

Navigating the Tides:
Indigenous Perspectives and Conventional Fisheries Management
in the Tropical Rock Lobster Fishery, Torres Strait, Australia

Annie Lalancette

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Abstract

Navigating the Tides: Indigenous Perspectives and Conventional Fisheries Management in the Tropical Rock Lobster Fishery, Torres Strait, Australia

Annie Lalancette, PhD

Concordia University, 2017

The thesis aims to gain a better understanding of opportunities for and constraints to the advancement of indigenous rights and aspirations in State-controlled fisheries. It explores the perspectives of Torres Strait (TS) Islanders in the context of expected shifts in governance of the tropical rock lobster (TRL) fishery. This fishery is shared between traditional inhabitants, non-indigenous Australians and neighboring Papua New Guinea; each with differing objectives, interests and capacities. In 2005, the highest governance Australian body for fisheries in TS decided to introduce a Total Allowable Catch (TAC) and quotas for each sector. Implementation of quotas has been systematically delayed due to initial problems with setting the TAC and difficult allocation negotiations. In parallel, the High Court recognized in 2013 the native title rights of TS Islanders to $\approx 37,800 \text{ km}^2$ of sea territory and non-exclusive commercial fishing rights.

This study is informed by 13 months of field work undertaken in 2008-2011 involving a core component of standard ethnographic methods and three supplementary components consisting of preference interviews and rankings, cognitive mapping and future scenarios. Methods used were assessed in terms of their usefulness and appropriateness in the TS context. While recent methodological developments offer exciting opportunities, this thesis contends that these methods can only achieve their full potential when combined with other complementary methods, are well-tailored to the context and are conducted in an atmosphere of trust which can require significant prior involvement in communities.

It is argued in this thesis that Islander practices contribute to social-ecological resilience and to all dimensions of Islander wellbeing. This thesis highlights how fisheries in TS are largely influenced by conventional management and neoliberal principles. It is shown that the current structure

greatly favors Western views and has generally not considered the potential contributions of Islander perspectives to fisheries management. It is argued that the current regime has the potential to erode Islander institutions and practices and is at odds with Islander realities, values and aspirations. It concludes that in the wake of the Sea Claim, significant changes are needed to the current governance structure for the actualization of Islanders' newly recognized rights.

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Contribution of Authors

The candidate is the principal author of all chapters. Chapters 5, 6 and 8 share authorship with the candidate's supervisor (Dr. Monica Mulrennan).

Other chapters are solely authored by the candidate with inclusion of valuable editorial suggestions of the supervisor. In addition, the candidate formulated research questions, developed the research design, collected and analyzed primary and secondary data and prepared initial drafts. All these steps were guided by the supervisor. The preparation of manuscripts to be submitted incorporated critical input and editorial suggestions of the supervisor.

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List of Acronyms

| | |
|-------------|--------------------------------------------------------------|
| AFMA | Australian Fisheries Management Authority |
| AQIS | Australian Quarantine and Inspection Service |
| ATSI Act | Aboriginal and Torres Strait Islander Act |
| CAS | Complex Adaptive System |
| CDEP | Community Development Employment Project |
| CDP | Community Development Program |
| CMT | Customary Marine Tenure |
| CPUE | Catch per Unit Effort |
| CQ | Community Quota |
| CSIRO | Commonwealth Scientific and Industrial Research Organisation |
| DAFF | Department of Agriculture, Fisheries and Forestry |
| EEZ | Exclusive Economic Zone |
| FCM | Fuzzy Cognitive Mapping |
| ITQ | Individual Transferable Quota |
| IQ | Individual Quota |
| MSY | Maximum Sustainable Yield |
| PAR | Participatory Action Research |
| PNG | Papua New Guinea |
| PZJA | Protected Zone Joint Authority |
| QMS | Quota Management System |
| RNTBC | Registered Native Title Body Corporate |
| SES | Social-Ecological System |
| SESF | Social-Ecological System Framework |
| TAC | Total Allowable Catch |
| TIB License | Traditional Inhabitant Boat License |
| TRL | Tropical Rock Lobster |
| TS | Torres Strait |
| TSIRC | Torres Strait Island Regional Council |
| TSEMAC | Torres Strait Fisheries Management Advisory Committee |

| | |
|-------------|----------------------------------------------------------------|
| TSPZ | Torres Strait Protected Zone |
| TSRA | Torres Strait Regional Authority |
| TSSAC | Torres Strait Scientific Advisory Committee |
| TSTRLRAG | Torres Strait Tropical Rock Lobster Resource Assessment Group |
| TSTRLWG | Torres Strait Tropical Rock Lobster Working Group |
| TURF | Territorial User Rights in Fisheries |
| TVH License | Transferable Vessel Holder License |
| UNCLOS | United Nations Law of the Sea |
| UNDRIP | United Nations Declaration on the Rights of Indigenous Peoples |

Chapter 1

Introduction

Indigenous peoples have shown remarkable resilience and agency in defending their rights to make decisions affecting their lives, territories and resources. Various international agreements include provisions affirming indigenous peoples' rights to self-determination, including their rights to use, own and control resources, and the value of indigenous knowledge (Mulrennan, 2013). In parallel with these recognitions, growing support for participatory governance, collaborative approaches and integration of multiple knowledge systems in environmental and natural resource management has opened up a space for indigenous peoples to assert their rights and interests. Figure 1.1 summarizes the convergence of factors that has created a more favourable context for the recognition of indigenous rights and agency.

First, indigenous efforts to reclaim their rights and secure their cultural survival coalesced in the 1970s through national and transnational mobilization (Anaya, 1994; Lennox & Short, 2016). These movements grew into an international campaign linking indigenous concerns with general human rights principles, such as self-determination and non-discrimination (Anaya, 1994), resulting in their effective mobilization at the UN (Anaya, 1994; Lennox & Short, 2016). Second, ecological crises resulting from failures in conventional environmental and natural resource management have been a catalyst for rethinking ecology. In particular, three conceptual shifts occurred: (1) a shift from an equilibrium view of ecosystems to the realization that ecosystems are complex adaptive systems (CAS) with multiple domains of attraction, (2) the adoption of a social-ecological systems (SES) approach which makes explicit the two-way linkages between social and ecological systems, and (3) calls to shift from expert-based command-and-control management to more inclusive adaptive management (Berkes, 2004). Third, the inability of many community-based conservation projects to achieve neither development nor conservation goals prompted “a long overdue critical assessment of the field” (Mulrennan et al., 2012, p. 244). Naive ideas about participation as a panacea to development and conservation issues were replaced by acknowledgement of the need for a more political approach recognizing power relations and the need for equal partnerships (Brosius et al., 1998; Nadasdy, 2003). Lastly, neoliberal governance,

with its focus on multiculturalism and property rights, has provided arguments in support of indigenous claims to territory and resources (Castree, 2004; Richards, 2013).

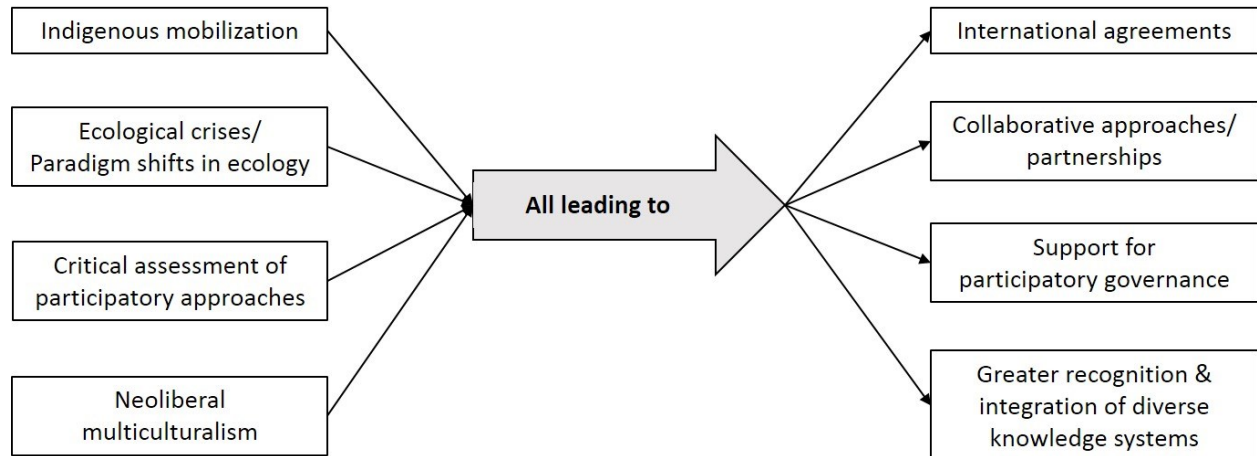


Figure 1.1: Converging factors that opened up a space for indigenous rights and agency

Despite these advances, indigenous rights – in particular rights to control natural resources (Capistrano & Charles, 2012) – continue to be constrained by hegemonic claims of the State (Butterly, 2013a; Carothers, 2011; Davis & Jentoft, 2001; Turner et al., 2013). Fisheries are especially problematic in this regard because resistance to indigenous rights is exacerbated by ontological dissonance. The dominant view that the sea is an international commons with pre-defined offshore areas tied to the territorial sovereignty of the State clashes with indigenous understandings of space as a land-sea continuum associated with ownership rights and responsibilities (Mulrennan & Scott, 2000). Indigenous rights and systems of tenure tend to be ignored on the basis that sea space cannot be property, and the doctrine of *mare nullius* prevails (Mulrennan & Scott, 2000). As Mulrennan and Scott (2000, p. 681) put it, coastal indigenous peoples are faced with a “double jeopardy of exclusion – jurisdictional and proprietary”.

Centralized fisheries management by the State has come under fire in the last few decades for its poor track record in ensuring the sustainability of fish stocks and in improving the wellbeing of coastal communities (Bavington, 2010; Carothers, 2015; Coulthard et al., 2011). Indeed, some of

the most spectacular ecological crises are the result of overfishing. Notorious examples include catastrophic stock collapses (e.g. Pacific bluefin tuna, North Sea herring and mackerel, northern cod in Atlantic Canada, Norwegian spring-spawning herring and British Columbia's Fraser River sturgeon) (Mackinson & Nottestad, 1998), regime shifts (i.e. changes in overall species composition of marine communities) (Daskalov, 2002; Myers et al., 2007), and ecosystem collapses (Mangel & Levin, 2005; Worm et al., 2006). Alternative approaches are urgently needed if fisheries are to fulfill multiple social and economic goals.

This thesis examines the perspectives and practices of indigenous Islanders and of government fisheries managers with respect to the tropical rock lobster (TRL) or *kaiar*¹ fishery in Torres Strait (TS), northern Australia. Perspectives are broadly defined to include values, principles, knowledge, observations, aspirations and recommendations. Practices refer to their general meaning of "actions". It includes, among others, actions performed as the result of individual agency, actions that are governed by institutions and actions based on individual or socially-accumulated knowledge. The goal is to identify connections and disconnections between these perspectives and practices in order to gain a better understanding of barriers to and opportunities for the advancement of indigenous rights and agency in State-controlled fisheries operating under the logic of conventional fisheries management.

The TS TRL fishery was chosen as a case study because it is currently at the confluence of two major and competing currents affecting fisheries worldwide: increasing adoption of individual market-based property rights and growing recognition of indigenous rights. On the one hand, governance of the TRL fishery is expected to shift following the introduction of output controls. In 2005, the highest decision-making body for fisheries in the region (the Protected Zone Joint Authority – PZJA) committed to introduce a total allowable catch (TAC) and allocate quotas between the indigenous and non-indigenous sectors to commence in 2007 (PZJA, 2005). On the other hand, Islanders began pursuing Native Title recognition for their sea territories in 2001 (referred to as the Sea Claim) and have been active in advancing their aspirations to regain

¹ In this thesis, I use the term tropical rock lobster (TRL) when referring to the fishery and its management from a Western perspective and the term *kaiar* when discussing from an Islander perspective.

ownership and control of their marine resources, including *kaiar*. A decision regarding the Sea Claim was pending, the outcome of which could profoundly transform power relations in the region. In addition, a shift was becoming apparent in the official fisheries management discourse. Although TAC introduction was originally motivated by sustainability concerns (Pitcher et al., 2001), these proved to be temporary. TRL abundance reached record highs in 2002-2005 (Pitcher et al., 2002; Ye et al., 2004, 2007) and the stock has been considered “underutilized” or “underfished” by managers since. Neoliberal principles underpin a preoccupation with the fisheries objective of optimal utilization and were informing negotiations concerning quota allocation, creating pressure on Islanders to change their ways as a precondition for greater access. Native Title recognition to an area covering approximately 37,800 km² of sea was achieved by Islanders during the course of this study accompanied by recognition of commercial fishing rights. Implementation of quotas has been systematically delayed due to initial problems with setting the TAC and difficult allocation negotiations and are still not in place. This case was thus an ideal context to explore: (1) the dynamics and potential impact of changes in fisheries governance on indigenous rights, agency and wellbeing, and (2) the tensions between indigenous worldviews, rights and aspirations on the one hand and conventional fisheries management in State-controlled fisheries on the other hand.

More specifically, this research project is directed to answering the following questions:

- What are the perspectives and practices of TS Islanders as they relate to the TRL fishery? How and to what extent do these differ among indigenous fishers? How do these contribute to social-ecological resilience and Islander wellbeing?
- What fisheries principles, objectives and measures are currently promoted by the Australian Commonwealth for fisheries management in Australia and in TS in particular? What are the likely implications of proposed changes on indigenous lives?
- What are the connections and disconnections between Islander perspectives and practices and the official fisheries management discourse?

In line with these research questions, the following objectives were pursued:

1. Gain a contextual understanding of Islander practices and perspectives in the TS TRL fishery.

2. Explore and experiment with different research methods to assess their effectiveness in eliciting indigenous perspectives.
3. Document the official fisheries discourse through a review of official documents and interviews with all government managers from the Australian Fisheries Management Authority that served in TS.
4. Analyze proposed management measures in the TS TRL in relation to larger political trends and their likely impacts for Islanders.
5. Compare Islander practices and perspectives with the official fisheries management discourse.
6. Identify connections and disconnections between Islander practices and perspectives and the principles of conventional fisheries management.

The research presented in this thesis was conducted as part of an interdisciplinary graduate program. As such, it draws on multiple bodies of literature from different disciplines including human geography, fisheries management, political ecology and anthropology. This thesis is also manuscript-based; hence much of the information typically found at the beginning of a conventional doctoral thesis is dispersed in the manuscript chapters that comprise the body of this thesis. To avoid repetition as much as possible, the next three chapters – Literature Review, Case Study and Research Approach – are limited to theoretical concepts and background information that are not covered in later chapters but useful to their understanding.

The title of this thesis was chosen as a metaphor to represent the different themes covered in the manuscript chapters. First, Islanders have learned to “navigate the tides”. In a literal sense, fishing is governed by the rhythm of the tides. Figuratively, Islanders adapt their fishing to changing needs, opportunities, and sociocultural responsibilities and commitments. This theme of Islander adaptations and practices is addressed in Chapter 6. Second, neoliberalism has permeated all areas of public policy in Australia since the 1980s. Neoliberal objectives are becoming more present in fisheries management in TS as quota management and the transfer of ownership are being discussed. Chapter 7 explores current neoliberal forces in the TS TRL fishery and their likely impacts on the lives of indigenous Islanders. The question remains as to how both top-level decision-makers for fisheries and Islanders will navigate this current. The third and final “tide”

refers to the growing affirmation and recognition of human and indigenous rights. Chapter 8 shows that significant changes to fisheries governance and management practices will be necessary to respond to these new imperatives. The conclusion chapter summarizes the main points and contributions of the thesis. The thesis ends in Appendix 1 with reflections directly from Islanders to give them the opportunity to speak directly to the reader without any intervention on my part.

Chapter 2

Literature Review

In this section, I briefly introduce three of the overarching theoretical concepts that inform my research: conventional fisheries management, social-ecological systems and social wellbeing. Other major concepts are detailed in the manuscript chapters and are therefore not covered here. These include methodological principles from indigenous methodologies and participatory action research (Chapter 5), indigenous rights and agency (Chapters 7 and 8), neoliberalism and property rights in fisheries (Chapter 7) and governmentality (Chapter 8).

I should also clarify that my research is informed by political ecology, especially in relation to the attention paid to issues of power, capacity, opportunity and benefit distribution and how these impact the relationships between people, communities and resources. The influence of political ecology is particularly evident in Chapter 8 where plurality of values and meanings of diverse actors are explored and how these, in turn, affect Islander lives. However, I have deliberately refrained from a more overt adoption of political ecology in my thesis. This decision was taken at the outset of my research to avoid overlap and encroachment upon doctoral work already begun by fellow PhD candidate, Annick Thomassin (McGill, Anthropology), on fisheries management in Central Torres Strait. While my engagement of political ecology is limited here, I anticipate fertile terrain for exploring its potential in future publications.

Conventional Fisheries Management

The Emergence of Fisheries Regulations

Common-pool resources such as fish stocks are a class of resources that are particularly problematic to manage. They share two characteristics which in combination cause serious problems (Acheson, 2006). First, it can be difficult to control access to the resource or to exclude people from using the resource (referred to as the “exclusion problem”). Second, the amount of the resource used by one person cannot be used by another, meaning that each user can subtract

from the welfare of all other users (referred to as the “subtractability problem”) (Berkes, 2006; Ostrom, 1990).

Many coastal fishing people have devised informal systems that allow them to use marine resources sustainably (Asafu-Adjaye, 2000; Aswani, 2005; Ruddle et al., 1992). Customary marine tenure (CMT) (also called customary sea tenure (CST)) is one such example. CMT is a system in which particular groups of people have rights to access, use and distribute marine resources and the responsibility to manage those resources (Mulrennan, 2015), including controlling access, exploitation, monitoring and policing (Asafu-Adjaye, 2000). CMT systems are thus collective property systems with exclusive access where “owners” self-manage and self-regulate (Asafu-Adjaye, 2000). CMT systems are diverse, dynamic, highly adaptive and are based on local environmental knowledge, values, norms and customs (Asafu-Adjaye, 2000; Aswani, 2005). While CMT may be considered as a form of fisheries management, it is much broader and part of social, political, and spatial relationships (Ruddle et al., 1992). They have been documented throughout the world: in the Western Pacific, the Pacific Basin, the Indo-Pacific Region, the Caribbean and in Latin America, as well as in Canada, the United States, Australia and New Zealand (Ruddle et al., 1992). CMT has endured for centuries in many tropical areas and continues to be applied in some fisheries such as in Japan, India and many Pacific island States to name only a few (Berkes, 2006; Ruddle & Hickey, 2008).

In contrast, industrial fisheries began as essentially free, unregulated, and open-access and remained as such up until the end of the 19th century when the exhaustibility of fishing resources became apparent (Scott, 2000). Attempts at reducing harvesting pressure began with the implementation of input controls (i.e. measures controlling fishing methods) using targeted gear restrictions (e.g. vessel types and power, net mesh size, types of trawls, etc.), area closures, fishing seasons, and minimum landing sizes (Merrifield, 1999; Scott, 2000). These regulations were intended to encourage reproduction of fish stocks by increasing escapement of spawning and under-sized fish (Scott, 2000). When this proved inadequate, seasons were shortened and gear restrictions increased. By the 1960s it was clear that these regulations alone could not counter the ever-increasing capacity of fishing vessels (Scott, 2000). Fisheries management turned to limiting effort and restricting access with entry barriers, commercial fishing license limits, or license

buyback programs (Merrifield, 1999; Scott, 2000). Restricting access did little to reduce the “race for fish”, and overcapitalization in fisheries continued, resulting in a significant waste of economic resources (Shotton, 2000).

The failure to reverse, or even slow down, stock declines led to a shift in the focus of centralized fisheries management from input to output control (Bradshaw et al., 2000; Hilborn & Walters, 1992; Scott, 2000). Output controls are measures that control how much fishers can harvest (Acheson, 2006). These are based on measures of total allowable catch (TAC), usually determined by a scientific process based on stock assessment models and a political process. Input controls are still present in most fisheries but as a supplement to other measures (Bradshaw et al., 2000; Hilborn & Walters, 1992). They include, among other interventions, caps on the number of fishing licenses, size limits on fish (e.g. minimum landing size), area closures, rotation of fishing grounds, temporal limits (e.g. fishing seasons), gear restrictions and effort controls (e.g. days at sea). Input controls are usually used in combination offering the possibility to design management arrangements tailored to the specific local conditions of a fishery. They can be very flexible and are usually understandable to fishers because they relate to the same scale at which they operate (St. Martin, 2001). Despite these advantages, input controls tend not to be viewed favourably by fisheries managers because rules must be constantly modified in response to increases in the capacity of fishers as they improve their skills and acquire new technology (often referred to as effort or technology creep).

Fisheries Science

“An epitaph for the concept of Maximum Sustainable Yield”

M.S.Y.

1930s-1970s

Here lies the concept, MSY.

It advocated yields too high,

And didn't spell out how to slice the pie.

We bury it with best of wishes,

Especially on behalf of fishes.

We don't know yet what will take its place,

But hope it's as good for the human race.”

– Larkin (1977)

Contrary to Larkin's epitaph above, maximum sustainable yield (MSY) is a theoretical concept still used extensively in fisheries science and management. It is defined as the maximum catch (usually expressed in biomass) that can be harvested from a population over an indefinite period (Maunder, 2008). It is based on the surplus production model, also known as the biomass dynamic model (see Figure 2.1), which assumes that the annual net growth in abundance and biomass of a stock increases as the biomass of the total fish population increases, up to a certain point. When biomass increases beyond this point, the stock will be affected by density-dependent factors such as competition for food and cannibalism of smaller individuals which will reduce net population growth down to zero, where an equilibrium that corresponds to the carrying capacity of the stock is reached (Cochrane, 2002).

MSY was quickly adopted into national and international agreements between 1949 and 1955, in great part due to pressures from industrialized nations, particularly the USA (Finley & Oreskes, 2013). The UN Rome conference in 1955 called for countries to fish without restrictions until MSY had been reached. This put the onus of proof on countries wishing to enact conservation measures, effectively preventing countries without the necessary scientific capability to do so to limit fishing by other nations in their waters (Finley & Oreskes, 2013). In 1982, MSY was included in the United Nations Convention on the Law of the Sea (UNCLOS). It is now part of most

international fisheries agreements and treaties (Cochrane, 2002) and as we will see in subsequent chapters, it was included in the Torres Strait Treaty and Australian fisheries legislations. The fact that MSY was used as a political tool by the US and the UK to protect their foreign interests, may explain its pervasiveness despite mounting criticisms of the concept beginning in the 1950s (Finley & Oreskes, 2013). Indeed, MSY has been criticized for the high uncertainty surrounding the estimation of many of its parameters, for being single-species, for not taking into account wider ecosystem considerations and impacts, for ignoring the size and age of harvested animals, and for ignoring social, cultural, political and economic factors and objectives (Maunder, 2008).

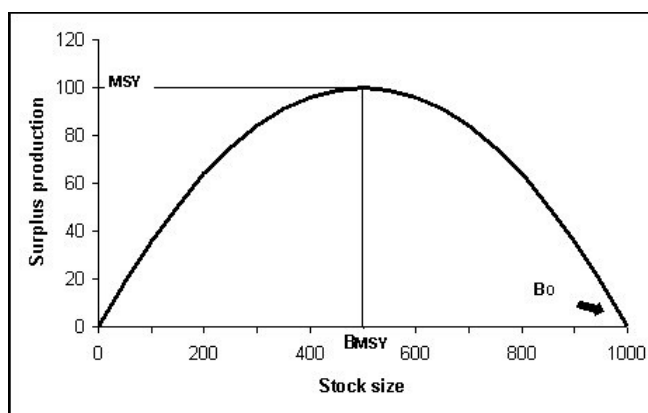


Figure 2.1: Schaefer model of surplus production (biomass dynamic) as a function of stock size showing the major reference points

Source: Cochrane (2002). <http://www.fao.org/docrep/005/y3427e/y3427e07.htm#bm07.3.2>

MSY = maximum sustainable yield; BMSY = the biomass at which MSY occurs; and B₀ = the average unexploited biomass of the stock (the average ‘carrying capacity’).

One early and very influential critique of MSY was provided by Gordon (1954) in his article on fisheries bioeconomics. Building on the standard economic theory of production, he argued that “the ‘overfishing problem’ has its roots in the economic organization of the industry” (p. 128). According to Gordon, management should not be concerned with determining the maximum catch that was sustainable, but rather attempt to maximize the overall rent. He demonstrated that the theoretical optimum economic fishing intensity (also known as the maximum economic yield –

MEY) is less than that which would produce MSY (see

Figure 2.2). He believed that the common property nature of fisheries created incentives for fishermen to race for fish which resulted in misallocation of fishing effort and dissipated rent. This behavior, he continued, was the cause of overfishing and the reason why fishers' are not wealthy. Gordon concluded that users of common-pool resources are stuck in a pattern of overexploitation that can only be solved by assigning property rights, either private or public.

While the MEY concept did not displace MSY in management, Gordon's conclusions had a profound influence on the development of fisheries management. The same ideas put forward by Gordon would be popularized twelve years later by the publication of Hardin's "The Tragedy of the Commons" (1968). In fact, both Hardin and Gordon used the example of the English Commons to illustrate their argument!

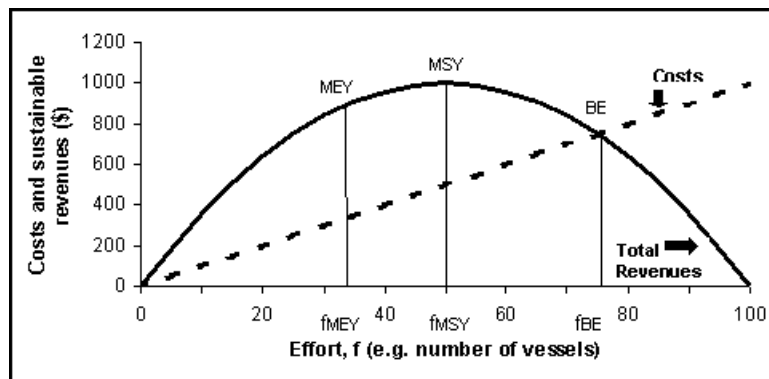


Figure 2.2: Gordon-Schaefer bioeconomic model of costs and sustainable revenues for a fishery as a function of fishing effort

Source: Cochrane (2002). <http://www.fao.org/docrep/005/y3427e/y3427e07.htm#bm07.3.2>

MEY = maximum economic yield, MSY = maximum sustainable yield, BE = the bioeconomic equilibrium. The suffix f indicates the effort at each of those reference points.

The Gordon-Hardin model (after McEvoy 1986 in St. Martin, 2001) continues to dominate conventional fisheries science and management (St. Martin, 2001). This model is based on the following assumptions:

- the system produces a predictable and limited quantity of one type of commodity (e.g. one fish species),
- the fishery is open to all without any restrictions on access,
- fishers can only gain property rights to the fish they have harvested,
- fishers form a homogenous group of individuals solely motivated by the pursuit of maximum personal gain, and
- fishers act independently from one another and do not communicate or cooperate with one another (Ostrom, 2000, p. 46).

Based on the above, management solutions reside either in the market (privatization) or in government control (public resources). McCay and Acheson (1987, p. 5) hypothesized that “the popularity of the model may be related to its ability to generate both liberal and conservative political solutions”. At the same time, assumptions about homogeneous rent-seeking independent fishers allow for the use of aggregate data in scientific numeric modeling (St. Martin, 2001). Because decision-making is solely informed by fisheries science and performed by actors removed from the resource, it tends to focus on the large scale (e.g. the whole stock) (Hilborn et al., 2005), while local-level variations in abundance of the resource and in habitat (e.g., bottom types, particular flora, depth, and water conditions) are ignored (St. Martin, 2001). Implementing regulations that ignore habitat considerations can create damaging local ecological impacts that may seem insignificant at the scale of the entire management area (Hilborn et al., 2005; St. Martin, 2001). Similarly, a focus on the stock level can detect changes that are not apparent at the local scale. For example, aggregating fish species will exhibit hyper stable catch per unit effort (CPUE) while the stock is declining until it is very close to collapse (Rose & Kulka, 1999).

Scientific numeric modeling under the logic of bioeconomics also limits the basis of information by rendering local knowledge incompatible and irrelevant due to its finer scale (St. Martin, 2001). Moreover, issues of trust between fishers and scientists in a context where fishers are viewed as “the fox in the henhouse” can make the sharing of knowledge more difficult. Without access to local knowledge and observations, feedback loops between the status of the resource and decision-

making take more time. This can undermine and delay the diagnosis of necessary actions and have a negative impact on sustainability of the resource (Berkes, 2002; Folke et al., 2005a).

Common Fisheries Management Measures

Fisheries management can vary widely from open-access and unregulated arrangements, to regulated regimes with no limits on access, to more restrictive systems. The latter includes limited licensing (i.e. capping the number of users and defining who they shall be) and constraining each user's catch. Despite well-documented experiences with these various arrangements, there is no consensus as to what constitutes the best approach to fisheries management. Currently a majority of Western managed fisheries operate under a system that depends upon TAC for individual species supplemented by input controls such as gear restrictions, minimum mesh sizes, closed areas and seasons (Hilborn & Walters, 1992; Rijnsdorp, 2007).

Catch-based and Market-based Property-Rights: Quota Management Systems (QMS)

The yearly TAC can be divided into shares for target user groups, a practice known as slicing the TAC (Anderson, 2000; Trondsen, 2004). These shares can be further divided into smaller quotas that may be held by a person, a vessel, a community, an enterprise, or some other form of collective (Hilborn et al., 2005; Shotton, 2000). Slicing the TAC offers the possibility of choosing different quota arrangements for different segments of the same fishery (e.g. to better match their objectives or capacity). As we will see in subsequent chapters, when the Protected Zone Joint Authority (PZJA) decided to introduce a TAC for the TS TRL fishery in 2005, it also proposed to slice the quota between the indigenous and non-indigenous sectors and to implement different quota options for each of these sectors. There are three major categories of quotas based on ownership: competitive or Olympic quotas, community quotas, and individual quotas.

Most traditional fisheries programmes allow all interested parties of a target group to participate (sectorial allocation), but control total harvest by shutting down the fishery when the TAC is reached (Anderson, 2000). Because of the 'race for fish' created by this level of allocation (Anderson, 2000), this management system is referred to as a competitive or Olympic quota (Trondsen, 2004).

Individual quotas (IQs) and community quotas (CQs) assign a portion of the TAC to individual fishers or fishing communities respectively. This difference in allocation has a tremendous impact on how these measures are implemented on the ground. CQs are associated with a common property perspective and communities will typically engage in devising additional local rules to meet community objectives (Holland & Ginter, 2001). CQs are thus also often associated with co-management arrangements in fisheries. Individual quotas on the other hand, are associated with the bioeconomic discourse advocating for privatization of the resource. By promoting individualism, this measure hinders fishers' capacities to self-organize. However, because management is controlled by the State and does not occur through the market, IQs are not linked to the negative social impacts commonly associated with individual transferable quotas (ITQs).

ITQs are property rights that are both catch-based and market-based because of their transferability. ITQs are very efficient in solving problems associated with the "race for fish" (Arnason, 2005; Bess, 2005). Economists argue that transferability will lead to optimal allocation involving the most efficient fishers will provide flexibility for emergencies such as illness or vessel breakdown. However, this perspective has been challenged on the basis of the observation of overcapitalization of ITQs in many fisheries (Pinkerton & Davis, 2015). ITQs are notorious for their social impacts. The most often cited include reduction in fishing employment which can threaten fishing communities, concentration of quotas in the hands of a few, increased processor control, changes in community structure, and problems with inter-generational equity as new entrants must purchase ITQs to access the fishery (Pinkerton & Davis, 2015). ITQs can also have deleterious ecological impacts as they create incentives for discarding marketable fish (e.g. high grading or dumping of by-catch) (Copes, 2000; Copes & Charles, 2004).

Place-based Property Rights

Place-based or spatial rights assign rights to a coastal area or to specific fishing grounds. Place-based property rights include traditional fisheries management systems such as customary sea tenure (e.g. Aswani, 2005; Hviding & Baines, 1996), but also arrangements created more recently such as Territorial User Rights in Fisheries (TURFs) in Chile (Cancino et al., 2007; González et

al., 2006). Place-based rights can help address the exclusion problem, but usually additional rules are required to address the subtractability problem. This can be achieved through input controls or by combining TURFs with a TAC. In Japan and Chile, some communities have engaged in effort coordination over space or have implemented pooling arrangements of revenues to mitigate the negative social impacts of TACs and ensure that equity goals are met (Cancino et al., 2007). The combination of place-based rights, input controls and output controls has enabled local fishers in Japan and Chile to engage in additional collective actions such as ecosystem management and habitat enhancement, marketing coordination and cross-TURF coordination with obvious benefits in terms of both ecological and social sustainability (Cancino et al., 2007).

Social-ecological Systems

When researchers began studying linkages between social and ecological systems, they discovered new and complex patterns and processes not apparent when studied by social or natural scientists separately (Liu et al., 2007). They realized that coupling between social and ecological systems (which are both complex adaptive systems) gives rise to a new complex adaptive system with its own emergent properties and feedbacks (Liu et al., 2007, 2015; Westley et al., 2002). Berkes & Folke (1998) applied the term “social-ecological system” (SES) to emphasize the integrated concept of humans in nature and to stress that the delineation between social and ecological systems is artificial and arbitrary. Thus, interdisciplinary integration is necessary in order to understand SESs (Stepp et al., 2003). As a subset of complex adaptive systems, SESs present the same characteristics, namely: emergence, path dependency, non-state equilibrium, adaptation, nonlinear relations and thresholds, cross-scale interactions, regime shifts, and uncertainty (Levin, 1998; Perez & Dray, 2005).

Other terms used in the literature to capture this idea include: coupled human and natural system (CHANS), human ecosystems, ecosocial systems, coupled human-environment systems, and socio-ecological systems.

Social-ecological System Framework (SESF)

Binder et al. (2013) identified 10 established frameworks for analyzing SESs. These frameworks differ according to three criteria: (1) whether a framework conceptualizes the relationship between the social and ecological systems as being uni- or bidirectional; (2) whether it takes an anthropocentric or an ecocentric perspective on the ecological system; and (3) whether it is an action-oriented or an analysis-oriented framework. They conclude that there is no single framework that can be used to address all research issues in SES. The choice of an appropriate framework should be guided by the focus of the study (i.e. the social system, the environmental system or the interactions between the two), how the environmental system is conceptualized (utilitarian vs intrinsic values) and whether the research is analysis or action orientated.

The social-ecological system framework (SESF) (McGinnis & Ostrom, 2014; Ostrom, 2007, 2009), is the only SES framework that treats the social and ecological systems in almost equal depth (Binder et al., 2013). It was developed to provide a common vocabulary and a common set of potentially relevant variables and their subcomponents to use in data collection and analysis of findings about the sustainability of complex SESs (McGinnis & Ostrom, 2014; Ostrom, 2009). The goal of the SESF is to facilitate multidisciplinary efforts and case comparisons to stimulate “the construction and testing of alternative theories and models that determine which influences on processes and outcomes are especially critical in specific empirical settings” (McGinnis & Ostrom, 2014, p. 1). It is the most general SES framework and data collected within its structure could potentially be analyzed with different lenses or used with any other SES framework (Binder et al., 2013).

The SESF offers a multi-tiered structure for organizing concepts and variables that have shown their relevance in explaining sustainability outcomes in a large number of case studies in the context of fisheries, water, and forestry common-pool resources (Hinkel et al., 2014; Ostrom, 2007, 2009). As illustrated in Figure 2.3, SESs are composed of four major subsystems that include resource system(s) (e.g., a fishery), resource units (e.g. lobsters), users (e.g. fishers), and governance systems (e.g. organizations and rules that govern the fishery in that specific location). Two additional variables – interactions and outcomes – serve to capture the fact that while these subsystems are relatively separable, they interact to produce outcomes at the SES level. Outcomes

have powerful reciprocal feedbacks which affect subsystems and their components, as well as other SESs. The four subsystems also interact with two other broad variables: (1) social, economic, and political settings; and (2) related ecosystems. Each of these eight broad first-tier variables contain other nested variables. First-tier variables can be unpacked into multiple lower tiers until the level best suited to the specific case study or research question under investigation is identified (McGinnis & Ostrom, 2014; Ostrom, 2007, 2009).

The SESF has undergone significant development throughout the years. It was originally proposed by Ostrom (2007, 2009) and later refined by McGinnis and Ostrom (2014). By applying methods from research fields that study formal relationships between concepts, Hinkel et al. (2014) clarified the semantic relationships between concepts to facilitate further development of the framework. Hinkel et al. (2015) also proposed a diagnostic procedure to operationalize the concepts and variables of the SESF to facilitate its application to different types of SES. Of direct relevance to this study, Basurto et al. (2013) and Partelow and Boda (2015) tailored the SESF to benthic small-scale fisheries and lobster fisheries respectively.

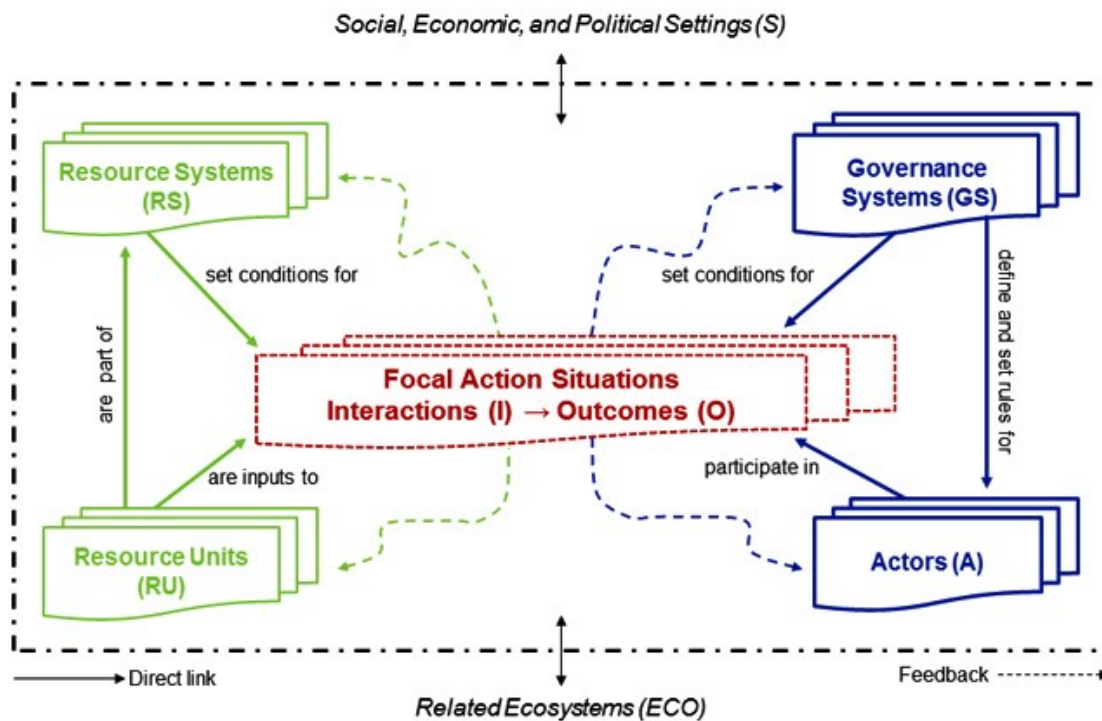


Figure 2.3: Social-ecological system framework (SESF)

Source: McGinnis & Ostrom (2014, p. 4)

Social-ecological Resilience

The concept of resilience is described in Chapter 6. To avoid repetition, only a brief overview of the concept and its relationship to fishing livelihoods is provided below.

Resilience is a key property of sustainability and a useful lens for analyzing adaptation to change (Berkes et al., 2003a). In the context of SESs, the scope of resilience is expanded from ecological systems to also include social systems and the links between the two (Folke et al., 2003). Social-ecological resilience refers to the amount of disturbance a system can absorb and remain in a given state, the degree to which the system is capable of self-organization, and the degree to which the system can build and increase the capacity for learning and adaptation (Folke, 2006; Folke et al., 2002). A cross-scale resilience analysis can highlight unanticipated impacts of policies and management measures at one level of intervention on another level (Marschke & Berkes, 2006)

Supporting positive resilience of SESs was proposed as a management objective over two decades ago (Holling & Meffe, 1996). Management for social-ecological resilience aims to “secure the capacity of ecosystems to sustain societal development and progress with essential ecosystem services” (Folke et al., 2003, p. 354). Resilience-building management must be directed towards slowly changing social and ecological variables such as experience, memory, and diversity (Folke et al., 2003). This requires flexible institutions that can respond to environmental feedback, learn, store understanding, and be prepared and adaptive to allow for change (Folke et al., 2003). The challenge for management is to expect the unexpected and shape it for sustainability without jeopardizing future options (Berkes et al., 2003b; Gunderson & Holling, 2002; Walker et al., 2004).

Because of the predominant influence of human intentional and unintentional actions on the dynamics and directions of change in SESs, adaptability of the system is mainly a function of the social component (Berkes et al., 2003a; Walker et al., 2004). Adaptability in SESs has been defined as the collective capacity of human actors to manage resilience, i.e. their capacity to reorganize the system within desired states in the face of uncertainty and surprises (Gunderson & Holling, 2002; Walker et al., 2004). Thus, social sources of resilience such as social capital (including trust

and networks) and social memory (including experience for dealing with change) are crucial in achieving sustainability in SESs (Folke et al., 2005b).

Walker (2004) links adaptability to the ability to alter the four attributes of resilience: precariousness, latitude, resistance, and panarchy. In other words, success in managing for resilience in SESs is dependent upon the ability to either move the current state of the system away from or closer to the threshold (change precariousness), move thresholds away from or closer to the current state of the system (change latitude), make thresholds more difficult or easier to reach (change resistance), or change the processes in response to dynamics at other scales (change panarchy responses). Hence, a SES can move from one regime to another either by the system crossing a threshold, or by a threshold moving across the system (Walker et al., 2004).

One must not confuse resilience with desirability. As Walker et al. (2006) remind us, some undesirable regimes such as a harsh dictatorship or desertified regions in the Sahel are very resilient. The capacity to create a fundamentally new system when the existing system is untenable has been termed “transformability” (Walker et al., 2004). There is a major distinction between resilience and adaptability, on the one hand, and transformability on the other. While resilience and adaptability deal with the dynamics of a particular system; transformability seeks to change the nature of a system, generating a novel one (Walker et al., 2004). Resource crises or shifts in social values can lead to the recognition of the failure of past policies or actions, subsequently calling for transformation (Gunderson et al., 1995). Moving away from an undesirable and resilient regime may require profound external disruptions or internal changes (Gunderson & Holling, 2002). Walker (2004, p. 6) notes: “A tension will exist between maintaining the resilience of a desired current configuration in the face of known (and some unknown) shocks, and simultaneously building a capacity for transformability, should it be needed.”

Social-ecological resilience is partly determined by the livelihood security of an individual or group (Allison & Ellis, 2001; Folke et al., 2003; Marschke & Berkes, 2006; Sievanen, 2014). Smith et al. (2005) identified four main livelihood strategies that correspond to different levels of fishing effort and are linked to different livelihood functions of fisheries (more on this in Chapter 6). The

first strategy is about survival where fisheries provide a livelihood of last resort (food and income). Fishing can also be part of a diversified semi-subsistence livelihood where it supports food security and nutrition, is a means for barter or for participating in reciprocal exchange and social networks, supplies occasional cash and acts as a risk reduction strategy and as a coping or buffering strategy against shocks. The third strategy is specialization where fishing is a means for market production, income and accumulation. The last strategy describes a process of diversification for accumulation where the proportion of fishing revenue to the household income will decline, but where it is retained as part of a livelihood portfolio to take advantage of periods of good returns, for consumption and recreation.

A large number of studies have documented fishers' strategies to cope with and adapt to change. These strategies span all principles for building resilience of desirable systems defined by Folke et al. (2003). Table 2.1 presents empirical examples of fishers' adaptive strategies according to these principles, and as summarized by Marschke and Berkes (2006).

Table 2.1: Examples of Fishing Communities' Strategies and Responses to Change that Build Social-ecological Resilience

| Principle | Strategy | Example | Reference |
|-----------------------------------------------------|----------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| Learning to live with change and uncertainty | Welfare function of fishing | Closed areas as a backup plan | Johannes (1978) ^a |
| | | Seasonal fishing supplements incomes of a range of people | Freire and García-Allut (2000) ^a |
| | Livelihood diversification: multiplicity and flexibility | Occupational multiplicity at the individual (part-time fishers) and household levels (complementary at the household level) | Geheb and Binns (1997) ^a , Ruddle et al. (1992) ^a , Shams and Ahmed (2000) ^a |
| | | Fishing flexibility: switching between different fishing times, habitats, target species and/or gear types | Chaboud et al. (2015), Freire and García-Allut (2000) ^a , Salas and Gaertner (2004) |
| | | Occupational flexibility (switching from one occupation to another) in response to seasonal and inter-annual variations in fish, including moving in and out of the fishery | Geheb and Binns (1997) ^a , Sarch and Allison (2001) ^a |
| | | Combination of commercial and subsistence fishing | Mulrennan (2007), Sievanen (2005) |
| | Sharing mechanisms (social capital) | Access to fishing grounds based on relations of reciprocity and kinship | Cordell and McKean (1992) ^a , Johannes (1978) ^a |
| | | Cheap or unpaid assistance within the fishing enterprise in times of need | Vestergaard (1996) ^a |
| | | Family labour | Chaboud et al. (2015) |
| | | Social networks provide support in time of needs (e.g. sharing and remittances) | Berkes and Jolly (2002), Perry and Sumaila (2007) |
| | | Trade | Berkes and Jolly (2002) |
| | Geographic mobility/ temporary migration | Temporary move to exploit different fishing areas, species or follow fish stocks | Freire and García-Allut (2000) ^a , Njock and Westlund (2010), Perry and Sumaila (2007), Sarch and Allison (2001) ^a |
| | | Temporary move for employment outside the fishery (often to send remittances back home) | Ellis (2000), Sinclair (2002) |
| | Low investment, simple gear | Gear limited to small units to maintain mobility and occupational flexibility | Mulrennan (2007) |
| | Adapting effort to abundance | Opportunistic behavior: harvesting according to species availability | Berkes and Jolly (2002) |

| | | | |
|------------------------------------------------------|------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------|
| Nurturing learning and adapting | Nurturing ecological memory | Land and sea tenure are integrated conceptually and in practice | Asafu-Adjaye (2000), Ruddle et al.(1992) ^a |
| | | Local rules, sacred areas or taboos regulate withdrawal, access (closed seasons), fishing methods, withdrawal of specific life history stages, total protection of certain species or of certain habitats (closed areas) | Colding and Folke (2001) |
| | | Protecting forests near community | Marschke and Berkes (2006) |
| | Nurturing social memory/ knowledge | Recalling past events to inform current decisions | Berkes and Jolly (2002), Marschke and Berkes (2006) |
| | | Local and traditional knowledge | Berdej & Armitage (2016), Berkes and Jolly (2002), Johannes (1981), Ruddle et al.(1992) ^a |
| | | Monitoring of fish stocks (seasonal and spatial variations) | Sultana & Abeyasekera (2008) |
| | Flexible institutions | Flexible fishing and access rights: redistributed or socially negotiated according to needs and surpluses or based on principles of equity and reciprocity | Johannes (1978) ^a , Ruddle et al.(1992) ^a |
| | Nurturing a diversity of institutions to respond to change | Horizontal and vertical institutions for decision-making | Berkes and Jolly (2002) |
| | | Creating political space for experimentation | Marschke and Berkes (2006) |
| | Creating opportunity for self-organization | Building capacity for user self-organization | Fisheries cooperatives |
| Conflict resolution mechanism | | | Castrejón & Defeo (2015), Marschke and Berkes (2006) |
| Dealing with cross-scale dynamics | | Cross-scale governance | Castrejón & Defeo (2015), Gadgil et al. (2003), Seixas and Berkes (2003), |
| | | Credit unions (remove dependence from external donors) | Nije and Mikkola (2001), Price (1987) |
| Accounting for/ taking advantage of external drivers | | Taking advantage of market opportunities | Castrejón & Defeo (2015), Marschke and Berkes (2006) |
| | | Social renewal as a response to crisis | Castrejón & Defeo (2015) |

^a Originally compiled by Allison & Ellis 2001

Social Wellbeing

In recent years, the concept of human wellbeing has attracted increasing attention in both research and policy. Countries such as Canada, the United Kingdom, Italy, Germany, Bhutan, Brazil and France are taking steps to measure and include wellbeing in policy processes (Armitage et al., 2012; NEF, 2012). In Latin America, indigenous conceptions of wellbeing are at the forefront of policy discourse and are popularly referred to by the umbrella term *Buen Vivir* (“living well”) (Gudynas, 2011). Ecuador and Bolivia have integrated such concepts into their Constitutions.

Wellbeing is often framed as a desired target or an outcome. The Millennium Ecosystem Assessment (2005) was one of the first efforts to substantially incorporate considerations of human wellbeing into how ecosystem dynamics are comprehended (Armitage et al., 2012). However, this approach has been criticized. For example, the Permanent Forum on Indigenous Issues put together a list of 12 core themes and issues reflecting indigenous notions of wellbeing that were not appropriately addressed (Dandeneau et al., 2008).

The social conception of wellbeing was developed by the Research Group on Wellbeing in Developing Countries (WeD) (Gough and McGregor 2007). Social wellbeing is presented as a simple framework, yet it is able to capture dimensions that are of relevance for indigenous peoples and multiple cultures. It is defined as “... a state of being with others, where human needs are met, where one can act meaningfully to pursue one's goals, and where one enjoys a satisfactory quality of life” (McGregor, 2008, p. 1).

The social wellbeing concept recognizes human wellbeing as both an outcome and a process. It takes into account three dimensions: (1) material, (2) relational, and (3) subjective (Gough & McGregor, 2007). The material dimension encompasses practical welfare and physical requirements of life, such as physical health, income, assets and basic needs, such as food and shelter and those provided by the physical environment such as clean water and air (Armitage et al., 2012; White, 2010). The relational dimension addresses two domains. The social domain pertains to social interactions, networks of support and obligation, collective actions, relations with the State (e.g. law, politics, welfare access to services and amenities), levels of violence, conflict or insecurity in a given context, and peoples’ social, political, and cultural identities (White, 2010).

The human domain of relational wellbeing includes personal relations such as friendships and family relations, and human capabilities such as how much influence individuals or groups can have on decisions that affect their lives and attitudes to life (White, 2010). Finally, the subjective dimension incorporates more intangible aspects such as cultural values, norms, trust, confidence, ideologies and beliefs, as well as both individual and shared hopes, fears, and aspirations. It also considers peoples' own level of satisfaction with their material, social and human situation which opens a space for considerations related to human agency (Armitage et al., 2012; Brown & Westaway, 2011; White, 2010).

Social wellbeing encompasses multiple scales (Coulthard, 2012b) and therefore goes beyond individualistic conceptions of wellbeing (Coulthard et al., 2011; White, 2009), which is especially important in many indigenous cultures. Moreover, the social wellbeing concept is not prescriptive and is therefore flexible enough to reflect different worldviews as opposed to other similar frameworks. For example, McNaught (2011) proposes a framework that takes into account human relations in addition to objective and subjective dimensions. However, which relations are to be considered are pre-defined. This framework could therefore not accommodate relations with non-human beings which is an important component of some indigenous and non-indigenous cultures.

Social wellbeing has recently garnered a lot of attention as a complementary framework to resilience, including in fisheries contexts (Armitage et al., 2012; Coulthard et al., 2011; Weeratunge et al., 2014). Several authors (e.g. Armitage et al., 2012; Béné et al., 2014; Brown & Westaway, 2011; Coulthard, 2012a; Davidson, 2010) have stressed that resilience at the social-ecological system level does not automatically translate into greater wellbeing for people. Béné et al. (2014) and Coulthard (2012a) illustrate this tension by discussing the problem of “adaptive preferences” (Nussbaum, 2001): people can “adapt” to undesirable circumstances by accepting them or lowering their desires and expectations, rendering assessment of wellbeing and quality of life more difficult. The subjective and relational dimensions of wellbeing thus provide a link to integrate issues related to people's preferences and identity which are not necessarily aligned with social-ecological resilience (Coulthard et al., 2011). For example, Coulthard et al. (2011) recount that fishers frequently describe fishing as an entire way of life, to which they are strongly attached. When fishing incomes decrease due to diminishing fish stocks, many fishers resist leaving the

fishery in search of another job. Even if this could improve the resilience of their household through increased and more stable revenue and improve the resilience of the ecosystem through reduced fishing pressure, it does not necessarily mean that it would increase fishers' wellbeing if it impacts negatively on social connections and their sense of identity. Drawing from Giddens's (1984) theory of structuration, Sen's (1985) capability approach and debates around adaptive preferences and social conditioning more generally, Coulthard (2012a, p. 5) argues for greater consideration of "the freedoms and choices that people have in negotiating their own adaptation strategies toward fostering resilience (...), how those capabilities are valued by different people and, following Deneulin and Stewart (*unpublished manuscript*), how those values are shaped by social structures and norms".

