Developing and testing a policy environmental assessment checklist for biodiversity conservation

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Strategic environmental assessment (SEA) and policy environmental assessment (PEA), the term used to describe the application of SEA at the policy level, are widely accepted as means of including environmental concerns in decision-making. This paper develops and tests a checklist for assessing policies with a biodiversity focus, drawing on principles from PEA and biodiversity conservation. The development and testing of such a checklist has been rarely reported in the literature. The checklist was applied to five natural resource management policies in Western Australia and the 19 policy workers involved in the study were then asked to reflect on the checklist's usefulness. A key finding was that the checklist allowed policy workers to report against PEA and biodiversity conservation principles. Another was that when the assessed policies were closely aligned with rational decision-making, the checklist proved to be reproducible (a desirable attribute), and easy to use. Lastly the context within which the policies were developed strongly influenced how policy workers responded to the checklist.

STRATEGIC ENVIRONMENTAL ASSESS-MENT (SEA) looks to incorporate environmental concerns into the decision-making process. To this end a number of methods have been developed under the SEA umbrella (Dalkham *et al*, 2004; Petts, 1999; Porter and Fittidaldi, 1998; Renton and Bailey, 2000; Sadler and Verheem, 1996). However, many of these have focused on the decision-making or approval step for proposed programs and plans, rather than on the development of a policy (Annandale *et al*, 2001; Bailey and Dixon, 1999; Nilsson *et al*, 2005). This division between policies on the one hand and plan and programs on the other has been attributed to the inherently intangible nature of policy decisions and political factors that impact the decision-making process (Sadler and Verheem, 1996) and has led to the development of an outgrowth of SEA termed policy environmental assessment (PEA) (Bailey and Dixon, 1999; Therivel *et al*, 1992).

PEA can be viewed as a tool to iteratively assess a policy during its development, thereby guiding policy development. This leads to a policy that will meet environmental and sustainability criteria and be ultimately approved. In this way PEA is both a design and decision-making tool.

Given this small amount of attention to PEA, and especially the limited efforts to develop assessment tools, this study developed and tested a checklist to operationalize PEA. SEA including PEA is a potentially powerful tool for improving the profile and consideration of biodiversity in policy-making (Byron and Treweek, 2005).

For checklists to succeed, in terms of both being adopted and accepted by policy workers, and then providing meaningful, useful assessments of policy, they need to have a number of attributes. One of

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the most important is *reproducibility*. Sadler and Verheem (1996) used this term to refer to the ability of a method to provide similar responses each time it is applied to a specific policy. So no matter who the applier is, the same answers are produced. *Applicability* is also a critical attribute for checklist success. This attribute is strongly influenced by the method's ease of use, described by the Department of Environment and Heritage (2006) as simple to use and accessible. In this study, with its focus on PEA and biodiversity, applicability was also dependent on how well the checklist captures the principles of PEA as well as the central concerns of biodiversity conservation.

The final attribute or group of attributes are those coalescing around *usefulness*. Usefulness is determined by the likelihood of use and the influence of context on policy-making. Likelihood of use asks the question — is the checklist useful to policy-makers in assisting them to meet the professional demands placed on them? The influence of context on the development and implementation of policies has been widely reported (Bailey and Renton, 1997; Brown and Therivel, 2000; Doyle and Kellow, 1995; Partidário, 1999; Renton and Bailey, 2000). In many circumstances, contextual influences can over-ride all others. A 'useful' checklist needs to work in very different contexts, or at least be adaptable enough to work in very different contexts.

Therefore, the study reported in this paper sought to achieve two aims — to translate the principles of PEA, biodiversity conservation, and 'good' public policy into an assessment checklist and, second, to do this translation in a way that provides a reproducible, easy-to-use and useful tool for policy workers. These aims[1] were pursued by developing and

testing a checklist, through application by policy workers, and then asking them to reflect, via a follow-up interview, on the checklist's usefulness. Further evaluation by the interviewees focused on usefulness as well as the checklist's reproducibility and applicability. The paper concludes with recommendations for practitioners and for further checklist development.

Methods

This study designed and then tested a checklist. The testing was undertaken by policy workers (i.e. through application of the checklist to a policy). Testing was followed by an in-depth interview with each study participant, to obtain further insights about the checklist as an assessment tool.

Designing the assessment checklist

To increase the likelihood of reproducibility, the checklist was divided into four sections. Each section contains a preamble to help set the context and understanding for the questions that follow. The four sections were:

1. The policy context;
2. How the policy was prepared;
3. The governance arrangements specified by or evident from the policy; and
4. How the policy dealt with matters critical to the conservation of biodiversity (Table 1).

