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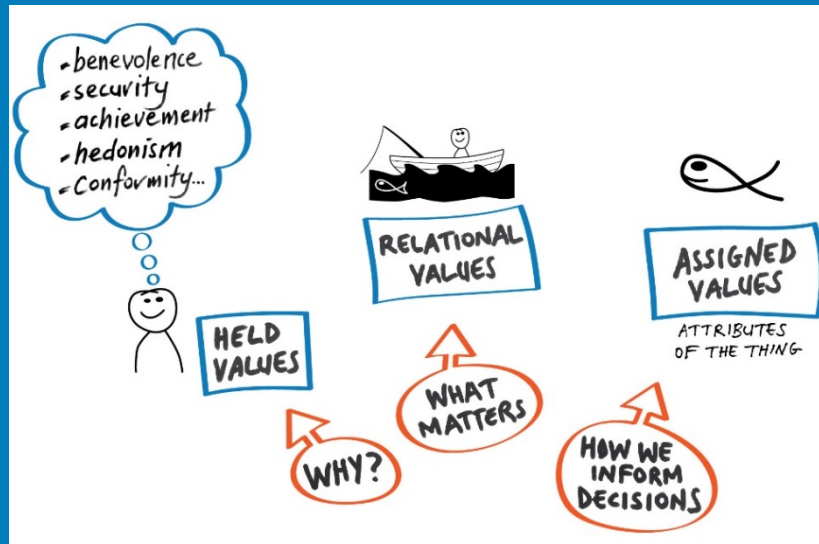
National **Environmental Science** Programme

Rethinking approaches to valuation in marine systems

Russell Gorddard, Michael Dunlop, Russell Wise and Piers Dunstan

Project C1: Improving our understanding of pressures on the marine environment

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CSIRO

Enquiries should be addressed to:

Russell Wise
CSIRO Land and Water
Russell.wise@csiro.au

Distribution List

Kylie Kulper	Department of the Environment and Energy
Amelia Tandy	Department of the Environment and Energy
Amanda Parr	Department of the Environment and Energy

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1. BACKGROUND

Understanding the range of values that are held and ascribed to the marine environment is key to supporting sustainable management across environmental, social and economic dimensions. The work distils a wide range of literature on values in environmental management and on the authors' experiences in addressing the roles that values (of individuals, communities and industry) play in climate adaptation problems in a range of terrestrial, coastal and marine environments[1].

This report focuses on presenting a conceptual and analytical framework designed to help stakeholders understand, interrogate and deliberate over: 1) the concept of values; 2) the dependence of values on the magnitudes of environmental change and the decision-making context of stakeholders; 3) the roles that values do, can or should play in environmental research, management and governance; and 4) what this means for future marine systems research and governance. We propose that the next steps flowing from this work might involve testing and revising this conceptual framework with a range of stakeholders in the marine research and policy space to identify key issues and potential case studies for further work.

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[1] See the following for examples of this work: https://i2insights.org/2017/06/20/values-rules-knowledge-and-transformation/; https://i2insights.org/2017/01/19/operationalizing-co-creation/ ; https://research.csiro.au/eap/

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2. OVERVIEW

2.1 The nature of the values problem in marine management

To manage the impact of activities in marine systems in the interests of societal wellbeing and environmental sustainability, managers require an understanding of what kinds of impacts on marine systems they should be concerned with. This is relatively straightforward for some aspects of biodiversity. Healthy populations of fish are good for supporting food security and healthy ecosystems and they should be managed to avoid decline (WWF, 2015; FAO, 2016). By-catch of seals and seabirds, for example, are bad and should be avoided. Population health, and by-catch are clearly good and bad (respectively), they are easy to codify into guidelines or regulations and to measure, and relatively straightforward to manage. Similarly, income from a fishing or tourist enterprise is a straightforward benefit.