According to Béné et al. (2014), Armitage et al. (2012) and Coulthard (2012a), combining the social wellbeing and the social-ecological resilience frameworks can assist in making both social and ecological trade-offs more transparent. In other words, they can together be used to assess and compare trade-offs that include: "(1) those that involve critical ecosystem services and their feedbacks across scales, and (2) those that involve the material, relational, and subjective dimensions of the social world linked with an ecological context" (Armitage et al., 2012, p. 6). The social wellbeing framework is therefore a useful complement to social-ecological resilience because it highlights issues of power and agency in people's wellbeing and how this in turn influences the resilience of the social-ecological system (Armitage et al., 2012; Béné et al., 2014; Brown & Westaway, 2011; Coulthard, 2012a, 2012b).

Chapter 3

Case Study: The Torres Strait Tropical Rock Lobster Fishery

This chapter begins with a brief account of the broader environmental, social and historical contexts in which the TS TRL fishery is situated. This serves as an introduction to the more detailed and TRL-specific information provided in the manuscripts (Chapters 5-8). I then present a comprehensive diagnostic of the TS TRL fishery following the social-ecological system framework (SESF) which was introduced in Chapter 2. This approach was chosen to provide a synthesis of the available information about variables that have been identified as potentially relevant in ensuring the sustainability of social-ecological system (SES). In line with the goals of the SESF, this framework is used to present data in a structure that facilitates case comparisons as well as potential future analyses with different lenses or frameworks. As this thesis is evaluated by a multi-disciplinary committee, the information presented in Table 3.1 can also serve as a “navigational guide” to the upcoming manuscripts. The reader is invited to refer to it as needed to access supplemental information which would typically not be included in a manuscript in the chosen target journals.

The Torres Strait Environment

Torres Strait (TS) is located between Papua New Guinea (PNG) and the Cape York Peninsula of northern Queensland, Australia. It stretches 180 km from the northernmost part of the Great Barrier Reef to the east to the Gulf of Carpentaria and the Arafura Sea to the west. This passage is predominantly shallow and contains more than a hundred scattered islands, reefs, and sand banks (Lawrence & Lawrence, 2004), making navigation in the Strait treacherous (Roberts, 2006). TS includes a variety of marine ecosystems and niches providing habitats for a wide diversity of species (Lawrence & Lawrence, 2004; Nietschmann, 1989).

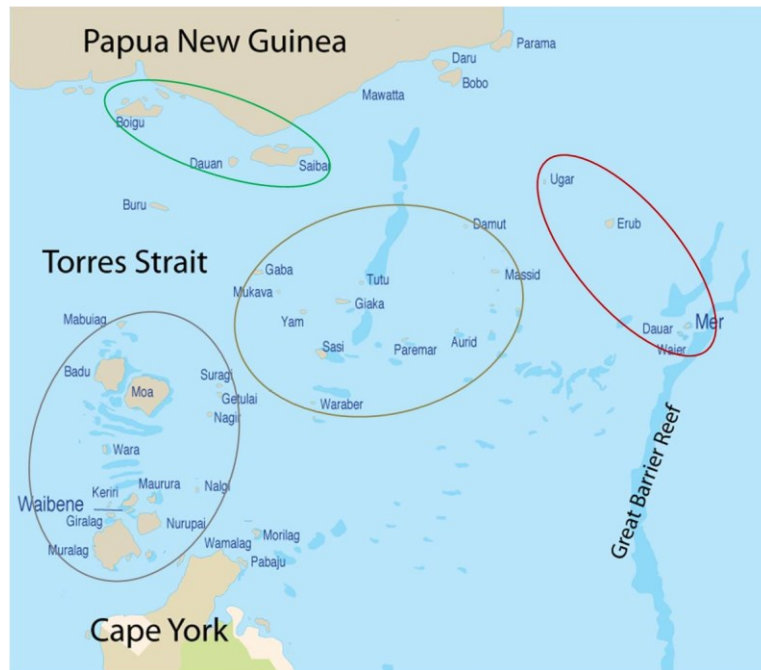


Figure 3.1 Four Geographical Groups of Islands in Torres Strait

Source: http://www.mabonativetitle.com/map_TS_2.shtml

The Eastern group in red include the islands of Mer, Erub and Ugar. The Central group in tan includes the islands of Warraber, Poruma (Paremar on map), Masig (Massid on map), and Yam (Yam is included in the Central group but has geological characteristics of the Western group). The Western group in grey includes the islands of Mabuia, Moa, Badu, Waibene (or Thursday Island), Keriri, Nurupai and Muralag. The northern group in green includes the islands of Boigu, Saibai and Dauan (Dauan geographically belongs to this group but is geologically part of the Western group).

The islands are geographically divided into four groups (Lawrence & Lawrence, 2004). The Eastern group is made up of high volcanic islands with rich fertile soil surrounded by coral reefs. Many sharks, rays and turtles are found in eastern waters as they travel from the Great Barrier Reef nearby. Maizab Kaur (Bramble Cay), located northeast of Erub Island, is one of the most important turtle nesting sites in Torres Strait (Lawrence & Lawrence, 2004). The Central group includes low sand cays that formed over platform reefs. Vegetation is scarce except for the many coconuts that have been planted on inhabited or frequently used islands, while the extensive fringing reefs

contain a rich diversity of marine life. The Western group includes high islands composed of volcanic and granitic rocks. Soil is poor, but the shallow waters and reefs of this region are ideal for seagrass on which sea turtles and dugongs feed. Orman Reef, located northeast of Mabuia Island, is one of the most important dugong hunting grounds in the region. Finally, the Northern group includes low islands composed of mangrove muds and peats that accumulated from alluvial deposits transported by rivers in PNG. Islands are fringed with mangroves and have broad interior swamps subject to seasonal drying and flooding. These northern waters are particularly known for their abundance of barramundi and mud crabs (Johannes & MacFarlane, 1991; Lawrence & Lawrence, 2004).

Islanders as Sea People

Torres Strait is home to a group of Melanesian Islanders with strong connections to both the islands and surrounding seas (Fuary, 2009; Lahn, 2003; Mulrennan, 2007; Sharp, 2002). Mulrennan and Scott (2000, p. 684) report that “Islanders view themselves as a maritime people, skilled navigators, fishers and marine hunters”. The sea area they use is significantly larger in extent than the limited area of their home islands and is crucial to their cultural, social and economic future (Mulrennan & Scott, 2001; Scott, 2004). Islanders depend on the productive coral reefs and shallow waters of TS for their subsistence (Johannes & MacFarlane, 1991). Exploitation of marine resources also plays an important part in social and ceremonial life and is integral to Islander identity (Fuary, 2009; Lawrence & Lawrence, 2004; Mulrennan & Scott, 2000; Nietschmann, 1989; Scott, 2004; Scott & Mulrennan, 1999)

Based on the 2011 Census, the total Islander population in Australia is estimated at 63 717 people. Of these 60% identify as TS Islander only and 40% as both TS Islander and Aboriginal. Approximately 5787 Islanders live in the TS region, inhabiting 17 islands and two communities (Bamaga and Seisia) established at the northern extremity of Cape York (Australian Bureau of Statistics, 2013a). The rest of the Islander population is settled throughout the Australian mainland, but most are located in Queensland – in Cairns, Mackay, and Townsville in particular (Australian Bureau of Statistics, 2007, 2013c).

Archaeological research has dated human occupation in TS to almost 3000 years ago (Carter et al., 2004). Islanders have accumulated, through generations of firsthand experience, an extensive knowledge of their environment. The sophisticated knowledge they have acquired covers geophysical aspects of their territory such as sea currents, tides, reefs, bottom topography, and relationships between lunar cycle and water clarity; biological characteristics such as fauna and flora identification and fauna behaviour; general ecology such as trophic levels, guild composition, and succession patterns; and weather and climate (Fuery, 2009; Green et al., 2010; Mulrennan, 2007; Nietschmann, 1989; Scott, 2004).

Over time, Islanders have developed a diversity of subsistence strategies that mirror the temporal and spatial availability of resources and respond to the needs created by the different population densities of each community (Lawrence & Lawrence, 2004). Subsistence harvest mainly concentrates on dugong, sea turtles and a variety of reef fishes (mackerel, trevally, red emperor, coral trout, and sardine among others), but also includes molluscs (e.g. giant clams), mud crab, squid, and tropical rock lobster (PZJA, 2008). Gardening in the Eastern Islands was also an integral component of subsistence, but its importance has declined with the availability of store foods on the islands (Beckett, 2004; Scott, 2004). Islanders engaged in a widespread network of exchange among themselves and with nearby communities of PNG and Cape York to increase their access to a greater range of resources (Lawrence, 1991; Mulrennan, 2007; Sharp, 2002). Although trading relationships have changed considerably since pre-colonial time, they have persisted and are still practiced (Arthur, 2004).

Mulrennan (2007) points out that strict taboos limited population growth in the past while many traditional stories indicate that Islanders were aware of the potential to exhaust local natural resources before European contact. Control over access to and sharing of marine resources was enabled by a detailed system of community ownership and responsibility for specific sea and reef areas (Johannes & MacFarlane, 1991; Mulrennan, 2007; Scott & Mulrennan, 1999; Sharp, 2002). Ownership includes 'home reefs' – the fringing reefs around home islands – as well as extended areas of sea water encompassing submerged reefs and sandbanks (Johannes & MacFarlane, 1991; Mulrennan & Scott, 2000). This system, known as customary marine tenure (CMT), also allowed

rotation of harvest respecting local conditions in order to prevent local depletion (Johannes & MacFarlane, 1991; Mulrennan, 2007; Sharp, 2002). Although boundaries are dynamic, overlap, and are routinely contested, customary marine tenure remains to this day the basis for Islander marine practice (Scott & Mulrennan, 1999; Sharp, 2002). Another feature of Islander harvesting practice is selectiveness; quality is prized over quantity and is regulated by local cultural and social norms (Mulrennan & Scott, 2000; Nietschmann, 1989).

For Islanders, belonging to Torres Strait comes with rights and responsibilities for caring for both their land and sea territories (Scott, 2004; Sharp, 2002). Mulrennan (2007, p. 195) states: “From an Islander perspective, local knowledge and management of marine resources has been continuous and evolving, and responsibility for their sea territories (even if inhibited by successive colonial regimes) has never been surrendered.”

Islander Economies

Similarly to Aborigines in Australia’s Northern Territory, most Islanders in Torres Strait engage in a “hybrid economy” composed of three interlinked components: market, state, and customary (Altman, 2001, 2005a).

Employment opportunities are limited in TS and fishing is a significant source of Islander income. The current main fisheries in TS are prawn, tropical rock lobster (TRL) or *kaiar*, Spanish mackerel, and reef line. Other fisheries include pearl shell, barramundi, crab, trochus and sea cucumber but these fisheries are of marginal economic value (Fairhead & Hohnen, 2007; PZJA, 2008). The TRL fishery is the one where Islanders are the most active. The prawn fishery, which is entirely exploited by non-Islanders, used to be the most lucrative fishery in the region. The extensive capital required and high production costs involved acted as effective barriers to Islander participation (Arthur, 2004; Fairhead & Hohnen, 2007). Since 2009, TRL has become the most valuable economic fishery in TS with a gross value of production of AUD\$12.2 million for the 2014-2015 fishing season (Patterson, 2016). Compared to prawning, harvesting TRL requires a relatively modest investment (an aluminum dinghy, an outboard motor and some diving gear) for

a good profit (Hand, 2008). Because the TRL fishery is of most importance to Islander fishing incomes, it is central to economic development in the region and for enhancing the quality of life and autonomy of TS Islanders (Fairhead & Hohnen, 2007; TSRA, 2005).

The largest source of employment in TS is a governmental “mutual obligation” system. This employment scheme has been revised many times in recent years², but has essentially remained the same: participants work part-time in community-led projects for income that is moderately higher than welfare payments (Fairhead & Hohnen, 2007). In 2007, at the beginning of this research project, participants could earn additional income from other sources of employment up to a maximum of \$864 every two weeks, which equates to \$AUS 22 525 a year. If they earned more than this ceiling, participants became ineligible for wages from the governmental program (Fairhead & Hohnen, 2007). Many Islanders derive a significant portion of their income from this employment scheme (Fairhead & Hohnen, 2007) which they combine with *kaiar* commercial fishing and subsistence fishing (e.g. fish, clam shell, turtle and dugong). Discussions about the interactions between the government’s mutual obligation employment program and TS fisheries can be found in Arthur (2005), Altman et al. (1994), Kwan et al. (2006), Buchanan (2013), and Busilacchi et al. (2013).

A limited number of studies have shown that catch from subsistence fishing is substantial (e.g. Busilacchi et al., 2013; Johannes & MacFarlane, 1991). However, as Buchanan (2014, p. 16) points out, “outside of the Torres Strait traditional turtle and dugong fishery, there has been little coordinated research aimed at capturing the significance of Indigenous customary harvest in Australia over time”. It has been noted that customary and commercial fishing are closely linked and even intermeshed as these activities can be conducted simultaneously or at different times using the same equipment, such as privately owned dinghies (Busilacchi et al., 2013; Kwan et al., 2006; Mulrennan et al., in prep.; Thomassin, 2016). In fact, there is considerable overlap between the three sectors of the hybrid economy and these complex interactions remain poorly understood (Arthur, 2005; Busilacchi et al., 2013; Kwan et al., 2006; van Putten et al., 2013a).

² At the beginning of fieldwork, this program was known as the Community Development Employment Projects (CDEP) which was then replaced by the Community Development Program (CDP). Starting in 2013, it was progressively replaced by the Remote Jobs in Community Program (RJCP).

A rich literature documents sociality in Melanesian and Australian Aboriginal societies, highlighting how various practices of resource (re)distribution (e.g. demand sharing, gifting, or reciprocity, commodity exchange) are configured by morally-sanctioned codes of behaviour rooted in obligations to kin and the need to constantly produce and reproduce social relations (Gell, 1992; Peterson, 1993, 2013; Peterson & Taylor, 2003; Strathern, 1992). Cases where resource distribution involves food illustrate how social imperatives can directly interact with livelihoods (Eves, 2014; Kahn, 1986; Peterson, 1993; Rio, 2014).

In TS, social conduct is shaped by a moral framework of behaviour known as *gud pasin* which has an important bearing on the conduct and distribution of the benefits arising from economic activities. Based on her work on Masig, Thomassin (2016, p. 102) remarks: “Whether for cash, subsistence, or ceremonial purposes, fishing is an activity that is facilitated by and tangled in social relationships”. Lahn (2003, 2006) provides a detailed account of the obligations and expectations that govern sharing in relation to both women’s subsistence and men’s commercial fishing at Warraber Island. She concludes that the distribution of “the proceeds of marine-based productive activities are enmeshed with the moral demands of sociality, of *gud pasin* and in particular, notions of obligation and responsibility associated with the *pamle* [family] network” (Lahn, 2003, p. 150). The relations between livelihood production, consumption of marine food and distribution of marine resources on the one hand and ideals of social relations and obligations to kin on the other hand have also been noted on other islands (e.g. Fitzpatrick-Nietschmann, 1980; Fuary, 1991). Lahn (2003) indicates that, in addition to providing the means to fulfil social expectations, marine fishing and hunting also offer opportunities for pleasure and to socialize with friends as well as respite from the immediacy of village-life demands. Islanders’ engagement in the different spheres of the hybrid economy – be it market, state or customary – are thus inextricably linked to social expectations and the responsibilities and obligations of the moral economy. For example, the development of the *kaiar* commercial fishery has modified certain economic relationships between Islanders from the islands and from the mainland. In earlier days, mainland Islanders would send money to the Islands. Nowadays, some mainland Islanders travel to TS to participate in the TRL fishery (Maegawa 1994 in Arthur, 2004) and send some of their earnings back to relatives on the mainland (Arthur, 2004).

Historical Overview of Management and Control of Marine Resources in Torres Strait

The European “discovery” of the Strait is attributed to Luis Vaez de Torres in 1606, sailing under the Spanish flag. However, European activity in the region only truly began after Captain James Cook confirmed the existence of a passageway between Australia and PNG in 1770. In 1792, William Bligh claimed possession of the TS Islands for the British Crown (Singe, 1979).

Outsiders mainly used the Strait for navigation purposes until they began exploiting the abundant marine resources of the region. The development of commercial fisheries brought an influx of outsiders to the region. Commercial fishing began in the 1860s with the arrival of trepangers (sea cucumber or *bêche-de-mer* fishers), soon after followed by the development of the pearl shell industry (Beckett, 1987; Ganter, 1994; Nakata, 2004). Stations were established employing a diversity of European, Asian, and Pacific Islanders (Ganter, 1994; Nakata, 2004). Unscrupulous marine entrepreneurs used Islanders as cheap labour, with or against their will, with their wages being on the lower end of the racial scale just ahead of Papuans (Beckett, 1987). Stories of abduction, murder, rape, and raids on Island resources are also linked to the early days of the *bêche-de-mer* and pearl shell fisheries (Beckett, 1987; Ganter, 1994).

In 1871, representatives of the London Missionary Society (LMS) established missionaries on inhabited TS islands, an event celebrated as ‘The Coming of the Light’ (Beckett, 1987). The following year the Queensland government began annexing TS islands to its territory, a process that was completed in 1879 (Nakata, 2004), and Islanders lost sovereignty over their islands. At that time, Islanders had learned at their expense that they were no match to the superior gun force of outsiders (Scott & Mulrennan, 1999). Annexation gave the government the means to regulate the emerging marine industries. The LMS and the colonial authorities succeeded in imposing a certain order against exploitative marine entrepreneurs while also grossly intruding upon and interfering with Islanders’ lives (Nakata, 2004; Scott & Mulrennan, 1999). The government started implementing in the 1880s a series of “protective” Acts which “legitimated the regulation of the entire population of Islanders” (Nakata, 2004, p. 156). Islanders lost many of their civil rights as their daily lives were strictly controlled by a paternalistic government-appointed Protector. Curfews and travel permits were imposed which restricted their movements. Government officials acted as both judge and jury and Islanders had no right to legal counsel or to appeals. The

Protector's permission was also required for a range of personal matters including marriage. This situation lasted until the 1970s after marine diving industries collapsed and repressive Acts were abolished (Lawrence & Lawrence, 2004; Nakata, 2004; Sharp, 2002).

The pearl shell and *bêche-de-mer* industries rapidly expanded in the early 1900s and a fishery for trochus shell, mainly for buttons and jewellery, was established (Woodhams, 2009). Islanders were strongly encouraged (and in some cases coerced) to participate in these booming fisheries as seamen or divers and schemes were established to allow Islanders to work towards ownership of boat (Nakata, 2004). Nakata (2004, p. 164) recounts: "Diving for pearl shell became a way of life and part of a reconstituted identity. The industry was the only means of earning wages apart from very limited openings in the administration as store managers, teachers and health workers. Islander men thus had little alternative but to participate in the government's economic vision." Islanders were brought into the cash economy although they could not directly access their earnings which were managed by the Protector (Beckett, 1987; Lawrence & Lawrence, 2004; Nakata, 2004). Islander communities were drawn in to different degrees depending on their respective location and the availability of alternative subsistence strategies. For example, Badu Islanders in western TS could not depend on agriculture for subsistence due to poor soil conditions. Moreover, they were located close to Thursday Island, the administrative centre for government and the pearl shell industry, and stores were readily accessible. This community came to depend more on cash and developed a collaborative relationship with government (Nakata, 2004). At the opposite extreme, Mer Islanders in eastern TS were isolated from authorities and could rely on the fertility of their volcanic island for subsistence. Hence, they developed a well-recognized attitude of independence towards the government which persists to this day (Nakata, 2004).

The advent of plastic in the 1950s precipitated the decline of pearling and trochus industries which essentially collapsed in the 1960s (Nakata, 2004; Scott, 2004; Woodhams, 2009). A lack of employment alternatives in TS, prompted an increase in welfare payment to the Islands, while an increase in demand for labour on the mainland supported Islander emancipation (Nakata, 2004; Shnukal, 2004). This is not to suggest that Islanders were passive during the Protection regime. On the contrary, as Scott and Mulrennan (2004, p. 164) recount, "more than one Protector was sacked by Islander design." Islanders proactively resisted, protested against, and undermined

Protectors' authority in many ways, including a region-wide strike by marine workers in 1936 and by playing the federal and state governments against each other (Nakata, 2004; Shnukal, 2004). Islanders, along with Aboriginals, finally gained full citizenship in 1967 and acceded to the full extent of Australian social benefits in 1974 (Arthur, 2004; Beckett, 1987). However, paternalistic policies continued to interfere with Islander aspirations for self-determination (Nakata, 2004).

New fisheries were initiated in the region following the economic crash of the pearling and trochus industries, namely Spanish mackerel and reef line fisheries in the 1950s, tropical rock lobster (TRL) in the 1960s, and prawn in the 1970s (Wilson et al., 2009). Islanders eventually participated in the finfish and TRL fisheries after the establishment of processing facilities and freezers on some islands in the 1980s (Wilson et al., 2009). However, those years also saw the arrival to TS of mother ships and fuel barges for prawning, reducing the need for prawn vessel to dock to unload or to fuel up, which resulted in the closure of processing facilities on Thursday Island (Woodhams & Perks, 2009). TRL harvesting gained in importance as *bêche-de-mer* was depleted (Wilson et al., 2009). Although there was a small resurgence in the 1990s of the trochus fishery for ceramic products and of the *bêche-de-mer* fishery, these fisheries are economically marginal, partly because they remain significantly depleted (Woodhams, 2009).

Islanders' more than a century-long involvement in dive fisheries expanded their knowledge and understanding of their marine environment (Nietschmann, 1989), especially regarding exhaustibility of resources (Mulrennan, 2007). Mulrennan (2007, p. 187) reports: "Islanders witnessed first-hand the depletion of wild pearl shell, as well as trochus shell, to the point that a crew might dive all day for what a man might formerly have easily gathered in half an hour." The same could be said regarding the collapse of three *bêche-de-mer* species and the steep decline of TRL. Eastern Islanders also observed the depletion of giant clams as a result of illegal harvesting by Taiwanese fishers and of local sardines as a result of a turtle farm established on Mer by a foreign biologist (Mulrennan, 2007). This history of external intrusion and resource crises strongly motivates Islanders "to gain both ownership recognition and management jurisdiction of their home seas" (Mulrennan, 2007, p. 189).

Until recently, Islanders were confined to a limited advisory role regarding management of the TS region (Mulrennan & Scott, 2005). They used a series of different legal and political strategies to further their involvement. Islanders began to argue their case in the international arena and there were three calls for independence between 1978 and 1988 (Kehoe-Forutan, 2004). In 1982, the people of Mer lodged a claim with the High Court of Australia seeking to recover sovereignty of their island. Ten years later, the High Court rendered a favourable judgment in the landmark Mabo case (*Mabo and others v. State of Queensland* [No.2], 1992 175 CLR1), recognising Islander ownership of land above the high water mark. This decision led to the *Commonwealth Native Title Act 1993* which provides a mechanism for Indigenous Australians' claims to native title (Kehoe-Forutan, 2004). TS Islander communities, similar to many aboriginal counterparts on the mainland, have since pursued native title claims and successfully gained native title recognition (Mulrennan, 2007; TSRA, 2007). In more recent years, Islanders have sought to extend their native title claims to the waters, shoals and reefs of their traditional marine territory (Mulrennan & Scott, 2001). In 2001, Leo Akiba lodged a claim on behalf of the TS Regional Sea Claim Group (referred to as the Sea Claim). On July 2, 2010, Justice Finn of the Federal Court of Australia formally recognized native title rights of TS Islanders to an area covering approximately 37,800 km² of sea. The Sea Claim does not recognize exclusive rights nor the right to control the conduct of others, but it recognizes the right of Islanders to access and take marine resources for any purpose, including for trading or commercial purposes (Finn, 2010). This last point was appealed by the Commonwealth of Australia, the State of Queensland and the Commercial Fishing Parties. On March 14, 2012, a majority of the federal Full Court of Australia found that the native title right to fish commercially had been extinguished by the passage of State and Commonwealth legislation prohibiting commercial fishing in the Sea Claim area without a license. Islanders appealed the Full Court's decision to the High Court of Australia and a final decision was rendered on August 7, 2013, in favor of Islanders' claim.

Islanders have expressed growing frustrations as non-Islander fishing expanded in the region. Islander grievances concerned unsustainable harvesting practices, increased competition, and absence of compensation for harvesting in their traditional waters (Mulrennan, 2007, p. 190). Direct actions at sea taken by Islanders against non-Islander fishing operations in the 1990s led to a 'gentlemen's agreement' where non-Islanders agreed to refrain from entering waters within a

ten-mile radius zone from inhabited islands. However, this is strictly an informal agreement with no legal weight and incidents at sea have persisted (Mulrennan, 2007).

Islanders have pursued their struggle and as a result have advanced their desire to gain a greater role in fisheries management. In June 2002, reforms to the decision-making and consultative structure significantly increased Islander input at every level of the complex arrangement of governmental bodies and committees involved in TS fisheries (Mulrennan & Scott, 2005). The Chair of the Torres Strait Regional Authority (TSRA) was included as a member alongside the fisheries ministers from the State of Queensland and from the Commonwealth of Australia on the highest-level committee pertaining to TS fisheries management – the Protected Zone Joint Agency (PZJA). This marked the first time Islander representatives were officially involved in decision-making about their marine resources.

Islanders also secured increased shares to fisheries. For example, the entire finfish fishery was transferred to Islanders following a 100% buyback of non-Islander licenses by the government in November 2007. At the beginning of this research, Islanders had achieved exclusive ownership of 53% of the Australian TRL fishery (PZJA 18 Minutes, 2005), but were actively pursuing a greater share. Islanders' strategies and progress in this regard are detailed in Chapter 7. In summary, Islander fisher representatives refused to partake in allocation negotiations during the years 2005-2013 unless their demand for a 70% share of the Australian catch was met at the onset of TAC-management. In 2014, following the Sea Claim, the PZJA officially supported Islanders' aspiration for full ownership of the fishery. How and when ownership transfer will occur is a matter that remains to be determined.

Social-ecological System Framework (SESF) Diagnostic: the Torres Strait Tropical Rock Lobster Fishery

The SESF diagnostic presented in the following pages (Table 3.1) reflects our current knowledge of the TS TRL SES and identifies gaps in this knowledge. Relevant variables were selected drawing from those identified by Basurto et al. (2013) for benthic small-scale fisheries and by Partelow and Boda (2015) for lobster fisheries. Variables that overlapped to some degree were omitted. The information presented in Table 3.1 was derived from the literature, as well as from observations and findings arising from my own research.

Table 3.1: Full Diagnostic Social-ecological System Classification of the Torres Strait (TS) Tropical Rock Lobster (TRL) Fishery

A) Social, Economic, and Political Settings (S)

| Attribute | TS TRL Fishery | Reference |
|-------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------|
| S1 – Economic development | <ul style="list-style-type: none"> • Out of 5,921 Aboriginal and TS Islanders in TS (Indigenous Regions – IREG), 2,275 were in the labour force in the week before the 2011 Census night. Of these, 45.7% were employed full time, 36.8% were employed part-time and 7.6% were unemployed. • The median weekly income was \$360 for personal income and \$952 for households. • Median monthly mortgage repayments were \$1733 and median weekly rent \$74. • The estimated Human Development Index (HDI) for the TS IREG in 2006 was 0.736 compared to 1.010 for non-indigenous Australians in the region. The gap between indigenous and non-indigenous Australians is higher for the TS IREG (0.274) than for all of Australia (0.230) | Australian Bureau of Statistics (2013a); Butler et al. (2014) |
| S2 – Demographic trends | Based on the 2011 Census, the total Islander population in Australia is estimated at 63 717 people. Of these 60% identify as TS Islander only and 40% as both TS Islander and Aboriginal. The estimated population of Islanders living in the TS region is 5787 people. The overall population of TS has increased at an average rate of 0.9% per annum in 2011-2012. This pattern is not uniform with some islands experiencing a net emigration of people. The projected average growth rate in 2011-2031 is of 0.91%. This is lower than the projected growth rate for Aboriginal and TS Islanders in Australia (2.2%) and for the total Australian population (1.4%). | Australian Bureau of Statistics (2013a, 2013b); Butler et al. (2014) |
| S3 – Political stability | Stable. High turnover rate of staff in all Islander and Australian organizations dealing with fisheries and based in TS. | -- |
| S4 – Other governance systems | See GS for all relevant governance systems | -- |
| S5 – Markets | Live TRL mostly sold to China, frozen tails mostly sold to the US, small domestic market in Australia for both live and tails. | Patterson et al. (2015); Chapter 7 |
| S6 – Media organizations | Local media consists of the newspaper the Torres News (available in print and online) and a radio station both of which are based on Thursday Island. | -- |
| S7 – Technology | See A9: Technology used by actors | -- |

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| GS1.3 Indigenous | <p><i>National Indigenous Reform Agreement (Closing the Gap)</i></p> <ul style="list-style-type: none"> - Aims to reduce disparities between Indigenous and other Australians by achieving six targets addressing health issues, education and employment <p><i>Community Development Program (CDP)</i></p> <ul style="list-style-type: none"> - The name and the rules of this program have changed many times during and since this project’s fieldwork. In the TRL fishery, it allows traditional inhabitants to work part-time in community-led projects for income that is moderately higher than welfare payments and complement this income with TRL fishing. <p><i>Aboriginal and Torres Strait Islander (ATSI) Act 2005</i></p> <ul style="list-style-type: none"> - Established the Torres Strait Regional Authority (TSRA) <p><i>Native Title Act 1993</i></p> <ul style="list-style-type: none"> - Legislative framework for the control and management of native title for recognized land and sea territories | |
| GS2 – Population of actors on which the rule system has effect or jurisdiction | <ul style="list-style-type: none"> • The TS Treaty applies to traditional inhabitants of the region defined as TS Islanders or PNG people that live in the TSPZ or the adjacent coastal area of Australia or PNG and that “maintain traditional customary associations with areas or features in or in the vicinity of the Protected Zone in relation to their subsistence or livelihood or social, cultural or religious activities (art. 1 (m)). • Australian fisheries regulations apply to all Australian citizens. Commercial fishing in TS requires a license, but not recreational fishing. | Torres Strait Treaty (1985); Patterson et al. (2015) |
| GS3 – Organizations GS3.1 Public sector/ Government | <p><i>Federal and State levels:</i></p> <ul style="list-style-type: none"> - TS Islanders are affected by decisions made by various ministries and Federal-State government coalitions dealing with the environment, natural resources, indigenous affairs, economic development and border security. - There are three agencies at these levels involved in TS fisheries. They are: the Australian Fisheries Management Authority (AFMA), Queensland Fisheries, the Commonwealth Department of Agriculture (fisheries division). - The Commonwealth Scientific and Industrial Research Organisation (CSIRO) conducts fisheries research and stock assessments for the TS TRL fishery. While they do not make rules directly, their recommendations and results are very influential. | Department of Agriculture and Water Resources (2017); PZJA (2016); TSIRC (2016); TSRA (2016); Chapter 8 |

Regional level:

- The TSRA is an Australian Government Statutory Authority. It has the responsibility to develop, implement and monitor programs for indigenous people in TS, advise the Minister for Indigenous Affairs, and protect the *Ailan Kastom* of TS Islanders living in the TS region. It supports capacity-building in the TS TRL fishery by providing preferential loans to purchase fishing equipment among other measures.
- The PZJA is responsible for managing commercial and traditional fishing in the Australian area of the TSPZ as well as designated adjacent TS waters. Its members are the TSRA Chair and the fisheries ministers from the State of Queensland and from the Commonwealth of Australia.
- The PZJA is advised by a consultative structure that includes the Standing Committee and four advisory bodies. The Standing Committee consists of the senior representatives from the four different agencies involved in PZJA fisheries (i.e. AFMA, Queensland Fisheries, Commonwealth Department of Agriculture and TSRA).
- AFMA has a regional office on Thursday Island. It is responsible for implementation and enforcement of fisheries regulations. In the past years it has assisted the TSRA with capacity-building.
- During the time of this project's fieldwork, the Australian Quarantine and Inspection Service (AQIS) was the government agency responsible for enforcing Australian quarantine laws with offices and staff throughout TS. It was dissolved in 2012 and quarantine responsibilities are now assumed by Divisions within the Department of Agriculture and Water Resources.

Local:

- There are two Councils with local offices on each inhabited island. The Torres Shire Council (TSC) represents Thursday Island, Prince of Wales, Horn Island and immediate surrounding islands. The Torres Strait Island Regional Council (TSIRC) represents the other 15 outer island communities.
- Native Title recognitions are managed by local Registered Native Title Bodies Corporate (RNTBCs) on each island.
- The TSRA employs over 45 full-time Indigenous rangers based in 14 outer islands. Each ranger group is responsible for implementing activities under a Working on Country plan that is developed in consultation with Registered Native Title Bodies Corporate (RNTBCs) on each island. These plans are aligned with community and Traditional Owner priorities, as well as with priorities in the Land and Sea Management

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| | <p>Strategy for Torres Strait 2016-2036. Rangers carry out land-based and sea-based cultural and natural resource management activities, but do not as of yet have a formal role in TRL monitoring and management.</p> | |
| GS3.2 Private sector | <p>My Pathway is a national company providing education, training and employment services. They are the Community Development Programme (CDP) provider for TS and the biggest CDP provider in the country. The CDP is the biggest employer in TS.</p> | <p>Fairhead & Hohnen (2007); My Pathway (n.d.)</p> |
| GS4 – Decision-making structures | | |
| GS4.1 Network structure | <p>Decision-making structures are largely vertical.</p> | |
| GS4.2 Management strategy | <p>Consultative co-management. Islander and stakeholder involvement consists of participation in consultative committees and open forum, commenting on draft policies and plans, and some involvement in research but not in stock assessment</p> | <p>Mulrennan & Scott (2005)</p> |
| GS5 – Rules and regulations | | |
| GS5.1 Constitutional rules | <ul style="list-style-type: none"> • The TS Treaty defines who can participate in decision-making related to the TSPZ and to whom it applies. • The TS Fisheries Management Act through the establishment of the PZJA defines who is eligible to participate in decision-making that applies to the area under Australian jurisdiction. | |
| GS5.2 Collective rules | <ul style="list-style-type: none"> • Issues related to the TS Treaty are negotiated between Australia (represented by PZJA members) and PNG through bilateral meetings. • Fisheries decisions in the Australian jurisdiction of TS are made by the PZJA. When consensus cannot be achieved, the Commonwealth Fisheries Minister has the casting vote. • The exact composition and operation for each committee and working group that advise the PZJA are defined in the <i>PZJA Management Paper No. 1</i>. | <p>AFMA on behalf of the PZJA (2008); PZJA (2016)</p> |

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| GS5.3 Operational rules | <ul style="list-style-type: none"> • Outlined in the <i>TS Fisheries Act 1984</i> and the <i>TS Fisheries Regulations 1985</i>. • A harvest strategy is being developed for the TRL fishery. The proposed harvest control rule uses a constant exploitation rate (FTARG = 0.15 per year) while the stock size is at or above the target reference point of 65% unfished spawning biomass. The target exploitation rate then declines linearly to zero as the spawning biomass declines from the target to the limit reference point of 40% unfished spawning biomass. The harvest strategy is used to determine a nominal Total Allowable Catch (TAC) | Patterson et al. (2015) |
| GS5.4 Commercial fishing regulations | <p><i>Input controls</i></p> <ul style="list-style-type: none"> - Fishing season - Hookah seasonal ban - Fishing method - Minimum size - Processing or carrying prohibition of removed TRL meat <p><i>Mandatory licenses:</i></p> <ul style="list-style-type: none"> - Boats - Master fisherman - Processor/carrier <p><i>Interim measures:</i></p> <ul style="list-style-type: none"> - Monthly hookah ban - Tender reduction <p><i>Output controls:</i></p> <ul style="list-style-type: none"> - The TAC of the fishery was set as the catch of the fishery until 2006. - Nominal Total Allowable Catch (TAC) calculated since 2006, but not yet implemented | Pitcher et al. (1997); PZJA (2016); detailed in Chapter 8 |
| GS5.5 Recreational fishing regulations | <p><i>Input controls</i></p> <ul style="list-style-type: none"> - Fishing season - Minimum size - Fishing method <p><i>Output controls</i></p> <ul style="list-style-type: none"> - Daily bag limit | |

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| <p>GS 5.6 Monitoring (see I9 for details on monitoring activities)</p> <p>GS5.7 Sanctions</p> | <p><i>Social</i></p> <ul style="list-style-type: none"> - Islanders observe that other fishers comply with agreed-upon behavior in their marine territories. - AFMA is responsible for compliance and enforcement of fisheries regulations (works along Border Protection Command to police TS for illegal fishing by PNG). <p><i>Biophysical</i></p> <ul style="list-style-type: none"> - CSIRO is responsible for biological and stock monitoring. <p>Graduated sanctions.</p> <ul style="list-style-type: none"> - Sanctions for offences to official rules are outlined in the <i>TS Fisheries Act 1984</i>. - Lack of respect for traditional institutions will lead to graduated social sanctions by Islanders. | <p>AFMA (2011); Chapter 6</p> |
| <p>GS6 – Property- rights systems and access</p> | <p><i>Australian:</i></p> <ul style="list-style-type: none"> - The indigenous sector is open access. Any traditional inhabitant with Australian citizenship officially recognized can hold a license. - The non-indigenous sector has limited entry since 1985. No new licenses are issued. - Initial allocation between the sectors in the Australian fishery when TAC will be introduced is unclear. The PZJA has released a draft management plan for comments on June 27, 2016 in which the indigenous sector’s quota share stands at 56.2%. However, the PZJA has also committed in 2014 to support Islanders’ aspiration for 100% ownership following Native Title recognition of Islander sea territories. - When a TAC will be introduced, it is planned that the non-indigenous sector will be allocated Individual Transferable Quotas (ITQs). <p><i>Islander:</i></p> <ul style="list-style-type: none"> - Access to and sharing of marine resources is governed by traditional institutions of customary marine tenure (CMT) whereby ownership and responsibility for specific sea and reef areas is divided by island or island cluster, community, and within some communities, by clan and lineage. | <p>Department of Agriculture and Water Resources (2016); PZJA (2007, 2014c); Scott & Mulrennan (1999); Sharp (2002)</p> |

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| GS7 – Norms and strategies | <p><i>Non-indigenous sector:</i></p> <ul style="list-style-type: none"> - Fishers tend to refrain from entering the 3 nm area surrounding Islander home islands to avoid conflict. <p><i>Islanders:</i></p> <ul style="list-style-type: none"> - Access to and sharing of resources is governed by a code of behaviour known as <i>gud pasin</i> | Chapter 6 |
| GS8 – Historical continuity | <p><i>Islander</i></p> <ul style="list-style-type: none"> - <i>Ailan Kastom</i> refers to the body of customs, traditions, observances and beliefs tied to Islander culture such as CMT and <i>gud pasin</i>. These long-standing institutions are rooted in traditional stories and creation myths. <p><i>PZJA</i></p> <ul style="list-style-type: none"> - The PZJA was established in 1984, but the TSRA Chair only gained PZJA membership in 2002. There were thus no Islander representative involved in decision-making before this date. <p><i>Scientific fisheries management</i></p> <ul style="list-style-type: none"> - CSIRO has been conducting research on the TS TRL fishery and providing advice on the resource and its management since 1973. The first visual baseline survey has been conducted in 1989 and visual surveys have been conducted yearly since. - Limited entry into the non-indigenous sector was introduced in 1988 and input controls were successively introduced or adjusted in 1990, 2001 and 2002. - The PZJA decided in 2005 to introduce a TAC and quotas but their implementation have been repeatedly delayed. | Mulrennan & Scott (2005); Phillips et al. (1983); Pitcher et al. (2002b); Scott & Mulrennan (1999); Sharp (2002); Ye et al. (2008) |

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| RS2.3 International waters | Pursuant to Article 37 of the UN Convention on the Law of the Sea (UNCLOS), the regime of transit passage applies to TS. Under this regime, Strait states have no unilateral regulatory powers to impose routing measures on ships in transit passage. They may impose controls on navigation with respect to safety of navigation and maritime traffic and the prevention and control of pollution, but coastal states are not to hamper, impair, deny, or suspend transit passage in international straits, even for violations of domestic laws and regulations. Thus, the implication of the transit passage regime for all Strait states is that user states have unlimited and maximum freedom of passage. | Roberts (2006); Spadi (2000) |
| RS3 – Size of resource system | <ul style="list-style-type: none"> • The resource system spans the Torres Strait, Queensland, Australia, the Great North East Channel, the Gulf of Papua and possibly includes the TRL population found in the East Coast of Queensland. Breeding lobsters can be found over a wide area, from the central GBR to the Gulf of Papua in PNG, usually on reefs adjacent to the Coral Sea. Both the Australian and Papuan license holders share a common stock, with the entire population of TRL found within the TSPZ being derived from the same breeding population. • Adult habitat from 0 to more than 100m. • Carrying capacity unknown, but the latest integrated model estimates the TRL biomass in 1973 to be 5199t | Plagányi et al. (2010a, 2010b) |
| RS4 – Human-constructed facilities | Some islands have a local factory equipped with freezers to preserve TRL tails. Only a few of those factories have tanks to preserve live product. At the time of fieldwork, Thursday Island and Badu had factories with live tanks while Yam only had a factory that could handle frozen TRL tails. | |
| RS5 – Productivity of system RS5.1 Stock status RS5.2 Biophysical factors | <p>Productive coral reefs and shallow waters. High biodiversity and abundant marine resources.</p> <ul style="list-style-type: none"> • The stock status is determined as “not overfished and not subject to overfishing” by the Australian Bureau of Agricultural and Resource Economics and Sciences. • The TS Rock Lobster Resource Assessment Group (TRLRAG) considers the fishery to be in good condition biologically, but notes that the fishery was moderately overfished in 1999, 2001, 2002 and 2006 – which were also years of low abundance and low Australian catch. <ul style="list-style-type: none"> • Development and growth are temperature sensitive. Higher sea surface temperatures speed growth of larvae, juveniles and adults up to physiological tolerances. • Habitat: settling juveniles rely mostly on subtidal seagrass, adult TRLs prefer hard substrate. | <p>Hand & Davies (2010); Patterson et al. (2015)</p> <p>Norman-López et al. (2013); Ye et al. (2006)</p> |

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| RS6 – Equilibrium properties | Unknown | |
| RS7 – Predictability of system dynamics | Weak stock-recruitment relationships are common for short-lived stocks like the TS TRL. TRL recruitment is highly variable, probably due to the complex current dynamics of the region. For example, similar-sized spawning stocks in 1994 and 2005 resulted in recruitment that varied by 250%. Nevertheless, data indicate that there is a general trend of large spawning stocks leading to large recruitment. | Dennis et al. (2002); Ye et al. (2006) |
| RS8 – Storage characteristics | <p><i>Storage in natural habitat:</i></p> <ul style="list-style-type: none"> - Migration - Environmental conditions that affect catchability - Different views. Islanders’ tend to have a longer-term view and therefore consider that TRL left in the water will be available for later harvest as opposed to non-indigenous fishers, managers and fisheries scientists <p><i>Storage in a human-designed facility:</i></p> <ul style="list-style-type: none"> - Islanders that do not have direct access to a factory that buys live product can temporarily store live TRLs in homemade cages and accumulate them until they have a sufficient number to justify the cost of transporting them to a buyer. However, the longer fishers keep TRLs the higher the risk of mortality. On some islands, there is also the risk of theft. | |
| RS9 – Location | <ul style="list-style-type: none"> • TRL can be found throughout TS, the Gulf of Papua and and the Great North-East Channel up to the Great Barrier Reef. • They are found in both shallow waters on reef top and to depths in excess of 100m. • There is also a genetically undistinguishable population of TRL on the north-east coast of Queensland. | Pitcher et al. (1997); Plagányi et al. (2010a) |

D) Resource Units (RU)

| Attribute | TS TRL Fishery | Reference |
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| RU1 – Resource unit mobility | <p><i>Settlement</i></p> <ul style="list-style-type: none"> - The major settlement occurs in central Torres Strait in the same area as the fishing activity. <p><i>Recruitment of juveniles onto TS fishing grounds</i></p> <ul style="list-style-type: none"> - There is some evidence of small-scale (tens of km) movements of juvenile (1+) lobsters onto shallow reefs soon after the breeding migration each year. Scientists believe these are probably small-scale movements from local juvenile nursery grounds to the preferred adult habitat. <p><i>Movements of lobsters within TS</i></p> <ul style="list-style-type: none"> - 2+ lobsters in TS show high reef fidelity throughout most of the year, although they are highly nomadic within a reef system. - There is persistent reliable anecdotal evidence of movements of mature (2+) lobsters in deeper water probably foraging for areas of preferred food items such as small molluscs. - There are probably some movements of 2+ lobsters in deeper water within TS before the migration. There is no evidence of a large-scale movement of 2+ lobsters from the Australian to the PNG fishery. <p><i>Breeding migration</i></p> <ul style="list-style-type: none"> - 2+ lobsters undertake an extensive migration of approximately 500 km in August/September to breeding grounds in the Gulf of Papua. Many other breeding lobsters must migrate elsewhere and some have been found in the eastern reefs of TS and outside of the Great Barrier Reef to depths in excess of 100 metres. | Moore & MacFarlane (1984); Pitcher et al. (1997); Plagányi et al. (2010a) |
| RU2 – Growth or replacement rate | <ul style="list-style-type: none"> • Fast growing species. Following settlement the juveniles grow rapidly and recruit to the fishery at about 1.5 years of age. • TRL migrate to breeding grounds at nearly 3 years of age. • Most TRLs do not survive breeding and the fishery is largely based on a single cohort. | Dennis et al. (1992); Ye et al. (2006) |

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| RU3 – Economic dynamics | | |
| RU3.1 Economic value | <ul style="list-style-type: none"> • AUD \$20.9 million in 2013-2014, AUD \$12.2 million in 2014-2015 • Most valuable commercial fishery in the region. • The price for live TRL varied between 20-35\$/kg in 2003-2014 and the price for wet tails varied between 26-48\$/kg during the same period. TRL tails represent about a third of the animal (conversion ratio tail to live: 2.67). | Patterson et al. (2015, 2016); Plagányi et al. (2010a) |
| RU3.2 Market predictability | Large fluctuations in prices for live TRL and tails caused by demand and supply at the major international markets or by exchange rate fluctuations. | Hand & Davies (2010) |
| RU3.3 Market diversity | There is only a handful of buyer/processors in the region and the market operates under an oligopsony. | Chapter 6 |
| RU5 – Cultural value | <ul style="list-style-type: none"> • Employment opportunities are limited in the region and kaiar is one of the few alternatives for Islanders who wish to remain in, return to, or spend time in TS thereby sustaining attachments to territory and culture. • By providing money that can cover fuel costs, the kaiar commercial fishery enables the maintenance of social and kinship ties and cultural and subsistence practices that are closely linked to Islander identity. | Chapter 6 |
| RU6 – Number of units | The TAC for Australian fishers (indigenous and non-indigenous sectors) has varied between 327t and 588t (whole weight) during the period 2006-2014. During the same period, catch from these two sectors varied between 236t and 558t (whole weight). | ABARE (2007-2015) |
| RU6 – Distinctive characteristics | <ul style="list-style-type: none"> • Single-species fishery. Other species are observed on relatively rare occasions. • Recently molted animals are too vulnerable to predation by other TRLs to be sold live. These animals are also preferred by Islanders and will thus usually be retained for consumption. | Phillips et al. (1983) Chapter 6 |

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| <p>RU7 – Spatial and temporal distribution</p> | <p><i>Seasonal movements</i></p> <ul style="list-style-type: none"> - Migration occurs from early September to late November when 2+ TRLs travel eastward to breeding grounds near Yule Island in the east coast of PNG, eastern TS and outside the Great Barrier Reef. - Only a very small proportion of males and a few females spend an extra year in the Torres Strait before migrating. - Breeding and spawning occurs during the subsequent months from November to February. The larvae released in the PNG coastal waters are thought to be transported via currents back to the TS and to the East Coast of Queensland. - Larvae settle in TS from April to August, mostly in Central and Western TS. The larval life is about four to six months and juveniles recruit to the fishery at about 1.5 year of age. <p><i>Spatial distribution during the fishing season</i></p> <ul style="list-style-type: none"> - TRL distribution is patchy in TS and abundance is higher in Central and Western TS where most TRL commercial fishing occurs. - Apart from some minor shifts, the spatial distribution of lobsters determined during the mid-year annual survey throughout western TS has not changed significantly since the initial population survey in 1989. - The distribution of lobsters is largely determined by the distribution of seabed habitats which have also remained consistent through time. - However, anomalous distributions of recruiting (1+) and fished lobsters (2+) have been recorded in a few years. | <p>Dennis et al. (1992, 1997, 2002); Moore & MacFarlane (1984); Pitcher et al. (2005)</p> |
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E) Actors (A)

| Attribute | TS TRL Fishery | Reference |
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| A1 – Number of relevant actors | <p><i>Commercial TRL fishers</i></p> <ul style="list-style-type: none"> - TS Islanders and Coastal PNG people based in TS and that access the TRL commercial fishery: 291 licenses on April 7, 2015 - Coastal PNG people that access the TRL commercial fishery pursuant to the TS Treaty: Only a limited number of vessels have requested and obtained cross-endorsement from Australia (0-3 per year). No PNG vessel crossed the border to fish in Australian jurisdiction in 2014. However, as PNG builds its fishing capacity, it can be expected that it will increase its access to the 25% of the Australian TAC to which it is entitled to. - Non-indigenous Australian commercial fishers: The sector is capped at 12 licenses and 33 tenders. <p><i>Traditional fishing</i></p> <ul style="list-style-type: none"> - Traditional inhabitants on both side of the border can harvest TRL for non-commercial use (e.g. subsistence, trade or ceremonial) <p><i>Organizations</i></p> <ul style="list-style-type: none"> - See GS4 Organizations for other relevant actors | Patterson et al. (2015); Torres Strait Treaty (1985) |
| A2 – Socioeconomic attributes A2.1 Socioeconomic resilience | <p><i>Islanders</i></p> <ul style="list-style-type: none"> - Most Islanders combine TRL fishing with other sources of income (other employment, the Community Development Program (CDP) or welfare) and subsistence. <p><i>Non-indigenous fishers</i></p> <ul style="list-style-type: none"> - Most non-indigenous fishers have dual endorsement for the TS and Queensland East Coast fishery. When abundance is low in TS, they shift their effort to the East Coast. | Altman (2001); Bensley et al. (2009) |

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| A2.2 Operating costs | | Non-indigenous (TVH) mothership + tenders | Indigenous (TIB) sector | Hutton et al. (2016, p. 470) |
| | Crew share (labor cost) | 0.425 | 0.33 | |
| | Unit costs of freight costs (re-usable ice packs) | 0.21 (AU\$ per kg) | 0 | |
| | Unit costs of repairs and maintenance | 133 (AU\$ per day) | 37 AU\$ per day | |
| | Base unit cost of fuel and oil | 1 417 (AU\$ per day) | 88 AU\$ per day | |
| | Annual vessel costs | 31 268 (AU\$ per vessel) | 1010 AU\$ per vessel | |
| | Opportunity costs of capital | 0.05 | 0.05 | |
| | Economic depreciation rate | 0.02 | 0.02 | |
| | Average value of capital | 330 022 (AU\$ per vessel) | 23 425 AU\$ per vessel | |
| A3 – History of use or past experiences | <ul style="list-style-type: none"> • Traditional inhabitants (TS and Coastal PNG people) have harvested marine resources including <i>kaiar</i> for time immemorial. • Islanders have been involved in commercial diving fisheries since the early 1900s for pearl shell and trochus. They joined the TRL fishery after the establishment of processing facilities and freezers on some islands in the 1980s. • Islanders have witnessed first-hand the depletion of pearl shell, trochus, and 3 sea cucumber species. They also witnessed a dramatic decline in CPUE for TRL from 200kg tails/day in the 1980s to a current CPUE of 10-20kg tails/day. | | | (Wilson et al., 2009) |
| A5 – Leadership/ entrepreneurship | <p><i>Islanders</i></p> <ul style="list-style-type: none"> - There are various levels of Islander leadership. There are official leadership positions within the various organizations mentioned in GS4. Each island also has local leaders that include, for example, elders, fishers that encourage informal local fisheries associations, or part-time fishers that encourage local youth to experience TRL fishing. | | | Chapter 6 |