Collectively, these sections provide a checklist[2] that includes elements of both the rigorous and rational

Table 1. Checklist summary

Sections	Sub-sections	Description
1. Policy context	1.1 Policy objectives 1.2 Definitions 1.3 Socio-economic context 1.4 Cross-referencing to other policies	• Clear policy objectives • Clear definitions of key terminology • Consideration of social and economic context in which policy will sit • Cross-referencing to other applicable policies (i.e. cross-cutting), including tiering
2. Policy preparation	2.1 Community consultation 2.2 Agency consultation	• Community and agency consultation during development and over the life of the policy
3. Policy content – governance	3.1 Strategies for achieving objective(s) 3.2 Authority 3.3 Accountability and performance improvement evaluation process 3.4 Policy instrument(s)	• Strategies for achieving the policy's objectives, including tiering • Clear definition of authority responsible for implementing the policy • Mechanisms to provide for accountability and performance improvement/evaluation post-implementation • Mix of policy instruments to be used in implementation of the policy
4. Policy content – substantive focus	4.1 Policy objective 4.2 Definitions 4.3 Strategies for achieving objective(s) 4.4 Scale of policy 4.5 Risk assessment 4.6 Precautionary principle	• Clear policy objectives • Clear definitions of key terminology • Strategies for achieving the objectives • Clearly defined scale at which the policy addresses the natural environment (both spatial and temporal scales), including consideration of cumulative effects • Measures for risk assessment • Inclusion of the precautionary principle

elements, and the more communicative and consensus-oriented elements of evaluation (Wallington *et al*, 2007).

The first three areas or sections (Table 1) focus on the principles of PEA and were informed by the work of Bailey and Dixon (1999); Boothroyd (1995); Brown and Therivel (2000); Partidário (1999); Renton and Bailey (2000) and Therivel *et al* (1992). Of particular note was the inclusion of evaluation questions about the presence of cross-cutting policies, that is, those directly or indirectly impacting on or being impacted by the policy being evaluated; and tiering, which is the ability to carry down key principles, concepts or objectives from a policy to plans and programs. Another important feature was evaluating whether the policy explicitly considers cumulative effects.

These sections also focus on the requirements of 'good' public policy. Here the development of the checklist relied on concepts widely known and advocated as part of public policy development and implementation. A number of these are also evident in SEA (e.g. Partidário, 1996; Stinchcombe and Gibson, 2001; Wallington *et al*, 2007). These included consultation (Table 1, Section 2), both within government and more broadly with the community, which is a concept considered and widely promulgated as part of the standard public policy cycle (Bridgman and Davis, 2004; Dunn, 1994). Most of the governance features listed in Table 1 are also widely acknowledged as part of 'good' public policy, especially issues such as authority and accountability (Anderson, 2003; Bridgman and Davis, 2004; Davis *et al*, 1993; Dunn, 1994; Ham and Hill, 1993). Using these widely accepted principles to design an evaluation checklist is an essential requirement for the design of an effective method for PEA. The central importance of ensuring that any environmental impact assessment method, and likewise any SEA or PEA method, recognizes these factors has been well supported by Holder (2004), Sheate (1994) and Taylor (1984).

The last section of the checklist (Table 1, Section 4) focuses on a substantive environmental issue — biodiversity conservation. A critical consideration in current ecological thinking about biodiversity conservation is the most appropriate scale(s) of conservation activities as well as the complex relationships between spatial and temporal scales (Wallington *et al*, 2005). This checklist asks if the policy being evaluated provides spatial boundaries and if these boundaries (when present) relate to administrative boundaries (Table 1). As with other questions in this section, these are presented in practical, readily understood wording to determine if concepts critical to biodiversity conservation, and well known to ecologists, are being picked up in policy activities. This checklist takes these ideas, as usefully summarized in Treweek *et al* (2005), and seeks to operationalize them.

In total, there are 136 questions organized into 16 subsections (as given in Table 1) covering the four evaluation components of the checklist. Each question was accompanied by four tick boxes. The available responses were yes, no, do not know, and not applicable. Examples of the questions included in the checklist are provided in Table 2.

Selecting the policies

Australia possesses several characteristics which made it a good location to test and evaluate this checklist; including its diversity of environmental policies, with a mix of statutory and non-statutory policies, and policies originating from a number of government agencies. This diversity enabled the checklist to be applied to a range of policies in a variety of contexts. Policies from Western Australia, one of the six states of Australia and an area that contains an internationally recognized biodiversity hotspot,[3] were selected for analysis. A hotspot is an area host to at least 0.5% of the world's plants species, which are endemic and subject to dramatic habitat loss (Myers *et al*, 2000). State rather than national policies were selected, given that the Australian Constitution generally places responsibility for the environment, including biodiversity, with the states (although there are exceptions) (Bates, 2006).

