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**The good, the bad, and the statutory: Are statutory or non-statutory natural resource management plans higher in quality?**

**Abstract:**

Numerous governments around the world have adopted statutory-mandates on plan content based on the assumption that they lead to greater consistency and higher quality of plans. While a number of studies have examined the relationship between mandates to develop plans and plan quality, there has been limited study of the influence of state mandates for plan content on plan quality in a regional natural resource management (NRM) planning context. This paper explores the relationship between the quality of regional NRM plans between statutory and non-statutory NRM regions in New South Wales and Queensland, Australia. An analysis of 22 regional NRM plans indicates that there is no evidence of a relationship between plan quality and the presence of statutory mandates for regional NRM plans in Australia. However, the paper identifies and discusses several other factors with unexpected relationships with an impact on the quality of NRM plans in New South Wales and Queensland, Australia.

**Key words:** *plan quality evaluation, statutory, non-statutory, environmental planning, natural resource management, planning*

**1.0 Introduction**

Natural resource management (NRM) plans play a key role in guiding the management of environmental resources throughout Australia's 56 NRM regions (Australian Government, 2014). The Australian Government has invested over \$AU6.51 billion over nearly 25 years in the five national-scale NRM programs that have largely been translated into regional NRM plans, local or regional action, enhancing capacity and implementing regionalism (Abrahams, 2005; Farrelly, 2005; Moore & Rockloff, 2006; Robins & Dovers, 2007b). While the quality and capacity of governance arrangements surrounding NRM planning has been studied in an Australian context (Dale et al., 2013; Potts & Vella, 2015; Potts et al., 2015), the quality of the regional NRM plans in Australia has not been consistently analysed or evaluated against accepted plan quality standards.

Since 2001, regions in six Australian states/territories have adopted statutory NRM plans (New South Wales (NSW), Victoria, Tasmania, Northern Territory, South Australia and the Australian Capital Territory). Congruently, NRM plans in regions in Queensland (Qld) and Western Australia have remained non-statutory (Dale et al., 2013; Hajkowicz, 2009). There is currently a gap in our understanding of the quality of NRM plans in Australia, and a need for a study of plan quality across states with varying levels of statutory influence on NRM plans.

Despite increasing attention on plan quality evaluation in the planning literature (Lyles & Stevens, 2014), there have been a limited number of studies examining the impact of State Government mandates on the quality of NRM or environmental plans

(Berke, 1994; Berke et al., 1999). This paper is unique in its evaluation of the influence of State Government planning mandates on the quality of regional NRM plans in two states in Australia. The paper builds on the work of Bunnell and Jepson Jr (2011) and Berke and Godschalk (2009, p. 231), and presents a modified standard plan evaluation protocol to explore whether there is a difference in the quality of regional NRM plans between statutory and non-statutory NRM regions in Australia.

The paper begins with a discussion of the characteristics of high quality plans and an overview of existing plan quality evaluative protocols. The paper then presents an evaluative protocol specifically focussed on assessing the communicative clarity, persuasiveness and adaptive qualities of plans. The protocol is used to evaluate 22 regional NRM plans drawn from two Australian states, one with statutory and one with non-statutory NRM plans. The research findings suggest that there is no evidence of a relationship between the presence of plan content mandates, and the quality of NRM plans in NSW and Qld.

## **2.0 Literature Review: What are the characteristics of a high quality plan?**

The plan quality evaluation literature is relatively narrow, with 45 papers published between 1994 and 2012 on the topic (Lyles & Stevens, 2014). Plan quality evaluation is a form of ongoing evaluation concerned with distinguishing 'good planning from bad' (Faludi, 1987, p. 127) by applying explicit, normative criteria to evaluate the quality of a plan (rather than evaluating plan outcomes, i.e. on-ground changes to the status quo as a result of action/s set out within plans)(Khakee, 2000; Lyles et al., 2016). It generally consists of researchers applying systematic content analysis methods to compare the substance, intent, and structure of plans following their publication (Guyadeen & Seasons, 2015; Lyles & Stevens, 2014).

