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Impact of different collaborative governance approaches on environmental outcomes: The case of Australian natural resource planning

Author(s)

Jaime Olvera-Garcia, University of Queensland, Australia, j.olveragarcia@uq.edu.au

Neil Sipe, University of Queensland, Australia, n.sipe@uq.edu.au

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Abstract

This paper examines the impact of collaborative governance on environmental outcomes within a water quality policy for improving the water quality of the Great Barrier Reef (GBR), a key Australian ecosystem that has been subject to continued pressures from land based run-off. The study identifies the role of collaborative governance in the implementation of the water quality policy, and compares the impact of the collaborative approaches followed by three natural resource management regions within the GBR on water quality outcomes. We found a positive association between collaborative governance and the achievement of better environmental outcomes, although, collaboration had a limited role in the policy.

Keywords: collaborative governance; environmental outcomes; Great Barrier Reef; funding; water quality policy

Introduction

Governing the planning and management of natural resources usually involves a multiplicity of government and non-government actors, who interact in different levels of decision-making and implementation. To manage this inherent complexity, natural resource management (NRM) and planning efforts have relied on collaboration. As a consequence, stakeholders from state and non-state realms work together to agree upon policy problems and solutions. Collaboration has been considered as a more appropriate strategy due to its emphasis on mutual gains and improved trust between the stakeholders as well as increased levels of knowledge-sharing and effective coordination (Ansell, 2012). In other words, the divergent interests of the stakeholders have the possibility of finding common-ground and action. Collaboration also has the potential

to integrate local knowledge and science (Weible and Sabatier, 2009), which are regarded as vital for dealing with environmental problems (Taylor and de Loe, 2012).

Despite this, collaboration is not recommended where there are fundamental value differences between the stakeholders (Wondoleck and Yaffee, 2000). By fundamental, the authors mean the existence of irreconcilable views among different actors regarding the central issue and the best means to approach it. In addition, it is not clear whether collaboration leads to better results than other forms of governance, such as markets or hierarchy (top-down). Few studies have focused on evaluating how collaboration differs from other governance modes as a policy strategy for NRM as well as the results it produces in the management of natural resource issues.

Among the few studies that have focused on the environmental outcomes facilitated by governance approaches, Weible and Sabatier (2009) found in a study about water quality outcomes that while collaboration tends to promote a convergence between the competing values of stakeholders, the actors involved do not rely more on scientific evidence compared to other governance approaches, such as hierarchical arrangements. Koontz and Newig (2014) found, in a series of case studies about water quality, that the governance approach (collaborative or top-down) did not decide the results of the policy. Instead, other factors were more decisive such as funds, available coordinators and networks. Newig and Fritsch (2009), for their part, did not find sufficient evidence to determine whether collaboration leads to better ecological outcomes than top-down governance approaches. In their review of more than 40 environmental policies in Europe and North America, they saw a mixed impact on improved compliance and implementation from collaborative and hierarchical modes.

Our study, rather than comparing governance modes, focuses on the results that different

approaches to collaboration had on environmental outcomes. For the analysis, environmental outcomes refer to the condition of a natural resource (e.g. land or water) after a planning or policy intervention (Christensen, 2015). Those "changes in environmental parameters appropriate to a specific resource" (Koontz and Thomas, 2006, p. 115). An environmental outcome would indicate, for example, if the water resource became healthier (or less polluted) as a consequence of a specific environmental plan or policy. There are three types of outcomes: 1) immediate; 2) intermediate; and 3) longer-term or end outcomes. The first refer to changes in the incidence of a natural resource problem or quality of an environmental public service. Intermediate outcomes are the measured changes in the natural resource conditions that increase the likelihood of future improvements in the resource. Longer-term outcomes are the measured reduced rates of recurrence of a natural resource issue, such as degradation or exploitation (Emerson and Nabatchi, 2015). In this study, we focus on the intermediate outcomes produced by a policy founded on collaborative governance.

Governance and collaboration

We view governance as the series of arrangements in place to structure and govern a policy process. The arrangements are comprised of institutions and rules where decisions are made and implemented (Bevir, 2009). The distinctive quality of the governance arrangements in this study is their emphasis on collaboration. Our analysis is guided by the definition of collaborative governance provided by Ansell and Gash (2008):

> 'A governing arrangement where one or more public agencies directly engage non-state stakeholders in a collective decision-making process that is formal, consensus-oriented, and deliberative and that aims to make or implement public policy or manage public programs or assets.' (p. 544)

It is worth noting the emphasis by the definition on "formal decision-making process" as our

study focuses on the formal processes of collaboration, disregarding any explicit exploration of informal governance, such as informal networks and relationships between stakeholders. However, as Ansell (2012) points out, in practice formal and informal collaboration overlap; hence, along the analysis, we recognize the impact that informal relationships might have in the collaborative effort.

We complement the definition of collaborative governance by emphasizing that the adoption of collaborative governance has the objective of carrying out a public purpose, such as providing a public good (Emerson and Nabatchi, 2015). The focus on implementing a public goal links with our focus on environmental outcomes or, in other words, the attempt to improve an environmental public good. In our approach of analyzing governance through its impact upon outcomes rather than its processes such as quality of the policy process, level of impartiality or bureaucratic autonomy, we coincide with Rotberg (2014), who argues for the importance of focusing on the services delivered (public goods or outcomes) to better understand the performance of a governance approach. Analyzing governance through the results it produces tends to minimize normative evaluations (e.g. the World Bank's governance indicators) of governance arrangements (Rotberg, 2014).

We include funding and the existence of coordinators in the organizations evaluated as the key variables to differentiate between the collaborative governance approaches. By funding, we refer to the financial resources available for on-ground delivery (e.g. water quality projects on land to reduce or halt run-off). By coordinators, we refer to staff devoted to engaging with the target groups (landholders, in this case) in order to promote behavior change. The aim is to explore the simple assumption that more funding for on-ground delivery would lead to better environmental outcomes. In the cases presented here, the availability of more financial

resources for on-ground delivery did not necessarily lead to better achievement of water quality outcomes.

Therefore, we seek to explain why and how, in some cases, better outcomes were obtained with less funding. For this purpose, we test the assumption that perhaps the cases that achieved better water quality outcomes with less funding had stronger collaboration. We use, then, the coordinators as the variable that would indicate stronger collaboration in our cases. This would indicate that the existence of an important collaborative element, coordinators for on-ground delivery, contributed to achieving better water quality outcomes regardless of funding received. In other words, the existence of a coordinator or coordinators for on-ground delivery would allow suggesting a positive or negative association between collaborative governance and the achievement of environmental outcomes.

The case study

The case evaluated is located in the state of Queensland in the north of Australia. The policy considered is a plan that aimed to improve water quality in the Great Barrier Reef, one of the most important Australian ecosystems. Water quality represents the environmental outcome that was delivered by six NRM regions established along the Reef catchment. In this study, we will focus on three of those regions, located in the north, center and southern areas of the catchment. We selected them as they represent examples of different land uses, funding amounts and environmental outcomes. In this sense, they provide different contexts in which to examine potential different impacts of their collaborative approaches (using the existence of coordinators as the proxy variable for collaboration).

