



Purpose, policy, and practice: Intent and reality for on-ground management and outcomes of the Great Barrier Reef Marine Park



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ABSTRACT

Notwithstanding a complex array of international, national, and local policies designed to protect biodiversity and manage human activities, the condition of Australia's Great Barrier Reef has been deteriorating. This trend indicates that policy settings are inadequate or the right policies have been prescribed but not effectively implemented. This study aimed to determine which policies influenced on-ground management of the Great Barrier Reef World Heritage Area and Marine Park, how they were implemented, and the challenges encountered by practitioners in applying policies. The research required content analysis of policy instruments relevant to various jurisdictional levels, and surveys and interviews with 19 key informants across jurisdictions and agencies. This study found that policy intent is not automatically translated into practice: international agreements are interpreted and reinterpreted along the policy pathway to on-ground management and, consequently, the aspirations of these agreements can be frustrated and their effectiveness diluted. Due to limits of jurisdictional responsibility, practitioners within the Great Barrier Reef Marine Park Authority are constrained in influencing key factors that impact on their capacity to address threats and manage outcomes. The major policy gap affecting management outcomes was the absence of a mechanism with which to manage cumulative impacts responsible for deterioration of key ecosystem processes and biodiversity. These findings highlight that effective policy implementation is a challenging task, limited by gaps between intentions and outcomes, inconsistencies, and conflicting agendas. An improved understanding of the policy implementation process and the policy-practitioner relationship is essential to enhancing links between policy and on-ground management.

1. Introduction

Attempts to resolve political, social, and economic conflict in the marine environment have led to an increasing range of environmental and legal policy initiatives, such as international agreements, laws, and conventions. These initiatives also aim to conserve biodiversity by improving management of human activities that impact on marine areas [10,61,8]. The policies can span many sectors, including conservation, fisheries, agriculture in coastal catchments, transport, and oil and gas production [10,11]. Even with these commitments and a large suite of marine policies available with which to manage the marine environment, global marine biodiversity is still in decline [67,69,88]. This indicates that policy settings are ineffective or that, although the right settings have been prescribed, policies are not being effectively implemented [85]. Furthermore, it has been argued that a major

contributor to the decline in health of the oceans is fragmented sector-based marine management, resulting in a patchwork of many policies that constrain the achievement of management goals through gaps, inconsistencies, and conflicting agendas [10,26,5,74].

Despite obligations associated with being a signatory to an international agreement, signing does not assure changes in behaviour of key actors or guarantee success in implementation [81]. The effectiveness of international agreements can be measured by their implementation at a national level [86]: the process by which their intent is translated into action by governments [81]. Countries signatory to international agreements are bound to implement commitments through existing governance frameworks and procedures [10,11,39]. This may require the development of national policy, legislation, and regulation, and coordinated national and local action (Fig. 1) [55,86]. Throughout this study, reference will be made to 'policy' but this term is used inclusive

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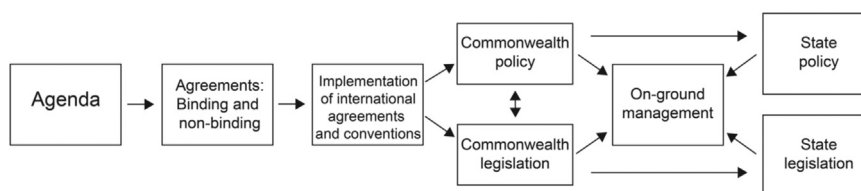


Fig. 1. Schematic view of the formation and implementation of international environmental agreements through Australian Commonwealth and state (including territory) policy and legislation, and their pathways to on-ground management (Adapted from [81]).

of legislation, agreements, treaties, and conventions.

Fulfilling international conservation commitments, such as those made under the Convention on Biological Diversity [14], may require the designation of protected areas to meet agreed targets for conservation. Marine protected areas (MPAs) are regarded as long-term policy and ecosystem-based management tools for science-based conservation [2,6,75]. MPAs provide a legal and institutional framework for managing complex socio-ecological systems [58,6] and to alleviate conflict between stakeholders [3,38].

MPAs frequently have goals supplementary to conservation such as fulfilling socio-economic objectives, and enhancing resources for a broad range of stakeholders [45,64,73]. These seemingly conflicting goals can make for complicated governance of MPAs [29,45], the management of which includes recognising the importance of anthropogenic impacts beyond the MPA boundaries [10,15,63]. As such, those involved in MPA management are required to use, consider, implement, and balance a broad range of policies. The intent and goals of all of these policies at various jurisdictional levels need to be harmonised and integrated for effective management to occur [10,41,79].

Conservation of biodiversity and management of marine systems may be inhibited if there are differences between what policy makers intend and what happens in practice [4]. A mismatch can occur between policy formed at a broad scale and actions delivered by those who are often locally-based [27,4]. The process of policy implementation is complex [16,60] and policies on paper may be disparate to their actual implementation. This phenomenon, known as the ‘implementation gap’, can occur when decision-makers tasked with implementing policy have a considerable degree of discretion in the way this occurs [21]. Implementation of marine policy requires, amongst many other elements, cooperation and communication amongst key institutions and actors. This necessitates establishment of a clear hierarchy, detailed objectives, and specific roles and responsibilities of those responsible for implementation [53,57,65]. There is no standard model for policy implementation, and the process can require different approaches for different contexts. Therefore, practitioner experiences of policy implementation can vary widely [62].

The complexity of policy implementation is seldom described through the relatedness of policy and practitioner. It is important to analyse implementation processes to understand the challenges practitioners face that may inhibit effective application of policy and future outcomes for biodiversity. Experiences of practitioners in implementing policy are vital to contribute to improving policy development, implementation processes, and adaptive management [68,81]. Relatively few studies have considered marine policy processes and implementation either globally or in Australia. Of those Australian studies that have done so, many discuss a specific policy from a broad, national perspective (e.g., [82,76,83,84]). This paper seeks to respond to a gap in the literature on how on-ground implementation of a range of international, national, and local policies influence effective management of MPAs, with a focus on the World Heritage listed Great Barrier Reef (hereafter “the Reef”).