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| A7.3 Local knowledge | Non-indigenous fishers have close and regular contacts with AFMA staff based on Thursday Island and are very well-informed about the latest scientific results. They have also accumulated considerable local knowledge of their fishing environment and business structures. | Annabel Jones, AFMA manager, pers. comm.; Hand & Davies (2010) |
| A8 – Importance of resource | <p><i>Economic dependence</i></p> <ul style="list-style-type: none"> - The TRL fishery is one of the few employment opportunities in the region for Islanders. It is the commercial fishery where they are the most active and is a major source of income. <p><i>Cultural dependence</i></p> <ul style="list-style-type: none"> - See RU5 Cultural value | Chapter 6 |
| A9 – Technology used | <p><i>Non-indigenous sector:</i></p> <ul style="list-style-type: none"> - Most fishers operate a 10-20m primary vessel fully equipped with flash freezers and/or tanks for keeping live produce, GPS and fish finders. These boats tow two to seven tenders which are used as fishing platforms. - All non-indigenous fishers use hookah. <p><i>Islanders:</i></p> <ul style="list-style-type: none"> - Islanders operate one 4.5-6m open dinghy (except for one Islander 14-meter boat that began operation in 2011). - It is estimated that approximately 50% of Islander divers use hookah while the remainder free-dive. - The adoption of GPS has become more common in recent years and other devices such as fish finders are only being used by a few full-time fishers. | (Fairhead & Hohnen, 2007; Hand, 2008) Chapter 6 |

F) Action Situations: Interactions (I) → Outcomes (O)

| Attribute | TS TRL fishery | Reference |
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| I1 – Harvesting | <ul style="list-style-type: none"> • The PNG sector has the right to access 25% of the fishery in Australian waters. Only a limited number of vessels have up to now claimed that right and obtained cross-endorsement from Australia. However, as PNG builds its fishing capacity, it can be expected that it will increase its access to the fishery, thereby increasing competition with other sectors. • The catch of the non-indigenous sector is usually much greater than that of the indigenous sector despite its substantially smaller size. However, when fishing conditions are unfavourable in TS (as occurred in 2008 and 2009), these vessels shift their effort to the Queensland East Coast fishery for which they also hold a license, explaining the low non-indigenous catches recorded in those years. The non-indigenous sector caught on average 59.6% of the Australian catch in 2008-2014, but this figure rises to 67.6% for the years 2010-2014. • Non-indigenous operations are not restricted by weather like the indigenous sector. Their bigger boats and use of technology enables them to access and quickly harvest areas before Islanders leave their home island. This competition can threaten the economic viability of Islander small-scale fishing operations. | Bensley et al. (2009); Mulrennan et al. (in prep.); Patterson et al. (2015) Chapter 6 |
| I2 – Deliberation processes | <p>The PZJA is advised by a consultative structure made up of the following committees and working groups:</p> <ul style="list-style-type: none"> – The TS TRL Working Group – The TS Scientific Advisory Committee – The TS TRL Resource Assessment Group – The TS TRL Management Advisory Committee – The Standing Committee | PZJA (2016); Chapter 8 |

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| I3 – Conflicts | <ul style="list-style-type: none"> • Competition between the indigenous and non-indigenous sectors have at time erupted in conflicts. In the early 1990s, motivated by sustainability concerns and the lack of economic benefits stemming from commercial fishing in their traditional waters, Eastern Islanders declared Exclusive Economic Zones within their traditional waters and formed a “Fisheries Taskforce”. Confrontations on the water eventually led to a “gentlemen’s agreement” where non-indigenous fishers accepted to avoid waters close to home islands. • Many Islanders believe the non-indigenous sector is harvesting a disproportionate share of the fishery. During 2005-2013, Islander fisher representatives refused to partake in allocation negotiations unless their demand for a 70% share of the Australian catch is met at the onset of TAC-management. In 2014, following the Sea Claim, the PZJA officially supported Islanders’ aspiration for full ownership of the fishery. | Mulrennan (2007); PZJA (2014c); Chapter 7; Chapter 8 |
| I4 – Investment activities | Unknown | |
| I5 – Lobbying activities | Unknown | |
| I6 – Self-organizing activities | <p><i>Islanders</i></p> <ul style="list-style-type: none"> – Local fishing organizations – Enforcement of CMT – Informal monitoring of fishers’ behaviors | Chapter 6 |
| I7 – Monitoring activities | <ul style="list-style-type: none"> • Islanders will observe the behavior of other fishers when out on the water. <ul style="list-style-type: none"> – With regards to non-indigenous fishers, this includes respecting official rules and regulations as well as informal rules such as not harvesting within 3 nm of home islands. – With regards to fishers crossing the border from PNG, this includes monitoring of illegal fishing. – With regards to other Islander fishers, this includes respecting official rules and regulations as well as traditional institutions such as customary marine tenure (CMT) and <i>gud pasin</i>. • AFMA conducts patrols to control illegal fishing and enforce regulations. • AFMA monitors catch through three sources: the mandatory TS Daily Tropical Rock Lobster Log (TRL04) for the non-indigenous sector, the voluntary Docket Book (TDB01) for the indigenous sector and catch data by PNG fishers in PNG are provided by the PNG National Fisheries Authority. <ul style="list-style-type: none"> – CSIRO fisheries scientists conduct underwater visual surveys every year for stock assessment. | AFMA (2011) |

| | | |
|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|
| O1 – Social performance measures | <ul style="list-style-type: none"> • The Commonwealth TS Fisheries Act defines the social objectives of the PZJA as follows: <ul style="list-style-type: none"> – to acknowledge and protect the traditional way of life and livelihood of traditional inhabitants (including traditional fishing), – to adopt necessary conservation measures in a way that will minimize any restrictive effects on traditional fishing, – to manage commercial fisheries so as not to prejudice traditional fishing, – to manage commercial fisheries for optimal utilization, – to share the total allowable catch (TAC) with PNG in accordance to the TS Treaty (Article 23 of the TS Treaty specifies that the total allowable catch for fisheries should be based on MSY). – to have regard, in developing and implementing licensing policy, to the desirability of promoting economic development in the TS area and employment opportunities for traditional inhabitants (art. 8). • Social performance measures proposed by CSIRO scientists include: Islander employment in the fishery, equity and consistency of management with customs (sense of self-determination). • Criteria discussed by AFMA managers in interviews include: efficiency, effectiveness, maximizing profit from the fishery, and ease of enforcement of fishing regulations | Plagányi et al. (2013); Chapter 8 |
| O2 – Ecological performance measures | <ul style="list-style-type: none"> • The Commonwealth TS Fisheries Act defines the ecological objectives of the PZJA as follows: “to protect and preserve the marine environment”. • Sustainability is evaluated against a target reference point of 65% of virgin biomass and a limit reference point of 40% of virgin biomass. | Patterson et al. (2015) |
| O3 – Externalities to other SESs | <ul style="list-style-type: none"> • Market fundamentals (supply and demand) • Exchange rates • Policies about the Community Development Program and welfare | |

G) Related Ecosystems (ECO)

| Attribute | TS TRL fishery | Reference |
|----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| ECO1 – Climate patterns | <ul style="list-style-type: none"> • Sea surface temperatures around Australia have increased by +0.7 °C since the early 20th century and are highly likely to continue warming. Greater warming expected in shallow areas (<30 m). • Recent (1993–2008) sea level rise is greatest to the north of Australia; global sea levels projected to continue rising during the 21st century and beyond. • Large internal tidal currents with westerly set in winter and easterly set in summer largely driven by tidal phase differences between Coral Sea and Arafura Sea, and wind fields during monsoons. Pattern appears stable. • Coral Sea Gyre and East Australian Current (EAC) driven by the South Pacific Gyre. EAC, the western boundary of the South Pacific Gyre, is projected to strengthen by 5% by 2030 driven by latitudinal shift in the westerly wind fields. • Global projections for cyclones are uncertain but some suggestion of increases in intensity with warming. • Rainfall impacts river flow which in turn affects lobsters. Projections of rainfall highly uncertain in northern Australia. Some studies indicate little freshwater incursion into TS from rivers. • Ocean acidification is highly variable in coastal zones. Expected to decline around Australia. | Norman-López et al. (2013, p. 20) |
| ECO2 – Pollution patterns | Unknown | |
| ECO3 – Flows into and out of focal SES | <ul style="list-style-type: none"> • Tagging studies in the 1980s revealed that the TS and Queensland east coast adult lobster populations do not interact. The east coast lobsters tend to settle on inshore reefs and then move offshore in a SE direction as they mature. However, it is likely that lobsters north of the green zone on the Queensland east coast may move northward into Torres Strait; possibly even joining the breeding migrations. • It is highly likely that TRL from the east coast of Queensland come from the same breeding stock as TRL in TS, given the genetic similarities of the populations and the ocean current patterns in the north-west Coral Sea that could disperse larvae to both areas from breeding grounds off the southern coast of PNG and northern Great Barrier Reef. | Pitcher et al. (1997); Plagányi et al. (2010a) |

Chapter 4

Research Approach: Towards Pragmatism

Mulrennan et al. (2012) identified three broad principles that should guide research partnerships involving local and/indigenous communities: (1) co-design of the research agenda; (2) collaborative processes throughout the research project; and (3) meaningful research outcomes. In this section, I begin by discussing my experience with Islander participation and involvement in both the design of my research project and during the research itself. I then present the research design and provide the rationale that informed it. I conclude with some reflections on the potential value of my research findings to Torres Strait Islanders and others, and situate this project in the context of building and sustaining long-term research relationships.

Muddling Through the Participation Ideals of Indigenous Methodologies and Participatory Action Research

The original intent of this doctoral project was to conduct research that would perfectly adhere to the ideals of indigenous methodologies and participatory action research (PAR). These include among others: initiation of the research project by the community, extensive collaboration throughout the research process and the establishment of long-term research partnerships, empowerment through capacity-building and democratization of the research process, ownership of the process by the community, and enactment of meaningful social change that improves the quality of life of the community and exposes and changes relations of power (Castleden et al., 2012; Evans et al., 2009; Louis, 2007). As such, I hoped that the research questions would be developed in collaboration with community members so that they would incorporate issues identified as locally relevant, the research itself would be “designed, carried out and integrated by the participants in partnership with the researcher” (Lingard et al., 2008, p. 461) and the research would have an impact on how fisheries governance and management is conducted in the region.

Although more nuanced accounts and recommendations are emerging in the literature (e.g. Kesby et al., 2005; Mulrennan et al., 2012; Wallerstein et al., 2013), such ideals are often presented in an “all or nothing” fashion, implying that imperfect application produces morally bad research (Klocker, 2011; Nakamura, 2010). What about the middle ground? What if communities do not have the capacity, have more pressing priorities, have a distrust of, or distain for, research, or for whatever other reason are not eager to dedicate significant time and resources to the research process but are nevertheless interested in seeing what might come out of the research? What then? This is exactly the situation in which I found myself.

Given Islander concerns and uncertainties about the implications of the anticipated introduction of new regulations (i.e. TAC and quotas) for the *kaiar* fishery, there was clear interest in a research project that would investigate how Islander perspectives could inform and be accommodated within the revised management regime. I easily obtained approval to conduct this research and received valuable support from diverse organizations and individuals at both the regional and island community levels throughout the project. Although the level of participation and involvement in the research evolved with time, I was not however able to develop with Islanders the level of partnership predicated by PAR and indigenous methodologies despite my best efforts. Attempts to develop research questions in collaboration with Islander representatives at various levels, to foster ownership of the research project at the community level, to engage in co-authorship or even to hire local research assistants all led to the same result: Islanders expressed various levels of interest about the research, but had other priorities.

There are at least four reasons I can identify that could explain approval but reluctance to engage in a more formal partnership. First, management of the TRL fishery was extremely political at the time – much more so than I realized. Tensions between all actors were very high. Negotiations regarding quota allocation were at a deadlock, with Islander fisher representatives refusing to participate in discussions until their demands for a 70% quota were met. Second, human capacity and resources at the TSRA and at the community levels were overstretched, particularly so for those individuals inclined to take leadership and entrepreneurial roles. Third, research in TS is dominated by natural science projects conducted by or in association with major research organizations such as the CSIRO, and by contractual studies done by consultants (often hired by

the TSRA). Islanders' ideas and expectations about the role and responsibilities of researchers, what research entails and how it should be conducted is based on this experience which has largely been less collaborative – at least not in the sense of PAR and indigenous methodologies. Fourth, Islanders' experience with fisheries research has been mixed and they have clear frustrations regarding the conduct of some past research projects (Nakata & Nakata, 2013). Understandably, Islanders tend to be cautious or ambivalent about new research projects, especially those that could negatively impact their livelihood or way of life. This was exacerbated by the fact that I was a complete stranger. Although my supervisor Monica Mulrennan and committee member Colin Scott have conducted research in the region for over 25 years, their work has been mostly in Eastern TS. Their names were vaguely familiar in Western TS, but I could not capitalize on them or their ties. Moreover, I was operating outside the official institutional structures for fisheries research and/or management in the region. With hindsight, I realize that hoping for people to invest significant time and resources in a politically risky project led by someone with no solid credentials was a lot to ask. My impression was that I first needed to demonstrate that I could conduct research in a respectful way before people would consider investing in a research partnership.

This begged the question: “What was the best way to show respect?” Was it to be more insistent in trying to convince Islanders to get more involved, to not conduct the research at all or to adapt to Islanders' level of participation while being attentive to and mindful of their priorities and other commitments? I chose the latter option which led me towards a more pragmatic approach.

Without the benefit of having Islanders explicitly involved in defining or driving the research agenda, I adopted the strategy of remaining open with regards to research questions and the focus of the research project, as suggested by Nakamura (2010). This meant that my research evolved in significant ways as I attempted to respond to the changing political context and emerging issues in the TRL fishery. For example, while I knew that decisions regarding the selection of a quota model for the indigenous sector were still pending, it was only during fieldwork that I realized the high stakes nature of these issues (these are later discussed in Chapter 7). This motivated me to spend significant time discussing with Islanders different levels of quota allocation (i.e. Olympic, vs community vs individual quotas) and quota characteristics that are known for their potential socio-economic impacts, such as quota duration (e.g. definite duration vs held in perpetuity) and

transferability (i.e. the possibility for the holder to sell or lease quota). These discussions prompted me to shift my original focus from improved integration of Islander perspectives with science for TRL management to further investigate potential impacts of quota options. This shift is what ultimately led me to conduct future scenario workshops during my final field visit.

This openness and responsiveness to the changing context and to my evolving understanding was, however, not without tension. I was afraid that my desire to produce outcomes of immediate relevance would conflict with the ability to produce a coherent narrative for the thesis. I was seriously concerned that I might get pulled in too many different directions, lose focus, and that in the end, the research would not “come together”. As explained in the next section, relying on a core component of interviews and participant observation and treating other methods used to investigate additional aspects as supplementary components was helpful in this regard.

Relational accountability is one of the central tenets of indigenous methodologies. There was definitely a gendered dimension to my work which was central to building relationships and trust. Line fishing is usually conducted by women, but commercial *kaiar* fishing is conducted almost exclusively by men. While I have been told of a few women who practiced diving to harvest *kaiar* for commercial purposes, *kaiar* fishers were all male on the three islands where I conducted my research. Marine hunting is generally perceived to be the domain of men. I asked a teenage girl who was assisting her father in *kaiar* fishing if she would be interested in pursuing commercial *kaiar* fishing herself. Her answer was: “*Naaah, it’s a guy thing.*”

I was extremely lucky to be taken under the wing of some very well-respected and influential women when I arrived on the outer Islands of Badu and Yam. I developed strong friendships with some of them and was adopted by a woman on Yam. I also consciously engaged with women in general – for example by attending Island dance practice (which is also a gendered activity) and helping to prepare feasts whenever possible and appropriate. I felt throughout my fieldwork that these relationships provided a form of both endorsement and protection which facilitated my relations with male fishers. I also was extra careful in ensuring that all my research activities were conducted in public spaces or, for the rare occasions when I conducted interviews in someone’s house, in the presence of the fisher’s spouse. This attitude and engagement allowed me to also

develop privileged relationships with some well-respected elders with a great knowledge of the marine environment and of the *kaiar* fishery. I was able to achieve a sufficient level of trust for some fishers to invite me to join them in their dinghy to go diving so that I could observe them in action while *kaiar* fishing. The fact that I am a certified rescue diver also helped as this alleviated fishers' concerns about their responsibility to ensure my safety.

In addition to developing strong research connections with Islanders within certain communities, I also worked with individuals within relevant governance structures. My fieldwork was iterative and I conducted four visits to TS: one per year between 2008 and 2011. I provided regular updates through email to the TSRA and local representatives, and before each visit, I submitted a research plan and sent a poster to the outer islands announcing my visit and my objectives. I also made a point of stopping at Thursday Island to meet with the TSRA staff at the beginning and end of each of my field visits. It is through this sustained engagement that I was able to enlist the TSRA rangers³ for the future scenario workshops. This is the closest I got to a true partnership. While at the TSRA on Thursday Island in 2011, I discussed the possibility of collaborating with the rangers for future scenario workshops on Badu and Yam. The proposal was approved by the coordinator of the Ranger program and the workshops were further discussed with the Ranger supervisors responsible for the Ranger teams based on Badu and Yam. However, it remained clear that this was *my* project. When I suggested that authorship of the scenario workshop results could be shared, this was immediately refused by the Ranger supervisors at the TSRA. While the collaboration with the rangers was discussed through the official channels, it was somewhat informal. The timeline for the scenario workshops was not recorded in the official Ranger activity work plan on Thursday Island which resulted in the unintentional and unfortunate scheduling of a training session for the rangers at a time that conflicted with the workshop planned on Badu. Despite this misunderstanding, the collaboration on-the-ground with the rangers was extremely productive. Rangers generously and enthusiastically did everything they could to make the workshops a

³ The TSRA began the Torres Strait Ranger Project in 2009. Rangers are responsible for carrying out a variety of activities including pest and weed control, marine debris management, surveillance and monitoring, dugong and turtle management, seagrass monitoring, cultural heritage site protection, and traditional ecological knowledge recording and management. The TS Ranger Project has grown from one Ranger group on Mabuiag to 13 Ranger groups (over 45 Ranger positions) in 14 communities located on 13 outer islands across the region. It was originally funded by the Australian Government's former Caring for our Country programme which has been rolled into the National Landcare Programme (TSRA, 2017).

success and their contributions were invaluable. I would never have been able to organize such an elaborate workshop in such a short time nor make the necessary adjustments to reschedule the workshop at a later date on Badu. I believe this was a fruitful first collaboration and hopefully one that will encourage rangers to engage in other research projects.

It is through this context of an evolving research agenda and relationships that I developed a pragmatic research approach that I outline below.

Pragmatism and Mixed Methods Research Design

Before I outline my research approach and design, I would like to offer some clarification on the vocabulary I use. Many of the terms related to the tools, techniques, rules and principles of how to conduct research have competing definitions or different combinations of terms are used interchangeably by different authors. To avoid confusion, I adopted a set of definitions, which are defined below.

Methodology

The procedures and principles for conducting appropriate research (Bailey, 2007) (e.g. as understood in participatory or indigenous methodologies). Methodology addresses issues such as “sampling, gaining entrée, resolving ethical concerns, and maintaining relationships in the field” (Bailey, 2007, p. 63).

Research approach

“Research approaches are plans and the procedures for research that span the steps from broad assumptions to detailed methods of data collection, analysis, and interpretation” (Creswell, 2014, p. 31). There are three broad research approaches: qualitative, quantitative or mixed methods. Qualitative and quantitative approaches should not be viewed as dichotomies, but rather as different ends of a continuum (Creswell, 2014).

Research design or strategies of inquiry

“Research designs are types of inquiry within qualitative, quantitative, and mixed methods approaches that provide specific direction for procedures in a research approach (Creswell, 2014, p. 41). Other scholars such as Denzin & Lincoln (2011) have used the term “strategies of inquiry”.

Methods

A systematic procedure that may involve the use of different techniques and tools.

Mixed methods design vs multiple method (or multimethod) design

Mixed methods design consists of one complete project (called the core component) combined with one or more supplementary components that consist of a different method or technique(s) drawn from a different method. It is a systematic way of using two or more research methods to answer a single research question. It includes using two or more qualitative or quantitative methods or both qualitative and quantitative methods; they can be conducted simultaneously or sequentially to the core component (Morse, 2009; Morse & Niehaus, 2016). The supplementary component adds to the results of the core component. However, it “does not ‘make sense’ on its own: qualitatively it lacks saturation; quantitatively it may consist of a set of scores” (Morse & Cheek, 2014, p. 4). On the other hand, “A multiple method design is a plan for a research program comprised of two or more related scientifically rigorous research projects conducted over time” (Morse & Niehaus, 2016, p. 10). That is, the results generated by the different methods can stand on their own (Morse, 2009; Morse & Niehaus, 2016).

As mentioned previously, this research project evolved significantly over time. At the thesis proposal stage, I was already considering the use of multiple methods, but more along the lines of a multimethod project than a mixed methods projects (see definitions above). I modified the research design as I gradually took more of a problem-centred approach. While acknowledging the importance of early conceptualization of research projects, Morse and Niehaus (2016) also recognize the need to remain flexible:

“The exploratory nature of research, the complexities of the phenomenon studied in social science, and the limitations within methods means that there are occasions when a phenomenon cannot be described in its entirety using a single

method. (...) At times, unexpected findings emerge that demand to be addressed using another methodological strategy. Sometimes these findings may best be addressed using a different methodological strategy. (...) Such possibilities mean that, to complete the study, a mixed method design must be used. This approach would incorporate a supplementary component that may or may not have been anticipated at the proposal stage” (p. 15).

I am strongly committed to a pragmatist paradigm or philosophical perspective. That is, I believe in both “an external world independent of the mind as well as that lodged in the mind” (Creswell, 2014, p. 40). The pragmatist paradigm recognizes that research always occurs in a specific social, cultural, historical, and political context. Researchers should thus use designs, data and methods that are best suited to the context, will provide the best understanding of the problem, and are the most likely to produce the intended outcomes or consequences (Creswell, 2014; Moon & Blackman, 2014). Table 4.1 presents the different levels of the research project’s conceptualization.

The details of my research design are presented in Chapter 5 and are therefore not repeated here. In brief, I used a qualitatively-driven mixed methods research design with supplementary methods conducted concurrently with the core methods. The rationale for the research design, the specific reasons for selecting each method and the details of each supplementary method are also described in Chapter 5. As such, only the details of the core methods are described below.

Table 4.1: Research Conceptualization

| | |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Ontology | Critical realism/ bounded relativism |
| Epistemology | Constructionism |
| Philosophical perspective/paradigm | Pragmatism |
| Methodology | Sensitive to indigenous and participatory methodologies |
| Research Approach | Mixed methods |
| Strategies of inquiry | <ul style="list-style-type: none"> • Case study • Qualitatively-driven concurrent mixed method design • Core component drawing on ethnography |
| Methods for data collection | <p>Core component:</p> <ul style="list-style-type: none"> • Interviews • Participant observation <p>Supplementary components:</p> <ul style="list-style-type: none"> • Preference interviews and rankings • Cognitive mapping • Future scenarios |

Details of Core Component Methods

I conducted numerous semi-structured and unstructured interviews during my visits to Australia between 2008 and 2011. During my reconnaissance trip in 2008, I had informal conversations with fisheries scientists at CSIRO, staff personnel at AFMA and at TSRA, and a few Islander leaders.

During my field research in 2009-2011, I conducted semi-structured interviews with active fishers on Badu and Yam (Islanders and Papua New Guineans) and semi-structured or unstructured interviews with Islander retired fishers, spouses, elders, factory managers and local leaders with an interest in the fishery. In total, I conducted semi-structured interviews with 83 traditional inhabitants (TS Islanders and fishers of PNG origin established in the region) and unstructured interviews with 33 traditional inhabitants. Interviews were iterative; i.e. I tried to interview the same people every year while also including new participants, resulting in a total of 119 semi-structured and 90 unstructured interviews. Details about the participants for semi-structured interviews for each field visit are illustrated in Figure 4.1. All participants were asked for their consent before using the voice recorder and I took hand written notes in the very rare cases where interviewees were uncomfortable with being recorded. Most unstructured interviews were documented by note-taking with a few also recorded.

During my field research in 2009-2011, I also conducted semi-structured and unstructured interviews with current fisheries scientists and managers. Between 2010 and 2014, I conducted semi-structured interviews with all AFMA managers that served in Torres Strait since the opening of the office on Thursday Island in 1989. The last two managers were interviewed while still in office. Semi-structured interviews were voice recorded and unstructured interviews were documented by note-taking.

I conducted participant observation in all research locations (TS communities, CSIRO laboratories in Queensland and AFMA offices). I also had the opportunity to attend as an observer some advisory committee meetings pertaining to the TRL fishery (i.e. the Resource Assessment Group (RAG) and the Scientific Advisory Committee (SAC)) and to join scientists for five days during a TRL survey in 2010. Finally, I was able to dive with some Islander free-divers to observe them harvesting TRL. Observations were noted in a journal. 7.0.79).

All interview material and journal observations were coded and analyzed with the Atlas.ti software (version 7.0.79) following the methodology described by Friese (2012).

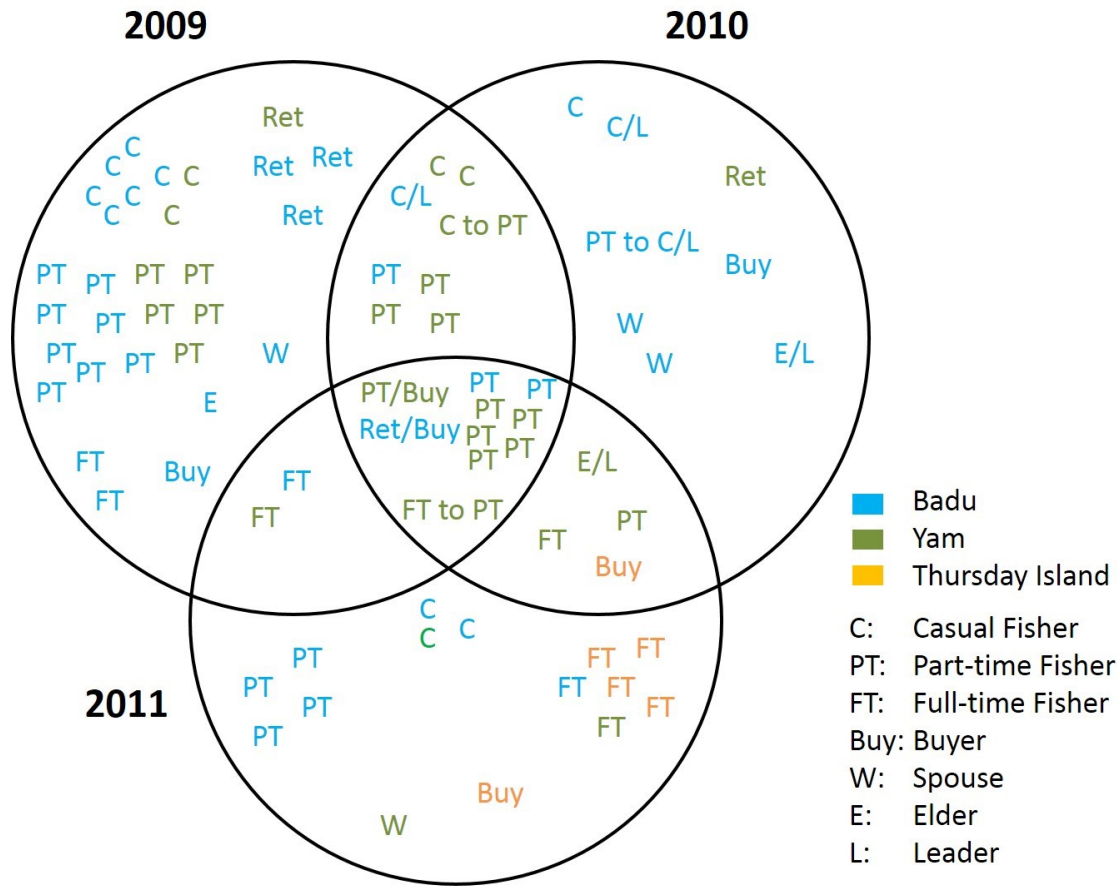


Figure 4.1: Indigenous participants interviewed between 2009 and 2011

Research Significance: Meaningful Outcomes for Islanders?

Has this research generated meaningful outcomes? This is probably one of the most difficult questions faced by (junior) scholars who engage for the first time in research with local communities, in particular with indigenous people. Reflecting on his Master’s research with the Ainu people of Japan and on the benefits it provided to the community, Nakamura (2010) raised the following questions:

“(…) what measures identify whether research benefits the community? Is it possible to predict, in a short time period, whether research really benefits the community? Which research provides benefits and which does not? (p. 98)

When I think about my own research and how it evolved over time, I am torn between two perspectives: the value of building and sustaining relationships (i.e. relational accountability) and the value of tangible policy outcomes. Obviously, the ideal research will provide benefits through both a meaningful process and meaningful “end products”. However, while the importance of directly contributing to indigenous struggles for self-determination and a better quality of life cannot be overstated, like Nakamura, I worry about the projects that may not provide *immediate* benefits. How can one know if they will in the future?

The political context in Torres Strait shifts very slowly at times (e.g. the introduction of a TAC was decided in 2005 and is still not in place) and incredibly fast at others. The relevance and usefulness of the findings reported in this thesis will therefore, to some large extent, be contingent on the timing of political events. Negotiations at the PZJA level are ongoing regarding ownership transfer of the fishery, initial quota shares when (and if) TAC will be introduced and quota models for the indigenous sector. It is my sincere hope that some material in this thesis will provide support to Islanders in these negotiations, particularly with regards to issues that have been, up to now, underrepresented. However, the question of whether any of this will result in positive policy outcomes for Islanders remains open. In terms of tangible benefits, as outlined above, I attempted to contribute to local capacity but had muted success in this regard. I was not able to hire a local research assistant despite my best efforts. The most obvious and tangible contribution to local capacity building was during the organization of the scenario workshops with the local rangers. This provided an opportunity to share some research techniques, such as how to conduct a stakeholder analysis and various facilitation tips. I provided each of the rangers with a detailed facilitation guide to assist them during the workshop but also to leave them with a document that might be useful to them in the longer term.

Most importantly, I hope the relationships I developed during this research project have laid the foundation for my sustained collaboration with Islanders into the future. There is also a rich collection of interview and other material, not all of which made its way into the thesis that can, and should, be tapped. Through my multiple visits, Islanders generously shared their knowledge and insights with me. In return I hope that I have been able to represent and do justice to their perspectives while also contributing to the generation of new conversations. TAC and quotas were

not on the radar of many fishers when I began my work. Sharing my knowledge about conventional fisheries management has hopefully contributed to local agency and resilience. Three fishermen with whom I had extensive discussions later got involved in fisheries management committees. While I am not claiming credit for this, I like to think that I contributed some knowledge to support their work.

My engagement also generated unexpected insights, some of which could form the basis of future research projects. For example, during my initial interview with a *kaiar* fisher, I would ask questions about environmental changes he might have noticed over the years. One observation that was mentioned by every fisher was the disappearance of boxfish about 10-15 years ago. In 2011, I asked a full-time fisher I had not previously interviewed: “Have you noticed any changes in the environment during the past years?” His answer was enthusiastic: “Yes!! Boxfish are back!” I could not believe it. Needless to say, boxfish became a topic of discussion between fishers and myself. I was not able to investigate this question, but along with Islander fishers, I am intrigued by the fate of the boxfish. There may never be a future research project on boxfish. Maybe Islanders will have other priorities or interests they would prefer to pursue. My point, however, is that such stories usually reveal themselves through sustained engagement. For me, this involved several months over four years of long, slow days spent “yarning” with Islanders, in sharp contrast to the “fly-in fly-out” constraints government fisheries agents and many scientists operate under. My sincere hope is that these days, weeks and years will extend beyond my doctoral research in to a life-long sustained research engagement with the Islanders and Torres Strait. In the interim my intention is to fulfill my commitment to relational accountability by ensuring the findings from my research are returned to their source in the form of my PhD thesis and as a more accessible document(s) directed to Islander priorities. My intention is to present the latter in person in the near future and to use that as an opportunity to begin a new and exciting phase of my research journey.

Chapter 5

Gaining Insight to the Human Dimension of Indigenous Fisheries: Reflections from a Qualitatively-Driven Mixed Methods Study

Annie Lalancette & Monica Mulrennan

Abstract

Drawing on research conducted on the perspectives of indigenous Torres Strait Islanders engaged in the tropical rock lobster fishery in northern Australia, this paper provides a critical reflection on the benefits and challenges of a mixed methods research approach in contributing to our understanding of the human dimension in natural resource management. We report on our experience using a qualitatively-driven research design with a core component consisting of interviews and participant observation. Three additional methods were used as supplementary components to explore specific aspects or dimensions of the inquiry: (1) a choice-based stated preference method (preference interviews and rankings), (2) a qualitative modelling exercise (cognitive mapping) and (3) a structured focus group method for targeted brainstorming (future scenarios). The merits and limitations of these methods – on their own and in combination – are discussed in terms of their success in eliciting Islander perspectives, highlighting that their real strength was in using them together and in conjunction with our core methods. We provide concrete recommendations that we hope will be useful to other researchers contemplating qualitatively-driven mixed methods research for choosing, adapting and implementing methods in a particular context. We conclude by emphasizing the importance of higher level considerations for fruitful engagement and productive research – in particular time spent in the field observing and talking to people, building relationships and trust.

Introduction

It is well recognized that a solid understanding of the larger social-ecological systems (SES) is needed for effectively dealing with natural resource management problems (Ostrom et al., 2007; Poteete et al., 2010). The complexity and interdisciplinary nature of these issues, which span the social and natural sciences, have attracted interest in using new methods and combining a diversity of methods in innovative ways. It is argued that using different methods for investigating different aspects or dimensions of the overarching research question will lead to more comprehensive research by expanding the breadth and range of inquiry (Creswell, 2014; Greene et al., 1989; Morse & Niehaus, 2016). Since methods have different strengths, weaknesses and biases, combining multiple methods can neutralize deficiencies in different types of data (Creswell, 2014; Morse & Niehaus, 2016; Poteete et al., 2010). Other reasons put forward for using multiple methods include discovering paradoxes and contradictions which can help reframe or refine research questions, clarifying results obtained by one method with those of another by using complementary methods, using the results of one method to inform and further develop another method, and improving reliability and internal validity of results through triangulation (Creswell, 2014; Greene et al., 1989; Morse & Niehaus, 2016). As such, the emphasis is on the contribution of a combined methods approach rather than the search for a single superior method.

The idea of method pluralism in research is not new. After all, as Denzin and Lincoln (2011, p. 5) remark: “qualitative research is inherently multimethod in focus”. What is relatively new, is the emergence of a pragmatic problem-centred approach that is not committed to any one philosophical position (i.e. ontology and epistemology) or methodological strategy – one that encourages researchers “to choose the methods, techniques, and procedures of research that best meet their needs and purposes” (Creswell, 2014, p. 39). Such research has been variously referred to as *multimethod*, *multiple methods* or *mixed methods* and there is no consensus as to the exact definition of these terms or how they may differ (Morse, 2010). Many authors consider mixed methods research to be limited to studies combining qualitative and quantitative methods (e.g. Creswell, 2014). In this paper, we adopt the broader definition of Morse and Niehaus (2016) who propose that mixed methods entail “the incorporation of one or more methodological strategies, or techniques drawn from a second method, into a single research study, in order to access some part of the phenomena of interest that cannot be accessed by the use of the first method alone” (p. 9).

For these authors, mixed methods research consists of a core component with one or more supplementary components that provide explanation or insight within the context of the core component. The core and supplementary components can both be qualitative, both quantitative or a combination of qualitative and quantitative methods. Depending on the objectives, they can be conducted concurrently or sequentially (Morse & Niehaus, 2016).

Many scholars (e.g. Graham, 1999; Poteete et al., 2010; Yanchar & Williams, 2006) have alerted mixed methods researchers to the importance of critically examining the theoretical assumptions and implications as well as underlying values of their chosen methods in order to design a defensible research program. Yanchar and Williams (2006) recommend continuous critical reflection on the coherence and practical consequences of the program of inquiry, possibly leading to revision of research questions and research approach.

The nature of the research process is also critical to the effectiveness of specific methods (Lynam et al., 2007). Ethical issues of power, equity and social justice are salient in natural resource management, especially when dealing with marginalized groups (Howitt, 2001; Jentoft et al., 2003; Syme & Nancarrow, 2001). The growing traction of participatory and indigenous methodologies in conservation, environmental management and natural resource management in the last 20 years has yielded an extensive literature on research principles. There are several excellent critical discussions on the methodological⁴ imperatives and challenges for ethical research involving communities (e.g. Cooke & Kothari, 2001; Mulrennan et al., 2012; Smith, 1999). Our purpose is not to reproduce these efforts. Rather, we provide an overview of the central methodological principles (see Table 5.1) in order to facilitate a discussion on issues of research design and implementation, focusing on how to choose, adapt and combine different methods.

Some guidelines have been published to assist in the choice of methods for mixed methods research as well as within participatory and indigenous methodologies. There are also practical considerations that can constrain or influence the number and choice of individual methods in a

⁴ There is much confusion in the literature on the difference between methodology, method and technique. In this paper, following Bailey (2007), we define methodology as general procedures and principles on how to carry out research.

mixed methods project. Table 5.1 presents some considerations that are relevant within the context of natural resource management. While these guidelines are useful, selecting a particular method or combination of methods can still be daunting. First, many methods can be used for different purposes (e.g. to extract information or to support participatory decision-making) (van Asselt Marjolein & Rijkens-Klomp, 2002; Lynam et al., 2007). Indeed, the manner in which methods are used may vary between disciplines due to different research traditions (Graham, 1999). Second, many methods are flexible and their logic, meaning and procedures can be reinterpreted or reformulated (Yanchar & Williams, 2006). Third, it is often the particular combination of methods and the research design that will determine a given method's usefulness and effectiveness within a research project (Lynam et al., 2007).

This paper provides an empirical example of how we dealt with these issues in the context of a qualitatively-driven mixed methods research project investigating the perspectives of indigenous Torres Strait Islanders engaged in the tropical rock lobster fishery in northern Australia. Our goal is to offer a critical reflection on the benefits and challenges of a mixed methods research approach in contributing to our understanding of the human dimension in natural resource management. We availed of a set of methods readily available to fisheries scientists (and scientists from other environmental or natural resource management fields) and selected to evaluate their utility. We report on our experience using these methods within a particular research design, philosophical stance, theoretical framework and sociocultural context. We then discuss the merits and limitations of these methods in terms of their success in eliciting Islander perspectives. We highlight that while our supplementary methods each have their individual set of advantages, their real strength was in using them together and in conjunction with our core methods: interviews and participant observation. We conclude by emphasizing the importance of higher level considerations such as theoretical context and methodological considerations for fruitful engagement and productive research and provide concrete recommendations that we hope will be useful to other researchers contemplating qualitatively-driven mixed methods research.

Table 5.1: Mixed Methods Research Design Principles and Considerations

| | Description | Reference |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| Methodological Principle | Rights, responsibilities, and obligations of research partners and researchers are clearly identified from the start of research, with special attention to power dynamics | Castleden et al. (2017), Menzies (2001), Reed (2008), Vernooy and McDougall (2003) |
| | Clear objectives for the research process are agreed to among participants at the outset | Louis (2007), Reed (2008), Vernooy and McDougall (2003) |
| | Relationship building/ Relational accountability | Kovach (2009), Latulippe (2015), Louis (2007), Reed (2008) |
| | Respectful representation of relevant actors | Louis (2007), Reed (2008) |
| | Appropriate level of collaboration and participation throughout the process | Louis (2007), Coombes et al. 2014, Reed (2008) |
| | Reciprocity: co-learning and knowledge sharing and co-creation | Castleden et al. (2012, 2017), Louis (2007), Mulrennan (2012), Reed (2008) |
| | Relevant and meaningful research outcomes: real progress toward community goals | Castleden et al. (2017), Evans et al. (2009), Kesby et al. (2005), Louis (2007), Mulrennan (2012) |
| | Community endorsement of findings | Louis (2007) |
| | Intellectual property remains with knowledge holders | Louis (2007), Menzies (2004) |
| | Acceptance and respect of different knowledge systems (indigenous and local knowledges) and appropriate representation of this knowledge | Latulippe (2015), Louis (2007), Tengö et al. 2014, Whyte 2015, Reed (2008) |
| | Take into account past experiences and expectations of research collaborators and participants | Bergold and Thomas (2012) |
| | Contribution to capacity-building | Mulrennan (2012), Castleden et al. 2008, Reed (2008) |
| | Respect for communities' timelines | Castleden et al. (2012), Louis (2007), Menzies (2004) |
| | Highly skilled facilitation is essential | Reed (2008) |
| | Openness and communication of results back to community, making results available and accessible through appropriate language and presentation styles | Bergold and Thomas (2012), Louis (2007), Menzies (2001, 2004), Mulrennan (2012) |
| Reflexive self-awareness | Kovach (2009) | |

| | | |
|--------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| Method Selection Consideration | Potential and limits of the method with regards to the research question and its complementarity with other chosen methods | Lynam et al. (2007), Morse and Niehaus (2016), Poteete et al. (2010), Yanchar and Williams (2006) |
| | Contribution to capacity-building | Mulrennan (2012), Castleden et al. 2008, Reed (2008) |
| | Goal of participation: <ul style="list-style-type: none"> • participation as a means vs as a goal • mapping out diversity vs reaching consensus | Van Asselt Marjolein and Rijkens-Klomp (2002) |
| | The methods' assumptions, values and moral commitments are consistent with the researcher's assumptive framework | Poteete et al. (2010), Yanchar and Williams (2006) |
| | Coherent with theories, questions, data analyses, and criteria for success (i.e. the method does not produce uninterpretable contradictions or self-refutation) | Graham (1999), Poteete et al. (2010), Yanchar and Williams (2006) |
| | Context-appropriate or can be tailored to context | Bergold and Thomas (2012), Reed (2008) |
| | Conditions of use (e.g. data needs, level of prior knowledge of context required) | Lynam et al. (2007), Poteete et al. (2010) |
| | Knowledge and skills required for competent deployment by the researcher | Poteete et al. (2010) |
| | Knowledge and skills required of participants (e.g. literacy and numeracy) | Lynam et al. (2007) |
| | Time commitment for both the researcher and participants | Lynam et al. (2007), Poteete et al. (2010) |
| | The nature/format of the results or outputs (e.g. easy to understand, good communication tools, level of accuracy, etc.) | Lynam et al. (2007), Barber and Jackson (2015) |

Research Context

The research that informed this paper was conducted as part of the doctoral research project of the first author, with inputs from the second author in her capacity as thesis supervisor. The goal was to investigate indigenous Islander perspectives⁵ pertaining to the tropical rock lobster (TRL) fishery in western and central Torres Strait (TS), northern Australia to identify connections and disconnections with current fisheries management and assess potential impacts of proposed policies. The first author had no prior connection to Islanders and trust and relationships needed to be developed with communities. The second author has worked with TS Islanders for more than 25 years, but her connections are mainly in the eastern Strait.

Similar to many other indigenous peoples, TS Islanders have struggled through a history marked by colonial injustices and dispossession (Beckett, 1987; Ganter, 1994; Nakata, 2004). TRL is currently the most valuable commercial fishery in the region (Patterson et al., 2015) and the most important for Islanders in terms of participation and income (PZJA, 2016). Islander fishers are heterogeneous in terms of socioeconomic attributes, diving techniques, fishing products, level of catch and effort, and consistency in annual participation (Lalancette & Mulrennan, forthcoming; van Putten et al., 2013a).

The TRL fishery significantly contributes to Islander economic and non-economic dimensions of wellbeing (Lalancette & Mulrennan, forthcoming). As such, Islanders consider the TRL fishery as an important component for achieving their aspirations for economic autonomy and self-determination. However, it is also the fishery with the highest participation by outsiders. The majority of the annual catch since the beginning of this fishery in the late 1960s has been harvested by non-indigenous Australian fishers with few benefits from this catch accruing to Islanders. Competition between the indigenous and non-indigenous sector is a contentious issue and many Islanders complain that non-indigenous fishers are accessing an unfair portion of the catch (Lalancette, 2017). The decision in 2005 to commit to the introduction of a total allowable catch (TAC) in the TRL fishery led to tense negotiations regarding allocation between the indigenous and non-indigenous sectors (Lalancette, 2017). In parallel, Islanders were pursuing Native Title

⁵ Perspectives include motivations, values, institutions, interests, concerns and aspirations.

recognition of their sea territories. The uncertainties surrounding quota allocation and both the timing and final outcome of the Sea Claim⁶ legal decision made fisheries management a politically-charged issue during the time fieldwork was conducted.

Islanders' experience with researchers varies considerably between island communities. Islanders have a long history of engagement with researchers, including their participation in the Cambridge Expedition to TS, led by Alfred Haddon in the late 1800s and early 1900s. More recently, TS has been the focus of an intense phase of research linked to the documentation of Native Title claims. This experience has been generally positive, in part because it has been linked to meaningful and positive outcomes (Butterly, 2013a; Scott & Mulrennan, 1999), while Islander experience of fisheries research tends to be more of a mixed bag (Nakata & Nakata, 2013). The result is that Islanders are generally cautious about new research projects, especially those that could negatively impact their livelihood. There are also practical issues of time constraints. In addition to fishing-related activities, Islander fishers have multiple social and cultural commitments and responsibilities they must attend to, which limit their availability and willingness to contribute to or participate in research.

Research Approach and Design

This research is grounded in a pragmatic philosophical perspective and follows a qualitatively-driven research design; i.e., it has an inductive theoretical drive (Morse & Niehaus, 2016). The research is strongly influenced by the principles of participatory and indigenous methodologies.

The core methods for this research were interviews (unstructured and semi-structured) and participant observation. They were designed to explore Islander motivations, values, principles, interests, concerns, institutions, knowledge, and aspirations pertaining to the TRL fishery. Three additional methods were used as supplementary components: (1) a choice-based stated preference

⁶ In 2001, Leo Akiba lodged a claim on behalf of the TS Regional Sea Claim Group (referred to as the Sea Claim). On July 2, 2010, Justice Finn of the Federal Court of Australia formally recognized native title rights of TS Islanders to an area covering approximately 37,800 km² of sea. A final decision was rendered on August 7, 2013 that, in addition, recognized the right of Islanders to access and take marine resources for any purpose, including for trading or commercial purposes.

method (preference interviews and rankings), (2) a qualitative modelling exercise (cognitive mapping) and (3) a structured focus group method for targeted brainstorming (future scenarios). We chose to combine these five methods to expand the breadth and range of inquiry, to complement results from one method with results from another, to inform the adaptation and application of other methods and to triangulate or cross-check results.

The role of supplementary components in mixed methods research is to add to the results of the core component which provides the major findings and theoretical base (Morse & Cheek, 2014). In our particular case, they were used to either access a level of detail that was difficult to observe or to elicit in interviews or to further investigate unexpected findings or emerging subquestions following changes in context (e.g. new political developments). Table 5.2 presents a brief description for each supplemental component and their potential applications as reported in the literature. Table 5.3 outlines the research objectives for each method used and the reasons for selecting them.

Fieldwork took place from 2008-2011 during which time the first author made four visits totalling 11 months in TS. Core methods were conducted iteratively throughout the project; i.e. when possible, the same people were interviewed during each field visit. All supplemental methods were thus conducted concurrently with core methods. Some supplemental methods were conducted concurrently with each other, while others were conducted sequentially (see Figure 5.1). Methods built on one another and these relationships are illustrated in Figure 5.2. Research was focused on the three islands contributing the most to Islander TRL catch: Thursday Island, Badu and Yam. However, supplemental methods were only applied on Badu and Yam due to logistical and time constraints. Details about participants for each field trip and additional details about method implementation can be found in Lalancette (forthcoming).

