



Australian Government

**Australian Centre for
International Agricultural Research**

Final report

Small research and development activity

<i>project</i>	Science, culture and community-based environmental governance: a pilot study of Palau
<i>project number</i>	C2014/1285
<i>date published</i>	7/12/2015
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<i>final report number</i>	FR2015-14
<i>ISBN</i>	978-1-925436-11-2
<i>published by</i>	ACIAR GPO Box 1571 Canberra ACT 2601 Australia

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1 Acknowledgments

The authors would like to extend warm thanks to our Palauan hosts at the PAN Fund, Clarinda Zeigler and Noe Yalap, our “trusted friends” without whom the research would not have been possible. Thanks also to Birduu, Regis and Jenny from PANF for all their hospitality and support.

Our thanks also to all the participants of this research for their time and willingness to share their experiences and insights. Specifically, we would like to recognise the contributions of all the Palauan elders who generously shared their wisdom with us over the course of this project.

Finally, we extend sincere gratitude to The Australian Centre for International Agricultural Research for funding this study.

2 Executive summary

Research-based knowledge can play ambiguous roles in development—on the one hand, it provides much-needed investigation and analysis of complex issues and supports innovation and opportunity; on the other, it can threaten cultural practices and deep-seated social values that are closely held and often hard to discern. This poses a tension that sits at the heart of challenges for designing, conducting and delivering research for development programs that have genuine social impact and lasting benefit.

Existing approaches to understanding and working with these challenges have most commonly fostered strong relationships at the project level through participatory research, but rarely had reach to broader societal change (the problem of ‘scaling up’). Sociological and political sciences have generated nuanced critiques that have had little practical application.

This project sought to pilot test a new approach to understanding the dynamics between research-based knowledge and social and cultural dimensions of decision-making. Drawing on a theoretical framing from the critical social sciences, as well as empirical evidence from its application to a case study of natural resource management in the Pacific Islands country of Palau, we refined the framework to create a new research methodology, based on the concept of ‘knowledge governance’.

Knowledge governance is concerned primarily with the rules (implicit or explicit) that shape what people do with knowledge—what is created (who sets research questions?); whether it is shared (intellectual property falls under the banner of knowledge governance); whether people have ability or incentives to access it (paywalls and professional reward systems); and application (what are the expectations around how decisions or actions should be justified?). It draws on both science-based approaches to facilitating stronger relations between research-based knowledge and action, and sociological critique to examine the social and cultural context shaping the influence of science in practical decision-making. It proposed six categories of interest that were investigated: the dominant style of knowledge-making; transparency; objectivity; effectiveness; expertise; and credibility.

The study applied qualitative research methods to examine these categories in detail. We found that many interpretations of the categories in the Palauan context were different from those that we would expect (and have been shown) in Western settings. In particular, objectivity was largely rejected in favour of the exercise of flexible judgement; transparency was not highly valued, and opaque decision-making processes were accepted and celebrated. We further found that the dominant style of knowledge making, through consensus, formed an overarching theme that many of the others embodied in different ways. We also identified an additional theme, ownership, which our participants highlighted and emphasised.

On the basis of this empirical feedback, we developed an ‘inquiry framework’ that poses questions under each of these categories. We propose that applying a knowledge governance approach in the early stages of research may help researchers design projects that are sensitive to the social and cultural contexts in which decisions are made and actions taken. Applying this framework helps to build a snapshot of the knowledge-based processes that unite knowledge and action, and to assist researchers and practitioners to build a shared understanding of the opportunities and threats associated with research-based knowledge. This may, in turn, enable both Australian and country-partner researchers to build sensitivity to relevant cultural norms, and be better equipped to work sympathetically with existing decision-making processes. Ultimately, this approach may enhance the impact of research-based knowledge at significant social scales.

3 Introduction

Understanding the contribution that research can make to environmental governance is a complex task, but one which is increasingly relevant to research agencies. The challenges are multiplied in developing country contexts, where political, social, and cultural dimensions of decision-making can vary widely from those we are familiar with in wealthy Western democracies. While there have been many methodologies and research practices developed to increase the impact of research project at the project scale, broader understandings of how research ‘fits’ in the general landscape of decision-making has the potential to extend these benefits more widely. As an agency that invests research funding in highly culturally diverse countries and communities around the Asia-Pacific region, ACIAR’s development impact may be enhanced by building this knowledge. This project explores one approach for systematically investigating the relationships between knowledge-based processes and governance, where traditional and customary values remain prominent in environmental decision-making.

In this pilot study, we ‘road test’ a new framework that applies insights from the field of science and technology studies to the practice of environmental decision-making. We propose that the concept of ‘knowledge governance’ offers a useful middle ground between high level sociological theory and day-to-day decision-making practice. By focusing on the formal and informal rules that shape the ways in which decision-makers draw on knowledge to make or justify their decisions, we expect to identify new or underdeveloped avenues for sensitively incorporating scientific knowledge into local natural resource management.

To road-test this framework we have undertaken a case study on protected area conservation in the Pacific island of Palau. Palau was selected for several reasons:

1. Palau is widely regarded as a success story in conservation (Beck and Burleson, 2014), including successfully integrating science and custom into community based resource management.
2. The Palau Protected Area Network is an organisation with a relatively independent financial resource base, reducing possible distortions from external actors such as aid donors.
3. Palau is small in population size (around 20,000 people), with strong indigenous communities combined with complex colonial history making the case both accessible and demonstrating relevant socio-political features.
4. Palau has relatively high average income levels, and high participation in education, reducing the effects of poverty on conservation efforts.
5. Palau faces many of the development challenges associated with small island states and shares cultural similarities with other members of the Pasifika community.

Thus, this study presents an opportunity to explore how local decision-makers see the relationships between science-based understandings of conservation, and customary or traditional approaches.

3.1 Objectives

The pilot study examines the organisation, decision-making and implementation processes and practices of the main organisation, the PAN and PAN Fund, alongside a study of seven locally managed protected areas. The objective of this work is to:

- Test and refine a new framework for investigating and understanding environmental decision-making, particularly through the interplay of cultural and scientific dimensions in the governance of knowledge.

- Evaluate whether, and to what extent, the knowledge governance framework can be used to identify actions to facilitate greater adoption of science-based knowledge in natural resource management.
- Demonstrate the application of the framework to a small-scale, well-defined case study, with a view to assessing its efficacy in complex natural resource management settings.

Tangible benefits to the PAN Fund and local communities will arise if the study reveals opportunities to remove roadblocks between the Fund and its implementing communities, or pathways to improve or enhance the formal rules under which the Fund currently operates.

We intend that following this pilot, we may be able to investigate the social and cultural dimensions of research impact and application in developing country contexts with greater confidence and more robust methodologies.

4 Relevant literature

While it is beyond the scope of this report to review the full sweep of literature concerning the science policy interface, or relationships between knowledge and action, in this section we will seek to contextualise the knowledge governance approach in relation to key points that emerge from that broader field. There are two major approaches to understanding and facilitating better engagement between knowledge and action in the context of development: science-based approaches, and sociological critique.

4.1 Science-based approaches

This suite of approaches are characterised by being initiated from the “knowledge production” domain. They are primarily concerned with developing new methodologies, methods, and techniques for conducting research that is more closely related to the context in which it is hoped the knowledge will be applied.

4.1.1 Project scale innovation

Science-based approaches to improving linkages between knowledge and action have a long history, including the well-known agricultural extension movement. As an early example of efforts to improve the relationships between knowledge and action, extension processes and services were developed by agencies and actors who were tasked with taking research findings and demonstrating their applicability and effectiveness in farming practice. As such, it typically has little impact on the conduct of research itself, and is mainly focused on brokering connections at the end of the research process.

Further developments in this area emerged with new agendas concerning participation, based on the premise that engaging practitioners in the research process will ensure that the research itself is more relevant, and better able to meet the needs of those practitioners. Participatory research approaches have also commonly been associated with “empowerment”, with a view that engaging minorities or disadvantaged groups in research can aid in giving them a voice in policy and decision-making domains. Participatory approaches typically involve practitioners throughout the research process, including in the questions that are set, the design of the research, and interpretation of results. Most recently, the concept of “coproduction” has taken hold in sustainability literature.

Despite the range of labels, and variations in approach concerning the extent and depth of practitioner engagement, the science-based approaches can be grouped together as they are predominantly concerned with how to develop research processes that apply at the project level. As a recent review of the usability of climate science concluded, “in spite of these efforts to rethink and restructure science production, current approaches have not been able to surmount the usability gap”. (Kirchhoff, Carmen Lemos, & Dessai, 2013:406). We would argue that while these efforts have achieved varied success in creating stronger connections at the project level, and facilitating specific applications of research based knowledge, they are often relatively blind to the broader socio-political context in which decision-making and action take place.

4.1.2 Institutional analysis

The other primary academic domain that has examined knowledge-action connections can be broadly categorised as institutional analysis. This field is concerned with the institutions (by which we mean the formal and informal rules that structure the ways in which people interact) and organisations that enact these rules, and how they shape environmental management. Alongside the specific field of institutional analysis, this

category also includes domains such as adaptive governance (Folke, 2006; Nelson, Howden, & Smith, 2008; Olsson et al., 2006), knowledge systems (Cash et al., 2003; Manuel-Navarrete & Gallopín, 2011; McCullough & Matson, 2011; Virji, Padgham, & Seipt, 2012), a social-ecological systems (Cote & Nightingale, 2015; Ostrom & Cox, 2010) and global change governance (Galaz, Biermann, Folke, Nilsson, & Olsson, 2012).

However, in most instances the role of research based knowledge is not the primary focus, but rather it is regarded as an enabling condition for institutional arrangements that facilitate stronger decision-making, and greater flexibility and social learning. This field has been criticised for generating institutional designs, and recommendations, that bear little resemblance to the predominant structures of decision-making (Morinville and Harris, 2014).

4.1.3 Reconstructing science

At a broader level across the science domain, there has been widespread commentary and to a lesser extent, advocacy around the reconstruction of science. This literature looks at science as a high-level social institution, examining ways in which science either has, or should, transform in the face of complex societal challenges. Earlier work in this field includes the well-known concept of “post-normal science”, in which the authors proposed that as problems society seeks to address become higher in their stakes, and (Funtowicz and Ravetz, 1993). Scientific processes need to change to accommodate that. Over the past decade, similar ideas have been proposed in different forms: the transition from Mode 1 to Mode 2 science (Gibbons et al., 1994), post-academic science (Ziman, 2002), and sustainability science (Clark & Dickson, 2003) have all been proposed as ways of understanding and engaging with the increasing complexity of social and sustainability challenges.

These three categories, science-based approaches, institutional analysis, and reconstructing science, each represent different scales at which ideas around science and scientific practice have been explored and reformulated. Science-based approaches are typically concerned with the project scale – what can we do better in our project-based practice as scientists and researchers to enable stronger linkages between our research and impact or outcomes? Institutional analysis examines the organisational and institutional scale – how can we create new rules for organisational structures that are more conducive to linking research with decision-making? Reconstructing science is concerned with science as a social and cultural (and political) phenomenon – how do we reshape the role of science in society, so that it is valued differently and can take a more legitimate seat at decision-making tables?