However, not all values can be characterised so that impacts can be easily codified and managed. For example, the cultural value associated with fishing, aesthetic values of an uninterrupted marine vista, the culinary and health benefits of eating (healthy) fish, or the enjoyment of snorkelling in clean ocean full of fish. While values are often categorised as 'environmental' (fish populations, by-catch), 'economic' (income) and 'social' (aesthetics, enjoyment, health), many human-marine interactions have complex effects across these categories. Recreational fishing for example may provide food, social identity and autonomy, and a way of engaging with the marine environment.

Complex and uncertain values can make it difficult for governments to manage marine systems. This is of increasing importance in situations of large and novel changes. Such changes in ecosystem may be caused by new external drivers such as climate change, or changes in how people interact with the environment (e.g., eco-tourism). Change affecting how we value marine systems may also stem from the social and governance systems, for example if market-based fisheries policy are imposed on top of cultural norms. These changes make legitimate, legal and effective management difficult. Rules and decision processes that have evolved to account for knowledge and values about the system pre-change will not necessarily account for new values and knowledge.

Here we present a framework to help account for multiple values in environmental and social assessment. The framework is derived by examining what values are, and how and why they are used in policy processes. We develop two related ideas. First, distinguishing between held values and assigned values can resolve some of the ambiguity that arises from using the term value to refer to different aspects of the relationship between people and the environment. That is people have a range of *held values* that they draw on in order to *assign values* to aspects of a *value relationship*. The distinction between what matters and why enables a more systematic analysis of values.

Our second proposition is that the best way to describe values depend on the policy question and process that use the value. *Context matters.* We use a values, rules, knowledge framework to describe how the *values* assigned to something are therefore fundamentally entwined with

knowledge about how it behaves, and the *rules* governing decisions about its management (Gorddard *et al.*, 2016).

Incorporating complex and changing values into marine policy therefore requires that values and objectives are not predefined, but rather are developed as an integrated part of research and policy making processes. Ideally, policy and research processes and objectives would adapt to account for a developing understanding of changing values. More pragmatically, appreciating the limitations and conditional nature of valuation concepts may help improve how values are used within established policy and research processes.

3. WHAT ARE VALUES?

3.1 People and things

Throughout this report we use the terms *people* and *things* as fundamental to the concept of value. Many different aspects of the marine environment are valued by people for all sorts of reasons. This can span valuing things that are of material use, such as fish that are eaten; valuing a place that is visited for aesthetic or cultural reasons; through to valuing the existence of deep-sea fish or a wilderness area that might be known about but never physically experienced. In this context, the notion of value relates to how important the various aspects of nature are to people. Things exist in nature, but without people there is no experiencing or determining of the importance of things: people turn things into assets. Values for and of things fundamentally result from the relationship between people and things (Brown 1984).

Values can be individual or collective. Individual people experience and value things in different ways, but there are often commonalities in the way some things are valued, and some values result from a communal relationship to a thing. In this report we mainly use the term people, since it pertains to value in public decision making, but in most instances the ideas also relate to how individuals relate to and value things.

Parts of nature that are valued by people are often referred to as assets, or liabilities where they pose a threat to people. In this report we use the term "things", to highlight that the value or importance associated with a thing is a product of the relationships people have with it rather than an intrinsic "objective" property of the thing.

3.2 Held values, assigned values and value relationships

The term 'values' is commonly used to refer to many related but different concepts. We provide a simple framework, drawing on Brown (1984), to help distinguish and relate three core value concepts (Figure 1):