The condition of the Reef has deteriorated over past decades and continues to do so [31,43,44,47,54], despite global recognition of the region’s Marine Park as one of the world’s best managed MPAs, with international and national levels of protection. There are many threats to the Reef that must be mitigated [31], requiring effective policies and

implementation. The aim of this study is to assess the implementation, and subsequent efficacy - defined as the capacity to produce a desired effect - of marine environmental policy in the management of the Great Barrier Reef Marine Park in Australia. The present study aimed to determine: (i) what policies influenced on-ground management, (ii) how the intent of these policies was implemented in practice, and (iii) what policy limitations and challenges to practitioners impeded the successful implementation of marine policy, and thereby the conservation of marine biodiversity. Specifically, this study provides analysis of policy relevant to managing the Great Barrier Reef Marine Park, and reports on surveys and interviews undertaken with key informants responsible for implementing policy in managing the Marine Park. This paper describes the challenges identified by practitioners in implementing policy, and discusses findings in the context of the need for effective on-ground management.

2. Methods

2.1. Policy context

Along with policies at the international and national (or ‘Commonwealth’) level, complexity is added by state and territory policies [10,39]. Under the Australian constitution, the Commonwealth Government is responsible for international treaties and can legislate to implement the terms of these commitments. However, it is the states and territories that have primary responsibility for delivery of environmental policy (Fig. 1). Practitioners undertaking management of marine areas in Australia may have all three of these jurisdictional levels of policy – international, Commonwealth, and state or territory – to consider in their roles. Additionally, there may be interaction with local government (and their associated policies), whose powers and geographical boundaries are determined by the states.

Regarded as one of the world’s greatest natural treasures, the Reef extends 2300 km along the Queensland coast. The Reef is managed through three separate protection areas, incorporating a complex mosaic of boundaries, zones, and uses. Thus, the Great Barrier Reef Marine Park (Commonwealth), the Great Barrier Reef Coast Marine Park (Queensland, tidal waters and tidal lands, and around islands), and the Great Barrier Reef World Heritage Area (International listing, managed by both the Commonwealth and Queensland Governments) provide the legislative spatial framework for managing the Reef but each have differing boundaries and inclusions Fig. 2, SI and Table S1. The primary agency managing the Great Barrier Reef Marine Park (hereafter “the Park”) is the Great Barrier Reef Marine Park Authority (GBRMPA, hereafter “the Authority”), an Australian Commonwealth Government statutory agency. The Authority undertakes cross-jurisdictional partnerships and co-management activities with the Queensland and Commonwealth Governments, each with their own sets of policies [34]. The Park was selected for this study because its complex spatial, governance, and management arrangements include all levels of government and policy (international, Commonwealth, state and local), and therefore provided a good opportunity to address the study aims. With changing influences on management and policy, this paper presents a snapshot in time of a fast-moving policy area.

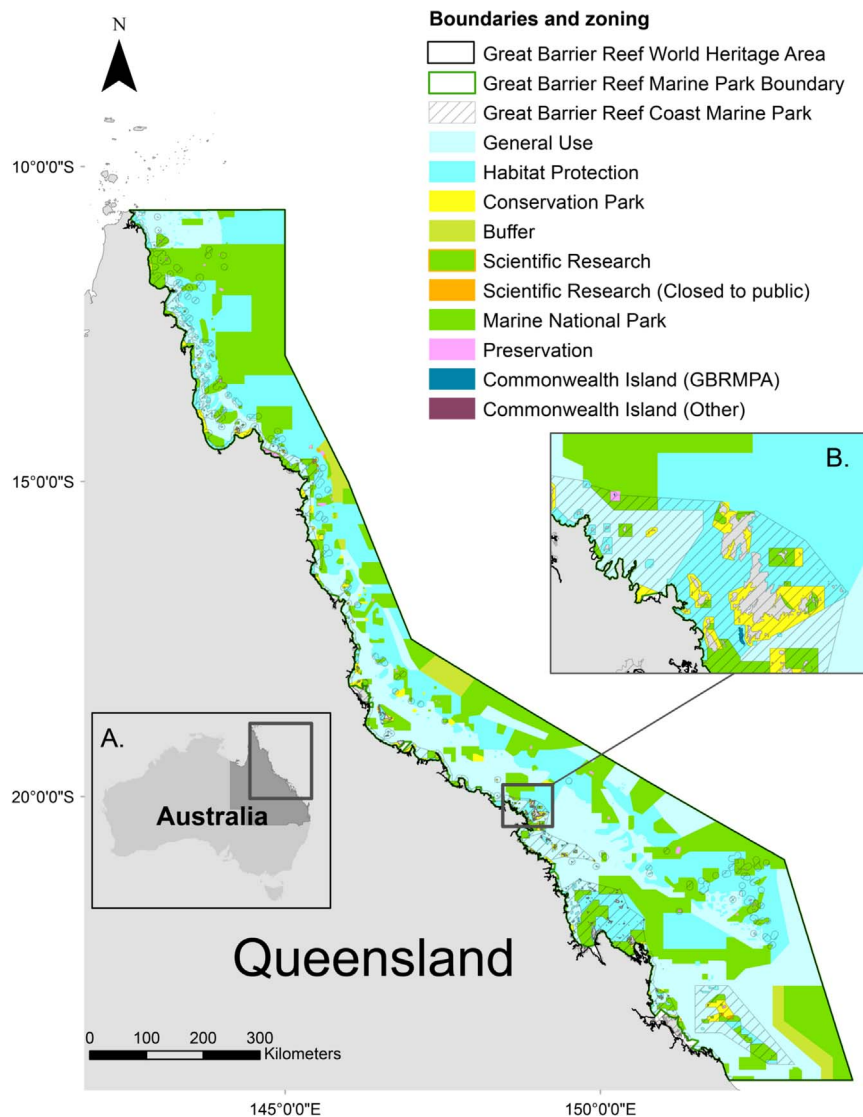


Fig. 2. Map of the Great Barrier Reef World Heritage Area, the Great Barrier Reef Marine Park, the Great Barrier Reef Coast Marine Park, and zonings. Inset A: Map of Australia indicating location of study site. Inset B: An example of the complex jurisdictional boundary and zoning arrangements for one area along the Great Barrier Reef. (Data obtained from the Great Barrier Reef Marine Park Authority, Department of Environment and Energy, and Department of Environment and Heritage Protection).

2.2. General approach

To understand how policy intent is applied in practice, namely the process, role, and goal of policy implementation, a review of relevant literature and peer-reviewed articles was undertaken. This process identified gaps, factors, and constraints influencing effective policy implementation, and was subsequently used to articulate research questions and overarching themes used in designing interview questions for key informants. To analyse the policy context for management of the Park, a collation and in-depth content analysis was undertaken of a range of key policy documents and other relevant materials, including government and independent reports, and government websites, including the Authority's website (www.gbrmpa.gov.au). Results from this analysis also contributed to the design of the interview questions. Through undertaking key informant interviews, access was gained to those practitioners implementing policy in the management of the Park, to understand the policy-practitioner relationship and obtain details of what policies were implemented and the challenges in doing so. The following sections provide further details of steps in the methods.