Hence, this is a case-study analysis of the impact of collaborative governance on water quality

outcomes within a natural resource planning endeavor. The data collected and analyzed was based on a review of official documents that reported on the environmental outcomes of the policy evaluated, which was complemented with semi-structured interviews of 15 key stakeholders involved directly in the implementation of Reef Rescue or that had knowledge of the implementation process and its outcomes. The interviewees were involved in managerial roles. Table 1 shows the distribution of the stakeholders per group and rank and interview code. The interviews were analyzed and coded through the Vivo software. The findings offered in this paper are based on the data about water quality outcomes as well as the perspectives of the actors involved about those same outcomes. Two research questions guided the study:

1. What was the role of collaboration in the implementation of the policy?
2. How did collaborative governance approaches impact on the different environmental outcomes achieved by the three regions?

Table 1. Distribution of stakeholders interviewed

Stakeholder group	**No. of Interviewees**	**Interview code**
Federal government	1	FG1
State government	3	SG1, SG2, SG3
Regional NRM bodies	6	NB1, NB2, NB3, NB4, NB5, NB6
Agriculture Industry Representatives	4	AI1, AI2, A13, AI4
Academic sector	1	AS1

In order to present the analysis, we divide the paper in three sections. First, we present the policy, its governance arrangements and implementation aspects, highlighting the water quality outcomes obtained by the three regions. In the second part, we discuss the findings in the three NRM regions based on the two research questions. The third and last part presents the implications of the study, explaining the relationship between collaborative governance and environmental outcomes, the two key variables of the analysis. Implications for further research

and collaborative approaches are also offered.

Collaboration in the Great Barrier Reef: a regional governance approach

Governance arrangements

Since the first decade of the 2000s, collaborative governance approaches have been used in Australia to address the degradation of natural resources. The governance arrangements are characterized by the participation of state and non-state actors in a multi-level setting of governance domains: federal, state, regional and local. In the NRM context, the regional level of governance plays a central role as the federal level established NRM regions within each Australian state based on the ecosystem boundaries. Through the NRM regions, the federal level devolved management and planning responsibilities to the regional level. Each region is governed by an NRM community-based body. This was the case with the Great Barrier Reef, comprised by six NRM regions along its 2,300 km catchment.

Due to the increasing levels of pollution and rising sea temperatures, the first Reef Plan was developed in 2003 to deal with water quality, which was mainly impacted by the intensive agriculture practices undertaken in the regions. Agriculture land-use covers more than 82% of the GBR catchment. 75% of that proportion is devoted to grazing, 1.3% to sugar cane and the rest to other smaller land-uses such as horticulture and dairy farming (Australian Government, 2014). After the planning intervention of 2003, water quality had not improved significantly. Hence, in 2007 stakeholders from the regional bodies, agriculture industry and conservation sectors came together and lobbied the federal government to develop a new proposal for dealing with water quality. In 2008, this proposal became the *Reef Rescue* program, which later became

part of the investment strategies of the 2009 Reef Plan (Queensland Government, 2009). *Reef Rescue* was developed by the federal level, while the Reef Plan was established by the state and federal governments. Reef Plan represented the collaborative framework through which *Reef Rescue* was implemented.

The main purpose of the 2009 Reef Plan was to halt and reverse the decline in water quality entering the Reef by 2013 (Queensland Government, 2009). The plan introduced specific targets to reduce the 'feeders' of non-point source pollution: nitrogen, pesticides and sediments, which were caused by agricultural run-off. Land-based run-off is considered one of the main threats to the health and resilience of the GBR, along with climate change, coastal development and port activities (Queensland Government, 2016). *Reef Rescue* represented and incentive-based and collaborative strategy directed to agriculture producers to change their land management practices (Australian Government, 2011).

The main stakeholders involved in this policy were the federal and state governments (three government agencies, respectively); six regional NRM bodies; agriculture industry (sugarcane, grazing, horticulture and other marginal land-uses); the conservation sector (represented by the World Wildlife Fund); and academic researchers, who contributed the scientific evidence of the declining health of the Reef that underpinned *Reef Rescue* (Queensland Government, 2008). The federal government invested $200AUSmillion dollars for *Reef Rescue* in the five-year period of 2008-2013 (Australian Government, 2011). It allocated the funding directly to the NRM bodies to deliver the policy. This was done in a top-down fashion as the funding criteria were developed solely by the federal level.

The collaboration of *Reef Rescue* occurred mainly between the six regional NRM bodies and the agriculture organizations within those regions. They worked together to motivate the

producers to change their behavior, towards more sustainable agriculture practices. Dealing with water quality became then a matter of promoting sustainable agriculture. However, collaboration also occurred between the regional NRM bodies and the federal and state governments. There were two collaborative arrangements taking place simultaneously in a multi-governance setting: a high collaborative domain and a regional one (Figure 1).

Within these collaborative arrangements, the central actors were the regional NRM bodies, which canalized the funding received from the federal government. The funds were distributed to the landholders through a competitive grant process, in collaboration with the regional agriculture organizations. The collaborative arrangements were complemented by a top-down approach from the federal and state governments to the regional domain of collaboration. Both governments decided the objectives and priorities of the policy. The federal level decided and allocated the funds for *Reef Rescue*, while the state level introduced regulations in 2009 to promote practice change during the implementation of the policy (Reef and Rainforest Research Centre, 2015).