Table 5.2: Overview of Methods Used as Supplementary Components

| | Description | Potential Application or Purpose | Reference |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|
| Cognitive Mapping | <p>Visual representations of peoples’ understanding of how a system works. Comprise concepts representing drivers of the system joined by connections representing interactions (e.g. landing prices influencing fishing effort). Different types of cognitive maps are characterized by the level of specification assigned to the links between elements. Cognitive maps can be diagrams where:</p> <ol style="list-style-type: none"> the relationship between concepts is unspecified, arrows identify the direction of causal relationships, a sign is attributed to each directed link to indicate if the relationship is positive or inverse (known as digraphs), or a weight is assigned to each relationship to indicate its strength. Weights can be determined by using a linguistic qualitative scale which is then transformed into a number, usually between -1 and 1, to produce so-called fuzzy cognitive maps (FCM). | <ul style="list-style-type: none"> Elicit peoples’ mental models of SES Anticipate management outcomes Model ecosystems Illustrate local knowledge Design semi-quantitative scenarios Contrast actors’ perceptions Analyze potential conflicts Communication and learning tool Digraphs and FCM can be used to explore system dynamics and considered predictive | <p>Barber & Jackson (2015), Kok (2009), Özesmi & Özesmi (2004), Papageorgiou (2011), Papageorgiou & Kontogianni (2012)</p> |
| Preference Interview and Ranking (ParFish package) | <p>Choice-based, stated preference method. Participants are asked to express their preferences on an assortment of alternatives defined by a set of attributes.</p> <p>The ParFish preference interview (Walmsley et al., 2005) is an ordering exercise of 17 illustrated cards representing different scenarios of catch and fishing effort. The values of the cards are calculated as a change from the fisher’s current situation (e.g. a 25% increase in effort for a resulting 50% increase in catch). Ranking is done by pairwise comparisons following an order pre-determined in the ParFish method where the fisher must choose the scenario he prefers between the two presented, resulting in a sequence of cards progressing from the most preferred to the least preferred scenario. This is followed by a scoring exercise where the fisher indicates the degree of preference between each successive pairs of scenarios using a qualitative rating scale.</p> | <p>Stated preferences methods are widely used in environmental valuation</p> | <p>Halvorsen et al. (2006)</p> |

| | | | |
|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p style="text-align: center;">Future Scenarios</p> | <p>Type of structured focus group for conducting targeted brainstorming. Scenarios are plausible stories about how the future might unfold that are neither predictions nor forecasts. They may be entirely qualitative narratives or include a significant level of quantitative analyses. The method focuses on uncertainties, drivers of change and causal relationships and stories must be based on consistent assumptions about these factors in order to be logical. There are many different approaches. Biggs et al. (2007) identified 16 axes along which scenario methods can vary. These can be summarized as the objectives of future scenario analysis, the methods and source of information used, the scale(s) of scenarios, the storylines' characteristics, the driving forces included, the dynamics of the system explored, the inclusion of norms, and the role of actors in the process.</p> | <ul style="list-style-type: none"> • Have been used to explore a diversity of environmental issues in SES; e.g., land use, climate change, natural resource management, water resources planning and biodiversity. • Have also been used to consider future changes in SES at a variety of temporal and spatial scales | <p>Biggs et al. (2007), Evans et al. (2008), MEA (2005), Nakicenovic & Swart (2000), Priess & Hauck (2014), Reed et al. (2013), Rounsevell & Metzger (2010), Settele et al. (2012), Wollenberg et al. (2000)</p> |
|-----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Table 5.3: Methods’ Objectives, Reasons for Selection, and Lessons Learned (Opportunities and Challenges)

| | Method | Objective | Selection Criteria | Opportunities/Merits | Challenges/Limitations |
|---------------------------------|-------------------------------------|-------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Core Component | Interviews (semi- and unstructured) | Document Islanders’ perspectives about a range of topics relevant to the TRL fishery | <ul style="list-style-type: none"> • Easy to implement • Culturally-appropriate • Flexible: allows the interviewee and the interviewer to pursue unanticipated but relevant topics • Good method to establish rapport and build relationships | <ul style="list-style-type: none"> • Can easily be iterative without feeling repetitive (e.g. follow-up interviews) • Provides information on a factual and meaning level • Provides social cues in addition to what people say • Can generate new conversations among participants | <ul style="list-style-type: none"> • Relies on appropriate skills • Requires relevant background knowledge in order to ask the right questions |
| | Participant Observation | Gain a better understanding of the realities and practicalities of TRL fishing | <ul style="list-style-type: none"> • Easy to implement • Natural complement to interviews | <ul style="list-style-type: none"> • Allows to observe actions that may be related to tacit knowledge and therefore not easily communicated • Allows to observe behavior (which the person might be unaware of) | <ul style="list-style-type: none"> • Gaining access to/obtaining the permission to observe or participate in certain activities • Making sense of what is observed (e.g. identify what is relevant to the research question) |
| Supplementary Components | Cognitive Mapping | Identify factors that influence Islander fishing behavior and outcomes and understand how these factors interact. | <ul style="list-style-type: none"> • Flexible • Does not require hard data • Functions with qualitative variables • Can illustrate feedbacks • Visual component facilitates understanding of complex systems • Can include social and cultural elements | <ul style="list-style-type: none"> • Can illustrate feedbacks • Identifies gaps in knowledge • Creates shared understanding • Good communication tool for validation • Simple diagrams can be developed further | <ul style="list-style-type: none"> • Determining appropriate level of variable aggregation • Time-consuming for researcher • Cannot illustrate co-occurrence of multiple causes (“and” condition) nor “if, then” statements |

| | | | | |
|----------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Preference Interview and Ranking (ParFish package) | Explore fishers' preferences for different scenarios of catch and effort: their diversity, their distribution among fishers, and the motivations and values underpinning them. | <ul style="list-style-type: none"> • Can accommodate competing systems of values • Does not assume that fishers' behavior are governed by objectives of profit maximization | <ul style="list-style-type: none"> • Concrete scenarios can effectively elicit details of decision-making, including preferences and underlying motivations • Good catalyst for discussion on a variety of topics • Objections to the generalizations and simplistic assumptions of the method can be very informative | <ul style="list-style-type: none"> • Can be long and tiring, especially if also conducting the scoring phase • Demands a high level of concentration from the interviewer to properly conduct the pairwise comparisons • There can easily be inconsistencies in the final ranking due to high number of factors/variables that influence fishers' preferences |
| Future Scenarios | Explore the potential impacts of three proposed quota management options for the TRL fishery. | <p>Flexible: can be used to explore a wide variety of issues</p> <p>Can accommodate different ontologies and epistemologies</p> <p>Opportunity for collaboration with local and regional entities</p> <p>Potential to enhance local capacity</p> | <ul style="list-style-type: none"> • Encourages reflection beyond immediate concerns • Stories are an appropriate format for communicating indigenous views • Stimulate co-learning • Flexible: <ul style="list-style-type: none"> – Allows the creation of additional stories based on current concerns – Multiple variables can be added – Story complexity can be increased | <ul style="list-style-type: none"> • Usual challenges to participation (e.g. recruiting participants, representativeness, effective and appropriate facilitation, managing participants' expectations, and potential conflicts with local calendars) • Time-consuming for both the researcher and participants |

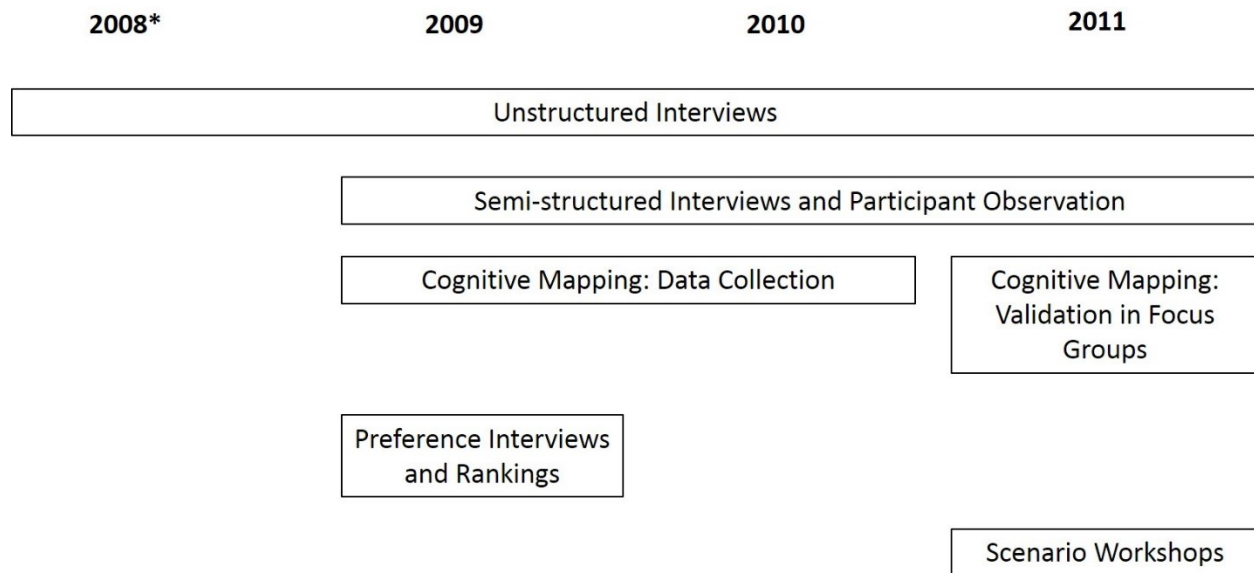


Figure 5.1: Research calendar of core and supplementary methods

*2008 was a reconnaissance trip which is why only unstructured interviews were conducted.

Our Experience with These Methods: Lessons from the Field

This section reports on our experience with applying the mixed methods research design described above. We begin by discussing each supplementary method by first outlining our expectations and how we implemented and adapted them to the context of our study, following with a discussion of their merits and limitations in terms of the opportunities they provided and the challenges we encountered. This assessment of supplementary methods is summarized in Table 5.3. We then reflect on the benefits provided by our particular research design combining a core component of interviews and participant observation with our three chosen methods as supplementary components.

(Fuzzy) Cognitive Mapping

Expectations, Implementation and Adaptation

Our intention was to generate a collective cognitive map that would bring together Islander fishers' perspectives on the SES. It was hoped that we would be able to identify the type of interactions

(i.e. positive or inverse relationship) and characterize their strength (weak, medium or strong) to obtain a crude fuzzy cognitive map that could be used to run simple simulations.

We originally planned to follow the method outlined by Özesmi & Özesmi (2004) who obtained individual cognitive maps through 40-90 minute interviews with participants who drew them directly. This proved to be very difficult in TS. First, the concept of a cognitive map remained abstract for fishers even after explanation and seeing an example. Van Vliet et al. (2010) warn that the use of flow diagrams might not be easy for all types of actors and this seemed to be the case in TS. Related to this point, fishers did not seem to see the value of drawing their understanding of the fishery and the factors that influence their decisions and many seemed suspicious of the motives for asking them to do this exercise. The first author attempted to obtain cognitive maps during her first trip to TS before trust had been established. Second, drawing cognitive maps was too time consuming. Therefore, it was decided to optimize interviewees' time and to focus on interviews rather than on producing individual cognitive maps.

We identified relevant information through semi-structured, unstructured and preference interviews and began building a preliminary collective cognitive map through an iterative process where knowledge gaps and uncertainties were identified in the collective cognitive map in progress and missing information pursued through additional interviews. We used qualitative aggregation to combine factors mentioned by interviewees into higher level variables or categories to simplify the map (Özesmi & Özesmi, 2004; Papageorgiou & Kontogianni, 2012). Once a solid "skeleton map" was achieved, it was completed and validated in 2011 during small focus group sessions with TS rangers (most of whom are fishers) which was followed by an additional round of qualitative aggregation. The whole collective cognitive map was completed and validated in a focus group with scenario workshop participants (see below) by using illustrated cards posted on the wall. Participants were asked to indicate linkages and connections between variables that were represented by drawing arrows. A set of blank cards was available to add new variables if needed.

In 2011, it was evident from interviews that there were many interactions between variables that led to opposite behaviors and that some causal relations had thresholds. For example, in the case of low TRL abundance, some individuals would increase their effort if their economic need was

high, while they would opt to reduce or even stop fishing if the need was low. These behaviors were also based on individual subjective thresholds of abundance corresponding to when fishers deemed TRL fishing worth the effort or not. Cognitive mapping cannot represent co-occurrence of multiple causes (“and” condition) nor “if, then” statements. Considering the range of reactions to similar factors, a valid aggregation of signed and quantified relations to produce fuzzy cognitive maps would have required a more extensive sampling. As our priority was to understand the diversity in relationships between variables, we consequently decided to produce simple directed diagrams.

Opportunities and Challenges

Our experience with cognitive mapping is consistent with that of Barber and Jackson (2015) who work with Australian aboriginal groups. These authors suggest that models that focus on visual and relational aspects may be more easily generated by indigenous peoples than models emphasizing numerical estimation and valuation. They indicate that models of local social-ecological knowledge and understanding developed in collaboration with indigenous Australians typically have not included numerical specifications nor were they iterative, highlighting that high-capacity individuals in indigenous communities are often heavily stretched.

Even though we did not create individual cognitive maps and did not characterize causal relationships, creating the collective cognitive map was still very time-consuming. Illustrating a complex system in a relatively easy way to understand is challenging: one needs to avoid ending with a cluttered “spaghetti-like” figure while not losing important details. Finding the right level of variable aggregation required significant time and multiple iterations. Identifying good entry points to elicit information was also a challenge. Using general open-ended questions about system variables and their interactions only generated superficial responses. Even asking fishers in interviews how they decide if they will go fishing or not on a given day only led to limited answers. Concrete examples were more effective to elicit information linked to their decision-making in which case participant observation and the preference interviews were very useful (discussed below).

The key strength of this method is its ability to provide insights on feedbacks in the system (Kok, 2009) and many are apparent in the collective map produced by Islander fishers. It was especially helpful to identify gaps in knowledge and uncertainties in terms of linkages in the SES. The collective cognitive map was an effective tool to create a shared understanding between the researcher and fishers and also between fishers themselves as the validation and completion of the map generated lively and interesting discussions. We agree with Kontogianni et al. (2012) that cognitive mapping can raise participants' self-awareness of complexities, inform others by making tacit knowledge explicit, reveal how individual perceptions shape choices and shed light on trade-offs. The collective cognitive map was also a very good communication tool in terms of seeking validation and feedback from the community. While Islanders needed guidance to "walk through" the map, it was easy to understand. Because cognitive maps are easy to modify, the simple diagram we generated could be developed further by either combining it with other cognitive maps or by characterizing the causal relationships to produce a digraph or a fuzzy cognitive map.

Future Scenarios

Expectations, Implementation and Adaptation

We anticipated that narratives would be an appropriate format for eliciting and communicating indigenous TS Islanders' views. We hoped that future scenarios would stimulate reflection beyond immediate impacts linked to allocation issues between the indigenous and non-indigenous sectors that were very present at the time of fieldwork and provide detailed information about issues of importance at a relevant scale for Islanders. The aim of developing future scenarios was therefore to raise awareness about the magnitude of likely impacts different quota options could have on the long-term wellbeing of Islander fishing communities. It was hoped that collaborating with the newly appointed rangers from both islands to design, plan and conduct the future scenarios workshops would provide a minor contribution towards local capacity building.

Two scenario workshops were conducted (one on Yam and one on Badu) adapting the method from Evans et al. (2006). The workshops were planned, developed and conducted in close collaboration with the rangers from each island during the course of three full days. In addition to the steps outlined in Evans et al. (2006), preparation with the rangers also included a thorough

review of conventional fisheries management concepts, such as the total allowable catch, quota management and the three proposed quota options for the TRL fishery.

The workshop lasted one full day instead of two, as suggested by Evans et al (2006), for reasons of participant availability. The workshop was first conducted on Yam. It began with an exercise to introduce the idea of scenarios followed by a brief overview of the history of the fishery where participants identified significant changes that occurred in the past and what had caused those changes. These identified drivers of change would become important when exploring potential future impacts. The next step was to explore the current linkages in the fishery through validation and completion of the cognitive map (see above). Participants could then refer to the cognitive map while creating their stories to ensure their storyline reflected logical outcomes. The cognitive map was followed by a short presentation and an open question period about the three quota options. Participants were then invited to write down one hope and one concern they had regarding the future. The group was divided into three smaller groups accompanied by either the first author or a local facilitator to start creating stories around a specific pre-determined quota option. Participants were encouraged to think about the likely impacts over the next 5 years, followed by two time steps of 10 years, ending the stories 25 years in the future. Future scenarios therefore covered the period 2011-2036. Because the goal of future scenarios was exploratory, consensus was not necessary, thereby circumventing issues related to group pressures for conformist behavior (Turnhout et al., 2010). Participants only had to agree that an impact was plausible no matter how likely or unlikely. Each potential impact was noted as a possible branch for a new storyline and participants were encouraged to explore as many alternative stories as they could. After an hour, the group reconvened to share their stories with all participants. On Badu, the workshop was shortened and occurred in a much more informal way. The introductory exercise to scenarios was skipped based on feedback received on Yam where this step was considered unnecessary. The potential impacts for the three proposed quota options were discussed as one group due to the low number of participants (8 in total) and was facilitated by the first author. Besides those adjustments, the workshop followed the same process as on Yam.

On Yam, the scenarios were written down after the workshop, based on facilitators' notes and the audio and video recordings of the workshop. These were posted at the community hall for one day

but the turnout was relatively low as there were other events happening concurrently despite our attention to local calendars when scheduling. Due to time constraints, the scenarios were sent by email to 27 people (including participants) for feedback. Rangers discussed the scenarios within the community and confirmed community support. On Badu, logistical challenges to engage with relevant community members were greater. Most participants did not have access to email and it was therefore not possible to obtain feedback. No narrative was written for the scenarios developed on Badu and information from the workshop was coded and analyzed following the same methodology that was used for interviews.

Opportunities and Challenges

Challenges to participation, such as difficulties recruiting participants, representativeness of participants, effective and appropriate facilitation, participants' expectations, and potential conflicts with local calendars, are well documented in the literature (e.g. Kesby et al., 2005; Reed, 2008). These were also present for conducting scenario workshops in TS. However, the greatest challenges were related to the extensive time commitment required from the researcher, facilitators and participants. Designing the workshop and developing storylines represented a huge time investment. Other studies applying scenarios have reported not having enough time to achieve all their objectives (Kok et al., 2007; Kowalski et al., 2009; Walz et al., 2007) and this was also the case for this study. We underestimated the time required to prepare the narratives for dissemination and to share them with community members. With hindsight, finalizing the future scenario process would have probably required spending two more weeks in each community. Some authors recommend an iterative process to scenario building (Biggs et al., 2007; Wollenberg et al., 2000). While a second round of scenario development would have undoubtedly allowed us to refine the stories and address gaps in storylines, it is unclear how willing Islanders would have been to dedicate more time on the same activity.

The literature on future scenarios clearly recognizes that the method has to be adapted to the local context and cultural preferences (e.g. Wollenberg 2000). The strategy of inviting a limited number of participants to avoid having too many people was clearly ineffective in TS. Some people came regardless of whether they were invited or not while others who had confirmed their participation

did not attend. In TS, the term “workshop” is often used to refer to formal presentations (often accompanied by power point slides) followed by a question period where Islanders play a relatively passive role. Many government officials and scientists come and go to the islands to give such presentations. Islanders have adopted a strategy of taking a preliminary look in before committing to staying and also to leaving at any point if they deem the event is not worth their time. This has implications for workshop dynamics that were not sufficiently taken into account during the design and planning phase. Exercises designed to ease participants into scenarios do not work well if participants are using these to evaluate the potential usefulness of the workshop. In a context where participants have many other priorities, it is crucial to quickly tackle issues of interest. Moreover, Islanders have a culture of learning-by-doing and many did not see the value of doing an exercise related to scenarios that seems removed from their immediate experience of fisheries. Wollenberg et al. (2000) indicate that the approach must be adapted to cultural preferences for certain learning styles. However, these might be tacit and thus not easy to identify despite spending significant time in the community and designing and planning the workshop in collaboration with local people. We therefore recommend consciously investigating learning styles to ensure appropriateness.

Despite the challenges outlined above, the future scenario workshops achieved all our objectives. A greater diversity of participants might have led to a greater diversity of perspectives in the stories created, but we do not claim that the scenarios generated cover the full range of potential impacts. Rather, these were meant as a starting point to initiate discussions among Islanders and raise stakeholders’ awareness of potential unintended consequences. Stories are culturally appropriate for TS and this format was very effective to stimulate creative thinking and promote co-learning between participants and the researcher. The workshop opened up a space for Islanders to express their frustrations but also provided a systematic approach to reflect on and articulate their perspectives about the future. The flexibility of the method allowed us to consider additional drivers and increase the complexity of stories. It also allowed for the creation of separate and additional scenarios that addressed issues of concern for Islanders that are not linked to specific quota options, but nevertheless interact with the potential impacts of quota management. The ability to take advantage of such opportunities heavily relies on effective facilitation.

As anticipated, the timeline of 25 years encouraged people to think beyond immediate and serious preoccupations linked to quota allocation. This pushed them to think about impacts affecting the next generation which had been difficult to elicit through interviews. Islanders discussed issues linked to values, knowledge, attachment to place and potential sociocultural impacts, providing a detailed overview of potential local-scale impacts. Scientists from CSIRO had already visited the islands twice to talk about TAC and quota. The safe space created during this workshop enabled us to build on Islanders' awareness of the quota options to generate a very dynamic discussion about the implications and technicalities of each of the options such as duration and transferability of quota.

Participants on Yam were asked to complete a workshop evaluation form at the end of the day. Five people responded in writing and the potential usefulness of the workshop was discussed with other participants informally and documented through note-taking. On Badu, the day ended with an informal discussion about the strengths, weaknesses and usefulness of the workshop which was recorded. All participants indicated that they found the workshop useful. Rangers were especially pleased with the new techniques they had learned. Participants believed the workshop achieved its objectives but that this was constrained by the level of participation. Indeed, the most common comment expressed on both islands was disappointment with the low attendance. Islanders appreciated the time taken to go through all the quota options and many indicated that the aspect they preferred was the group discussions. The review of the fishery's history was also highly appreciated. However, many participants on Yam indicated that the workshop was too intensive either directly or indirectly by asking for longer breaks. As mentioned previously, the workshop on Badu was shortened which probably explains why no such comments were received from them.

Preference Rankings and Interviews

Expectations, Implementation and Adaptation

Our objective was to gain a better understanding of the diversity of fishers' preferences, how these were distributed among fishers, and the motivations underpinning their preferences. We hoped that using concrete fishing scenarios would elicit information on fishers' decision-making that had been difficult to obtain through open-ended questions.

We largely followed the method detailed in Walmsley et al. (2005) for conducting individual preference interviews with minor modifications. The ParFish version asks fishers to ignore all constraints when choosing between scenarios. Because we were interested in factors influencing fishers' preferences, we slightly departed from this by asking fishers to choose between scenarios according to their current situation (e.g. other employment, social responsibilities, etc.) while ignoring external constraints such as weather, fuel and ice shortages and motor breakage. Fishers were encouraged to explain their preferences, but they were not systematically asked to justify their choices for all pairwise comparisons. Many questions were asked by the interviewer to either prompt reflection or to confirm the fisher's choice. Scoring was initially performed to indicate the relative preference between successive scenarios in the final sequence, but it significantly increased the length of the preference interview and was consequently abandoned.

The ParFish software only uses data from the preference interviews to determine a fishing level (target reference point) that would maximize the expected preference of fishers within sustainable limits. We adopted a completely different approach to analyzing fishers' preference sequences (detailed in Lalancette and Lalancette (forthcoming)). Discussions occurring during the preference interview were digitally recorded and qualitatively analyzed. Quantitative analyses were performed on fishers' preference sequences using the Kendall tau distance (not to be confused with the Kendall tau coefficient), or *bubble-sort* or *swap distance*. Clustering was performed to identify potential sub-groups within the part-time fishers. Preference sequences were also aggregated to obtain a single representative order, sometimes called a consensus order, by calculating the Kemeny order. Differences between groups (e.g. between islands or clusters) were verified by conducting permutation tests. Finally, standard multivariate tests were performed to investigate the influence of different socio-economic variables on the preference orders.

Opportunities and Challenges

Cards illustrating concrete fishing scenarios of catch and effort were effective triggers for fishers to reflect upon and communicate details about their preferences and decision-making process. Because scenarios of catch and effort are a simplification of reality, they involve a certain level of abstraction. To be effective elicitation tools, these needed to be related to fishers' daily lives in order to clearly make apparent trade-offs between scenarios in terms of rest, catch, catch per unit

effort (CPUE) and conflict with another employment. This means that some background knowledge of the context such as fishing tides and the requirements of a government income support program was essential for the interviewer.

The generalizations and simplification of reality involved in the fishing scenarios sometimes made it difficult for fishers to choose a preferred scenario, but generated interesting discussions. These were especially revealing about how fishers deal with the high variability of the TRL fishery. The first step of asking fishers to estimate their average monthly catch and effort led many of them to explain how they tend to modulate their effort according to potential catch and their present needs, adding that this highly depends on other environmental and economic factors (e.g. landed value and price of fuel). Through these discussions, the interviewer and the fisher were able to come up with a rough estimate of average monthly catch for the current period of the fishing season for the current year. Many fishers had also the tendency to evaluate scenarios with catch variability in mind, stating that they would go out fishing more when TRL are more abundant. TRLs migrate yearly to breed, which affects their spatial distribution and therefore abundance during the fishing season. However, the catch scenarios represent a stable catch for the fishing season known in advance which is not representative of fishers' realities. The interviewer had therefore to constantly verify if fishers were willing to sustain the level of effort indicated on their preferred scenario or if they were willing to dedicate this amount of effort to TRL fishing only for a limited time. Tides is probably the most influential factor in determining effort and the majority of part-time fishers concentrate their fishing during the neap tide. While most fishers also fish outside the neap tide when the weather is good (as they indicated when estimating their monthly average effort), it became evident that many fishers strongly associate fishing with the neap tide. This means that the interviewer had to be careful when presenting scenarios and confirm that fishers were taking into account all the days they go out fishing (i.e. during the long and short neap tides plus extra days during the spring tide).

The scenarios also made apparent some false dichotomies in the way the TRL fishery is perceived by managers. For many part-time fishers, TRL fishing is also an opportunity to harvest other species for subsistence and this plays a role in their decision-making. Comparisons of scenarios where TRL catch was identical for a different level of effort generated some confusion. Some

fishers preferred a higher level of effort because they considered subsistence fishing, while others became hesitant and unsure of how they should answer. The interviewer needed to ask relevant questions to clarify or confirm fishers' preference and reassure fishers that there were no right or wrong answers.

While extremely informative, these different discussions increased the time required to perform rankings and these lasted on average 45 minutes (after scoring was abandoned) which was longer than anticipated. Also, the preference interview is repetitive which can make it tedious for both the interviewer and the interviewee. Some fishers showed clear signs of fatigue at the end of the interview, especially those who did the scoring phase (before it was abandoned). The method demands a high level of concentration from the interviewer to mentally calculate the values of scenarios for each pairwise comparison and to properly follow the binary tree. One can easily get confused during both of these tasks. Such errors can be corrected during the review phase, but they unnecessarily extend the duration of the interview. The interviewer also has to be extra diligent during the review phase. Because many variables influence fishers' preferences, sometimes during a particular pairwise comparison a fisher would forget one (for example the number of days they are required to work for the government support program) and would thus not be consistent, ending up with a sequence which was not logical. Reducing the number of pairwise comparisons to achieve the final ranking would shorten the exercise and undoubtedly improve the final results.

Relating fishing scenarios to fishers' daily lives revealed more about their motivations for fishing and the challenges they struggle with than when asking these questions directly. In fact, fishers' objections to particular scenarios were as informative as the justifications provided for choosing a scenario and the resulting preference sequence. Preference interviews also proved to be an excellent catalyst for discussion on a wide variety of topics which provided valuable information to be further developed in follow-up interviews. The following are three areas where qualitative and quantitative results from preference interviews provided information not communicated or only briefly mentioned during interviews: (1) the relation between maximum effort fishers were willing to dedicate to harvesting and satisfactory catch to fulfill basic economic needs, (2) the importance of financial security, and (3) the heterogeneity within the group of active part-time fishers in terms of fishing preferences.

Using methods in conjunction

The three methods outlined above have their individual sets of advantages, but their real strength was in using them together and in conjunction with our core methods: interviews (unstructured and semi-structured) and participant observation. The interactions between the different methods used in this study are illustrated in Figure 5.2. Preference interviews opened up the discussion and supported a refinement of semi-structured interview questions. Preference interviews contributed to the development of the cognitive map, especially in terms of identifying factors influencing catch and effort. Standard interviews were also crucial for cognitive mapping. As mentioned earlier, cognitive maps were attempted with individual fishers but without success. Fishers would get stuck quickly and it was difficult to elicit the connections. There was considerable back and forth between interviews and the creation of the cognitive map and the two built on one another. The cognitive map was very useful to introduce the scenario writing exercise. Consciously “making the connections” and discussing them prepared participants to hypothesize on the impacts that new fisheries regulations could have on their daily lives and practice. There is a growing literature that recommends combining fuzzy cognitive mapping with future scenarios to support the development and internal consistency of storylines (e.g. Kok, 2009; Reed et al., 2013; van Vliet et al., 2010). A large representation of the cognitive map that scenario participants had just reconstructed and refined was posted on the wall and participants did refer to it during scenario building, suggesting that even simple directed diagrams can be helpful in structuring storylines. Information provided by interviews and participant observation was instrumental for designing and conducting the scenario workshop. Scenario workshops, in turn, generated ample material that could be further explored through individual interviews. Finally, participant observation was an important source for new questions to be pursued through interviews which then fed into the other methods.

Our iterative design provided many benefits. Iteration of methods is often recommended in the literature. Our experience indicates that this is probably easier to do with individual, flexible and relatively simple methods such as interviews. We are doubtful about Islanders willingness to repeat more demanding methods such as preference interviews and rankings and future scenarios. Multiple field trips and interviews enabled the high level of integration we achieved between our selected methods. This increased the contributions of each method, making them more valuable,

which in turn reduced the “cost of competency” and the cost of time requirements. However, we do acknowledge that iterative field work can be costly and demanding and therefore not always an option.

For most investigations or collaborations, Lynam et al. (2007) recommend starting with creative and open tools such as future scenarios and progressively moving towards more focused methods. Our experience in TS was the opposite. Open and creative methods required a prior level of trust and solid background knowledge to support participation and elicit information. These methods worked well *because* of the time spent engaging with Islanders through interviews and active participation. Cognitive mapping could not be directly performed during the first trip to the islands at the beginning of the research process. Organizing and conducting scenario workshops would not have been feasible without the support of local rangers and other influential community member. Ironically, it is the preference interview – with its narrow focus on scenarios of catch and effort – that provided the most concrete and non-threatening starting point and opened up the range of discussion topics.

In addition to enriching the data by complementing each other, the combination of methods allowed for triangulation. Participant observation was crucial in this respect and was used to confirm and refine understanding of behaviors reported in interviews, preference rankings and during collective cognitive mapping. Cognitive mapping during focus groups or scenario workshops served to validate information communicated through preference and standard interviews. Finally, values, concerns and aspirations expressed in interviews were also elicited during preference interviews when fishers were asked to justify their preferences and during scenario workshops.

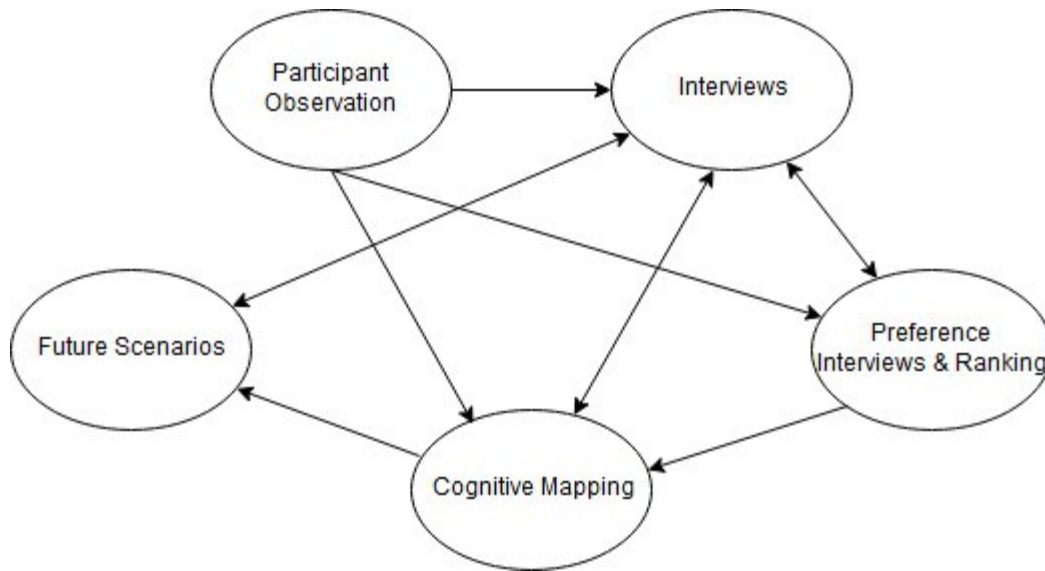


Figure 5.2: Interactions between all methods part of the mixed methods research design

Conclusion

In this paper, we have stressed that there are no perfect “recipes” for choosing, adapting and combining research methods. Indeed, many authors have cautioned against a “tool kit approach” which emphasizes choosing the right tool, stressing the importance of the nature of the process in which the tools are embedded (Lynam et al., 2007; Reed, 2008; Turnhout et al., 2010). Rather, research has to be carefully designed and tailored to the research context, take into account logistical and pragmatic issues and pay special attention to building respectful and productive relationships with participants. Considering the increasing availability of methods and techniques, the fact that they can be adapted to achieve different goals and the myriad of possible combinations, we are doubtful that any research design can claim superiority in capturing local actors’ perspectives and knowledge. However, as Lynam et al. (2007, p. 7) indicate: “Nevertheless, tool selection matters: success is not guaranteed by selecting the right tool, but it is excluded by selecting the wrong one.”

Our experience highlights the need for clear objectives to choose and appropriately adapt methods and for flexibility in applying specific tools. In many cases, our goals resulted in prioritizing the

process; i.e., the process and information it generated was more valuable for our purpose than the end product (e.g. scenario stories, cognitive maps). For example, as we experienced with preference interviews and rankings, a focus on process allows difficulties with implementing a specific method to become a valuable source of information rather than being seen as a barrier to obtaining “results”. In this respect, Lynam et al.’s (2007, p. 12) warning is particularly relevant:

[Some participatory] tools have the potential to become ends unto themselves, with the researchers focusing almost exclusively on development of the tool. This is a trap that needs to be avoided. The reason why a tool is being used needs to be clearly articulated in terms of a goal or end point that can be reached. The use of the tool after this end point must be justified, and the revised goal and new end point must be clearly stated.

Along the same lines, Kok (2009) recommends using fuzzy cognitive maps as part of a larger toolbox, rather than attempting to perfect specific maps. This recommendation can also be extended to scenario storylines and preference sequences.

In addition to determining the appropriate level of engagement, special attention needs to be directed towards particular socio-cultural features when selecting and/or adapting methods. Cultural preferences such as learning styles may be tacit and therefore require targeted investigation. While testing methods is highly recommended, this may not always be feasible, especially in contexts where participants suffer research fatigue or have limited availability.

In light of our experience, we offer the following recommendations to researchers contemplating qualitatively-driven mixed methods research for investigating the human dimension in environmental or natural resource management:

- Define clear goals. In particular, clarify if you want to prioritize documenting consensual views or diversity.
- When developing your research design, take into account the scope of the methods. In other words, in your particular research context, is it preferable to begin with concrete and narrowly focused methods and move on to more creative and open tools or the other way around?

- Determine the appropriate level of participation in your specific context and adapt accordingly.
- Investigate cultural preferences such as learning styles to assess appropriateness of certain techniques.
- Be ready to modify and adjust your methods as you go based on their appropriateness to context and emerging results.
- Budget extra time to complete your chosen methods.
- Be aware of participants' expectations and past experiences when selecting, adapting and implementing methods.
- Do not overly focus on end-products. The process can potentially provide more valuable information.

We want to end by reinforcing the importance of methodological principles. As it has been previously highlighted in the literature, there are multiple factors that influence research outcomes and the use of any particular method is but one of them. The effect of a given method is difficult to isolate and largely depends on the nature of the interactions between the researcher and participants. None of the methods outlined in this paper can replace the value of spending time on the ground observing and talking to people, building relationships and trust.

Chapter 6

Linking Social-ecological Resilience and Social Wellbeing in the Understanding of an Indigenous Fishery

By Annie Lalancette and Monica Mulrennan

Abstract

Social-ecological systems (SES) analysis that combines the concepts of resilience and social wellbeing can assist in the understanding of small-scale, particularly indigenous, fisheries. This, we propose, can be achieved by taking an emic perspective which exposes and privileges indigenous knowledge and institutions, as well as the values, motivations, and socially constructed meanings of indigenous fishers. Using the case of indigenous Islanders' participation in the tropical rock lobster (TRL) fishery in Torres Strait, northern Australia, we illustrate how this approach can uncover both the multiple functions of the fishery within the larger SES and the rich diversity of adaptive strategies that shape Islander participation in the fishery. We argue that more attention to alternative understandings and institutional arrangements as well as a stronger appreciation of the role of social meanings, cultural values and norms, and diverse and sometimes competing motivations and aspirations, are needed to support more equitable and sustainable fisheries that contribute to resilience and wellbeing. Such a broadening of scope requires explicit attention to the linkages between the fishery of interest and the broader SES at different spatial, temporal and social scales to make trade-offs visible.

Introduction

Small-scale fisheries are widely acknowledged for the potential promise they offer to global issues of food security and nutrition, poverty eradication, equitable development, local and regional aspirations for economic and political autonomy, and ecosystem stewardship (Jentoft & Chuenpagdee, 2015). Guidelines based on international human rights standards (ILO, 1989; UN General Assembly, 2007), responsible fisheries standards and practices (FAO, 1995, 2005, 2015),

and sustainable development (UN General Assembly, 2015; United Nations, 2002) are available to support these roles. A burgeoning literature also affirms the importance of participatory governance arrangements, the value of local knowledge, and the need to include diverse values, perspectives, and interests in fisheries management (Acott & Urquhart, 2014; Baelde, 2003; Castrejón & Defeo, 2015; Coulthard et al., 2011; Deepananda et al., 2016; Hicks et al., 2015; Hind, 2015; Mulrennan, 2003). Despite this, the reality remains that in many places, fisheries management continues to be a top-down, state-driven process focused on narrow ecological and economic objectives such as single-species sustainability and rent maximization. This limits the ability of fisheries, particularly small-scale indigenous fisheries, to fulfill multiple goals and possibilities. Instead, increasing political and economic pressures towards specialization, professionalization and rigid property rights (Pinkerton & Davis, 2015) result in the dismissal of local practices and institutions as “inefficient” and thus irrelevant (e.g. Kelleher et al., 2009). Various measures aimed at rationalization, such as limited licensing and ITQs are then imposed, often with significant adverse social, cultural and economic consequences to local communities (Béné et al., 2010; Coulthard et al., 2011; Pinkerton & Davis, 2015). In the case of indigenous fisheries, failure to recognize the embeddedness of local fishing practices is exacerbated by ontological and epistemological dissonance as well as long histories of colonial injustices and dispossessions (McCormack, 2010; Rogerson, 2015; Turner et al., 2013).

The adoption of a social-ecological systems (SES) approach has helped to underscore the extent to which fisheries and local resource users are part of a coupled human-environment system, highlighting the need for integrated analyses that span the biophysical and social sciences (e.g. Leslie et al., 2015). Supporting positive resilience of SESs was proposed as a management objective two decades ago (Holling & Meffe, 1996) and calls to foster and maintain a diversity of both ecological and human responses in fisheries at various scales continue (e.g. Perry et al., 2011). Resilience offers a useful lens to explore stresses and shocks and to understand livelihood dynamics (Marschke & Berkes, 2006). Resilience thinking focuses on cross-scale interactions, uncertainty and the identification of slow and fast changing variables as drivers of change (Gunderson & Holling, 2002). It emphasizes actors’ adaptive capacity to respond to change and disturbance through short-term coping mechanisms and long-term adaptive strategies (Perry et al., 2011; Walker & Salt, 2006).

A resilience analysis across different scales can highlight discrepancies between fisheries management assumptions and the contribution of fishing practices to livelihoods (Allison & Ellis, 2001; Smith et al., 2005) and therefore avoid unintended consequences of fisheries measures (Marschke & Berkes, 2006; Sievanen, 2014). Folke et al. (2003) defined principles for building resilience of desirable system configurations which have been summarized by Marschke and Berkes (2006) as follows: (i) learning to live with change and uncertainty, (ii) nurturing learning and adapting, and (iii) creating opportunity for self-organization. A large number of studies focused on sustainable livelihoods and/or adaptation to large-scale processes such as climate change and globalization have documented small-scale fishers' strategies to cope with and adapt to change that incorporate all these principles (for a review of fishers' strategies see Allison & Ellis, 2001; Lalancette, forthcoming). These studies highlight how diversification, flexibility and social capital can spread risk and reduce dependence on a single resource, thereby increasing the resilience of both fishing communities and marine species. Such strategies are often sustained by local and/or traditional knowledge and institutions (Allison & Ellis, 2001; Mulrennan, 2015; Perry et al., 2011; Sievanen, 2014). Smith et al. (2005) demonstrate how different levels of fishing effort reflect different strategies aimed at achieving specific livelihood objectives. They discuss a diverse range of livelihood functions performed by fisheries and argue that these cannot "be captured in any simple comparison of returns from fishing to opportunity costs" (p. 370). For example, it has been noted that the main contribution of most small-scale fisheries is their welfare function (i.e. their capacity to act as a safety net, a labor buffer or a safety valve). Sustaining the welfare function of fisheries requires maintaining wider access which goes against the rent maximization model (Béné et al., 2010; Jul-Larsen et al., 2003).

The concept of social-ecological resilience has, however, been criticized for its normative dimension which obscures relations of power, competing values and social diversity (Cote & Nightingale, 2012; Fabinyi et al., 2014; Nadasdy, 2007; Smith & Stirling, 2010). Some authors have also remarked that the focus in resilience discourse on the system's ability to absorb shocks minimizes the role of human agency in shaping resilience (e.g. Bohle et al., 2009; Bristow & Healy, 2014; Coulthard, 2012). Moreover, resilience at the SES level does not automatically translate into greater wellbeing for people (Armitage et al., 2012; Coulthard, 2012a).

Social wellbeing has recently garnered a lot of attention as a complementary framework to resilience in the analysis of complex fishery-related SESs (Armitage et al., 2012; Coulthard et al., 2011). According to Coulthard (2012b), a social wellbeing approach can uncover a wider range of motivating factors and important social dimensions which are often neglected in fisheries management; these include agency, capacity, identity, aspirations, norms and values. Armitage et al. (2012, p. 3), based on McGregor (2008), define social wellbeing as “a state of being with others and the natural environment that arises where human needs are met, where individuals and groups can act meaningfully to pursue their goals, and where they are satisfied with their way of life”. The social wellbeing framework encompasses three dimensions: material, relational and subjective (McGregor, 2008). Livelihood practices are intertwined with systems of meanings and collective identity (Crane, 2010). The social wellbeing framework can bridge material considerations such as ecosystem functions and livelihood outcomes – which are typically the focus of SES analyses – and social and cultural considerations. Crane (2010) advocates for the coupling of cultural resilience in SES studies which he defines as “the ability to maintain livelihoods that satisfy both material and moral (normative) needs in the face of major stresses and shocks; environmental, political, economic, or otherwise” (p. 2). The relational and subjective dimensions of the social wellbeing concept can thus provide the link to fully integrate cultural, ecological and socioeconomic systems in resilience analyses (Armitage et al., 2012). According to the social wellbeing concept, human wellbeing is seen as both a desired outcome and a process that can encompass multiple scales (Coulthard, 2012b). In doing so, it goes beyond individualistic conceptions of wellbeing (Coulthard et al., 2011), which is especially important in many indigenous cultures. It is not prescriptive and can therefore encompass different worldviews.

Scale is an important element in both social-ecological resilience and wellbeing analyses. Livelihood strategies can be enacted at diverse social scales and impact ecological resources and wellbeing at different spatial, temporal and social scales (Coulthard, 2012b; Fabinyi et al., 2014; Marschke & Berkes, 2006; Sievanen, 2014). For example, responses that may allow ecological or social systems to cope with stress in the short term can become detrimental and maladaptive if the stress persists (Fabinyi et al., 2014; Perry et al., 2011). Livelihood strategies are also influenced by factors at different scales such as individual preferences, household obligations and cultural

norms (Coulthard, 2012a; Crane, 2010). A cross-scale analytical framework that links social wellbeing and resilience can therefore make values explicit, multiple and complex identities visible, and trade-offs more transparent (Armitage et al., 2012; Coulthard, 2012a; Coulthard et al., 2011; Weeratunge et al., 2014).

Defining SES boundaries is an important step that has political implications and that can impact the fairness of outcomes (Crane, 2010; Leslie et al., 2015; St. Martin, 2009). This issue is closely related to the questions of determining the resilience of what to what, for whom and for what end (Armitage & Johnson, 2006; Carpenter et al., 2001; Cote & Nightingale, 2012). In a context where human and indigenous rights are increasingly being asserted and recognized, we argue along with Crane (2010) that these questions must be answered from an emic perspective; i.e. one that is based on peoples' wellbeing as defined by themselves.

In this paper, we undertake a cross-scale analysis of indigenous Torres Strait Islanders' adaptive strategies in the tropical rock lobster (TRL) or *kaiar* fishery to understand their contributions to social-ecological resilience and wellbeing. We define social-ecological resilience in terms of the ability of Islanders to defend and sustain ecological attachments to their territory. This extends beyond their resilience as a human community or political entity to consider the extent to which they sustain those attributes that are important to Islander society in the face of change. Social-ecological resilience is focused on absorbing recurrent perturbations within the system, coping with uncertainty and risk, while recognizing that disturbance and change are integral to it (Hughes et al 2005). As such, a well-functioning SES can deal with external change, such as natural variations in the abundance of a fishery, evolving market demands or changes to fisheries regulations and management. The social wellbeing framework complements this analysis by paying attention to the social and cultural imperatives that underpin Islander society and inform their aspirations for participating in the fishery and for shaping new social-ecological configurations more broadly. We pay special attention to the various meanings associated with Islander *kaiar* fishing and how these contribute to wellbeing at various levels – from individuals to the TS Nation.

The TS Islander *kaiar* fishery is an interesting case to explore the interplay between indigenous adaptive strategies, SES resilience, and wellbeing in fisheries. First, Islanders have a long history of being active agents of change. They have worked (and continue to do so) to move the SES towards an alternative state they deem more desirable and *kaiar* is central to this endeavor as a resource that can increase their autonomy. Second, this fishery is at a crossroads as its governance is about to shift to a new regime. The fishery is currently managed by input controls and the Australian catch is shared between indigenous Islanders and non-indigenous Australians. The fishery is planned to come under quota management soon, while full ownership of the fishery is about to be transferred to Islanders following a successful Sea Claim in 2013. Third, contrary to many fisheries, the TRL fishery is considered to be “underfished”. In fact, there is considerable pressure on Islanders to “change their work ethos”, increase their catch, and adopt new fishing practices aligned with neoliberal principles (Lalancette, 2017). A greater understanding of how Islander livelihood strategies contribute to social-ecological resilience and wellbeing can thus provide a window into potential and differentiated impacts of changes in the fishery.

We begin by situating the TS TRL fishery within the larger SES, focusing on its complexity and dynamics. Using the principles for building resilience outlined above, we then analyze Islanders’ adaptive strategies and motivations as applied in the *kaiar* fishery. We discuss the implications of these for fisheries management and governance in the region and highlight the importance of investigating spatial, temporal and social scales at different levels. We conclude that in order to support more sustainable and equitable fisheries, SES analyses should frame system boundaries based on the requirements for indigenous wellbeing as defined by indigenous peoples themselves and take into account the contributions indigenous adaptive strategies make to social-ecological resilience.

Situating the TRL fishery

What is the SES?: Defining the resilience of what to what and for whom

The TS Islanders are an indigenous Melanesian people whose traditional territories are located in the strait separating mainland Australia from Papua New Guinea (PNG). This area stretches from

the Great Barrier Reef in the east, to the Gulf of Carpentaria and the Arafura Sea in the west (Figure 6.1). The diverse geomorphology coupled with variations in depth, climate, currents, tide amplitude, water clarity, and effluents from rivers from PNG create many distinct ecosystems and niches resulting in an incredible biodiversity (Lawrence & Lawrence, 2004; Nietschmann, 1989).

Islanders define themselves as sea people and have devised many strategies to cope with and adapt to their environment. Islanders' survival in the past depended on their ability to harvest the abundant marine resources and control the harvesting activities of others. Through generations and experience they accumulated detailed knowledge of their environment (Nietschmann, 1989; Scott, 2004). Access to and sharing of marine resources was governed by a code of behaviour known as *gud pasin* and a complex system of community ownership and responsibility for specific sea and reef areas that continues to be the basis for Islander marine practices known as customary marine tenure (CMT) (Mulrennan, 2007; Scott & Mulrennan, 1999; Sharp, 2002). To compensate for the uneven distribution and seasonality of resources, Islanders harvested multiple species for subsistence, trade, social prestige and ceremonial purposes and continue to do so (Mulrennan, 2007; Nietschmann, 1989). These include dugong, sea turtle, various reef fish, molluscs, mud crab, squid, and TRL. The productive waters also provide the basis for various commercial fisheries such as TRL, prawn, Spanish mackerel, reef line, pearl shell, barramundi, crab, trochus and sea cucumber (Fairhead & Hohnen, 2007; PZJA, 2014a). Islanders participate in all these fisheries except for prawns which are exclusively exploited by non-indigenous fishers from mainland Australia (PZJA, 2014a). Islanders also engaged in a widespread network of exchange throughout TS and with nearby communities of PNG and Cape York (Lawrence, 1991; Mulrennan, 2007; Sharp, 2002). Although trading relations have changed considerably since pre-colonial time, they have persisted and continue to serve as a practice that enables greater access to resources (Arthur, 2004).

Islander history is a tumultuous one, characterized by violence, intrusion and exploitation by outsiders followed by successive paternalistic colonial regimes (Beckett, 1987; Ganter, 1994; Nakata, 2004). Such disruptions to Islanders' SES required adaptation to change. For example, rules of inheritance were adjusted to incorporate outsiders, specifically non-Islander men that married into TS (Mulrennan, 2016a). The abolition of repressive "protective" Acts in the 1970s

meant a new political engagement with the State and with global markets (Lawrence & Lawrence, 2004; Nakata, 2004; Sharp, 2002). Islanders' relations with outsiders continues to be one of negotiation between resistance to assimilation, struggle towards self-determination, pragmatic alliance building and hybridization (Scott & Mulrennan, 1999). Islanders have adopted institutions and modalities of being in the colonizing system. For example, a new region-wide Islander political identity has emerged characterized by political institutions that are no longer directly anchored in the land and sea. The imposition of a market economy and a growing population has motivated many Islanders to move to the mainland to pursue new economic opportunities⁷. While extended absences and living on the mainland removes them to some extent from the cultural ecology of fishing and marine hunting, Islanders sustain their identity and their connections to land and sea territories by engaging in significant travels to and from TS. Such movement of people has allowed the maintenance of the overall SES by reducing social and ecological pressures. As Scott and Mulrennan (1999, p. 166) remind us, "change is not diagnostic of cultural discontinuity as such". They add: "Cultural hybridity (...) is the circumstance of all contemporary indigenous peoples resistant to assimilation and frequent displacement, yet engaged in processes of creative compromise and renewal" (Scott & Mulrennan, 1999, p. 168).

Through cultural innovation and political creativity, Islanders have clearly demonstrated their resilience. They have maintained a sustainable resource base and successfully adapted and sustained systems of land and sea tenure, subsistence practices, aspects of cosmology and a relational ontology despite numerous impositions and disturbances (Scott, 2004; Thomassin, 2016). Through their new political order, they made continuous advances towards greater autonomy: from the first Native Title recognition for indigenous land in 1992, to dramatically increasing their role in the management structure for fisheries in the region in 2002, to gaining Native Title rights to sea territories covering approximately 37,800 km² in 2013. Islanders have been active agents of change, directing the system towards a more desirable state – a regime of

⁷ According to the 2011 Census, there are 38134 people that identify exclusively as TS Islanders in Australia of which 3301 live in TS (~ 10%). TS Islanders make up ~ 78% of the population in TS. This figure rises to 89.7% if we include people that identify as both Aboriginal and TS Islanders (511 people) (Australian Bureau of Statistics, 2013b, 2013c).

self-determination where they could control and manage their territories and attend to their stewardship responsibilities in support of the sustainability of valued resources.

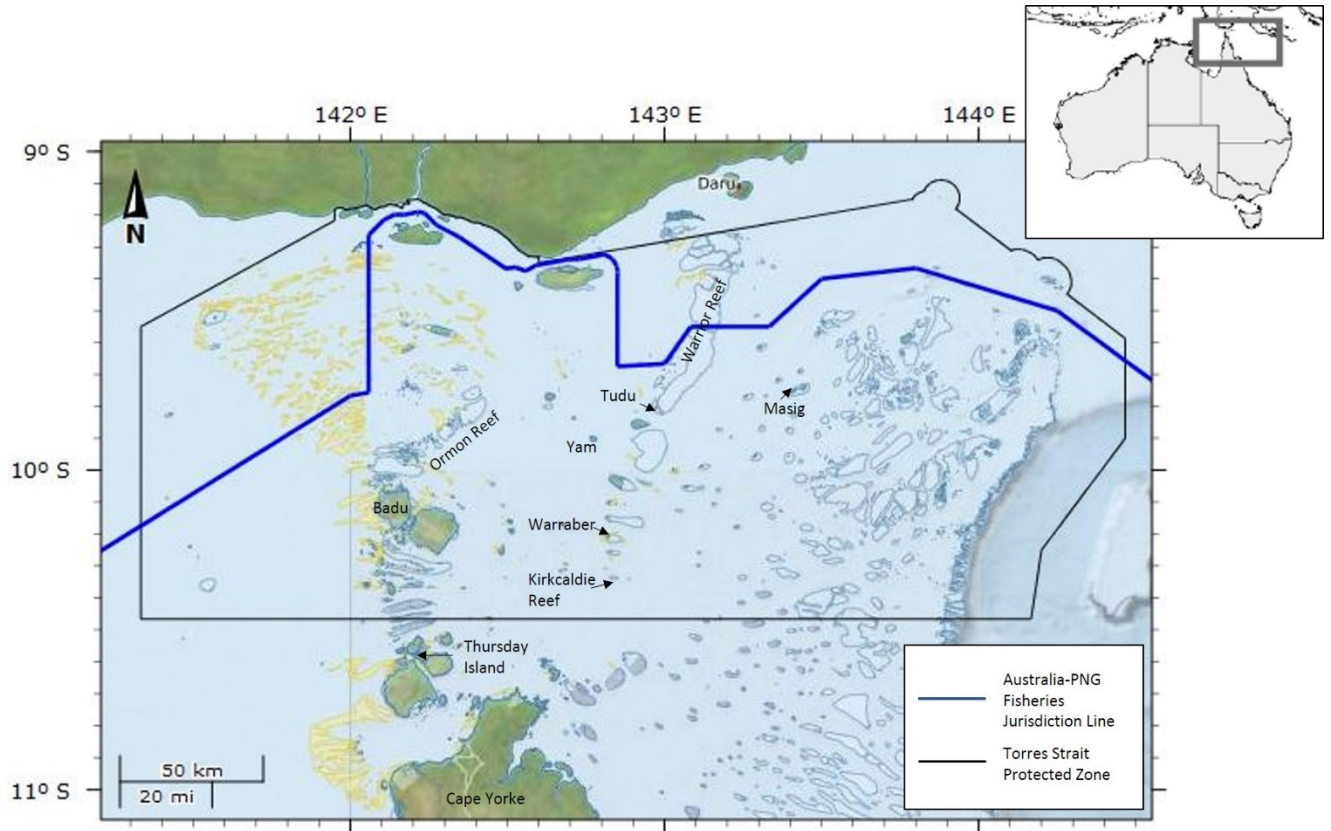


Figure 6.1: Map of Torres Strait
 Source: <http://ts.maps.eatlas.org.au>

Social-ecological complexity and dynamics of the TS TRL fishery

The TRL fishery is situated in a context of continuity where Islanders have successfully defended and sustained ecological attachments to their territories and a culture where fishing and living off the sea is as much about livelihood as relationships, identity and self-determination. While *kaiar* is but one resource among many that are harvested by Islanders, it is central to their aspirations for economic and political autonomy.