2.3. Policy compilation and content analysis

International, Commonwealth, state (Queensland), and Authority policies relevant to each of these jurisdictional areas were collated from documents described in Section 2.2. This process identified a large, varied, and often sector-based range of policy which was potentially being utilised by those involved in the management of the Park and confirmed which agencies have responsibility for these policies. This list was supplied to key informants as a survey described in Section 2.4.

A detailed content analysis of this list of policies was undertaken, along with implementation documents, policy text, reviews of specific policies, policy explanatory memos, 2nd reading speeches from Hansard (the report of the Australian Parliament and its committees), policy guidelines, policy implementation progress reports to international bodies, management plans, and any independent reports relevant to the Park (Table S2). Findings from this process included identifying objectives, goals, and expected outcomes from implementing these policies, processes required for implementation, gaps and conflicting agendas, and potential considerations for operationalising policy through management actions. This analysis also contributed to designing interview questions for key informants. The themes pursued related to: the translation of policy intent into practice, policy implementation

processes, decision-making, and challenges and opportunities in implementing policy (Table S3).

2.4. Key informant survey and interviews

Informants were identified using a purposive sampling strategy [52] and were included because they had specialist knowledge relevant to the research questions being asked [23,56]. Snowball sampling was also engaged, by which informants were asked to recommend colleagues whose roles they deemed appropriate to this study [52,9]. To capture a range of perspectives, key informants were initially targeted from diverse roles across organisations involved in the management of the Park, including policy officers, conservation officers, directors, and managers. Nineteen such informants were interviewed between July 2015 and February 2016, with interviews conducted face to face and ranging in duration from 35 to 80 min.

To identify what policies influenced on-ground management, a survey comprising the compiled list of relevant policy was sent to informants one week prior to the interview. In this survey, informants were asked to rank policies utilised in their roles according to their level of importance from 1 to 10 (with 1 being the highest) and to state how often they implemented, considered, or utilised these policies. The top 3–5 policies identified from the survey as most important were then validated and discussed in greater detail during an interview that followed a semi-structured format. If informants had not responded to the survey, their most utilised policies were ascertained during the interview. The use of semi-structured interview questions enabled key informants to provide in-depth responses, allowing identification of how policies were implemented and what challenges were experienced that may impede successful implementation. Sample size was determined by sampling saturation, namely when the collection of new data did not indicate new concepts, findings, challenges, or opportunities [28,35]. All interviews were audio recorded and transcribed, and informants were identified by code only to ensure anonymity.

2.5. Key informant interviews data analysis

Transcripts were imported into Nvivo software (QSR International 2012) and an inductive process was used whereby a number of “nodes” (concepts) were pre-determined from the interview protocol, and others were generated from scrutiny of raw data where core common responses and topics were identified to build analytical nodes from informant interviews [46,77]. Data were categorised under these nodes, under relevant themes through a manual selection process. A coding system was used to organise and assign units of meaning to the data [51]. By way of example, a theme that emerged from the content analysis was the multi-faceted interaction of various levels of policy (e.g., international and Commonwealth). Subsequently, a number of nodes were engaged to describe how international policies influence management, such as through national policies like the *Environment Protection and Conservation Act 1999*.

2.6. Analysis of research findings

To ensure the reliability of these findings, the interview responses were triangulated across other data sources, and scrutinized for consistency. A common approach here involved analysing policy documents considering the adoption and utilisation of specific policies, and examining how implementation was undertaken in reference to the findings from the key informant interviews and the literature review. Policies and themes identified in the interviews were given further context through a second scrutiny of those policies and other relevant documentation mentioned in Section 2.2. Further validation was provided through questioning practitioners occupying different roles across a number of agencies and departments and determining the degree to which constraints and opportunities were common across

roles and agencies.

3. Results

With international conventions and committees, combined with Commonwealth and Queensland Governments and various agencies and departments involved in managing the Park, there are many levels of policy to consider and integrate for effective management outcomes. Practitioner's interactions with, and implementation of, policies across various jurisdictional levels highlighted the complexity of integrating all of these levels (international, Commonwealth, state, and local). This was noted by one key informant who suggested that management outcomes may be constrained by the jurisdictional arrangements in place for managing the Reef.

“The whole notion that you can have a State Government, Commonwealth Government, local government, all these different groups, all managing the one resource and have good outcomes is just really nonsensical. It’s not good.”

At the international level, the primary policies were the World Heritage and Ramsar Conventions, and to a lesser degree the Convention on Biological Diversity. These policies relate to important national policies including *The Great Barrier Reef Marine Park Act 1975* and the *Environment Protection and Biodiversity Conservation (EPBC) Act 1999* (Fig. 3). The national-scale policies interact with the recently introduced ‘whole-of-government’ policy, the Reef 2050 Long-Term Sustainability Plan (hereafter “Reef 2050”), designed to direct on-ground action as well as link international commitments with on-ground management.

Table 1 presents the primary policies identified by key informants from the survey list of 79 international, Commonwealth, Authority, and Queensland policies (full list in Table S4). Queensland policies identified as important were selected mainly by informants whose roles fell within that jurisdiction. Another 31 policies were added by informants (in Table S4). A number of these policies and their influence are discussed below, presenting the main themes from both the analysis and interviews.

3.1. Two Acts and their influence: *The Great Barrier Reef Marine Park Act 1975* and the *Environment Protection and Biodiversity Conservation Act 1999*

The Great Barrier Reef Marine Park Act 1975 (hereafter “the Marine Park Act”) is the primary Act under which the Park was designated. Its main object is “to provide for the long-term protection and conservation of the environment, biodiversity and heritage values of the Great Barrier Reef Region.” Further, other objects are in place and allowed so far as they are consistent with the main object. The Marine Park Act and its associated regulations give effect to governance and management arrangements for the Park, and provide the mechanisms for enforcement. The Authority was established under the Marine Park Act. This policy was most explicit in the management of the Park and regarded by most informants as the most important statutory policy in guiding how the Park is managed. The Marine Park Act was described as being strong and flexible, and practitioners were acutely conscious of the need to exercise consistency in applying it, acknowledging that decisions made in managing the Park were expected to be consistent with the objects of the Marine Park Act. The decision-making process, however, was not always straightforward. In some cases, it may be a single person making a decision based on their judgement and interpretation. Although the decision-maker may acquire information to assist with that decision, numerous informants suggested that, ultimately, the decision could still be regarded as personal or subjective. For example, in assessing permit applications, informants made decisions on a case-by-case basis that involved a level of subjectivity, even based on the relevant policy.