- *Value relationships*: the value or importance of a thing derives from how people relate to and experience the thing. The relationship between people and the thing determines and reveals the values that people have for, and assign to, the thing and the benefits they derive from the thing. Value relationships often take the form of formal and informal rules about how individuals or groups are allowed or expected to interact with the thing and how the values are articulated.
- *Held values*: the values that people hold within themselves, for example their moral compass, and which fundamentally shape their views about, and the ways they interact with and relate to, nature.
- *Assigned values*: the stories or measures (indicators) used to describe, quantify, or articulate the value relationships and held values that people have for things, so these can be legitimately considered in particular decision-making process.
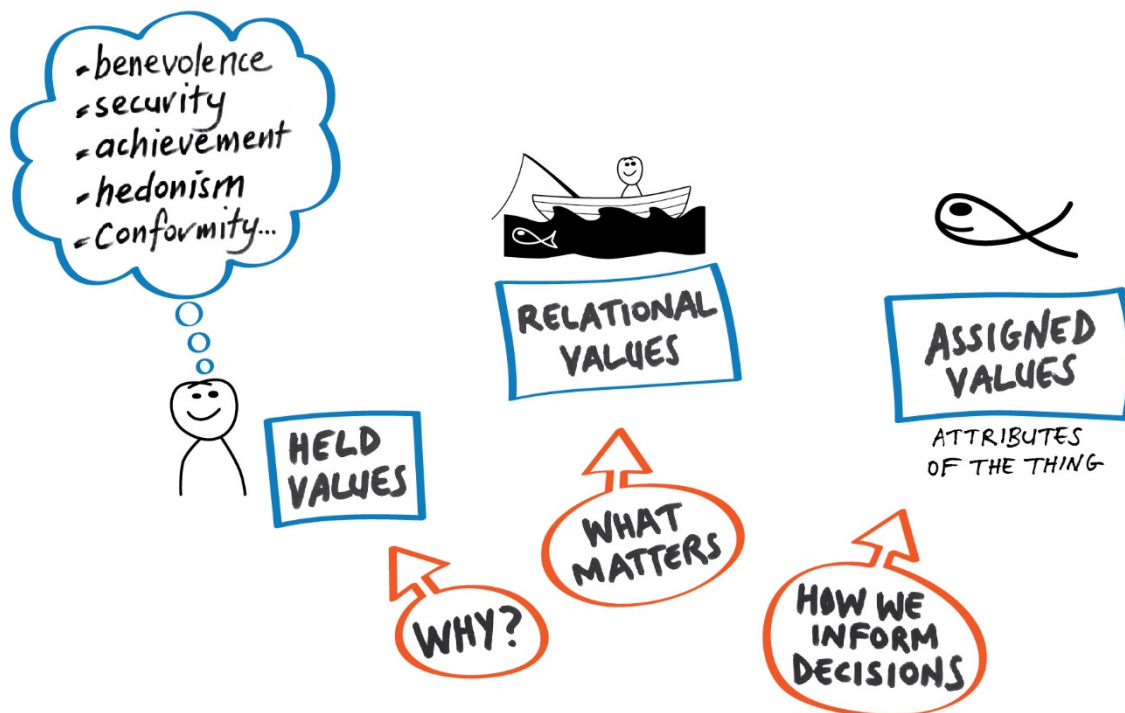
Figure 1: Illustration of the three core concepts of value and their relationships to each other (adapted from both Brown, 1984 and; Schwartz, 2012)

This framing (Figure 1) highlights that: 1) it is the relationship between people and the 'thing' which reveals the values people hold for, and derive from, the thing and which influences the ways in which values can be considered in decision making (e.g., fish as economic assets generating income or an essential element of cultural or livelihoods practices); 2) it is the 'held values' of an individual or community that explain why something is important and why people relate to the thing the way they do; and 3) it is the 'assigned values' that correspond to how value is articulated, particularly for the purposes of decision making.

A person catching fish may value the population density of the target species so they can readily satisfy their need for food. Here:
- the relationship (fishing) between the person and the fish is the relationship that creates value.
- the need for food is fundamental to the person (held value)
- the density of the population of the fish (assigned value) might be used to describe the salient aspects of the environment

3.3   Value narratives

Held values, value relationships and assigned values are all different aspects of what makes something valuable to a person or group of people. When people talk about values they necessarily draw on all these aspects, however some of these aspects may be emphasised and made explicit, while others are only implicit and hidden. For instance, while we often refer

to species diversity as an ecological value, this emphasises the assigned values. Implicit but hidden in this claim for, or narrative of, ecological value is that a group of people with a particular relationship to biodiversity wish to express its importance (as they perceive it) in order to influence particular decisions which they can (sometimes) effectively do through these particular attributes. In this instance the held value might be that there is value in biodiversity, and the value relationship is one of stewardship of nature to derive greater ecosystem services from greater species diversity.