Kaiar was traditionally harvested by Islanders for food or trade. Two traditional methods were used: night fishing where men and women speared *kaiar* while walking on top of reefs during suitable tides, and diving where men would jump out of a canoe after *kaiar* had been sighted to

catch it by hand (Haddon et al., 1901-1935). While *kaiar* was an important food component on some islands (Phillips et al., 1983), fish, turtle and dugong were the main sources of protein and the main cultural species (Haddon et al., 1901-1935). Since serious commercial fishing for TRL began in the late 1960s, it has been the most lucrative fishery accessible to Islanders and their participation grew as new processing factories were established in the region. The value of the fishery increased throughout the years and is now the most profitable in the region with a real value of AUD \$20.9 million in 2014 (Patterson et al., 2015). Islanders view the *kaiar* fishery as a cornerstone of their economic future and as a key element towards achieving self-determination. It is the fishery where they are the most active, but also the one with the highest participation of outsiders.

The TRL fishery is shared between users with very different interests, power and capacity. The provisions of the *Torres Strait Treaty* grant PNG the right to access 25% of the fishery in Australian waters. Only a limited number of vessels have up to now claimed that right and obtained cross-endorsement from Australia (Patterson et al., 2015). However, as PNG builds its fishing capacity, it can be expected that it will increase its access to the fishery. The Australian catch is shared between two sectors. The indigenous sector is mostly comprised of TS Islanders, but includes a limited number of fishers of PNG origin who have settled in TS. Because these fishers comply with the informal rules and norms established by Islanders for the *kaiar* fishery, for the purpose of this paper they are included in the general term “Islander fishers”. The non-indigenous sector is comprised of non-indigenous Australians who mostly live on the mainland. Non-indigenous operations consist of a 10-20m mothership with flash freezers and/or tanks for live produce each towing two to seven tenders. All non-indigenous fishers dive using an air compressor (hookah) and most operations are vertically integrated with processors. Entry into the non-indigenous sector has been limited since 1988 (Osborne, 2009) and now counts 12 licenses and 33 tenders⁸ (Patterson et al., 2015). The indigenous sector has no restriction on entry other than the requirement of being officially recognized as a traditional inhabitant of TS⁹. The number of

⁸ Voluntary license buy-backs conducted by the Australian government in 2007-2011 have reduced the non-indigenous sector by slightly more than half by removing 14 licenses and 30 tenders.

⁹ The TS Treaty defines traditional inhabitants as TS Islanders or PNG people that live in the Protected Zone or the adjacent coastal area of Australia or PNG and that “maintain traditional customary associations with areas or

licenses varies from year to year (Figure 6.2) and numbered 291 licenses in 2015 (Patterson et al., 2015). Islanders operate one 4.5-6m open dinghy (except for one Islander 14-meter boat that began operation in 2011). It is estimated that approximately 50% of Islander divers use hookah while the remainder free-dive (Fairhead & Hohnen, 2007).

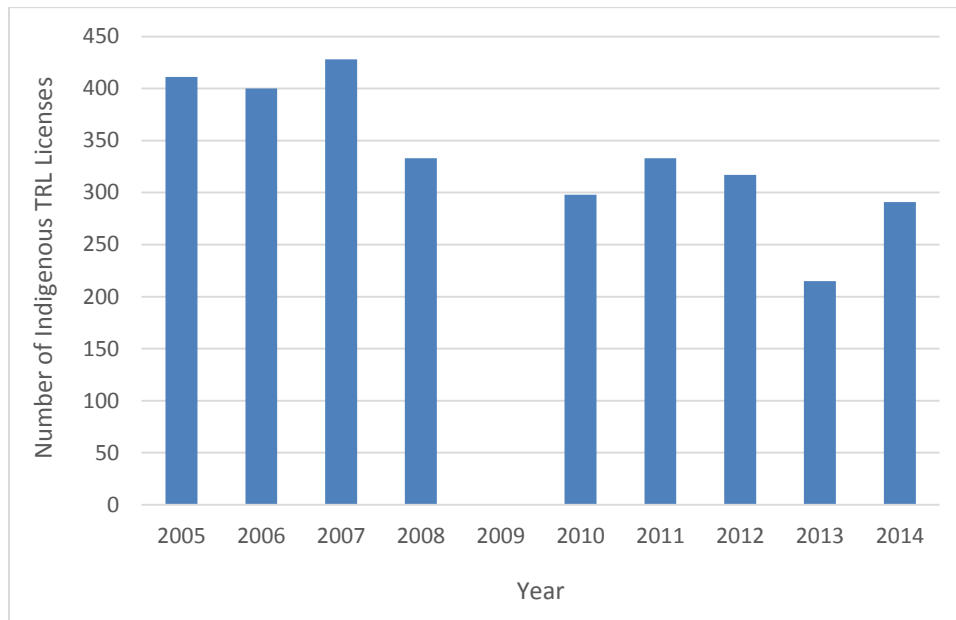


Figure 6.2: Number of TRL licenses in the indigenous sector

The number of licenses for 2009 is not available. Data source: ABARE fishery Status Reports 2005-2015

Biological and economic characteristics of the TRL fishery significantly affect social-ecological resilience. Inter-seasonal abundance fluctuates widely (Ye et al., 2006), probably due to TRL migration patterns and complex current dynamics in the region (Dennis et al., 2001; Pitcher et al., 2005). The commercial catch is almost entirely comprised of one year-class that is harvested before it migrates to breed with little to no returns (AFMA, 2007). Overfishing in one year could thus have serious consequences for recruitment, possibly leading to collapse. These characteristics

features in or in the vicinity of the Protected Zone in relation to their subsistence or livelihood or social, cultural or religious activities (art. 1 (m))

make this fishery particularly challenging for fisheries scientists to estimate a total allowable catch (Ye et al., 2006). The fishery also fluctuates intra-seasonally requiring constant adaptation in fishing effort, timing and location. TRL abundance varies spatially and temporally; it tends to be higher in Western and Central TS and changes during the season as TRL migrates towards breeding grounds in eastern TS and PNG. Prices can fluctuate widely and suddenly (Hand & Davies, 2010). There is only a handful of buyers in the region and the market operates under an oligopsony. Moreover, these buyers/processors own nearly half of the non-indigenous licenses (AFMA manager, personal communication) and therefore have a lot of power.

The TRL fishery is expected to soon undergo major changes in terms of management and ownership which can be viewed as both a response to ecological change and a disturbance to the governance of the system. In 2005, the Protected Zone Joint Authority (PZJA), the top decision-making body for fisheries in TS, committed to introduce a Total Allowable Catch (TAC) and quotas for the TRL fishery as a response to low stock abundance observed in 2000-2001. Although the Chairman of the TSRA sits on the PZJA, Islanders tend to be ambivalent about a TAC. Some agree however that a TAC could provide a much needed mechanism to address allocation issues and perhaps potentially advance Islanders' aspiration to fully own and manage fisheries in their traditional waters. The implementation of TAC and quotas have been repeatedly delayed over the past decade due to technical difficulties in determining a TAC and political dissent on the proposed allocation shares between the indigenous and non-indigenous sectors. In the meantime the fishery continues to be managed by input controls¹⁰. One notable development however, is that following the success of the Islanders' regional Sea Claim in 2013, the PZJA committed to eventually transfer full ownership of the TRL fishery to the TS Islanders (PZJA, 2014c)¹¹.

Since allocation negotiations began in 2005, there has been pressure on Islanders to change their practices in order to increase their catch (Lalancette, 2017). The catch of the non-indigenous sector is usually much greater than that of the indigenous sector despite its substantially smaller size (Figure 6.3). However, when fishing conditions are unfavourable in TS (as occurred in 2008 and

¹⁰ Current measures include gear restrictions, fishing closures, and a minimum catch.

¹¹ Before the final Sea Claim decision, Islanders had secured 55.53% of the Australian TAC for TRL (PZJA, 2013). Following the Sea Claim, the PZJA officially supported Islanders' aspirations for 100% ownership of the TRL fishery.

2009), these vessels shift their effort to the Queensland East Coast fishery for which they also hold a license (Bensley et al., 2009), explaining the low non-indigenous catches recorded in those years. The non-indigenous sector caught on average 59.6% of the Australian catch between 2008-2014, but this figure rises to 67.6% for the years 2010-2014. Processors are concerned that overall supply will go down if the non-indigenous sectors' catch is reduced, potentially affecting the economic viability of their operations. A reduction in total catch is also incompatible with the fishery's objective of "optimal utilization" as prescribed by the *Torres Strait Treaty* and the *Commonwealth Torres Strait Fisheries Act*. Finally, the Commonwealth is seeking to reduce welfare and community support programs and is encouraging indigenous people into mainstream employment (Altman, 2014b; Biddle, 2012). The Torres Strait Regional Authority (TSRA) has identified increasing TRL catch as a means to achieve Federal indigenous policy objectives (TSRA, 2009, 2014a). This focus on catch is creating other pressures towards specialization, professionalization and individualization which are closely aligned with neoliberal ideology, but do not account for non-economic dimensions of Islander wellbeing and positive contributions of lower catch levels to ecological resilience (Lalancette, 2017).

Islanders in the *kaiar* fishery are part of a complex and dynamic environment with many fast and slowly changing variables. On the policy side, Islanders have made significant advances towards self-determination often after years of legal challenges. Changes in fisheries regulations have been slow at times (e.g. TAC and quota implementation) and rapid at others. Fishers must adjust to environmental variability and market fluctuations and deal with the uncertainty of potential changes due to long-term processes, such as climate change, ocean acidification and globalization of markets. In short, Islander fishers experience and must deal with environmental and market changes, competition with fishers that have greater fishing capacity and different motivations, power dynamics involving processors and a complex and evolving policy environment.

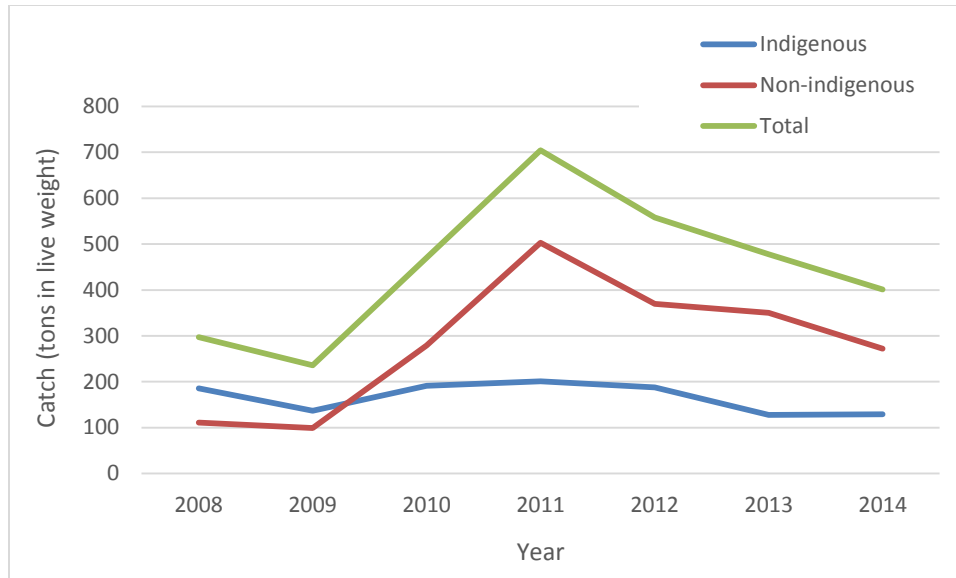


Figure 6.3 : TRL catch per year of the Australian indigenous and non-indigenous sectors in equivalent live weight.

Source: Georgeson et al. (2014), Patterson et al. (2015), Wilson et al. (2009, 2010), Woodhams et al. (2011, 2012, 2013)

Methods

This article draws upon doctoral research carried out by the first author during four trips to Australia between 2008 and 2011. The first author spent a total of 11 months in Torres Strait divided between the three island communities that are most actively engaged in the TRL fishery: Thursday Island, Badu and Yam. Our findings are directly informed by participant observation, semi-structured and unstructured interviews, preference interviews, and cognitive mapping. This information is supplemented by the observations and insights the second author brings through a research partnership she has sustained with TS Islanders, particularly in Eastern TS, for over 25 years.

Semi-structured interviews were conducted with 83 indigenous people (TS Islanders and fishers of PNG origin established in the region). The great majority are *kaiar* fishers (including full-time, part-time and casual fishers), but a few elders, spouses, factory managers and local leaders with

an interest in or influence on the fishery were also interviewed. Unstructured interviews were conducted with 33 indigenous people. Whenever possible, people were interviewed again during each return visit, resulting in 119 semi-structured and 90 unstructured interviews. Semi-structured interviews were voice recorded while most unstructured interviews were documented by note-taking with a few recorded. Twelve semi-structured and 48 unstructured interviews were also conducted with 11 and 16 staff members of the Torres Strait Regional Authority (TSRA) respectively. Interview material was coded and analyzed with the Atlas.ti software (version 7.0.79) as described by Friese (2012). Methodological details for cognitive mapping and preference interviews can be found in Lalancette (forthcoming).

Islander Adaptive Strategies in the *Kaiar* Fishery

Islander livelihood strategies in the *kaiar* fishery are embedded within complex social networks that typically extend from households to lineages, to clans and totems up to a regional identity (Mulrennan 2009). As such, Islander “community operates as nested and intersecting levels and networks of difference and alliance” (Mulrennan, 2009, p. 75). Islander fishing decisions are aimed at improving wellbeing at the individual as well as at all other levels. Just as identity is multi-scale, strategies are enacted at and affect resilience and wellbeing at multiple scales.

The following section analyzes the role of the *kaiar* fishery within the larger SES. It explores Islander strategies (focusing on motivations, practices, institutions and knowledge) in response to spatial and temporal changes in the *kaiar* fishery, and how these relate to social-ecological resilience and wellbeing at multiple spatial, temporal and social scales. Table 6.1 presents Islander adaptive strategies to social-ecological changes according to the principles for building resilience, the scale at which they are enacted, and their contributions to social-ecological resilience and to wellbeing at a specific social scale.

Table 6.1: Islander Strategies that Foster Social-ecological Resilience and Wellbeing

| Islander Strategy | Contributions to social-ecological resilience (SER) / Contributions to Islander wellbeing (WB) | Scale enacted at/ Scale of wellbeing | | | |
|--------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|----|------|------|
| | | Ind. | HH | Isl. | Reg. |
| Dynamic regulation of access through Customary Marine Tenure (CMT) | SER: Nurtures ecological memory by managing local abundance, increases the likelihood of a good catch for the local community, minimizes conflict, promotes self-organization (1) (2) (3) | | | X | |
| | WB: Minimizes conflict, reinforces identity and attachment to territory, supports aspiration of ownership and control, enables fulfilling stewardship responsibilities, manages likelihood of good economic return (a) (b) (c) | X | X | X | X |
| Diversified livelihood (multiplicity and flexibility) | SER: Spreads risk, nurtures ecological memory (reduced fishing pressure, effort follows species abundance), subsistence fishing provides low-cost and reliable source of high-quality proteins, allows taking advantage of new opportunities, greater access to fishing income through part-time fishing (e.g. older fishers) (1) (2) | X | X | | |
| | WB: Provides economic security, promotes equitable sharing of benefits, allows people to contribute to community projects through the CDEP, greater access to the fishery (economic and sociocultural benefits), allows more time with family and community, seasonal work outside the fishery can help remain in TS (reinforces identity and attachment to territory) (a) (b) (c) | X | X | X | X |
| Flexible effort and participation | SER: Nurtures ecological memory by modulating fishing according to abundance, allows taking advantage of new opportunities, minimizes economic risk (1) (2) | X | | | |
| | WB: Maximizes economic returns, allows more time with family and in community, enables fishing on a needs basis including costs of sociocultural events (reinforces identity and attachment to place) (a) (b) (c) | X | X | X | X |

| Islander Strategy | Contributions to social-ecological resilience (SER) / Contributions to Islander wellbeing (WB) | Scale enacted at/ Scale of wellbeing | | | |
|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|----|------|------|
| | | Ind. | HH | Isl. | Reg. |
| Small-scale operations | SER: Facilitates flexible effort and participation, nurtures ecological memory through reduced fishing (weather constraints) (1) (2) | X | | | |
| | WB: Freedom to choose effort level, minimizes financial stress, allows more time with family and community (a) (b) (c) | X | X | X | |
| Careful adoption of technology | SER: Nurtures ecological memory by managing fishing pressure (limits effort creep), minimizes conflict (2) | X | | X | |
| | WB: Promotes equal opportunities and equitable sharing of benefits (now and for future generations), minimizes conflict, increases likelihood of good catch in the long term (a) (b) (c) | X* | X | X | X |
| Kaiaf as safety net | SER: Provides a mechanism to deal with economic shocks and stresses (1) | X | | | |
| | WB: Promotes equal opportunities and equitable sharing of benefits (now and for future generations), provides economic security (a) (b) (c) | X | X | X | X |
| Social networks, kinship and reciprocity | SER: Can provide a mechanism to cope with shocks and stresses (1) | X | X | X | |
| | WB: Reinforces identity, attachment to place, and relationships; provides material security (safety net) (a) (b) (c) | X | X | X | X |
| Extended mobility through kinship and reciprocity | SER: Controlled dispersion of effort (manages local abundance), minimizes conflict (2) | X | X | X | |
| | WB: Reinforces identity and social relationships, increases access to resources (a) (b) (c) | X | X | X | X |
| Concentrate fishing when conditions are optimal | SER: Ensures high CPUE (reduced economic risk), nurtures ecological memory by letting the resource “rest” (1) (2) | X | | | |
| | WB: Improves safety, increases the likelihood of good economic return, allows more time with family and community (a) (b) (c) | X | X | X | |

| Islander Strategy | Contributions to social-ecological resilience (SER) / Contributions to Islander wellbeing (WB) | Scale enacted at/ Scale of wellbeing | | | |
|------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|----|------|------|
| | | Ind. | HH | Isl. | Reg. |
| Long-term view: sea as a bank | SER: Nurtures ecological memory by fishing according to needs (2) | X | X | X | X |
| | WB: Promotes equitable distribution of benefits (now and future generations), allows more time in the family and community (a) (b) (c) | X | X | X | X |
| Informal hookah and free-diving zones | SER: Minimizes risk of local depletion and conflict (1) (2) (3) | | | X | X |
| | WB: Minimizes conflict, promotes equitable sharing of benefits (b) (c) | X* | | X | X |
| Local monitoring of environmental conditions | SER: Builds rapid feedback capacity to adapt to change, improves understanding of the social-ecological system's dynamics (1) (2) (3) | X | | X | |
| | WB: Improves confidence in individual and community fishing decisions, minimizes risk, provides knowledge that can be pooled at the regional level in fisheries meetings (a) (c) | X | X | X | X |
| Learning by doing in both management and fishing practices | SER: Creates political space for experimentation, favors continuous adaptation; minimizes economic, social and cultural risks (2) (3) | X | | X | X |
| | WB: Allows testing appropriateness according to Islander criteria before committing to a practice/measure (a) (b) (c) | X | X | X | X |
| Using scientific and traditional knowledge | SER: Improves understanding of the social-ecological system's dynamics at different scales (3) | X | | X | X |
| | WB: Improves confidence in fishing decisions taken at different social levels, minimizes risk, can foster trust building between actors (b) (c) | X | X | X | X |
| Informal effort controls (constraints and norms) | SER: Nurtures ecological memory (reduced fishing pressure) (2) | X | X | X | X |
| | WB: Allows more time with family and in community, improves safety, cultural norms reinforce identity (a) (b) (c) | X* | X | X | X |

| Islander Strategy | Contributions to social-ecological resilience (SER) / Contributions to Islander wellbeing (WB) | Scale enacted at/ Scale of wellbeing | | | |
|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|----|------|------|
| | | Ind. | HH | Isl. | Reg. |
| Recalling CPUE levels and resource crises; actively sustaining traditional knowledge | SER: Learning from past events, provides a context for social responses to change, increases the likelihood of flexible and adaptive responses (1) (2) | X | X | X | X |
| | WB: Provides information on which to base decisions, reinforces identity and attachment to territory, fosters intergenerational relations and equity (b) (c) | X | X | X | X |
| Nurturing a diversity of institutions at different scales | SER: Increases the range of potential responses to change, spreads risk, institutional redundancy can shorten feedback loops, encourages creativity and adaptive capacity, encourages use and creation of different knowledges (1) (2) (3) | | | X | X |
| | WB: Supports aspiration of self-determination and full management of marine resources (c) | X | X | X | X |
| Flexible duration of fishing trips (day vs camping) | SER: Minimizes economic risk;, disperses fishing location (minimizes conflict and risk of local depletion); allows balancing of environmental, economic and sociocultural factors (1) (2) | X | | | |
| | WB: Increases the likelihood of good economic return, allows for more time with family and community, allows consideration of multiple objectives (a) (b) (c) | X | X | X | |
| Coping with infrastructure issues | SER: Provides a mechanism to respond to shocks and stresses (1) | X | | | |
| | WB: Provides the opportunity to still gain income from fishing if necessary (a) | X | X | | |

Ind. = Individual, HH = Household, Isl. = Island, Reg. = Region

* This strategy can involve for some individuals a trade-off between immediate material wellbeing for the greater wellbeing of the community.

Principles for resilience-building (Marschke and Berkes, 2006 based on Folke et al., 2003):

- (1) Learning to live with change and uncertainty
- (2) Nurturing learning and adapting
- (3) Creating opportunity for self-organization

Social wellbeing dimensions (McGregor, 2008):

- (a) Material
- (b) Relational
- (c) Subjective

Islander Motivations for Fishing Kaiar

The *kaiar* fishery is the fishery that makes the greatest contribution to Islander incomes (Fairhead & Hohnen, 2007; TSRA, 2005). It is an important economic resource for full-time, part-time and casual fishers albeit to different degrees. Part-time fishers were asked in interviews to estimate the proportion of their total yearly income derived from *kaiar* fishing. Responses ranged from 25-100%, with the majority indicating that approximately 75% of their income came from *kaiar*. Many Islanders view commercial *kaiar* fishing as a safety net in times of need. Equity of access to resources is an important concern that was repeatedly raised by Islanders during interviews and also publicly in fisheries meetings. These Islanders are adamant that access to the commercial fishery must remain open to all Islanders to maintain equal economic opportunity. While income is an important driver for Islander *kaiar* fishing, Islander objectives and motivations are multiple and interlinked. They resist separation and span a range including sustainability, cultural, economic and political factors.

Harvesting of marine resources – including *kaiar* – is deeply embedded in Islander life. As one part-time fisher on Badu explained:

“Diving is traditional, but diving for crays is not... but it has been embedded in our system, our livelihood. And for years, people just rely on that extra. (...) And... it's been... yeah: it's been embedded in our culture.”

Money from *kaiar* is often used to pay for incidental expenses, such as home appliances, furniture, dinghy parts, boarding school, school holidays or flights. Many fishers reported during interviews that they also rely on *kaiar* fishing to cover the costs of social and cultural events, such as shaving parties, 21st birthdays, church, sport and school activities, weddings, funerals and tombstone openings. Fuel is particularly expensive in remote Torres Strait and money from *kaiar* fishing is often used to pay for dinghy travel between islands. It is also used to pay for fuel to hunt for marine turtles and dugongs which are necessary for feasts. For example, one casual fisher from Badu explained that there had been a death in his wife's family. According to customary norms, it was his responsibility to ensure there would be food for the tombstone opening. Because he needed money for fuel to go hunting, he took time off from his full-time job to fish for *kaiar* and then go marine hunting. As such the money he made from *kaiar* allowed him to go hunting to provide turtle, dugong, coral trout and *kaiar* for the tombstone opening.

For many Islanders – including full-time fishers – diving for *kaiar* is also an opportunity to harvest clam shell, hunt turtle and spear fish if available, contributing to a diversified livelihood (more on this later). When asked about his preferred level of effort for *kaiar* fishing, a full-time free-diver on Yam explained:

“But then again, in my situation, I’d be out there, I’d be catching fish and to feed my family at home too. (...) I’m not only out there for crays. Cray is my income, but I still get my food from the sea.”

Full-time Islander hookah divers from Thursday Island also indicated that they will spear fish if the opportunity arises. Two fishing partners specified that they will especially target fish when camping out near Kirkcaldie as they only bring along a limited amount of food in order to save ice for *kaiar*.

Islanders will rarely harvest *kaiar* to eat unless they receive a specific request from a kin, elder or friend, or they have been asked to provide seafood for a feast, or they intend to give a gift. Many fishers have reported that they will send *kaiar* to family and friends living “down South”. These gifts can be substantial; for example, a part-time fisher on Badu gave 40 live *kaiars* to his brother-in-law (worth approximately AUD\$ 500-600). *Kaiar* does however contribute directly or indirectly to local consumption of subsistence foods. Islanders prefer to eat the heads and recently molted animals (referred to as “soft ones”). Soft ones are too vulnerable to predation by other *kaiar* to be sold live and only the tail is sold when they are speared. What cannot be sold is generally retained for consumption. Divers will often give away *kaiar* heads or under the minimum size, especially to elders. On Yam, *kaiar* is the preferred bait for handline fishing by women who are significant and consistent providers of fish for consumption at the household level (see Mulrennan, 2016b). Women’s fish sharing is also an important component of Islander social and kinship obligations part of *gud pasin*. Lahn’s (2006) detailed account of the complex rules and expectations that govern women’s fish distribution at Warraber Island illustrates the importance of “gift-fish” in the maintenance of local Islander identities, values, and social relations.

The opening of the *kaiar* season is a big social event on Yam: on the eve of December 1st, fishers and their families set up camp on Tudu Island. When the clock reaches midnight, all dinghies go

out in a friendly free-diving competition¹² followed by a celebration of the season's first catch. Families will camp for 2-4 weeks on Tudu with kids that have often returned home from boarding schools for the holidays. This offers an opportunity to build social capital, transfer knowledge and earn money for the upcoming Christmas holidays.

When asked about their motivations for *kaiar* fishing, fishers typically spoke about their love of the sea regardless of their level of participation in the commercial fishery.

"It's probably the love of diving, I think it's just like the passion for it, yeah. Yeah, you just wanna get in the water and the water is nice and clear..."

– Full-time hookah diver, Thursday Island

"I guess I love it, there's no other way to explain. Why I love... I love... It's a totally different world underneath."

– Part-time hookah and free diver, Badu Island

"It's just paradise out there."

– Casual free diver, Yam Island

In many cases, fishers' responses highlighted the importance of being able to "*experience the stories*" or "*live the life of our forefathers by living off the sea*". This link with identity and tradition is an important aspect of knowledge transmission. While many fishers stated that they do not encourage their children to become full-time fishers (due to concerns about the long-term sustainability of the resource under the current management regime among other reasons), most teach their kids how to dive for *kaiar*. A part-time free-diver on Badu explained:

"My eldest one (...): good diver, a good hunter. I teach them all cultural: how to hunt, how to spear fish, crayfish... all those things. Like, Torres Strait culture. Cause we live in the sea area, not on the land like in Australia. We are different from those. They're a different culture to us: they hunt on the land, we hunt on the sea."

¹² The free-diving season runs from December first to September 30th but the hookah season only starts in February and is therefore banned during the months of December and January.

While fishing *kaiar* is not the only opportunity to pass down knowledge, it is one that pays for itself and can generate extra income. Many fishers also reported that they went *kaiar* fishing with family members and friends when they were visiting from the mainland. Fishing *kaiar* therefore enables a connection with the past and promotes the continuity of Islander identity as sea people.

Employment opportunities are limited in the region and *kaiar* is one of the few alternatives for Islanders who wish to remain in, return to, or spend time in TS. Many fishers indicated they had spent significant time on mainland Australia, either to study or to work but eventually returned to TS. Some fishers combine contractual work on mainland Australia, such as work in the mines or on railroads, with *kaiar* fishing. They typically spend a few months on the mainland sending remittances to family and return to TS for the fishing season, a strategy that has been referred to as “leaving in order to stay” (Sinclair, 2002). Continued access to a productive *kaiar* fishery is thus valued as a central element of intergenerational equity.

As TRL is the fishery with the highest economic value and the greatest competition from outsiders, it has to some extent become a symbol of Islanders’ struggle to assert their rights. An indirect motivation for *kaiar* fishing is to patrol marine territories. On a few occasions, when discussing with Yam fishers their concerns regarding the PNG sector, the interviewee would pause and then say that they should go to Tudu “*to see what’s going on up there*”. Islanders’ “monitoring” of other fishers’ behaviour is a political tactic to show their presence, ensure in the case of the PNG sector that they do not harvest more than their share, and advance their aspiration to have full ownership and control of their territories and resources. Islanders are open to sharing the fishery with non-indigenous fishers, but they want to do so on their own terms.

Location and Timing of Kaiar Fishing

Islander fishing is framed by the rules of customary marine tenure (CMT) (Scott & Mulrennan, 1999; Sharp, 2002): fishers must obtain permission to harvest *kaiar* in another sea territory and respect conditions set out by the host community. Such conditions can include limitations on areas that can be harvested, fishing methods that can (or cannot) be used, as well as the timing and duration of the visit. The hosting community can decide to change these conditions, make new

rules or revoke the granted privilege at any time. The rules of this institution are based on kinship affiliations, personal relationships and principles of reciprocity (see Scott & Mulrennan, 1999 for a detailed account of CMT rules as applied to fishing). People with very close ties to an island community do not need to request permission to fish in those waters, although they will still announce their visit to show respect. Fishers with such ties will move to other islands according to opportunities such as *kaiar* abundance or selling price. These visits can last anywhere from a few days to a few months, resulting in substantial, yet controlled, geographic mobility. By applying and adhering to the rules of CMT, Islanders can fulfill their stewardship responsibilities and minimize conflict by determining who can fish where and when, taking into account kinship, reciprocal relations, local abundance and local needs.

CMT has high legitimacy for Islanders even if boundaries are evolving and often contested. As observed and discussed in the field, CMT rules are still enforced and communities will not hesitate to expel unwelcomed fishers or those who have overextended their stay. On numerous occasions during interviews, fishers directly expressed their respect for marine estates or gave examples showing their respect for these rules. On Thursday Island, two full-time hookah divers who were fishing partners indicated that they had the elders' permission to camp on one of the islands near Kirkcaldie. In contrast, other full-time fishers who did not have this permission were sleeping in their dinghies – sometimes during up to one week – when fishing at Kirkcaldie. In 2011, there were talks that the community on Mabuiag island was considering implementing a hookah ban within their customary waters. The majority of professional fishers on Badu use hookah and heavily rely on access to reefs in Mabuiag's sea territory. When asked what they thought about this possibility, fishers replied that they acknowledged the community of Mabuiag's authority to create new rules in their sea territory and that they would respect their decision even if it meant a significant reduction in income.

While CMT provides a mechanism that can enhance social-ecological resilience by regulating fishing to some extent, its reach is limited by the fact that the non-indigenous and PNG sectors do not conform to these boundaries. The cross-endorsed boats from PNG consistently target the portion of Warrior Reef located in Yam Island's Sea Country. While non-indigenous fishers refrain from entering a zone defined by a radius of 3nm surrounding inhabited islands to avoid conflict

with indigenous fishers, they still harvest on major reefs located further out that are claimed by Islanders such as Ormon, Dungeness and Warrior reefs. Lack of respect for CMT is one of the most common complaints expressed by Islanders through interviews and in official fisheries meetings.

Beyond the *kaiar* fishery, CMT plays a central role in attachment to territory (Scott & Mulrennan, 1999) and is fundamental to Islander “local-to-regional nesting of social identities and relationships” (Scott & Mulrennan, 2010, p. 150). Islander land and sea tenure has endured due to its flexibility. Bending and adapting certain rules has been crucial in maintaining clan rights, identity and property while incorporating outsiders into Islander culture and its systems (Scott & Mulrennan, 1999). The continued application of CMT has been key in arguing for and winning the Sea Claim (Butterly, 2013b). Tenure is an important part of *Ailan Kastom*¹³ and its role in maintaining Islander identity and sets of social relations despite a history of colonial disruption and injustices cannot be overstated.

Environmental and economic factors are also important in determining fishing location and timing. Fishers on Yam explained that if the weather is good, some people will stay around the island, but if it is rough, they will travel to Tudu island and camp so they can fish on the protected side of Warrior reef. Fishers react differently to *kaiar* abundance and economic factors. When abundance and/or *kaiar* price are high some fishers prefer to stay close to their home island to spend more time with family and in the community, while others will want to maximize the opportunity to get a good catch by camping close to a major reef. The main reason mentioned by fishers for camping is to save fuel. Some fishers favor camping as a general strategy, while others only as a coping mechanism when fuel prices are relatively high. Another important advantage provided by camping is that it allows more time for fishing, as less time is spent travelling, thus generally resulting in a higher catch. Fishers who favor day trips indicated they do so to spend more time with their family and in the community. Another important factor is the level of comfort they have when camping. The term “camping” is used loosely and simply refers to an extended trip to another location. Camping conditions are contingent on the rules of CMT. Many fishers from Badu stay with friends or relatives when they go to Mabuia – only a few will actually set “camp”. On Yam,

¹³ *Ailan Kastom* refers to the body of customs, traditions, observances and beliefs tied to Islander culture.

when people go to Tudu, they will stay in small aluminum shacks and sleep on the ground. And as mentioned earlier, “camping” can mean, in some cases, sleeping in one’s dinghy. Other factors such as need, application of CMT rules, values and personal responsibilities, commitments and preferences thus interact with weather, *kaiar* abundance, landed value and fuel price. Finally, considerations such as physical constraints due to the fishing method used, avoiding or minimizing conflict and competition, and equity also affect where *kaiar* fishing occurs.

Effort and Participation in the Kaiar Fishery

Islander fishing is characterized by a wide range of catch and effort (Hand, 2008; van Putten et al., 2013a). Most combine *kaiar* with other economic and/or subsistence activities, contributing to a diversified livelihood. Islanders rely on both land and sea as indicated by a Badu part-time fisher: “*My dad would tell me: Never argue over the sea, never fight over land: both are our providers*”. Total dependence on the fishery is the exception and is usually not desired by part-time and casual fishers. Most casual fishers and part-time fishers in the lower range of fishing effort have a full-time job. These part-time fishers typically go *kaiar* fishing every week-end during the neap tide (i.e. 4-5 days per month) while casual fishers will go fishing more sporadically. This strategy is known as “diversification for accumulation” where the proportion of fishing revenue to the household income declines with diversification, but where fishing is retained as part of a livelihood portfolio to take advantage of periods of good returns, consumption and/or recreation (Smith et al., 2005). However, the majority of part-time fishers derive income from the Community Development Employment Projects (CDEP) where they work part-time in community-led projects for income that is moderately higher than welfare payments¹⁴. Part-time fishers typically alternate “one week on, one week off” between CDEP and *kaiar* fishing, timing their fishing as best they

¹⁴ The name and the rules of the CDEP program have changed many times since this fieldwork was conducted. From July 1st 2013 up to July 1st 2015, CDEP has been progressively replaced by the Remote Jobs in Community Program (RJCP) (Department of the Prime Minister and Cabinet, 2015a). On July 1st, 2015, RJCP was modified and renamed the Community Development Program (CDP). In December 2015, the Australian Government introduced legislation into the Parliament to reform the CDP. Implementation of these changes to remote income support began in June, 2016 (Department of the Prime Minister and Cabinet, 2016).

can with the neap tide. Altman (2001) has coined the term ‘hybrid economy’ to refer to Australian indigenous remote communities’ economies that include inter-linked state, market and customary components. He has argued that all three sectors as well as their articulations are important to enhance indigenous livelihood options, highlighting the importance of the inherent flexibility of this system (Altman, 2005b).

Many part-time Islanders indicated during interviews that the CDEP provides a stable income that compensates for the uncertainty of fishing and typically added: “*CDEP is for the rent, fishing for the rest*”. A part-time fisher on Yam explained:

“I wouldn't quit CDEP otherwise I got no... security to pay my [bills] and my rent on the house. I would rather be equal both sides: work crayfish and work CDEP as well.”

A few fishers explained that the CDEP was a means for them to accumulate the money needed to purchase equipment (e.g. dinghy or hookah) before transitioning to fishing as their only source of income. The CDEP allowed them to enter the fishery with no debt or a lower level of debt, decreasing the economic risk. The CDEP also allows older fishers who no longer have the physical capacity to go out full-time to complement their income from a lower level of effort in *kaiar* fishing.

At the community level, the CDEP provides much more than an opportunity to spread risk in terms of revenue. One fisher on Yam stressed: “*I can't leave that job [CDEP] cause it's work for the community. The job, I have to finish that job before I go out to crayfish*”. Through the CDEP, he was participating in the construction of a sea wall to protect the west shore of the island. Due to rising sea levels, houses located on the beach are being flooded and people have been forced to move out and live with extended family or friends for months every year. The sea wall is intended to mitigate the effects of flooding until a more permanent solution can be implemented. CDEP projects can thus be of crucial importance for community wellbeing.

Diversification is also present at the household level. Many women work full-time or part-time in a variety of occupations, including at the schools, at the local Island council, or in shops. Some will also supplement household revenues by selling home cooked foods or household items. As mentioned earlier, subsistence harvesting activities are gendered and cover a wide range of species.

Harvesting multiple species according to their natural fluctuations in abundance supports ecological resilience. It also makes more economic sense since alternate high quality proteins to seafood are not easily accessible on the outer islands (the only options at the local store are very expensive frozen or canned meat).

Islander fishers interviewed explained their tendency to modulate their fishing effort according to other income opportunities, resulting in their non-participation in *kaiar* fishing some years. In the Central and Eastern Islands, this includes participation in other commercial fisheries such as trochus, bêche-de-mer and finfish. However, these are not as well developed in Western Torres Strait and diversification on those islands mainly involves employment outside of fisheries. Participant observation and interviews revealed that it is not uncommon on Thursday Island, Badu and Yam for an individual fisher to move back and forth between the categories of full-time, part-time and casual fisher. For example, a full-time fisher on Yam became a casual fisher after accepting a position as a Ranger and confirmed that he would return to full-time fishing if the Ranger program were to cease. This occupational flexibility can also entail temporary migration to the mainland. A young Badu fisher who was only fishing *kaiar* sporadically left TS for a year to work in the mines on the mainland and returned to become a part-time fisher with the intention of becoming full-time once he could afford to buy his own equipment. The remittance economy is important in TS and further contributes to diversification at the household level.

Islanders' levels of effort and participation in the *kaiar* fishery also vary over time according to environmental conditions. Islander small-scale operations are restrained by environmental conditions, especially by tides and winds. All interviewed fishers indicated that they will not go out when winds exceed 30-35 knots. Part-time and casual fishers will typically operate during the neap tide when water clarity is best. Full-time fishers also plan their fishing according to tides to take advantage during the spring tide of the days with the weakest currents and therefore the best underwater visibility. Most Islanders concentrate their efforts when fishing conditions are optimal to maximize the probability of a good return. Lalancette and Lalancette (forthcoming) have shown that CPUE is an important factor in fishers' decision to go out fishing and CSIRO scientists have

observed that Islander fishers are efficient at compensating for low stock levels (Pitcher et al., 2002a)¹⁵. During a preference interview, a part-time fisher on Yam explained:

“Like here we got sort of that style, that lifestyle that if you go out for 4 days and get 40 kilos: ‘Oh no, you haven’t got much: we have to wait now. Let’s have a break and give’ em [the *kaiar*] time to go up [on top of the reef].’ And then, we can go next week, you know. That’s the mentality we got.”

Islanders have a long-term view in relation to fishing. Many think of the sea as a bank and therefore do not see the value of fishing more once needs are met. When asked to rank different fishing scenarios of catch and effort according to their personal preferences, part-time fishers on Badu and Yam repeatedly replied that it depended on their needs at the time and most expressed reluctance to increase their effort once a certain income is attained (Lalancette & Lalancette, forthcoming). Wealth accumulation is generally not well viewed in Islander society (Mulrennan, 2007). *Kaiar* fishers operate under the tenet “take only what you need” and this also applies to full-time fishers. Two full-time Islander hookah divers from Thursday Island stressed during an interview that they were different from the non-indigenous sector, repeating: “*We’re not here to kill everything in the sea*”.

Income needs vary within the indigenous sector and interact with factors such as *kaiar* abundance, landed value and price of fuel to influence fishing effort. For some fishers, low *kaiar* price will motivate them to work harder to make ends meet, while others will decide to not participate in the fishery until prices improve. Islanders’ main reasons for preferring a lower level of effort were spending time with family and in the community and having time to rest. Others indicated that they would not vary their effort much due to prices (within a certain reasonable range) because their motives were not only economic: “[*Sometimes*] *it’s not really about the money. Go out, relax, you know... No noise around...*”

¹⁵ AFMA monitored catch per unit of effort (CPUE) of the indigenous sector over 4 weeks at the Northern Star Seafoods processing facility on Badu Island from 1989-2001. The sector’s CPUE varied by 30% while abundance fluctuated over 400% during that same period. No systematic monitoring of the sector’s CPUE has been conducted since.

Islander life involves numerous sociocultural expectations, obligations and responsibilities that are integral to local definitions of wellbeing. As a general norm, Islanders will refrain from fishing on Sundays and during certain social and cultural events. During major community events, such as the death of a community member, most activity stops on the island, including commercial fishing. Obligations tied to such events can, however, lead to an increase in effort. The same Badu fisher mentioned earlier in connection with responsibilities to provide food for a tombstone opening increased his effort from casual to the level of part-time fisher in 2009 and then returned to casual fishing the following year. Fishing effort and timing is therefore closely tied to kinship and community ties.

Lack of adequate fisheries-related infrastructure and services were also identified as a major constraint to fishing. Only a few islands have an operating freezer and even fewer have a factory with a live tank. A recurring problem on the outer islands is a lack of fuel. For example, between December, 2010 and May, 2011, the gas station on Badu had no fuel for a total of 6 weeks. A popular coping mechanism is to travel by dinghy to neighboring islands to purchase extra fuel or sell *kaiar*, incurring substantial additional costs in both fuel usage and time. This strategy is not always effective: some fishers reported travelling to other communities only to find out that they also had ran out of fuel. Under those conditions, only the best divers will choose to go out as a bigger catch is required to make a profit. During extended fuel droughts, even those divers are sometimes forced to stop fishing as was the case on Badu in 2011.

Social networks and relations of reciprocity can provide a mechanism to cope with some fishing constraints. When people are restricted by cash flow, fuel is often borrowed from other fishers. On some islands, factory owners will lend fuel and deduct the cost from the first catch. Access to equipment is also a constraint for many fishers. Many fishers reported that purchasing a dinghy was difficult, even with access to preferential loans from the TSRA. Dinghies are lent and borrowed and short-term fishing partnerships can also be formed to help out someone with an equipment issue. However, some fishers indicated that it can be difficult to “jump on a dinghy” as many fishers have regular fishing partners. Factors such as social and kinship connections and fishing skills will influence fishers’ decision in accepting a new partner.

Fishing Techniques and Products

Islander operations are small-scale and have remained relatively low-tech despite strong incentives to increase efficiency provided by intense competition with TVH boats (Lalancette, 2017; Mulrennan, 2007). As mentioned earlier, Islander fishers harvest from dinghies and about 50% are using hookah in addition to free-diving. They make short trips to unload and sell their catch directly to a land-based factory located on their home island or on a neighboring island (Fairhead & Hohnen, 2007; Hand, 2008). The adoption of Geographical Positioning Systems (GPS) has become more common in recent years and other devices such as fish finders are only being used by a few full-time fishers.

Views expressed on Thursday Island, Badu and Yam regarding Islander small-scale fishing operations are consistent with those reported by Mulrennan et al. (forthcoming) as well as by Thomassin (2016) in Eastern and Central TS. The majority of Islander fishers reported preferring dinghies to bigger boats. Dinghies require a much lower capital investment and are less costly to operate than bigger boats. They allow fishers the freedom to decide when and how long they will go out to sea, as a bigger boat would require a more stable and relatively high level of effort to repay loans and be profitable. Small-scale operations therefore facilitate flexible effort that can adapt to change and accommodate values and norms central to Islander wellbeing. While on balance Islanders tend to prefer smaller operations, some Islander leaders and fishers explained they would like to see Islanders operating larger boats to increase catch and efficiency (especially regarding fuel consumption). However, the bureaucracy involved in obtaining the relevant permits coupled with the difficulty of securing a loan and the pressure to make repayments can be a significant barrier for those wishing to make this transition.

Islanders harvest *kaiar* during the day while diving or at night while walking on top of reefs. In both cases, *kaiar* can be speared and the tails sold or taken live either by hand while diving or using a scoop net at night. Local topography influences access to night fishing. On islands with suitable fringing reefs, such as Horn Island, Islanders can go night fishing without a dinghy. This involves fewer risks. Most fishers prefer day diving as it does not interfere with sleep and allows more time with family and community.

Islanders are alert to the possible impacts of technologies that might improve catch efficiency. Indeed their merits and weaknesses are hotly debated within the indigenous sector. The use of hookah has been contentious since its arrival in TS in the 1980s. Hookah significantly increases the range of areas accessible for harvest. It also increases efficiency, resulting in catch rates approximately 50% higher than those of free-divers (Dennis et al., 2006). Hookah is mainly used on Badu and Thursday Island where the great majority of full-time fishers are based and in close contact with the non-indigenous sector. Arguments put forward by Islanders for using hookah relate to better economic returns, fierce competition with non-indigenous bigger boats, and spreading of effort which reduces competition within the indigenous sector and risk of local depletion.

The use of hookah is also implicated in the weighing of options presented by the live market. While the majority of *kaiar* harvested by the indigenous sector are currently speared, there is a growing shift to catching live lobsters. Live produce usually fetches a higher price per kg than tail meat which only represents approximately one third of the animal's total weight. However, catching live *kaiar* takes more time than spearing for tails which can be a challenge when free-diving. Many hookah divers consider the live market a better option for economic reasons, but also because it involves the harvesting of fewer animals. Live *kaiar* can also be harvested with a scoop net on top of the reef, however there are challenges to this in addition to Islander fishers' preference to avoid working at night.

Despite its advantages, some island communities have banned the use of hookah on their home reefs both for themselves and for other Islanders wishing to fish in their customary waters. On Yam – as in other areas with similar self-imposed restrictions (see Mulrennan et al. in prep.) – Islanders justify this restriction based on concerns about resource sustainability and equitable sharing of benefits. They argue that hookah introduces an unfair advantage over free-diving as not everyone can afford to purchase this equipment. They are also concerned that it makes harvesting “too easy” and many believe that previously inaccessible deeper areas should remain as sanctuaries for *kaiar*. In these communities, local hookah bans act as both an informal input control and a measure to provide equal opportunity to access resources. Islanders are also well aware of non-

indigenous fishers' dependence on hookah and repeated proposals for "hookah-free zones" (e.g. TRLWG, 2003) or even region-wide "hookah bans" are partly motivated by their aspirations to fully manage and control their fisheries (Mulrennan, 2007). Finally, the choice to use hookah or to free-dive is often influenced by personal preferences and circumstances such as health and factors determining economic needs.

The debate around GPS is similar to the one about hookah in some respects. There are concerns about sustainability due to increased efficiency on one side and economic concerns linked to competition with non-indigenous boats on the other. Hookah divers are not necessarily advocates for the use of all technology. For example, a full-time diver from Thursday Island stated:

"I think hookah is alright. They should ban GPS and fish finder. Without, you can miss the place. With hookah, you're just diving: you have good days and bad days. With technology, you have cray every day. (...) you don't give a chance to the crays to move around."

Advocates of GPS argue that its use decreases fuel consumption by reducing the search time to find specific fishing spots compared to using traditional land- and seamarks. Local opinions about GPS shifted during the years 2009-2011. Many fishers who had originally indicated that they were against GPS eventually bought one or were planning to do so in the near future. The main reasons stated for this change of mind were potential fuel savings and safety. Some fishers also stated that they had a GPS in the dinghy as a safety measure, but were not using it when fishing. Other arguments are tied to knowledge transmission. Some fear that increased reliance on certain new forms of technology will erode traditional knowledge. However, some fishers reported taking active steps "*to keep the cultural knowledge alive*" despite new technologies. For example, a young fisher from Badu who was learning to dive for *kaiar*, reported that while his mentor was using GPS, he was still teaching him the landmarks required for traditional navigation. In contrast, some fishers regard GPS as a tool to record the knowledge they have learned and accumulated with experience. One Badu fisher indicated that he was planning to purchase a GPS to "*keep all the good spots for my sons*" for when they would return. He explained that his eldest son was a good diver, but that he was currently on the mainland working on the railroads to take advantage of the better economic conditions – another example of occupational mobility as part of Islander diversification strategy.

The availability and reliability of community infrastructure is an important consideration in Islander fishers' choice of product which in turn influences the fishing method used. During the period of fieldwork, only Thursday Island and Badu (where the great majority of Islander hookah divers are based) had access to a factory equipped with an operating live tank¹⁶. To overcome this constraint, fishers from other islands temporarily stored live *kaiar* in homemade cages. Once they had accumulated a sufficient number of *kaiar*, they incurred significant costs to either send them by plane to Thursday Island or drag the cage by dinghy to another island that had a buyer of live produce. The longer fishers keep live *kaiar*, the greater the risk of mortality. While some dead *kaiar* can be tailed, not all can be salvaged, leading to economic losses. Many fishers without direct access to live tanks on their home islands are therefore not willing to take the risks involved.

Islander Knowledge

Islander perspectives about *kaiar* management are informed by a holistic knowledge of their environment accumulated over generations by experience and through contact and exchange with outsiders (Green et al., 2010; Nietschmann, 1989). This knowledge was further expanded and elaborated through Islanders' direct experience of industrial fisheries (Nietschmann, 1989) where they witnessed the depletion by non-Islanders of marine resources such as wild pearl shells, trochus, and giant clams (Mulrennan, 2007). In the specific case of *kaiar*, previous CPUE levels during the early years of the fishery are common knowledge among Islanders, preventing the "shifting baseline" effect (*sensu* Pauly, 1995). The lessons learned from these profit-driven crises combined with the fact that Islanders (in contrast to the non-indigenous sector) are confined to TS for commercial fishing has heightened their concerns about the sustainability of the *kaiar* fishery. Fishers discussed in great detail changes they are observing in *kaiar* physiology and behavior, sand banks, species composition, marine litter and pollution, coral bleaching, climate, and aspects of physical oceanography such as water temperature and tides. Some Islanders maintain a fishing diary where they diligently record their observations. This knowledge is key to their ability to maintain high CPUE and close monitoring of environmental conditions creates short feedback

¹⁶ The factory on Yam Island was in the process of installing a tank for live.

loops necessary for rapid adjustments and adaptations. However, fishers worry about the long-term impacts of observed changes and indicated that it was now more difficult for them to predict fishing conditions. In this context, weather constraints combined with norms and practices that limit fishing are viewed as positive effort controls that can let the resource “rest”.

Islanders’ long history of contact and incorporation of outsiders has made them receptive to new ideas (Mulrennan, 2009). For example, they are eager to learn more about *kaiar* from biologists, especially regarding aspects that occur at larger scales than their observations, such as migration patterns and recruitment. Interviewed fishers all supported regulations such as minimum size and hookah closures. However, they were opposed to regulations that would control and limit the flexibility of their fishing or undermine their ability to control their marine territories.

Learning by doing is a fundamental principle of Islander approaches and openness to acquiring and retaining knowledge, as evidenced by their response to new options and ideas. For example, many Islanders mentioned that they were “practicing to do live”, meaning that they were regularly experimenting with new techniques to evaluate the potential of adding live product to their livelihood portfolio. When discussing proposed regulations, such as a TAC and different quota models, rarely did an individual flatly reject the change. More often, fishers indicated their openness to considering the proposal, but that since they had no experience with such management measures, they would need to try it for a few years before deciding if it would be beneficial and appropriate for them. This stance is evident in Islanders’ insistence on a competitive quota for the first 2 years of TAC before discussing other quota models. This open but cautious approach creates space for experimentation, favors continuous adaptation, and minimizes economic, social and cultural risks. It stands in stark contrast to the implementation of other fisheries measures currently proposed in the region, such as ITQs which are nearly irreversible.

Conclusion

The analysis above has highlighted the multifunctionality of the *kaiar* fishery in terms of Islander wellbeing (Table 6.1). *Kaiar* contributes to material wellbeing through revenue generation (either as a stable income, a supplement or as a safety net), direct subsistence, bait for fish, and as an

opportunity to harvest other species. Identity is an important thread that weaves through the relational and subjective dimensions of wellbeing (Weeratunge et al., 2014). By providing money that can cover fuel costs, the *kaiar* commercial fishery enables the maintenance of social and kinship ties and cultural and subsistence practices that are closely linked to Islander identity, contributing simultaneously to all dimensions of wellbeing. Finally, *kaiar* adds to relational and subjective wellbeing through shared experiences and recreation, by supporting equitable distribution of resources and community cohesion through the ethic of sharing, and by reinforcing Islander identity as sea people.