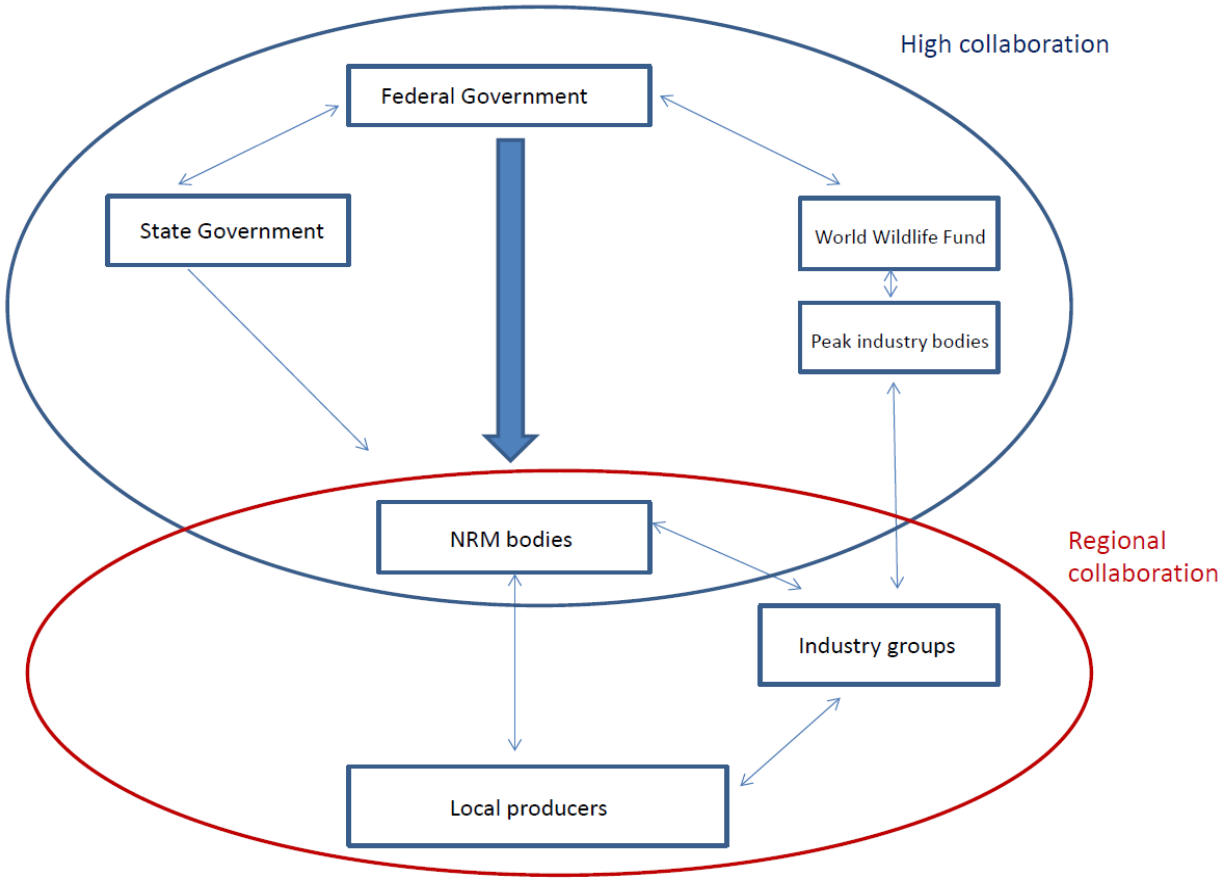
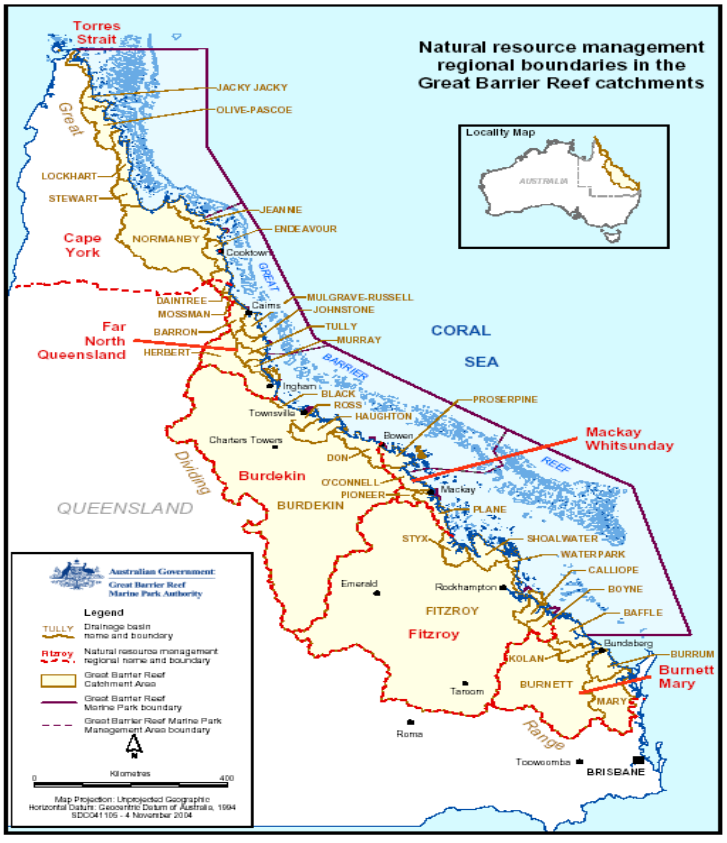


Figure 1. Overview of collaborative governance arrangements during implementation of Reef Rescue (developed by authors). The arrows in both directions indicate collaboration between the stakeholders; whereas the arrows in one direction indicate a top-down directive.

In this study, we consider three of the six NRM regions to discuss about the different impacts of collaboration on the water quality outcomes achieved by *Reef Rescue*: Burnett Mary, Fitzroy Basin and Wet Tropics. The first region is located south from the Reef Catchment, the second is at the center, while the third is in the northern part (see map 1 for more detail. The Wet Tropics is identified as the Far North Queensland region in the map). Burnett Mary is administered by Burnett-Mary Regional Group, Fitzroy Basin by the Fitzroy Basin Association, and Wet Tropics by Terrain NRM. We focus on the level of regional collaboration at each of the three NRM regions, indicating the role of the high collaboration domain. The results shown

are based on the official data on water quality outcomes as well as interviews with the stakeholder groups previously identified (Table 1). There are two reasons behind our selection of *Reef Rescue*: 1) given our focus on outcomes, we considered to study an implementation strategy as it is where outcomes are produced (in this case, the $200AUSmillion for *Reef Rescue* represented the highest funded implementation component of the 2009 Reef Plan, while the other component were the $50AUSmillion invested by the state government in regulations); and 2) *Reef Rescue* was selected as it was one of the very few programs within Queensland's water quality planning that included factual information about environmental outcomes rather than merely outputs (e.g. plans developed or the activities that lead to the outcomes).



Map 1. NRM regions in the Great Barrier Reef (Queensland Government, 2008)

Water quality outcomes

Reef Rescue targeted intensive agriculture activities, such as grazing and sugarcane cropping to improve water quality. The policy followed the 2008 *Scientific Consensus Statement on Water Quality* in the GBR, which identified agriculture as the main contributor of non-point source pollution in the Reef catchment, generating mainly sediments, nitrogen and pesticides (Queensland Government, 2008). In terms of land-use, the three regions are dominated by grazing. Fitzroy Basin dedicates 78% of its land use to this activity, Burnett Mary 54%, and Wet Tropics 33%. However, Burnett-Mary and Wet Tropics are also important producers of sugarcane, 2% and 9% respectively. Fitzroy Basin, on the other hand, does not produce sugarcane in its region. Figures 2, 3 and 4 below illustrate the proportion of land-uses per region. Within each region, we include the land area devoted to conservation in order to provide a contrast between the agriculture land uses. However, we do no not consider the potential influence that conservation land uses might have on water quality.

Regarding the general contribution of each land use on the Reef's non-point source pollution, sugarcane is the major producer of nitrogen contributing with 56% of the total impact, even though this agriculture activity accounts for only 1.3% of total agriculture land use in the GBR (Australian Government, 2014b). Grazing covers 75% of total agriculture land use, and contributes mostly with sediments, which account for around 45% of total sediments in the Reef (Australian Government, 2014b). Pesticides are also produced mostly by sugar cane; however, there is no specific percentage reported on the industry's impact. Pesticides are, rather, a combination of all the agriculture land-uses. We refer to the pollutant reductions in nitrogen, sediments and pesticides as the water quality outcomes of *Reef Rescue*, because they indicate the extent to which the health of the water in the GBR catchment was improved. The water quality outcomes were mainly the result of engaging landholders to change their land

management practices. However, in the official documents it is unclear if there was a cause-effect relationship between land management practices and water quality outcomes.

