systems of small-scale fishers (Firth 1966; Hviding 1996, 2005; Johannes 1981; Mangahas 2004). To tap into the often-diverse ecological niches of tropical coastal environments, fishers utilise many different fishing methods and have detailed place-specific knowledge (Hviding 2006; Yano 1994: 44). Skilful small-scale fishers know much about the terrain at the bottom of the ocean and use the triangulation method to locate coral patches, channels, crags, shoals and submerged rocks (Randall 1977). Through naming practices and story-telling, they further develop and systematise their insights and knowledge of fishing grounds. Many artisanal fishers also know how to build, repair, modify and improve boats and gears (Hart 1956), and they develop considerable bodily knowledge, strength and stamina to efficiently paddle, sail and operate these. In addition, the competent fishers have detailed knowledge of fish behaviour (Johannes 1981). Such knowledge is often species-specific. They know much about where and when different kinds of fish and other aquatic species group together, spawn, what they feed on and how they feed (Johannes and Hviding 2000). As fishing conditions are better during particular months, moon phases and tidal stages, knowledge of timing and seasonal factors are crucial (Espina 2008; Firth 1966; Hviding 2005; Randall 1977; Zayas 1994).

Although many studies discuss various temporal dimensions of fishing, the topic of time is rarely made the primary focus of research. Issues relating to time tend to be subsumed under other topics (material culture, ecology and indigenous systems of classification, poverty and resource decline, coastal resource management, etc.). The approach of this chapter is different in that it takes the problem of time, tides and currents as the main topic of investigation. How do small-scale fishers in the Municipality of Sibulan (see Fig. 2.1) make decisions about where and when to fish, and why is it so important for them to be able to predict, with considerable accuracy, changes in the direction and strength of sea currents? The chapter looks at daily, weekly, monthly and seasonal aspects of the small-scale fisheries. It shows how fishers' knowledge of the links between sea currents, the lunar cycle and monsoon

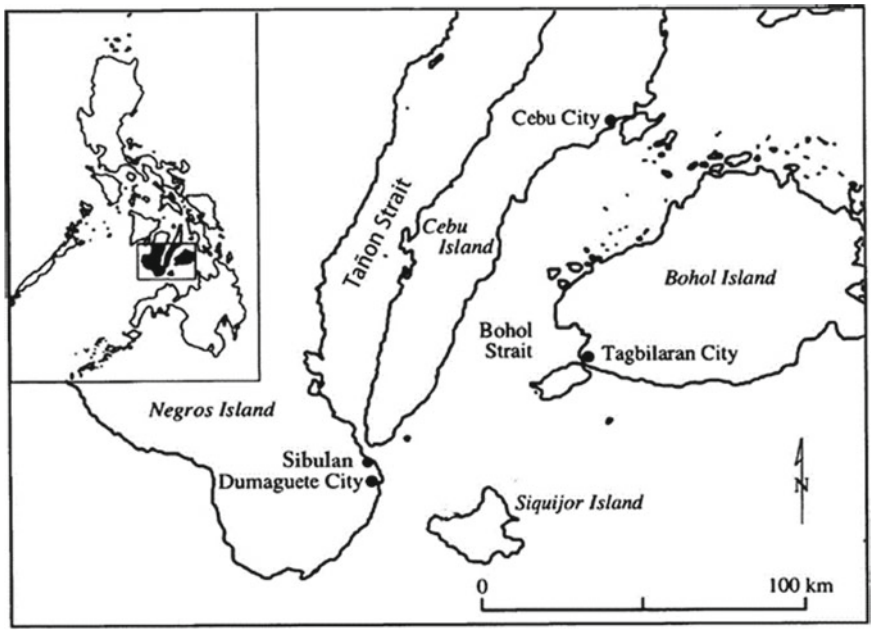

Fig. 2.1 Location of the research site. Map modified from the original in Shio Segi (2013: 338), with permission of author

winds play a significant role in structuring their fishing activities, giving the fisheries a distinctive 'rhythmic form' (Mughal 2014; Munn 1992).

This argument has to be developed with some caution, however. Due to considerable diversity in species composition and gear use in many tropical coastal zones (Bailey and Pomeroy 1996; Hviding 2006), fishers' 'ecological clocks'[1] are not entirely synchronised. A fisher's preferred time to fish depends on many factors, including his skills, knowledge and commitment to fishing as a livelihood. It also depends on the fisher's access to boats and gears, the abundance (or otherwise) of aquatic resources, market access and price, and the availability of employment or income-earning activities outside of fishing. In peri-urban Sibulan, there are significant differences among small-scale fishers in terms of their knowledge, status and access to fishing gears (Knudsen 2016). Many are part-time fishers. Some only fish when they have no other jobs. With a considerable decline in the resource base and new regulations of the fisheries in recent decades, the timing aspect of the small-scale fisheries has altered in some new ways. Opportunities for seasonal migrant fishing, for example, has more or less closed down. Nonetheless, the key principles of the temporal knowledge system continue to structure much fishing activity,

[1] The concept of 'ecological time' hails back to E. E. Evans-Pritchard's study of 'Nuer time reckoning' (1939). Being cattle herders, the life of the Nuer is significantly structured around the 'cattle clock' (Evans-Pritchard 1939: 101; Gell 1992: 17).

and for the dedicated small-scale fishers, knowledge of sea currents and tides has arguably become more—not less—important as fish stocks have declined, enabling the skilful local fishers a decent return on fishing with low-cost gears. In addition to its direct livelihood significance, calendric knowledge serves as a resource in the formation of identity as *mananagat* (fisherman) and authority and status within the fishing community. Yet skills and knowledge alone are not enough to secure access and status.

To develop a fuller understanding of who succeeds and who fails to make small-scale fishing a viable and legitimate livelihood in Sibulan, the last part of the chapter draws on insight from political ecology. In the 1970s, cultural ecology still tended to use basic ecology principles to examine the adaptive capacities of human societies (Bryant 1992; Bryant and Parnwell 1996). Political ecology emerged in response to these approaches, putting more emphasis on power, social inequality and history in shaping human–environment interaction. Focus shifted to 'the political dynamics surrounding material and discursive struggles over the environment' (Bryant 1998: 89). Goldman and Turner (2011: 1) argue that 'knowing nature is a complex, multiple, and highly political process'. In efforts to legitimate certain resource use practices and discredit others, whose claims to knowledge stick, and whose knowledge is ignored? While not ignoring class-related differences in economic resources, I show how social and cultural capital, in the form of social networks, settler status and livelihood background, help explain whose knowledge gains traction in efforts to regulate and redefine appropriate resource use among small-scale fishers in Sibulan.