Yet each of these approaches for thinking about the relationships between knowledge and action sit within broader social, institutional, and decision-making structures. We will now briefly outline some of the sociological critiques that highlight the limitations of these science-based approaches.

4.2 Sociological critique

Sub-disciplines within the fields of sociology and development studies have examined the role of science from very different perspectives. In contrast to practising scientists who have approached the need to improve linkages between knowledge and action from a perspective that favours scientific knowledge in decision-making, sociological critiques do not. There have been strong and far-reaching critiques of the objectivity of science, and the challenges involved in bringing technical, rational beliefs about science into complex socio-political domains. Science and technology studies in particular has developed a substantial body of work examining the role of science in complex environmental and

sustainability -related fields. This literature also roughly corresponds to the scales of project/practice; institutions; and wider context.

4.2.1 Constructed science

At the project and practice level, science and technology studies has emphasised the constructed nature of scientific knowledge. Early anthropological studies of scientists in laboratories powerfully revealed the limitations of the scientific method in generating abstract, objective knowledge. These critiques have been important for challenging assumptions about science and research based knowledge that are often held by practising researchers – objectivity, universality, generalisability, and so forth. They highlight the challenges of dealing with uncertainty, the extent of interpretation, the often somewhat arbitrary selection of research questions, and other dimensions of the very human process of conducting science.

4.2.2 Contested science

Politically-oriented studies have highlighted the various ways in which science is contested in decision-making contexts, such as the application of global assessments. There is a substantial body of work at the global scale (Hulme, 2010; Miller, 2004), and closer to this study, in the Pacific (Barnett and Campbell, 2010). These studies show the contested nature of research-based knowledge and its relations to the exercise of power in decision-making.

4.2.3 Culturally embedded science

Other efforts from both within science and technology studies and development studies point to the ways in which science is (or is not) embedded in our societies and cultures. Work by Allenby and Sarewitz (2011), for example, argues that wealthy Western societies have deep cultural affinities for technology. Jasanoff has argued that science and society are “co-produced”: the way we choose to know things (science) is inseparable from the world as we experience it. She describes this perspective as constitutional, that is, that science and society constitute each other, and cannot be meaningfully separated out.

This is very different from the interactional perspective that characterises the science-based approaches. The science-based approaches tend to consider knowledge production as similar to other forms of production-- knowledge is created, and needs to be transmitted somehow to those who will use it. The constitutional perspective points to the deep and constant interactions between the production of scientific knowledge and its social context.

The majority of science and technology studies literature that has examined the social and cultural embeddedness of science has been conducted in western countries and societies. In development studies, particularly postcolonial critique, new questions are raised concerning the role of science in relation to society. STS scholars have pointed to the strategic application of science-based, technical approaches to development that have consolidated power in the hands of elites (Scott, 1998; Ferguson, 1994). More strident critics point to the application of “science” in the colonial devastation that was wrought on indigenous communities (Tuhiwai Smith, 2012; Harrison, 2005). From this perspective, and highly relevant to any efforts to apply scientific research in non-Western contexts, the constitutive role of science potentially looks very different. At its simplest, science can represent both a much-needed opportunity for development, as well as a threat to social and cultural integrity.

The “threat” dimension has been recognised in relation to indigenous studies, and efforts to reconcile, value and incorporate traditional ecological knowledge into scientific and policy practices (Gómez-Baggethun, Reyes-García, & Corbera, 2013; Knudtson & Suzuki,

2006). Yet even brief analyses suggests that the relationships between science and society in non-Western contexts are likely to be highly diverse, extremely complex, and not well understood (van Kerkhoff & Berry, 2015; van Kerkhoff & Lebel, 2015).

This poses particular challenges for research in development contexts. Many of our implicitly held ideas and beliefs about science are founded on Western social and cultural values, in which science tends to be regarded solely as an opportunity for development, and rarely as a threat to social and cultural integrity. The knowledge governance approach aims to develop conceptual and practical tools for investigating, understanding, and accommodating the diverse social and cultural contexts within which science is expected to make a difference.

4.3 Knowledge governance

Knowledge governance is a relatively new concept (van Kerkhoff, 2014) that sits across the three scales of sociological critiques and the science-based approaches just discussed, as illustrated in Figure 1.

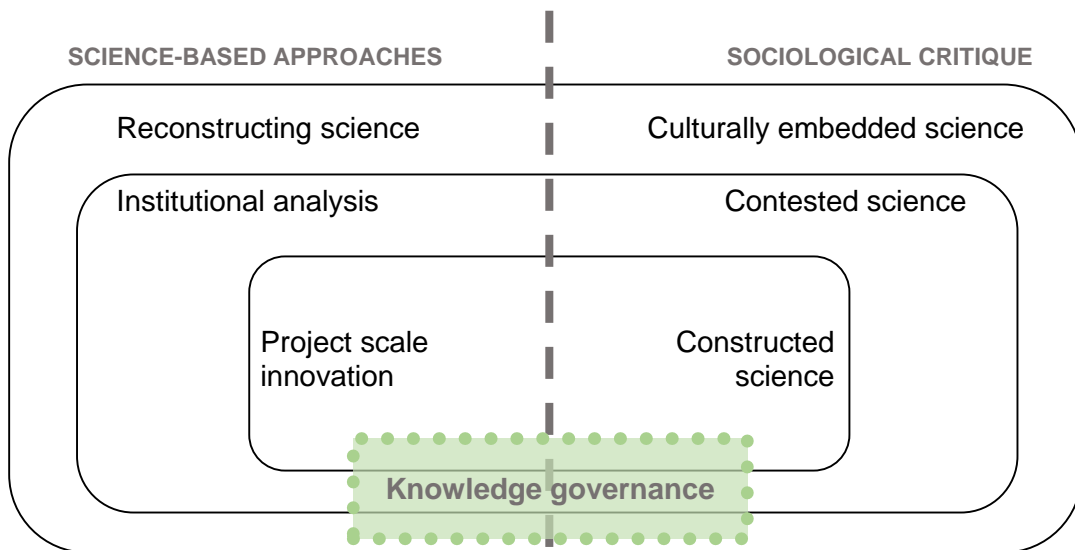


Figure 1. Knowledge governance draws on both science-based approaches and sociological critique to examine the social and cultural context shaping the influence of science.

Knowledge governance applies a broad definition of governance : a "system of formal and informal rules, rulemaking systems, and actor networks at all levels of human society (from local to global) that are set up to steer societies..." (Biermann et al., 2009) to knowledge-based processes, such as creating, sharing, accessing, and using knowledge. It is intended to direct researchers' attention to the broad range of formal and informal rules that shape the application of knowledge, as the institutional conditions from which science may or may not have impact.

The concept of knowledge governance emerged from academic work situated in the institutional analysis category of the previous section (Meffe and Viederman, 1995; Kolmuss and Agyeman, 2002; van Kerkhoff and Lebel, 2006; Manuel-Navarrete and Gallopín, 2012; Cook *et al*, 2013). It is concerned primarily with the rules (implicit or explicit) that shape what people do with knowledge—what is created (who sets research questions?); whether it is shared (intellectual property falls under the banner of knowledge governance); whether people have ability or incentives to access it (paywalls and professional reward systems); and application (what are the expectations around how

decisions or actions should be justified?). Within this context, as van Kerkhoff posits, the so-called “gap” between knowledge and action is actually a “space thick with institutional arrangements that have little to do with sustainability, but still strongly shape the knowledge-action landscape” (van Kerkhoff, 2013: 91). In essence, knowledge governance as a concept is about identifying the rules that link the socio-cultural critique of science and its concerns with the embeddedness, contestation and construction of science with the practice of environmental decision-making.

This is, however, a very wide remit that is not yet well-formulated into research-able questions. In this pilot study, we test a new approach to knowledge governance that draws from the “culturally embedded science” sociological critique mentioned above. This is expanded on in the next section.

5 Conceptual approach and research design

The three main elements used in the design of this study include a specific sociological concept concerned with the cultural embeddedness of science and its use (theoretical framing); knowledge governance (framework under development); and the practice of environmental decision-making as it is understood by practitioners.

5.1 Theoretical framing: “civic epistemology”

Jasanoff defines civic epistemology as “the systematic practices by which a nation’s citizens come to know things in common and to apply their knowledge to the conduct of politics” (2005:9). Essentially, it focuses on the ways in which cultural, political and social values are embodied in formal and informal rules that shape the knowledge people use in making decisions. While Jasanoff initially applied these ideas to a comparison between the United States, the United Kingdom, and Germany (and their policies on genetically modified organisms), the idea has potentially greater power in helping us to unpack knowledge governance in non-Western settings.

Importantly, Jasanoff proposes six dimensions that unpack the relationships between culture and rules that we are concerned with. These six dimensions are summarised in Table 1, with some reinterpretation suitable for the context of this project.

Themes	Our description and application
Dominant style of knowledge making	Who has public endorsement to generate sound knowledge on certain issues? What the dominant methods are for information to become knowledge and generate action?
Credibility	How knowledge is tested, and in so doing, deemed credible and trustworthy.
Effectiveness	How the benefits or outcomes of knowledge are demonstrated to the wider public.
Objectivity	How knowledge claims seek to appear objective. Jasanoff construes this as a fairness issue in that it seeks to avoid subjective bias.
Expertise	There is a distinction to be made here between experts and knowledge holders. Experts help navigate society through conditions of uncertainty by providing knowledge and reassurance. Expertise is largely ascribed through unwritten cultural rules.
Transparency	Institutional mechanisms for permitting public observation and in turn, participation in decision-making processes.

Table 1. Key themes derived from Jasanoff (2005)

These six dimensions pose relatively familiar themes in relation to decision-making, that offer useful starting points in targeting investigations of the relationships between the broad, nebulous concept of “culture” and the more specific concerns of knowledge-action connections.

5.2 Decision-making in practice

To realise the potential of the theory, however, the broad ideas need to be connected with decision-making practices. The case study provides the evidence base for the identifying the rules that are actually applied in the kinds of decision-making settings we are interested in. Details of the case study are provided in the next section.

The conceptual framework used for this research is illustrated in Figure 2. By bringing a wider theoretical framing and a specific evidence base together, this study aims to explore and refine the concept of knowledge governance as a tool for understanding the ways varying cultural settings influence the role of research-based knowledge in decision-making.