The focus was further narrowed to consider environmental policies that have a natural resource management focus (i.e. water, land, soil, biotic concerns). This enabled an evaluation of how well the biodiversity component of the assessment worked even though biodiversity was not necessarily the central concern of the policy but was nevertheless an important part.[4] The selected policies[5] were (Table 3):

1. Draft Policy Statement No. 9 — Threatened Species and Ecological Communities;
2. Revised Draft Environmental Protection (Cockburn Sound) Policy;
3. New Horizons in Marine Management;
4. Policy Statement No. 3 — Management of *Phytophthora* and Disease Caused by It;

Table 2. Examples of checklist questions

Section 1. Policy context: socio-economic context

Q 1.4.1. Are there other relevant policies cross-referenced in this policy?
Q 1.4.2. Is a hierarchy of the other relevant policies stipulated, to help in determining which policy takes precedence when a conflict between policies arises?

Section 4. Policy content – substantive focus: scale of policy

Q 4.4a.1. Does this policy provide spatial (geographic) boundaries?
Q 4.4a.2. Do these policy boundaries correspond to administrative boundaries (e.g. government jurisdictions)?
Q 4.4a.3. Has there been a compromise between administrative boundaries and biogeographical boundaries?

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5. Environmental Protection and Sustainability of the Rangelands in Western Australia — Preliminary Position Statement No. 5.

The fate of these policies since they were subject to this study has varied; however, the study was focused on their development up to 2004 only. A brief review of these policies follows to provide context for understanding the analysis of the checklist application.

The Threatened Species Policy seeks to protect threatened species and ecological communities in Western Australia. Western Australia is home to 220 species of mammals, of which 42 are threatened, with another 11 presumed extinct. There are over 14,000 plant species in WA, of which 378 are threatened and 14 are presumed extinct (Department of Environment and Conservation, 2006). In order to protect these species, the policy provides a strategy for identifying and listing threatened species and ecological communities. Once a species or ecological community is listed, the policy provides that a recovery plan be developed and implemented. The threatened species list has statutory backing under the *Wildlife Conservation Act 1950 (WA)*; however, the threatened ecological communities list is not yet afforded similar statutory standing.

The Cockburn Sound Environmental Protection Policy was crafted to better manage and protect the water quality of Cockburn Sound. The sound is a sheltered marine embayment, home to a wide range of commercial and recreational uses, and is the most intensively used marine embayment in Western Australia (Lord and Associates, 2001). Activities include commercial and recreational fishing, water sports and beach recreation, industrial shipping and aquaculture. The intensity of Cockburn Sound's use coupled with adjoining land uses has resulted in environmental degradation. This degradation, combined with the sound's high community value, has led to the preparation of this draft environmental protection policy (EPP). EPPs are prepared by the Western Australian Environmental Protection Authority to address 'protection of any portion of the environment or the prevention, control or abatement of pollution' (Section 26 [a] and [b] of the *Environmental Protection Act 1986 [WA]* [EP Act]).

The New Horizons policy outlines how the Western Australian Government intends to create and manage a state-wide system of multiple-use marine conservation reserves along the 12,500 kilometres of Western Australia's coastline. The coastline has a high degree of environmental variability that ranges from the warm, tropical waters of the Kimberley region to the cool, temperate waters of the southern coast. The coastline is home to an array of flora and fauna and significant ecosystems as well as economically valued natural resources (e.g. rock lobsters, scallops, and oil and gas reserves).

Table 3. Description of policies

Characteristic	Policy				
	Draft Policy Statement No. 9	**Cockburn Sound Policy**	**New Horizons**	**Policy Statement No. 3**	**Rangelands Position Statement**
Key natural resource	Threatened species and ecological communities	Marine water in Cockburn Sound	Marine parks and reserves	Forests	Rangelands
Author	DEC[1]	EPA[2] Service Unit	DEC	DEC	Independent consultant
Statutory (S)/ non-statutory (NS)	NS	S	NS	NS	NS
Implementing agency	DEC	EPA/DEC	DEC	DEC	EPA
Date of development	2002	2002	1994	1998	2002
Problem addressed	Lack of comprehensive biodiversity conservation	Environmental degradation of Cockburn Sound	Lack of marine reserves	Spread of the pathogen *Phytophthora*	Lack of comprehensive conservation of state's rangelands
Purpose of policy	Protection of threatened species and ecological communities	Managing the Cockburn Sound and protecting its environmental values	Establishing multiple-use marine conservation reserves	Managing the spread of dieback in the state	Providing a vision for future management and describing their current status
Development/origin	Amalgamation of four existing policies	As prescribed in EP Act	State commitment to marine reserve development	Based on past experience of DEC	Developed by independent consultant
Consideration of biodiversity	Explicitly identified and the primary focus	Explicitly identified as a consideration but not the policy focus	Explicitly identified as a component of the policy	Explicitly identified as needing conservation	Explicitly identified as needing conservation

Notes: [1] DEC – Department of Environment and Conservation. [2] EPA – Environmental Protection Authority.