The paper is organised as follows. First, I introduce the study and research methods. Next, I examine fishers' knowledge of daily, weekly and monthly changes in tides and currents, and how they utilise this knowledge in their fishing activities. I then look at how fishers categorise seasons and adjust their fishing practices over the year. Lastly, I show how resource decline and new regulations affect the timing aspects of the small-scale fisheries, and explain why some fishers continue to do well while others barely cover the cost of fishing and are squeezed out.

2.2 Background to the Study and Methods

Between 2005 and 2008, as part of my Ph.D. research in social anthropology, I conducted 18 months of ethnographic fieldwork among fishing families in the Municipality of Sibulan (Knudsen 2009). Since then, I have returned to Sibulan regularly, nearly every year, for shorter periods of fieldwork. Long-term fieldwork has allowed me to develop good trust relationships with several family groups living along the shoreline. I am well-versed in Cebuano, the main language of the Central Visayas. In addition to participant observation and casual conversations, I have collected data through semi-structured interviews, focus group discussions and quantitative surveys.

In 2005/2006, 131 households were included in a survey of livelihoods. Nearly half of the households had one or more members who were involved in small-scale fishing.

The vast majority of the boats were small non-motorised outriggers (*baroto*) (79%). A daily record of the catch of twenty-four fishers was collected, most of them for more than six months and eight for more than a year. I recorded the species caught, the amount in kilogram (kg), location of the catch, how much of the catch was consumed and sold, and the price of fish sold. On later field trips, I collected additional data on fish catch and income, accompanied fishers on their fishing trips and observed changes in their fishing practices. I have covered topics such as coastal resource management (Fabinyi et al. 2010), conflict over land (Knudsen 2012), social organisation and political leadership (Knudsen 2013) and fishing and poverty (Knudsen 2016).

During fieldwork in 2019, my focus was on timing issues and temporal knowledge in the fisheries. Eleven of the fifteen key informants who participated in this part of my study were dedicated 'full-timers' who had fishing as their main source of livelihood.[2] Four were former 'full-timers' who had retired or were semi-retired. All had considerable knowledge of the marine environment and were locally recognised as skilled in fishing (*kahanas sa panagat*). Three of them, George, Leoncio and Ed, were particularly helpful in sharing their knowledge of sea currents and tides. In 2019, despite being in their late 60s, they were still active fishers. George was a highly skilled hook-and-line fisher who could fish under any condition. Leoncio's expertise was in deep-sea trap fishing. Ed was a local authority on schooling pelagic fish and how to catch them with net and hook-and-line techniques in strong currents. I will return to these local experts in various sections throughout the chapter.

2.3 Knowledge of Sea Currents and Tides: Daily, Weekly and Monthly Rhythms

2.3.1 Talab-on *and* Hologton

Sibulan fishers use the movement of the sun and the moon to predict the direction and strength of sea currents. They also link changes in the strength and direction of sea currents to changes in wind patterns. *Talab-on* refers to the current going north, when the tide is coming in. *Hologton* is the current going south, when the tide is going out. There are two high tides and two low tides in a lunar day,[3] one more pronounced than the other. The bigger the difference between the tides, the stronger the *talab-on* and *hologton* currents are. Leading up to the peak flood (*ta-ub*) and ebb (*hunas*) tides, more water is squeezed through the narrow mouth of the strait, creating the strong current phenomenon.

[2] For definition and discussion of 'full-time', 'part-time' and other categories of small-scale fishers, see Knudsen (2016).

[3] A lunar day is 24 h and 50 min. Four times per lunar day, every 6 h and 12.5 min, the tidal current changes direction.

Just after the *talab-on* current ends and before the *hologton* current begins, a period of 'no current' (*walay sulog*) tends to occur, called *padantol*. The period just after the *hologton* current ends and before the *talab-on* current picks up in strength is called *hinagite*. The length of the *padantol* and *hinagite* periods depends largely on the moon phase. In the days following half-moon (*mudtong bulan*), a period Sibulan fishers call *lakad*,[4] the difference between low tide and high tide is at a minimum (neap tides). During the three to four days after half-moon, the *walay sulog* periods last up to thirty or forty minutes. During the periods of full moon (*tibook*) and new moon (*patay ang bulan* ('death of the moon'), the difference between high tide and low tide is at a maximum and the periods of 'no current' are much shorter and sometimes non-existent.[5] At these times, the *talab-on* and *hologton* currents are very strong (*kusog kaayo ang sulog*). Sometimes there is an overlap in the *talab-on* and *hologton* currents, typically coinciding with spring tides. This is when '*talab-on* and *hologton* are fighting' (George, the skilful hook-and-line fisher), and a 'whirlpool' effect (eddy), called *lilo*, is created. At these times, the water circles around with massive force in the middle of the mouth of the strait.[6] If a low-pressure system coincides with new moon or full moon, the currents tend to be even stronger, and severe coastal flooding may happen.

According to the Sibulan fishers, there is a link between changing wind strength and tides. Just before the peak high tide of the lunar day, there is often no or very little wind. When the high tide reaches its maximum and the low tide begins, there is typically a period of stronger wind. The wind also tends to be stronger when the peak low tide ends and the flood tide begins.

There are also other currents linked to the *talab-on* and *hologton* currents. *Ulwag* is a current going out from the beach. It takes place both during *talab-on* and *hologton*. *Dumagsa* is a current going towards the beach and happens both during *talab-on* and *hologton*. *Waso*[7] refers to the phenomenon where the upper level of the water moves *talab-on* and the deeper level moves *hologton*. The *waso* phenomenon can be enhanced or triggered by strong winds, when the top layer of water is pushed in the opposite direction of the underlying current.

[4] Among some Cebuano-speaking fishers elsewhere in the Visayas, *ang mga lakad sa bulan* means 'moon phases' (Espina 2008). For the Sibulan fishers included in this study, the *lakad*-concept refers to the days following half-moon (*mudtong bulan*).