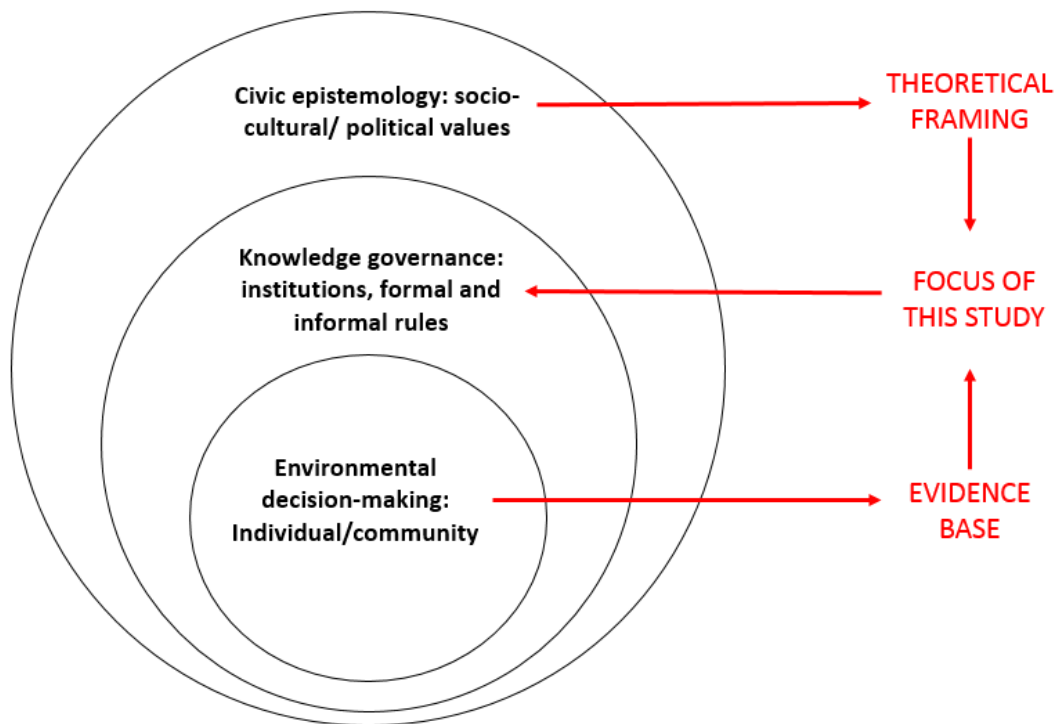


Figure 2. Conceptual framework for this study

6 Case study and methods

6.1 Palau in brief

Palau is an archipelago of islands situated in the Western Pacific, between Indonesia and the Philippines on the western edge of the Coral Triangle. It is a part of the Micronesian group of islands, with a population of 21,000 and 2014 per capita Gross National Income of USD11,110, placing it in the upper-middle income category of the World Bank (World Bank, 2015).

6.1.1 Environment

The seas of Palau are recognised as the most biodiverse marine environment in the world. Palau is comprised of a chain of volcanic islands, which sit at the confluence of Pacific and Indian Ocean currents, supporting rich and diverse marine ecosystems. Combine with its unique geology, the country also includes a range of marine lakes and hosts resident, endemic and migratory birds (Episton and Davidson, 2004)

6.1.2 Economics and governance

Palau enjoys the highest living standards in Micronesia, with around 80% of present GDP earned from tourism (Remengesau, 2015). Palau's beaches and diverse marine environments attract an ever growing number of tourists, with the vast majority centred on marine activities such as diving and snorkelling (Vianna *et al.*, 2012). The economic rise of Asia coupled with the expansion of air travel and Palau's geographic proximity to these markets has allowed Palau to become the premier Pacific destination for East Asian tourists (Ueki, 2000). The vast majority of the 140,000 tourists who visited Palau in 2014 came from China, Taiwan, South Korea and Japan (Republic of Palau, 2015). In contrast, annual revenues from international fisheries in 2007 accounted for only 3.4% of GDP (Bell *et al.*, 2011:169), although fishing for domestic use is significant.

Palau is a democracy, with three branches of government: the Executive Branch; the Legislative Branch comprised of the Senate and House of Delegates; and the Judicial Branch. The Council of Chiefs advises the President on traditional laws and customs. There are 16 states, each with its own elected Governor and State Legislature. Demographically, Palau is quite centralised with 70% of the population living in Koror state and the rest spread across much smaller states, each comprised of a few hundred citizens (Friedman and Golbuu, 2011).

6.1.3 History

A summary of Palau's complex colonial history is presented in Box 1. In more recent terms, Palau's relatively high standard of living can, in part, be attributed to the negotiation of a relatively favourable compact of free association with United States of America which was later supplanted by the recent rise of East-Asian tourism. The Compact of Free Association¹ between the United States and Palau was the result of the long and arduous process of determining Palau's political status and independence from the United States

¹ The Compact of Free Association guaranteed Palau substantial American financial support for 15 years following its independence in exchange for giving the United States full authority over Palau's defence policy (Rechebei and McPhetres, 1997). Similar agreements were negotiated with other American trust territories in Micronesia (Haglelgam *et al.*, 2011).

(Peacock, 2002:xxiii) (see Box 1). This agreement provided Palau with a \$500 million aid package in the 15 years following its independence which funded crucial infrastructure in a range of sectors (Ueki and Clayton, 1999:58). The compact also generated a substantial remittance economy which further bolsters the Palauan economy (Mineshima and Browne, 2007) and allowed for a number of Palauans, including environmental professionals to be educated internationally (Ueki, 2000). However, when the compact was renegotiated in 2009, the amount of aid Palau was to receive from the United States was halved (Haglelgam *et al.*, 2011) and Palau turned to developing its tourism industry in order to a self-sustaining economy (Carlile, 2000).

Box 1. Palau's colonial history: a brief overview

- **1522** The first recorded European to visit Palau, Ferdinand Magellan, passes through on his circumnavigation of the globe.
- **1598-1898** Spain claims dominion over Palau. Spanish engagement largely took the form of a series of Jesuit missions (Hezel and Del Valle, 1972) and occasional voyage stopovers but no real attempts at permanent occupation were made (Ibáñez y García, 1992). This period was ended by Spanish defeat in the Spanish-American War.
- **1899-1914** German dominion over Palau (ended by German defeat in World War 1) (Kiste, 1986)
- **1919-1944** Japan was formally given control of the islands by the League of Nations as part of the South Pacific Mandate (or Nanyo) (Aldridge and Myers, 1990). Japan was the first power to establish an occupying presence in Palau (Rechebei and McPhetres, 1997). During World War 2, Palau was Japan's major Pacific base of operations.
- **1947-1994** United States of America administers Palau as a trust territory, essentially operating the country as a colony (Goetzfridt and Peacock, 2002: xxiii). During the negotiations for independence, Palau attempts to include provisions for a nuclear-free constitution (Smith, 1997). Largely, this is in response to the nuclear testing endured by the neighbouring Marshall Islands at the hands of the US military (see: Aldridge and Meyers, 1990). Thus, the independence movement linked nationalist aspirations with international environmental and peace activism (MacLellan, 2005).
- **1994** Palau becomes an independent nation and enters into a compact of free association with the US.



Figure 6. The ongoing American influence on Palauan conservation: American character Smokey the Bear becomes Palau's Smokey the Biib (Palauan fruit-dove), warning of the dangers of forest fires (Photo Credit: Victoria Pilbeam).

6.1.4 Natural resources

Coastal fisheries remain a significant part of diets and culture in Palau which complicates the protection of marine ecosystems. Although, international oceanic fishing is relatively marginal to the Palauan economy, local dependence on coastal fisheries is considerable. Nearly all Palauan households are involved in coastal fishing activities whether commercial or subsistence (Gruby and Basurto, 2013:263), with much of Palau's reef

fisheries' production geared towards domestic urban markets (FAO, 2009). Furthermore, fishing remains central to Palauan culture with references to fishing throughout Palauan legends (see: Telmetang, 1993; Temengil, 2004), as well as contemporary Palauan stories (see for example: Callaghan, 2012). Within this context, as with many other places throughout the Pacific, fishing is as much a biological as a socio-cultural issue (Ran-Bidesi and Mitchell, 2005). Additionally, with a burgeoning tourist population hungry for seafood and increasing urbanisation, Palauan coastal fisheries have entered decline over the last decade (Friedman and Golbuu, 2011:51), suggesting a potential gap between government conservation policy and actual existing practices around reef fisheries. Thus, in the face of competing resource uses, resource managers must strike a balance between environmental conservation and protecting local livelihoods and cultural values. Towards this project, Palauan officials have begun looking to customary Palauan institutions.

6.2 Bul: traditional Palauan conservation

Bul was the primary vehicle through which resource use was regulated prior to colonization (Gruby and Basurto, 2013:264). In his work *Words of the Lagoon*, perhaps the most complete academic catalogue of Palauan customary ecology to date, Johannes roughly equated *Bul* with “conservation laws” (1981: 64). *Bul* includes provisions for terrestrial and marine areas including fishing moratoriums, seasonal restrictions, fishery reserves, waste limiting practices, and even some gear restrictions (Johannes, 1981). Palau's traditional land and marine tenure laws constitute the central element of *Bul* (Johannes, 1981). They are immensely complex (see: McCutcheon, 1981; Hezel, 2001). In essence, they are administered by chiefs to determine use rights and they flow through intricate networks of family inheritance. Traditionally, this system of tenure functions by giving fishers, hunters and cultivators defined exclusive use rights to resources in specific locations (McCutcheon, 1981). Johannes argues that because of these defined and defensible property rights “self-interest thus dictates conservation” (1981:64). In the past violators of these regimes could be fined hefty amounts, banished or even killed and in so doing, they would cause considerable shame to their chief and village (Johannes, 1978).

Beyond these more institutional checks, there was a wider culture of environmental sacredness which Steven Kuartei terms “*Chedolele Belau*” whereby violation of environmental provisions exposed one to “wrongness of the spirit” (2005a: 93). Actions such as littering were considered “*mekull*” which directly translates as taboo but has a more profound meaning, in that such actions will disturb the order of the universe itself and in so doing endanger the perpetrator and their loved ones (Kuartei, 2005b: 84).

Outside *Bul*, other cultural practices have also contributed to the sustainability of Palauan society at relatively high densities for over 2000 years (Koshiba *et al.*, 2014). For example, Koshiba *et al.* (2014) note that traditional practices surrounding the cultivation of taro and maintenance of mangrove swamp helped to reduce sediment levels on adjacent reefs. Despite this considerable heritage of sustainable environmental management, much concern at the erosion of *Bul* and traditional conservation regimes has been expressed (see: Johannes, 1978; Graham and Idechong, 1998; Kuartei, 2005a).

In 1978, Johannes predicted the continual decline of *Bul* and its associated institutions based on two reasons. Firstly, as Graham and Idechong (1998:143) argue, power was increasingly shifting away from the chiefs to the state through the process of Palauan independence and in so doing, was undermining the primary cultural mechanism for *Bul*. Secondly, the growing incorporation of Palau into the cash economy was set to undermine the development of indigenous knowledge by redirecting attention to paid work other than fishing and the skills that such professions require (Johannes, 1981:81). Of particular concern to Johannes, was increasing participation in the commercial fisheries industry

which drastically amplified the scale of local fisheries exploitation (Johannes, 1981:83). However, in recent years, Palau has reasserted the importance of *Bul* in its contemporary politics indicating that its role, at least as a rhetorical tool, remains important to Palauan conservation (see: Remengesau, 2015; Palau PAN Fund, 2015).