Policy Statement No. 3 — Management of *Phytophthora* addresses the management of the fungi *Phyophthora*, which are soil-borne fungi that cause root rot, commonly known as dieback disease. Spread of the disease has had devastating effects on the biota of numerous ecosystems in the south-west of Western Australia. The most destructive species has been *Phytophthora cinnamomi*. It is estimated that 2,000 of the 9,000 native plant species of the south-west are susceptible to *P. cinnamomi*. Many of these species are endemic (Department of Environment and Conservation, 2007). This policy statement focuses on protecting the health of native plants, fauna habitat and ecological communities. It seeks to achieve this through required hygiene practices in and between 'protectable' and infected 'unprotectable' areas.

The last of the selected policies is the Rangelands Statement, based on the powers of the Environmental Protection Authority (EPA) under Section 17 of the EP Act, to publish such statements. This power includes the right to provide information to the community to raise awareness of environmental issues, to conduct research and to make proposals for future state government policy.

Rangelands cover 87% (2,175,000km^2) of Western Australia. They contain a diversity of plants and animals, landscapes and geological formations as well as a rich cultural heritage. These resources are used for grazing, mining, tourism, and biodiversity conservation. The statement describes these resources and outlines the EPA's vision for the future of this vast area.

Data collection and analysis

The checklist was evaluated through its application by policy workers and then follow-up interviews with the same policy workers. A total of 19 respondents were selected (Table 4). Purposive sampling, where researchers select respondents with a clear study purpose in mind (Frankfort-Nachmias and Nachmias, 2000), was used to access senior staff in government agencies, non-government organizations, and academic institutions who were familiar with policy-making as a political and technical exercise and with at least one of the five policies. Each respondent was asked to apply the checklist to only one of the policies. They were matched by the researchers to a policy within their field of expertise.

Once completed, the checklists were collected for analysis. The data provided through this process (i.e. yes, no, etc. responses to each question) were used to evaluate the checklist rather than the individual policies. These data were collated into tables. In the tables, each checklist item for each policy received one of three categorizations: complete concurrence (CC), majority concurrence (MC) and poor concurrence (PC). *Complete* concurrence meant all of the respondents provided the same answer to a selected checklist question for a single policy. A result of *majority* concurrence was attributed when more than half of the respondents provided the same response to the same checklist question. *Poor* concurrence resulted when neither complete nor majority concurrence existed.

Concurrence was selected as a means to evaluate the checklist as it enabled the researchers to examine the reproducibility of the checklist (Sadler and Verheem, 1996). As already indicated, a central aim in developing and testing this checklist was to develop a method that no matter who the applier, the same answers would be produced each time.

Once the respondents had reviewed their allocated policy using the checklist, a follow-up interview was conducted. The interviews employed a structured, face-to-face format, chosen so that each respondent answered the same questions ensuring that all responses were comparable (Frankfort-Nachmias and Nachmias, 2000). The questions were:

1. How easy was the checklist to use?
2. Did the checklist allow you to fully evaluate the complexity of the policy?
3. Did the checklist adequately address biodiversity?
4. Is the checklist a tool likely to be used by your institution?
5. Were you surprised by anything during the application?

The interviews were tape-recorded and transcribed. The transcripts were analysed by a coding system. A

Table 4. Participants

Participant category	State government agency	Non-government organization	Academic institution	Total
Policy				
Draft Policy Statement No. 9	3	1	1	5
Cockburn Sound Policy	2	1	1	4
New Horizons	1	1	1	3
Policy Statement No. 3	1	1	1	3
Rangelands Position Statement	2	1	1	4

coding system is an established set of directions regarding the recording of the content of a text or texts in a systematic mode (Neuman, 2000). The coding process was conducted by hand, the researchers examined the transcripts line by line noting emerging patterns and themes, and applying a set of constructed codes. Coding was an iterative process.[6]

Results

Checklist results

Two of the 136 checklist questions (1.5%) had complete concurrence for all five policies (Table 5). One question was about tiering, asking, 'Is it intended that the principle(s) of this policy will carry down to documents and/or projects arising from this policy?' The other asked about biodiversity: 'Is the term biodiversity clearly defined?' When instances of complete concurrence were reviewed for three or four, but not all five of the policies, the number of questions where this was achieved rose to 32 (23.5%) (Table 5).

Majority concurrence was similarly evident for a very small number of checklist questions when a similar response over all five policies was sought (nine questions, 6%). When this level of concurrence was reviewed for three or four (but not all five) policies, the number of questions with majority concurrence rose to 75 (55.1%). When complete and majority concurrence were combined, 107 (78.6%) of questions were covered (Table 5).