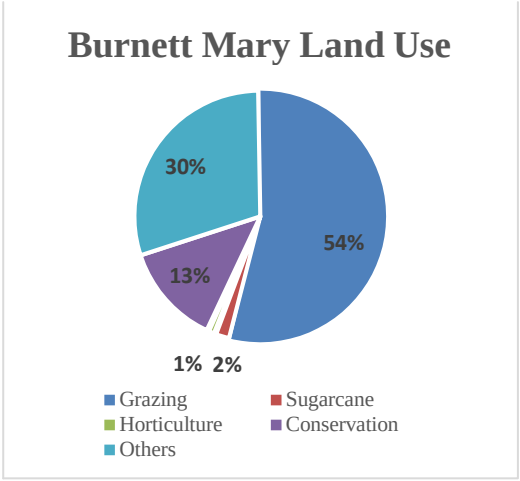


Figure 2. Burnett Mary Land Use (Alluvium, 2016)

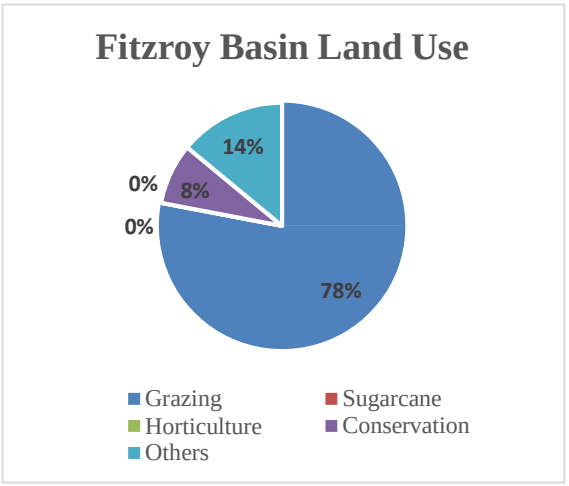


Figure 3. Fitzroy Basin Land Use (Alluvium, 2016)

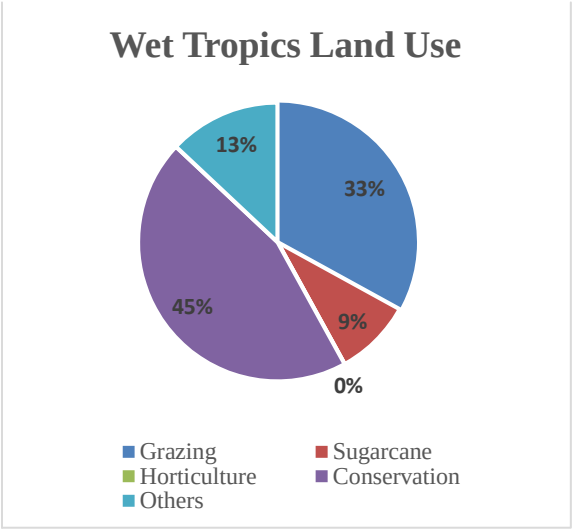


Figure 4. Wet Tropics Land Use (Alluvium, 2016)

The 2009 Reef Plan that informed *Reef Rescue* included three targets to reduce the impact of agriculture activities on the GBR's water quality, based on three key pollutants from land run-off: nitrogen, sediment and pesticides. The targets were the same for all six NRM regions and consisted in reducing by 50% nitrogen and pesticides by 2013 (a five year time frame that began on 2008), as well as reducing sediments by 20% in 2020 (a longer time frame of 12 years).

Regarding nitrogen loads, Burnett Mary achieved the highest reduction with 15%, while Fitzroy had the lowest nitrogen reductions with 3%. Wet Tropics achieved less reduction than Burnett Mary, despite being the region with the highest contribution of nitrogen in terms of pollutant loads (33.1%, compared with 11.6% from Fitzroy Basin and 6.0% from Burnett Mary). Wet Tropics is also the region with more land use dedicated to sugarcane farming; however, it achieved almost half the outcome that Burnett Mary, where sugarcane covers 2% of its land use. Table 2 below shows in more detail the reductions in nitrogen per region compared with the original target of the Reef Plan.

Table 2. Water quality outcome on nitrogen by percentage and the regional contribution of pollutant loads as a percentage of the GBR total baseline loads as presented in the final 2012-2013 Report Card (Queensland Government, 2014) of the 2009 Reef Plan (Queensland Government, 2009).

Region	Reduce nitrogen by 50% (by 2013)	Nitrogen pollutant loads per region
Burnett Mary	15%	6.0%
Fitzroy	3%	11.6%
Wet Tropics	8%	33.1%

In terms of sediment loads, Wet Tropics achieved the highest reduction with 13% out of a target of 20%. It must be noted though that the time frame for sediments was longer than for the other two outcomes. Burnett Mary had the lowest decrease in sediment loads with 3%. Fitzroy achieved a slightly higher reduction with 4%, despite being the region with the highest contribution on sediment loads (22.8%). As shown by Figure 3, 78% of the Fitzroy region is devoted to grazing, while the other two regions are less grazing-intensive. Burnett Mary achieved almost the same target as Fitzroy, despite having 54% of its land use devoted to grazing. Table 3 shows in more detail the reductions in sediment per region. In this respect, it remains unclear for this analysis the behavior between land use proportion to pollutant loads and reductions in those pollutant loads. If, for example, in a larger proportion of land use, such as grazing in Fitzroy (which contributes with most of sediments) a unit of change in land

management practices would deliver a higher amount (expressed in percentage) of reductions in sediments. Or, on the contrary, in a smaller land use proportion, such as grazing in Burnett Mary, a unit of change would deliver higher amounts of reduction in those sediments.

Table 3. Water quality outcome on sediment by percentage and the regional contribution of pollutant loads as a percentage of the GBR total baseline loads as presented in the final 2012-2013 Report Card (Queensland Government, 2014) of the 2009 Reef Plan (Queensland Government, 2009).

Region	Reduce sediment by 20% (by 2020)	Sediment loads per region
Burnett Mary	3%	5.4%
Fitzroy	4%	22.8%
Wet Tropics	13%	14.3%

Burnett Mary achieved also the highest reduction in pesticide loads with 28%, while Fitzroy had the lowest one with 5%. In this case, Fitzroy has the lowest contribution of pesticide loads, with only 3.5%. Wet Tropics achieved almost the same reduction as Burnett Mary, only 2% lower than the southern region. However, Wet Tropics has by far the highest contribution of pesticide loads, with 51.4%. Table 4 presents the results of pesticides reductions. As with the other water quality outcomes, there is no linear relationship between pollutant reductions and the proportion of pollutant loads per region. In the three water quality outcomes, the region with the highest contribution of pollutant loads is not necessarily the one with the highest achievement in terms of pollutant load reductions. That is the case of the Wet Tropics with nitrogen (33.1% of load contributions and 8% reductions) and pesticides (51.4% of load contributions and 26% reductions); and of Fitzroy Basin with sediments (22.8% of load contributions and 4% reductions).

Table 4. Water quality outcome on pesticides by percentage and the regional contribution of pollutant loads as a percentage of the GBR total baseline loads as presented in the final 2012-2013 Report Card (Queensland Government, 2014) of the 2009 Reef Plan (Queensland Government, 2009).

Region	Reduce pesticides by 50% (by 2013)	Pesticide loads per region
Burnett Mary	28%	9.1%
Fitzroy	5%	3.5%
Wet Tropics	26%	51.4%

A key consideration to take into account with these results is that the percentages for the water quality outcomes are based on estimates from a modelling program developed by the state and federal governments. Therefore, they do not represent actual reductions of pollutant loads; rather, they are projections based on the "Paddock to Reef" model program (Queensland Government, 2017). In addition, the figures reported by "Paddock to Reef" are based on data that each region provided to both government levels. They all had different methods of obtaining and reporting that data. Hence, it is uncertain to what extent they reflect the real achievements.