Evidence suggests that high quality plans are more effective and lead to great goal achievement than low quality plans, making evaluation of plan quality critical to both effective and adaptive planning processes (Berke & Godschalk, 2009; Stevens et al., 2014). However, plan quality evaluation studies have been divided in their assessment of whether the relationship between state mandates for planning and plan quality is positive (Berke & French, 1994), or neutral in their affect (Berke, 1994; Bunnell & Jepson Jr, 2011). These studies found that a variety of factors can in fact influence plan quality beyond the presence of a mandate. For example, in a study of local comprehensive plans, Berke and French (1994) found that the design, rather than the presence of state mandates was influential on plan quality, particularly the clarity, structure, and facilitating features of mandates. Similarly, Norton (2005) and Burby and May (1998) found that the capacity and level of commitment of local elected officials to undertake planning was correlated with plan quality and implementation.

There has also been some discussion of the differences in role and content of first and second generation plans (i.e. plans that have been developed iteratively) in the NRM context (Vella et al., 2015). However, there has been limited discussion within plan quality studies of the role of historic plan evolution over time on plan quality (Berke & Godschalk, 2009; Brody, 2003a). This leads to the question of whether localities with greater opportunities and time for progressive or incremental improvements in their planning have higher quality plans than localities with less historic planning efforts to build upon through their contemporary planning. The 'implementation gap'

caused by a lack of adequate funding provision by higher levels of government to lower levels of government to implement plan actions has also been widely discussed in the literature, as an issue affecting planning outcomes (Curtis et al., 2014; May & Burby, 1996; Robins & Kanowski, 2011). However, few studies have examined whether the amount of funding allocated to institutions undertake the planning process influences the quality of plans.

Scholars have discussed the nexus of planning practice and planning theory at length (Allmendinger & Tewdwr-Jones, 2002; Faludi, 1973; Friedmann, 1998), but there has been limited exploration of the relationship between plan quality and the use of any planning theory or paradigm to inform plan development (Bunnell & Jepson Jr, 2011; Lyles & Stevens, 2014; Norton, 2008). For example, while Bunnell and Jepson Jr (2011) grounded their work in communicative planning theory, and found no indication of a relationship between mandates to create prepare plans, and their communicative efficacy, they did not explore the relationship between or influence of any other theoretical paradigms on plan quality. A number of plan quality evaluation protocols exist, and variously emphasise plan consistency (Berke et al., 2006), communication and persuasiveness (Bunnell & Jepson Jr, 2011), democratic discourse (Norton, 2008), and rationality (Gruft & Gutstein, 1972). These evaluation protocols typically consist of a series of overarching principles, under which sit corresponding criteria. For example, the Bunnell and Jepson Jr (2011) protocol is based on principles of rigidity, uncertainty, role of policies/actions on outcomes, and narratives, each of which has a number of corresponding criteria enabling a comprehensive evaluation relative to the principles. These protocols have been applied in a variety of planning contexts internationally. This includes, but is not limited to, plans for natural hazards (Brody, 2003a), affordable housing (Hoch, 2007), climate change (Baker et al., 2012), environmental management (Tang, 2008), and urban sprawl (Norton, 2008).

Environmental plans have been a particular focus of plan quality evaluation internationally in the last two decades (Berke, 1994; Berke et al., 1999; Brody, 2003a; Burby & May, 1998; Steelman & Hess, 2009; Tang, 2008; Tang et al., 2011; Termorshuizen et al., 2007). Indeed, scholars have examined numerous different aspects of the relationship between plan quality and action on environmental degradation in varied international contexts, such as stakeholder participation (Brody, 2003b), and the efficacy of mandates on cooperative environmental policies (May & Burby, 1996). Many of these studies adapted existing plan quality evaluation protocols, often based on the work of Berke and French (1994), Brody (2003b), Berke et al. (2006), and Berke and Godschalk (2009).

A set of validated attributes defining a high quality plan have emerged following two decades of empirical studies in the plan quality evaluation literature. In a meta-study of 16 plan quality studies, Berke and Godschalk (2009) found consensus on a total of ten characteristics of high quality plans. Berke and Godschalk (2009) categorise the ten characteristics as being either internal or external features of plans. The characteristics are as follows:

#### Internal characteristics of plan quality

1. Issue identification and vision are based on community needs, trends, threats and forecasted change/s

2. Goals reflect public values and desired future conditions
3. Fact base is used to describe current and future social, environmental and economic conditions
4. Policies are specific and tied to definite actions to achieve desired goals
5. Implementation timelines, responsible organisations, and funding are identified
6. Monitoring and evaluation built into the plan as measurable objectives, indicators of objectives to assess progress, responsible organisations, and a timetable for monitoring.
7. Internal consistency of issues, vision, goals, policies and implementation