Table 6 was constructed to help interpret these findings. Here the concurrence results for each sub-section (which may each contain up to 22 checklist questions) have been aggregated to provide an illustrative, summary description of the extent of concurrence for each sub-section by policy. A review of this figure suggests that the Cockburn Sound EPP and Rangelands Policy had much more variability in responses than the other three policies, which resulted in poor concurrence. When the effects of these two policies are 'removed' by examining the level of concurrence across the other three policies, the extent of concurrence (both complete and majority) increased greatly.

This figure was also useful for identifying the checklist sub-sections with the greatest and least concurrence. Those dealing with a policy's objectives, its definitions, and authority were characterized by complete concurrence, but not for all policies (Table 6). At the other end of the spectrum there was poor concurrence, for three or more of the five policies, for at least some of the checklist questions within half of the sub-sections. The questions associated with the socio-economic context, use of policy instruments, and the inclusion of strategies for achieving biodiversity conservation had elements of poor concurrence for all five policies (Table 6).

Interview results

Regarding ease of use (the first interview question), the majority of respondents determined that the checklist was easy to use (Table 7). Several noted that they were comfortable with the format, based on questions with check boxes, as it is a common approach elsewhere in their work. Several recommendations were provided for improvements. Respondents thought that the answer choices could be expanded beyond a simple yes–no, to include the opportunity to add comments or qualifiers.

For example, several participants thought a policy met the criterion identified in a checklist question, but would have liked to add a note that this was only partial, and the policy could have gone further. In addition, some participants thought underlying principles could have been expanded and made more obvious (e.g. cross-cutting as a central principle of PEA), to avoid confusion over terminology and overcome structural differences between a policy and the checklist that made application of the latter to the former difficult.

Table 5. Summary of extent of concurrence associated with checklist questions[*]

Extent of concurrence	All policies		Three or more policies	
	Number	**Percentage**	**Number**[1]	**Percentage**[2]
Complete	2	1.5	32	23.5
Majority	9	6.6	75	55.1
Poor	0	0	10	7.4
Complete and majority	42	30.9	–	–
Majority and poor	31	22.8	–	–
Complete, majority and poor	51	37.5	–	–
Complete and poor	1	0.7	–	–

Notes: [*] Total number of questions = 136
     [1] The number of questions which had three or more policies provide the indicated response. There were five policies in total
     [2] The remaining 14.0% (or 19 questions) did not have a dominant response. A dominant response meant that three or more policies provided the same response (i.e. majority concurrence)

Table 6. Concurrence results from checklist application

Checklist topic	Policy[1]				
	P1	P2	P3	P4	P5
Part I. Policy context					
1.1 Policy objectives					
1.2 Definitions					
1.3 Socio-economic context					
1.4 Cross-referencing					
Part II. Policy preparation					
2.1 Community consultation					
2.2 Agency consultation					
Part III. Governance					
3.1 Strategies for achieving objectives					
3.2 Authority					
3.3 Accountability, performance improvement/evaluation					
3.4 Policy instrument(s)					
Part IV. Policy content – substantive focus (i.e. biodiversity)					
4.1 Policy objective					
4.2 Definitions					
4.3 Strategies for achieving the objectives					
4.4 Scale at which policy is addressing the natural environment					
4.5 Risk assessment					
4.6 Precautionary principle					

Extent of concurrence[2]

Complete

Majority

Poor

Complete and majority

Majority and poor

Complete, majority and poor

Complete and poor

Notes: [1] P1: Draft Policy Statement No 9; P2: Cockburn Sound Policy; P3: New Horizons; P4: Policy Statement No 3; P5: Rangelands Position Statement
[2] The extent of concurrence reflects the responses received by each policy against the set of questions in each sub-section. A 'complete', 'majority' or 'poor' indicates that all of the responses were complete, majority or poor concurrence, respectively. The remaining options of concurrence (e.g. 'complete and majority') indicate that a mix of responses was received for the policy against the identified set of sub-section questions. In order to be a mix, the extent of concurrence (i.e. complete, majority or poor) had to be represented at least once. For example, one poor concurrence and five majority concurrences is considered a mix of poor and majority concurrence. The figure presents the extent of concurrence across a sub-section by policy, whereas Table 5 sums the responses to all the checklist questions.

The responses to the second interview question ('Did the checklist allow you to fully evaluate the complexity of the policy?') were highly varied. Almost half of the respondents answered yes, while the rest found it difficult to answer. Some attributed this difficulty to the policy they evaluated being poorly put together, making it challenging to determine the policy's complexity. Others indicated it was difficult to determine the complexity of the policy because the policy and checklist formats were different.

A few respondents stated 'no', because the checklist did not evaluate the document(s) resulting from the policy, especially those associated with implementation. For Draft Policy Statement No. 9, for example, the policy 'requires' the development of threatened species recovery plans. Respondents indicated that these plans contain much of the information interrogated by the checklist. Based on this they recommended that these plans and the policy be evaluated together.