[5] During full and new moon, the Sun and the Moon are aligned with Earth, creating gravitational pull on the Earth's water in the same direction. Due to friction between the water and the land masses at the bottom of the ocean, the biggest difference between the tides are about two days after full moon and new moon. For the same reason, the neap tides happen a day or two after the First and Third Quarter.

[6] The town at the southern tip of Cebu Island, Liloan ('the place of *lilo*'), has more or less daily occurrences of *lilo*.

[7] *Binal-an* is another term for *waso* currents.

2.3.2 Moihap ug pito ka adlaw

The fishers have developed a calendric system to keep track of the main features of these changes in the currents. They call it the 'seven-day count' (*moihap ug pito ka adlaw*):

- 7 days after new moon => half-moon => first quarter *lakad* => weak currents the following three to four days
- 7 days after half-moon => full moon => strong currents
- 7 days after full moon => half-moon => last quarter *lakad* => weak currents the following three to four days
- 7 days after half-moon => new moon => strong currents.

The more detailed version of the 7-day count, as explained to me by Leoncio and his brothers, all highly skilled trap fishers, is as follows:

Starting from the first day after new moon:

(1) *Entrada* or *paingon sa subang*[8] (first day of the rising [moon])
(2) *Ika duha sa subang* (second day of the rising)
(3) *Ika tulo sa subang* (third day of the rising)
(4) *Ika upat sa subang* (fourth day of the rising)
(5) *Ika lima sa subang* (fifth day of the rising)
(6) *Ika unom sa subang* (sixth day of the rising)
(7) *Ika pito sa subang* (seventh day of the rising) => *mudtong bulan* => first quarter

(1) *Entrada sa lakad* or *primero lakad* (entry or first day of *lakad*)
(2) *Ika duha sa lakad* (second day of *lakad*)
(3) *Ika tulo sa lakad* (third day of *lakad*)
(4) *Ika upat sa lakad* (fourth day of *lakad*)
(5) *Ika lima sa lakad* (fifth day of *lakad*)
(6) *Ika unom sa lakad* (sixth day of *lakad*)
(7) *Ika pito sa lakad* (seventh day of *lakad*) => *tibook ang bulan* (full moon)

(1) *Entrada sa hilom* (entry or first day of the fading [or disappearing moon]
(2) *Ika dua sa hilom* (second day of the fading)
(3) *Ika tulo sa hilom* (third day of the fading)
(4) *Ika upat sa hilom* (fourth day of the fading)
(5) *Ika lima sa hilom* (fifth day of the fading)
(6) *Ika unom sa hilom* (sixth day of the fading)
(7) *Ika pito sa hilom* (seventh day of the fading) => *mudtong bulan* (halved moon) => last quarter

(1) *Entrada sa lakad/primero lakad* (first day of *lakad/* primary *lakad*)

[8] *Entrada* is Spanish for entrance/entry. *Subang* means 'rise' or the gradual beginning, coming forth or growth. *Paingon* means 'toward'. Another expression used is: *paingon sa itom ang bulan* ('towards the black moon').

(2) *Ika duha sa lakad* (second day of *lakad*)
(3) *Ika tulo sa lakad* (third day of *lakad*)
(4) *Ika upat sa lakad* (fourth day of *lakad*)
(5) *Ika lima sa lakad* (fifth day of *lakad*)
(6) *Ika unom sa lakad* (sixth day of *lakad)*
(7) *Ika pito sa lakad* (seventh day of *lakad*) => *patay ang bulan* ('dead moon')

With Spanish colonial and missionary presence on the east coast of Negros Island going back to the 1570s, it is not surprising that fishermen use several Spanish words in their account of the lunar cycle. Their narrative of the 'rising' and 'death' of the moon mirrors the story of the birth and death of Christ.

2.4 Timing of Rituals

Among the key informants I worked with, the sea is not a neutral space. The sea is filled with diverse lifeforms and spirit beings. To ensure safety and success at sea, they conducted small rituals.[9] The timing of these rituals was very much structured by the fishers' knowledge of tides and currents. To appease the sea spirits, some fishers conducted a ritual called *halad sa dagat* ('send to sea'). It consisted of a small raft on which they put rice, tobacco and some other items. The ritual was usually conducted at high tide on a Friday just before *lakad*. Another way to seek good luck (*swerte* or *chamba*) is to fill a coconut shell with a special kind of grass and flowers from the procession parade of Jesus Christ. The grass and flowers are burnt to produce smoke and, in inauguration rituals, the coconut shell is carried around a new boat or important fishing gear. Again, the timing of the ritual tends to coincide with the lunar cycle, performed just before fishing conditions with the gear is 'ideal'. When I asked Ryan, one of Leoncio's sons, why he performed this ritual, he said: 'I follow the tradition of my papa and the people before'. There is continuity here, a transmission of knowledge of how to be successful, safe and comfortable at sea, and a value attached to such continuity which forms the basis for their identification as *mananagat* (fisherman). Moreover, in the process of sharing calendric knowledge and conducting rituals, fishers forged stronger ties between the generations, with senior and more experienced fishers acting as calendar keepers.

[9] Many rituals are held individually or by a small group of fishers, partly because they do not want to draw critical attention from non-believers, or those who think the rituals go against Christian doctrine.

2.5 How Tides Shape the Rhythm of Fishing

A knowledgeable fisherman using a non-motorised outrigger knows how to utilise the daily changes in the currents and winds to his own advantage. He rides the current—*magpaanod sa sulog*—to the fishing ground, arriving just when the current weakens and it is time to drop the line to catch bottom-dwelling fish. This is when *isda sa bato* ('fish in the rocks') come out of their shelters to feed. When the current changes direction and picks up in strength, the fisherman rides the current back home again, limiting the need for laborious paddling.

When currents are strong, bottom-dwelling and several reef-associated fish are harder to catch for two reasons. Firstly, the fish tend to hide in corals or behind rocks. Secondly, with strong and complex currents, the task of getting a fish trap or a set of hooks tied to a nylon line to the desired place—their *tulongdon* ('secret fishing place')—in deep water is nearly impossible. Today, partly due to overfishing and degradation of nearshore fishing grounds, the skilled small-scale fishers' 'secret fishing places' (*ang mga tulongdon*) are almost entirely located in deeper waters, in hard-to-access places.