On the other hand, each region received different amounts of funding for on-ground delivery to achieve the water quality targets. The funding was allocated by the federal government based on multiple criteria analysis (MCA) developed by the stakeholders. The MCA suggested prioritizing the regions with extensive grazing land-uses as they delivered the largest pollutant loads to the catchment (Australian Government, 2014b). Fitzroy and another region not considered in this study (Burdekin) were the ones recommended by the MCA. However, the official document about the achievements of *Reef Rescue* does not specify how the federal government decided to allocate the regional funds for on-ground delivery. For instance, as Figure 5 shows, despite the MCA advice, the Wet Tropics received more funding than Fitzroy.

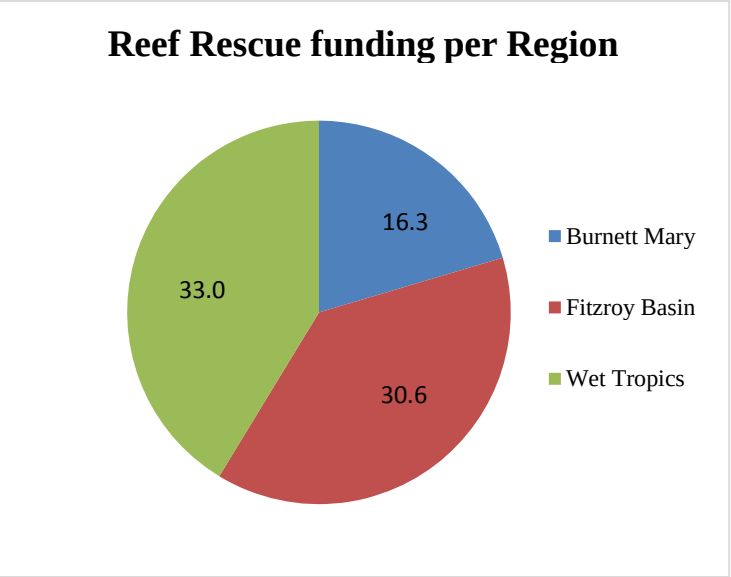


Figure 5. *Reef Rescue* funding allocated per region in AUS million (BMRG, n.d.; FBA, n.d.; and Terrain NRM, n.d.)

The amounts in Figure 5 represent the funding for on-ground delivery available for the five year period of *Reef Rescue* (2008-2013). The most important thing to highlight on this section is that Wet Tropics was the region that received the highest amount of funds for on-ground delivery, but did not necessarily achieved the highest reductions in pollutant loads. In two of the environmental outcomes, nitrogen and pesticide load reductions, Burnett Mary achieved the highest reductions in pollutant loads with fewer funds available. Can this be explained by their collaborative approach? On the other hand, it is worth noting that, in general, the water quality outcomes achieved by the three regions fell short of the original targets of the 2009 Reef Plan. As a consequence, the overall water quality condition of the Reef catchment within those regions remained poor (Queensland Government, 2014).

Moreover, before *Reef Rescue* the water quality condition of the GBR was considered poor and it remained the same after the policy intervention (Australian Government, 2014a). The state and federal governments recognized this by stating that "while there is considerable funding for the protection of the Great Barrier Reef, it is modest relative to the size of the water quality problem" (Australian Government, 2014b, p. 10). The interviewee from the academic sector

(AS1) commented that the prioritization in the allocation of funds was inappropriate, and the distribution of the financial resources could have been better. Subsequently, new plans were developed to improve the water quality condition, the 2013 Reef Plan (Australian Government, 2014b) and the Reef 2050 Long-Term Sustainability Plan (Australian Government, 2015). However, the role of collaborative governance in achieving the water quality outcomes of these planning efforts has not been explored yet. As previously stated, in this study we focus on the 2009 Reef Plan and *Reef Rescue*, the main implementation strategy of the plan. The next section discusses this collaborative role based on the stakeholder views. It also explores the impact of the collaborative approaches of each region on the water quality outcomes based on the coordinators proxy variable. This exploration is complemented with comments by the stakeholders interviewed.

Impact of collaboration on regional water quality outcomes

Role of collaboration

As mentioned before, the water quality outcomes achieved by the regions were based on an implementation strategy that relied on regional collaboration. This type of collaboration, according to the interviewees, consisted of the NRM groups working together with regional agriculture industry organizations to promote among the landholders the voluntary adoption of more sustainable management practices. The instrument they used to engage the landholders was grants, awarded through a competitive process of project selection. Reconsidering Ansell and Gash's (2008) definition on collaborative governance, regional collaboration in *Reef Rescue* had a limited scope, not seeking deliberation or consensus-based decisions between the parties. On the contrary, collaborative governance adopted more the style of a formal working relationship between non-state actors that relied on a key policy instrument: incentives. The

landholders also collaborated in achieving the environmental outcomes through their voluntary participation in exchange for grants. Nevertheless, there were landholders who did not participate at all in this collaborative scheme.

Despite the limited scope of collaboration, all the stakeholders from the three regional NRM bodies interviewed argued that regional collaboration was essential for implementing the water quality policy and achieving its outcomes. This was also shared by around 80% of the stakeholders from the other stakeholder groups interviewed. In general, the main benefit of collaboration, according to the stakeholder views, is that it allowed sharing information as well as best practices. No water quality outcome would have been achieved without collaboration and, overall, all the stakeholders interviewed consider that *Reef Rescue* was an example of successful collaboration in the GBR water quality issue. This was also the conclusion of the final report on the achievements of *Reef Rescue* (Australian Government, 2014a). In this study, we avoid discussions about success or failure of the policy analyzed. We focus on the outcomes achieved by each region, and contrast those outcomes with the original targets.

For the interviewees, the relationships developed between the NRM groups and the regional agricultural bodies for sugarcane or grazing were essential for engaging the landholders in changing their practices. Collaboration with the state and federal levels was less important, and it occurred mainly through reporting and informing these levels about implementation progress. According to interviewee NB3, staff from the federal government met twice per year with the regions to oversee the coordination efforts. The state government, though, never met with them. Collaboration between the NRM regions was also rare:

> "A lot of times it was just learning, you know, sharing of information from government down, there wasn't a lot of sharing across (NRM regions), which I think that was what was meant to do" (NB4).

More than 80% of the stakeholders from the NRM bodies did not mention collaboration across the NRM regions as part of the collaborative governance arrangements, despite the existence of the Regional Groups Collective (RGC), which is the coordinating body of 13 regional NRM groups (including the six Reef NRM regions in Queensland). Interviewee NB2, though, stated that the RGC allowed regular discussions between the NRM groups. On the other hand, less than 10% of the interviewees considered that there was no collaboration in the governance arrangements to implement *Reef Rescue*:

> "What collaborative arrangements? There weren't any real collaborative arrangements in place during Reef Rescue. Some had working relationships with other stakeholders, some didn't. This was based on how each NRM regional group works within their respective region" (NB6).