Table 7. Summary of interview results

Response	Percentage of interviewees
Question 1: Ease of use	
Easy to use	89%
Not easy to use	11%
Question 2: Addresses policy complexity	
Yes – it showed policy omissions	37%
Yes – but did not go deep enough	5%
Difficult to answer some of the checklist questions because the policy was poorly put together	26%
Difficult to answer because the checklist was designed in a different format than the policy	21%
No – because the checklist did not address the policy's implementation documents	11%
Question 3: Addresses the complexity of biodiversity	
Generically addressed biodiversity	63%
Yes – checklist adequately addressed biodiversity	37%
Question 4: Likely to use the checklist	
Yes – with moderate modifications	53%
Would like a copy for personal reference but not directly applicable to current occupation	37%
Some employees within their institution are likely to use	5%
Unsure of its likely use	5%

Regarding whether the checklist adequately addressed biodiversity, the third interview question, nearly all respondents indicated that it did. A few suggestions were made regarding broadening the scope of the term biodiversity. When asked whether the checklist was a tool likely to be used (Question 4), the majority responded yes. Several respondents asked for copies for their use while being unsure if there would be uptake by their institution.

A number of participants were surprised that a similar tool had not previously been developed, a comment provided in response to Question 5, which asked whether interviewees were surprised by anything during the application process. In the absence of a standard method, such as the checklist, respondents relied on their intuition to develop and evaluate a policy. They identified several benefits to using a standard method: reducing human fallibility; adding consistency and comprehensiveness to the process; and supporting people new to the policy arena.

Discussion: evaluation of the checklist as a PEA tool

The value of this checklist as an assessment tool for PEA rests on whether it is judged reproducible (Sadler and Verheem, 1996), applicable and useful. Applicability is particularly important because it addresses ease of use, ability to consider the complexity of the policy being analysed, and whether the principles underpinning the checklist have been adequately captured and then investigated. The three groups of principles explicitly considered and interpreted through checklist questions were those associated with PEA, biodiversity conservation and 'good' public policy. For usefulness, the influence of the policy context (Bailey and Renton, 1997; Brown and Therivel, 2000; Clark, 2000; Kørnøv and Thissen, 2000; Partidário, 1996, 1999; Renton and Bailey, 2000; Sadler and Verheem, 1996) was a point of interest.

Reproducibility

Reproducibility was affected by the nature of the policy itself and, for some parts of the checklist, how the questions were worded and presented. The policies with the highest numbers of concurrent responses were those that most closely followed the format of the checklist: Threatened Species Policy, New Horizons, and Policy Statement No.3. These policies are authored by the same agency and are all internal departmental policies. They have clear objectives, background information, and strategies for preventing identified threats and protecting the environment.

The Rangelands Policy and the Cockburn Sound EPP are quite different from these three policies. The former is descriptive, with lengthy details on the Rangeland's current environmental and social status and values. The policy contains very few 'teeth' or strategies for implementing the policy's intent. The Cockburn Sound EPP is the only statutory policy, with the accompanying statute prescriptive in what the policy must contain and how it should be designed and implemented. The other policies in the study are afforded a higher degree of flexibility in terms of development and implementation.

Development of the Rangelands Policy and Cockburn Sound EPP follow a very rigid and

prescriptive format. This differs from the flexibility given to the DEC in developing policy, which means that policies often reflect the ideals, including design and terminology, of those writing the policy. Hence, there is a higher degree of familiarity, as is provided when interviewees are involved in the development process, with the evaluated policy which means, even if the selected terminology varies slightly, it may be easier to align the policy and checklist questions.

The checklist seems to have the most 'reproducible' results when the policy has a rational decision-making structure (Bridgman and Davis, 2004) with objectives, background information on which decisions can be made, and strategies for implementing those decisions. This is because the checklist, especially those parts drawn from 'good' public policy (Sections 1–3), is underpinned by notions of rational decision-making.[7] Boothroyd (1995) advocated the centrality of rational policy-making in his conceptualization of policy assessment.

The second element contributing to reproducibility was how the questions were worded and presented, and the effect on concurrence. Where questions received poor concurrence across a number of policies — in this checklist those associated with the socio-economic context, policy instruments and inclusion of strategies for achieving conservation — poor wording appeared to contribute to the confusion between respondents (Table 8). During the interviews, participants identified several questions as being confusing and/or lacking clarity. These questions would likely benefit from re-wording. Where a policy received poor concurrence across the questions in a sub-section there was likely a mismatch between the policy and the set of questions.