3.4   Context matters

Context is a critical part of any narrative about value. The nature of the relationship between a person and a thing, including the relevant held and assigned values, depends intimately on what else is happening to the person and the thing. The context of the person determines which held values will shape the relationship between a person and the thing and therefore its assigned value. For example, using Schwartz's classification of different types of held value[2], in one situation the held values of 'achievement and power' might lead to a sport-fishing relationship between a person and fish; in another, 'benevolence values' might lead to valuing of the existence of a fish; hunger or 'security value' might drive someone to catch fish for food. In each of these, the assigned value is different and depends on the held value that drives the nature of the relationship between the person and the thing. Key differences in context between different groups and individuals will lead to or amplify differences in their relationships to the environment, potentially leading to key points of conflict where decision making becomes difficult.

The context of the thing might also affect the nature of the relationship. For example, an uncommon fish might not be highly valued in a fishing-for-food relationship, but it might be highly valued in a relationship based on respecting the existence of the fish (conservation). A person's relationship with a declining fish population might be different from that with a stable, or rapidly expanding (invasive) population. The heavy metal content of a fish is likely to affect the fish-for-food relationship but may not affect one based on enjoying seeing the fish. In these circumstances different values may be assigned to the fish reflecting whether it is rare or abundant; threatened or a pest; healthy or contaminated; tasty or colourful; and so on.

A particularly important part of the context relates to the nature of the decisions that are being made about the thing. Assigned values are often directly related to the decisions that will be made about how the thing will be used or managed. This is most obvious in the assigning of dollar values (price) and notable desirable attributes to things traded in markets (view just about any advertisement). This example highlights that the context of other similar things also affects how we assign values; for example, individuals of a threatened species are valued because of the declining or small population not because of any property of the existing individual. The value of fish in a market is affected by how many other fish are for sale and the number of people wanting to buy the fish. A change in the rules governing the decisions about a thing can dramatically change the relationship and value that is assigned to it. Banning the sale of a fish

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[2] Schwartz (2012) Theory of Basic Human Values

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may remove any use for commercial fishing and associated legal market value (or significantly increase its value in a black market). The making of laws about protection of threatened species leads to the assigning of 'threatened' status to certain species, which raises its 'value' in that particular setting. Similarly, the prospect of a development or action in a location may lead to a biological survey that discovers a new population of a threatened species leading to the assigning of a 'significance value' to the location that reflects certain combinations of, or value relationships between held and assigned values.

At least three types of context matter:
- the context of the person, affecting the held values that are activated and the relationship with the thing, hence its importance
- the context of the thing and like things, affecting the relationship between the person and thing
- the nature of the decisions about the thing (or the regulatory environment) affect how 'importance' or 'value' is assigned to the thing.

Changes in context will change the relationship people have with the thing and its importance. And in particular, changes in decisions (or the rules) will change the way values are assigned to things. It flows from this that values described or assigned in one context will generally not transfer to another context. The assignment of dollar values does not readily translate from marketed goods to goods that are not exchanged in a market. And the dollar value in one market does not generally translate to another market. Similarly, the values assigned by one person may not correspond the values assigned by another.

3.5   A values framework

We propose a simple framework for thinking about and describing values, involving the following elements:

- the *thing* (environmental asset) that is valued
- the *person* or group with a relationship to the thing
- the *held values* of the person or group that are most relevant in that relationship
- the nature of the *relationship* with the thing
- the descriptors or *assigned values* used to characterise how the thing should be represented in decision making

An entailment of the above elements is that any description or expression of a value or value relationship depends on context and must be qualified by:
- the *social context* of the person or group (e.g., fishing licence holder, local resident, tourist, and their current needs such as income, food or recreation)
- the *environmental context* of the thing (e.g., its state and trend, pressures affecting it), and
- the *decision context* or factors determining the set of possible decision options relating to the use or management of the thing (described by the values rules knowledge framework).