The majority of the fishers in Sibulan are part-timers who utilise non-motorised boats (Knudsen 2016). During full and new moon phases, fewer fishers are out at sea. Instead of fishing, when the shoreline (*baybayon*) is exposed during the big low tides, many go gleaning (*manginhas*) for molluscs, crustaceans and other marine products. Men, women and children partake in gleaning activities. Some use smaller nets near the shore, splashing water to scare fish into the net. Many of the Sibulan fishers who continue to fish with non-motorised outriggers at these times target smaller coral reef and bottom-dwelling fish with hook-and-line gear near Dumaguete City, in areas sheltered from the strong currents. *Pamasiyon* is the most commonly used hand-line technique in this kind of fishing. It consists of a nylon line with 7–15 small hooks baited with shrimp. Considered easy to learn, it is the favoured technique among less-skilled hook-and-line fishers. While it is easy to catch fish with the technique, the nearshore reefs on which the technique is mostly used are heavily overexploited. Hence, the fish caught with the technique tend to be small in size, and the combined catch seldom more than a kilogram per fishing trip.

The well-rounded, skilful hook-and-line fishers have more options. Many of them master more than ten different hook-and-line techniques and are able to fish in many different environments. They target fish in all depths of the sea: 'fish in the rocks' (*isda sa bato*); 'fish in the middle' (*isda sa tunga-tunga*) and 'fish in the surface' (*isda sa kapaw*). Some skilled hook-and-line fishers utilise the strong currents created during full and new moon to target fast-moving fish near the surface of the sea, including trevally (*mamsa*), Spanish mackerel (*tangigi*), flying fish (*salasa*) and flat needle fish (*balo*).

I will briefly describe some of the techniques the fishers use to catch fish in strong current with non-motorised boats. *Pangbalo*, to catch *balo*, consists of two hooks tied together and baited with a round scad or small mackerel. The fisher rides the current and lets the baitfish drift off from the boat, at depths of 1–2 m below the surface.

Habyog, another full and new moon technique from a non-motorised boat, consists of one hook (US nr. 5) with sliced round scad or mackerel as bait. The fisher anchors the boat in a strong current and lets the baited hook drift away from the boat, 2–4 m below the surface. The target fish is big-eye bream (*katambak*). *Lasdak* is a multiple hook-and-line technique to catch round scad, herring, Indian mackerel, redtail scad and other small schooling pelagic fish during daytime. The small schooling pelagic fish are valued food fish locally. As they are also used as baitfish in big hook-and-line fishing, the skilful fisher must master *lasdak*. It is practised at any time of the month when these fish are available, also during new and full moon periods. It consists of a few hundred small hooks tied to a nylon line. Sometimes with the help of their wives or daughters, the fishers tie a piece of 'rentex' (strings of silky cloth) in different colours on each hook. *Pamirit*, a technique to catch *perit* (frigate tuna), is similar to *lasdak*, but the hooks are slightly larger and fewer in numbers, and instead of 'rentex', the hooks are covered with a plastic hose in green, blue or white colour. Green imitates Japanese mackerel, locally called *hasa-hasa* and *anduhaw* (depending on its size), blue imitates a sardine locally called *malalangsi*, and white imitates an anchovy locally called *bolinao*. Less experienced fishers, or those who do not know how to accurately predict the strengths and changing directions of currents, tend to feel uncomfortable fishing far from the coast in a small non-motorised outrigger when the currents are strong.

Those who have access to motorised outriggers and have knowledge of suitable techniques for chasing tuna in strong current tend to use two techniques: *salabay* and *habal-habal*. *Pang tulingan nga salabay*, to catch a tuna species called *tulingan*, consists of hooks with coloured plastic strips tied to a line that is dragged on the surface between two motorised boats. An improvisation on the *salabay* technique is the *pangtulingan nga habal-habal*, a one-fisher-one-boat operation with a drag at the end of the line. Chasing tuna in strong currents requires considerable fuel consumption. To keep the cost of fishing down, fishers conduct this kind of fishing when somewhat larger schools of pelagic fish pass through the strait.

During the days of *lakad*, activity levels at sea are much higher. Fishers utilise a range of hook-and-line, trap, spear and net fishing gear. Many fishers venture further north and into the middle of the mouth of the strait. More experienced fishers cross the strait to reach fishing grounds near the southern tip of Cebu Island. Some use small sails on their boats. For them, knowledge of currents and wind patterns are crucial.

Some knowledge-intensive fishing methods are practised only during the *padantol* and *hinagite* periods of *lakad*, including trap fishing in deep water. Some fishing families in Sibulan have long traditions of trap fishing (*bobo*). As fish catch started declining in the 1970s and 1980s, Leoncio and his brothers developed traps suitable for fishing in deeper waters. The traps are set out at depths between 45 and 70 m. They catch species such as grouper, long-faced emperor, surgeon fish, sweet lip and parrot fish. Four or five fishermen go together in a large non-motorised dugout canoe (*bangka*) to pull up, empty and set out the traps. This kind of trap fishing only occurs during the *hinagite* and *padantol* periods of the first three or four days of *lakad*. When currents are strong, the traps are too heavy to pull up. It is also near impossible

to control where the traps end up when the fishers lower them back in the water. When currents are strong, the traps easily get stuck in or ripped by rocks or corals. At night, and on days with strong wind and big waves, they are unable to do this kind of fishing. With such a limited window of opportunity (a maximum of 30 or 40 min once or twice per day for six to eight days per month), the trap fishers are very busy at work when the timing is right and conditions are good.

Another high-skill *lakad* technique is called *taktakon.* This is a hook-and-line technique for catching high-value, good-sized fish such as groupers, jacks, snappers and long-faced emperors. It consists of 5–20 hooks tied to a drift line. The drift line is tied to a thicker nylon line attached to a heavy sinker. The hooks on the drift line are baited with sliced pieces of fresh squid, herring or mackerel. The drift line is located a couple of metres above the sinker, close to the bottom of the sea. On the surface, the thicker line is attached to a floater. The fishers' 'secret fishing places' for this technique are located mostly in the middle of the strait, two or three kilometres from the coast, at depths between 80 and 130 m. George and some of the other highly skilled fishers who target 'fish in the rocks' with the *taktakon* technique showed me how they learn about bottom conditions and locate good fishing grounds. In places that are too deep for studying bottom conditions by diving or looking into the sea, the fishers measure the depth and 'feels' the bottom conditions with a line attached to a sinker. They also observe movements in surface currents and, when the sea is quiet, look for air-bubbles to locate coral patches. As with the deep-sea fish traps, the difficulty of this technique is getting the sinker and drift line to the right place. When currents are weak, the fisher is able to locate the sinker and baited hooks in the right place at the right time, when the target fish feed. When the currents are strong, during the days following full and new moon, *taktakon* fishing is rarely practised.