In contemporary Palau, *Bul* remains prominent in environmental discourse. So much so, that in his 2015 recent state of the Republic address, Palauan president Thomas Remengesau Jr. made the following remarks:

The sanctuary is Palau's tradition and the *Bul* is Palau's proven success story [...] a return to our traditional ways will allow us to implement a clean healthy high value eco-tourism based economy that will support sustainable fishing while enhancing our ability to support our local industries. Now is the time to implement the *Bul* across the entire Republic. (Remengesau, 2015:16)

Here, President Remengesau directly links his vision of Palauan sustainable development, specifically his proposal to make all of Palau's Exclusive Economic Zone into a marine sanctuary (at time of writing, not yet confirmed), with local customary practices. To evoke notions of *Bul* in this way issues powerful connotations in that it both acknowledges the centrality of local knowledge and cites ownership over a particular state-endorsed conservation measure. However, determining what is and is not traditional, particularly when it relates to the environment, is often itself a contested space which reflects the politics of a particular context (Hames, 2007). Certainly, when asking about the proposed sanctuary's relationship to *Bul* during fieldwork, we found a series of contrasting opinions on the subject (see section 7). Foale *et al.* (2011) warn that assuming the centrality of a traditional conservation ethic undermines the very real work that has to be done to support conservation in Oceania. This presents an important critique in relation to Palau where despite *Bul*'s legacy being enshrined in the Palauan constitution (Graham and Idechong, 1998), included in most governmental environmental policies (Palau PAN Fund, 2015) and the judicial provisions for its application (Gruby and Basurto, 2013)², the overexploitation of local fisheries remains an important issue. Therefore, some degree of critical consideration of the gap between local practice and state rhetoric is necessary.

For the purposes of our study, the prominence of *Bul* in contemporary management suggests that Palauan natural resource managers recognise and to some extent, support customary governance principles and practices. In our theoretical terms, the socio-cultural context clearly includes *Bul* as a way of understanding conservation and resource management. This raises the question of whether and how it relates to non-customary resource governance.

6.3 Modern Palauan conservation governance

Palau is a regional and global policy leader in conservation. The Palauan government has created a series of policy initiatives to preserve Palau's natural capital. On the international stage Palau, like many other small island developing states, has been at the forefront of a number of significant global environmental initiatives including the elimination of deep sea bottom trawling and the creation of a network of shark sanctuaries (Beck and Burtleson, 2012). More recently, Palau has successfully lobbied the UN on the

² In theory, because Palau's 16 states own the land and waters up to 200 miles from the shoreline on behalf of communities and with the exception of Koror state, they have a population of only a few hundred (Gruby and Basurto, 2013), there is institutional capacity to effectively administer *Bul*. Participants in this research were somewhat mixed about how well this worked in practice.

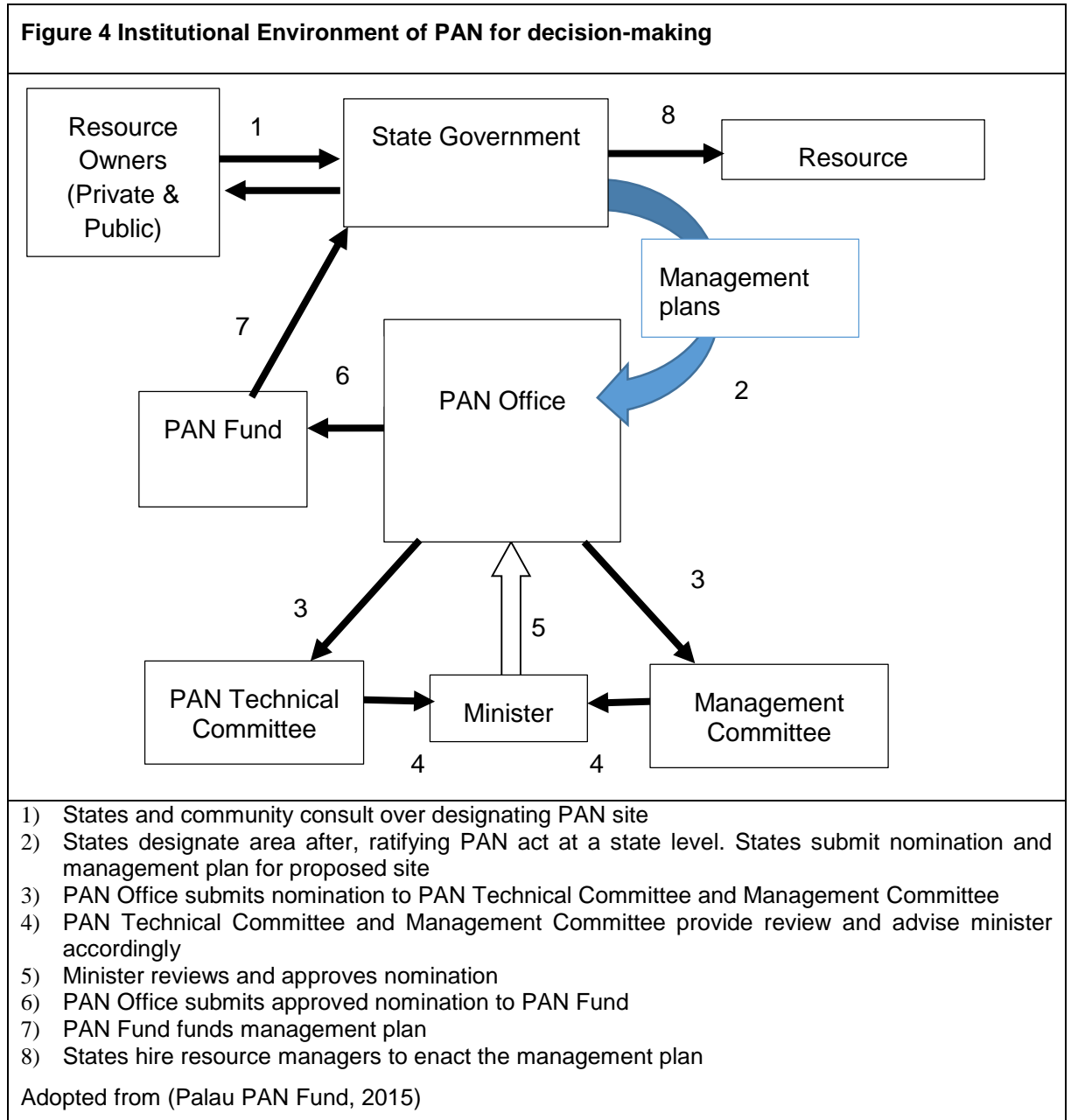
inclusion of a specific Sustainable Development Goal on the protection of the world's oceans (Beck, 2013).

Domestically, Palau is part of the Micronesia Challenge (a commitment made in 2003 by all the countries of Micronesia to increase the number of protected areas and increase conservation efforts in the region (Kleiber and Koshiba, 2014)), and created the Protected Areas Network (PAN) as a way of bolstering local conservation efforts in 2003 (Kleiber and Koshiba, 2014). PAN's role is to provide technical assistance, monitoring and funding for member sites and moreover to reframe conservation as a national rather than a state level issue (Gruby and Basurto, 2013). In 2012, this program was further strengthened by the creation of the Palau Green Fund, funded through a 15 US dollar tourist departure levy which provides an autonomous and sustainable funding source for PAN (Gruby and Basurto, 2013). Given the considerable numbers of tourists visiting Palau's shores, the amount of revenue raised for conservation through this mechanism is considerable. The funds generated are administered through a statutory body called the Protected Areas Network Fund which distributes the funds to various state governments to administer for the management of protected areas which are part of the network (Palau PAN Fund, 2015). In 2012, Palau's work on the creation of PAN, the Palau Green Fund and the world's first shark sanctuary earned Palau the prestigious Future Policy Award from the World Future Council (Beck and Bureson, 2012). In addition, Palau recently legislated a world-first conservation measure, designating its entire EEZ (Exclusive Economic Zone - an area roughly the size of France) as a marine sanctuary (ABC, 2015).

Palau is in many ways a conservation success story. Palau's reliance on ecotourism for its economic wellbeing presents a strong incentive for enacting conservation measures. This is coupled with a Palauan cultural conservation ethic which is also formalised through legal institutions. Consequently, Palau's progressive environmental policy is seen not as a radical departure but as a form of cultural continuity. Palau's conservation record is internationally acclaimed. From advocating the elimination of deep sea bottom trawling in the UN to designating its entire EEZ as a marine sanctuary, Palau has shown itself a world leader in marine conservation initiatives. There are, however, important concerns around the state of Palau's coastal fisheries due to local overexploitation which are at least partly addressed through the creation of local protected areas. For the remainder of this study we focus particularly on the Palau PAN, as a site where local needs, customary understandings and practices meet more formal institutional structures, including the application of scientific methods and tools.

6.3.1 The Protected Areas Network

PAN functions through the interactions of Palauan state governments working in tandem with the national government (represented by the PAN Office), with technical oversight from the PAN technical committee and independent funding from a government established statutory body called the PAN Fund (Palau PAN Fund, 2015). This structure follows provisions laid out in the Palauan National Congress Protected Areas Act (Palau, PAN Fund, 2015). The basic formal interactions of PAN are summarised in the diagram below (see Figure 4). These processes are quite complex but the most significant features are that the decision-making process starts with resource owners and involves a variety of other actors. This means that although there is intervention by several different decision making bodies, to really understand the environmental implementation (the focus of this thesis) of specific sites, one must target planning at the level of resource owning communities.



