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THE SOCIAL VALUES AT RISK FROM SEA-LEVEL RISE

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Abstract

Analysis of the risks of sea-level rise favours conventionally measured metrics such as the area of land that may be subsumed, the numbers of properties at risk, and the capital values of assets at risk. Despite this, it is clear that there exist many less material but no less important values at risk from sea-level rise. This paper re-theorizes these multifarious social values at risk from sea-level rise, by explaining their diverse nature, and grounding them in the everyday practices of people living in coastal places. It is informed by a review and analysis of research on social values from within the fields of social impact assessment, human geography, psychology, decision analysis, and climate change adaptation. From this we propose that it is the 'lived values' of coastal places that are most at risk from sea-level rise. We then offer a framework that groups these lived values into five types: those that are physiological in nature, and those that relate to issues of security, belonging, esteem, and self-actualisation. This framework of lived values at risk from sea-level rise can guide empirical research investigating the social impacts of sea-level rise, as well as the impacts of actions to adapt to sea-level rise. It also offers a basis for identifying the distribution of related social outcomes across populations exposed to sea-level rise or sea-level rise policies.

Keywords: social values; climate change; vulnerability; adaptation; place; quotidian practices

1. Introduction

Sea-level rise is one of the most certain consequences of climate change (Nicholls and Tol, 2006) and has a suite of potential impacts on coastal areas. Most of the research into the potential impacts of sea-level rise have characterised the impacts in simple terms, stemming from the large spatial scales that are used in climate impacts modelling. This research identifies risks of loss and damage using metrics such as areas of land subsumed, settlements at risk, populations potentially displaced, the costs of lost assets, and ecological impacts (e.g. Darwin and Tol, 2001, Small and Nicholls, 2003, among many others). While those are necessary considerations, the implication of focusing on such metrics is that sea-level rise only becomes important to society when it affects material aspects of well-being (Adger et al., 2011); thereby overlooking the impacts that sea-level rise has on the non-material dimensions that contribute to meaningful lives (Adger et al., In press, Adger et al., 2009).

A small number of social scientists have begun to investigate other social elements at risk from climate change, which are particular to localities and the people within them (see Adger et al., In press, Adger et al., 2009, Crate and Nuttall, 2009, Davidson et al., 2003, Hovelsrud et al., 2010, Petheram et al., 2010). These researchers are finding that a sense of belonging, culture, community cohesion, identity, self-determination, and attachment to places are central in the social construction of climate risks, and in enabling or constraining adaptation. They argue that places are unique and valued by people in ways that cannot be captured through economic analyses (Adger et al., 2011); and that such values need to be considered alongside existing economic metrics in decision-making so that adaptation is inclusive, equitable and sustains or enhances the provision of things that societies value (Novaczek et al., 2011). Unfortunately, there is little research of this kind, particularly from developed countries, and this constrains the development of theory and guidance for decision-makers. Therefore, Barnett (2010), O'Brien and Wolf (2010) and Novaczek et al.

(2011) propose that future investigations into the social impacts of climate change should focus on social values.

We know of no value-based assessments of the potential social impacts of sea-level rise. For the most part, this is because approaches for conducting such research in the context of sea-level rise, and climate change more generally, are not well established, and also in part because there is little specification about what is meant by values (indeed, the meaning of 'values' is itself is not always clearly defined). Thus, O'Brien and Wolf (2010) argue for consideration of new literatures and methodologies in climate change assessments. To this end, the literature on social impact assessment (SIA) offers much to enhance understanding of the values at risk from sea-level rise because it has a broad understanding of social impacts (Esteves et al., 2012) and considers social values to be central to understanding the consequences of environmental changes in social settings (Slootweg et al., 2001).

The SIA research seems to offer potential for evaluating the social impacts of sea-level rise, and adaptation, because it is designed to assess the consequences of biophysical changes and interventions on social settings (Slootweg et al., 2001, Vanclay, 2002). It also recognises that social impacts vary from place to place and that the significance of these impacts will vary within and between communities (Vanclay, 2002). At its best, SIA aims to work with communities to ensure that a diversity of social values and aspirations are accounted for and that more equitable outcomes are achieved (Esteves et al., 2012). Therefore there is compatibility between the normative goals of SIA and those of a value-based approach to sea-level rise.