Our cross-scale analysis has also demonstrated that Islander participation in the *kaiar* fishery is supported by a wide range of adaptive strategies that promote cultural continuity and identity, contribute to increasing their overall wellbeing and foster positive social-ecological resilience. Of course, not all strategies are enacted with the purpose of promoting social-ecological resilience. The resilience framework has in fact been criticized for its functionalist tendency (Fabinyi et al., 2014). However, in a context where Islanders are pressured to change their ways, we would argue that such contributions to social-ecological resilience need to be considered, even if they might be a side effect, in order to avoid unintended consequences.

As shown in Table 6.1, adaptive strategies are enacted at and impact wellbeing and resilience at different social, temporal and spatial scales. For example, some adaptive strategies imply a trade-off between immediate individual wellbeing and long-term community wellbeing (such as the adoption of rules that limit catch), reflecting Islanders' relational ontology and values such as the importance of equitable distribution of benefits and intergenerational equity. These results highlight the importance of scale to the analysis of both resilience and wellbeing as it is in the negotiation between short term and long-term considerations and between wellbeing at different scales that trade-offs are revealed.

The defining feature of the Islander *kaiar* fishery is its flexibility in terms of its ability to allow for different strategies that support positive resilience in response to social-ecological change. The resulting diversity of livelihood options and combinations can also accommodate different perspectives and circumstances that affect wellbeing pathways. Diversification is largely adopted

by choice rather than by the constraints of survival, thanks in part to the availability of income support and other social welfare benefits. This strategy allows Islanders to attend to valued aspects of their lives, such as time with family and the community, and to adapt to variability and change in the *kaiar* fishery.

This is not to say that Islanders have successfully adapted to all disturbances to the SES. They continue to face constraints that restrict their ability to fully benefit from the fishery on their own terms. Coping mechanisms help mitigate negative impacts but usually imply a trade-off in terms of wellbeing. Islanders are also vulnerable to external factors. Given that climate change will likely exacerbate environmental variations, the uncertainty surrounding the impacts of warming temperatures and ocean acidification on crustaceans, and potential changes in markets linked to globalization, it would seem wise to maintain as much diversity and flexibility in the fishery as possible.

Regulations and policies should support flexibility in the fishery to facilitate increased indigenous access. Problems of infrastructure and services have long been noted in the fishery (Hand & Davies, 2010) and this is an area where the State can support the development of the fishery without eroding wellbeing or social-ecological resilience. Fisheries regulations, such as limited licensing and ITQs, would restrict access while mandatory leasing of quota to the non-indigenous sector would maintain or even increase competition between sectors. Proposed legislation to reform remote income support will, on the one hand, raise the amount of income a person can earn and still receive income support (Department of the Prime Minister and Cabinet, 2015b), but on the other hand, will impose more demanding requirements in terms of both the number of hours worked each week and the number of days of attendance (Fowkes & Sanders, 2016). It is unclear how such policies will affect *kaiar* fishers. This paper has shown that *kaiar* contributes to all dimensions of wellbeing in different ways among Islanders. New regulations will need to take into account the differentiated impacts they would have on wellbeing and positive resilience at all scales.

Social-ecological system (SES) analysis that combines the concepts of resilience and social wellbeing can assist in the understanding of small-scale, particularly indigenous, fisheries.

Indigenous adaptive strategies are informed by knowledge and institutions that have evolved with and adapted to the complexity and limits of the SES in which they are embedded. The question should be whether these positively affect long-term wellbeing or if they are instead maladaptive, rather than being reduced to simple criteria such as “efficiency”. Fisheries should no longer be managed as an economic resource but recognized as fundamental to the maintenance of the SES. Greater attention to alternative knowledge and institutions such as tenure as well as a stronger appreciation of the role of social meanings, cultural values and norms, and diverse and sometimes competing motivations and aspirations, are needed to support more equitable and sustainable fisheries that contribute to resilience and wellbeing – particularly in contexts where indigenous rights and territorial claims are being asserted and recognized. Such a broadening of scope requires explicit attention to the linkages between the fishery of interest and the broader SES at different spatial, temporal and social scales to make trade-offs visible. This can be achieved by taking an emic perspective which exposes and privileges the values, motivations, and socially constructed meanings of indigenous fishers.

Chapter 7

Creeping in? Neoliberalism, Indigenous Realities and Tropical Rock Lobster (*Kaiar*) Management in Torres Strait, Australia

By Annie Lalancette

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Abstract

This article examines current neoliberal forces in the Torres Strait tropical rock lobster (TRL) fishery and their likely impacts on the lives of indigenous Islanders. It describes how neoliberal principles of market governance, commodification of natural resources, profit maximization, individualization and property rights are at odds with Islander rights, values, sense of place, and institutions of knowledge, tenure and practice. It argues that proposed fisheries measures based on neoliberal imperatives could cause important conflicts and create high social, political, and economic costs. The TRL fishery is integral to Islanders' aspiration of self-determination and economic autonomy. A more holistic vision inclusive of Islander perspectives is necessary if management of the TRL fishery is to be truly socially and culturally appropriate.

Introduction

“The overall aspiration has always been that we would fully manage the fisheries, that decisions and policies and the entire regime would be a 100% managed and controlled by Torres Strait Islanders. That’s always been the aspiration.”

- Ned David, Chair of the Yam Island Native Title Prescribed Body Corporate (PBC), February 11, 2013 (Armbruster, 2013)

Indigenous Islanders in Torres Strait (TS), Australia have long expressed the aspiration to regain ownership of marine resources in their traditional sea territories. Tropical rock lobster (TRL), referred to as *kaiar* by Islanders, represents the commercial fishery where they are the most active. It provides a significant source of revenue for Islanders in a region where alternatives are limited, but also significantly contributes to other dimensions of wellbeing¹⁷ (Lalancette, forthcoming).

This article examines how neoliberal principles of market governance, commodification of natural resources, profit maximization, individualization and property rights are influencing fisheries management in the TS TRL fishery. The paper argues that neoliberal paradigms and programs currently advanced are inconsistent with Islander values, rights, sense of place, and institutions¹⁸ of knowledge, tenure and practice. *Kaiar* is important for improving Islander economy and self-determination, but development of the fishery needs to include Islander perspectives if it is to be truly socially and culturally appropriate and maintain other desirable attributes such as self-management and the capacity to adapt to social-ecological changes.

The next section reviews how indigenous rights, neoliberalism and fisheries management influence one another. Sections 3 and 4 introduce the TS TRL fishery and the methodology employed. An overview of existing policies and legislation regarding the TS TRL fishery and how these align with neoliberalism is then provided. This is followed by a detailed description of likely impacts of current neoliberal pressures. Section 7 presents Islander perspectives regarding the proposed introduction of individual quotas for a subgroup of the indigenous sector. Section 8 highlights Islander agency and the paper concludes by suggesting avenues to improve the social and cultural appropriateness of TRL management in TS.

¹⁷ The term wellbeing in this article refers to the satisfaction of material, relational and subjective needs. The latter includes hopes, fears and aspiration among other aspects (Weeratunge et al., 2014).

¹⁸ “The term “institution” is used in this paper as defined in Common Property Resources (CPR) theory. “Institutions can be seen as sets of formal and informal rules and norms that shape interactions of humans with others and nature” (Agrawal & Gibson, 1999, p. 637). They include “sets of rules, decision-making procedures, and programs that define social practices, assign roles to the participants in these practices, and guide interactions among the occupants of individual roles” (Young, 2002, p. 5).

Theory: intersections between indigenous rights, neoliberalism and fisheries

Recent literature on neoliberalism emphasizes that it is not a complete philosophy or ideology. Neoliberalism has been variously referred to as “a loosely demarcated set of political beliefs” (Thorsen, 2010), “a roughly coherent paradigm” (Davies, 2014a) or “a theory of political economic practices” (Harvey, 2005). From a philosophical/ideological perspective, neoliberalism is focused on “liberating” individual (commercial) freedoms, considers the market as the most efficient distributor of resources and advocates for a minimal State and strong property rights (Brown, 2003; Cahill, 2010; Harvey, 2005; Thorsen, 2010). However, government practice is complex and shaped by multiple and sometimes contradicting forces, historical legacies and local context (Beeson & Firth, 1998; Cahill, 2010; Larner, 2000). A whole scholarship focuses on neoliberalism’s contradictions, such as the literature on “actually existing neoliberalism” (Brenner & Theodore, 2002; Cahill, 2010) and on political rationalities/governmentality (Beeson & Firth, 1998; Brown, 2003; Davies, 2014b; Foucault & Senellart, 2008; Larner, 2000). Because application of any particular doctrine is only partial and context-specific, there is considerable variation in the implementation of neoliberalism. Nevertheless, some authors have identified commonalities among its different configurations: the attempt to replace political or normative judgment by quantitative economic evaluation, the pursuit of the marketization of everything, a focus on individual rights, reason and responsibility, an active State, and the value of competition (Davies, 2014a, 2014b; Foucault & Senellart, 2008; Thorsen, 2010). What emerges from these commonalities is a system where the State directly intervenes in the market as little as possible, but actively manages society to create and maintain appropriate institutions and individual conducts for competition to take place in markets, or in a market-like fashion, in every sphere of life (Brown, 2003; Davies, 2014a, 2014b; Foucault & Senellart, 2008; Harvey, 2005; Larner, 2000). A comprehensive review of the critique of neoliberalism is beyond the scope of this paper. However, three arguments are particularly relevant to the upcoming discussion: 1) neoliberalism’s propensity to create and accentuate inequalities (Brown, 2003; Davies, 2014a; Foucault & Senellart, 2008; Harvey, 2005; Western et al., 2007), 2) the reduction of incommensurable values to quantitative evaluations through the technical language of efficiency, price and preference (Davies, 2014a), and 3) neoliberalism’s prioritization of individual wellbeing, freedoms and responsibilities over that of the collectivity (Brown, 2003; Harvey, 2005; Thorsen, 2010).

Indigenous struggles are often presented as sites of resistance against capitalism or globalization, especially with respect to neoliberalism (Bargh, 2007; Fenelon & Hall, 2008; Hale, 2005; Jung, 2003; Postero, 2005). Indigenous efforts to maintain or revitalize social systems of decision making, economic distribution, tenure, and community relations run counter to the ideal of market-based governance; processes of valuation, commodification and privatization; and values that emphasize individual freedom and profit maximization (Fenelon & Hall, 2008; Laurie et al., 2005; Postero, 2005).

Analysts have pointed out that neoliberal governance, through its endorsement of multiculturalism, has opened up a space for indigenous rights (Altamirano-Jiménez, 2013; Castree, 2004; Laurie et al., 2005; Postero, 2005; Richards, 2013). Indigenous peoples around the world have used legal systems to gain recognition and have often focused on property rights to advance their claims to territory and resources (Castree, 2004; Fenelon & Hall, 2008; Hale, 2005; McCormack, 2011; Richards, 2013). However, the cost of engaging with the legal system is what Hale (2005, p. 16) refers to as a “deeper entanglement in neoliberalism’s grid of intelligibility”. Many scholars have argued that the legal process has furthered the State’s reach into indigenous internal affairs by giving it the power to determine the extent and the shape of indigenous rights, to set standards of authenticity, and to determine who meets those standards (Hale, 2005; Muehlmann, 2009; Povinelli, 2002; Warren & Jackson, 2010). Critics have remarked that while neoliberal States have been relatively open to indigenous recognition, they often actively resist those groups’ claims to economically valuable resources (Castree, 2004; Hale, 2002; Horton, 2006; Postero, 2005; Richards, 2013) – despite international law recognitions of indigenous peoples’ rights to access, manage and own resources (Mulrennan, 2013). According to Hale (2005, p. 13), “the great efficacy of neoliberal multiculturalism resides in powerful actors’ ability to restructure the arena of political contention, driving a wedge between cultural rights and the assertion of the control over resources necessary for those rights to be realized”.

In the case of fisheries, indigenous peoples must also contend with specific neoliberal forces associated with conventional fisheries management (Carothers & Chambers, 2012; Mansfield, 2004; Pinkerton & Davis, 2015; Sabau & van Zyll de Jong, 2015). These stem from bioeconomic models of the 1950s (Gordon, 1954; Schaefer, 1957) which saw private property as the solution to

problems of overexploitation and economic waste brought by open access. While neoliberalism unfolds in various ways in different contexts, science-based fisheries management typically includes a combination of enclosure, privatization, marketization of access, deregulation and the devolution of government responsibility to resource users (Mansfield, 2004; Pinkerton & Davis, 2015). Furthermore, they often treat subsistence and commercial fishing separately. For example, McCormack (2010) argues that while the New Zealand quota management system has resulted in an economically valuable Maori fishery, it has also served to alienate some indigenous rights and criminalize everyday practices by disassociating commercial from customary fishing.

Many countries have implemented fisheries measures to accommodate indigenous rights, including preferential access rights, protection of customary fishing and increased participation in decision-making, sometimes through co-management. However, these are often controversial and contested, sometimes leading to violent conflicts, such as in Canada after the *Marshall* decision (Coates, 2000). Ultimately, indigenous rights to self-determination and to manage and own marine resources are constrained by hegemonic claims of the State which are often swayed by powerful corporate interests (Bess, 2001; Butterly, 2013c; Capistrano & Charles, 2012; Carothers, 2011; Davis & Jentoft, 2001; Eythorsson, 2003; Harris & Millerd, 2010; Turner et al., 2013; Wiber & Milley, 2007).

Context

Torres Strait (TS) is located between Papua New Guinea (PNG) and the Cape York Peninsula, Australia (Figure 7.1). This area is home to TS Islanders, a group of Melanesian indigenous people. Islanders define themselves as sea people and their navigation, fishing and marine hunting skills as well as their strong connections to the large areas of sea they use are integral to their identity (Mulrennan, 2007; Mulrennan & Scott, 2000; Nietschmann, 1989; Sharp, 2002). Consistent with *Ailan Kastom*¹⁹, Islanders have never surrendered what they consider their responsibilities in terms of caring for their land and sea territories (Mulrennan, 2007) and share a strong aspiration to regain control over associated natural resources.

¹⁹ *Ailan Kastom* refers to the body of customs, traditions, observances and beliefs tied to Islander culture.

The TS tropical rock lobster (TRL) or *kaiar* fishery is based on a single species, *Panulirus ornatus*, and is currently managed under input controls (temporal closures, minimum catch size, and gear restrictions) (Patterson et al., 2015). TRLs are harvested by free diving, hookah²⁰ diving or while walking on top of reefs at night. They can be speared for tails or taken live either by hand while diving or with a scoop net on top of the reef.

Within the Australian fishing zone, TRL is shared between three main fishing sectors: 1) owners of a traditional inhabitant boat (TIB) license who are either indigenous Torres Strait Islanders or traditional inhabitants from coastal PNG established in the region, 2) owners of a transferable vessel holder (TVH) license who are non-indigenous fishers from the Australian mainland and, 3) coastal PNG vessels issued with a cross-endorsement under the provisions of the TS Treaty.

In the indigenous sector, any traditional inhabitant of the TS region can apply for a TIB license. Indigenous fishers operate a 4.5-6m dinghy and approximately 50% exclusively free-dive while the remainder also use hookah. In contrast, the TVH sector has limited entry with no new licenses issued since 1988 (Osborne, 2009). Most TVH fishers operate a 10-20m primary vessel fully equipped with flash freezers and/or tanks for keeping live produce (Fairhead & Hohnen, 2007; Hand, 2008). These boats tow two to seven tenders each fitted with hookah which are used as fishing platforms (Hand, 2008). In 2013, the TRL fishery in the Australian zone counted 3 cross-endorsed PNG commercial freezer vessels (towing up to 7 tenders), 12 TVH licenses (32 tenders in total) and 214 TIB licenses (AFMA, 2013).

²⁰ A diving compressor which delivers air supply via a single hose (also known as “airline” equipment).

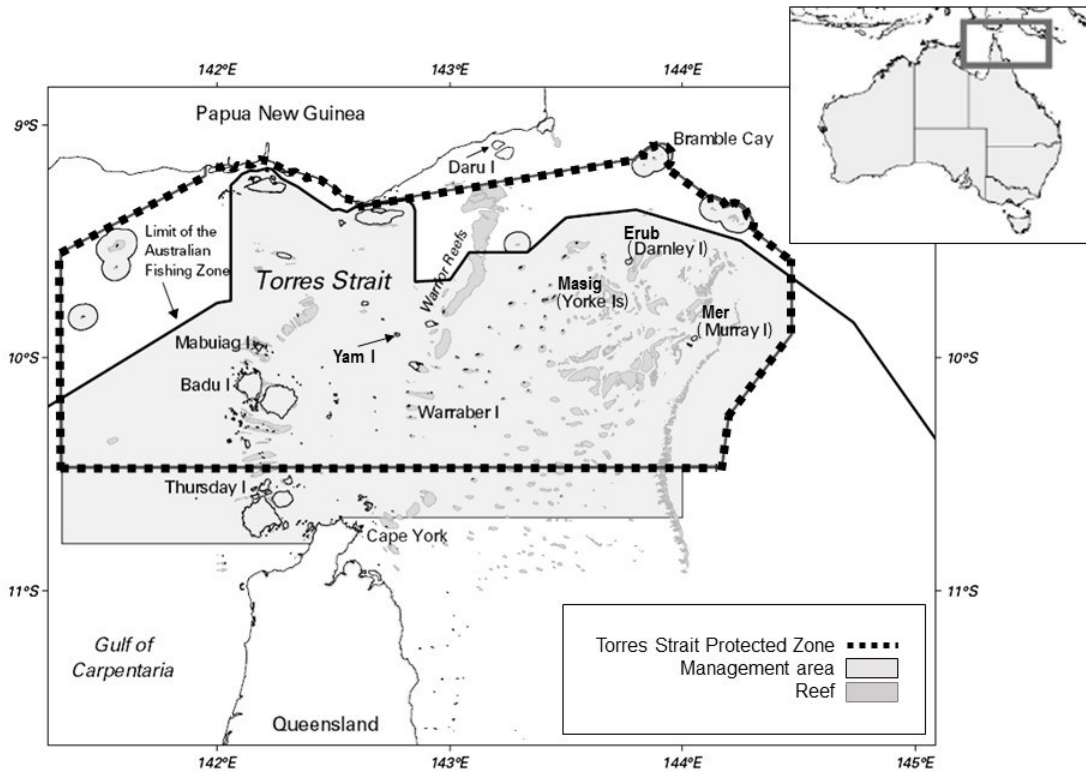


Figure 7.1: Jurisdictional boundaries in Torres Strait.

Adapted from Larcombe & McLoughlin (2007, p. 58)

Indigenous fishing is governed by traditional institutions of customary marine tenure whereby sea property in parts of Torres Strait is divided by island or island cluster, community, and within some communities, by clan and lineage (Scott & Mulrennan, 1999). Although boundaries are dynamic, overlap, and are routinely contested, traditional marine estates remain the basis for Islander marine practice (Scott & Mulrennan, 1999; Sharp, 2002). To this day, fishers wishing to harvest *kaiar* in another sea territory must ask permission to do so and respect conditions set out by the host community. Sea territory rules have high legitimacy within the indigenous sector and are respected by indigenous *kaiar* divers, even if sometimes grudgingly (Lalancette, forthcoming). However, since this institution is not formally recognized, both the TVH and PNG sectors do not fully comply with these informal rules despite decades of grievances expressed by Islanders.

Kaiar is an important source of revenue for the indigenous sector. However, total dependence on the fishery is not common – only 6 to 9% of indigenous fishers were full-time between 2004 and 2009 (van Putten et al., 2013b). Most Islanders engage in a three-sector economy or “hybrid economy” (Altman, 2001, 2005a) that includes interlinked state, market and customary components. The largest employer in TS is the Community Development Employment Projects (CDEP), a governmental employment scheme where participants work part-time in community-led projects for income that is moderately higher than welfare payments²¹ (Fairhead & Hohnen, 2007). Most part-time fishers derive a significant portion of their income from the CDEP which they combine with *kaiar* commercial fishing and subsistence fishing (e.g. fish, clam shell, turtle and dugong) (Fairhead & Hohnen, 2007).

Kaiar also plays a crucial role in Islander wellbeing. Exploitation of marine resources is embedded in Islander social and cultural life (Lawrence & Lawrence, 2004; Mulrennan & Scott, 2000; Nietschmann, 1989; Scott, 2004; Scott & Mulrennan, 1999). *Kaiar* is especially important for pursuing other cultural activities. It is a significant source of capital used to cover the costs of cultural events and to sustain subsistence activities; for example, by paying for fuel for travel or for marine hunting (Lalancette, forthcoming). Diving for *kaiar* is also an opportunity for Islanders to connect with their identity as sea people and to pass down valuable knowledge. Finally, *kaiar* contributes to community cohesion through the ethic of sharing (Fuary, 1993; Lahn, 2006).

Islander *kaiar* fishing practices promote social-ecological resilience as they can adapt to changing abundance, weather conditions, market conditions, other employment opportunities, economic needs and socio-cultural commitments (Lalancette, forthcoming). Adaptive strategies include livelihood diversification, low capital investments in fishing operations, occupational mobility (e.g. temporary work in mainland mines), and flexibility in fishing effort, including moving in and out of the fishery (Mulrennan, 2007; Mulrennan & Scott, 2005).

²¹ From July 1st 2013 up to July 1st 2015, CDEP has been progressively replaced by the Remote Jobs in Community Program (RJCP). Full implementation of the RJCP is anticipated by July 2016 (Department of the Prime Minister and Cabinet, 2015a).

Methods

This article draws upon doctoral research carried out between 2008 and 2011. It is based on four field trips totaling 13 months in Australia of which 11 were spent in TS on Thursday Island, Badu and Yam. These three islands were selected because they represent the communities which are the most active in the TRL fishery, contributing approximately 75% of the indigenous sector's catch (van Putten et al., 2013b). This article is directly informed by a review of policy documents and official meeting minutes, participant observation, scenario workshops and a subset of interviews with Islanders²² and TIB fishers of coastal PNG origin, and interviews with staff members from the Torres Strait Regional Authority (TSRA) and managers from the Australian Fisheries Management Authority (AFMA).

Details of the methods employed to collect and analyze data can be found in Lalancette (forthcoming). In summary, 134 semi-structured interviews and 138 unstructured interviews were coded and analyzed as described by Friese (Friese, 2012)²³. Scenario workshops were used to explore with participants what they believed to be the potential impacts of three different quota management options considered by the Protected Zone Joint Authority (PZJA) and AFMA for the TRL fishery²⁴. The methodology closely followed Evans et al. (2006). A two-day workshop was conducted on Yam (June 8-9, 2011) where 16 people participated of which 12 engaged in creating scenarios. These were later posted at the community hall for people to comment and were sent directly to 27 people (including participants) for feedback. A one-day workshop was held on Badu

²² The great majority are TRL fishers (including full-time, part-time and casual fishers), but a few elders, spouses, factory managers and local leaders were also interviewed.

²³ Some people were interviewed more than once. Interviews include 119 semi-structured and 90 unstructured interviews with 80 and 33 indigenous people respectively, 12 semi-structured and 48 unstructured interviews with 11 and 16 TSRA staff members respectively, and one semi-structured interview for each of the 3 managers from AFMA that were successively based on Thursday Island since 1999 (the last two managers were interviewed while in office).

²⁴ Participants were selected to represent a broad range of views. They include *kaiar* fishers with different levels of effort (full-time, part-time and casual fishers), with different levels of experience (long-time involvement and new entrants) and using different fishing methods (free-diving or hookah diving), as well as women closely involved in the fishery.

with 8 participants (June 15, 2011). No workshop was held on Thursday Island, but interviewees²⁵ were asked about the three quota options and they discussed their preferences as well as their concerns regarding the different options.

Setting the stage: Australian neoliberal ideology and the regulatory environment in the TS TRL fishery

Neoliberalism has been the dominant principle guiding Australian public policy since the 1980s (Bayari, 2012; Cahill, 2007, 2013; Chris & Lionel, 2014; Western et al., 2007), including environmental and natural resource management (Coffey & Marston, 2013; Robins, 2007), labor and welfare (Cox, 2006; Gray & Agllias, 2009), and indigenous policies (Altman, 2014b; Humpage, 2005; Lawrence & Gibson, 2007; Strakosch, 2011). Neoliberal reforms included extensive deregulation and privatization, extending the market into all areas of society (Bayari, 2012; Beeson & Firth, 1998; Cahill, 2007, 2010; Cox, 2006; Western et al., 2007). However, implementation of such policies did not always strictly adhere to neoliberal theory. For example, privatization has often led to new regulations or new regulatory bodies to oversee privatized enterprises or new markets, marketization of social services has been subsidized by the State and some welfare institutions remain such as universal health care (Cahill, 2010). Nevertheless, the idea of the self-regulating rational individual responsible for his success and failings has permeated Australian society (Bayari, 2012; Beeson & Firth, 1998; Cahill, 2007; Western et al., 2007) and governance is characterized by a pervasive technocratic audit culture (Scott, 2003; Shore, 2008). A more detailed account of Australian neoliberalism can be found in (Bayari, 2012; Cahill, 2007, 2010; Thurbon, 2012). For a historical account of Australian Indigenous policy see (Altman, 2014b; Sanders, 2009).

Torres Strait Treaty and Fisheries Act

The *Torres Strait Treaty (1985)* defines the jurisdiction line between Australia and PNG for fisheries. It established an area known as the Torres Strait Protected Zone (TSPZ) (Figure 7.1)

²⁵ Interviews on Thursday Island include: 6 full-time hookah fishers (out of approximately 15), 2 factory managers and one part-time fisher turned casual after obtaining a full-time job.

with the principal purpose of “acknowledg[ing] and protect[ing] the traditional way of life and livelihood of the traditional inhabitants including their traditional fishing and free movement” (art. 10.3). The enacting legislation for fisheries management in the area under Australian jurisdiction is the *Commonwealth Torres Strait Fisheries Act 1984* which established the Protected Zone Joint Authority (PZJA), the top-level decision-making body in TS²⁶. Fisheries objectives can be grouped in three categories: those concerned with the environment, the economy, or the traditional way of life and livelihood of traditional inhabitants.

On the one hand, economic objectives such as optimal utilization²⁷ and maximizing economic returns are well aligned with neoliberal ideology. On the other hand, provisions such as protecting the traditional way of life and livelihood of traditional inhabitants and recognizing the primacy of subsistence fishing over commercial fishing interests in the TSPZ have limited, to some extent, the expansion of neoliberalism. For example, they played an important role in preventing privatization in the indigenous sector, despite the desire of fisheries managers to limit licenses.

National indigenous policy: Closing the Gap

Following the Prime Minister’s *Apology to Australia’s Indigenous Peoples* of February 13, 2008, the *National Indigenous Reform Agreement (Closing the Gap)* was negotiated between the governments of the Commonwealth and of all States and Territories. According to Altman (2014b, p. 118), “the idea of Closing the Gap has become the dominant term shaping Indigenous policy”. The initiative aims to reduce disparities between Indigenous and other Australians by achieving six targets addressing health issues, education and employment (COAG, 2011). Closing the Gap is clearly based on neoliberal principles of reliance on the market to improve the quality of life of indigenous peoples, individual responsibility (accompanied by a diminished recognition of the role of broader social and economic structures), economic deregulation, and welfare state retreat (Altman, 2010; Pholi et al., 2009).

²⁶ The PZJA is comprised of the Commonwealth Fisheries Minister, the Queensland Fisheries Minister and the Chair of the Torres Strait Regional Authority (TSRA). Together they are responsible for all fisheries management decisions affecting Torres Strait.

²⁷ Article 21 of the Torres Strait Treaty requires that Australia and PNG cooperate “in the conservation, management and optimum utilisation of Protected Zone commercial fisheries”.

Closing the Gap was welcomed with enthusiasm by the public and some indigenous leaders. However, it has also been the subject of harsh criticism. Jon Altman – one of the policy’s most vocal critics – has recently likened it to “neoliberal assimilation” (Altman, 2014a). The main concerns about this policy revolve around issues of effectiveness, appropriateness, limited focus on the market economy, reductionist and essentialist representations of indigenous peoples, decontextualization of indigenous issues and attempts by the State to “recalibrate” indigenous aspirations, values and norms so that they conform to mainstream society (Altman, 2010, 2014b; Altman et al., 2008; Biddle, 2012; Hoy, 2009; Pholi et al., 2009).

Move to a quota management system and Sea Claim

Input controls were introduced or adjusted in 2001-2002 (PZJA, 2010) in response to concerns raised by fisheries scientists about the sustainability of the TS TRL fishery (Pitcher et al., 2001). These were forecast to lead to a recovery of the stock in three to nine years, provided fishing effort would remain stable (PZJA, 2010). However, abundance unexpectedly increased in 2002 (Pitcher et al., 2002a) and the 2003 stock became the second highest recorded since 1992 (Ye et al., 2004). In June 2003, the then PZJA Chair (the former Commonwealth Minister for Fisheries, Forestry and Conservation Ian MacDonald) officially proposed to introduce a Total Allowable Catch (TAC) for the TRL fishery (PZJA, 2003). TRL abundance soared in 2005 and a record harvest of 893 tonnes was registered (Ye et al., 2007). The same year, the Protected Zone Joint Authority (PZJA) agreed to implement quota management in the TRL fishery to commence in 2007 – despite the healthy status of the stock and voiced opposition by both indigenous and non-indigenous fishers (PZJA, 2005). The rationale for this decision is unclear as it was not based on recommendations from CSIRO (Ye et al., 2006) nor AFMA (personal communication).

The PZJA agreed in 2005 to allocate 25% of the Australian TAC to PNG, respecting the conditions of the Torres Strait Treaty. The remaining 75% of the TAC was to be shared 50/50 between the indigenous (TIB) and TVH sectors with adjustments to be achieved through the purchase of non-

indigenous licenses by an open tender process which occurred in 2007-2008²⁸. In the longer-term, it was believed that a target of 70/30 share (TIB/TVH) could be achieved by Islanders through “an open market and self-funded process” (PZJA, 2005). It has been noted since that this latter suggestion was unrealistic given the capital required to purchase non-indigenous licenses (Hand, 2008; Hand & Davies, 2010).

Internal allocations within each sector were agreed to in 2006-2007. The TVH sector would be allocated individual transferable quotas (ITQs) at the outset of TAC management (PZJA, 2007). Following the request of Islander representatives, it was decided that the indigenous sector would operate under a competitive quota (or Olympic quota) for the first two years of TAC implementation after which they would have the option of transitioning to another quota model if they desired to do so (PZJA, 2006a). Quota from the indigenous sector would only be allowed to be temporarily transferred to the TVH sector, i.e., it could be leased but not sold (PZJA, 2006b, 2014b).

The implementation of quotas has been systematically delayed year to year due to initial problems with setting the TAC and difficult allocation negotiations. The proposed allocation agreement was highly contested by Islanders who demanded that the government fund a 70/30 allocation that would take effect at the outset of quota management. Some Islanders refused to partake in management discussions, effectively stalling decisions for the TRL fishery (Australian Government Department of Agriculture, Fisheries and Forestry (DAFF), 2009). In May 2011, the PZJA agreed to conduct a second round of voluntary TVH licenses buy-back, likely due to mounting pressure from the TIB sector. In exchange, the TSRA agreed to “negotiate with potential lessees to lease back to the TVH sector for a period of up to ten years with a guarantee that lease conditions will not be restricted by additional conditions such as area closures, without the full agreement of the parties to the lease” (PZJA, 2011). This buy-back resulted in only one license surrendered which raised the share of TIB license holders to 55.53% of the Australian catch (PZJA,

²⁸ The first voluntary buy-back of TVH licenses removed 13 primary and 29 associated tenders, leaving a total of 13 primary and 34 tenders in the TRL fishery and bringing the TIB/TVH shares of the Australian TAC to 53.5/46.5 (AFMA, 2010).

2013), far from the 70% demand²⁹. However, the course of allocation negotiations was significantly altered a few years later by a successful Sea Claim.

In parallel with quota developments, Islanders were seeking Native Title recognition of their sea territories. A claim was lodged by Leo Akiba on behalf of the TS Regional Sea Claim Group in 2001 (referred to as the Sea Claim). On July 2, 2010, Justice Finn of the Federal Court of Australia formally recognized native title rights of TS Islanders (defined as “group rights”) to an area covering approximately 37,800 km² of sea. The Sea Claim does not recognize exclusive rights nor does it confer the right to control the conduct of others. However, it recognizes the right of Islanders to access and take marine resources for any purpose, including for trading or commercial purposes (Finn, 2010). This last point was appealed by the Commonwealth of Australia, the State of Queensland and the Commercial Fishing Parties which included members of the TVH sector and marketing agents/buyers. This reaction is consistent with the neoliberal practice discussed previously in which governments readily recognize cultural rights, but resist relinquishing control over commercially valuable resources essential for the actualization of these rights. On March 14, 2012, a majority of the federal Full Court of Australia found that the native title right to fish commercially had been extinguished by the passage of State and Commonwealth legislation prohibiting commercial fishing in the Sea Claim area without a license. Islanders appealed the Full Court’s decision to the High Court of Australia and a final decision was rendered on August 7, 2013, in favor of Islanders’ claim.

Since the Sea Claim win, a shift has been observed in the dynamics of fisheries management in the region. In April 2014, the PZJA officially “acknowledged and supported the aspirations of 100 per cent ownership of Torres Strait fisheries by Torres Strait Islander and Aboriginal Traditional Owners” and established a Working Group to consider the draft TSRA policy document *Road Map to 100 percent Ownership of the Torres Strait Commercial Fisheries by Torres Strait Communities* (PZJA, 2014c, p. 3).

²⁹ As mentioned earlier, the Australian share represents 75% of the TAC. The final shares of the TAC for all three sectors in the area under Australian jurisdiction after the buy-back were therefore 25% for PNG, 41.65% for TIB and 33.35% for TVH. Islanders demanded 70% of the Australian share which amounts to 52.5% of the TAC.

The planned introduction of quota management opened up a space for Islanders to negotiate clear allocations between the TIB and TVH sectors. Dividing the TAC provided a concrete mechanism (in the form of TRL biomass) to discuss Islanders' aspirations and demands for an equitable distribution of benefits from the TRL fishery. For the first time, capping and reducing non-indigenous catch was seriously contemplated and led to the difficult political decision by the PZJA to impose a restrictive quota on the lucrative TVH sector in the near future. However, as discussed previously, the initial insistence that Islanders achieve their ownership aspirations through the market was shown to be unrealistic and a potential barrier to increasing Islanders' share of the TRL fishery (Hand, 2008; Hand & Davies, 2010).

The Sea Claim decision provided a major final push towards settling an intense eight-year negotiation period. In her review of indigenous customary marine tenure, Butterly (2013c, p. 11) noted that the Sea Claim "is certainly an exciting step forward, particularly in terms of the size of the claim and the new commercial rights. However, in some ways, it still leaves us where we were before – with non-exclusive native title rights to the sea".

Neoliberalism and the objective of optimal utilization

The objective of optimal utilization is especially influential in the current fisheries management discourse. TS fisheries have been labeled as "underutilized" by fisheries biologists, economists and managers. In the last two *Torres Strait Development Plan* (2009-2013 and 2014-2018), the TSRA identifies increasing finfish and *kaiar* catch as a means to achieve the Closing the Gap policy objectives (TSRA, 2009, 2014a). Improving indigenous fishers' income from *kaiar* fishing can play a significant role towards achieving TS Islanders' aspiration for economic independence and political autonomy; however, relying on neoliberal processes of production to do so has implications that are worth investigating.

Change in legitimacy perceptions

When the goal of optimal utilization is combined with quota management, legitimacy to access the fishery becomes largely determined by catch level. First, the TAC exacerbates the focus on catch. Rather than being viewed as an upper catch limit not to be exceeded, it becomes a concrete objective measured in tonnage of catch to reach optimal utilization. Second, internal allocations will most probably be based on catch history, favoring those who harvest the most to the detriment of those who do not fish as intensively.

The TVH sector's participation in the TS TRL fishery is currently justified as necessary based on economic concerns of maximizing the value of the fishery and of maintaining current supply chains (Hand & Davies, 2010; TSRA, 2014b). Despite its greatly lower number of licenses, the TVH sector harvested on average about 56% of the Australian catch during 2006-2014 (range: 37.37% to 73.22%) (Georgeson et al., 2014; Larcombe & Begg, 2008; Patterson et al., 2015; Wilson et al., 2009, 2010, Woodhams et al., 2011, 2012, 2013; Ye et al., 2007). Based on a workshop conducted in 2009, Hand and Davies from the consulting firm Marsden Jacob Associates reported that the three marketing agents operating in TS were concerned that the phasing out of the TVH sector would result in significant reductions in catch volumes. The marketing sector called for a gradual re-allocation of the TRL resource to the TIB sector and stressed the need to “ensure that the TIB sector is able to (...) use all of the additional resource allocated to them under a potential future buyout process” (Hand & Davies, 2010, pp. 24–25). In the same report, the consultants proposed increasing indigenous catch to full utilization or a predetermined portion of their share as a precondition for transferring additional quota to Islanders (Hand & Davies, 2010). This focus on catch can distort the objective of improving the economic situation of indigenous fishers by overlooking other strategies. For example, even if the sector did not increase their total catch, harvesting live produce instead of tails would improve their economic return from TRL fishing³⁰. It must be noted that there is no information on the minimum volume required to ensure the viability of the processing and marketing agents (Hand & Davies, 2010), especially if indigenous fishers were to increase their harvest of live lobsters.

³⁰ TRL tails represent only about a third of the animal's total weight. Moreover, live produce generally fetches a higher price per kg than tails. However, there are exceptions when it can be more lucrative to spear lobster for tails.

An AFMA manager stated in 2014 that there is a strong expectation that if Islanders do not fully utilize their allocated share, they will lease the unused portion to the TVH sector. Quota leasing is well aligned with neoliberal principles as it commodifies and marketizes access. The issue of leasing quota to the TVH sector was discussed in interviews as well as during scenario workshops. In most cases, Islanders were against this possibility.

Islanders unanimously agreed that the TVH sector was already taking, and would be allocated³¹, a disproportionate share of the fishery. First, the twelve TVH licenses remaining represent only a few people (e.g. the processor MG Kailis owns five of these licenses) in comparison with the hundreds of Islanders who access the *kaiar* fishery. Second, an individual TVH share (ITQ) will – depending on the quota model chosen for the indigenous sector (discussed below) – likely exceed the share of any indigenous individual or of some island communities. Third, most TVH fishers also hold licenses for the TRL Queensland East Coast fishery – an area to which Islanders do not have access. Leasing, it was argued, would only serve to increase an already inequitable share for the TVH sector.

The primary reason for opposing leasing, however, was that it would encourage TVH fishers to remain in TS. There is a strong desire throughout TS to “get the boats out”. This does not mean that Islanders are not willing to share marine resources with any non-indigenous Australians. Rather, they stressed that fishing should be done “with respect”, meaning respecting the rules of marine estates by asking permission to the relevant community before entering a sea territory. Many saw leasing as contrary to the aspiration of indigenous control of the fishery. For example, a woman on Yam likened leasing to “*taking something from one hand and then giving it back with the other*”. Some contended that with leasing, the TVH sector could successfully resist leaving the fishery by arguing that the indigenous sector was not fishing its quota.

³¹ Fieldwork was conducted in 2008-2011, before the commitment to eventually move to 100% ownership by Islanders. At that time, the TVH share was to be 44.47% of the Australian TAC for TRL. It is unclear if this share will be modified before the beginning of TAC-management.

The only pro-leasing argument made by Islanders was that doing so could raise money to eventually buy out the TVH sector. However, this might not be necessary if the Commonwealth decides to buy the licenses for transitioning to 100% Islander ownership. In any case, if leasing were to occur, Islanders were adamant that restrictions should be put in place defining where, how, and when the TVH could fish.

The rhetoric of optimal utilization – with its focus on catch – effectively obscures indigenous rights in terms of access to, ownership and management of resources, and attachment to territory. Equity of access to *kaiar* is an important value within the indigenous sector (Lalancette, forthcoming). When asked about the possibility of limiting licenses, all Islanders interviewed argued that the fishery should remain open to all Islanders for “*fairness reasons*”. Many acknowledged that *kaiar* is an important supplement for people who work on land, retirees and free-divers. Finally, inter-generational equity is highly regarded as *kaiar* fishing provides one of the few opportunities for young people to remain in TS and to acquire valuable knowledge tied to Islander identity.

Professionalization

The emphasis on optimal utilization and increasing catch as well as Closing the Gap employment targets have created pressures towards professionalization. In their proposed business plan for developing the indigenous TRL fishery, Hand and Davies (2010) unambiguously promote professionalization. They argue that a buyout of the TVH sector to increase the indigenous sector’s catch could be beneficial if it “*helped to change the overall work ethos in the region*” (p. 35). To stimulate TRL fishing, they suggest providing economic support only to those who intend to specialize into full-time diving (Hand & Davies, 2010).

A positive bias towards full-time hookah fishing is apparent in the language used by managers and policy-makers. Managers tend to refer to TVH fishers and full-time TIB hookah fishers (whose behavior is assumed to be more aligned with that of non-indigenous fishers) as the “real fishers”. Hand and Davies (2010, p. 10) define indigenous fishers either as “*serious commercial TIB fishers*”, “*semi-professional TIB fishers*” or “*casual TIB fishers*” (emphasis added). The result is

that management has overly focused on a very small portion of the indigenous sector, virtually ignoring the interests of those with lower levels of participation, especially “casual” fishers.

Fishers are being redefined as “business managers” with efficiency and profitability as the primary goals (Hand & Davies, 2010). This view reduces *kaiar* to a commodity which eclipses its social and cultural embeddedness, its relation to subsistence activities, and its role in sustaining Islander culture. It also runs counter to the fishing practices and norms of the majority of the indigenous sector. While Islander institutions are dynamic, wealth accumulation is still generally disparaged, especially in Central and Eastern Torres Strait (Mulrennan, 2007; Thomassin, 2016). The tenet “take only what you need” was observed on Yam and to a lesser extent on Badu and Thursday Island. Many Islanders interviewed consider the *kaiar* fishery as a fail-safe option in times of need and are usually more interested in high catch rates and catch stability over high cash flow.

Fishing *kaiar* “as a business” has further implications for intergenerational knowledge transmission and cultural continuity. Younger fishers typically learn how to navigate and dive from a relative. Casual and part-time fishers are very important in this process of knowledge transfer. Many active part-time fishers are partnering with their sons or nephews, but these younger fishers mentioned that it was hard for them to develop diving skills as experienced fishers would do most of the diving to ensure a good catch. Younger fishers mentioned that they would go out with less active or experienced divers in order to “practice diving”. Hand and Davies (2010) report that there are few commercial incentives for full-time fishers to train new entrants. As a result, they suggested that full-time fishers be monetarily compensated to take on apprentices as a way to stimulate participation in the fishery, introducing yet another form of commodification without evaluating the social and cultural impacts this might create alongside the economic benefits.

Prioritizing full-time *kaiar* fishers may seem to be the most straightforward solution to improving the economic situation of the sector and increase its overall catch. However, it can lead to the “specialization trap” (Badjeck et al., 2010), decreasing fishers’ resilience to changing resource abundance, markets and climate (Allison & Ellis, 2001; Badjeck et al., 2010; Castrejón & Defeo, 2015). As mentioned earlier, Islanders are restricted to TS unlike TVH fishers. To compensate for high fluctuations in abundance, Islanders tend to concentrate their fishing at peak times when

abundance, environmental conditions and prices are acceptable; thus achieving a good return by maintaining high catch per unit effort (CPUE). It was observed in 1989-2001 that the TIB sector's CPUE varied by only 30% despite abundance variations of over 400%. (Pitcher et al., 2002a). This flexibility in effort levels is facilitated by small-scale, low overhead operations, partly explaining Islanders' preference for dinghies over larger boats.

TRL is sold either as frozen tails (mostly to the US) or live (to China) and is vulnerable to the vagaries of the global market. During the 2010-2011 fishing season, prices for live TRL plummeted. Fisheries officials and marketing agents explained that this was due to a Chinese ban on Australian produce that affected the beginning of the fishing season³² (ABC News, 2011; Brindal, 2010; Holland, 2010), which was then followed by a period of high mortality rates of live TRL from TS during shipping. Most fishers therefore concentrated their efforts on spearing lobsters for tails. However, some TVH boats were not able to adapt as they had replaced all their flash freezers with tanks. Finally, it is uncertain how climate change will affect TRL. Norman-López et al. (2013) suggest that TRL abundance in TS could either increase or decrease by 2030 compared to a no climate change scenario.

The march towards individual catch shares: are ITQs inevitable?

The push towards professionalization and increasing catch creates a strange paradox in the fisheries management discourse. There is a high level of latent effort in the indigenous sector and this is viewed as a “key risk” by government fisheries officials and economists (Hand & Davies, 2010). It is feared that a rapid increase in indigenous participation could lead to a sharp decline in CPUE causing economic losses for full-time Islander fishers, and perhaps lead to the infamous “race for fish”. There has been much speculation about how changes to the CDEP scheme would impact indigenous fishers' participation in the TRL fishery (Hand, 2008; Hand & Davies, 2010; van Putten et al., 2013b). On the one hand, measures and incentives are deployed to increase

³² On November 16, 2010, China stopped all lobster shipments from Australia and trade re-opened just before Christmas. The free-diving commercial season in TS opens on December 1st and hookah diving begins on February 1st. The season ends on September 31st for all fishers.

indigenous catch. On the other hand, it is argued that this increase should be carefully controlled to protect the economic interests of a few, rather than focusing on the community as a whole (Hand & Davies, 2010). Following this convoluted logic, the only viable long-term solution is to implement some form of catch shares or ITQs.

Islanders are not inclined to engage in overcapitalization. During the 2010-2011 fishing season, TRL prices were low and stock abundance was very high. These are ideal conditions to bust a quota because product is easy to harvest and more of it is necessary to make profit. The TVH sector fished intensively and harvested nearly double the amount of their nominal quota, whereas the TIB sector only caught 69% of their nominal quota (Flood et al., 2012). The TVH sector has exceeded its non-binding quota by 20-50% every fishing season since, while the indigenous sector continues to fish below its quota level (Georgeson et al., 2014; Patterson et al., 2015; Woodhams et al., 2013). Ironically, AFMA attributed in 2013 “the ongoing sustainability of the fishery” to “the underperformance of the TIB and PNG sectors” (AFMA, 2013). The fact that Islanders have resisted strong pressures to move into more business-like fishing operations despite intense competition with the TVH sector, that they continue to state their preference for small-scale operations and that they did not enter into a fishing frenzy in 2011 strongly indicates that they are not likely to enter into a race for fish characterized by overcapitalization. However, by strongly encouraging the professionalization of fishers, by promoting individualistic behavior over community decision-making and by rewarding the most “economically aligned” fishers, the PZJA is introducing incentives for competitive behavior that could eventually make the race for fish a self-fulfilling prophecy.

Property rights and marketization of access

ITQs and spatial considerations

According to a PZJA agreement in 2007 (PZJA, 2007), the twelve remaining licenses in the TVH sector will be allocated ITQs after the introduction of a TAC. Fishing efficiency is promoted under

the logic of ITQs (Arnason, 2000; Scott, 2000) but with no spatial distribution of effort. This has multiple implications for the indigenous sector.

First, Islanders fear that TVH fishers will venture more often into their sea territories. Up until now, TVH fishers have avoided entering the 3 nm area surrounding home islands. However, with imposed catch limits, many indigenous participants worried that the TVH sector might no longer respect this informal “gentlemen’s agreement”. Since it was announced they will be allocated ITQs, TVH fishers have been lobbying for the removal of all additional restrictions, arguing that since their catch will be capped, they should be allowed to harvest at the lowest cost possible (Hand & Davies, 2010).

Second, the increased presence of more efficient boats in areas Islanders consider their own, and recognized as such by the Sea Claim, will accentuate competition. It will also increase risks of local depletion as overexploitation of preferred areas has been noted under ITQ management (Ecologic Foundation, 2001; Holland, 2004; Wertheimer & Swanson, 2000). This sets the stage for a potential increase in the frequency and severity of conflicts between the two sectors. In the longer term, if the TVH sector continually harvests in the same Islander sea territories, this could threaten the economic viability of some Islander small-scale fishing operations (Mulrennan & Scott, 2005). This is also true for the PNG cross-endorsed boats which consistently target the portion of Warrior Reef located in Yam’s marine estate when they enter the Australian fishing zone. In communities dependent on popular reefs, fishers might be faced with the difficult choice of changing their fishing practices in order to compete with boats, resolve to fish in other communities’ sea territory (contingent on approval by the host community) or simply leave the fishery.

Proposed two-tier quota model: are ITQs appropriate for the indigenous sector?

While the TVH sector will be allocated ITQs (PZJA, 2007), which quota model will be implemented for the indigenous sector is still not determined. In 2006, it was decided that the sector would operate under an Olympic quota for the first two years after which Islanders would have the opportunity to implement another quota model if desired (PZJA, 2006a). The TSRA hired

the firm Marsden Jacob twice, in 2008 and 2010, to propose quota models and strategies to increase Islanders' share and economic returns from fisheries. Because their reports have been very influential, this section first examines the rationale for the two-tier quota model they advocated.

Rationale

Strong neoliberal influences are apparent throughout the 2008 report authored by Hand with its uncritical embrace of market-based solutions. The justification provided for supporting ITQs was limited to the following:

It is well recognised by fishery managers that the best way to establish economic incentives to expand and become more efficient is by utilising individual transferrable quotas (ITQs) – hence Marsden Jacob recommends that in the longer term ITQs are appropriate for the professional sector. This promotes expansion, as it enables more efficient operators to buy quota from less efficient operators (Hand, 2008, p. 23).

This is a classic example of what Copes (2000, p. 2) deplored in his evaluation of ITQs' social impacts: the promotion of the superiority of ITQs as “conventional wisdom”. Without acknowledging documented social, economic and cultural impacts of ITQs in other indigenous and small-scale fisheries, the consultants recommended implementing a “dual system” consisting of ITQs for “professional fishers” only, with the remainder of the indigenous fishers participating in a competitive quota. In 2010, the business plan authored by Hand and Davies reiterated the recommendation of a dual system, which they relabeled a “two-tier system” (Hand & Davies, 2010). But this time, rather than recommending ITQs for “professional fishers”, which indicated that some active part-time fishers might be included, they recommended ITQs only for “serious commercial fishers” which, by their estimation, represented 14 fishers in 2010.

The two-tier system was advocated to mitigate the risk of indigenous latent effort which could result “in serious fishers being unable to earn a reasonable income from the fishery (or their incomes could get significantly reduced)” (Hand & Davies, 2010, p. 44). Privatization measures are often justified as a means of compensating for fishers' investments. However, full-time *kaiar* fishers operate from dinghies and have similar levels of investment to casual or part-time fishers

using hookah. Therefore, the penalizing of fishers with lower levels of participation by funnelling them “into a license class that would not allow an expansion of fishing effort” (Hand & Davies, 2010, p. 44) is questionable.

Islander perspectives regarding the two-tier quota model (ITQs and Olympic quota)

Allocation under this proposed option is very contentious as Islanders realize that it would create two classes of fishers: one that would have privileged access to *kaiar* versus the rest. It would reward fishers with the highest catch over most recent years, possibly excluding legitimate fishers who were not as recently active, as well as new entrants. Both scenario participants and interviewees understood the benefits of ITQs – for those who could obtain one. They realized the advantage of having a guaranteed portion of the catch (which allows more flexibility to choose when and how to fish), of having the option of leasing in case of sickness or other extenuating circumstances, and of owning quota as a secure asset. Nevertheless, none of them supported the idea, including interviewed full-time fishers from Thursday Island. Discussions overwhelmingly focused on issues of fairness and the conflicts that would result from inequities created by a two-tier system.

First, ITQs would not be uniformly distributed throughout TS and would likely be concentrated on only a few islands. While the “cut off” point between the two tiers has not been determined, it is clear that fishers from Thursday Island would be favored since they are the fishers with the highest catch history (Plagányi et al., 2010a). Scenario participants on both Yam and Badu believed that this would lead communities to become more protective of their reefs. They argued that since ITQ fishers would be granted an unfair advantage, their future requests to access reefs in other sea territories would no longer be accepted. Another sensitive point that was raised on Badu is that not all TIB fishers are Islanders. For example, most full-time fishers on Badu are legal PNG residents. If only these fishers were allocated ITQs, it could increase some tensions between those two groups.

Second, rewarding a certain type of fisher was viewed as an affront to the management decisions of some communities and, to a certain extent, running counter to some cultural norms. Because allocation would be based on catch, hookah divers would inevitably be favored over free-divers.