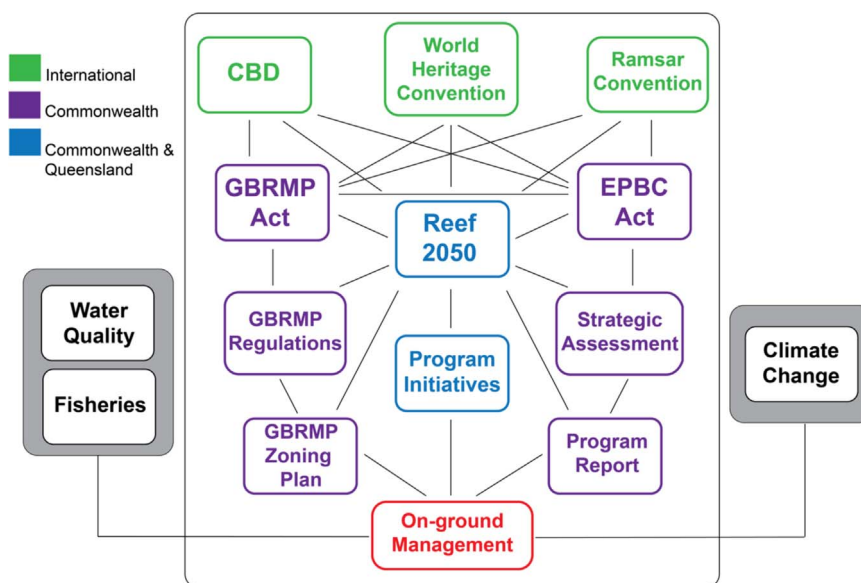


Fig. 3. Map of relationships of primary policies influencing on-ground management of the Great Barrier Reef Marine Park. The relationships were identified from policy and document content analysis and key informant interviews undertaken for this study. Policy areas highlighted in grey boxes were outside of the jurisdiction of the Great Barrier Reef Marine Park Authority. Acronyms: CBD=Convention on Biological Diversity, GBRMP=Great Barrier Reef Marine Park, Reef 2050=Reef 2050 Long-Term Sustainability Plan, EPBC Act=Environment Protection and Biodiversity Conservation Act, Strategic Assessment=Great Barrier Reef Region Strategic Assessment Report, Program Report=Great Barrier Reef Region Strategic Assessment: Program Report.

Table 1

The primary policies for on-ground management of the Great Barrier Reef World Heritage Area and Marine Park from each jurisdiction, as identified from key informant surveys (all policies included in the survey are listed in Table S4).

International policies
The World Heritage Convention
The Ramsar Convention
Convention on Biological Diversity
Commonwealth policies
Great Barrier Reef Marine Park Act 1975
Great Barrier Reef Marine Park Act Regulations 1983
Great Barrier Reef Zoning Plan 2003
Environment Protection and Biodiversity Conservation Act 1999
Great Barrier Reef Region Strategic Assessment: Program Report
Commonwealth and Queensland policy
Reef 2050 Long-term Sustainability Plan
Queensland policies
Marine Parks Act 2004 (Qld)
Marine Parks Regulation 2006 (Qld)
Fisheries Act 1994 (Qld)
Fisheries Regulations 2008 (Qld)

One recurring theme in both the analysis and amongst informants was that decisions that may influence the on-ground management of the Park are often taken by those outside of the Park and/or the managing Authority. The Authority does not have a mandate to influence all activities and threats that affect the Park, instead relying on other Government entities to deliver relevant legislation and some of the Authority’s management outcomes. One example cited was that the Authority was not able to control or legislate to improve land-use practices in the catchment that impact water quality on the Reef. The Authority instead plays a support role, working with stakeholders on the ground to improve management practices and stewardship.

Some informants expressed frustration at not being directly able to undertake decision-making on matters that impact on the Park, instead having to attempt to influence those in decision-making roles within other agencies. This ultimately limited the ability of some on-ground managers to achieve their desired objectives (Table 2). Separate to the issue of water quality, concerns were raised that, as other agencies are not necessarily bound to implement or have regard for the Marine Park Act, these agencies and their overarching policies may have competing

interests or priorities with those of the Act or the Authority.

Although the objects of the EPBC Act include providing for the environment, especially on Matters of National Environmental Significance, they are implemented through promoting the internationally-recognised notion of ecologically sustainable development. Sustainable economic development is therefore at the core of the objects. The EPBC Act is broad, operates at a higher departmental level, and was regarded by informants as a weaker policy than the Marine Park Act. These two Acts differ in how they contribute to management of the Park. The Marine Park Act looks at how an action may impact on the World Heritage values of the Park, whereas the EPBC Act looks at whether the action will have a significant impact on the Park’s environment. When considering Outstanding Universal Value of the Reef as a World Heritage property, the EPBC Act has the provision for use of the precautionary principle, stating that, in the absence of scientific certainty on the impact of an action, this principle is applicable. Informants claimed that this principle was not applied in practice and the use of biodiversity offsets under the EPBC Act had streamlined and facilitated unhindered development in the region (Table 2). In 2013, the United Nations Educational, Scientific and Cultural Organisation’s (UNESCO) World Heritage Committee, concerned that the unprecedented scale of proposed coastal and port development would affect the Reef’s Outstanding Universal Value, requested development not be permitted if it would impact the value either individually or cumulatively [80]. Development assessments and the use of EPBC offsets were topics raised by informants as policy areas that were challenging to resolve. Furthermore, the EPBC Act lacks the ability to consider the overall capacity of the Reef to withstand many individual actions and subsequent impacts. As such, informants were concerned with an end result of *death by a thousand cuts*.

Informants acknowledged that the Marine Park Act has a narrower scope in its application than the EPBC Act, enabling managers to look at how an activity or development may cause localised impacts. Differences in the interpretation of the EPBC Act and its components were raised by informants, suggesting that views of what might cause a significant impact in the Park (and thereby trigger assessment under the EPBC Act) differed between agencies. This highlighted the practical inconsistencies in determining what constitutes a ‘significant impact’, and one informant suggested these discrepancies were perhaps attribu-

table to differences in sources of information provided to agencies for consideration, but also to discrete expected outcomes that might apply because of differing agency priorities. The Matters of National Environmental Significance Significant Impact Guidelines 1.1 and 1.2 are guidelines for self-assessment by any person or Commonwealth agency who proposes to take an action, for whether that action will cause a significant impact and whether to seek its approval under the EPBC Act. These guidelines incorporate processes and standards that involve substantial interpretation and exercising of discretion at the individual/ practitioner level. Informants confirmed that the EPBC Act presented challenges to development proponents in deciding what constitutes a significant impact on a Matter of National Environmental Significance and whether to consequently refer their proposal for assessment under this Act.