Applicability

Although the checklist was widely regarded by participants as easy to use, its structure proved problematic for respondents associated with the Cockburn Sound EPP. This EPP's structure is prescribed in the EP Act and is heavily focused on

specified details, e.g. the inclusion of a table outlining water quality standards in numerical form. This contrasts with the other policies which outline broad overarching concepts informed by science, but with few technical details. The checklist mimics this design of broad overarching themes. Based on this, the Cockburn Sound EPP was somewhat incompatible with the checklist. In the end, it required greater interpretation on the part of the respondents in order to overcome the differences between the checklist and the policy, probably contributing to the poor concurrence in responses.

Applicability also includes whether or not the checklist enabled consideration of a policy's complexities. Responses to this question were highly variable, although half commented that the checklist did enable this consideration. Reasons given as to why full consideration was not possible included the difficulty in translating principles into checklist questions and the associated risks of loss of meaning and creating confusion. The mismatch between the structure of the policies and the checklist was also noted as a reason why it was difficult to determine the complexity of the policy. This was the case for two policies in which the policies differed from the checklist in both terminology used and objectives sought.

One of the main sets of principles underpinning this checklist were those derived from PEA and specifically cross-referencing policies, tiering and cumulative effects. Through their responses to the checklist, it was clear that the majority of participants understood and recognized all three. This was supported during the interview process in that respondents were able to speak fluently about the three concepts and explicitly recognized the importance of each.

For the principles associated with biodiversity, respondents similarly concluded that the checklist raised the appropriate issues, enabling comprehensive consideration of biodiversity. Interestingly however, respondents recognized biodiversity concerns where the checklist questions explicitly concerned biodiversity, but not necessarily where other checklist questions addressed concerns that had indirect but nevertheless important effects on biodiversity. This was particularly the case for questions about socio-economic considerations, e.g. 'Does the policy identify relevant social values?' Several respondents explicitly noted that socio-economic considerations were not relevant in conserving biodiversity.

This conclusion is not consistent with the prevailing literature. 'Biodiversity is influenced by cultural, social, economic and biophysical factors' (International Association of Impact Assessment, 2005: 4). Treweek (1995: 179) goes further by observing that: 'Ecological factors … cannot be evaluated effectively in isolation from prevailing social, economic, aesthetic and cultural conditions'. Although biodiversity is influenced by socio-economic

Table 8. Questions with poor concurrence

Question number	Questions
3.4.1	Are the selected policy instruments appropriate for effective implementation?
3.4.3	Was the context (i.e. social and economic setting) in which this policy will be implemented considered during policy instrument selection?
4.3.1	If the policy does not identify key sources of valued genetic material, do other documents specify key sources of valued genetic material?
4.3.9	If the policy does not identify value ecosystems, do other documents specify valued ecosystems?

Although biodiversity is influenced by socio-economic considerations, the fact that few participants recognized this importance was not surprising

considerations, the fact that few participants recognized this importance was not surprising. Literature on new ecological theory (e.g., Botkin, 1990; Hull *et al*, 2002; Ludwig *et al*, 2001) highlights the disparity between the need to consider socio-economic issues on the one hand and the lack of consideration on the other. This may mean that future users of the checklist may regard some questions as irrelevant, although such issues play a significant role in natural resource management policies (Amy, 1987; Fischer, 1998). The checklist would benefit from further support to direct the users more clearly in this regard. This would include additional documentation (e.g. a covering letter) to clarify the questions and principles underlying the checklist.

Another gap in understanding associated with biodiversity conservation emerged during the interview process. In a number of instances, respondents did not see the policy they were asked to evaluate as impacting on the conservation of biodiversity. They appeared to have overlooked the fact that the checklist sought to evaluate natural resource management policies and their consideration of biodiversity. Natural resource management policy, even in cases where biodiversity conservation is not explicitly identified, does impact on biodiversity (Atkinson *et al*, 2000). This suggests two possibilities: the checklist was not clear in its objectives, or respondents were unclear regarding how natural resource management policies might impact on biodiversity conservation.

Usefulness

Usefulness is determined by the likelihood of use and was influenced by the role played by respondents in the development process of the selected policies. The checklist was most useful for two groups: those with a direct role in the development of the selected policies; and staff from non-government organizations who comment on government policies during public consultation periods and closely follow their development. The other respondents involved in this study often found the checklist irrelevant or not applicable in their current roles as researchers and university academics. This was expected.

The likelihood of use and more broadly the usefulness of the checklist were also influenced by the context in which each policy was developed and

implemented. These influences have been explored by those working in SEA (Bailey and Renton, 1997; Brown and Therivel, 2000; Clark, 2000; Kørnøv and Thissen, 2000; Partidário, 1996, 1999; Renton and Bailey, 2000; Sadler and Verheem, 1996) as well as in the broader field of public policy (Amy, 1987; Doyle and Kellow, 1995). Contextual factors, such as participant background, institutional decision rules and organizational culture (Bailey and Renton, 1997; Brown and Therivel, 2000) play a substantial role in how policy actors make decisions. In terms of this study, such context influenced how participants interpreted both the checklist questions and the selected policies, thus influencing checklist responses.