The quote above from the interviewee NB6 suggests that informal collaboration might have been more important, as it depended on how each NRM group worked within their region, and not really on how they all followed the formal collaborative arrangements that framed the policy. As interviewee NB1 pointed out, the NRM bodies managing the regions are different organizations with different rules and styles of management. Hence, even though they have the same structure, comprised by a community-based Board and an operational body led by a Chief Executive Officer (CEO), the regions have different rules (e.g. different Constitutions) and ways of operating informally.

Regarding collaboration at the higher levels of government ('high collaboration'), around 70% of interviewees (except from the federal and state governments) tend to view it more as a top-down strategy developed by the state and federal levels for the regional level. The stakeholders from the regional NRM bodies said that sometimes, particularly the landholders did not even distinguish between the two levels of government. They viewed the government as one

entity commanding the policy. For them, collaboration was merely a working relationship to 'get things done'. In other words, our case study represents an example of limited collaborative governance between state and non-state actors. One that was motivated by devolution of responsibility for delivery to the regional, on the assumption that this level of governance was best suited to implement the policy (Kroon et al., 2016).

Additionally, collaborative governance in *Reef Rescue* was counterpointed by regulations. The regulations were introduced by the Queensland government during the implementation of the policy and their main purpose was to advance change in management practices between the reluctant landholders. Regulations represented the 'stick' of the 2009 Reef Plan, while *Reef Rescue* through its incentives represented the 'carrot'. For this reason, some of the interviewees considered that the state government should not be included in the collaborative arrangements of the policy. Interviewee NB5 commented that, due to the regulations, some landholders would collaborate out of fear of being wrong and being told by the state government that they could no longer farm:

> "It is an implied threat by them, I don't know if it's really real, I mean you've also got the state government with their Reef regulations saying 'you must do this this way or else, you are gonna get fined, you are gonna…this' you know. That is a fear-based process and growers are fearful" (NB5)

The interviewees, though, did not mention examples of any penalties imposed, such as an agriculture business losing its operation license for not complying with the 2009 Reef Plan. In addition, the official report on the achievements emphasizes the collaborative component of the policy, with no mentions about the role of regulations (Australian Government, 2014a). Apart from being limited, collaborative governance was grounded by regulations in the attempt to establish a minimum standard among the land management practices. Thus, the collaborative

approach was combined with more centralized approaches to governance, represented by regulations. Collaboration might have been reinforced or contradicted by regulations. However, exploring that issue is out of the scope of this study.

Regional collaboration was then decisive to implement *Reef Rescue* and within this regional level, the different approaches to collaboration per region were more important in determining the achievements (or lack of achievements) in terms of water quality outcomes. In order to explore the likely impact of collaboration per region, we focus in the next section on the coordinators proxy and how it interacted with the funding for on-ground delivery as well as with the regional water quality outcomes.

Impact of collaborative governance approaches

Each of the three NRM groups included in this study was responsible for the delivery of *Reef Rescue* in their regions. They were devolved this responsibility by the federal government. The key factor that enabled their collaborative approaches was funding. Moreover, stakeholders from the regions considered that without the incentives collaboration would have been marginal. As it was shown in Figure 5, each of them received different amounts of funds, which were decided by the federal government. In this section, our purpose is to analyses with more detail the potential relationship between collaborative governance and environmental outcomes, based on the key coordinator variable to differentiate between the regional collaborative approaches. This analysis is used to develop a potential explanation to the fact that the NRM regions with more funding did not necessarily achieved the best water quality outcomes. The views from the interviewees complement our understanding of how the regions' collaborative efforts impacted on the environmental outcomes. It is important to note

that the stakeholders did not participate (e.g. through deliberation) in the decisions about funding allocation in *Reef Rescue*. This was decided solely by the federal government.

As we mentioned previously, one of the key characteristics of *Reef Rescue* is that the policy represents an example of a collaborative governance approach that was informed by robust scientific evidence about the impacts of land-based run-off on water quality. It was an evidence-based policy that provided a strong argument about the importance of addressing the water quality problem (Queensland Government, 2008); however, the stakeholders from the regional NRM bodies and agriculture industry representatives question the data on the water quality outcomes. Particularly, the four interviewees from the Agriculture Industry Representatives group argue that the modelling program behind that data does not provide fully accurate measures of their efforts.

These agricultural stakeholders considered that the scientific information is insufficient and only accounts for a general aspect of the issue. Moreover, they complained about the lack of evidence on the impacts of water quality from individual farms. In their view, the policy problem of water quality is not a serious issue. It became huge due to politics and international pressure from international organizations such as the United Nations World Heritage Committee. Hence, the water quality outcomes are overshadowed by the uncertainty that surrounds the actual impacts. For these reasons, the agricultural stakeholders as well as most of those from the regional NRM bodies tend to disregard the data about the water quality outcomes shown in Tables 2-4.

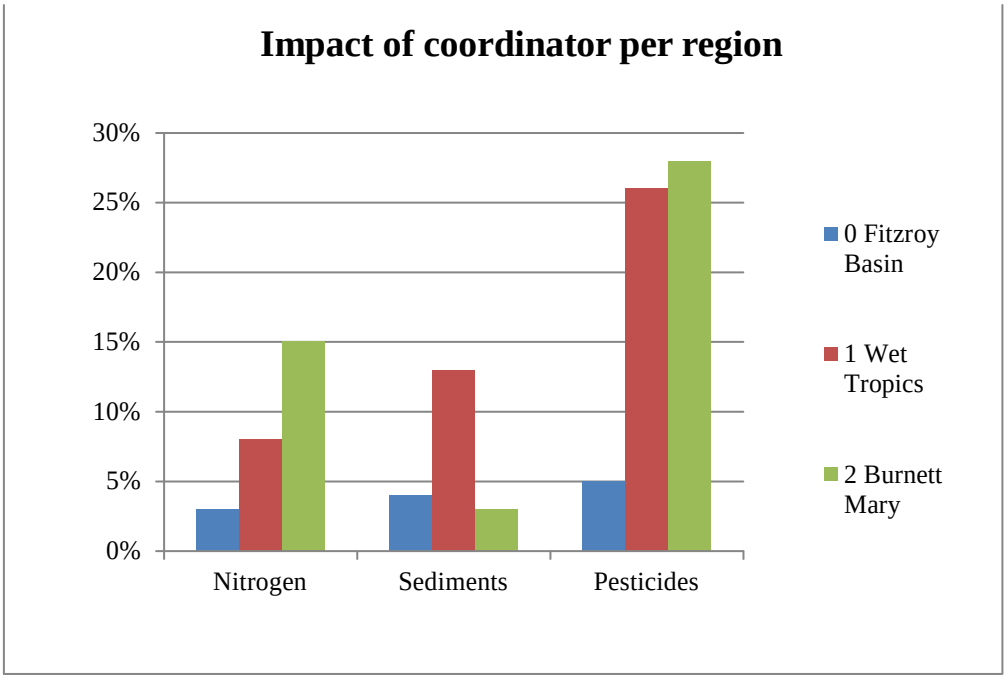
Stakeholders from the regional NRM bodies and agriculture industry representatives also tend to disqualify the reporting method followed by the state and federal governments regarding the overall water quality condition. They consider that the rating between poor-moderate-good-

very good from the modelling program (Queensland Government, 2014) is a simplistic way of evaluating their regional efforts. However, each region had their own method of collecting the data about pollutant reductions and reporting it. The uncertainty, in this analysis, is also generated by these different regional reporting standards. It is worth noting that, overall, the achievements on water quality fell short of the original targets and, as stated previously, the official view considered that the investment towards the policy issue was modest.