6.3.2 Site selection

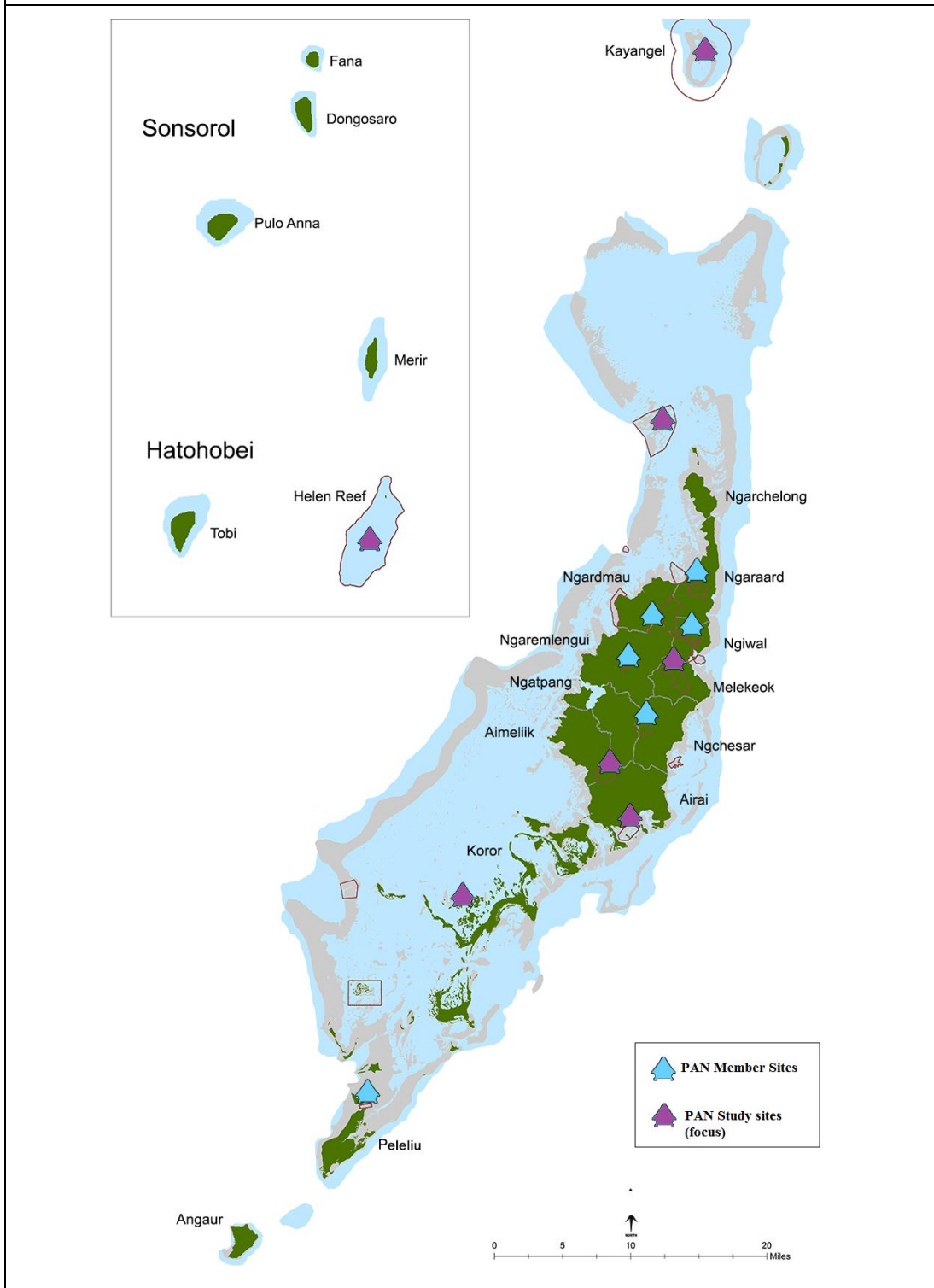
The sites chosen for this study were determined through a process of purposive sampling based on three criteria. Initially, sites were chosen based on the goals of their management plans which indicated the type of conservation undertaken at the site (criterion 1), the management goals for the site (criterion 2) and the range of different interests embodied in the management regime of the site (criterion 3). Through the evaluation of these plans, a diverse sample was identified to try and capture a snapshot of how PAN operates across Palau. Then, through consultation with PAN, seven sites were chosen based on an initial assessment of their management plans and the willingness of local stakeholders to engage with the research process.

Electing for a smaller sample, allows for a more focused analysis, while conserving a diverse sample. Rather than an attempt at capturing a representative sample, these sub-

cases were purposefully selected to capture the diversity of knowledge institutions at play in the management of PAN. Each site differed considerably across the sample criteria but each accommodated a range of actors involved in management which provides for a particularly rich context for analysis. In addition, a smaller sample allows for a more in-depth approach and is better suited to the constraints of small project. The 7 sites presented in this research are:

- Ebiil Channel, Ngarchelong
- Ngardok Lake, Melekeok
- Rock Island Southern Lagoon, Koror
- Ngeruangel Marine Reserve, Kayangel,
- Ngerderar Watershed, Aimeliik
- Medal Ngediull, Airai
- Helen Reef, Hatohobei (see Figure 4).

Figure 4. Map of Protected Areas Network Member Sites



Map adapted from Palau PAN Fund (2015)

Sites surveyed were (listed North to South): 1. Negeruangel 2.Ebiil Channel 3.Ngardok Lake 4.Ngerderar Watershed 5. Medal Ngediull, 6. Rock Islands Southern Lagoon 7. Helen Reef

6.4 Data collection

This study relied on a range of qualitative research methods. Qualitative methods, as Winchester and Rofe (2010) note, are well suited to an in depth assessment of the motivations and the reasoning of stakeholders and this, in turn, is key to cultivating an understanding of knowledge governance. In addition, qualitative methods also provide a degree of flexibility which gives researchers room to explore issues as they arise (Winchester and Rofe, 2010) which is crucial given the relatively uncharted waters that this study explores both conceptually and as a relatively new case study. The data used for this research was sourced through document review, participatory research/observation and key informant interviews.

6.4.1 Key Informant Interviews

The major component of data collection consisted of a series of key informant interviews conducted in Palau. In the overall study, a series of 20 one to two hour long semi-structured interviews were conducted with a total of around 80 key informants. Interviews were conducted primarily in small groups with some individual. Participants were chosen which represented a diverse range of stakeholders and which directly referenced the management of my study sites discussed in this thesis. This sample of interviews includes environmental managers of the sites in question, traditional leaders, legislators, local environmental NGOs, research institutes, as well as PAN officials from a range of different agencies. It is noteworthy that we spoke with more women than men in total (see Table 2).

Questions for the interviews focused on decision-points in the PAN, with specific questions derived using the theoretical framework (see section 5.1). Interview procedures were iterative, evolving in relation to ideas raised in previous interviews. A sample interview guide is provided in Appendix 2.

Table 2. Interview participants

Type of interview participant	Number of interviews	Number of interview participants
Site specific groups	3	12
Government agencies	2	8
NGOs	4	8
Customary institutions	3	27
Scientific research institutions	1	4
Men		27
Women		32
Total	13	59

6.4.2 Document review

In order to provide a rigorous assessment of Palauan environmental management, we examined management documents to triangulate the findings from the interviews. Primarily, we focused on the management plans and accompanying literature such as management evaluations of all the sites under study. The review process was largely conducted before the fieldwork component of this study. As such, it was used to inform

sample selection and in drafting interview protocol. A detailed assessment of these plans within the context of the three study sites is presented in an Honours thesis (Pilbeam, 2015), which is available on request.

6.4.3 Observational Research

The third method which used for data collection was observational research. When combined with critical reflection, observational research provides a useful complementary source of evidence for developing an understanding of context (Kearns, 2010). Over two weeks, we visited each of the different sites across the PAN used in this analysis, usually accompanied by a ranger or PAN coordinator which allowed for less formal discussions about management, as well as firsthand observation of conservation areas. Other components were comprised of informal conversation with Palauans and with visits to a number of places across Palau including taro fields, museums and archaeological sites.

6.5 Data Analysis

The dataset was imported into the qualitative analysis software NVivo™. Data was coded on a thematic level drawing on the 6 theoretical themes presented in Section 5.1. Additional themes were noted where they appeared in the data, and evaluated in relation to the objectives of the analysis and existing themes. Where they added new and relevant dimensions to the analysis, they became included as 'emergent themes'.

7 Findings

Across the themes of the theoretical framework outlined above, a series of different knowledge governance rules emerged through our data collection. This section provides an empirical analysis of how these different themes manifested in this case study.

7.1 Dominant styles of knowledge-making

Dominant style of knowledge-making refers to the process through which information becomes knowledge and how this is made actionable, hence is central to identifying the pathways through which knowledge becomes action. The two key descriptors that were identified in this case study, for this theme were **consensus** and **continuity**.

Many participants raised the idea of consensus in decision making around environmental issues. One Palauan elder asserted that this was because “*our culture is all about relationships*” and she went on to note that it was important to avoid alienating people given the relative size of Palauan society. As such consensus and the inclusion of different perspectives was crucial to decision-making, and there was notable resistance to any exclusive exercise of authority. One participant working for a local environmental NGO highlighted this by saying:

We value the process of getting a consensus on a decision. We cannot just have a bottom-up decision-making process and frankly in Palau distance between bottom and top is like this (indicates with fingers very small distance). ... at the end of the day, it's not whether it was a top-down, bottom-up, lateral decision making it was whether there were enough people that believe in the decision, in the process, to get traction on something and to get by. (Local environmental NGO worker)

In contrast, participants took a dim view of conflict as a means of asserting knowledge in decision-making. For example, open conflict through court contestation, was not seen as an appropriate way of evaluating knowledge and determining courses of action. In particular, many Palauan elders raised concerns over the rigidity and cultural inappropriateness of judicial processes such as these. This differentiates Palau from governance models such as the United States, where environmental sciences often enter decision-making through court testimony. It could also be a particular barrier to those working in the sciences where there is a tradition of building theory through contestation. One participant involved in a number of MPA studies at the Ebiil Channel, was frustrated by the misfit between rapidly evolving research-based knowledge and relationships with the communities:

You cannot come into the same community one day and say ‘MPA is the way to go’ and then comes in another time and say ‘they don’t work, we need to go in this direction’. That’s fine, that science continues to do that because everyone needs to push their own theory, right? But that’s where we don’t come from [...]. That’s why we need to be very careful about how we adopt those new studies and implement them with communities [...] It is critical that they maintain that level of trust with us for the next study. When we do come in, [we need to ensure] that this new science is actually building from where we are today and not competing with it because then we are actually pulling the rug out from under our own feet, so to speak. We need to build that level of trust and confidence in the communities that we work in, so that we can continue. (Local NGO worker)

Emphasising continuity with Palauan culture was a key way that knowledge was created and reaffirmed. One manifestation of the desire for continuity was often-heard expression that “*science validates*” what Palauans already know and do, rather than breaking new ground. One participant working for a local environmental NGO encapsulated this by telling the following story (see: Box 2).

Box 2. We have always practiced informed decision-making

“When I first started working here [...]. I was implementing this ecosystem based management and because it was based in Babeldoab, I went to go see Reklai [high chief of Babeldoab] and so we drove all the way to his house in Melekeok and I went in and I was telling him all about this fabulous initiative. I must have [talked] like 10-15 minutes just running on and on about this work and finally, he is listening to me and then he says “Oh so you’re going to do my job now”. And then he tells me, it was looking out of his house which is right next to the beach and he says look out there. Then he says ‘in the old days, when you go to the dock there, there’s a resting platform and there are four corners and the four highest chiefs of the village sit at these corners. So what they do is they talk informally and they get updated about what is happening in the clansman in the village proper and then towards the end of the day, the fishermen come in and others, customarily they show their catch to the chiefs who are assembled there and the chiefs will know the size of the fish, the type of the fish and because to become a chief in the olden days, you would have to live a long life and gained a lot of experience, one of them is sort of an understanding of the marine ecosystem and so the chiefs would know to put a moratorium on certain species because it was dwindling or because of certain things.’

And essentially what he is telling me is that “in Palau, we practice informed decision-making in our traditional practices. That concept is built into what we do” and so, there is no difference in being informed by science now. The only reason why we need it, is because we are a multicultural society with many different people who are not raised in our conservation ethic and because of this multicultural society that we live in, we have a government that is by nature large and extends beyond the individual village boundaries and so really this process that we are in now is only an expansion of that cultural process that we will operate in. We sometimes forget that, but that is the truth. There is no dichotomy and there is no sort of big gap. It’s just using tools today in the context of the society today but managing the way that we’ve always managed.” (Local NGO worker)

In terms of the dominant styles of decision-making, these illustrations show that public endorsement for new knowledge to be regarded as legitimate tends to be derived from personal involvement or connections (consensus). It further suggests that new research-based knowledge is typically understood and interpreted in the ways it connects with customary decision-making practices.