We propose, for any one relationship between a person and a thing, that these elements can be combined into a single narrative (Box 1). While this framework appears to be complicated, with many elements, we suggest it is consistent with every-day understanding of value[3] and the current use of value in environmental decision making, such as the values implicitly and explicitly described in the EPBC Act (Matters of National Environmental Significance), through the designation of Commonwealth Marine Areas (CMA), designation of Particularly Sensitive Sea Areas and Indigenous Protected Areas. The difference is that in familiar decision-making situations most of these elements are implicit and agreed, and they rarely have to be recognised let alone negotiated or documented. However, in situations where the context changes—new types of value relations are relevant, ecosystems are undergoing unprecedented change or where new stakeholders become relevant— and where legal and legitimate decisions need to be made, the usually implicit key elements of the relationships between people and nature may need to be made explicit, codified and socially sanctioned.

Box 1. An illustrative example of analysing and diagnosing narratives about value relationships

We propose developing methods to enable the process of doing such analyses in a transparent and repeatable way.

Biologically important areas for supporting Humpback Whale **(thing)** migrations are currently **(assigned)** value for their importance for the viability of the species under the EPBC Act, to reflect society's **(person)** respect for nature **(held)**. These areas are described by scientists (**person**), who study the species and want to ensure (**relationship** and **social context**) that the populations recover to pre-whaling levels (**assigned**). Under the EPBC Act the species is listed as protected (assigned), triggering specific protections (**decision contex**t), as they are recovering from whaling (**environmental context**).

However, the same Humpback Whales **(thing)** are also valued by tourism operators (**person**), who run whale-watching (**relationship**) tours for tourists (person) and want to have high whale numbers (assigned) to ensure a continuing flow of paying (**assigned**) tourists leading to viable businesses and income streams to sustain their livelihoods (**held**). They employ a number of staff (**social context**), but want to ensure (**decision context**) that the species continues to expand (**environmental context**).

In this case, assigned and held values from different social contexts support the same decision which produces the same environmental outcome. However, this is not always the case. **Decisions** on the operation of the FV Margiris in southern Australia were made based on scientific (**person**) advice (**relationship**) and estimated economic value (**assigned**) of commercial fishing (**relationship**) through the understanding of the environmental sustainability of fishing small pelagic (**environmental contex**t). However, this decision was in direct conflict with the **relational** values of recreational fishers and conservationists (**person**), who despite having very different **held** values and **relationships** with the targeted species had similar ways of articulating the importance of avoiding industrial fishing (**assigned**) and joined together to oppose the operation of the FV Margiris (**social context**).

While description of **things** under this values framework will not avoid conflict, it will allow the identification of places where decisions are likely to cause conflict and it will allow the identification of alternative decision pathways that could allow these conflicts to be avoided or mitigated.

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[3] Indeed we suggest it helps make sense of many of the ambiguities and confusions in the multiple every-day uses of "value".

4. SCOPING THE IMPLEMENTATION OF THIS FRAMEWORK FOR MULTIPLE MARINE VALUES

Here we outline one way to develop this framework to include more value relationships in marine environmental decision making.

We suggest exploring the types of information that might be needed to support assessment of whether a proposed activity could potentially have a significant and unacceptable impact on some of the values that are currently difficult to assess.

Step 1. Develop, in consultation with the Department of the Environment and Energy (DoEE) and Parks Australia a template to describe the values relationships described in section 3.5 that builds on the values that have already been described by DoEE and Parks Australia and extends to include other values types.