#### External characteristics of plan quality

1. Organization and presentation is clear and understandable to a wide audience
2. Interorganizational coordination with other plans/policies horizontally and vertically
3. Compliance with plan mandates

*Source: (adapted from Berke & Godschalk, 2009, p. 231)*

The set of evaluative principles above and sub-criteria (set out in Berke and Godschalk (2009)) are recognizably far more succinct than the 60 criteria suggested by Baer (1997) or Berke et al. (2006), and are agreed by scholars as being broadly useful indices of plan quality. The Berke and Godschalk (2009) protocol is considered a strong foundation for evaluating the quality of NRM plans because it contains clearly articulated, recognised, and widely agreed on principles of what exactly a good plan contains. However, some of its criteria are clearly inappropriate for application in a NRM planning context because they emphasise considerations of land use supply, provision of public infrastructure, and transportation (Berke & Godschalk, 2009). While these factors may represent broad threats to environmental quality, they are generally not emphasised within NRM plans. Rather, NRM plans generally emphasise responding to environmental degradation, species and habitat conservation, cultural, social, and landscape values (Cleaver, 2012; Potts et al., 2015).

NRM plans in Australia differ from comprehensive land use plans, in that they are often not written by State, or Local Government agencies (Davidson et al., 2006; Vella et al., 2015). They are generally State Government approved documents written by community-based, non-government organisations, with varying levels of Commonwealth and State Government financial support (DAFF & SEWPaC, 2013; DIICCSRTE, 2012). They are a primary example of a 'cooperative intergovernmental policy', in which higher levels of government devolve the responsibility and provide funding to lower levels of decision-makers to deliver broad desired outcomes (Burby & May, 1998; May & Burby, 1996). These factors mean that such plans generally rely on local capacities and have a greater need to be persuasive, and inclusive of multiple stakeholder perspectives to ensure community support and 'buy in' to the plan and its implementation (Brody, 2003a; Burby & May, 1998). The lack of certainty surrounding the efficacy of actions to address 'wicked' problems inherent within environmental management is also not acknowledged in the Berke and Godschalk (2009) protocol.

The factors described above suggests that the Berke and Godschalk (2009) protocol requires slight modifications to ensure its relevance and applicability in evaluating both non-statutory and non-regulatory NRM plans. Such modifications should include criteria that focus on:

- The process taken to develop the plan (including stakeholder participation and stakeholder roles/responsibilities within the process)
- Whether preceding plans/policies are described and analysed
- The clarity of the plan's written content and the degree to which jargon is used or avoided.
- Acknowledging that uncertainty exists, and how it may be addressed

### **3.0 NRM Planning in Australia and the role of the State Government**

In response to ongoing and increasing environmental degradation, planning for the management of natural resources in Australia's regions has received significant Australian and State Government attention and funding (Australian Government, 2014; DNRM, 2014; SEWPaC, 2013; SNRMO, 2014). While land use plans are statutory documents and are the responsibility of local and state governments in Australia, natural resources are planned for and managed at the regional scale by regional NRM organisations (Australian Government, 2014). The Australian Government is responsible for allocating all of the funding for NRM planning in Australia to regional NRM organisations as part of national NRM funding programs (Australian Government, 2014). NRM organisations also receive the majority of their of funding for on-ground NRM activities from the Australian Government's national NRM programs (Currently the National Landcare Programme), State Government investment programs, and smaller amounts from philanthropic or industry sources (Australian Government, 2014; DNRM, 2014).

The Australian Government has invested significant resources into supporting the development and updating of regional NRM plans in the last 15 years. Phase two of the Australian Government's Natural Heritage Trust funding program in 2001 constituted the first Australian Government Investment in NRM planning (Lockwood & Davidson, 2010). More than a decade later, the Australian Government distributed new funds in 2013 following applications by regional NRM organisations as part of the 2011 Clean Energy Futures Plan (SEWPaC, 2013). These funds were specifically intended to enable regional NRM organisations to update their NRM plans to ensure their continued responsiveness to ongoing and emerging environmental issues (SEWPaC, 2013). The majority of regional NRM organisations in Australia explicitly adopt a theoretical approach or paradigm that underpins their plan and approach to NRM more broadly (e.g. Murray Catchment Management Authority, 2013; Terrain NRM, 2016). These range from broad paradigms of sustainability and integrated management, to more specific theories of resilience thinking, adaptive management, or systems thinking (Bellamy, 2007; Farrelly & Conacher, 2007; Mitchell et al., 2014).