7.2 Credibility

Participants indicated that the credibility of knowledge was closely linked to the people who are promoting it. Even during the course of our research, it was important that we be accompanied by a trusted Palauan member of the PAN Fund to confer credibility upon the research process. One participant summarised the importance of who is involved in a conservation by saying:

People won’t normally ask ‘what is the meeting about’, they will ask who will be there. It is about credibility, based on relationships and trust. When I come with someone from the community who is trusted, people will

*believe you, otherwise they will not, even if you have good science.
(International NGO worker)*

The credibility of knowledge was not conceived of independently from its champions and any distinction made between the two was seen as relatively artificial.

Within the context of PAN, this translated into an emphasis on who the particular PAN Manager of a site was and this was often touted as a crucial factor in the success of any given protected area. The case of the Ngardok Lake PAN site manager was raised several times as an example of how important the individual leadership of a site manager can be and how this in turn, strengthens the work of the whole network. One participant stated:

So if there is a lesson here, it's critical that you make that investment in the first or even the second manager and as soon as they've built some sort of institutional culture for [the protected area], it becomes a little bit easier. So I look across the network now and in those areas where you see that kind of leadership, you see much better performance. (Local NGO worker)

At Ngardok Lake, those involved with management were equally emphatic that individual managers were crucial. One member of the Ngardok board noted, “*for all the PAN sites in Palau, what I would like to see in future, is for all the PAN sites to have a manager like [ours]*”.

In this case, institutions were seen as largely secondary in fostering credibility. Within this context, the components of credibility identified above meant that individuals reinforced the legitimacy of institutions, rather than institutions conferring legitimacy on individuals. Indeed, in several instances, participants would refer to the people synonymous with organisations rather than actually naming the organisations they were talking about. This form of credibility was largely established through the relationships, kinship, knowledge of cultural protocols, and fulfilling specific criteria for expertise. These are qualities which international scientists often find hard to establish with the same proficiency as locals knowledgeable in custom.

7.3 Expertise

We found that the notion of expertise manifested in a variety of different ways across this case study: critical reflection on the position of this research, cultural norms surrounding explicit labels, and the valuation of knowledge-holders opinions.

Participants expressed a degree of distaste with the idea of “experts”. Although we met with many Palauans with an incredible depth of knowledge, none self-identified as experts. Self-promotion was considered in poor taste. As researchers we adapted to this by predicating our interviews by saying things like “*we are here to learn, not to tell you what to do*” and generally, by rejecting the label when it surfaced. This is perhaps an illustration that an “expert” as recognised in the Western sense did not resonate in this context. One participant echoed these sentiments by asserting:

Palauans will be very quick to say that “we’re not the experts”. Part of it is the humility part. We don’t showcase ourselves, it’s mekull. The other thing is that when we think about “experts” it’s a very western concept. You’re educated, it’s your profession, and you have this experience behind you. So Palauans will never say that they’re conservation experts, environmental experts, and yet they’re extremely knowledgeable. (Local business woman)

Within this context, the notion of “expertise” associated with conventional views of research and researchers may actually erect barriers to effectively bringing research-based knowledge to action around conservation. As another participant involved in a local environmental NGO noted:

We really had to work hard with communities to help them believe in their knowledge and to share it. Because a lot of times, they didn't share knowledge not because they were hiding anything, they just didn't think it was valuable. (Local NGO worker)

This illustrates the need for approaches to knowledge governance which value the contributions made by local knowledge, and work to connect new contributions from non-locals with existing knowledge. In addition, this assessment raises important questions about the exclusionary tendencies of science as a relatively technical formal institution.

There were several factors in determining who was considered an expert. Traditionally, in Palauan society there were strong norms about who could and could not know certain things and who could share information (McKnight, 1968: 19). This tradition seems to continue today in who is qualified to speak about certain issues. From the data, we have identified two major criteria for how expertise is determined in Palau:

- **Practical experience and knowledge of custom**– this was closely linked to age and one participant noted that despite the changing nature of Palauan society, one participant noted “*there, is still that respect that wisdom comes with age*”. This also linked to experience in certain areas. For example, managers involved in terrestrial conservation were often reluctant to speak to the issues faced by MPAs and vice versa. Another manifestation of this respect was the way that those with a deep knowledge of custom were the subject of a great admiration and their advice was often trusted over that of scientists.
- **Foreign exposure** – Often this came in the form of a foreign education among the younger generation. Almost all the young environmental professionals that we met with held foreign university degrees. Among the elder generations, many of the high ranking chiefs, even if they had not been educated overseas, had served with the US military or had worked in other parts of Micronesia. There was a certain notion that Palauans must prove themselves elsewhere, if they wanted recognition at home.

One would assume a certain degree of tension between these two criteria but we saw very few manifestations of this. For the most part, they were seen as largely complementary. Those with foreign qualifications expressed a great deal of reverence towards elders with a depth of customary knowledge and elders expressed a desire for Palauan youth to cultivate both a knowledge of local environments and to receive western university qualifications. It is interesting to note that the majority of Palauans working as environmental professionals that we interviewed were foreign educated (there are no tertiary education facilities in Palau)..

However, when scientific and customary knowledge conflicted on a particular issue, most opted to follow the advice of elders. One example of this, was the practice of cutting back of mangroves in Airai, presented in Box 3.

Box 3. The mangroves of Medal Ngediull

At the Medal Ngediull PAN site, there is an ongoing concern about mangroves encroaching on the reef and the closing off of navigation channels. There is a strong custom of communities keeping channels clear by cutting back the mangroves. In recent years, due in part to run-off from the nearby airport, the sediment load reaching the site has increased greatly leading to a significant increase in mangroves around the reef. Site managers, drawing on traditional practices and knowledge, wanted to cut back the mangroves. However, scientists expressed concerns at this practice because of the role that mangroves play in maintaining the integrity of the coastline. Despite the disagreement voiced by scientists, PAN managers and rangers decided to remove mangroves from the site and the community was even brought on board as volunteers to help clear the channels.



Noe Yalap from the PAN Fund, at the contested mangroves of Airai (Photo: Lorrae van Kerkhoff)

Expertise was not a straightforward concept in Palau. Customary knowledge was not only a source of expertise directly (as per Box 3), but also played a role in determining who were most trusted to navigate the sometimes conflicting knowledges relevant to conservation decision-making.

7.4 Effectiveness

In this case study, the effectiveness of management regimes was closely linked to the tangible benefits that they provided local communities, and relates to how knowledge demonstrates its value to the wider public.

During most interviews, we asked participants which PAN site they thought was the most successfully managed. One consistent response to this question was Koror state's Rock Islands Southern Lagoon. A number of reasons were given for this:

- **Financing** – this took two forms. Firstly, the site’s ability to fund itself outside the support of PAN and secondly, the site’s ability to provide financial benefits to the local community. For example, the Jellyfish Lagoon in Koror’s PAN site is Palau’s most visited tourist destination and Ngardok Lake runs a community orchid nursery. These economic resources, many observed, were the result of active pursuit of financial sustainability by Koror state. One participant from Ngarchelong encapsulated both this desire to independently finance management and to deliver more benefits to the community by saying:

Our ultimate goal should be sustainable and that is to be more like Koror state. And that money, in Koror state comes from tourists. It doesn’t come from anywhere else, just from tourists. To participate in this money, you just sit home and wait. No! This tourist money, doesn’t work like that.
(Ngarchelong legislator)

Building on this idea, the Palau International Coral Reef Centre has begun commissioning socio-economic studies on the value of MPAs to demonstrate some of the benefits of protected areas to local communities (Kleiber and Koshiba, 2014). Finance was also an important enabling factor for the other demonstrations of effective management.

- **Public outreach** – was an important part of demonstrating the value of conservation areas. Many sites, including Koror brought in local school students to visit and learn about conservation initiatives. One particular strategy that Koror used to promote their work was giving one of their protected areas a mascot, “Captain Malii” the Napoleon Wrasse (see Figure 5).



Figure 5. Captain Malii Banner. Photo credit: RARE , 2015

- **Enforcement** – of environmental regulation emerged in discussion with all the PAN managers, especially those working in MPAs, as a major challenge. Due to its considerable resources, Koror state was able to hire more rangers and implement a more rigorous regime to deter illegal fishers and irresponsible tourist behaviour. This criterion was largely about protecting local communities.

One clear message that emerges from these different measures of effectiveness, is that for management to be deemed effective it has to have tangible outcomes for the local community. Amassing scientific data was not seen as a social good on its own terms. However, one notable absence which was listed as the primary goal across all

management plans was the conservation of biodiversity. This indicates that the conservation outcomes of management were perhaps more for external consumption.

7.5 Objectivity

Contrary to the often presumed association between objectivity and fairness, almost universally, among participants, no clear link of this kind emerged. Instead, many participants linked fairness to more flexible context specific knowledge and decision-making practices. Indeed, some participants noted that one of the great strengths of management based on *Bul* was that it could be used in a more discretionary way to create more equitable results. One PAN site manager saw *Bul* as an alternative to an increasingly codified form of management which would allow for both conservation and economic growth in the area. He posited that:

Instead of adding more sites, it would be great if it was like the traditional system of Bul. [Where] you can move the boundaries of one protected area to another area. So like, if the fish move, the gleaning will change from molluscs to invertebrates, so if you can be more flexible like before, the traditional leaders would just say 'okay that part is good' and then just move the boundaries. I think that would be really good, to be flexible and start following the old system more closely. (PAN manager)

However, many noted the use of more objective knowledge in regulating the behaviour of outsiders unaware of Palauan context:

I think so because traditional closures, that's only known to locals in Palau, and to the international people that come in and fish the waters, they won't know it. So if we apply the science, on top of the traditional, then science can be applied to international people coming in and we can enforce it more clearly with them. So I think that's where the traditional isn't working as well now. (Local researcher)

In this quote, the participant makes the distinction between local and international audiences for conservation and asserts that the role of science is to address the former. Given increasing numbers of tourists, and that many Palauans are venturing further afield to fish, this dimension may become more prominent in years to come. In a similar vein, the concept of transparency in knowledge-making found little traction in this dataset but there was some indication that it may so in the future.

7.6 Transparency

Transparency did not seem to be a particularly highly valued function of knowledge governance in Palau by interview participants. The Palauan congress building, is inscribed with the words "*Obiil era Kelulau*" which translates as "the house of whispered decisions" (Republic of Palau, 2015). This image offers a symbolic representation of how democratic principles and a tendency towards secrecy coexist in Palauan decision-making. One participant working in an environmental NGO, when asked how political decision-making happened in Palau, likened the process to that of discussions which took place traditionally in the *bai*. He described these connections in the following narrative (see Box 4).