To sum up this section: small-scale fishing in Sibulan is significantly shaped by changes in tides and currents, and by the knowledge fishers have of these. The 'seven-day count' and other temporal dimensions of the knowledge system structure much fishing activity. Moreover, the analysis reveals a differentiated rhythmic pattern, reflecting diverse ecological conditions and significant differences among fishers in terms of their skills, knowledge and access to boats and gears.

2.6 Seasonal Variations

2.6.1 Amihan, Salatan *and* Habagat

Fishers divide the year into three seasons: *ting amihan*, *ting salatan* and *ting habagat*. The prefix '*ting*' means 'season'. The main wind direction moves clockwise over the year and varies in strength. *Ting amihan* is characterised by strong, persistent cool and dry wind from northeast. The season of *amihan* begins late October or first half of November (see Fig. 2.2). It is sometimes referred to as the 'cold season' (*ting bugnao*) and the 'season of waves' (*ting balalod*).

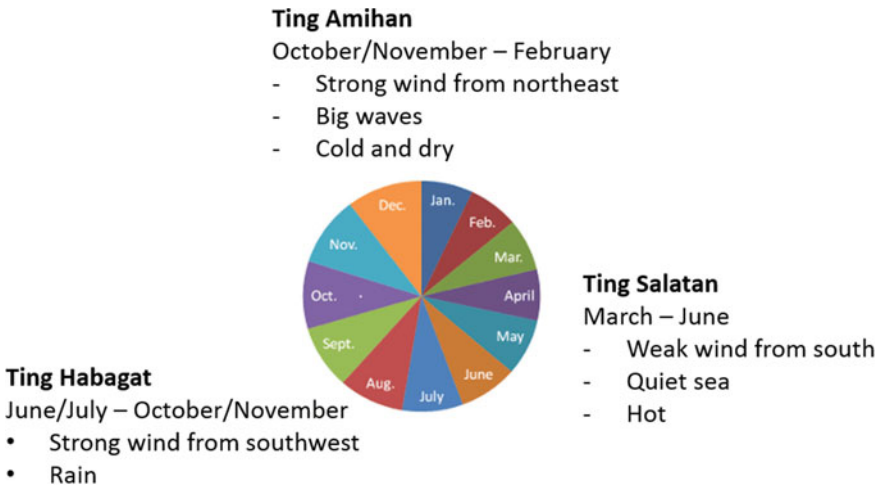

Fig. 2.2 Seasons in a year

In the months of December and January, the *amihan* wind tends to be at its strongest.[10] With strong north-easterly wind, the top layer of the sea moves south even when the underlying current goes north (*talab-on*), creating *waso* currents. While the Island of Cebu provides some shelter against *amihan*-created waves and currents, on days when *amihan* is strong and turns a bit more easterly (*timog*), the waves in Sibulan tend to be large. Big waves make fishing with a small outrigger canoe difficult. The number of fishers who go out fishing declines. Many fishers use the strong-wind *amihan* period to repair boats, traps and other fishing gear. They also do other kinds of jobs, fixing houses and doing paid work locally or in Dumaguete City. Only the most dedicated small-scale fishers continue to fish 'full-time' during *amihan*.

The *amihan* season is followed by *ting salatan*, typically starting in March. *Ting salatan* is characterised by a gentle breeze from the south[11] and a 'quiet' (*linaw*) sea. This is the start of the peak season for many fishers in Sibulan. Figures 2.3 and 2.4 show the average catch per fishing trip and number of fishing trip per month over a 14-month period in 2005/2006. Although catch levels were generally low, the seasonality of fishing remained pronounced. In December, the fishers included in the study went fishing, on average, ten times. They caught an average of 1.5 kg per fishing trip (per fisherman). The average catch levels increased to around 3 kg per fishing trip in March, April and May, during *ting salatan*. Fishers went fishing most days during these months.

Ting habagat refers to the southwest monsoon season, usually starting mid-to-late June and lasting until September or early October. It is characterised by

[10] The strength of the *amihan* winds varies from year to year. The 2019 *amihan* season was gentle, with weaker than normal north-easterly winds.

[11] *Salatan* means 'south'.

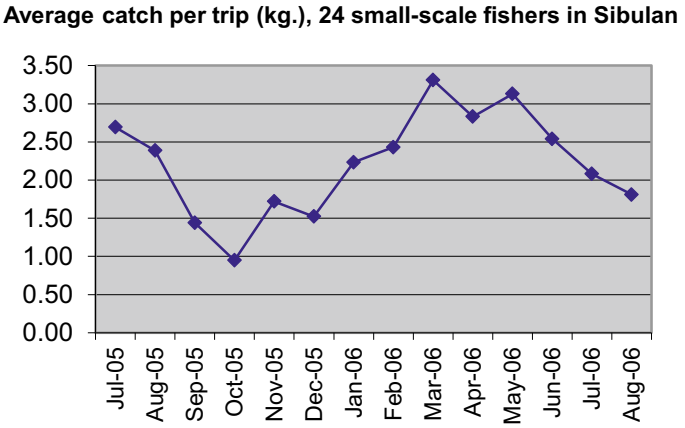

Fig. 2.3 Seasonal variations in catch (kg per fishing trip)

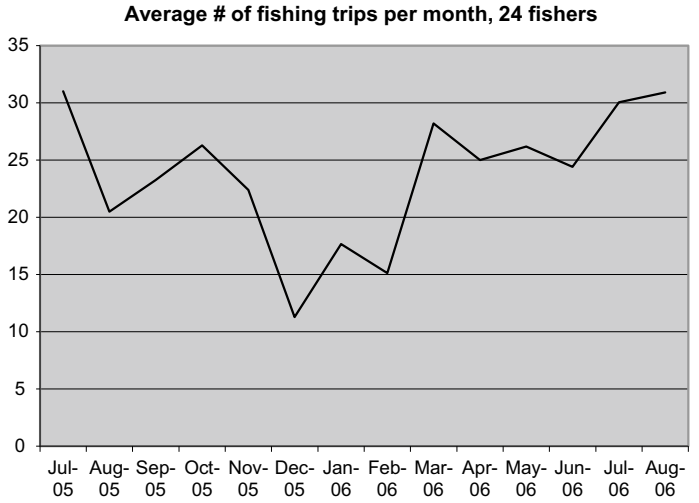

Fig. 2.4 Number of fishing trips per month

frequent heavy rain showers and gusty winds from southwest and west. As Mt. Talinis (1,903 m.) on Negros serves as a windshield, the small-scale fishers in Sibulan are not strongly affected by the *habagat* winds.