The regional organisations responsible for NRM planning vary in their statutory power, governance structure, and capacity across regions. Four of Australia's eight states/Territories (NSW, Victoria, South Australia, and the Northern Territory) have statutory requirements surrounding the content of regional NRM plans (Hajkowicz, 2009). NRM plans in the remaining four states/territories (Qld, Western Australia,

Australian Capital Territory, and Tasmania) are not required to meet any specific state/territory government mandate regarding their content (Hajkowicz, 2009). Despite this, some plans in non-statutory states/territories are voluntarily compliant to an industry standard (e.g. Queensland Regional Groups Collective, 2012). Furthermore, many NRM organisations align their plan content with national funding priorities to increase their likelihood of receiving funding to deliver projects in their region. Recognising the differences in statutory requirements for regional NRM planning across states/territories in Australia, this paper seeks to explore whether statutory requirements have any effect on NRM plan quality by comparing NRM plan quality in NSW and Qld. **Error! Reference source not found.** provides a summary of the similarities and differences between the approaches taken to NRM planning in NSW and Qld.

**Table 1: Comparison of NRM planning approaches in NSW and Qld**

Characteristics	New South Wales	Queensland
Number of NRM regions	11	13*
Organisation responsible for NRM	Catchment Management Authorities	NRM groups (regionally varied names)
Type of organisation	Semi-autonomous from government	Non-government, community based
State Government approval of plan	Required	Required
Statutory content requirements/standards	All plans <i>required</i> to meet the 'Standard Quality NRM'	Voluntary compliance with Queensland Regional NRM Planning Guidelines
Regulatory power	No	No
Mandated alignment of regional plans with State Government targets	Yes	No
Average Plan time horizon	10 years (some 2 year transitional)	8 years (some ongoing)

\*Excluding the Torres Strait Islands

Sources: (Australian Government, 2016; Griffith, 2009)

In Qld, 13 (excluding the Torres Strait Islands) community-based, non-statutory, non-government organisations are responsible for NRM planning, while in NSW, there are 11 statutory and semi-autonomous organisations undertaking regional NRM (Australian Government, 2016). Unsurprisingly, the capacity of regional organisations to develop plans in NSW and Qld has varied over time (Robins & Dovers, 2007a, 2007b; Vella et al., 2015). The variability in their capacity is demonstrated by some regions having only recently developed their first-generation of NRM plans (e.g. Cape York Peninsula in 2016), while others have already developed a third generation of their regional NRM plan (e.g. Hunter Central-Rivers Catchment Management Authority in 2013) (Hunter-Central Rivers Catchment Management Authority, 2013).

In 2005 the NSW State Government introduced the 'Standard Quality NRM' guidelines, requiring all regions in the State to meet basic standards in their statutory NRM plans (Natural Resources Commission, 2005). Alternately, in Qld, the Regional Groups Collective (a non-government organisation representing regional NRM organisations in Qld) published the *Queensland Regional NRM Planning Guidelines* in 2012 as a set of principles to support the development of NRM plans in Qld (Queensland Regional

Groups Collective, 2012). Adherence to these principles is totally voluntary and is at the discretion of regional NRM organisations.

The governance arrangements for NRM in NSW were substantially restructured in 2013-2014 (Griffith et al., 2013). This process involved the merging of NRM organisations in NSW with other organisations involved in agricultural and pest management (Griffith et al., 2013). As part of this process, many of the recently updated regional NRM plans (called Catchment Action Plans in NSW) were replaced with regionally consistent Local Strategic Plans (Griffith et al., 2013), leading to significant changes to the format and content of regional NRM plans in NSW. The Catchment Action Plans predating the Local Strategic Plans are considered more comparable in quality and depth to the Qld NRM plans because they were developed as part of the same NRM planning program driving the NRM plan updates in Qld. Consequently, this research compares the NSW regional Catchment Action Plans with the Qld regional NRM Plans.