In order to test the assumption that stronger collaboration might explain why an NRM region achieved better water quality outcomes than the others (despite having less funding for on-ground delivery available), we used the existence of coordinators among the NRM bodies as an indicator to differentiate between their collaborative approaches. Coordinators were identified as facilitators by the NRM bodies. They engaged with the landholders to support them in their adoption of better land management practices. Improved land management practices would reduce the pollutant loads into the Reef and thus, improve the quality of water. Graph 1 shows a positive association between having one or more coordinators and achieving better water quality outcomes.

For example, Burnett Mary had two coordinators and achieved higher percentages of reductions in nitrogen and pesticides, despite being the region with less funding for on-ground delivery available. While the Wet Tropics had one coordinator and achieved the highest percentage of sediment reductions and almost the same percentage of pesticides reductions as Burnett Mary. Fitzroy Basin had the lowest percentage reductions in pollutant loads, which could be associated with the fact that there were no coordinators in the NRM body that administered *Reef Rescue* in this region. Wet Tropics, though, had the highest amount of funding for on-ground delivery available. Thus, the existence of one or more coordinators is associated with the achievement of better water quality outcomes, and having more than one,

as with the case of Burnett Mary, provides a potential explanation regarding the relationship between funding for on-ground delivery and water quality outcomes. In other words, stronger collaboration indicated by the existence of more coordinators might explain why a region achieved better water quality outcomes despite the funding received.



Graph 1. Impact of coordinator per region in terms of regional water quality outcomes

The analysis is complemented by the interviewees from the three regional NRM bodies. In general, these stakeholders considered that they would have been able to achieve more pollutant reductions with more funding. However, when asked about why in some cases this was contradicted during *Reef Rescue* −such as a region achieving better outcomes despite having less funding− there were two types of explanations offered: 1) approaches to collaboration that facilitated more effective implementation; and 2) external factors. Table 6 divides both explanations between their main features. We highlight the specific engagement roles (e.g. coordinators) explanation on regional collaboration because it complements our finding of the positive relationship between the existence of coordinators and achievement of water quality outcomes. It should be noted, as well, that the interviewees from the regional NRM bodies were

reluctant to discuss in detail about potential comparisons between them. The majority of them said that they were unaware of the funding amounts received by other regions.

Table 5. Factors that explain the different achievements on regional water quality outcomes of *ReefRescue*

Regional collaboration	o Higher levels of cohesion between the stakeholders o Specific engagement roles (e.g. coordinators) o Informal regional collaboration
External factors	o Staff skills (e.g. technical knowledge) o Weather events (e.g. cyclones or floods) o Land area of each region o Market shifts (e.g. price changes)

However, we cannot disregard the impact of the external factors in our explanation. For instance, Burnett Mary's highest reduction on nitrogen could also be explained by market shifts, such as the price of production inputs. Interviewee NB5 pointed out that the nitrogen reductions as well as the pesticides ones might have also been consequence of a change in the price of fertilizers. In 2009, the price of this appliance increased more than double from previous years, which made the farmers reduce their use or employ it more efficiently by putting it underneath the ground. In terms of the approach to regional collaboration, the interviewees from this region (NB3 and NB5) explained that the trust developed through the informal relationships between the NRM group, the industry representatives and the landholders could have contributed to higher rates of change in management practices. This might also explain why before the implementation of *Reef Rescue*, there were already different land practices in place from sugarcane. For example, some of the farms built dams to stop the run-off and use the water

contained in them for irrigation. So part of the achievements in nitrogen could have been reflective of previous years of sugarcane practices.

The interviewees from Fitzroy region (NB1 and NB6), for their part, explained that the figures on water quality outcomes, particularly the sediment reductions, were not comparable as their land area was significantly bigger than the other regions (about three times the size of the other two regions). For this reason, their reductions were less likely to be visible than in smaller regions such as Burnett Mary or Wet Tropics. Following this logic, the region should have received more funding, one that matched its land area. In addition, the interviewees from Fitzroy argued that the implementation efforts were strongly impacted by weather events that occurred in their region, such as cyclones and floods. However, the weather events occurred in the three regions analyzed during the implementation of *Reef Rescue*. Therefore, all the regions were subject to the same climate unpredictability, which they highlighted as factors that affected the implementation of the program in their respective individual reports on *Reef Rescue* Achievements (BMRG, n.d.; FBA, n.d.; and Terrain NRM, n.d.). A likely consequence of Fitzroy's collaborative approach, though, was that by the end of the policy, around 2013, there were more landholders willing to change than incentives available. "In 2008 we begged people to take projects; in 2013 we were turning people away" (NB1).

Regarding the Wet Tropics region, Interviewee NB4 said that the water quality outcomes were reflective of the land-uses in each region. For instance, a region that is devoted mainly to grazing would get a larger outcome on sediment reductions. But Wet Tropics, despite being an area that focuses largely on sugar cane farming, achieved the highest outcome in terms of sediments, as Table 4 showed. The interviewees in this region (NB2 and NB4) argued that more funding would not have make a difference as the outcomes would probably have remained the same. First, the engagement of landholders was voluntary and, therefore, there was a limit

on land practice change. Secondly, they considered that doubling the amount of funding would not have doubled the achievements on water quality outcomes. This logic is based on the 80-20 rule of investment, in which the investor receives 80% of the investment return with 20% of the effort. Continuing the effort leads only to marginal increases of the investment return. On the other hand, the interviewees accepted (without offering details) that some regions that received less funding might have been upset. This probably explains the limited cross-regional collaboration during *Reef Rescue*.

Interviewees from the 'high collaboration' sphere (federal and state governments as well as agriculture industry representatives) offered also views on why more reductions in pollutants were achieved in some cases by regions with less funding. However, they were careful in not identifying a particular region or engaging in comparisons. For instance, an interviewee from the peak agriculture industry bodies explained that better outcomes with fewer funds available might have been the result of having an extension officer on the ground that focused on engaging the landholders in its region to participate in *Reef Rescue*. Extension officers are another name for coordinators. This view, thus, supports our finding on the positive association between coordinators in place in a region and achievement of better water quality outcomes.
Interviewee SG2 considered that rather than funding, the results reflected the levels of cohesion between the stakeholders of a region. At certain times, the interviewee added, some regions had quite fractured relationships between the stakeholders, leading them to less effectiveness in the implementation of the policy. Interviewee SG3 argued that the key factor explaining the impact of funding were the staff skills in the regions.

In this case, the regions with more qualified people would have been able to achieve more. These skills, such as technical knowledge, fit with the view from interviewee FG1, who explained that this type of skills allowed a more appropriate prioritization and project

selection towards the areas with more impact. To support this view, the interviewee said that 95% of the water quality outcomes were caused by 50% of the land management projects (this represented a more specific example of the 80-20 investment rule). This shows the partial efficiency of the policy. Rather than more funding, improvements in the project selection would have led to better outcomes. The staff skills could also have been involved in the ability of each region to collect data and report it to the Paddock to Reef program. In consequence, staff able to use more comprehensive methods of data collection could have influenced a higher estimate of pollutant reductions for a given region.