Some communities have voluntarily chosen to ban hookah use in their marine estate partly motivated by sustainability concerns, but also out of equity considerations for free-divers. The fact that some full-time free-divers might not have a catch history that would be high enough to get an individual quota – even if *kaiar* is their only source of income – was viewed as highly unfair. On Badu, there are many hookah divers who fish only during the neap tide, respecting weather conditions and modulating their effort according to social and cultural commitments. These fishers heavily (and in some cases totally) rely on *kaiar* for income. Their work ethic is considered by Islanders as more sustainable and is aligned with the social norm of “taking only what you need”. Prioritizing certain fishing practices over others was not appreciated nor deemed legitimate by interviewees and scenario participants.

The feeling of unfairness was greatly intensified when scenario participants considered quota transferability and duration. Many considered ITQs as giving certain families an unwarranted share of the fishery, especially if they would not fish their whole quota.

Badu fisher 1: (...) when they retire, they've automatically been given a freebie. And they can retire on it. And that could, they could be given this year or two years or in one year time and say “OK, I retire it's alright”, because getting older and don't want to go out diving anymore. And they've just been given a chunk of money for free.

Badu fisher 2: They could just go out for 3 neaps in the year just to make it look like they're working and then lease it out.

Participants also spoke about the power imbalance that the two-tier system would create because ITQ holders would control a portion of the catch. If fishers in the Olympic tier were to fill their quota first, they would depend on ITQ fishers to be able to continue fishing. Scenario participants expressed feelings of anger and injustice; one fisher on Yam said that fishers from the Olympic tier “*would be angry and feel short-changed*”. Moreover, individual ITQ fishers would have the power to decide to lease their quota to the TVH sector without consulting other community members. Another point of concern was that the TVH sector could probably pay more to lease quota than any TIB fisher because their profit margin is higher (i.e., their operating costs are lower and they usually get a better price for their product). The bidding up of lease prices by fishers who

inherited or accumulated quotas has been documented in the halibut ITQ fishery in British Columbia, Canada (Pinkerton & Edwards, 2009). Therefore, if an indigenous ITQ holder wanted to lease, there would be strong financial incentives to favor the TVH sector.

Quota duration was by far the characteristic that created the most vocal oppositions. When told that individual quotas could be allocated in perpetuity, the overwhelming reaction during both scenario workshops was disbelief, followed by various passionate (and not necessarily polite) outbursts about the unfairness of such an idea. Many were struggling with the concept, simply finding it mind-boggling. For example, on Yam:

Yam Woman 1: I'm so depressed... This is making me depress. Just the thought you know, like now, knowing that AFMA is considering this option... It's just like...

Yam fisher 1: ...disgusting

(...)

Yam Woman 2: For them it looks good on paper because it doesn't affect them – it affects us. But they're making the decision for our... for our wellbeing.

If the allocation within the two-tier system were permanent, it may not as easily accommodate fluctuating levels of effort and mobility in and out of the fishery. A woman on Yam, visibly upset, decried this lack of flexibility: *“Yeah but things change! Things change, people change, people work harder to make ends meet! Yeah... but that [the two-tier system], that's just wrong...”*

Scenario participants and interviewees were greatly concerned about the impact of ITQs on inter-generational equity. Many participants framed their opposition to permanent ITQs in terms of their inherent right to access the fishery. A Yam fisher stated that if individual quotas could be passed down, it would create a *“big fight”* because other fishers would say: *“I should be entitled too”*. A woman on Yam lamented: *“People are being cheated... They're being cheated of their right”*. Rights were also specified on Badu where participants concluded that such a system would lead to political conflicts.

At first, scenario participants believed that the next generation of full-time fishers would most probably be comprised of fishers that inherited an ITQ from a relative, arguing that the two tiers could discourage others from considering full-time *kaiar* fishing. However, when they began considering that ITQs could also be leased, then both Yam and Badu participants arrived at the conclusion that most ITQ holders would probably end up leasing and stop fishing – if not this generation, then probably the next. This possibility reignited previous discussions about the prospect of the TVH sector remaining in TS despite Islander aspirations of controlling the fishery.

All scenario participants and interviewees agreed that a two-tier system would inevitably generate conflict: between island communities, between ITQ holders and other fishers and within communities where both tiers would be present. Some even feared that it could create conflict within families.

Badu fisher 2: That there [the two-tier system], that is gonna create a lot of conflicts. It's gonna cause a lot of troubles that quota. Because it's gonna be very hard dividing that: that line [the threshold dividing the different tiers]. I reckon for Torres Strait, only people all together [in an Olympic quota] and then done. TVH there, they can do what they want; PNG, they can do what they want.

Badu fisher 3: The thing about the side effects this could have on the communities...

Conflicts would be more prevalent in the case where one of the two tiers would fill up its quota before the other. In the case where the Olympic tier would be first, some participants on Yam indicated that people would “*rebel*” and “*retaliate*”; on Badu the reaction was “*Well, we just go out and fill up their quota too!*” In the case where it would be the other way around, Islanders were concerned that ITQ holders could easily continue to fish under the Olympic tier.

Badu fisher 1: That fisherman with an individual quota could still drive with his brother and tell him: “Jump here, jump here and jump here” [indicating him where to dive to get *kaiar*]. And then they split it [the revenue] down the middle.

Badu fisher 3: (...) Because people up here they have a different perspective, if they're family, you can't really stop them.

Such behavior would obviously create conflicts. As one fisher on Badu said:

Badu fisher 3: Well you had your own quota buddy, you can't come into ours. It would cause some bit of problem, yeah. There will always be conflict, no matter which way you go, you will always have conflict there [with a two-tier system].

Scenario participants were deeply concerned that the introduction of ITQs would fundamentally change values and disrupt community structure and relations. Women on Yam were especially vocal:

Yam Woman 1: We need to get more women involved in this crayfish stuff! (General laughter). (...) Because at the end of the day women suffer too you know, at the end of the day, relationships and marriages and, like, community... Because women suffer, at the end.

Yam Woman 2: Because we're at the front trying to make ends meet.

Yam Woman 1: It affects you the men, as the bread winner in the crayfish industry, but it affects us women too as well.

Many participants spoke indirectly about the process of individualization. They were concerned that individuals would become more "greedy" (which is considered a serious fault and tantamount to an insult in many communities) and that it would undermine community relations. A woman on Yam stated: "*It will destroy our cultural practices. It will destroy our identity*". On Yam Island, participants discussed their ownership of *kaiar* "prime reefs" and were worried that ITQs would erode customary marine tenure. A full-time free-diver reflected: "*Now there is respect and knowledge of that respect. Once quota comes in, that will go down*".

It was clear that if rules were deemed illegitimate, people would find ways to work around them. On both islands, scenario participants quickly began developing schemes as to how fishers could access the other tier by teaming up and registering the catch under the right name, highlighting potential future monitoring and enforcement difficulties associated with dividing the TIB sector. They also discussed at length the restrictions that would be required to make individual quotas and

leasing acceptable. These included respect of sea territories, limits on duration (e.g., reviewing individual allocation every 5 years) and limits on the amount that can be leased by an individual (i.e., the ITQ owner must fish a significant portion of his quota). Many participants made it clear that if a two-tier system was implemented without meeting these conditions, it would prompt future political actions.

Creeping in? Neoliberalism and Islander agency

The case study presented here shares many similarities with other fisheries where the introduction of quota and neoliberal principles act in concert, reinforcing one another (e.g., (Davis, 2015; Jenkins, 2015; Mansfield, 2006)). Findings from this study suggest that the objective of optimal utilization could be used to justify and maintain a strong presence of the non-indigenous TVH sector, despite the Sea Claim decision, by requiring the indigenous sector to fully utilize its share of the fishery or to lease it to the TVH sector. It was also demonstrated how professionalization has the potential to erode Islander practices that foster social-ecological resilience and interfere with non-economic contributions of *kaiar* to wellbeing. Islander concerns about quota leasing and the introduction of ITQs in the indigenous sector documented in this article are well-founded and consistent with a large body of empirical evidence. Indeed, inequitable access to fisheries resources and benefit distribution, barriers to new entrants, creation of a new elite, inactive or absentee quota owners, reduced opportunities to pass on knowledge and practices to younger generations, erosion of traditional institutions, and changing values and community cohesion have been reported in both indigenous (Carothers, 2010, 2011; Jenkins, 2015; Turner et al., 2013) and non-indigenous ITQ fisheries around the world (Eythorsson, 1996; Maurstad, 2000; Olson, 2011; Pinkerton & Davis, 2015; Pinkerton & Edwards, 2009; St. Martin, 2007). Current commodification of natural resources, prioritization of the market, emphasis on individual rationality and privatization are at odds with Islander values, sense of place, and institutions of knowledge, tenure and practice. They are also antithetical to indigenous rights to access, own and manage their resources.

While there are strong neoliberal pressures in the TS TRL fishery, this does not mean that it will experience “an inevitable displacement by a dominant and invasive capitalism” (St. Martin, 2005, p. 63). A large portion of the indigenous sector continues to favor small-scale operations with low

overhead costs, short fishing trips that enables more family time, and fishing according to needs as they appear. These preferences do not mesh well with business-like profit-seeking fishing operations. This in itself may offer strong resistance to “mainstreaming” efforts and be sufficient for the maintenance of multiple economic identities (St. Martin, 2005) and the emergence of new embedded alternatives (Foley et al., 2015; Mansfield, 2007).

Many Islanders have openly asserted their agency by expressing their preferences and the prospect of bending rules and resorting to political actions if they determine regulations to be unfair or inappropriate. Islanders have long been very politically active. They have successfully enhanced their role in resource management and decision-making “through a combination of legal actions, political negotiations, knowledge exchange, and – when progress along those avenues slowed – direct action at sea” (Mulrennan, 2007, p. 195). Islanders made it clear that they will not shy away from action if they feel it necessary. However, as Howlett (2010) aptly stresses, indigenous agency is often constrained and inhibited by the structural reality of historical and institutional relationships between the state, capital, and indigenous people.

The effects of neoliberal principles are insidious. Some may take years before becoming fully apparent and they can therefore be difficult to recognize. For example, the Maori experience with quota management has produced a mixed bag of results. It has dramatically increased Maori economic revenues and ownership of fisheries in New Zealand, but has also caused numerous negative effects which are still being investigated to this day. Some of the most salient impacts include inequity in the distribution of benefits which has widened social class difference within Maori society causing many conflicts, decreased Maori participation in fisheries, and interference in traditional modes of exchange by divorcing commercial and customary fishing (Altman, 2002; Day, 2004; McCormack, 2010, 2012). Community consultations managed by TSRA on the draft *Road Map to 100 per cent ownership of the Torres Strait Commercial Fisheries by Torres Strait Communities* are currently underway. Islanders will need to be especially vigilant if management decisions are to adequately address their concerns while successfully achieving their aspirations for ownership and economic development.

Conclusion: towards socially and culturally appropriate TRL management

The current rhetoric of economic development in TS is powerful as it feeds into Islander aspirations of greater autonomy and self-determination. Sabau and van Zyll de Jong (2015, p. 4) contend that “when economic growth leads to higher social inequality it becomes unjust uneconomic growth, because the social costs of dealing with rising inequality are higher than the benefits of the increased GDP”. They argue that it is unfair and costly to force small-scale fishers to maximize profit and to compete with larger operations, concluding that policies should “take into account both the objective limits of the ecosystems but also the legitimate needs of all the members of communities, *including those for whom wellbeing does not consist in utility or profit maximization*” (emphasis added) (p. 13).

The TS Treaty and the Sea Claim play an important role in limiting the possible domain of market governance. TS Treaty provisions that protect the traditional way of life and livelihood and that prioritize subsistence fishing, combined with the Sea Claim recognition of the right to harvest marine resources for all purposes, prevent complete access restriction in the indigenous sector and the selling of indigenous quota to other sectors. These constraints effectively protect the indigenous sector from quota *ownership* drain. However, as Islanders noted, these are not sufficient to prevent quota *usage* drain. The terms “traditional way of life and livelihood” are not defined in the TS Treaty and management has, up to this point, solely focused on the protection of subsistence fishing. However, if management policies were to erode well established and documented traditional institutions such as customary marine tenure, their legality could come into question. Moreover, the Sea Claim is framed as a collective right (Butterly, 2013c). It is thus unclear how restraining the expansion of a specific subgroup – as is suggested in the two-tier quota model – could be justified.

The challenge in achieving socially just economic growth is to devise appropriate development strategies to the TS context, avoiding the pitfalls of neoliberal mainstreaming. One of the objectives of the recent *Draft Torres Strait Tropical Rock Lobster Fishery Management Plan 2015* is “To promote economic development in the Torres Strait area with an emphasis on providing opportunities for traditional inhabitants *and ensuring that commercial opportunities available to all stakeholders are socially and culturally appropriate*” (emphasis added). However, the

proposed “measures by which the objective is to be attained”, “performance indicators” and “performance measures” are all economic, with no reference to social or cultural appropriateness (PZJA, 2014b, p. 10). Scenario participants have articulated some elements that would need to be considered to ensure that policies are acceptable. Respect of sea territories by all fishers and limits on quota duration and on quota amount that can be leased were presented as basic minimum requirements. These proposed restrictions were motivated by the desire to maintain equal economic opportunities and fairness for all indigenous fishers, indicating the enduring importance of the moral economy (Pinkerton, 2015). Fabinyi et al. (Fabinyi et al., 2015) argue that inequality is an important concern for many small-scale fishers and that it must be addressed for reasons of social justice and for successful governance.

Neoliberal principles of profit maximization, commodification of natural resources, prioritization of the market, emphasis on individual rationality and property rights are not appropriate for achieving Islander political and economic aspirations, and are not compatible with many Islander values, norms, and practices. *Kaiar* is a key component for developing economic autonomy in TS, but a successful Islander commercial fishery should build on current strengths and promote *kaiar*'s diverse contributions to wellbeing. This suggests that the PZJA should move away from the narrow objective of optimal utilization and embrace a broader objective. Such an objective could be defined as “optimal benefits”, encompassing the political, economic, social and cultural dimensions for all TS inhabitants. A focus on *benefits* rather than *catch* would bring these different dimensions on equal footing and could include aspects that are overlooked in the current interpretation of the undefined objective of protecting the traditional way of life and livelihoods. Such a broader objective could accommodate new criteria such as supporting Islander institutions of tenure, practice and knowledge, building resilience and promoting social justice and self-determination. It could also include new economic strategies such as subsidies and increasing produce value. While a TAC can be effective in assuring fisheries sustainability, this study indicates that a more holistic vision inclusive of Islander perspectives is necessary if (quota) management of the TRL fishery is to be truly socially and culturally appropriate.

Chapter 8

Competing Voices: Indigenous Rights in the Shadow of Conventional Fisheries Management in the Tropical Rock Lobster Fishery in Torres Strait, Australia

Annie Lalancette & Monica Mulrennan

Abstract

Much progress has been made in recent decades in achieving high-level recognition of indigenous fishing rights. Unfortunately, the translation of international declarations, legal principles and court decisions into fisheries regulations and management approaches has proven challenging. We argue that a sea change in conventional fisheries governance arrangements is needed to respond to new imperatives and expectations around indigenous fishing rights and interests. Through an examination of the tropical rock lobster (TRL) fishery in TS, Australia, we show: (1) how current fisheries management structures, processes and discourses are at odds with indigenous Islanders' conceptions of the fisheries; and (2) how the existing regime excludes and renders silent the priorities of Islanders, in particular those related to Islander ontologies. We believe our findings extend to indigenous-State relations in other State-managed fisheries. We conclude that conventional fisheries management requires a fundamental shift in institutional alignments and existing power relations that can only be achieved through the creation of a new governance system.

Introduction

Legal recognition of indigenous rights to access and participate in commercial fisheries is regarded by indigenous peoples "as a critical step toward dismantling dependency and to achieving agency" (Davis & Jentoft, 2001: 237). Much progress has been made in recent decades in recognizing these rights. At the international level, Article 3 of the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) provides for a right of self-determination for indigenous peoples

which includes the free pursuit of economic, social and cultural development. Article 26 provides for the protection of the rights of indigenous peoples to own, use and control resources, lands and territories they possess by traditional ownership, occupation or use. Developments at the state level, such as Australia's Native Title Act (1993) which clarifies that native title can extend to indigenous fishing rights, also reflect a growing recognition of such rights.

Despite these advances, there is ample evidence that indigenous rights to access marine resources are often inhibited in practice by a host of constraints. These include, among others, narrow interpretation of indigenous rights, contestation of indigenous rights by non-indigenous commercial fishers leading to conflicts, bureaucratic and legislative requirements that do not accommodate indigenous fishing practices, and regulations and legislations based on concepts and promoting outcomes that contradict indigenous interests and worldviews (Ban et al., 2008; Bess, 2001; Turner et al., 2013).

Actualization of indigenous rights to own and control marine resources has been especially difficult to achieve (Capistrano & Charles, 2012), and these continue to be constrained by hegemonic claims of the State (Butterly, 2013a; Carothers, 2011; Davis & Jentoft, 2001; Turner et al., 2013). The dominant view that the sea is an international commons with declared offshore areas tied to the territorial sovereignty of the State (Bavington, 2002) clashes with indigenous understandings of space as a land-sea continuum associated with ownership rights and responsibilities (Mulrennan & Scott, 2000). The State is considered the legitimate owner and steward of common resources and Indigenous rights and systems of tenure tend to be ignored on the basis that sea space cannot be property (Mulrennan & Scott, 2000). As Mulrennan and Scott (2000, p. 681) put it, coastal indigenous peoples are faced with a "double jeopardy of exclusion – jurisdictional and proprietary".

Conventional fisheries management's engagement of neoliberalism has resulted in a management system that is tightly aligned with legal, business, and financial spheres (Johnsen et al., 2009; St. Martin, 2005). The commitment to "wealth accumulation fisheries" (Davis & Jentoft, 2001) with the associated growing trend of allocating catch-based and market-based property rights is a case in point. Langdon (forthcoming) has shown how this assemblage is particularly resistant to

alternative practices, even when this accommodation could significantly benefit indigenous peoples without any adverse effects on other users or the sustainability of a particular fishery.

This paper aims to gain a better understanding of opportunities for advancing and constraints to indigenous agency and rights to use, own and control marine resources in State-controlled fisheries. Song et al. (2013) have suggested that investigating images (i.e. mental models), values and principles held by fisheries actors and linking them to the analytics of governmentality could be a productive avenue of research with the potential to reveal inter-group power dynamics and thereby improve the governability of fisheries. While these elements are addressed in comprehensive Foucauldian discourse analysis, we propose that they can provide the basis for a more targeted analysis. We propose a new conceptual framework that situates mental models, values and principles as defined by Song et al. (2013) within Foucault's larger concept of the "apparatus of governmentality" and that links with the political ontology framework (Blaser, 2013a, 2013b, 2014). We suggest that this integrated conceptual framework allows for a focused analysis of the construction and practices of the State while being sensitive to issues of ontological dissonance.

Our analysis is focused on the tropical rock lobster (TRL) or *kaiar* fishery in Torres Strait (TS), Australia. This fishery is currently at the confluence of two competing currents: a commitment to introducing a TAC and quotas and recent legal recognition of indigenous Islander sea territories and commercial fishing rights. This case is thus ideal to explore the tensions between indigenous rights and conventional fisheries management in State-controlled fisheries.

We first begin by describing our conceptual framework and its rationale and the methods used for data collection and analysis. We briefly introduce the context for the tropical rock lobster fishery in Torres Strait, Australia before applying our conceptual framework to examine Islander realities in relation to their rights and aspirations in the context of conventional fisheries management. In accordance with our conceptual framework, we present our analysis in two parts. First, we describe the different institutional structures and processes that influence the governance and management of the TS TRL fishery and their embedded power differentials. Second, we contrast the official fisheries management discourse and Islander realities and aspirations focusing on connections and

disconnections. We discuss the implications of our findings in the TS context and highlight how the framing of fisheries, in particular what constitutes “good management”, serves to obscure some indigenous interests and consciously exclude others. We argue along others that comprehensive shifts in institutional alignments and in existing power relations are necessary in fisheries in order to fully respect indigenous rights, enhance indigenous wellbeing and improve fisheries governance and management.

Framework: Investigating Constraints to Indigenous Rights and Agency

Our proposed conceptual framework draws from Foucault’s theory of governmentality (Foucault, 1991a, 1991b) combined with elements from the interactive governance (Jentoft & Chuenpagdee, 2015; Kooiman, 2003; Kooiman et al., 2005) and political ontology frameworks (Blaser, 2013a, 2013b, 2014) (see Figure 8.1). The governmentality framework is particularly useful in drawing attention to discontinuities and change in practices and norms. Foucault (1991c) recognizes that at any point in time, there are multiple diverging and competing systems and discourses that interact in “a complex relationship of successive displacements” (p. 55). This line of inquiry focuses on identifying the conditions that make the emergence and hegemony of certain discourses and practices possible at a specific time (Foucault, 1991c). Langdon (forthcoming) argues that an examination of both the construction and the practice of the State are necessary to understand how conventional fisheries management systems infringe on indigenous rights and to identify potential levers of change. In Foucauldian terms, such an enquiry requires investigating the “apparatus” (*dispositif*) of governmentality and its “technologies” (*techniques*); i.e., the network formed by the dominant discourse(s), structures, institutions, knowledge and processes used in fisheries governance and management as well as how power is exercised in everyday practice (Foucault, 1991a, 1991b).

Discourse is central to the understanding of governmentality. It transforms individuals into “subjects”, contains claims about its own authority and legitimacy, and prescribes practices for dealing with subjects (Foucault, 1982, 1991b). As Hall (1997, p. 44) explains:

“It is important to note that the concept of *discourse* in [Foucault’s] usage is not purely a ‘linguistic’ concept. It is about language *and* practice. It attempts to overcome the traditional

distinction between what one *says* (language) and what one *does* (practice). Discourse (...) defines and produces the objects of our knowledge. It governs the way that a topic can be meaningfully talked about and reasoned about. It also influences how ideas are put into practice and used to regulate the conduct of others. Just as a discourse ‘rules in’ certain ways of talking about a topic, defining an acceptable and intelligible way to talk, write, or conduct oneself, so also, by definition, it ‘rules out’, limits and restricts other ways of talking, of conducting ourselves in relation to the topic or constructing knowledge about it”.

Issues related to problem framing have long attracted attention, especially in literature concerned with wicked problems such as fisheries (Jentoft & Chuenpagdee, 2009). Bardwell (1991, p. 605) indicates that problem definition “ramifies throughout the problem-solving process, reflecting values and assumptions, determining strategies, and profoundly impacting upon the quality of solutions”. In official commercial fisheries discourses, one can therefore find all the elements leading to its definition of the “fishing problem”.

Investigating power relations in fisheries must also include an examination of the ontology underpinning “taken-for-granted” concepts, especially when dealing with indigenous peoples (Howitt & Suchet-Pearson, 2006). Blaser (2009, 2013a, 2013b) warns that “environmental” conflicts may be ontological in nature, meaning that the issue is not simply about different perspectives on the world “out there”, but rather about *what* is there. Reducing radical differences about reality (ontological differences) to just another cultural perspective on nature (epistemological differences), Blaser (2013a, p. 21) continues, “reinforc[es] modern ontological assumptions that are central to the very process by which indigenous worlds are being destroyed”. While he specifies that not all conflicts involving indigenous peoples are ontological, he cautions against assuming what the conflict is about to avoid perpetuating existing power relations. Although we do not engage in a deep exploration of different ontologies in this paper, we are alert to the potential co-existence of and collisions between multiple conceptions, representations and enactments of reality, corresponding to the “three registers” of ontology as defined by Blaser (2013a). While it could be argued that some aspects of ontology as defined by Blaser are addressed in the concept of governmentality (e.g. enactments of reality), Foucault does not explicitly refer to ontologies nor to different conceptions of realities. To reflect this, ontologies are located outside the box representing the apparatus of governmentality, as shown in Figure 8.1.

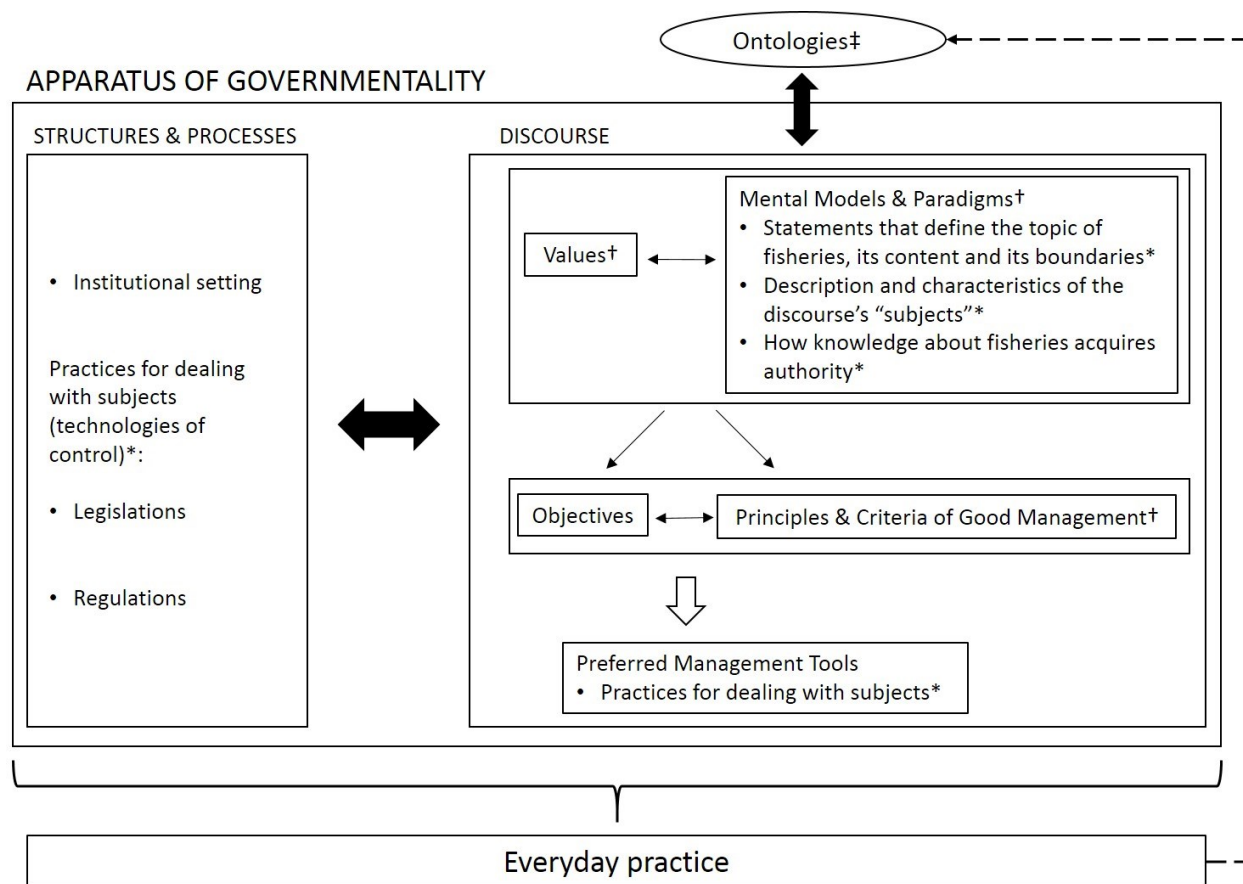


Figure 8.1: Conceptual framework drawn from Foucault’s theory of governmentality in combination with elements from the interactive governance and political ontology frameworks

*Central elements of discourse analysis following Foucault (Hall, 1997)

†Meta-level governance elements from the interactive governance framework (Song et al., 2013)

‡Ontologies following the political ontology framework (Blaser, 2013a)

The conceptual framework described here will be applied in section 5 to assess the interaction of indigenous Islanders with structure and practices of fisheries governance and management in the tropical rock lobster (TRL) fishery in Torres Australia. While our framework illustrates ontology, mental models, values and principles as discrete elements, we recognize there is a great amount of interactions and overlap between these and that they may not be easy to differentiate from one another.

Methods

This article draws upon research undertaken as part of the first author's doctoral project. Primary data was collected during the course of four visits to Australia between 2008 and 2011 totalling 13 months. Eleven months were spent in TS, focusing on the three islands with the highest indigenous participation in the TRL fishery (Thursday Island, Badu and Yam). This article is directly informed by semi- and unstructured interviews, participant observation, preference interviews and rankings, cognitive mapping and future scenarios conducted with Islanders. The great majority are *kaiar* fishers (including full-time, part-time and casual fishers), but a few elders, spouses, factory managers and local leaders were also interviewed. Details about participants for each field trip and additional details about methods can be found in Lalancette (forthcoming).

Semi-structured interviews and informal conversations were also conducted with fisheries scientists from the Commonwealth Scientific and Industrial Organisation (CSIRO) and current staff members from the Australian Fisheries Management Authority (AFMA) and from the Torres Strait Regional Authority (TSRA). Finally, all AFMA managers that served in Torres Strait since the opening of the office on Thursday Island in 1989 until 2014 were interviewed. The two last managers were interviewed while still in office.

All interview material and field notes were coded and analyzed in Atlas.ti following Friese (2012). This data is supplemented by a review of policy documents and official meeting minutes and by the second author's experience and insights derived from more than two decades of research partnering with Islanders. This data was then queried based on the framework we developed and presented above (Figure 8.1).

Study Site

The Torres Strait is located between Australia and Papua-New Guinea (Figure 8.2) and is the traditional territory of indigenous Torres Strait Islanders and Papua New Guineans from the southeast coast. The Islanders are of Melanesian descent and include several TS Islander communities living on numerous islands within the strait (estimated at 5787 people in 2011) as

well as a large population of Islanders who have moved out of the region and live on the Australian mainland (estimated at 63 717 people in 2011). Islanders are marine people: active fishers and hunters possess detailed knowledge of their environment and exceptional navigational and marine hunting skills (Mulrennan, 2007; Nietschmann, 1989). Like many other indigenous peoples, Islanders have struggled through a history of colonial injustices and dispossession, but they never surrendered their rights to self-determination and actively maintain their stewardship responsibilities (Mulrennan, 2007).

Islanders harvest a range of marine species for subsistence, ceremonial and commercial purposes. Tropical rock lobster (TRL) or *kaiar* is the commercial fishery that contributes the most to Islanders' income (PZJA, 2016). It is also the one where they are the most active with nearly 300 fishers participating on average. The indigenous sector of this fishery (also referred to as the traditional inhabitant sector) is predominantly comprised of TS Islanders, but it also includes a limited number of traditional inhabitants of PNG origin who have settled in TS. These fishers have strong kinship ties with Islanders and they have adopted the informal rules and norms established by Islanders for the *kaiar* fishery.

The TRL fishery is the most economically valuable fishery in the region (worth 18.4 million AUD in 2013 (PZJA, 2016)) and also the one with the highest participation from outsiders. Indeed, the commercial fishery is also accessed by non-indigenous fishers mostly based on mainland Australia and by cross-endorsed vessels from Papua New Guinea who are entitled to access 25% of the fishery under the TS Treaty (more on this later).

In recent decades, indigenous TS Islanders have gained – through the Australian common law doctrine of Aboriginal title known as Native Title – legal recognition that their rights and interests to their lands come from their traditional laws and customs. Building on this recognition, they have sought an expanded role in decisions affecting resource use in the region, including increased representation within the fisheries governance structure (Mulrennan, 2007). In 2013, native title recognition was extended to their sea territories in a decision that resulted in the largest native title claim to sea country in Australia and including recognition of non-exclusive indigenous commercial fishing rights (Butterly, 2013c).

Despite these major shifts in legal recognition and adjustments in decision-making and representations, fisheries decision-making in TS continues as a State-controlled governance structure that privileges Western fisheries science and neoliberal objectives. While there has been a commitment from the top decision-making body for fisheries in TS to transfer full ownership of the lucrative TRL fishery to Islanders, no changes in governance have been proposed. It is thus unclear to which extent these developments can or will increase Islanders' ability to control and manage their resources.

An Analysis of the Apparatus of Governmentality in the TS TRL Fishery

This section analyzes the fisheries governance and management apparatus in TS closely following the framework we developed and presented in Figure 8.1. We do so in two parts: we begin with the structures and processes (see first box on the left in Figure 8.1) pertaining to the TS TRL fishery and then continue with the central elements of discourse (see box on the right in Figure 8.1) from the official fisheries management discourse and Islander realities. Each subheading in this section corresponds to an element referred to in Figure 8.1.

Structures and Processes of TS Fisheries Governance and Management

The official fisheries management apparatus in TS comprises a complex structure that tightly aligns legislation, management, and fisheries science. Islanders have to deal with multiple jurisdictions, governmental agencies, and fishing regulations and a bureaucratic and technical consultative structure that makes participation difficult and where their decision power is limited. We provide a brief overview of this assemblage and highlight power dynamics.

Legislative Framework

Due to its location, TS is subject to a plethora of legislations and competing jurisdictions that limit and control movements and permitted activities in the region. At the international level, the regime of transit passage applies to TS pursuant to Article 37 of the United Nations Convention on the Law of the Sea (UNCLOS). This regime prevents Strait States from interfering with navigation and thus provides user States unlimited and maximum freedom of passage (Roberts, 2006; Spadi, 2000).

TS is also the site of an international border between Australia and Papua New Guinea (PNG). The Torres Strait Treaty (1985) is an international arrangement that defines a complex set of jurisdiction lines between the two countries and established an area known as the Torres Strait Protected Zone (TSPZ) (see Figure 8.2). The principal purpose of the TSPZ “is to acknowledge and protect the traditional way of life and livelihood of the traditional inhabitants including their traditional fishing and free movement” (art. 10.3). Indigenous peoples of TS and of coastal PNG have the right to access and use land and marine areas within or adjacent to the TSPZ for the purpose of pursuing traditional activities such as visits and subsistence activities, including harvesting of protected species (e.g. dugong and turtles) (art. 11–12). Immigration, customs, quarantine, and health procedures also apply to peoples on both sides of the border affecting everyday movements.

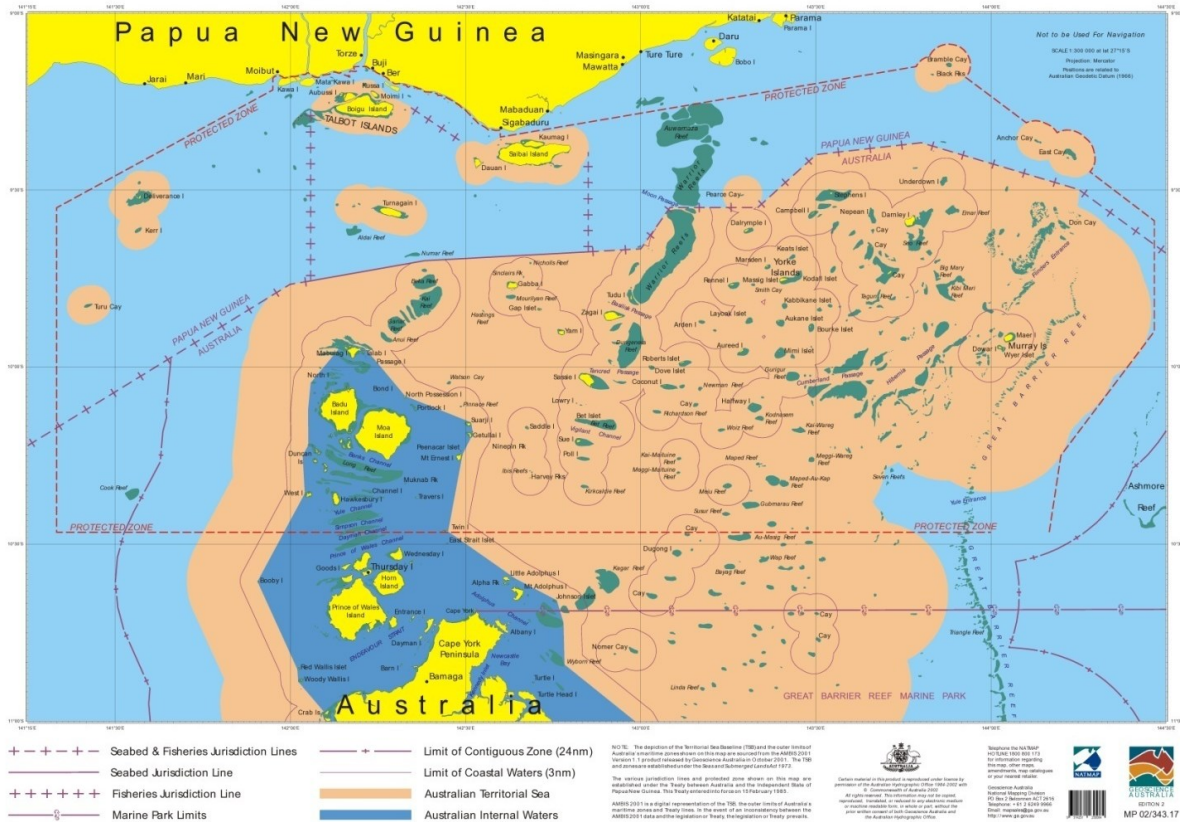


Figure 8.2: Australia’s jurisdictional boundaries in Torres Strait.

Source: <http://www.immi.gov.au/media/fact-sheets/72-torres-strait-map.pdf>

Regarding fishing specifically, the Treaty recognizes the primacy of traditional fishing³³ over commercial fishing interests in the TSPZ (art. 20). Although traditional fishing is allowed throughout the TSPZ, no commercial fishing can be conducted across the fisheries jurisdiction line without a license endorsement of the other country (art. 26.1 c). The enacting legislation for the TS Treaty in the area under Australian jurisdiction is the *Commonwealth Torres Strait Fisheries Act* (1984). The Act defines fisheries management objectives closely following the TS Treaty and established the Protected Zone Joint Authority (PZJA) as the highest governance body for fisheries in TS.

³³ The TS Treaty defines traditional fishing as “the taking, by traditional inhabitants for their own or their dependents’ consumption or for use in the course of other traditional activities, of the living natural resources of the sea, seabed, estuaries and coastal tidal areas, including dugong and turtle” (art. 1 (l)).

The TS fisheries operate in the context of a recently resolved Sea Claim. On August 7, 2013, the High Court of Australia recognized native title rights of TS Islanders over an area covering approximately 37,800 km² of sea. The Sea Claim does not recognize exclusive rights to resources for Islanders nor does it confer the right to control the conduct of others. However, it recognizes the right of Islanders to access and take resources for any purpose, including for trading or commercial purposes. While the Sea Claim is a significant advancement for Islander sea rights, it is constrained by the prescriptions of the *Native Title Act* and its delegated legislations. For example, once native title is recognized, a prescribed body corporate must be established in accordance with pre-defined functions, characteristics and procedures under the framework of Australian law. The imposition of a Eurocentric corporate model creates problems in terms of operation, representation and authority among many others (for a detailed legal and anthropological analysis, see Mantziaris & Martin, 2000).

Governance Structures and Processes

Fisheries governance in TS comprises a complex structure in which many different governmental agencies and political levels interact (see Figure 8.3 for an illustration of the different bodies and their membership). It is based on a model that essentially mirrors the structure imposed in other Commonwealth-managed fisheries, except for the PZJA which is a significant departure. Indeed, the PZJA has three members that represent different political levels: the fisheries ministers at both the federal and state (Queensland) level and the Chair of the Torres Strait Regional Authority (TSRA). The TSRA is an Australian Government Statutory Authority established under the *Aboriginal and Torres Strait Islander Commission Act 1989*³⁴. It has the responsibility to develop, implement and monitor programs for indigenous people in TS, advise the Minister for Indigenous Affairs, and protect the *Ailan Kastom* of TS Islanders living in the TS region (TSRA, n.d.). The TSRA Chair only gained PZJA membership in 2002; there was thus no Islander representative involved in decision-making before this date. The PZJA functions by consensus, but the Commonwealth Minister has the casting vote in case of disagreement between its members (Commonwealth Torres Strait Fisheries Act 1984, art. 40).

³⁴ Now known as the *Aboriginal and Torres Strait Islander (ATSI) Act 2005*.

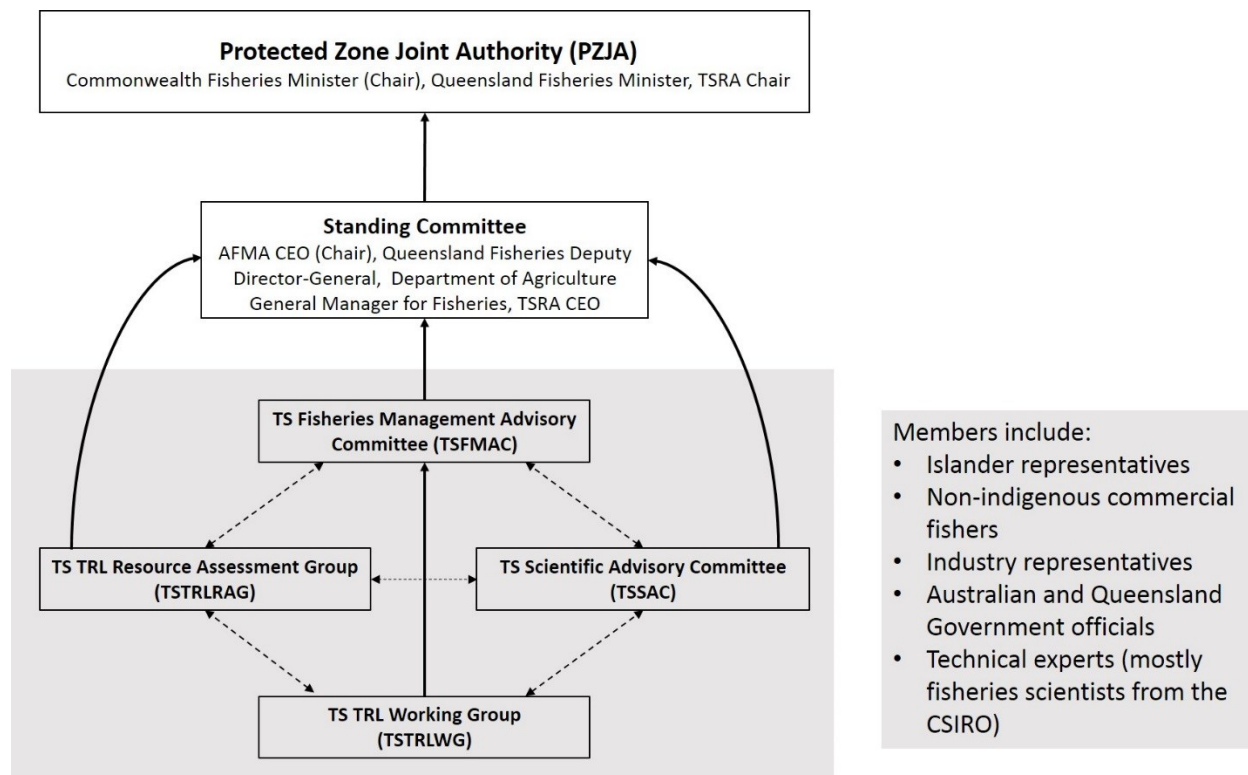


Figure 8.3: Consultative structure of the Protected Zone Joint Authority (PZJA)

Solid lines and dashed lines indicate primary and secondary lines of communication respectively.

Adapted from (PZJA, 2016, p. 7)

The Standing Committee reviews the information provided by the other advisory groups and provides strategic and operational advice to the PZJA. It is very influential and its recommendations are usually adopted at the PZJA level (AFMA Manager, personal communication). It consists of senior representatives from the four different agencies involved in PZJA fisheries: the TSRA, the Australian Fisheries Management Authority, and the Queensland and Commonwealth Fisheries Departments (PZJA, 2016). The four member agencies also oversee the implementation of the PZJA's agreed policy commitments. However, the sharing of management responsibilities and accountability is not clearly defined and their fragmentation between four agencies in three different locations has made management confusing and inefficient (Stevens, 2008). Some efforts have been made in recent years to transfer different management

tasks and responsibilities in order to bring them under the responsibility of the AFMA office based in TS. In addition, AFMA acts since 2010 as Standing Committee Chair and Secretariat as well as the PZJA Secretariat.

There are four advisory bodies under the Standing Committee. The composition and mandate and rules of operation of each committee and working group are defined in the *PZJA Management Paper No. 1* (2008). At least one Islander representative sits on each of these bodies. The TSRA was responsible for administering and supporting indigenous representation on all PZJA consultative forums up until March 2015. Between 2002 and 2015, the TSRA made a number of changes to the nomination process for fisher representation, some of which were contentious. The nomination process has now been transferred to the indigenous sector with continued funding from the TSRA (TSRA, 2015). While each of the advisory committees has distinct roles and responsibilities, there is considerable overlap in membership between them. Islander representatives must attend numerous meetings which requires significant traveling and time away from community and fishing, especially when considering that many of those meetings are conducted on the mainland.

Regarding management of the TRL fishery, the TS TRL Working Group (TSTRLWG) and the TS TRL Resource Assessment Group (TSTRLRAG) are of particular interest. The TSTRLWG is at the grassroots level where indigenous and non-indigenous fishers can discuss fishery-specific issues. It is also the only body that does not report directly to the Standing Committee. The TSTRLWG was inactive during 2008-2013. Islanders boycotted this forum to protest against original allocation shares for the TRL fishery agreed to by the PZJA, effectively stalling decisions (see Lalancette, 2017). The TSTRLWG resumed shortly before the Sea Claim decision by the High Court. The TSTRLRAG is a technical forum with a much narrower focus than the Working Group. Its main role is to provide advice to the PZJA on the setting of a Total Allowable Catch (TAC) and on the biological status of the fishery based on stock assessments conducted by CSIRO scientists. It therefore plays an important role in the upcoming introduction of a quota system for the TRL fishery.

The Malu Lamar Corporation (the Native Title body for the Sea Claim) is not a member of the PZJA nor of any consultative group. However, in August 2015, it formally requested PZJA membership and that the Standing Committee be replaced by an elected management committee. The PZJA agreed to consider the request for representation if the Malu Lamar Corporation submits a paper justifying its request (PZJA, 2015). To our knowledge, there have been no new developments regarding this issue.

Regulatory Environment of the TRL Fishery

Although protected by the TS Treaty, subsistence fishing in Australian waters by traditional inhabitants from both sides of the border is subjected to the same limits as recreational fishing by non-indigenous Australians – that is, 3 lobsters per person per day or 6 lobsters per dinghy if there is more than one person aboard. Commercial fishing regulations comprise different types of licenses and input controls (listed in Table 8.1). These are typical measures except for the interim measures that were introduced to control non-indigenous effort as a strategy to promote Islander economic development (Table 8.1).

In 1984, a Community license system was put in place to cover commercial fishing for the indigenous sector. In 1999, the PZJA changed this community system and imposed licenses for individual dinghies (TIB licenses) instead. To be eligible, traditional inhabitants must first be recognized by lodging a “Torres Strait Traditional Inhabitants ID Form” that has been supported by the councillor of the relevant community and the mayor of the same council. TIB and fishing boat licenses are transferable and both have the same minimal fees. A boat can be used for multiple species, but the annual entry fee must be paid for each commercial fishery. Islanders protested that licenses were infringing on their rights as traditional owners. These arguments were largely dismissed by fisheries agencies as being unrelated to the issue of licensing and as being politically motivated. However, in 2010, the Commonwealth, the State of Queensland and the Commercial Fishing Parties (non-traditional fishers and marketing agents/buyers) appealed the Sea Claim decision recognizing Islander non-exclusive commercial fishing rights rendered by the Federal Court of Australia, arguing *that fishing licenses had extinguished Islander commercial rights*. This argument was eventually rejected by the High Court, but the State nevertheless attempted to use

licenses as a technology of control in the Foucauldian sense, confirming Islanders' original concerns.

Output controls have been in discussion since 2005 when the PZJA first agreed to introduce a TAC for the TRL fishery. Negotiations over quota allocations between the indigenous and non-indigenous sectors have been very contentious because Islanders consider that non-indigenous fishers are accessing an unfair portion of the catch³⁵ (Lalancette, 2017). Islanders demanded at least 70% of the Australian quota at the outset of TAC-management with the objective of achieving full ownership of the TRL fishery (Hand, 2008). The Commonwealth conducted voluntary buy-backs of non-indigenous licenses which brought Islanders' share to approximately 56% and negotiations were at a deadlock for years. In 2014, in the wake of the sea claim win, the PZJA committed to support Islanders' aspiration for 100% ownership. However, the PZJA released a draft management plan for comments in June, 2016 in which the proposed traditional inhabitant quota share is 56.2%. The management plan does not acknowledge the commercial fishing rights recognized in the Sea Claim nor the PZJA's previous commitment regarding full ownership and does not provide any mechanism for Islanders to increase their share besides buying non-indigenous licenses. This plan has provoked strong reactions from all sides, including from the TSRA.

The distribution of power has shifted over the years as the TSRA Chair joined the PZJA and Islanders increasingly participate in the consultative structure. These shifts continue as Islander rights, interests and authority are being asserted and new Islander actors enter the fishery such as the Malu Lamar Corporation. However, the processes and the structure where the Commonwealth has the casting vote have largely remained the same. The request put forward by the Malu Lamar Corporation to replace the Standing Committee with elected members might be a start.

³⁵ The non-indigenous sector currently has only 12 licenses with 33 tenders, but harvested approximately 60% of the total Australian catch on average between 2008 and 2014.

Table 8.1: TS TRL Fishery Commercial Fishing Regulations

| Regulation | Type | Detail | |
|-------------------|------------------------------------|----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| License | Boat | <ul style="list-style-type: none"> • TS Traditional Inhabitant Boat (TIB) | <ul style="list-style-type: none"> - Limited to traditional inhabitants - Open entry |
| | | <ul style="list-style-type: none"> • TS Fishing Boat (also referred to as transferable vessel holder – TVH) | <ul style="list-style-type: none"> - Held almost exclusively by non-indigenous fishers - Limited entry since 1985 |
| | | <ul style="list-style-type: none"> • TS Sunset Fishing Boat | <ul style="list-style-type: none"> - Allow non-indigenous fishers to temporary access the finfish fishery through quota leasing - Issued and managed by TSRA |
| | Master Fisherman | Required to operate a non-traditional vessel | |
| | Processor/Carrier | Required to process and carry commercial products | |
| Input controls | Fishing season | December 1 st to September 30 inclusive | |
| | Hookah seasonal ban | December 1 st to January 31 ^s | |
| | Fishing method | Harvest by hand or with the use of a hand held instrument, such as a spear or scoop net | |
| | Minimum size | 115 mm tail size or 90 mm carapace length | |
| | Processing or carrying prohibition | TRL meat removed from any part | |
| Interim measures* | Monthly hookah ban | Seven days during the spring tide | |
| | Tender reduction | 30% reduction for non-indigenous vessels | |

*Interim measures have been negotiated each year and were adopted almost every year since 2003.

Central Elements of Discourse

This section examines the official fisheries management discourse and Islander realities focusing on the central elements of discourse identified in the right-hand box of the framework in Figure 8.1. In the text below, we grouped certain of those elements to highlight contrasts, but a detailed comparison that mirrors the categories of Figure 8.1 is presented in Table 8.2.

We first analyze the fisheries management discourse. While we focus on the official version, we acknowledge that discourse is not static and contested. Many AFMA managers made a distinction in interviews between their personal views and those from the Agency they represented. We then examine the same elements in Islander life. Similarly, Islanders are a heterogeneous group with

multiple shifting perspectives. We attempt to represent some of this diversity, but cannot do justice to all the nuances here.

Official Fisheries Management Discourse

Paradigms, Mental Models and Ontological Basis

The official discourse of fisheries management in TS does not occur in a vacuum: it is influenced by and influences other ideological trends. The concept of management itself is founded on unquestioned assumptions expected to be of universal relevance. First, the State is considered the legitimate owner and steward of common resources, a status reinforced by the declaration of Exclusive Economic Zones (EEZ) and in the TS Treaty (with regards to conservation and management obligations). These constructs are what grant the State the authority to assign rights. It also creates the discursive space for scientific management or managerial ecology to emerge (see Bavington, 2002). Second, management is based on an ideal of progress defined by predictable productivity that can only be achieved through control. The legitimacy of management interventions rests on an ontology that situates humans as superior to and separate from nature (Howitt & Suchet-Pearson, 2006). Lastly, fisheries science is based on a positivist ontology and is thus believed to produce an objective and value-free representation of reality. Recommendations stemming from fisheries science are seen as apolitical and its authority is derived from this supposed neutrality.