## **4.0 Evaluation Methods and Evaluation Protocol**

### **4.1 Sample Selection**

This study used 22 regional NRM plans drawn from NSW (11) and Qld (11) as the unit of analysis. While this sample size appears small, it represents 2 out of 6 Australian States, and approximately 40% of the regional NRM plans in Australia (22/55), suggesting that the results below are representative of Australian NRM plans. However, as a result of issues surrounding power and effect in small sample sizes, the analysis below uses a descriptive rather than statistical approach to data analysis. The two states were selected as representative of both a statutory and non-statutory NRM planning context. All of the regions contained within the two states are included in the study with the exception of Queensland's Fitzroy Basin, Cape York Peninsula, whose plans were incomplete at the time of the study, and Torres Strait Islands because of the integration of NRM and land use planning in that region. The regional NRM plans (also called Catchment Action Plans in NSW) were identified and collected online through the designated regional NRM planning organisations' official websites. In NSW the plans are all compliant with the 2005 *'Standard for Quality NRM'* in accordance with the *Natural Resources Commission Act 2003 (NSW)* and s. 20(2)(c) of the *Catchment Management Authorities Act 2003 (NSW)*. A small number of regions in Qld are voluntarily compliant to the 2012 *Queensland Regional NRM Planning Guidelines* developed by the NRM representative body for Qld (Queensland Regional Groups Collective, 2012).

### **4.2 Evaluative Protocol and Coding Process**

An evaluation protocol form was developed to support the analysis of the regional NRM plans. The protocol form contained questions for coders to use to assess each NRM plan. The evaluative protocol used to examine plan quality in this research was derived by combining indicators of quality from the Berke and Godschalk (2009) and Bunnell and Jepson Jr (2011) evaluation protocols. In this research elements pertaining to land use, development, and infrastructure provision have been removed, and replaced with indicators regarding uncertainty, and the communicative qualities of plans drawn from the Bunnell and Jepson Jr (2011) evaluation protocol. Indicators

from the Berke and Godschalk (2009) protocol were also amended to focus on NRM planning rather than land use planning.

Consistent with other studies of plan quality (Berke, 1994; Berke & French, 1994; Zhengong et al., 2010), items on the coding form were evaluated numerically as: 0 = absent from the plan, 1 = mentioned, but only in a perfunctory or superficial way, and 2 = mentioned, and explained. All of the items on the protocol form were equally weighted. To ensure reliability, the protocol form was pretested on six randomly selected regional NRM plans from Victoria (statutory NRM plans) and Western Australia (non-statutory NRM plans) to ensure assessment consistency and reduce bias in the evaluation process. In line with the methods used by Bunnell and Jepson Jr (2011) and Lyles and Stevens (2014), two independent evaluators undertook both pretesting and evaluation of the main sample and their subsequent scores were compared for consistency. At this point, any inconsistencies were discussed and where possible, the scores were clarified and mediated.

Reliability scores were calculated using percentage agreement and Krippendorff's alpha. The reliability statistics for the pretests were 91.4% average agreement, and an average Krippendorff alpha score of 0.84. Any disagreements in scoring were also discussed to ensure clarity of indicators and their application. The pretesting process also revealed the need to clarify and refine the indicators of plan quality surrounding plan organization and presentation (e.g. use of a table of contents) as some of the plans analysed were in an online rather than a 'big book' format. This specific indicator was amended to focus on clarity of organization of content in the plans. The modified evaluative protocol used in this research can be found in the appendix of this paper. The reliability statistics for the main sample were 93.51% average agreement, and an average Krippendorff alpha score of 0.83, which meets acceptable standards according to Krippendorff (2012).

## 5.0 Results and Discussion of Findings

Regional NRM plans in Qld and NSW, Australia were analysed to determine the degree to which statutory requirements on plan content and structure influence plan quality. Plans were evaluated and could receive a maximum score of 56. As shown in Table 2, the highest scoring plan was written the Namoi Catchment Action Plan (NSW) and received a score of 55 out of 56. On the other hand, the lowest scoring plan was the Central Tablelands Action Plan (NSW) and received a score of 31 out of 56 (Table 2). Statutory plans were slightly more prevalent in both the top five highest and lowest scoring plans, indicating a higher level of variability in plan quality in NSW compared to Qld.