While it is clear that stronger forms of collaboration facilitated effective implementation, we cannot disregard the possibility that the impact of the external factors to the regional collaborative approaches could have been more significant, such as staff skills or market shifts. On the other hand, there is no clear evidence of how the relationship between contribution and reduction of pollutants behaves. For instance, whether it is more difficult to show a reduction when the contribution is higher (as in the case of Wet Tropics with nitrogen or Fitzroy with sediments) or, on the contrary, higher reductions should be obtained in the regions with higher pollutant load contributions. This relationship requires more testing but is out of the scope of this paper.

Implications and observations

The impact of different collaborative approaches to environmental outcomes was analyzed through a case study analysis that was based on document reviews as well as interviews with the key stakeholders of the policy evaluated. Regarding our first research question about the role of collaboration in the implementation of *Reef Rescue*, we found that there was a consensus between the stakeholders' perspectives on the fact that collaborating was essential

to achieve the water quality outcomes, even though it had a limited nature and, in general, it was viewed as a working relationship rather than as a process of deliberation and consensus-building between the stakeholders. Limited or narrow collaboration is used as a technique to facilitate cooperation rather than a broader approach, in which collaboration deepens participation and deliberation in public affairs and, thus, enhances democratic consent (Ansell, 2012). From the perspective of water quality outcomes achieved by the policy, it can be said that collaboration made possible the implementation of the policy but was moderately effective in improving the water quality conditions, as the overall water quality condition of the GBR remained poor after the governance intervention.

We also found that collaboration interacted with top-down processes of governance at higher levels of government, such as the federal and state levels. In addition, collaboration was supplemented by regulations introduced by a higher level of government, the state level. In this regard, the limited nature of collaboration was constrained by higher (and more powerful) levels of government, which directed the policy, despite that the official documents emphasize the collaborative approach as a successful example that should be continued by further policies (Australian Government, 2011). In the stakeholder views, collaboration occurred in combination with top-down governance strategies, resembling a mix governance approach used as a tool to solve a policy problem.

The type of collaboration perceived by the stakeholders during *Reef Rescue* represents an example of Scott and Thomas (2016) account of collaborative governance as a 'toolbox' used to solve public problems. Moreover, the mix between collaboration through incentives and more top-down mechanisms such as regulations fits with the conceptualization of collaborative governance offered by Scott and Thomas (2016). In their view, collaborative approaches are characterized by a variety of tools, such as participation incentives, formal agreements, rules and deliberative forums that support collaborative governance "as a means to an end" (p.3).

Within the collaborative governance arrangements of *Reef Rescue*, we found that the main role of collaboration was to develop working relationships (either formal or informal) at the regional level, between the NRM groups and the regional agriculture industry to promote practice change among the landholders. Collaboration had a key but limited role, which contradicts the official view that presents *Reef Rescue* as a landmark of collaborative efforts (Australian Government, 2014a).

Regarding the second question, about the impact of the collaborative approaches on the water quality outcomes, using the existence of coordinators as a proxy for collaboration, we found that, despite funding amounts allocated for on-ground delivery, the appointment of an specific coordinating role from the regional NRM bodies to promote land management practice change among the landholders might have led to better water quality outcomes. We were able to test this hypothesis by reviewing the past organizational structures of the regional NRM bodies to find out if there was staff appointed for the coordinator role. This finding was also supported by interviewees from the state government and regional NRM bodies. The existence of coordinators could indicate the development of trust at the regional collaborative approach. Trust is an important benefit of collaboration that could represent an intermediate outcome that led to the water quality outcomes. Although this might suggest that more funding should be allocated for coordinators, this stands as a partial explanation for the impact of collaboration. Other variables mentioned by the stakeholders interviewed to test the impact of collaboration were the informal relationships developed between the regional actors as well as the levels of cohesion between the regional stakeholders. For these variables we still need to develop a proxy. Hence, they remain a further research area.

On the other hand, we cannot disregard that better water quality outcomes might have been also the result of external factors, such as land size, markets shifts or more skilled staff. Regulations

were not mentioned by the stakeholders interviewed as having a role in the water quality outcomes achieved. The effect of regulations was not identified either by the stakeholders or by the official documents. Kroon et al (2016) highlight that the state government suspended enforcing the regulations in 2012, and there were no assessments about their effectiveness. Overall, the main contribution of this study is its proposal to use a specific collaborative role (e.g. coordinators or facilitators) to deal with the difficulty in attributing the environmental outcomes to the collaborative governance approaches. In this regard, we contribute to address a gap encountered by previous research (Ulibarri, 2015). "The less proximate outcomes are to the collaborative action or the more dependent they are on other contributing or intervening factors, the more difficult it is to attribute the specific outcomes directly to collaborative efforts" (Emerson and Nabatchi, 2015, p. 724).

In other words, we put forward a variable that could reduce the uncertainty on the relationship between less proximate outcomes (e.g. environmental outcomes) and the collaborative action. Through the coordinator proxy, we suggest that collaborative governance had a positive impact in the achievement of environmental outcomes; however, this could also have depended on the external factors that each region experienced. What was clear, though, is that through more extensive and inclusive forms of collaboration, it is highly probable that better water quality outcomes would have been achieved, despite the funding amounts available.

From the water quality outcomes achieved by the policy compared with the original targets, it could be inferred that the performance of collaborative governance –following our approach of analyzing governance based on its outcomes, as Rotberg (2014) suggests− fell short of the expectations as the outcome figures were far from the original objectives. However, the figures on the outcomes are based on estimates, which do not allow any conclusive statements about

governance. Focusing on the funding, though, the main implication about analyzing why less funding could deliver better outcomes is to highlight that with more collaboration it is more likely that better results could be achieved. For instance, develop closer ties between the NRM groups and the regional industry bodies as well as between the NRM groups themselves.

The need for governance reform to develop more coordinated efforts has also been argued by Brodie and Pearson (2016). This reform could include the promotion of collaborative approaches that include extension strategies to motivate the participation of landholders. The type of extension strategies or methods, though, needs more research. Governance reform of collaboration should also offer greater access to the regional stakeholders in the deliberation about the implementation decisions developed at federal and state levels of governance, such as the water quality targets and the monitoring and evaluation mechanisms. While other studies (Leach and Pelkey, 2001; Koontz and Newig, 2014) have found that funds are decisive to improve environmental outcomes, we saw that in the regions analyzed funding did not have the most significant impact in the outcomes achieved. Hence, we emphasize the importance of improving the collaborative approach, regardless of the funding available.

In addition, with similar funding or at least through a consensus-based process where all the stakeholders are involved in deciding the funding allocation, the regions might be able to collaborate closer between them during the implementation process. This could also avoid developing feelings of resentment and unfairness. Our analysis, however, is limited by the reluctance of the stakeholders interviewed in providing details about implementation approaches and comparing them to other regions. For instance, the stakeholders avoided discussing thoroughly aspects of their regional collaboration as compared with those of the other regions. This type of information is also absent from the official documents. Additionally,

the analysis of the coordinators proxy as a measure of the impact of collaborative governance needs further refinement. For instance, expand the use of this variable in more than one policy, and develop a method to find out the level of skills of the coordinators. The proxy variable would deliver more certainty if it combines the number of coordinators and their skills. It would also be worth examining their effect in other collaborative environmental policies, either from Australian or international cases.

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