3.2. *The Reef 2050 Long-Term Sustainability Plan: overarching policy influencing management*

Reef 2050 was the overarching policy document directing strategic and adaptive management of the Reef. Reef 2050, released in 2015, was developed to address the request from the World Heritage Committee in 2011 for a coordinated and comprehensive long-term plan for the Reef. Although this policy has buy-in from both the Commonwealth and Queensland Governments, it is not secured in legislation and requires implementation through various pieces of pre-existing legislation. As such, this may leave parts of Reef 2050, and its broad targets, open to more variation in interpretation than if it were formalised through legislation. In fact, many parts of Reef 2050 were to be delivered by Queensland legislation and specific details of how this process was to occur were still in flux, with legislative amendments likely required to fulfil obligations within this policy.

Reef 2050 had the potential to be an effective conduit between international commitments and on-ground management. The implementation of this policy will be exposed to much higher scrutiny than most others, with commitments to the World Heritage Committee driving this process. Yearly reporting has commenced with the Reef 2050 *Annual Report and Implementation Strategy 2016* delivered to the World Heritage Committee in December 2016. Several key actions, one of which required the Queensland Government to enact stronger tree-clearing laws, have not progressed. Consequently, UNESCO, dissatisfied with this lack of progress, may again consider inscribing the Reef on the 'World Heritage in Danger' list at its next meeting.

Articulating objectives, targets, and actions to maintain the Outstanding Universal Value for which the Reef was inscribed was a vital component of Reef 2050. However, key informants reiterated that the broad scope and high-level commitments of this policy are problematic. Reef 2050 required translation to relevant regional and local scales at which management actions could be applied through program measures, such as a regionally based reef recovery program. Although many informants regarded it as the most important and influential overarching policy, at the time of the interviews Reef 2050 was seen to be limited in its scope to directly influence on-ground management.

As a policy commitment intended to prioritise management processes, Reef 2050 was still needing to be embedded into the way the Authority and other agencies conduct their management actions and "business". Practitioners are not bound by policy in the same way as legislation. It is not policy, but legislation, that has a basis in law, with legislative regulations and enforcement providing a mechanism for decision-making. It was noted by informants that, at that time, Reef 2050 could not be utilised as a rationale for decision-making but rather for prioritisation of work. Still, there was a lack of clarity about how this policy would be embedded into individual work plans.

Both positive and negative perceptions of the Reef 2050 plan were expressed by informants. Some perceived direct line of sight between international commitments and Reef 2050, and others were concerned

by missed opportunities and existing gaps. Those who noted gaps in this policy also agreed they could be addressed through the process of review as the policy evolves. With several informants suggesting few details were provided for how Reef 2050 would be implemented, the process of implementing this new policy was a common topic of discussion. Some informants were unsure as to the expectations of their roles in implementing relevant parts of the policy, or how it might direct actions in specific areas of management.

With mainly qualitative, broad actions, targets, and objectives in Reef 2050, few quantitative targets were outlined except in regards to water quality where targets were drawn from the *Reef Water Quality Protection Plan 2013*. Reef 2050 targets were "perhaps not as quantitative as they could be" and how Reef 2050 "lines up" with other initiatives was unclear to a number of informants. It was noted that, prior to Reef 2050, there was already a deficiency of articulated management objectives and targets and, as such, monitoring programs and targets were not well linked "because what were they going to link to?". Translating high-level policy commitments into explicitly quantitative targets was perceived by informants as very difficult to do.

One informant suggested a disparity between the Reef 2050 targets and the listed actions needed to fulfil these targets, noting that it would take a lot more than the identified actions to achieve the targets. Some targets were lacking the relevant information needed for achievement by 2020. For example, one of the 2020 targets (Target BT5 in Reef 2050 p.39) states "Trends in populations of key indicator species and habitat condition are stable or improving at Reef-wide and regionally relevant scales" but the key indicator species and targets to include for determining trends were yet to be identified. The recently released Reef 2050 *Addendum to the Annual Report and Implementation Strategy 2016* suggests the identification of indicator species will be included in work packages for the integrated monitoring and reporting program, a commitment made in Reef 2050 for which a strategy has only recently been released. Therefore, this 2020 target relies on the delivery of a program not yet in place. Identifying indicator species and determining population trends at the suggested reef-wide and regional scales will require considerable time and monitoring efforts, with achievement of this target by 2020 unlikely due to these factors.

3.3. *International policies, implementation, and on-ground management*

The World Heritage Convention and its associated Committee have been particularly influential on the management of the World Heritage Area. Of the international policies, the most frequently used and implemented were the World Heritage and Ramsar Conventions, and the Convention on Biological Diversity. Yet despite this, informants generally undertook very little regular reference to the wording of these conventions. Instead, these conventions were seen as being implemented through policies such as Reef 2050 and the EPBC Act, which incorporate international conventions into national frameworks (Table 2).

Marine protected areas were described as key in delivering on international commitments, providing justification for the Park and for the application of stringent management arrangements. However, a mismatch of scale between international commitments and regional expectations was noted. Informants suggested a "significant gap" in translating commitments and bold targets made and agreed to through the signing of international conventions, to smaller spatial scales relevant to on-ground management. Practitioners may need to develop local objectives or quantitative targets that address the intent of international obligations, but these local initiatives are developed within the context of the national framework that provides mechanisms for their implementation. An example given was how to develop quantitative targets or measurable outcomes from the Outstanding Universal Value of the Reef that are deliverable in practice.

The Ramsar Convention was regarded as adding another layer of management and an additional consideration in managing the Park,

although informants did not apply the Convention through the use of its text (Table 2). Ramsar may have greater operational applicability than other international conventions because the spatial mapping of Ramsar sites was useful as a management tool. Conversely, though, Ramsar could not be utilised by informants in stopping key threats affecting these sites. The Ramsar Convention lacks the capacity to address or consider cumulative impacts, namely the impacts from the interaction of multiple stressors from multiple sources. Assessments were conducted as to whether a threat would impact the ecological character of the whole Ramsar site rather than considering the localised impacts, along with indirect and cumulative ones.