Step 2. Collect, document and analyse narratives about a selection of value relationships, to make explicit the elements of the framework in section 3.5. This could be drawn from existing proposals, departmental knowledge about specific actions and values, or selected stakeholders. It could be linked to maps or spatial data about the things being valued. This could be focused on MNES or the values described for CMRs

Draft versions of Step 1 & 2 could be completed by 20 December 2017.

Step 3. Analyse the resulting data to see what gaps exist and assess priorities for future work to address these gaps. Our expectation is that some of the value dimensions (who, why, relationship, what, and for what decision?) will be missing from many of the identified value narratives.

Step 4. Critically evaluate the data to assess if or how it might meet the standards necessary to be legitimate and credible with stakeholders and experts, and rigorous enough to support defensible decision making. This would be assessing both the utility and weakness of the data and aiming to identify the institutional constraints involved in using various types of values information.

It is envisaged the Steps 3 & 4 would form part of the programs of work to be developed as part of RPV4 (2018+) for the Marine biodiversity Hub. It may be necessary to develop work programs / research proposals to address the knowledge gaps identified, create standards for collecting and codifying elements of the narratives, test the transferability of these for different places, environmental assets, proposed impacts and social contexts. This work would necessarily involve co-creation of any standards that were developed, involving participation by stakeholders, assessors, decision makers and technical experts, facilitated by researchers.

5.   INCLUDING MULTIPLE VALUES IN DECISION MAKING

We suggest that the reason some types of value relationships are harder to capture in environmental decision making than others is because the relevant elements are not well understood, shared or agreed. We propose that articulating the relevant elements in the value narratives of some of these missing values, in a standardised and legitimate way, may provide the basis for more effectively, legitimately and inclusively including them in decision making.

However, we must make it clear that doing this is not simply a matter of doing expert research to define the elements of the different narratives. A true reflection of the narratives of value would require an iterative, consultative process that could be expected to evolve over time, and may even entail changes in the decision-making processes.

5.1   The decision context described by 'values, rules and knowledge'

In Gorddard et al., (2016)[4] we argued that values need to be understood within the context of the decision process they are used in. The decision context can be viewed as interacting systems of societal values that are intrinsically linked with the knowledge and rule systems that guide, inform, enable and constrain decisions (Figure 2).
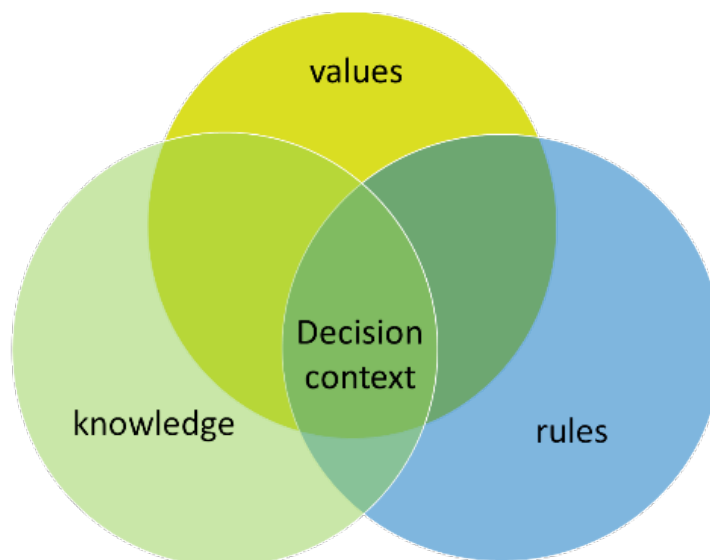

Figure 2: A perspective on the decision context of decision makers as interconnected systems of values, rules and knowledge which can reveal the 'values', 'rules', or 'knowledge' constraints and opportunities to decision making and suggest strategies for overcoming limits and exploiting opportunities (adapted from Gorddard et al., 2016).