Box 4. Whispered decision making in the bai

In the traditional men's house, the bai, chiefs would come together to discuss different local issues and to make decisions about the future of their clans. It was considered disrespectful to talk above a whisper or for the chiefs to address each other directly, so they would have a messenger who they would whisper their statements to, who would then take their message to the other chief. Along the way, the messenger would often massage the message to ensure that it was well received by the other chief. The chief can never be wrong, it is always the messenger who is at fault, in contrast, when things go well it is a reflection of the chief's wisdom. Everyone would leave the meeting and only the messenger would know what exactly had happened in the decision-making process.

The PAN network provides an indication of this push and pull between a democratic emphasis on formalised transparency and a more traditional framework based on implicit trust. A participant engaged in the management of Ngardok Lake detailed the proceedings of a public hearing on the last management plan which illustrates some of the ways that disinterest in formal transparency processes might play out at the site level.

Participant: When the first management plan was put out, the state was going to conduct a public hearing, where the community could make any questions or comments to the state officials and then the legislature passed it into law. They are provided with copies of the management plan and then we went through the same process with the plan. [...]

Author: With the hearing, did many people come?

Participant: Unfortunately, I was not able to attend the hearing but I think there were a lot of people who got involved with the public hearing. The people of Melekeok were satisfied with whatever the board put into the plan. So it was able to go out quickly and smoothly because if there was someone in the community who had a negative impression of the management plan, that would have slowed the process. But because nothing came out, it went fine.

Interviewees suggested that official or formal processes for transparency are not highly valued because there are plenty of informal channels for people to know and participate in the inner workings of decision making. These channels are particularly robust across all different levels due to the highly interconnected nature of Palauan society. It is also considered highly impolite to criticise others in public, especially those in positions of authority as in this example.

However, some representatives from government stressed the importance of reporting in ensuring that the wider public knows how funding is used. When asked what the major capacity development need across the network is, one public servant responded:

I think that reporting might be one of the biggest capacity needs. It's been something that we've emphasised from the very beginning, we want to see more use of management reports that we are receiving from the states. So there are those types of needs. (PAN public servant)

The participant went on to say in regards to the importance of sites reporting on their progress in that:

Basically, it's the report to our key stakeholders in leadership to say what are the green fee is contributing to. This is our way of showing them

progress. This is the work that is taking place. [...] Especially, to leadership because when it comes to the green fee there is always that interest in 'can we do something else, in addition to what we're doing now, with the existing green fee collection' and we want to make sure that ... It's called the green fee and it's important that it continues to be the GREEN fee. (PAN public servant)

These statements indicate that while formal transparency may be unimportant to local audiences around decision making, this was not the case when it came to showing local officials and international funders where the money was going. The idea of different knowledge governance strategies for different audiences is expanded on below.

7.7 Ownership

Ownership was a key part of knowledge-making in Palau, and is a theme we have added to the original six dimensions proposed by Jasanoff (2005). When we asked the Palau Conservation Society (PCS) about what made its work different to international environmental NGOs involved in Palau, after having remained silent for the length of the entire group interview, one of the participants answered simply that “*PCS is Palauan and [this other NGO] is not Palauan*”. This a relatively self-evident statement but it indicates a wider undercurrent to Palauan conservation, that it must be defined on Palauan terms to work. Taking into consideration Palau's history, having had political control wrested by a series of colonial powers this need for ownership seems a logical response. In this case study, this manifests in the desire for continuity, the reliance on those knowledgeable in tradition and the desire to see conservation knowledge yielding tangible benefits for local communities. The women's traditional leaders group, the *Mechesil Belau*, exemplifies relatively new processes that have been developed along customary principles to collectively consider important social issues and make decisions to support particular courses of action, as reported in Box 5.

Box 5. Collaborative decision making in the *Mechesil Belau*

Each year for the past 25 years, the Mechesil Belau have convened a conference of up to 200 women from around Palau, to discuss social issues that are important from a customary standpoint. This includes a range of thematic areas, such as education, health and the environment. The outcomes of these conferences are a small number of recommendations for policy changes that are taken directly to Parliament. The women are highly respected, and the outcomes of their deliberations are implemented almost without fail. Conservation issues have included recommendations to post a moratorium on the harvest of the endangered Hawkesbill Turtle, a species that is highly valued in Palauan custom; and changes to sewerage outfall that was damaging the lagoon. In each case, however, the issues have been raised and noted on the basis of the women's own experience and knowledge, with science then being brought in to support their case: "Science validates what we do".



Researchers with the *Mechesil Belau*, Palau's traditional women leaders group (Photo credit: Noe Yalap)

The value of the local communities owning the knowledge was closely entwined with deploying appropriate customary processes to validate decisions for action. This poses real challenges for international research. The Pacific International Coral Reef Center (PICRC) is based in Palau, and employs both Palauan citizens as well as international scholars. While widely respected amongst the Palauan community, and used heavily in international promotions, PICRC's research was most typically referred to as assisting protected area managers meet their monitoring requirements, rather than influencing decisions. This was in marked contrast to the Palau Conservation Society, established by Palauan advocates and researchers who had studied in the US, and returned to promote, advocate and support local conservation. PCS has been highly influential, including in the establishment of the formal PAN. The ownership here is not only concerned with local communities setting their own priorities, but equally about research and actions being conducted and promoted by people with high awareness of the customary processes and decision-making structures, and how to work effectively with them.

7.8 Conclusion

Through the thematic framework identified above, elements of knowledge governance in Palau emerge. Palau appears as a high trust environment where relationships are central to the functioning of society. The current dominant styles of knowledge-making are embodied by the notions of consensus and continuity. Credibility was seen largely as a

personal quality rather than as the function of institutions. As such individual experts had an important role to play in directing conservation. Although the word “expert” was largely seen as distasteful, there were common ideas around what qualifies knowledge-holders to speak on certain issues, namely, experience, international exposure and knowledge of custom. The latter was seen as an important tool for navigating environmental uncertainty. Transparency and objectivity were not highly valued functions of knowledge governance. The perceived effectiveness of conservation regimes was a reflection of the tangible benefits which they brought to the local community. All of these different aspects were important in fostering a sense of ownership over conservation institutions.

8 New models for knowledge governance

The previous section offered an overview of the dynamics between knowledge and action in Palau conservation through the lens of the proposed theoretical framework, adding the final category of ‘ownership’ as a theme that emerged from our data. This section focuses on how such understandings can inform a new model for knowledge governance. This model draws on the existing themes, and places knowledge governance within the context of the societal goals that unite or conflict in efforts to address their different audiences.

8.1 Multiple knowledge governance regimes

While analyses such as Jasanoff’s have tended to identify a single national approach to knowledge governance that reflects a unified “civic epistemology”, our research suggests that while there may be a dominant style of knowledge-making that reflects deeply-held cultural values, other aspects of the knowledge governance were more flexible. The differences we observed in transparency, objectivity, effectiveness, expertise, and credibility, and ownership largely reflected the audiences our participants were addressing. There was one narrative around the primacy of protecting biodiversity largely for external audiences (donors, tourists, international organisations) and another which focused on supporting local livelihoods, for internal (local resident) audiences. Each of these audiences invoked different rules for governing knowledge, as discussed in the previous section. These are summarised in Figure 6.



Figure 6. Comparing knowledge governance regimes for different audiences

These two different knowledge governance regimes can be understood as two different *styles of decision-making*. On the left, the customary style of decision-making reflects the customary and cultural values intrinsic to the Palauan community. On the right, the

evidence-based style of decision making reflects the norms and expectations of the international communities who interact with Palauan conservation. While scientific research ‘fits’ readily into the latter, and was frequently noted in terms of advocacy, monitoring and reporting, in the customary style of decision-making it was regarded at best as unnecessary, and at worst as potentially supplanting traditional practices (“you are going to do my job for me now are you?”). This confirms the point raised at the end of section 4, that in a non-Western context, science can be regarded both as an opportunity and as a threat.

In our case study, the opportunity was clearly driven by the overarching shared values across the local and international audiences regarding the importance of conservation. As the Honours thesis accompanying this report notes in its title, when Palauans speak about the environment, they call it “the nest of life”, and have long-standing traditions of conservation management to maintain the health of their ecosystems. These deep-seated values are broadly compatible with biodiversity values promoted by the various international communities, including NGOs, United Nations and, of course, paying tourists. Palauans’ willingness to shift between different styles of decision-making recognises the international opportunities that can be used to further their own conservation goals and values.

Beneath this compatibility, however, there is potential for substantial conflict. That there was little evidence of conflict between the two knowledge governance regimes was surprising to us. This sits in contrast to what one might expect based on the disconnect between the epistemologies of these two bodies of knowledge which scholars like Tuhiwai Smith (2012) and Thaman (2003) point to. However, this absence of conflict does not necessarily denote cooperation but rather that there is a parallel relationship between these bodies of knowledge. Decisions to take action are reached within the consensus-based style of knowledge-making, where customary relationships are prioritised and maintained; the styles of decision-making that enable these goals may then be selected as those most suited to the task.

8.2 Towards a knowledge governance methodology

The pilot study has confirmed that a slightly modified version of the original theoretical framework offers useful insights into understanding knowledge governance in non-Western contexts. In this section, we develop this into an inquiry-based methodology that could be applied in further research. This methodology would be most applicable in contexts where non-Western, traditional or customary values are widely held; where investments in research are having trouble gaining traction in decision-making and action; or where research planning would benefit from developing an overview of cultural factors that may influence research impact.

Theme	Questions	Possible outcomes
Dominant styles of knowledge making	Who has the authority to determine the relevance and actionability of information? How is this authority exercised? What processes are used? What criteria are applied? How does research-based knowledge offer opportunities or pose threats to the dominant styles of knowledge-making?	Contestation, consensus, hierarchical, authoritarian
Characteristics of Knowledge governance		
1. Transparency	Are decision-making processes transparent? Why? Why not? Under what circumstances?	Different approaches to transparency depending on the relevant audience
2. Expertise	Is expertise expressed? Are there different kinds of expertise? Is expertise valued? By whom? In which contexts?	Expertise resides with different groups under different circumstances
3. Credibility	What gives knowledge credibility? Are different criteria applied under different circumstances? How? Why?	Credible organisations, institutions or individuals are identified
4. Ownership	Is the ownership of knowledge important? How are different sources of knowledge regarded in decision-making?	Understanding the relationships between local and non-local knowledge
5. Effectiveness	How are outcomes of decisions demonstrated or promoted? What do relevant communities want to gain from the application of new knowledge?	Overlaps and disconnects between research goals and local goals
Knowledge governance regimes		
1. Audiences	Are there different knowledge governance regimes for different audiences?	Single or multiple knowledge governance regimes are identified
2. Role of research	How do different knowledge governance regimes relate to research-based knowledge?	Some more favourable to research than others
Strategic assessment		
1. Enhance opportunities	Are there opportunities to connect more favourable knowledge governance regimes to decision-making? Where are there significant overlaps between existing goals and values and those of the research?	Research designs that incorporate strategic connections
2. Reduce threats	How might threats of research-based knowledge be reduced?	Strategies to integrate research with current knowledge governance structures

Table 3. Knowledge governance inquiry framework

One of the benefits of this framework is that it targets specific dimensions of social and cultural practice that are relevant to the application of research-based knowledge. There is no doubt that the citizens performing these cultural practices, and other scholars who have been deeply engaged in the relevant societies, will recognise the partial and incomplete understandings it may generate. However, in many practical research contexts there is neither the time nor resources to allow for a deep investigation of the complexities of societies and their cultural mores. Applying this framework helps to build a snapshot of the knowledge-based processes that unite knowledge and action, and to assist researchers and practitioners to build a shared understanding of the opportunities and threats associated with research-based knowledge. This may, in turn, enable research designs and practices that are more sensitive to cultural norms, and better equipped to work sympathetically with existing decision-making processes.