3.4. Policy gap: management of cumulative impacts

The major policy gap, identified through the content analysis and confirmed by key informants, was the failing of policy in addressing management of cumulative impacts. The Great Barrier Reef Outlook Report 2014 states that the ability of management measures to address cumulative impacts remains weak, and Reef 2050 recognises that the capacity to address cumulative impacts needs additional effort. There was no policy framework or mechanism by which practitioners could explicitly consider, manage for, or address cumulative impacts (Table 2). Assessments were conducted to consider only the direct impact of each particular action or activity. Informants suggested that these assessments needed to be broadened to include indirect impacts as well as flow-on effects of direct and indirect impacts. Moreover, what constitutes acceptable impact was somewhat undefined. An example given was “*How many dugongs can you impact before it is impacting on the value as a whole?*” Informants commented that the cumulative effect of many small decisions made across a range of agencies and sectors impacting on the Park could significantly affect the ability of managers to meet goals of maintaining the Outstanding Universal Value of the Reef. Managers need to incorporate assessment of facilitated and consequential impacts resulting from further actions, not just local impacts, and consider how these both contribute to cumulative impacts at local and broader (whole-of-Great Barrier Reef) spatial scales (Table 2).

3.5. Putting policies into practice

The process of implementing policies in on-ground management effectively determines whether a policy has applicability in a practical sense [81]. Many insights into common characteristics of both policy and the difficulties of implementing policy from a practitioner's point of view were discussed in key informant interviews. Informants considered policies to be often so broadly written that they were open to wide interpretation and, as such, impeded their use in decision-making. Implementation can be hindered, even when the reasons for the broad nature of policies is the need for longevity and flexibility (Table 2). Failing to develop operational-level guidelines and procedures to detail implementation processes such as how and when to apply that policy, was an issue raised by informants who were left unclear of their role in implementation (Table 2).

Informants suggested that many aspects of policies never get implemented, applied, or enforced. It was purported that this was in part attributable to the political environment. Policies were suggested as being developed and implemented from the political rhetoric of the day, and without appropriate scientific input or influence that informants regarded as crucial in policy development. Several informants commented that, to avoid ineffective implementation, policy-makers should write policies informed by undertaking reviews prior to implementation to develop prior knowledge of constraints and undesirable outcomes likely to arise through the implementation process. This would provide increased certainty about how the policy would be applied in practice.

4. Discussion

A complex and difficult governance and policy environment is in place for managing the Park due to the overlap of Commonwealth and Queensland jurisdictions (also highlighted by [25]), reflected in various agencies involved with different areas of management, plus global pressure from UNESCO's World Heritage Committee concerned with the management of a deteriorating, internationally-recognised World Heritage Area. Each jurisdiction and agency has its own set of policies to implement in management of the Park and World Heritage Area. The Marine Park Act, the EPBC Act, Reef 2050, and the World Heritage Convention were regarded as the most influential marine environmental policies in on-ground management of the Park and World Heritage Area. The implementation of policy is contingent and complex [16,50,81]; in the case of the Reef there were numerous challenges encountered by practitioners implementing policies. On-ground managers may have limited ability to contribute to policy implementation and decision-making that impact on the Park and affect management outcomes because some processes lie outside of their control, within other jurisdictions or agencies. Moreover, the intent of international agreements such as the World Heritage and Ramsar Conventions is, in practice, interpreted and reinterpreted through other policies in the process of being applied. This dilutes the intent of these conventions and may result in an implementation gap or deficit. The major policy gap noted through analysis and confirmed by practitioners concerned the lack of formal policy for assessing cumulative impacts, leading to managers being unable to effectively manage these impacts in the absence of a framework or mechanism with which to do so. Cumulative impacts are particularly relevant where impacts coincide and interact, or accumulate spatially and temporally. If the sources of some of these impacts are outside the jurisdiction of the managing agency, on-ground management of cumulative impacts is even more difficult. Each of these key research outcomes are discussed in detail below.

4.1. On-ground managers have limited ability to influence key factors that impact their management outcomes

It has been argued that sector-based, fragmented policy has failed to address the declining health of our oceans [26]. Nonetheless, management of MPAs such as the Park requires the consideration, prioritisation, and implementation of many single-issue policies. Despite both the Commonwealth and Queensland Governments' involvement in managing the Park, management responsibilities generally lie with the Authority. However, pressures that may have the greatest effect on the Reef are not solely confined to those within the Park's boundaries. Decision-making and implementation of policy to address these pressures occur at different levels of government, by many different practitioners in various roles, within different agencies, departments, and jurisdictions. This ultimately affects the Park, its management, and outcomes.

The Authority's Outlook Report 2014 identified the highest risks to the Reef as climate change, land-based run-off, coastal land-use change, and direct pressures including fishing, ports, and shipping. Most of these risks are outside of the policy areas of the Authority. For example, climate change is a Commonwealth Government policy area that also requires a concerted international and national approach to policy and action to alleviate risk to the Reef. An assessment of the effectiveness of the Authority's management released in 2013 reported that, in relation to climate change and extreme weather, existing measures to protect and manage biodiversity were ineffective in producing outcomes [40]. The Authority has little power or jurisdictional responsibility in broadly addressing climate change or developing climate-change policy, but is charged with developing, implementing, and managing best-practice responses to climate change [40]. The resultant problem is that on-ground managers have limited capacity to drive and influence key factors that impact directly on the management outcomes they seek.

Table 2

Themes identified from policy and document content analysis and key informant interviews with selected supporting quotes from interview participants. Sections of the manuscript that correspond with each quote are in brackets.