This values-rules-knowledge (vrk) model or perspective on decision contexts emphasises that the value of things cannot simply be reflected or accounted for in decisions in the form of information or knowledge about the thing (e.g., their estimated economic values), but that the

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[4] Free to download at: http://www.sciencedirect.com/science/article/pii/S1462901115301210

values of things are also embedded in the fundamental held values of individuals and communities and the formal and informal rules and processes (cultural practices and regulations) used to guide and enforce how people interact and engage with their environment and make decisions. Challenges to valuing nature and effectively considering these in decision making are therefore often institutional or cultural and necessarily or unavoidably involve understanding and influencing (shifting) the nature of the interactions between the systems of values, rules and knowledge that constrain and enable decisions.

Interactions between values and rules and between values and knowledge can in the end determine which values will actually influence decisions, and what types of knowledge informs them. Changing which values are used within a decision process (e.g., to introduce or raise the profile of relational (cultural) values in a decision process which has historically only considered the assigned (ecological) values) may therefore need to involve changes to the social structures and processes that enable that particular decision process. For example the rules defining the funding of research may determine what concerns about a marine system are studied. New funding models may be required in order to support research into topics of interest to particular groups.

5.2   Implications for the science-policy interface

It is useful to view the values, rules and knowledge integral to any decision problem (or value narrative) as being dynamic and co-evolving. As one of these factors changes the others will respond. This suggests that any decision or management process that changes any of these elements should seek to observe changes in the others. Implications of this framework for research and policy include:

- More effectively considering the range of relevant values may require examining how particular values interact with the policy process and with how research is framed and commissioned.
- Values issues may need to be considered at all stages of the adaptive decision making cycle, not just as an input to the choice of options. For example, we may need to refocus research questions in order to more effectively consider different values.
- Focusing on narratives to understand values. How values are used or excluded from decision-making processes can be revealed by examining the narratives people tell around a decision-making process. Narratives that provide motivation for investment, sense making, justifications for choices, and accountability implicitly draw on values.

6. APPENDIX 1

The following template suggest how stories about value can be decomposed to identify the various ways a system is valued and the different dimensions of each "value relation". The stories about value could come from various sources: interviews, submissions to decision processes, analysis of documents or conversations describing how and why decisions were made, or discussions with people who value a resource.

The choice of method and subject would depend on the purpose of analysis: who might act on it, and what types of actions might they undertake in response to the analysis.

Element in the values narrative	Description	Sample Question
the *thing*	environmental asset that is valued	How do you describe or refer to the marine the system are you concerned about?
the *person* or group	with a relationship to the thing (Multiple people may have a relationship with each thing)	How do you describe yourself when talking about how you interact with the marine system? E.g. fisher, recreational diver, whale watcher,
the *held values*	of the person or group that are most relevant in that relationship	What kind of reasons does the person give for why they value the marine system?
the nature of the *relationship*	with the thing including the *relational value* or importance of the thing (Each person may have multiple different types of relationship with a given thing)	What is your relationship with the marine environment? How do you interact with it, or how do you think of yourself in relation to the marine system?
the descriptors or *assigned values*	used to characterise how the thing should be represented in decision making (Different value relationships are likely to lead to different assigned values.)	What attributes of marine the system are you concerned about? What are the attributes you want to emphasise to decision makers?

Element in the values narrative	Description	Sample Question
the *social context*	of the person or group (e.g., needing food, seeking enjoyment)	How is your relationship with the marine environment influenced by other people and other things in your life? Do you belong to or feel your views and use of the environment is typical of a particular group in society?
the *environmental context of the thing*	its state and trend	What changes are occurring in the environment? How do they affect your relationship with the thing? What factors are driving these changes?
the *decision context*	Factors determining the set of possible decision options relating to the use or management of the thing, and how they are chosen. (Different decision contexts will lead to different assigned values.)	What decisions making process affect the thing and your relationship to it? How does the value of the thing affect the decision making? Do other people's values affect the decision making process? What informs the decision making?

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Contact:
Russell Wise
CSIRO Land and Water

Address | Black Mountain |Canberra ACT
Russell.wise@csiro.au