While monsoon seasons affect fishing practices, spawning cycles and migratory patterns of fish do not fit neatly within the monsoon categories. Different species of sardines, anchovies, herring, mackerel, tuna, snappers, groupers and other fish are abundant or good to catch at different times of the year, and also at different times of the lunar cycle. There are also significant variations in the availability of particular species of fish from one year to another. It goes beyond the scope of this chapter to

detail the knowledge fishers have of such complex dynamics. Some broader trends will have to suffice.

The mackerel and tuna season generally starts during *amihan*. Many species of sardines, mackerels and herrings spawn (*yag-yag*) between October and December. The following months are often good for catching these. Fishers continue catching mackerels and herrings until August or September. Barracuda, jack, Spanish mackerel and tuna feed on mackerel and herring. Barracuda fishing is usually good from May to September. Fishers have four different names for barracuda depending on their size (*tabanko*, *bulatok*, *rompi* and *pangalwin*). The larger barracuda (*rompi* and *pangalwin*) are mostly caught in August and September. Fishing with beach seine net (*sahid*)[12] to catch small sardines and anchovies, which is one of Ed's areas of expertise, reaches a peak between June and September, but is also practised at other times of the year, as different species follow different cycles. A sardine fish called *malalangsi* spawn in October, November or December, and are usually good to catch a month or two later. A smaller kind of *malalangsi* tend to spawn a month later. The catch level of two anchovies species locally called *bolinao* and *tulakhang* tend to peak in the transition period between *habagat* and *amihan* (September/October). During *ting salatan*, conditions are good for fishing *isda sa bato* ('fish in the rocks'), such as *lapu-lapu* (grouper), *maya-maya* (snapper) and *mol-mol* (parrot fish). One group of fishers reported that some of the more lucrative bottom-dwelling fish species tend to be 'fat' (*tambok*) in July or August and spawn (*yag-yag*) in September or October. Just before spawning, when the fish is full of roe (*bihod*), they 'feel full in their stomachs and are not eating much'. Other fishers noticed a more varied pattern of spawning among the same species, however, varying with the temperature in the water. There was much more agreement on the spawning period of mangrove crabs (*kagan*), which is expected to take place in October, during new moon.

2.6.2 Seasonal Migrant Fishing

Scholars have documented how seasonal migrant fishing has resulted in the production of vast inter-island social networks within and beyond the Visayas (Mangahas 2001; Seki 2000, 2004; Zayas 1994). In the past, migratory fishing during *ting amihan* was common among Sibulan fishers. Starting in the 1960s, George and his group of skilled hook-and-line fishers went on trips to Cabangahan, Siaton, located on the southwest coast of Negros Island, a place sheltered from the strong wind and big waves. Being 'migrants' (*langyaw*) in Cabangahan, they re-activated kinship ties and formed new friendship relations to get permission to build temporary shelters near the beach. They exchanged their knowledge of fishing with local fishers, the 'original people of the place' (*lumad*). When the *habagat* season began, with strong winds from the southwest, Sibulan fishers acted as hosts to fishermen from Cabangahan and other

[12] The best time of the day for *sahid* fishing is after low tide. It is illegal to use fine-mesh *sahid* nets.

places. During the 1970s and 1980s, the fishers switched easily between *langyaw* and *lumad* status. The relationship between 'locals' and 'migrants' was largely seen as mutually beneficial. For young, single men, courtship and the prospect of marriage were a part of the excitement associated with these fishing trips.

During *ting salatan*, the season of little wind, roughly between March and June, this same group of Sibulan fishers roamed around the islands of the Central Visayas and beyond, using motorised outriggers. In the 1970s, some of the men went to smaller islands off the northwest coast of Mindanao, the main island in the Southern Philippines. They used a larger motorised outrigger (*pamboat* or pump boat) with a 16 horse powered engine. A fish trader in Dipolog City owned the boat. Half the catch was for the owner and half for the fishers (*tunga-tunga*). In the early 1980s, several of these fishers owned their own motorised boats, usually equipped with a 10 horse powered engine. During *ting salatan*, they went on overnight and two-day trips to the islands of Cebu and Siquijor and five-day trips to Apo Island, off the east coast of southern Negros. They were in part driven out by the declining fish catch at home, but also by new opportunities for profitable fishing elsewhere. They expanded the area of fishing and used more expensive boats and gears, exploiting the period of little wind.

2.7 Migrants No More: Dynamics of Exclusion

2.7.1 Declining Fish Catch and New Regulations

In the late 1980s and early 1990s, this kind of long-distance seasonal migrant fishing became increasingly difficult for the Sibulan fishers. A substantial drop in fisheries resources across the Visayas made long-distance small-scale fishing trips less profitable. As in many other regions of the Philippines, the rising demand for seafood, introduction of more capital-intensive fishing gears, rapid increase in the number of fishers, destruction of mangrove forests to establish aquaculture ponds and a poorly regulated commercial fishing sector, with rampant illegal intrusion of commercial fishing vessels into 'municipal waters',[13] contributed to the decline (Anticamara and Go 2016; BFAR 2004; Butcher 2004; Green et al. 2003).