Theme	Quote
On-ground managers unable to influence key factors affecting the Park	We can only deal with things that are in the marine park and the things that have the biggest impact on the marine park don't actually happen in the marine park (3.1) The thing that leaps up the most is that tension between here's the bit that is us (GBRMPA), or us and Qld [...] there's something we would really like to happen [...] and we can provide support to that and try to steer things in a particular direction but we don't actually have a decision-making role (3.1)
Offsets facilitate unhindered development	When was the last time anybody said no to a development [...] We do the avoid, mitigate, offset but that means pretty much every proposal gets through and it just depends how big your offset is (3.1) What I see happening in practice is that some of those high level approvals are used as a justification that "I can't avoid it. I've already got an approval to already have this impact, so we'll just jump straight to offsetting and we don't want to go through the how can we avoid this impact and how can we mitigate it" (3.1)
International conventions applied through other policy frameworks	On the ground we don't, day to day, use the text of the (World Heritage) Convention... They (on-ground managers) are operating under a set of policy frameworks that have come out of that (3.3) We're not fully digesting the extent of the (Ramsar) convention but rather knowing that it exists and using it in thought processes and decision-making that might be another avenue for matters to be assessed under (3.3)
Policy gap: Managing cumulative impacts	What is missing out of the equation at the moment is cumulative impacts assessments [...]. The difficulty for us [...] is always that your gut instinct may be this shouldn't be allowed but of course you can only make your decision on what the regulations say you can consider [...] there's nothing explicitly allowing us to consider cumulative impacts (3.4) One of the other things that is very hard for us to deal with at the moment is local impacts and when is a local impact so significant that it affects that value at a GBR-wide scale. You could build the world's largest coal port and it only has a local impact you know. It doesn't affect 90% of the reef (3.4)
Putting policies into practice	It comes back to the nuances, and the way stuff is written is so broad [...] it provides very little guidance in terms of application (3.5) There is quite a disconnect for most people in the agency. They are aware that the policy is there but wouldn't be able to explain to me what their role is in implementing that policy. How am I supposed to do that? What does that mean in that situation? (3.5)

The terrestrial areas adjacent to the Park are the jurisdictional responsibility of the Queensland Government. Consequently, the Park is affected by decisions taken by those outside of the Authority regarding catchment-based land-use practices that influence water quality of the Reef region. Similarly, fisheries within the Park are managed by the Queensland Government, and their environmental performance is assessed under the EPBC Act by the Commonwealth Government. In these cases, the Authority contributes to, interacts with, and influences policy and decision-makers external to the agency, but is without mandated authority to make decisions. Managers may be responsible for outcomes they are unable to deliver because decisions affecting those outcomes could ultimately be made by other agencies.

The presumption may be that positive outcomes for the Reef would be the highest priority of any agency or government department responsible for decisions that impact on the Park; however, goals and objectives vary both within and among institutions [4]. For example, the main object under the Marine Park Act, for which the Authority is responsible is "to provide for the long term protection and conservation of the environment, biodiversity and heritage values of the Great Barrier Reef Region". In contrast, the Commonwealth Government, responsible for Matters of National Environmental Significance (including the Reef) under the EPBC Act, has a policy objective of promoting sustainable economic development [18]. The EPBC Act requires consideration of environmental factors in deciding project approvals but also necessitates consideration of economic and social issues. As such, development that may impact the long-term protection and conservation of the Reef can be approved. Objectives of agencies are often multiple and some may not be explicitly defined or stated [21]. Conflicting objectives, priorities, and focus both within and between agencies, departments, and jurisdictions can result in tensions and inconsistencies between institutions [36], and a compromise situation for the Park. The best demonstration of this inconsistency is the Commonwealth Government's commitments to protect the Reef through funding and resource commitments for Reef 2050, despite its persistence with policies that put the Reef at further risk. Policies that contribute to climate change such as those promoting and expanding the fossil fuel industry, along with those that encourage economic

development and further industrialisation of the region, have competing objectives with those that seek to secure the Reef's future [37,43,87].

4.2. International agreements: Could intent be lost in translation?

Australia is a signatory to a number of international marine environmental agreements, conventions, and treaties, so there is an obligation to implement these agreements through national policy and action, as illustrated in Fig. 1. A major challenge for implementing international agreements is translating them into effective action at a local scale and setting [4,55]. Indeed, McLaughlin [50, p. 171] suggests "Policy cannot always mandate what matters to outcomes at the local level".

The EPBC Act includes provisions to give effect to Australia's international environmental responsibilities, including the World Heritage and Ramsar Conventions. As examples, a number of other policies such as Reef 2050, the Great Barrier Reef Biodiversity Conservation Strategy (2013), and even the four Authority Plans of Management for specific areas within the Park, contribute to some degree to implementing international agreements through having regard for World Heritage values. Consequently, international policies go through a complex process of interpretation and reinterpretation even before they become the responsibility of on-ground managers. As such, a linear process from higher-level international treaties to on-ground management is not always evident. Weston [86] found a consensus in the literature that, to avoid implementation gaps or deficits, policy should be "free from the need for further interpretation by implementation agencies". However, at each stage of the implementation process, from the redefining of international policies in national legislation (such as the EPBC Act) and then to management and assessment frameworks, the intent of international policies is interpreted. Additionally, when undertaking decision-making using a national framework that is fulfilling international obligations, practitioners respond to, translate, and interpret the intent of those policies [17,50]. If the effectiveness of international policies is measured through the translation of their intent into action [81], these various layers of interpretation leave considerable scope to introduce subject-

tivity and discretion in how international conventions are utilised and implemented. Subsequently, the intent of the policy can be lost in translation, resulting in the weakening of its effectiveness [10,86].

4.3. Policy gap: management of cumulative impacts

Although the issue of management of cumulative impacts is not new [13,49] and is slowly being addressed, the inadequacies of past and present policy in proactively tackling this issue constitute a risk to the future of the Reef. The Authority's Outlook Report 2014 (p. V) says “[...] key habitats, species and ecosystem processes in central and southern inshore areas have continued to deteriorate from the cumulative effects of impacts”. The 2013 Scientific Consensus Statement on land-use impacts on the Reef's water quality and ecosystem condition [72] states that the cumulative impacts from climate change and increasing intensity of extreme events have led to declining trends in condition of key Reef ecosystems [12]. Reef-related reports like these acknowledge the negative effects of cumulative impacts and suggest development of policy to mitigate them, recognising that many impacts are beyond the boundaries of the Park [12,19,31,32]. If on-ground managers, specifically those within the Authority, are unable to act on sources of impacts on the Park because of jurisdictional boundaries, it becomes extremely difficult to address cumulative impacts, and to develop future policy to specifically address management of these impacts in the Park.

The Authority had previously released a framework for understanding cumulative impacts [7], and recommendations have been made for developing Reef-specific cumulative impact frameworks or assessment protocols [22,36], but practitioners had no policy or legislative mechanism by which to manage or address cumulative impacts. The 2014 Great Barrier Reef Region Strategic Assessment Report stated that plans and processes to address cumulative impacts on the Outstanding Universal Value of the Reef were lacking across the Authority's entire management scheme. Additionally, tackling this issue across jurisdictions was found to be highly challenging. Information matrices presented in the Strategic Assessment Report assist in understanding the range of impacts and the effects of each acting on an individual value of the Reef. Qualitative models and spatial analysis techniques investigated the interactions between some key impacts and values but many impacts were uncertain. A recommendation of this report was the drafting of a cumulative impact assessment policy to provide a systematic approach to managing the cumulative impacts of all activities within the region, but the mechanism (legislative or policy) to deliver these types of assessments was unclear. Reef 2050 committed to developing guidelines for addressing cumulative impacts, aiming to reduce impacts to the Reef so that “*cumulative impacts are managed below threshold levels*” ([19] p.88). What current information exists on appropriate thresholds and how these are determined was not documented in the policy.