Implications for practice

This study has shown that a checklist, incorporating the principles of PEA, 'good' public policy and biodiversity conservation, can be developed and implemented. Implementation provided meaningful results and the feedback from those who applied the checklist suggests that it could be a useful policy tool for those involved in natural resource management. The results and feedback provide a number of implications for further development and refinement of the checklist as part of moving towards practice.

The checklist worked well where the policy being evaluated had been developed and/or compiled using a rational decision-making approach. In this study this meant the checklist proved suitable for three of the five policies. In the interviews, respondents commented on their comfort with the checklist being logically ordered and comprehensively addressing biodiversity. From this it can be determined that respondents were comfortable using a rational-comprehensive format as part of policy development.

Parts of the checklist (particularly those dealing with the socio-economic context, use of policy instruments, and inclusion of strategies for achieving conservation) proved problematic (there was poor concurrence between responses) and require reworking to clarify their intent. A lack of awareness by some policy workers that socio-economic factors *are* relevant to biodiversity conservation could have contributed to this problem. Several respondents wanted direct access to the underlying principles of PEA and biodiversity conservation.

The influence of contextual factors (e.g. participant background, institutional decision rules and organizational culture) on the decision-making process presents implications for those methods employed in PEA. For instance, it implies that such methods need to be flexible, to enable adaptation to contextual factors, which vary case by case (Renton and Bailey, 2000). One example highlighted in this study was institutional decision rules. The Department of Environment and Conservation (responsible for Draft Policy Statement No. 9, New Horizons,

and Policy Statement No. 3) has a policy that outlines how departmental policies are to be developed (i.e. institutional decision rules); it requires policies to be broad and to be supported by subordinate documentation. In this study, subordinate documents were unique to the Department of Environment and Conservation, and were not accounted for by the checklist. This made it difficult for some participants to apply the checklist. Hence PEA checklists must be sufficiently flexible in their design and application to account for such circumstances.

Although this study has shown that the principles of PEA can be turned into a checklist and used to assess policies, several issues remain. First, if the policy does not have a rational decision-making basis or structure, the checklist may be difficult if not impossible to apply. The PEA literature has demonstrated that it is important for methods to fit the context of their application. Thus, to require refinement of a method such as this checklist before use should enhance its value. Second, the influence of context on the checklist results requires that some flexibility be used in its application. This may mean altering the available responses (e.g. adding 'found in a subordinate document') or using a range of methods. Last, there was not a widespread expectation among respondents that rapid uptake of the checklist within their institution would occur. This suggests that it may be more useful to these policy workers as a design rather than decision-making tool. Several respondents suggested this role.

The first part of the PEA challenge has been addressed by this study — translating its principles into workable checklist questions. The second part remains — getting widespread adoption of such principles either in the decision-making or more likely in the developmental stages of policy-making. The issues raised in the previous paragraphs and accompanying suggestions provide a way forward for practitioners and researchers alike. This not only applies within the context of natural resource management policy. The checklist questions were designed to be generic to ensure their wider applicability to environmental policy activities.

Acknowledgments

Notes

1. When the research project was undertaken, the WA State Government was seeking to incorporate SEA into the Environmental Protection Act 1986 (WA). The WA State Government also was seeking to develop a Biodiversity Conservation Act. With these changes it was anticipated that there would be demand for a PEA methodology.

2. For more information or a copy of the checklist please contact Sabrina Genter.

3. The southwest region of Western Australia is a biodiversity hotspot. The hotspot stretches from Shark Bay in the north to Israelite Bay in the south and covers over 300,000 square kilometers.

4. The next step would be to apply the checklist to non-environmental policies; however, this was outside the scope and resources of this study.

5. In addition, an assessment was to occur in a live policy-making context. However, the policy to be assessed was significantly delayed and therefore could not be included in the study.

6. The results provide implications for future use of the checklist. However, the checklist has not been revised to reflect the outcomes of the study.

7. An individual policy is often constructed using a model that lies somewhere on a continuum. On one end is the rational-comprehensive model. As the name suggests, the model is rational as it describes a logically ordered series of steps; and is comprehensive as it is meant to encompass a description of all available policy options. The incremental model lies at the other end of the spectrum. The rational-comprehensive model is characterized by a series of steps: (1) goals are established, objectives are derived from the goals and the objectives are ranked; (2) all policy options are examined and compared; (3) an option is selected, implemented, monitored and evaluated. The incremental model is characterized by its use of small incremental changes to bring about reform in a policy. Often policy is not created in a rational-comprehensive manner. However, participants supported the idea of a rational tool being used to inform an otherwise incremental world.

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