9 Future directions

As indicated in the previous section, this pilot study has offered some insights into how a knowledge governance approach can reveal new insights into the dynamics of knowledge-based processes that affect the uptake and application of research-based knowledge. Further research would test the inquiry framework presented in Table 3 above in a range of contexts.

We recognised that while Palau was selected to enable “proof of concept” by its favourable characteristics, the next step would be to test the application of the framework to current or planned research projects or programs, in more challenging environments. This may entail environments where poverty and livelihood pressures create different goals and values within the knowledge system; where governance is ill-defined and unstable; or where local customs and traditional processes are contested.

Connecting the knowledge governance framework to research projects or programs will enable more targeted recommendations and relevant findings. Approaching this from a perspective of ongoing development of the theory of knowledge governance and learning through application will ensure that lessons continue to be refined, and the usefulness of the framework grows.

Future work would also benefit from considering issues such as equity and gender more fully than we have done here. The application of the framework is likely to present challenging ethical questions around how to best engage with socio-cultural norms that perpetuate gender inequalities, ethnic repression or other class-based inequities. While there are likely to be positive opportunities to engage with these issues, the next iterations of the framework would be strengthened by adding equity-relevant questions and strategies.

10 Conclusions and recommendations

10.1 Conclusions

As noted in our original proposal, understanding the socio-cultural structures that shape the uptake and application of research-based knowledge has implications across ACIAR's investment portfolio. ACIAR, along with other donors, are increasingly concerned with whether and how impact on the ground is achieved, and seeking to develop more effective approaches. We contend that this search for greater impact should proceed on the basis of building greater sensitivity to the complexities of decision-making and action in development settings. It is critically important to build both Australian and partner country researchers' capacities to do this. While many researchers readily see the overlaps and positive benefits of research, we tend to be reluctant to come to grips with the threats science and research may pose to the cultural integrity of the communities we work with. The framework presented here offers one tool towards building a more complete understanding, and from that, identifying appropriate strategies for enhancing the possible contributions of research.

10.2 Recommendations

The knowledge governance methodology tested and refined here has the potential to be effectively integrated into ACIAR's investment strategies, to build stronger understandings of the relationships between research and action, and ultimately, achieve greater impact.

We recommend that:

1. ACIAR consider areas of investment where the linkages between research and uptake are considered weak or problematic, that may benefit from knowledge governance analysis.
2. ACIAR consider either a new project specifically applying the knowledge governance framework or existing or upcoming projects where it may be usefully integrated. This approach will most likely be best applied in the early stages of research design, as part of a scoping phase.
3. ACIAR consider supporting research training in knowledge governance and building both Australian and partner-country researchers in building capacity to work more effectively and sensitively with existing decision-making structures.
4. Further work in the area of knowledge governance be regarded as a research investment in its own right, whereby the methodology and framework can continue to build theoretical understandings as well as practical applications.

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11.2 List of publications produced by project

Publications in preparation:

1. Final stakeholder report to PAN Fund, for online publication
2. Methodological paper, “Knowledge governance for enhancing research impact”
3. Case study paper “Conservation decision-making in Palau: where science meets custom”

12 Appendixes

12.1 Appendix 1: Field Report

Provided to PAN Fund as a record of our field work, August 2015. These notes outline our data collection activities whilst in Palau, and our next steps for further data collection and refinement.

Background:

As noted in the project proposal, we are interested in understanding the interplay between science and culture as two important dimensions of decision-making for natural resource governance. So how do they interact? Can their interactions be strengthened with careful planning and management? The purpose of our field work in Palau was to speak with and learn from a wide range of people connected with the Palau Protected Area Network, with different roles and different contributions to these questions. As a pilot study, we were unable to speak with all the States or other groups with relevant contributions to make due to limited time and funds. We selected groups in close consultation with PAN Fund to gain a diverse range of experiences and expertise, given our limited resources.

Aims and objectives:

This pilot study aims to test a preliminary framework that incorporates aspects of governance that are often excluded in science-driven academic and aid-based analyses of environmental management and change, particularly culture and politics.

Its objectives are to identify and analyse the range of influences in the organisation, decision-making and implementation of the Palau Protected Areas Network, through focusing particularly on the PAN Fund as a vehicle for governing the interactions between science-based knowledge, traditional ecological knowledge and broader cultural values.

Field work 1-14 June 2015:

Formal and informal group discussions

Over the course of our visit we met with roughly 80 people. These meetings were mostly held as group interviews (or discussions), where we followed an outline of topics and themes we wanted to cover, while also allowing and encouraging participants to raise their own interpretations of the ideas we were interested in. Our approach to the discussions was that we were here to learn, and all were generous with their time and insights. Below, are the activities we conducted for our fieldwork. To respect the disclosure wishes of our participants, we have not included any names in this initial report.

Informal discussions included dinner meetings with:

- representatives from The Nature Conservancy;
- representatives from the Palau Conservation Society and Palau Resources Institute

Formal meetings with PAN site staff and connected representatives in

- Helen Reef, Hatohobei
- Medal Ngediull, Airai;
- Ngerderar Watershed, Aimeliik
- The Ebiil Channel, Ngarchelong
- Ngardok Lake, Melekeok

Additional important formal meetings were held with

- High Chief Reklai
- The Council of Chiefs
- The Mechesil Belau

And with representatives from

- Palau International Coral Reef Centre
- The Shark Sanctuary Foundation
- PAN Office
- Bureau of Arts & Cultural
- Environmental Quality Protection Board
- Ebiil Society

We were unable to meet with The Minister for Natural Resources, Environment & Tourism; and representatives from the Coral Reef Research Foundation. We will seek some input from them via email or phone over the next few weeks.

Observation and site visits

Discussions were enriched by observations during site visits. Site visits included both visits hosted by PAN staff or representatives, as well as 'tourist' visits to Koror State Rock Islands. Site visits were conducted to:

- Ngerderar Watershed, Aimeliik State
- The Ebiil Channel, Ngarchelong State
- Ngardok Lake, Melekeok State; and
- The Rock Islands Southern Lagoon in Koror State

Data preparation

Victoria has transcribed 10 group interviews, and our notes from the site visits have been written up in digital format. This work is ongoing. When complete, our dataset will include:

- 13 transcripts of group interview
- 5 transcripts of individual interviews
- 2 sets of notes from informal discussions
- 6 sets of notes from participant observation

Where next? Data analysis

Once complete, notes will be forwarded to participants to check for accuracy and to make additional comments if they wish. Following this, the next steps in our process are to analyse the data. We will start with descriptive questions:

- How and through what processes are Palauan culture, custom and tradition integrated into the activities of the PAN Fund?
- How, why and through what processes are science or research-based knowledge integrated into the activities of the PAN Fund?
- How are any technical requirements of Fund projects or programs integrated with local ecological knowledge, customs and management?
- Do these two domains contradict each other or complement? How? Why?

From these, we will move to more analytical questions around decision-making:

- Is there a dominant **style of decision making**? When are different forms or processes for decision-making deployed?
- How do different groups or contexts demonstrate **public accountability**? Who are they accountable to? Are there multiple accountabilities, and if so, how do they interact?
- How do people determine **effectiveness** in their decision-making about conservation and protected areas? Are there different kinds of criteria applied by different groups? How? To what ends?
- How is **objectivity or fairness** of decision-making approached, presented, or conducted?
- Who holds “**expertise**”? on/of what? For what purposes?
- How is **transparency** exercised? By whom? What are the social expectations of transparency by or of different groups?

We will also note any other key themes that emerge from the data that are not covered in our analytical questions. Initial impressions from the data so far have raised initial topics we will examine more closely (this is not an exhaustive list).

- The ongoing contribution of *bul* to local conservation, particularly in so far as it relates to regulating local use, but its limitations in addressing non-local issues such as international fishing incursions.
- Occasional conflicts between traditional governance and formal legal processes, as discussed particularly by the Council of Chiefs
- The use of science as seen primarily for legitimising or validating decisions that have largely already been made, as well as for monitoring purposes.
- Some challenges with the current PAN reporting structure.
- Concern for immediate rather than long-term threats, e.g. difficulties with enforcement and concern over how to regulate illegal international fishing rather than climate change.
- Diverse views on the role and importance of the proposed EEZ Marine Sanctuary.

Approximate timeline:

- August: finalise any outstanding data (e.g. email questions to the Minister)
- August to September: Finish collating data from all sources and return notes to participants for additional comments if they wish.
- September: Analysis and drafting report, consultation with PAN Fund and any interested others on preliminary themes and findings
- October: Draft report
- November: Finalise report

We will deliver:

A final report for PAN Fund and all study participants; a final report for the Funding agency; a conference presentation (slides made available) and, if suitable, an academic publication. If sufficient funds remain, we may be able to return in person to present our findings; if not they will be provided electronically.

12.2 Appendix 2: Sample interview guide

General questions

- 1) To begin with, can you tell me about your role(s) and how you're involved with the PAN/Conservation in Palau?

Key decision points

- 2) Can you tell me about how this site became part of PAN?
 - a. Why decide to join PAN in the first place? What were the benefits to the move?
 - b. Who was involved in the process?
 - c. Was there any opposition to this? On what grounds?
- 3) Can you tell me about how you make day to day decisions about the site?
- 4) How did you incorporate science into your decisions?
- 5) How was *Bul* or the traditional knowledge included?

Effectiveness

- 6) In the management plan/the mission statement of your organisation, there is a goal about X, how are you progressing towards that goal? How do you measure progress?
- 7) Which protected area in the network do you think is performing the best and why?
- 8) What is the role of scientific monitoring and reporting requirements in the management of the plan? Do you find these exercises useful to management?

Objectivity, transparency and credibility

- 9) What makes for a fair decision?
- 10) How are decision-makers held accountable? By whom?
- 11) What makes people trust that the right decision was made?
- 12) How was the community involved with decisions around the site?

Expertise

- 13) What kind of skills do you see as crucial to the management of the site?
- 14) Whose input is necessary to get a particular decision?

Future challenges and opportunities

- 15) Going forward, what changes would you like to see in the way that the PAN is managed and why?
- 16) Looking forward in a wider sense, what do you feel are the main challenges and opportunities that Palau faces with its conservation?
- 17) Did you have any final comments or thoughts on some of the issues that we discussed that you wanted to share?

Probes:

- Could you provide me with an example of that?
- What does that mean in the context of X?
- We have heard that X, has that been your experience?

Descriptions of PAN Fund etc.