**Table 2: Highest and Lowest Scoring Plans**

Highest Scoring Plans	Lowest Scoring Plans
1. Namoi/North West CMA (NSW) (55)	1. Central Tablelands (NSW) (31)
2. Northern Rivers CMA (NSW) (50)	2. (a) SEQ Catchments (Qld) (33) (b) Lachlan CMA (NSW) (33)
3. Hunter Central Rivers CMA (NSW) (49)	3. Western CMA (NSW) (35)
4. Murray CMA (NSW) (48)	4. Queensland Murray Darling (Qld) (38)
5. (a) Desert Channels (Qld) (47)	5. Murrumbidgee CMA (NSW) (39)

(b) Northern Tablelands CMA (NSW) (47)	
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### 5.1 Comparison of Statutory and Non-statutory Plan Quality

On average, statutory regional NRM plans in NSW were lower in quality than non-statutory regional NRM plans in Qld (Table 3). However, the study found no evidence of a relationship between the presence of plan content mandates, and the quality of NRM plans in NSW and Qld. This was contrary to the initial hypothesis of this paper, which was that the statutory plans would logically have a higher level of quality than the non-statutory plans as a result of mandates surrounding the inclusion of specific content. The results below reiterate that there is no evidence to indicate a relationship between statutory requirements of content in NRM plans and their overall quality. What is clear from Table 3, nonetheless, is that there is a slightly higher degree of consistency in the quality of the non-statutory plans compared to statutory plans based on the standard deviation and range of scores. This finding is consistent with the studies by both Bunnell and Jepson Jr (2011), and Berke and French (1994), which found that state planning mandates requiring local areas to develop plans have little impact on the quality of hazard mitigation plans or land-use plans. While in this study, the state mandate in NSW for NRM plans was specific to their content, rather than their development, it is clear that mandates in a broader sense had negligible impact on the quality of plans. Arguably, the governance arrangements that support the development and implementation of such plans are likely to play a much greater role in affecting plan quality, than state planning mandates. It also suggests that there should be greater investment in building the capacity of organisations developing plans, than in the development of state mandates for plans or plan content.

**Table 3: A Comparison of Plan Quality Scores in Statutory and Non-Statutory systems**

State	Non-statutory/Qld	Statutory/NSW
Mean (Range: 0-56.00)	41.00	42.82
Median	42	44
Mode	42	33
Range	15	24
Standard Deviation	3.92	7.77

While the average quality of the NRM plans in Qld and NSW is similar, an analysis of the quality of internal traits of the plans revealed several key differences between regional NRM plans in Qld and NSW. Regional NRM Plans in Qld demonstrated significantly greater proficiency (mean = 1.91) in identifying and describing the regional context, trends, threats and opportunities compared to the NRM plans in NSW (mean = 1.36) (Table 4). Based on this, it was also unsurprising that the fact base characteristic also scored moderately high in plans in Qld (mean = 1.36)(Table 4). Regional NRM plans in Qld and NSW both received relatively low scores for the quality of their implementation characteristics. Despite these low scores, the quality

of implementation characteristics of plans in NSW (mean = 0.91) was higher than those in Qld (mean = 0.84). Aside from these factors, there is no evidence to suggest other meaningful differences between the plans in Qld and NSW based on the remaining internal plan quality characteristics.

**Table 4: Comparison of Internal Plan Quality of Queensland and New South Wales Natural Resource Management Plans**

Plan Quality Characteristics	Non-statutory/Qld Mean	Statutory/NSW Mean
1. Issue Identification	1.91	1.36
2. Vision, and Goals, objectives	1.68	1.55
3. Fact Base	1.36	1.23
4. Implementation	0.84	0.91
5. Monitoring and Evaluation	1.06	1.12
6. Internal Content and Consistency	1.67	1.62
7. Organization and presentation	1.56	1.73

## 5.2 Plan Format

Regional NRM plans in Qld were substantially more varied in their format to those in NSW. All of the plans analysed were publically accessible through the NRM group and Catchment Management Group websites, however the format of the plans varied across regions and states. In Qld, five out of the 11 NRM plans were published digitally as interactive, online plans, such as the NRM plans for the Wet Tropics, and the Burnett-Mary regions (Table 5). The remaining six Qld NRM plans were published as more traditional, 'big book', portable document format (PDF) plans. Comparatively, all (11) of the NRM plans in NSW were published as traditional, 'big book', PDF plans (Table 5). While the variability in plan format suggests a higher level of creativity and innovation in Qld's non-statutory NRM regions compared to the statutory regions in NSW, there is no evidence to suggest any relationship between plan quality and plan format (Table 5). This finding suggests that state mandates on plan content to a degree stifle the creativity of planning bodies in the development of plans, and may have flow on affects regarding their capacity to develop creative solutions to wicked problems inherent in planning for NRM (Rittel & Webber, 1973).