At the national level, Australian public policy has been strongly informed by neoliberalism since the 1980s, emphasizing individual rationality, commodity production, efficiency, and marketization (Bayari, 2012; Cahill, 2007, 2010). There is a powerful rhetoric in the country that promotes “mainstreaming” as the solution to indigenous economic development (Altman, 2004; Dockery, 2010). Indigenous economies are often characterized as “welfare dependence”, while ignoring the contributions of subsistence, stewardship and cultural activities (Howitt & Suchet-Pearson, 2006). Indigenous economies, including that of TS Islanders, are generally perceived as “pre-capitalist” (*sensu* St. Martin, 2005), rather than a viable alternative to capitalist economies. It is assumed that given the proper incentives and capacity-building, the “drivers of behavior” for Islanders will change allowing them to achieve a greater quality of life.

Conventional fisheries management in TS is informed by fisheries bioeconomics and the concept of maximum sustainable yield (MSY). Gordon (1954) redefined the fisheries problem from a sustainability problem to an economic one. He argued that since the Sea is open to all, fishers will inevitably plunder marine resources because rent is dissipated by competition. Such patterns of overexploitation, the logic goes, can only be solved by assigning property rights either private or public. In short, fisheries bioeconomics is well aligned with neoliberalism (Mansfield, 2004) and is consistent with the “Tragedy of the Commons” metaphor (Hardin, 1968). In the MSY paradigm, fish populations are aggregated and reduced to abstract “biomass”. The theory posits that when the population size is at the point of maximum growth rate, it produces a “surplus” that if not harvested, is wasted. In TS, this view is reinforced due to the characteristics of the TRL migration and the highly variable stock-recruitment relationship (Dennis et al., 2015). The combination of MSY, neoliberalism and bioeconomics means that the subject of fisheries management is constructed as a rent-maximizing individual whose behavior is to be both encouraged and controlled (see Johnsen et al. (2009) for a detailed historical account of the transformation of fish, fishers and fishing practices into abstract biophysical systems and techno scientific networks).

Conventional fisheries management is conceived along the lines of a business model and this is most evident in the pervasive economic vocabulary and metaphors used in official documents and by AFMA managers. For example, during an interview, an AFMA manager quoted the recommendation from an administrative review to “*establish a one-stop fisheries management shop in TS*”. Management responsibilities are framed as “services” and fishers as “business managers”, adding a client dimension to the definition of fisheries’ subjects. When discussing cost-recovery of fisheries management in other Australian fisheries, a different AFMA manager stated: “*Fishers pay for management through their levees. Therefore they have legitimate expectations that management will perform to a certain level because they paid for it*”.

Objectives and Underlying Values

The latest version of the Commonwealth TS Fisheries Act defines the objectives of the PZJA as follows: to acknowledge and protect the traditional way of life and livelihood of traditional

inhabitants (including traditional fishing), to protect and preserve the marine environment, to adopt necessary conservation measures in a way that will minimize any restrictive effects on traditional fishing, to manage commercial fisheries so as not to prejudice traditional fishing, to manage commercial fisheries for optimal utilization, to share the total allowable catch (TAC) with PNG in accordance to the TS Treaty, and to have regard, in developing and implementing licensing policy, to the desirability of promoting economic development in the TS area and employment opportunities for traditional inhabitants (art. 8). Article 23 of the TS Treaty specifies that the total allowable catch for fisheries should be based on MSY.

The combination of these objectives in the official discourse promotes values of conservation and utilitarianism framed by MSY; i.e. the resource should be used up to a pre-determined target point and only conserved beyond that specific catch level. It also reflects neoliberal values such as individual freedom and wealth accumulation.

“Good Management” and Preferred Management Tools

The hallmark of good management is foremost to be able to achieve its objectives. As mentioned above, obligations set out in legislation concern the environment and resource sustainability, the traditional way of life and livelihood of traditional inhabitants, and economic development.

First, sustainability in fisheries is generally defined as a function of the biomass required to achieve the MSY (B_{MSY}) or the Maximum Economic Yield (B_{MEY}). Sustainability is thus evaluated in terms of abundance of a single species at the stock level on a yearly basis to ensure proper recruitment and thus the longevity of the fishery. This is reinforced by stock assessments that are conducted at these scales. The harvest strategy for the TS TRL fishery follows the internationally recognized “best practice” of setting target as well as limit reference points that will trigger fishing restrictions when the biomass falls below the target, down to full closure when it reaches the limit reference point³⁶ (FAO, 1995). Managing for sustainability is thus a technical endeavor that relies

³⁶ The limit reference point is set at a stock abundance equal to 40% of the unfished (or “virgin”) spawning biomass, and the target reference point corresponds to a stock abundance equal to 65% of the unfished spawning biomass. The harvest control rule uses a constant fishing mortality rate of 0.15 per year while the stock is above or at the target

on stock assessment models that require information on stock status, spawning-recruitment relationships, and fishing mortality. Another principle of fisheries management is that it should be based on the best science available which in turn will seek to use the most “unbiased” data. Scientific management favors data collection about abundance through so-called fishery-independent data (i.e. visual surveys) and about catch rates through direct catch monitoring at landing or selling sites. Second, the objectives of enhancing economic opportunities and economic development are interpreted as maximizing profit from the fishery³⁷. This was also mentioned as a principle of good fisheries management in general by AFMA managers during interviews. According to this view, fishers should maximize their catch (within the limits of sustainability) at the lowest cost possible. The objective of optimal utilization is thus perfectly aligned with this principle. Maximizing profit implies adopting a certain level of technology to improve catch “efficiency”. Conventional fisheries management will thus favor measures that will encourage and reward this behavior.

Effective management depends on compliance and many interviewed managers mentioned ease of enforcement as an important principle when devising rules. Concerns about ease of enforcement, TRL stock sustainability and maximizing fishery profits explain fisheries agencies’ preference for output controls. A total allowable catch (TAC) facilitates optimal utilization by setting an explicit catch target. In TS, a TAC allows Australia and PNG to share the fishery as outlined in the TS Treaty in a transparent manner. Dividing the Australian TAC between the indigenous and non-indigenous sectors through explicit quotas is seen by the Commonwealth and managers as the best way to promote economic opportunities for Islanders. Individual transferable quotas tend to be preferred by the Commonwealth for fisheries management as they encourage profit maximization behavior and lead to consolidation which facilitates enforcement by reducing

reference point and linearly declines to zero as spawning biomass declines from the target to the limit reference point (Patterson et al., 2015).

³⁷ Recently, the interpretation of economic efficiency in fisheries science as maximizing *economic* rent has been criticized as being misconstrued from its meaning in economic theory which rather promotes maximizing *resource* rent. This debate is beyond the scope of this paper, but for a detailed analysis see Bromley (2009).

the number of license holders. Also, in line with the principle of profit maximization, managers tend to favor the removal of effort controls under TAC-management.

Other criteria referred to by AFMA managers are typically associated with good governance. The most common criteria mentioned were efficiency and effectiveness. Efficiency was discussed in relation to the timing and costs of decision-making and operations. This view favors centralization. Effectiveness was seen by AFMA managers as necessitating legislating all rules and having a mechanism for formal enforcement by government agencies. Transparency of decision is also an important governance principle that guides the flow of research information in TS.

Finally, managers discussed in interviews matters of “*good and bad practices*”. The “open access” nature of the traditional inhabitant sector was the factor of most concern for interviewed managers. Having a large latent effort goes against the basics of fisheries management. Limiting access is a fundamental measure of fisheries management designed to avoid the “race for fish” created by profit-maximizing individuals and facilitate enforcement. Because this measure is not an option due to traditional inhabitants’ rights, output controls are seen as the only alternative to ensure future sustainability.

Islander Discourses

Paradigms, Mental Models and Ontological Basis

The Islander worldview is based on networks of relationships and an ethics of sharing, equity and reciprocity which challenge assumptions about separation, hierarchy and progress as well as neoliberal assumptions about property, individualism and profit maximization (Mulrennan & Scott, 2000; Scott & Mulrennan, 2010). Community is emphasized and many Islander fishers are willing to trade-off some level of immediate individual wellbeing in favor of greater and longer-term community wellbeing (Lalancette & Mulrennan, forthcoming). Wealth accumulation is generally discouraged and commercial fishing is based on a moral economy with strong values and norms. Islander aspirations are framed by indigenous rights to self-determination and they see rights to ownership as stemming from their detailed knowledge and continuous occupation and

use of their land and sea territories (Nietschmann, 1989; Scott & Mulrennan, 2010) a view that is also supported by Australian common law.

In the Islander world, the Sea is not open access: it is effectively owned, controlled, managed and shared following the rules of customary marine tenure (CMT). Islanders do not make strict distinctions between land and sea but rather recognize a continuum along environmental gradients (Mulrennan & Scott, 2000; Nietschmann, 1989; Sharp, 2002). Access is controlled based on principles of stewardship, reciprocity and kinship and social relations (Scott & Mulrennan, 1999). Sea territories also contain history which is anchored in place and is an important component of one's identity (Nietschmann, 1989; Scott & Mulrennan, 1999). As Nietschmann (1989, p. 60) stated, "A territory is social and cultural space as much as it is resource or subsistence space". In interviews, some AFMA managers seemed unaware of the extent to which CMT rules are applied and enforced. Our observations in the field indicate, as do those of others (e.g. Mulrennan, 2007; Thomassin, 2016), that CMT has not only strong legitimacy, it is also highly respected: fishers do request permission to enter another sea domain and adhere to requirements imposed by owners.

Finally, *kaiar* is seen as one element of a larger interconnected system and plays multiple roles in Islander life (Lalancette & Mulrennan, forthcoming). *Kaiar* that is not harvested is therefore not seen as a waste but as being available for other uses – now or in the future.

Objectives and Underlying Values

Islander objectives for the *kaiar* fishery are multiple and cut across the sustainability, cultural, economic and political domains (Lalancette & Mulrennan, forthcoming). Islanders' overarching aspiration for self-determination is expressed through objectives of 100% ownership and control of territories and resources. Islanders are prepared to share resources, but on their own terms. As a full-time fisher from Badu stated:

"Everybody has a right to work, you know. But as long as it's being managed and controlled by those who own the sea".

Safeguarding *kaiar* sustainability is motivated by inter-generational equity concerns and stewardship responsibilities. *Kaiar* fulfills multiple functions in Islander society. The fishery is important economically as a primary or supplementary source of income, for its welfare functions and as one of the few employment alternatives in the region. It also enhances Islander wellbeing by supporting subsistence and food security, learning, knowledge transmission, cultural practices and the maintenance of social and kinship networks and relations, ultimately strengthening Islander sense of attachment to place and identity (Lalancette & Mulrennan, forthcoming). Ensuring the continuity of this option for future generations is thus seen as crucial. A woman on Badu captured this sentiment:

“Very few young people are fishing now, very few. The economic times, the changes. Some of our kids are more attracted to the city lights and a full time job. (...) It’s not like everyone will leave, some of them will stay. There will be a few that will have the knowledge. It’s not something that will ever die out. At the end of the day, it has to be something that will be there for our children and their children. (...) [You need] to make sure that you have crayfish down along the track. Because you might have two generations that skip on crayfishing and then at the third generation they’re all fishermen again. You just can’t say what’s going to happen in 20 years’ time.”

The Commonwealth sees TRL as a cornerstone of economic development for the region as do Islanders. However, views about what economic development entails differ. The great majority of Islanders have a diversified livelihood with varying and flexible combinations of subsistence, State allowances, and employment in commercial fishing (*kaiar* and/or other species) and outside of fisheries. Islanders expressed in interviews their desire to enhance their economic autonomy, but in a way that will cover their needs while at the same time allow them to spend time with family and in the community, attend to sociocultural responsibilities and participate in cultural and ceremonial life. In other words, economic development does not supersede other sociocultural values and responsibilities.

Equity in benefit distribution is an important value for Islanders. They consider that the fishery should provide equal opportunities to everyone in terms of access, catch and revenue. The indigenous sector is heterogeneous in terms of socioeconomic attributes. The combination of

differences in terms of economic needs, capability, sociocultural obligations and personal preferences about fishing effort has an impact on individual fishing motivations and objectives. This is evidenced by the diversity of fishing practices, levels of effort and participation in the fishery.

“Good Management” and Preferred Management Tools

For Islanders, good fisheries management starts with them being in control and respecting *Ailan Kastom* and rules of *gud pasin*³⁸. This means that management should be based on CMT and respect the authority of traditional owners to control their marine estates, resulting in decentralized management. It also means that fishers should adhere to principles of reciprocity and respect the norm of only harvesting what is needed.

A well-managed *kaiar* fishery should be dynamic and flexible. In order to meet various needs as they arise, Islanders require high and stable catch rates within their individual sea territories. The fishery must accordingly be managed to maintain high local abundance. Access and effort is adjusted based on a holistic knowledge of the environment and daily observations. Development of the fishery therefore needs to maintain the flexibility to accommodate various levels of efforts and participation so that fishers can adapt to changing responsibilities, opportunities, and ecological conditions.

Islanders tend to prefer small boats with low overhead costs because it gives them the freedom to choose when and how much they will fish. However, dinghies cannot operate in strong winds and currents. Most Islanders therefore concentrate their fishing during the neap tide. Good management is thus one that can support the economic viability of their small-scale operations. In addition to maintaining local abundance, good management must thus control competition and minimize conflict to achieve equitable distribution of benefits.

³⁸ *Ailan Kastom* refers to the body of customs, traditions, observances and beliefs tied to Islander culture such as CMT and *gud pasin*. These long-standing institutions are rooted in traditional stories and creation myths.

Equity of benefit distribution rests upon the principle of equal opportunity. Most Islanders are adamant that the fishery should be equally accessible to all Islanders, regardless of their level of effort and participation. Interviewed Islanders recognize the importance of the fishery for older people to be able to get “pocket money” and as a general supplement for the community before holidays among other things. The importance of the fishery is valued by the number of households that benefit rather than by the aggregate revenue it produces for the region. A part-time fisher from Badu, reflecting on the various contributions of *kaiar* to the community, stated: “*It would be sad if they forced everyone to be full-time*”. Islanders tend to disapprove of regulations or technologies that confer an advantage to only some fishers to the detriment of others. For example, there is a strong awareness and concern for free-divers who must compete with hookah divers. Because hookah makes harvesting easier, Islanders have devised informal rules to level the playing field such as prohibiting the use of hookah on top of reefs. Some communities have also instated hookah bans in their waters.

Equal opportunity does not mean equal access to knowledge or information. Nietschman (1989) recounts how dugong hunters will sometimes share misinformation to protect their hunting locations but will cooperate when hunting for feasts. Similarly, some *kaiar* fishers described how they will sometimes make large detours on their way back from fishing to misdirect other fishers. Information is not neutrally shared but embedded within social and kinship relations.

As mentioned earlier, for Islanders, sustainability is an extension of the principle of equal opportunity for future generations and a responsibility that comes with ownership. A sustainable fishery is thus one that can provide for both the environment and people in the future. This is where the principle of “take only what you need” takes on its full meaning as a central component of Islander management:

“See when the white people came... they wanna make money all the time: you know what I mean. Here we are in TS, we fish at certain time. We can stay here for months and certain time we can go out fishing: just get enough for the family. Like that's how we be live before: never overfish.”

The general view is that what remains in the sea is a long-term investment for the future. When discussing *kaiar* catch and fishing effort, a fisher on Yam indicated: “*If I've got money in the bank,*

what's the use of going out fishing? There's only one shop here, might as well leave it there [in the sea]." Another fisher from Thursday Island challenged scientific interpretations of TRL migration:

"What we don't catch, who knows to say that it's not gonna be there next year. A lot of people say that the 3+ [mature TRL] just walk away. But still, other crays will still be here and they'll be there for the next season."

According to Islanders, sustainability is best achieved by a combination of restraint, careful adoption of technology so that fishing is not "too easy", and adjusting effort to environmental conditions such as weather and *kaiar* abundance. In addition, as a general norm, Islanders do not fish on Sundays and during social events and fishing is prohibited during other cultural events. All these constraints are viewed as positive effort controls. As a well-respected elder and retired fisher stated: "*That way it just manages itself.*"

Islanders are mindful of the long-term impacts new fishing regulations can have and want to make sure that they "*are not closing down options*". When discussing new measures such as quotas and leasing, many interviewed fishers suggested the need for a trial period and learning from it before taking a decision.

Discussion: Implications for Everyday Practice

The Boundaries of Fisheries Management

The combination in TS of a tightly aligned and complex governance structure with a powerful discourse based on conventional fisheries management and neoliberalism results in highly bureaucratic and technical management. Islanders have to deal with multiple jurisdictions, governmental agencies, and fishing regulations and a consultative structure that makes participation difficult and where their decision power is limited.

Statements about fisheries, what counts as valid knowledge and characteristics of the fisher subject (see Table 8.2) have implications for recognition of Islander issues, knowledge and skills. The explicit requirement of managing for MSY privileges scientific knowledge, in particular statistical

knowledge at the stock level. This defines who can credibly talk about fisheries management and creates a hierarchy of knowledges that manifests itself in different ways. For example, the Resource Assessment Group (RAG) is strictly concerned with stock assessment. To meaningfully participate, one has to master the language and the science – any other type of knowledge is pushed aside. Islander knowledge is recognized insofar as it can complement science within the existing framework. Talks about Islander participation in scientific research have been up to now about how Islander knowledge and skills can be at the service of scientific research rather than Islanders being equal research partners, leaving the primacy of Western science unchallenged.

The definition of the subject of fisheries management (see Table 8.2 – “Paradigms and Mental Models”) leaves little room for reciprocity, rights to self-determination and priorities that are not economic. Sociocultural differences are often portrayed as challenges as management tries to make Islanders “fit” into the fisheries management’s conventional model. The solution put forward is to raise Islanders’ capacity: to understand fisheries science, to participate in meetings, and to increase their catch by “*honing their business skills*”. Capacity-building is only directed at Islanders and there are no initiatives in parallel to improve State and government agency representatives’ capacity to understand Islander perspectives and worldviews in order to improve communication and relationship-building. When asked about the factors that limit their fishing, Islanders overwhelmingly discussed issues related to infrastructure. Recurrent fuel shortages have been a problem on the outer islands for many years. Difficulties in accessing mechanical support or parts are also an issue. These problems are well known, but seen as outside of fisheries management mandates, despite the direct positive impact it would have on Islander capacity. In addition, fisheries management casts traditional inhabitants as one stakeholder group, one towards which the Commonwealth has special obligations, but one among others nonetheless. This approach goes against Islanders’ status as traditional owners. A manager emphasized:

“All their [Islander’s] views cannot be implemented because their interests have to be balanced with other stakeholders’ views, legal requirements, the environment, the wider Australian society.”

As the only representative of formal management based in the region, AFMA managers’ personality and management style have a tremendous influence on everyday practice. How they

exercise their individual agency plays an important role in Islanders' perception of and relationship with fisheries management as well as in the perceptions and understanding of TS fisheries by AFMA's Chief Executive Officer and staff based in Canberra. All interviewed AFMA managers indicated that they understood that TS fisheries do not correspond to what is considered "standard" on the mainland and that this appreciation grew as they spent more time in the region. One AFMA manager stated: "*These fisheries can't be managed like other fisheries because of many other factors that are not economics. You can't compare: they're apples and oranges.*" For this manager, the biggest challenge for fisheries management in the region was: "*Effectively taking into account the very unique social and cultural aspects of these fisheries in a contemporary fisheries management context.*" Despite this awareness, AFMA managers repeatedly emphasized that management is constrained by legislative requirements. An AFMA manager explained:

" (...) the fisheries management that comes out of the [AFMA] Canberra office obviously adheres very stringently to all the Commonwealth fisheries policies that are in place. The PZJA being a joint authority gives some leeway in the way we operate, but at the end of the day we still want to make sure that we fit under that umbrella of policies that are coming out of the Commonwealth."

The need to legislate all rules and the formal decision-making structures makes any modification a lengthy and complicated process. A manager even referred to this structure as "*a big unwieldy beast*". This complexity creates resistance to change, ultimately constraining agency.

While legislation frames management practice, the fisheries discourse (summarized in Table 8.2) also strongly influences how legislation is interpreted and therefore applied. The TS Treaty clearly makes a distinction between the objectives of protecting the traditional way of life and livelihood from ensuring the primacy of traditional fishing over commercial interests. The terms "traditional way of life and livelihood" are not defined in the TS Treaty and thus open to interpretation. However, in defining "traditional activities", the TS Treaty indicates: "(...) except in relation to activities of a commercial nature, 'traditional' shall be interpreted liberally and in the light of prevailing custom" (art. 1 (k)). A liberal interpretation has clearly not been applied in pursuing the objective of protecting the traditional way of life in TS and any aspect not explicitly mentioned in the Treaty (i.e. traditional fishing and visiting rights) is seen as being outside of fisheries' mandate.

Issues of Framing

The current framing of fisheries management obscures and excludes Islander objectives, values, and ontologies in everyday practice. The desirability of full utilization and of maximizing total revenue from the fishery are unquestioned by the State. Profit maximization behavior is encouraged and the interests of fishers with lower level of efforts are dismissed as “cultural” or “lifestyle choices”. The welfare function of the *kaiar* fishery and the importance of the economic contributions provided by lower effort are completely absent from management considerations. TRL that migrate out of TS annually are considered by CSIRO scientists to be of “no alternative use and value (...) (other than a small additional contribution to spawning biomass)” (Dennis et al., 2015, p. 113). This discounts any potential contributions of TRL to the larger ecosystem. While not the focus of this paper, it also negates the interests of coastal PNG people, namely those at Yule Island where part of the stock goes to breed. CMT – which shapes Islander everyday life and is paramount in governing fishing – is ignored in a similar fashion. While all actors in the fishery are cognizant of CMT, these boundaries are not taken into account by other fishers nor in discussions about raising Islanders’ catch. The ontological, social and cultural dimensions of sea territories are rendered invisible (see Table 8.2). When Islanders request that fishers show respect by asking permission to enter their territories it is not simply a question of access to resources, but these other aspects are concealed.

As outlined in Table 8.2, Islanders’ vision of management significantly differs from that of the official fisheries discourse. Interactions between optimal utilization and the focus at a regional scale in terms of sustainability, economy and centralized management do not account for very serious impacts of competition and conflicts between sectors, local depletion and economic viability of indigenous small-scale operations. Non-indigenous fishers also harvest on some of the reefs claimed by Islanders. Their boats can remain anchored at reef sites and harvest continually while Islanders stop during the spring tide to either work on land or because the tides are too strong. Many Islander fishers expressed discouragement and frustration by the constant presence of boats. Local depletion is a general concern, but the risk is heightened in Yam sea territory. PNG cross-endorsed boats have just recently begun harvesting in Australian waters, but they are entitled to 25% of the TAC. Up until now, PNG boats have taken all their harvest from the portion of Warrior

Reef located within Yam territory. Yam Islanders are extremely concerned about the impacts of potentially catching 25% of the TAC on one reef, namely one they depend on. Even though fisheries scientists and the local AFMA fisheries manager have clearly expressed an awareness of this scale issue in personal interviews, there seems to be an unwillingness to address these concerns in management.

For Islanders, knowledge is gained by experience and is socially embedded. It is not shared openly and must be earned. Some Islander fishers expressed frustration at the fact that CSIRO scientists make the results of the surveys freely available before the end of the season. Non-indigenous fishers will use this information to decide the location of TRL fishing. When local abundance is high in an Islander sea territory, this increases the likelihood of boats coming to harvest.

Environmental, sociocultural and self-imposed technological constraints to fishing are viewed by Islanders as positive measures that contribute to sustainability, while management considers these as “inefficiencies” contributing to the TRL fishery being “underutilized”. There is considerable pressure for Islanders to either increase their catch or to lease it to the non-indigenous sector once quotas will be implemented (see Lalancette, 2017). Some managers recognized the sustainability of Islander ways, but highlighted the Commonwealth imperative for achieving optimal utilization:

“But it doesn’t seem like the government is willing to just say: ‘we’ll just leave this thing and it’ll just be a little fishery ticking along wherever it finds its natural level below some sustainable level”.

“I’m not sure of the government’s appetite for to see a good output fishery being reduced to one that’s chopped in half.”

This preoccupation with optimal utilization trumps again Islander concerns about the adverse economic and environmental effects of competition. Dennis et al. (2015) recently published a cost-benefit analysis on conducting one or two annual fishery-independent surveys as opposed to using CPUE data alone to set the TAC. Their argument is based on the additional revenue afforded by a more precise and higher TAC, with the prerequisite that a certain portion of this extra catch would

be harvested. The authors do not acknowledge, however, that the traditional inhabitant sector does not currently harvest their quota share and that any increase in TAC would only benefit the non-indigenous sector thereby increasing competition for Islanders.

Islander demands for spatial limitations are considered to be incompatible with the objectives of optimal utilization and maximizing revenue. Principles of equal opportunity and precaution beyond the target reference point are generally ignored on these bases. Since the introduction of hookah in the 1980s, Islanders have cyclically called for hookah-free zones at fisheries meetings, motivated by competition, sustainability and equity concerns. Positive discrimination towards free-divers is seen by managers and Fisheries Departments as unjustifiable as they have significantly lower catch rates. Moreover, Islanders' resistance to hookah is viewed by other actors as politically-motivated, which is true to some extent. Islanders are well aware of the non-indigenous sector's reliance on hookah. Nevertheless, any technology that improves the non-indigenous sector's catch also exacerbates the effects of competition on their small-scale operations. Islanders' priority of ensuring long-term access to future generations means that they do not see "underfishing" as an issue and are thus very cautious about any means that can threaten long-term sustainability. Besides optimal utilization and maximizing revenue, some managers have also argued that hookah-free zones would be very difficult to implement and nearly impossible to enforce.

Finally, management's efficiency imperative is an obstacle to relationship-building. Some AFMA managers indicated in interviews they felt the need for "having a reason" to travel to the various islands and interact with Islanders despite their desire and interest to do so. AFMA managers and fisheries scientists typically conduct very short visits, often lasting only a few hours. The recommendation to literally "sit down and drink some tea" put forward by Castleden et al. (2017, p. 86) as part of relational ethics would be considered to be outside of fisheries management mandates and simply inappropriate. From an Islander perspective, however, this lack of relational accountability is viewed as a lack of respect.

Conclusion

In this paper, we proposed a framework that combines elements of the interactive governance and political ontology frameworks with the analytics of governmentality as a lens to analyze issues related to indigenous peoples' rights and aspirations in State-controlled fisheries. This framework has allowed us to conduct a targeted analysis of indigenous Islander realities in relation to conventional fisheries management in the TS TRL fishery. We have shown how current structures, processes and discourses forming the apparatus of governmentality in the TS TRL fishery mutually reinforce each other and are at odds with indigenous Islanders' conceptions of fisheries, fishers and good management. We highlighted how the framing of fisheries by the official management discourse excludes and renders invisible certain issues of importance to Islanders, in particular those related to ontologies.

The current regime contradicts indigenous rights and aspirations in fundamental ways. Uneven relations of power are deeply embedded in Eurocentric structures and processes and these cannot be completely resolved by simply increasing indigenous participation. We agree with Mabee and Hoberg (2006, p. 878) that "equality in comanagement between indigenous peoples and the state is more likely to be achieved when a new system is created that truly integrates the key elements from both traditions, rather than trying to fit indigenous cultures and knowledge into Western 'scientific' resource management systems". Comprehensive shifts in institutional alignments and in existing power relations in fisheries are thus necessary to fully respect indigenous rights, enhance indigenous wellbeing and ultimately improve fisheries governance and management.

Table 8.2: Comparison of Key Elements of Discourse According to our Framework (Figure 8.1) between the Fisheries Official Discourse and Islander Discourses

| | Islanders | Fisheries Management |
|-----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <ul style="list-style-type: none"> • The Sea can be and is property • TS Islanders are the legitimate owners of resources within their sea territories | <ul style="list-style-type: none"> • The Sea is an international commons, it cannot be owned • The State is the legitimate owner of marine resources within its coastal waters |
| Paradigms and mental models | <ul style="list-style-type: none"> • Customary Marine Tenure (CMT): <ul style="list-style-type: none"> – Sea is owned, shared and managed – Stewardship responsibilities – Linked to identity – Sea places contain history • <i>Kaiar</i> one element of a larger interconnected system <ul style="list-style-type: none"> – <i>Kaiar</i> not harvested is available for future use | <ul style="list-style-type: none"> • Tragedy of the Commons: <ul style="list-style-type: none"> – Sea is open access – Fishers solely driven by profit and must be controlled • Maximum Sustainable Yield (MSY) <ul style="list-style-type: none"> – “Surplus biomass” of no value if not harvested – Focus on single species |
| | <ul style="list-style-type: none"> • Subject: <ul style="list-style-type: none"> – Embedded in kinship and social relations – Different and varying motivations – Engaged in self-management through Islander institutions | <ul style="list-style-type: none"> • Subject: <ul style="list-style-type: none"> – Separate from and superior to nature – Rent-maximizing individual – Client in need of management “services” |
| | <ul style="list-style-type: none"> • Wealth accumulation generally disparaged • Ethic of sharing, moral economy | <ul style="list-style-type: none"> • Neoliberal development |
| | <ul style="list-style-type: none"> • Indigenous rights <ul style="list-style-type: none"> – Self-determination: economic development on their own terms | <ul style="list-style-type: none"> • Mainstreaming <ul style="list-style-type: none"> – Islanders are in a “pre-capitalist” state |

| | | |
|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Objectives and values | <ul style="list-style-type: none"> • Ensure future availability of <i>kaiar</i> <ul style="list-style-type: none"> – Inter-generational equity – Stewardship responsibilities | <ul style="list-style-type: none"> • Protect fishery resource <ul style="list-style-type: none"> – Conservation value |
| | <ul style="list-style-type: none"> • Economic development <ul style="list-style-type: none"> – Based on needs – Accommodate sociocultural values and responsibilities (e.g. time in community and with family) | <ul style="list-style-type: none"> • Optimal utilization of TRL • Increase employment opportunities for traditional inhabitants |
| | <ul style="list-style-type: none"> • Ownership, management & control of the <i>kaiar</i> fishery | <ul style="list-style-type: none"> • Acknowledge and protect the traditional way of life and livelihood of traditional inhabitants <ul style="list-style-type: none"> – Limited focus on traditional fishing • Share the TAC with PNG in accordance to the TS Treaty |
| | <ul style="list-style-type: none"> • Equitable distribution of benefits: equal opportunity (Islanders, between sectors) <ul style="list-style-type: none"> – Community wellbeing – Wealth accumulation discouraged | <ul style="list-style-type: none"> • Promote economic development in the TS area <ul style="list-style-type: none"> – Individual freedom – Wealth accumulation encouraged |
| | <ul style="list-style-type: none"> • Utilitarian value <ul style="list-style-type: none"> – Multiple functions | <ul style="list-style-type: none"> • Utilitarian value <ul style="list-style-type: none"> – Commodity production |
| Criteria and principles | <ul style="list-style-type: none"> • Controlled by Islanders | <ul style="list-style-type: none"> • Effectiveness: compliance <ul style="list-style-type: none"> – Ease of enforcement – Legislating all rules – Formal mechanisms for enforcement by government agencies |
| | <ul style="list-style-type: none"> • Respect <i>Ailan Kastom</i> and <i>gud pasin</i> | <ul style="list-style-type: none"> • Respect obligations set out in legislation |
| | <ul style="list-style-type: none"> • Economic viability of small-scale operations • Respond to different and changing needs • Take only what you need | <ul style="list-style-type: none"> • Maximize profit of the fishery (regional scale) |
| | <ul style="list-style-type: none"> • High local abundance in individual sea territories | <ul style="list-style-type: none"> • Sustainability at the stock level: target biomass in function of MSY |
| | <ul style="list-style-type: none"> • Based on holistic knowledge and daily observations of the environment | <ul style="list-style-type: none"> • Based on the best available science <ul style="list-style-type: none"> – Objective and neutral (apolitical) |

| | | |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| | <ul style="list-style-type: none"> • Long-term view | <ul style="list-style-type: none"> • Yearly temporal scale |
| Preferred tools | <ul style="list-style-type: none"> • Adjust effort based on: <ul style="list-style-type: none"> – CPUE – Costs (mostly fuel) and landing prices – Needs – Other economic and/or subsistence opportunities | <ul style="list-style-type: none"> • Single-species and technical <ul style="list-style-type: none"> – Stock assessment – Visual surveys and catch monitoring – Target and limit reference points based on estimates of unfished spawning biomass |
| | <ul style="list-style-type: none"> • Decentralized: CMT | <ul style="list-style-type: none"> • Centralized |
| | <ul style="list-style-type: none"> • Informal input controls by way of small-scale operations and cautious adoption of technology to control effort creep | <ul style="list-style-type: none"> • Output controls: TAC • Preference for ITQs |
| | <ul style="list-style-type: none"> • Enforcement of norms through social sanctions (e.g. “take only what you need”) | <ul style="list-style-type: none"> • Incentives to encourage and reward profit maximizing behavior (avoid regulation that limit fishing “efficiency”) |
| | <ul style="list-style-type: none"> • Open entry for Islanders to promote equal opportunity • Access to fishing grounds controlled by CMT | <ul style="list-style-type: none"> • Limited licensing <ul style="list-style-type: none"> – Remove latent effort |

Chapter 9

Conclusion

This doctoral research explores the connections and disconnections between the perspectives and practices of indigenous small-scale fishers and those of government fisheries managers. It aims to provide a better understanding of barriers to, and opportunities for, the advancement of indigenous rights and agency in State-controlled fisheries operating under the logic of conventional fisheries management. The larger goal is to contribute to the improvement of fisheries governance and management in terms of sustainability and social justice.

The focus of study is the tropical rock lobster (TRL) or *kaiar* fishery in Torres Strait (TS), northern Australia. The islands and surrounding seas in this area make up the traditional territories of a group of indigenous sea people of Melanesian descent – the TS Islanders. Islanders have proven to be resilient as an indigenous people despite a history marked by violence, intrusion, exploitation by outsiders and colonial dispossession (Beckett, 1987; Ganter, 1994; Nakata, 2004). Through cultural innovation and political creativity, Islanders have successfully defended and sustained ecological attachments to their land and sea territories and a culture where fishing and living off the sea is as much about livelihood as relationships and identity (Scott, 2004; Scott & Mulrennan, 1999; Thomassin, 2016). Using a variety of legal and political strategies, Islanders have actively pursued their aspirations to self-determination and have made continuous advances towards greater autonomy. In recent decades, they gained legal recognition of their traditional lands and expanded their role in decisions affecting resource use in the region, including increased representation within the fisheries governance structure (Mulrennan, 2007).

TRL or *kaiar* is the most economically valuable fishery in the region (worth 18.4 million AUD in 2013 (PZJA, 2016)). While *kaiar* is but one resource among many that Islanders harvest, this fishery is central to achieving their aspirations for economic and political autonomy. It is the commercial fishery in which Islanders are most active, but also the one with the highest participation of outsiders. At the outset of this research, this fishery was subject to two competing currents. On the one hand, the highest decision-making body for fisheries in the region (the

Protected Zone Joint Authority – PZJA) had committed in 2005 to introduce a total allowable catch (TAC) and allocate quotas between the indigenous and non-indigenous sectors to commence in 2007 (PZJA, 2005). On the other hand, Islanders were pursuing legal recognition of their sea territories. A decision regarding the Sea Claim was pending, the outcome of which could profoundly transform power relations in the region. In addition, a shift was becoming apparent in the official fisheries management discourse. Although TAC introduction was originally motivated by sustainability concerns (Pitcher et al., 2001), these proved to be temporary. TRL abundance reached record highs in 2002-2005 (Pitcher et al., 2002; Ye et al., 2004, 2007) and the stock has been considered “underutilized” or “underfished” by managers since. Neoliberal principles underpin a preoccupation with the objective of optimal utilization and were informing negotiations concerning quota allocation, creating pressure on Islanders to change their ways as a precondition for greater access. This case was thus ideal to explore the tensions between indigenous worldviews, rights and aspirations on the one hand and conventional fisheries management in State-controlled fisheries on the other hand.

The research conducted was by necessity interdisciplinary in nature, bridging the disciplines of Human Geography, Political Science, Biology and Anthropology. It contributes to a body of literature that is centered on the governance and management of indigenous and small-scale fisheries, while also addressing considerations that pertain to social-ecological systems, social-ecological resilience, social wellbeing, livelihoods, conventional fisheries management, and neoliberalism and property rights in fisheries. The major contributions of this thesis are summarized and discussed in the following sections at three levels: methodological, theoretical and empirical.

Methodological Advances

Understanding participants’ plurality of perspectives (broadly defined to include values, principles, knowledge, observations, aspirations and recommendations) is central to resolving natural resource management conflicts and for improving governance (Ostrom et al., 2007; Poteete et al., 2010). Access to, control over, and ownership of resources tend to be politically-charged issues that can potentially have serious social, economic and cultural impacts. However, in addition to ethical

considerations, effectively eliciting participants' views can be difficult, especially in cross-cultural settings involving tacit knowledge. The complexity of these issues, which span the social and natural sciences, calls for an interdisciplinary perspective as well as new methods and innovative combinations of a diversity of methods (Creswell, 2014; Morse & Niehaus, 2016; Poteete et al., 2010). There are also practical considerations that can constrain or influence the number and choice of individual methods in a mixed methods project. The task of developing a research design that will be practical, effective and respectful can be daunting. To address these challenges, I opted to use a qualitatively-driven mixed methods approach where I experimented with a number of different methods.

This thesis contributes to advances in mixed-methods research by critically examining salient issues of research design and implementation. The emphasis is on the contribution of a combined methods approach rather than the search for a single superior method which will in any case tend to be strongly influenced by the nature of the research process (i.e. relationships), the combination of methods, and the research design. Chapter 5 offers practical advice on how to choose, adapt and combine different methods in a given context while paying due attention to methodological principles from participatory action research and indigenous methodologies. It also contributes to methodological development by proposing a novel way to conduct and analyze preference rankings of fishing scenarios of catch and effort.

The thesis proposes a research design that enables a high level of integration between methods and offers the possibility to refine data collection. Following Morse (2009) and Morse and Niehaus (2016), the research design presented in Chapters 4 and 5 consists of a core component combined with supplementary components. The core methods for this research were interviews (unstructured and semi-structured) and participant observation and were supplemented by three additional methods: (1) a choice-based stated preference method (preference interviews and rankings), (2) a qualitative modelling exercise (cognitive mapping), and (3) a structured focus group method for targeted brainstorming (future scenarios). Some of the methods proposed, such as cognitive mapping and future scenarios, are increasingly being used in combination and our findings confirm the advantages of this pairing. In contrast, ranking exercises are typically applied by economists. Chapter 5 presents a novel way to conduct scenario rankings, allowing this method to serve as an

additional interview tool that can elicit factors and values underlying fishers' preferences. Proposed quantitative analyses, such as clustering, are used to reveal the data structure, thereby providing new insights into the variety and distribution of preference profiles among fishers.

The methods used and the advice presented in this thesis are readily applicable to research in fisheries and can easily be extended to issues of natural resources and environmental governance and management.

Theoretical Contributions

This dissertation provides a novel theoretical synthesis by bringing together insights from social-ecological systems, social wellbeing theory, resilience thinking, post-structuralism (Foucauldian governmentality) and political ontology. In particular, the thesis proposes in Chapter 8 an integrated conceptual framework that allows for a targeted analysis of the relations between the structure and practices of the State and indigenous realities, while being sensitive to issues of ontological dissonance. This framework was useful in revealing conflicts between conventional fisheries management and indigenous peoples' rights and aspirations. An analysis, such as presented in Chapter 8, can thus identify potential levers of change to improve the governance and management of fisheries.

Building on recommendations from Armitage et al. (2012) and Coulthard (2012), among others, Chapter 6 uses the dual lens of social wellbeing and social-ecological resilience to examine Islander practices and adaptive strategies. In order to achieve a greater degree of integration between these concepts, an emic perspective was adopted in defining SES resilience, defined as the ability to sustain the attributes considered important to Islander society in the face of change as determined by Islanders themselves. This provides a means to broaden the scope of inquiry to explicitly include cultural resilience which directly links to the subjective dimension of social wellbeing. Chapter 6 illustrates how this approach can uncover both the multiple functions of the fishery within the larger SES and the rich diversity of adaptive strategies that shape Islander participation in the fishery. It is hoped that the manuscript to be published from this Chapter will contribute an interesting example that adds to the a growing body of literature illustrating how small-scale fisheries are more

than an economic resource and should be managed and sustained as a fundamental component of the SES.

The particularities of TRL fisheries management in TS, explored in Chapters 7 and 8, underscore discrepancies between the theory and principles of conventional fisheries management and its application in practice. Bioeconomic theory, with its objective of profit maximization is fundamentally tied to issues of ecological sustainability. Fisheries management measures, such as TAC and ITQs, are typically introduced when stocks are in serious decline. Sustainability arguments will often take center stage in obtaining social acceptance as these measures are presented as tools to strike a balance between environmental and economic objectives. Individual quotas have long been promoted on the basis that ownership automatically leads to greater stewardship despite evidence of a trend towards concentration of quotas in the hands of absentee owners (e.g. Batstone & Sharp, 1999; Eythorsson, 1996a, 1996b; Gibbs, 2008; Pinkerton & Edwards, 2009) and incentives for high-grading and discarding in ITQ fisheries (Copes, 2000; Copes & Charles, 2004). By examining a fishery considered to be “underutilized”, this research reveals that in practice, the commitment to wealth accumulation takes precedence when sustainability is not an urgent issue. The case of the TS TRL fishery clearly shows that the objectives of optimal utilization and profit maximization, unfettered by sustainability concerns, have unleashed the full power of a neoliberal discourse and are the driving force behind proposed fisheries policies. The contradictions between the deep commitment to these uncontested economic objectives and the need to attend to stock sustainability are readily apparent in contradictions within the official fisheries discourse in TS that simultaneously promote the need to both increase and limit TRL catch.

The tension between environmental and economic objectives in fisheries is well recognized and many social scientists have documented the negative social impacts brought by conventional fisheries management (for recent reviews see Olson, 2011; Pinkerton & Davis, 2015). “Wealth accumulation fisheries” have been shown to be particularly detrimental to small-scale and indigenous fishers (e.g. Carothers, 2015; Davis & Jentoft, 2001; Pinkerton, 2015). Chapter 7 and 8 add to an extensive literature that documents social and cultural impacts of neoliberal measures in fisheries by exposing how these are antithetical to indigenous rights to access, own and control

their resources. They provide a fresh perspective by illustrating how clashes between fisheries objectives go well beyond different understandings of fisheries management and are rooted in fundamentally different paradigms and ontologies. Both chapters attempt to show that in contexts where the State is intent on imposing its vision for economic development, it is unlikely that limited recognition of indigenous rights to access territories and resources will be sufficient to protect their interests. Indeed, Chapter 8 confirms that uneven relations of power are deeply embedded in structures and processes and these cannot be completely resolved by simply increasing indigenous participation.

Taken together, the findings of this research confirm the crucial relevance of careful social science research for fisheries policy. It shows that fisheries governance that seeks to enhance wellbeing and respect indigenous rights must pay special attention to ontological conflicts.

Empirical Contribution: Policy-relevant Fisheries Governance and Management Insights

It is hoped that the findings of this doctoral research have generated practical insights that shed light on the governance and management of TS fisheries in general and of the TS TRL fishery in particular.

The results presented in Chapter 7 address potential impacts of measures currently proposed to achieve optimal utilization while increasing Islanders' ownership of the TRL fishery. They strongly indicate that mandatory leasing of unused Islander quota and introduction of ITQs for the indigenous sector are likely to create serious economic, social, cultural and political negative impacts for Islanders. Islander concerns about these measures are well-founded and consistent with a large body of empirical evidence stemming from both indigenous and non-indigenous fisheries around the world.

Chapter 7 ends with a recommendation that fisheries management in TS should move away from the objective of optimal *utilization* to focus instead on achieving optimal *benefits*. This shift would by no means be a simple undertaking. The analysis in Chapter 6 reveals that *kaiar* fulfills multiple functions in Islander society, some of which are currently ignored, such as the important welfare

function of *kaiar* for many Islanders. It also highlights that the contributions of *kaiar* to Islander wellbeing are multi-faceted and vary among individuals. Chapters 7 and 8 highlight how, up to now, the interests of fishers with lower levels of effort have largely been dismissed as “cultural” or “lifestyle choices” while fisheries governance has overly focused on full-time and active part-time fishers. How proposed fisheries measures might support or hinder material, relational and subjective wellbeing in the short and long-term and how these impacts would differ among Islanders deserves major attention. Such an assessment, based on wellbeing criteria determined by Islanders themselves, could provide a strong foundation to strike a balance between political, economic, social and cultural objectives.

As recounted in this thesis, Islanders have recently gained recognition of their sea territories along with non-exclusive commercial fishing rights. This decision prompted the PZJA to officially support Islanders’ aspirations for 100% ownership of the TRL fishery. However, no changes in governance have been proposed and the pressures for achieving optimal utilization do not seem to have relented. It is thus unclear at the present time to what extent these developments can or will increase Islanders’ ability to control and manage their resources.

Findings in Chapter 8 indicate that uneven power relations are deeply embedded in the current fisheries governance structure which privileges Western views, in particular fisheries science. This structure fails to support the type of collaboration required for identifying and evaluating different fisheries options as suggested by a focus on optimal benefits. Creating a space for Islander values, aspirations, institutions and knowledge – alongside fisheries science – is essential to ensure respect of indigenous rights, enhance Islander wellbeing in a socially just manner, and achieve sustainability. The optimal governance arrangement for such a space would need to be determined in collaboration with Islanders in order to be culturally-appropriate and avoid duplicating the same power differentials. Such an endeavour may require capacity-building on all sides to foster trust and understanding of different perspectives, knowledges and worldviews. Recognition of long-standing Islander institutions of customary marine tenure and their incorporation as a valid component of fisheries governance could provide a starting point for introducing shifts towards broader and more inclusive objectives and outcomes, and for building more equitable relationships.

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Appendix 1

Final Words – Islander Voices

This doctoral research has examined TS Islanders’ perspectives in the context of a proposed TAC and quotas and growing recognition of their rights pertaining to marine resources. Throughout this thesis I did my best to faithfully represent a variety of Islander voices. I would like to end by giving back the floor to Islander themselves without any intervention on my part besides a loose organization of quotes under very broad themes.

Islanders as Sea People

“Yeah, it's like being in the dinghies... most of my life I've been doing it. It's like lifestyle. I like the sea...”

– Part-time hookah and free diver, Badu Island

“Yeah, I get hyped. You know when I stay too much on – here in the house – I'm off my head. I'm not used to stay on shore you know cause my life is on the sea.”

– Part-time hookah and free diver, Badu Island

“Just enjoy swimming and diving and... I just love the sea, so. On the other hand, it's extra money. Like now I have bills to pay. And it's quick. It's quick to get extra money on the side.”

– Full-time free diver, Yam Island

“Most of our grandad bin diving all their life. We just love stuff like that and because we can also make money from the thing, yeah... It's another source of income I suppose.”

– Full-time free diver, Yam Island

“Diving, it's my life”

– Part-time hookah and free diver, Badu Island

“Yeah, he's been brought up in that lifestyle he's grown up... It's what he's best at actually. He loves it so... Cause, he does part-time work (...), but, if he could do that, he would only be doing crayfishing. And he's that type of person who likes to work like, seasonal work? Yeah, put it this way, he would never be able to work on the land as a day job 8 to 5 every day. No, it's just not him (laughs). Yeah... that Island lifestyle, island way.”

– Spouse of part-time free diver, Badu Island

“Because I really love the sea, I never intend to go and living down South and that. There's also good things like down South, like Barrier reef and that. But, it's a lot of costs involved and everything to get out there... And [spouse name] understands, she knows that I'd rather spend a Christmas holiday here than head down even though... Like, I've been down to Sydney and all the things passing there but I really don't get off of dem (...) Just, there's so many things to do here! We can do, right there: diving. We can go... like there: it's right here! We don't need to go that far.”

– Casual free-diver, Badu Island

Assertion of rights/ Aspirations/ Competition with non-indigenous fishers

“We, as TS Islanders, can manage our own fisheries. When, someone else is managing it... Cause when someone else is managing it, then naturally you'll have loopholes and stuff. When we manage it, we understand, you know, when to work and when *not* to work. But when there's someone else there, they just get in there and work and work that thing and fish it up. Now it's neap and there's boats working at the back, off the bottom, right now. And when the wind blows, the water gets dirty, they move off of the reef, they anchor at the back of the reef and while all the fishermen – all the Islanders – are back home waiting for the next neap they work the reefs and by the time we go there to the reef, there's nothing there and they're back out there again working on the bottom and... [big sigh]. It's like, basically, they can do what they want to do.”

– Part-time free diver, Badu Island

“My theory is that we can't win [against outside economic interests], that's why we need to be out there and get the product. If I don't beat them, my kids will. That's what I'm teaching them now.”

– Full-time free-diver, Yam Island

Speaking of the demand for a 70% at the outset of quota management:

“There will always be a fishery, but that way who chooses to be a fisherman there will be buyers for them and the product will always be there for them. We're not here to kill everything in the sea like the... A lot of boats are here for... to make... The majority of our money stays in the Torres Strait where we get the money. A lot of these companies and boats come here, they're making the money. Torres Strait is not benefitting from that. And if the young kids they actually want to work in the future. They have a guaranteed future for them.”

– Full-time hookah diver, Thursday Island

Speaking about the TIB license (the money and the hassle of making sure it's not expired, the paper work, etc.):

“If they say we're the traditional owners, why do we have to pay for something that's ours?”

– Full-time free-diver, Yam Island

“The thing is, what we're trying to do is to keep it [*kaiar*] for, like, future kids, but where now we are forced to use it, use that resource; because we're limited: we've got other people doing it [fishers from other sectors]. And when these people [other Islanders] go out there, they get upset when they see: “Aah, somebody bin here”. That's THEIR grounds where they make their money and once they get out there and they see a boat there and all these boats are doing it – they just stay there, they just anchor there and move to the next place, wait for the crays to come back and they can get back there straight away. And they know how community works, the timing of community, that's how they know they can beat the fishermen to the spot.”

– Full-time free diver, Yam Island

“...but the honest point is that 70% – we're not there to kill everything in the sea. We're there about sustainability. What we don't catch who knows to say that it's not gonna be there next year. A lot of people say that the 3+ just walk away. But still, other crays will still be here and they'll be there for the next season. Like we don't want to have boats running around here all year without no closure. A lot of boats have proven that, you know, even like now with tides so strong and the full moon, they're still working and that's creating more hardship for island divers because more restrictions are coming down on us and we gotta do all these new things and we don't really have time for that. We dive safely, now we need a ticket for diving”

– Full-time hookah diver, Thursday Island

“Most of dem boats too they work here and then like they can go. If there's nothing here next year, they go down the East Coast you know? They don't care what happens here.

– Full-time hookah diver, Thursday Island

Islander Management

Full-time free-diver, Yam: “Yeah, yeah that's too easy [hookah], it's too easy [using hookah] and that's the thing we were trying to avoid in the past. But it's happening! So... it's not working what we want.”

Spouse: “Some people are scared. Some people want the hookah cause it's easy. But then other people look at it like in the long-run and you know, like: how much damage are you gonna do? It's lasted that long [kaiar] but you didn't have all those machines and now you want to bring dem things in.”

Diver: “The way they [the non-indigenous boats] were doing it the first time, even though they were doing it the most efficient way, and like: too easy. That's it, yeah... like too easy for them to catch it and at the time they're catching it at a faster rate than us. Where if we do it our way, that way, it'll still be sustainable.”

“Right at this point, we still want to stop hookah. Why? Because, so we can give time to the crays to come back to our home reefs again. And so it can be fair from the other end to the other end

where everyone will be catching like 70-80 kg, once again. The whole lot. Regardless of whoever you are whether you're a good diver or not. It's just a matter of getting a bommie and getting them out. Right now, you have to have an experience, right now you need to know what you're doing and gotta work hookah to get that kilo. Either than that: just go and work CDEP."

– Part-time free-diver, Badu Island

"You dive in the shallow areas, where crays in the deep should be reserved."

– Full-time free-diver, Yam Island

"Let me be honest with you, OK? For someone that has a heart for the other Islanders, for the people in the community and other Islands in TS... On the island, I know that not everybody has hookah. And I think it's only fair that we all do it together: free-dive. It's not fair that someone's catching more than the others. (...) if you have a heart for the others, the struggles that they go through: I think it's not fair."

– Part-time free diver, Badu Island

"A lot of them you'll see they'll go hard some time: bang, bang, bang because they want to buy something. Yeah, the need. They got a need, an obvious need. They want something and they want it quick maybe something to do with their dinghy: parts or this and that or whatever. Then they'll go hard to get that money to buy that thing and then relax."

– Spouse Full-time free diver, Badu Island

"Before time we would only free dive and the catches were always there. We goes out for a neap and we give a break in between. We worked one area and then move to another area to let it rest and restock. That way it just manages itself."

– Retired free diver, Badu Island