An equally, if not more, important factor in closing down opportunities for small-scale migratory fishing was the implementation of new regulations. These regulatory efforts intensified in the 1990s. Throughout the country, government agencies and their partners (including USAID, EU, research institutions and NGOs) invested money and effort into Community-Based Coastal Resource Management (CB-CRM) projects (Alcala 2001). The main bulk of funds and resources allocated for resource management was invested in the regulation of the small-scale fisheries sector. These

[13] According to Republic Act 8550, known as the 'Philippine Fisheries Code of 1998', 'municipal waters' is reserved for small-scale fishers (or 'Municipal fisherfolk'). Municipal fishers use boats of 3 gross tons or less. Municipal waters stretch 15 km into the sea from the shoreline.

projects had a rather narrow territorial institutional setup and focus, with each municipality having responsibility for its own 'municipal waters'. Coral reef protection received much attention. In 1999, the municipal government of Sibulan established two 6-hectare non-take Marine Protected Areas over nearshore reefs. Several fishers from long-established families, the 'original people of the place' (*lumad*), were involved in CB-CRM. They formed government-accredited fishermen's associations. Some became sea wardens (*bantay dagat*) and received monthly honoraria for their policing efforts. Fishers with 'migrant' status and very poor households with weak social networks in the place were not involved in CB-CRM (Fabinyi et al. 2010).

One effect of the new regulations was rising exclusionary pressures on small-scale migrant fishers. Fishers belonging to *lumad* families increasingly subscribed to the idea of 'protecting fish for local fishers'. Fishers with migrant and newcomer status were more often apprehended or blamed for illegal fishing. From around 2006 onwards, highly skilled Sama-speaking ('*Badjao*'[14]) fishers, who have long been fishing and dwelling in Sibulan during *ting habagat*, were no longer welcome. In the past, local fishers in Sibulan were keen to tap into Sama knowledge of marine environments, fishing and navigation. In 2007, I observed two Sama fishers and their families being blamed for illegal poison fishing and forced away from Sibulan. Some of their fishing gears were confiscated and they were not allowed to dock their boats and sleep on the beach.

In stark contrast to the Sama ('*Badjao*'), some local Sibulan fishers have been able to make certain fishing practices legal despite a national ban, such as beach seining (*sahid*). After strong lobbying from skilled fishers belonging to Ed's large family group, beach seining became permitted seasonally in restricted areas. In addition to having solid *lumad* settler status, this family was politically well connected. With much better knowledge of seasonal factors, bottom conditions and fish behaviour than municipal officials pushing to implement national laws, Ed argued successfully that fishermen should be allowed to use *sahid* nets seasonally in designated areas, in locations where there is no damage to seagrass beds and corals. In the sea just in front of his house, where Ed has always used the net, the bottom is sandy. This is also an area where many Sibulan fishers dock their boats. Being a member of a large local family group, and having strong support from neighbours and other people who regularly joined to pull in his large *sahid* net, Ed was well-placed to lobby support. A municipal councillor was also important in lobbying for Ed, being his relative and receiving voter-support from Ed, his family and many of his friends.

As shown with the examples of Sama-*Badjao* and Ed, the ability of small-scale fishers to use their environmental knowledge in shaping resource regulation clearly varies. At the same time, there are limitations to the power small-scale fishers like Ed are able to mobilise through local social networks. Illegal commercial fishing within municipal waters is an issue that has largely been ignored in resource management, despite prevalent critique from small-scale fishers. In 2006, I observed frequent illegal

[14] The Sama ('*Badjau*') is one of the most widely dispersed ethnolinguistic groups indigenous to insular Southeast Asia (Sather 1997: 2). '*Badjao*' is an exonym with largely negative connotations in much of the Philippines. The language is also referred to as Sinama (Zayas 2014).

commercial purse seine fishing, locally known as *kubkob*, in the southern part of the Tañon Strait. These boats were particularly active at night during new moon periods. During the *habagat* season, from June to September, the number of boats and the intensity of fishing increased. Yet, for the entire year of 2006, not a single *kubkob* was apprehended for illegal fishing in Sibulan. Owners of commercial fishing boats are part of the local and regional elite, including governors and congressmen, and the operators of these boats, despite its illegality, have been able to continue to fish inside municipal waters. Many fishermen in Sibulan are in direct competition with *kubkobs*, competing for small pelagic species such as mackerels, round scads and small tunas.[15] One fisher said: 'It's useless even to complain. They [referring to the mayor, the head of police and the head of the municipal *bantay dagat* association] are all corrupt'. Another fisher presented a similar critique:

> Commercial fishing is a really big problem. They fish once only, and it's all gone. We cannot do anything. And the *bantay dagat* cannot run after them, and besides there are only a few of them [*bantay dagats*]…One *kubkob* can catch 100 coolers in one night of fishing [40-50 kg of fish per cooler]…We cannot do anything about this. Only the national government can do something…The municipality cannot be trusted anymore. If you are mayor or head of police you can say: 'give me 15,000 per *kubkob*'. That's what we are thinking. They are in power while we are just small-time fishers. We can only complain.

2.7.2 Further Decline in Fisheries Resources and Differential Effects

Although the new territorially-based resource management scheme has protected a few local reefs, it has not led to improved fisheries. Catch levels have continued to decline. In 2006, fishers who remembered back to the 1960s and 1970s reported a decline of roughly 80% over the last forty years. In the early 1970s, a hook-and-line fishing trip would normally result in a catch of 10–15 kg. In 2005/2006, over a 14-month period, the average catch of the 24 fishers who took part in my survey was 2.23 kg per fishing trip. The average catch per trip of 8 fishers surveyed in 2012 was 1.6 kg.

With a significant drop in fisheries resources and a booming construction and service sector economy in nearby Dumaguete City, there has been a significant drop in the number of fishers in recent years. Between 2005 and 2019, I estimate a 24% decline in the number of small-scale fishers in the field site (from 174 to 132). In addition to 'migrant' fishers having been squeezed out, many local fishers have also dropped out of the fisheries in this period, mainly less-skilled 'part-timers' using a few hook-and-line techniques.