Our understanding of cumulative impacts on biodiversity and ecological processes is somewhat limited [20,36]. Despite marine environments being subjected to simultaneous multiple stressors that interact [20], the majority of policy in marine management is intended to manage single-issue impacts [24]. Therefore, small, seemingly inconsequential single decisions can result in *death by a thousand cuts* [24,59]. Examples include the cumulative impacts from individual coastal and port developments contributing to the ongoing decline of biodiversity [36] and deterioration of key habitats, species, and ecosystems [36,70], or diffuse-source pollution from agricultural land-use decisions affecting the Reef water quality [31,72]. Whilst implementing policy and subsequent management actions to address one threat, the specific contribution of the management action to mitigate that threat may be masked or influenced by the variable and synergistic effects of interaction and overlap among multiple threats [31].

It has been acknowledged that cumulative impacts from multiple anthropogenic drivers affect the ability of ecosystems (including those

of the Reef) to recover from disturbances [19,30–32,43]. The future of the Reef and the ecosystem goods and services it provides rests with its resilience and ability to withstand future and increasing pressures including climate change and declining water quality, and relies upon mitigation of drivers of these threats, threats themselves, and their subsequent impacts [31,42,43]. With cumulative impacts spatially broadening across the Reef region and jurisdictions, and accumulating over time, a new, strong policy mechanism with which practitioners can manage cumulative impacts is needed urgently. Without policy or mechanisms enabling assessment and management of cumulative impacts that give consideration to specific spatial and temporal scales, there is no motivation to move beyond the current, inadequate process for environmental assessment of developments. This challenge will be felt across jurisdictional boundaries, and will apply to policy development, to governance and permission systems, and to the maintenance of the future health, resilience, and Outstanding Universal Value of the Reef.

4.4. Summary: policy, decision-making, and on-ground management

Decision-making and policy implementation take place in a shifting and dynamic setting [50] with fluctuating political and social pressures, influence, and will [65,66], competing economic pressures [37,43], differing policy settings and influences (potential addition of the Reef to UNESCO's ‘World Heritage in Danger’ list), emerging threats (dredge spoil dumping, coral bleaching events), fluctuating resource constraints [1], and diverse international and national expectations (e.g., the Convention on Biological Diversity, UNESCO, International Maritime Organisation, United Nations Framework Convention on Climate Change COP 21 Paris Agreement, [19]). Consequently, decision-making processes are not always transparent or well documented, and decisions are often made on a subjective or discretionary basis [78].

Policy-makers perhaps assume that practitioners understand the intent of the policy and what they are being asked to do, but ambiguous policies can be left open to modification, and broadly written policies can hamper strategic decision-making. Ambiguous and broad policies allow a large degree of subjectivity in interpretation, which can limit the ability of practitioners to reach decisions that effectively translate the policy intent into practice as intended [4,71]. What was highlighted through this research was a tension between discretion and flexibility in interpreting policy on one hand and, on the other hand, the risk of cherry-picking pieces of policy to implement. Policies introduced without directives for local implementation such as an implementation schedule, appropriate resourcing, or clear goals for practitioners in implementing agencies, risk being cherry-picked and ineffectively or partially implemented [48,71]. Such situations may retard progress towards outcomes, as was the case with Reef 2050. Reef 2050 was required to fit within an already existing policy and legal framework, and was initially released without an implementation strategy, although one was released several months later. Outlined in that strategy were governance arrangements and lead agencies for actions contained within Reef 2050, categorised under broad topics such as ecosystem health, water quality, and biodiversity. These arrangements were then required to be operationalised within specific areas of each agency and actioned by their practitioners. With the implementation and outcomes of Reef 2050 under intense global scrutiny, releasing implementation strategies and procedures for all implementing agencies and practitioners at the same time as the release of the policy would have provided clarity as to how the policy was to be operationalised and the specific roles of agencies in that process, which in turn would have assisted its successful implementation.

Additionally, in early 2016, a draft policy guideline was released for decision-makers reviewing current policies, programs, agreements, and partnerships to ensure the Reef 2050 vision, outcomes, objectives, and targets were taken into account [33]. This guideline was produced to assist government agencies, communities, industry, and others in

making decisions that contribute to achieving Reef 2050 outcomes. However, the guideline does not directly aid in incorporating the policy into already existing management systems. In situations or agencies where other policy objectives may take priority, this guideline may be limited in influencing practitioners' decisions. The need for this guideline perhaps highlights the differing priorities and agendas of agencies that are required to consider Reef 2050, and the difficulty in implementing a whole-of-government policy across several jurisdictions, agencies, and departments, and within specific roles.

5. Conclusion

The increase in anthropogenic impacts on the marine environment has required an increasing amount of international, national, and state-based policy aimed at mitigating these impacts. However, challenges associated with implementing policy at various jurisdictional and governance levels may obstruct the ability of some MPAs to achieve their objectives. This study found a complex range of policy that practitioners are expected to interact with, understand, and implement, and the process of policy implementation is challenging and contingent. Because the translation of international treaties to on-ground management is not a linear process, the intent of international agreements is constantly interpreted and refocused in the process of implementation, which may dilute effectiveness. The policy pathway that practitioners take when indirectly implementing international commitments through national and local policy may be difficult to define.

External factors affecting marine parks are many and significant, yet on-ground managers have limited capacity to drive and influence key factors that impact directly on effective management of their areas of responsibility. The challenges in implementing policies are numerous, and practitioners' abilities to meet their management objectives may be hampered by jurisdictional and sector-based decision-making processes. Furthermore, without the ability to manage cumulative impacts, there may be limited opportunities to determine which policies and management actions are working, which are not, and why not. Identifying how policies are put into practice and their efficacy should lead to improved understanding of whether the intent of international agreements, Commonwealth, and state policy is being realised, and whether this is impacting the ability of on-ground management to deliver effective outcomes for biodiversity.

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Appendix A. Supplementary material

Supplementary data associated with this article can be found in the online version at [doi:10.1016/j.marpol.2017.03.039](https://doi.org/10.1016/j.marpol.2017.03.039).

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