**Table 5: Comparison of Plan Format and Plan Quality**

Plan Type	# of regions	Mean Plan Quality Score (Range: 0-56.00)
Online Plan	5 (5 Qld, 0 NSW)	40.125
Traditional 'Big Book' Plan (PDF document)	17 (6 Qld, 11 NSW)	42.29

### 5.3 Plan Generation

Sixteen out of the twenty-one plans examined were second-generation plans. Only one first generation, and five third generation plans were evaluated. An analysis of these plans revealed that there is no evidence to suggest a relationship between plan quality and the generation of the plan (Table 6). This refutes the assumption that regional NRM plans with greater iteration, and review would have higher quality than those with fewer iterations or reviews. This finding suggests that incremental improvements in plan quality are not guaranteed with longer histories of regional NRM planning. However, this result may also be reflective of the dynamic nature of NRM groups, and changes to their funding, and capacity to plan over time as a result of changes in government policy, rather than inability to incrementally improve their plans.

**Table 6: Comparison of Plan Quality and Plan Generation**

<b>Plan generation</b>	<b># of regions</b>	<b>Mean Plan Quality Score (Range: 0-56.00)</b>
<i>First generation</i>	1 (NSW)	44.00
<i>Second generation</i>	16 (7 Qld, 9 NSW)	41.00
<i>Third generation</i>	5 (4 Qld, 1 NSW)	40.33

### 5.4 The Effect of Funding

There was an obvious difference in the amount of funding allocated to regions in Qld and NSW. Approximately 80% of NSW Catchment Action Groups received less than \$450,000, compared to 45% of Qld NRM groups. On the other hand, 55% of Qld NRM groups and 18% of NSW Catchment Action Groups received more than \$450,000 (Table 7). Despite the significant differences in funding allocation and contrary to the hypothesis that regions with greater funding would have higher quality plans, this study found that there is no evidence of a relationship between funding quantity and plan quality (See Table 7). The lack of a clear difference in plan quality and funding allocation for plan development, suggests that direct funding does not increase plan quality and regional NRM groups are capable of communicating their region's NRM aspirations regardless of the funding available. However, that is not to say that funding is unimportant. Rather, NRM groups may be capable of describing aspirations, and ideal strategies to respond to the NRM challenges unique to their region, however they may not functionally be capable of responding due to limited availability of funding to enable implementation of the strategies contained within the plans (Robins & Dovers, 2007b; Robins & Kanowski, 2011).

**Table 7: Comparison of Funding Allocation and Plan Quality**

<b>Funding allocation</b>	<b># of regions</b>	<b>Mean Plan Quality Score (Range: 0-56.00)</b>
<i>Regions with &lt; \$450,000 funding for NRM planning</i>	14 (5 Qld, 9 NSW)	43

<i>Regions with &gt; \$450,001</i>	8 (6 Qld, 2 NSW)	40.50
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### 5.5 The Effect of Underpinning Theoretical Approaches

A range of underpinning theoretical approaches was evident in the plans analysed, including adaptive management, systems approach, resilience thinking, sustainability, integrated NRM, and asset-based NRM. While in Qld plans tended to be based on one specific theory or paradigm, several of the NSW plans described using multiple theories in combination. For example, the Murray Catchment Management Authority (NSW) applied a combination of systems thinking, resilience thinking, and adaptive management approaches (Murray Catchment Management Authority, 2013), while the Namoi Catchment Management Authority (NSW) combined resilience thinking and adaptive management to inform their plan design (Namoi Catchment Management Authority, 2013). Four regions (two from NSW and two from Qld) did not identify any theory in describing the development process and approach to their plan. They include the Burnett-Mary (Qld), South East Qld Catchments (Qld), Central Tablelands (NSW), and Central West regions (NSW). Resilience thinking was the most common theoretical underpinning for regional NRM plans in NSW. On the other hand, adaptive management was more common as a basis for NRM planning in Qld. Despite some differences in the mean plan quality in Table 8, there is no evidence to suggest a difference between plans with varied theoretical foundations.