For the highly skilled local fishers, the decline in catch levels and income has been less significant. The average figures presented above shield significant differences in catch levels and income among the fishers. Some of the skilled 'full-timers' own and

[15] Of the fishermen included in my research, slightly more than 50% of their catch were small pelagic species, the same fish caught by the *kubkobs*.

use many different types of fishing gears. By knowing when and where to fish for different kinds of species, and having the skills, boats and gear to target these, they are able to catch larger and better-quality fish than the less-skilled fishers, while at the same time keeping the cost of fishing low. From January to June 2019, with the help of two record-keepers, I conducted a survey of four highly skilled hook-and-line fishers in their mid-to-late 20s. Their average catch per trip was 3.74 kg. The average selling price of the fish was 162.20 Philippine pesos. With an average of 28.5 fishing trips per month, the average monthly market value of each fisher's catch was 17,289 pesos (or US$ 331).[16] Their income from fishing was more than twice the income of people working full-time for minimum wage in the formal sector of the economy, including security guards, construction workers and store attendants in shopping malls (PhP 330 per day/PhP 7,920 per month).[17] Even after expenses, their return on fishing was well above the official poverty threshold for the Central Visayas (PhP 10,580 for a family of five) (Philippine Statistical Authority 2018).[18]

Two of these young fishers were grandsons of Ed, a local authority on when and how to catch pelagic fish in the narrow mouth of the Strait. Instead of becoming obsolete, his vast knowledge of the links between tides, currents and fish behaviour has been transmitted to a new generation of small-scale fishers. These fishers, in turn, constantly seek to refine and expand on their knowledges and skills, trying out new fishing techniques and adapting to altered conditions. The temporal aspect of this evolving biocultural knowledge complex is set to remain important also in the future, albeit for a smaller number of fishers.

2.8 Conclusion

The southern mouth of the Tañon Strait is a place of very strong and complex sea currents. The small-scale fishers of Sibulan have developed considerable knowledge to exploit fisheries resources in this challenging body of water. The temporal dimensions of the knowledge complex are particularly important. Successful fishers in Sibulan know how to predict, with great accuracy, the strength and direction of sea currents. The sea currents follow diverse paths and have different strengths depending

[16] Calculated with 1 US$ = 52.22 Philippine Pesos.

[17] These fishers all had some other sources of income as well, and other members of their families contributed to their household's budget.

[18] Three of the four fishers owned two boats each, one non-motorised and one motorised. The fourth fisher owned a small non-motorised boat only. A non-motorised outrigger (*baroto*) cost around PhP 1,800 (US$ 34.50). A small motorised boat with a 5.5 horse powered engine cost approximately PhP 30,000 (US$ 574.50). These boats and engines are good for more than ten years of fishing. Those using a mix of motorised and non-motorised boats spent on average P110 per fishing trip. For the fisherman who used a small non-motorised boat, the expenses of fishing were around P40 per fishing trip. Included in the calculation of expenses are hooks, lines and other fishing gear, ice, baitfish and gasoline, as well as epoxy, glue and other materials used in the making and maintenance of boats and gear.

on the features of the terrain, weather phenomena and the position of the moon and sun. Their calendric and place-specific knowledge overlaps with their knowledge of currents and fish behaviour. Fishing activities fluctuate within the month, linked to the lunar cycle, and across the monsoon seasons. While the tides, currents and winds shape the rhythm of fishing, the ideal time to fish are not the same for all small-scale fishers. They use different kinds of boats and gears and exploit different ecological niches, and their knowledges and skills vary, resulting in a differentiated rhythmic pattern.

As fisheries resources have declined, the knowledge barrier in the small-scale fisheries has increased. Nearshore reefs are heavily overexploited and fishing as a livelihood has become increasingly difficult for many. The number of people who fish for a living has declined in recent years. Many of those who have completely dropped out of fishing tend to earn more money from construction work and other land-based jobs than from fishing. Others remain highly dedicated fishers, and some of them regularly catch significantly more fish per fishing trip than other fishers.

In response to declining catch levels, the highly skilled fishers who participated in this study, mostly men who were born in Sibulan and whose fathers and grandfathers were fishers, began refining their knowledge of local fishing grounds. With long-distance migrant fishing becoming economically and politically difficult, they turned their focus on how to access fish in hard-to-reach places with low-cost hook-and-line techniques and small outrigger canoes. They also improved their fish traps to enable fishing in deeper water. Some continued to use beach seine nets seasonally, in suitable places. A key aspect of this adaptation process entailed developing more detailed knowledge of the temporal aspects of the fisheries, such as the direction and strength of sea currents in particular places. Senior, highly experienced fishers, including George, Leoncio and Ed, have played a key role in this process, sharing their calendric knowledge with younger fishers within their respective family groups and neighbourhoods, forging stronger ties between the generations. The significance of such knowledge thus goes beyond its immediate livelihood aspect; it serves as a resource for forming an identity as *mananagat* (fisher) and authority and status within the fishing community.

While considerable knowledge and advanced skills are necessary for securing a good return on fishing, under current conditions other factors also come into play. Highly skilled Sama (‘*badjao*’) fishers have been forced out of the place. With a rather narrowly conceived territorial system of resource regulation proliferating in the last decades of the twentieth century, migrant and ethnic minority fishers became increasingly blamed for illegal fishing and are no longer welcome to fish in Sibulan. The fishers who continue to have some level of success in Sibulan tend to have solid status as ‘locals’ and belong to well-connected family groups. Their socio-political and cultural capital help them in their effort to legitimate their own resource use practices.

Whether it is possible to integrate small-scale fishers’ temporal knowledge into resource regulation to ensure more socially inclusive and environmentally sustainable outcomes remains to be explored. Meanwhile, coastal resource management should focus much more on how to limit commercial fishing, such as purse seine and trawl

fisheries. Fishers in Sibulan compete directly with purse seine boats for small pelagic fish. The politics of such regulation must be brought into the open. Large-scale commercial fishing in the Tañon Strait has been banned for several decades. More recently, regional and national government agencies have imposed seasonal bans on commercial fishing of schooling pelagic fish. Yet state-sanctioned laws regulating the fisheries are often undermined by various social forces. Governors, congressmen and other politically influential people own commercial fishing fleets in many parts of the Philippines, including the Central Visayas. Their boats continue to intrude illegally into municipal waters. The small-scale fishers feel powerless 'changing the tides' in this long-standing resource conflict.

Acknowledgements This study was made possible by the support of an International Postgraduate Research Scholarship and an Australian National University (ANU) Scholarship. Follow-up research was made possible by research leave granted by the National University of Singapore (NUS) and Universiti Brunei Darussalam (UBD). A Gratuitous Permit for the 2019 re-visit study of the fishing families of Sibulan was granted by the Municipality of Sibulan.

Compliance with Ethical Standards The study was conducted in accordance with the Principles of Professional Responsibility of the American Anthropological Association. Ethics Committee approval was obtained from ANU, NUS and UBD. Informed consent was obtained from all participants involved in the study.

Funding Sources Self-funded.

Conflict of Interest No conflict of interest has been declared.

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