**Table 8: Comparison of Underpinning Paradigms or Theories and Plan Quality**

<b>Underpinning theoretical approach</b>	<b># of regions</b>	<b>Mean Plan Quality Score (Range: 0-56.00)</b>
<i>Adaptive Management</i>	6 (5 Qld, 1 NSW)	41.0
<i>Systems Approach</i>	3 (2 Qld, 1 NSW)	45.0
<i>Resilience Thinking</i>	6 (0 Qld, 6 NSW)	45.66
<i>Other (sustainability, asset-based, integrated)</i>	3 (2 Qld, 1 NSW)	42.0
<i>No theoretical underpinning identified</i>	4 (2 Qld, 2 NSW)	34.25

Perhaps the most thought-provoking finding of this research is that plans based on a paradigm or underpinning theory had much higher average quality scores compared with plans with no theoretical foundation (Table 9). While this finding is not surprising, it suggests a strong theory-practice connection and that plans will be of a higher quality regardless of which theory or paradigm is used to inform them. This emphasises that no one theory produces a higher quality plan than any other theory. The result implies that NRM groups making plans with attention to a specific theory/ies or paradigm have higher levels plan-making rigour, and intellectual engagement with the plan making process than those NRM groups without a guiding theory or paradigm. Indeed, it indicates a greater degree of capacity for plan-design in the regions with consideration for their paradigmatic foundations, as opposed to

more reactive planning approaches. It also emphasises that any of the theories described above provide an effective framework, suggesting that their particular emphasis on different elements of systems (e.g. social, environmental, economic aspects, or drivers of change and/or stability) is helpful in aiding planners to develop high quality regional NRM plans (Bellamy, 2007; Farrelly & Conacher, 2007; Mitchell et al., 2014). This finding raises further questions regarding the impact of governance arrangements on plan development and quality – Do planning systems with stronger governance arrangements surrounding their planning processes, have greater capacity to incorporate theory into their plan design? Do the regions that incorporate theory into their plans employ planners specifically to develop their plans or are non-planners writing these plans?

**Table 9: Comparison of Plan Quality and the Application of an Underpinning Theory or Paradigm**

	# of regions	Mean Plan Quality Score (Range: 0-56.00)
<i>Regions with an underpinning theoretical approach</i>	18 (9 Qld, 9 NSW)	43.55
<i>No theoretical underpinning identified</i>	4 (2 Qld, 2 NSW)	34.25

## 6.0 Conclusions

High quality plans are more effective and lead to great goal achievement than low quality plans, emphasising the critical need for ongoing evaluation of plan quality for effective and adaptive planning processes (Berke & Godschalk, 2009). There have been numerous studies of plan quality in the context of natural hazards (Brody, 2003a), affordable housing (Hoch, 2007), climate change (Baker et al., 2012), environmental management (Tang, 2008), and urban sprawl (Norton, 2008). The plan quality studies by Berke and French (1994), and Bunnell and Jepson Jr (2011) specifically found that there little relationship between plan quality and the presence or absence of state mandates requiring the development of plans for land use, and hazard mitigation.

This paper sought to build on the works of Berke and French (1994), and Bunnell and Jepson Jr (2011), and examine the relationship between statutory mandates for plan content and plan quality in NRM plans in Australia. An evaluation of 22 regional NRM plans from two Australian states, one with statutory and one with non-statutory NRM plans, revealed that state planning mandates appear to have little influence on the quality of regional NRM plans in Australia. However, the study found evidence of a relationship between 1) the absence of plan content mandates, and the quality of certain sections within regional NRM plans, and 2) whether the plans subscribed to a particular theoretical foundation or paradigm, and their quality.

This finding has real-world implications for NRM planning practitioners and policy-makers internationally. It suggests that state mandates in an NRM context provide little assurance of high quality plans, and thus positive outcomes. While this study used a desktop approach to plan quality evaluation, it revealed a number of areas

requiring further empirical research and exploration. They include: practitioner perspectives of plan quality and content, the choice and use of different theories to support the development of plans, and way in which mandates drive or inhibit creativity in plan development.

The findings of this study have several implications for planning practitioners internationally. Foremost, the lack of relationship between funding and plan quality, indicates that regional organisations may be better off prioritising investment into organisational and regional capacity and relationship building to implement plans, rather than the plan itself. This raises a question of whether the process of developing the plan (i.e. building trust, and social capital) is more significant to outcomes than the plan itself. Secondly, it suggests that planners to need consider the broader rationale, and paradigm informing their approach to plan development and design. This may involve considering the relevance of different paradigms to different and specific contexts. It is likely the efficacy and relevance of different paradigms to guide plan development and implementation will vary significantly across sectors (e.g. transport planning, environmental planning, and statutory land use planning). It also emphasises a need for ongoing professional development to ensure practitioner awareness of such paradigms does not fade over time following the completion of their university studies. Most significantly, this study reiterates that theory remains highly relevant, and important in planning practice.

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