Twenty years ago, SIA was facing similar challenges to those faced by researchers studying the social impacts of sea-level rise; social impacts were primarily determined through measurable and politically convenient indicators, such as population change and job creation (Vanclay, 2002). The problem with focusing on such indicators was that they illuminated broad social change processes—processes that take place regardless of the social context of society—rather than the impacts of these processes on the actual experiences of individuals or communities (Vanclay,

2002). Consequently, the following changes were made to the field of SIA: 1) social impacts were defined as consequences that affect "the ways in which people live, work, play, relate to one another, organize to meet their needs and generally cope as members of society" (ICGPSIA, 1994); and 2) lists of social impact variables were developed, so that a wide range of impacts would be considered in SIAs (Vanclay, 2002). While considerable improvements could still be made to SIA, these developments have resulted in greater recognition of the importance of social issues in infrastructure and resource extraction projects, resulting in a positive legacy beyond the life of projects (Esteves et al., 2012). A values-based approach to sea-level rise could benefit from considering similar definitions of social impacts and variables.

Beyond expanding the definition of social impacts and providing lists of examples of social impacts, Slootweg et al. (2001) suggest that SIA could benefit from considering the way social change processes translate into social impacts. They propose that a 'social filter' mediates this relationship, which is supported by other research within the field of SIA. For example, Canan and Hennessy (1982) argue that "'values' define the difference between the 'objective' consequences of social change and the perceived impacts on the individuals who experience the change" (Canan and Hennessy, 1982). From this perspective values play an important role in understanding how social change processes come to be seen as social impacts; they provide a mechanism for narrowing long lists of potential impacts to the relevant impacts for a particular social group (Slootweg et al., 2001). Despite their importance, few SIA researchers have made values, or social filters, central to their empirical research (Slootweg et al., 2001, Stolp et al., 2002). The studies that have considered values explicitly (specifically Canan and Hennessy, 1982, Córdova, 2011, Olsen et al., 1985, Stolp et al., 2002) provide little clarity on what is meant by values and do not give detailed explanations of the methods they use to identify and measure values.

This paper seeks to address gaps in understandings about social values at risk that exist in the climate adaptation and SIA literatures. Specifically, it aims to: 1) develop a definition of social values that can inform future research into social impacts, particularly those arising from sea-level rise; and 2) propose

a framework for identifying and categorising such value-based social impacts. The paper will begin by exploring how research from five fields conceptualises values – namely those of SIA, climate adaptation, decision analysis, psychology, and human geography. It will then provide a synthesised definition of values that can be used to assess the social impacts of sea-level rise. It concludes by giving examples of the types of values that may be at risk and proposes a framework that can be used for categorising these values, which can be tested empirically.

2. Defining values

A small number of studies within the climate adaptation and SIA literatures indicate that values are important for understanding the social impacts of environmental change as well as individuals' and communities' responses to particular projects and government policies. Despite this, values are poorly conceptualised in these bodies of literature; few definitions are provided, and the term 'values' is used to refer to a range of phenomena. If the concept of values is to be used to assess the social impacts of sea-level rise as we propose, it is necessary to clearly define the concept. To achieve this, we reviewed and analysed perspectives on values from five bodies of literature—SIA, climate adaptation, decision analysis, psychology, and human geography—that empirically or theoretically engage with the concept of values. Here we consider the way each disciplinary, or sub-disciplinary, perspective defines and categorises values, as well as consider empirical examples that may be relevant to sea-level rise. While we recognise that there is overlap in the ways different disciplines define values we believe that focusing on the treatment of values by particular disciplines is a useful way of making sense of the broad literature on values. A consolidated definition of values will be provided at the end of the section.

2.1.Social impact assessment

Only two studies within the SIA literature were found that define social[1] values. Slootweg et al. (2001) defines social values as referring "to the quality of life in general" (p. 22) and Stolp et al. (2002) defines citizen values as "the value judgements of individuals about the quality of their living environment and its various attributes" (p. 12). If the review is broadened to include the environmental impact assessment (EIA) literature, then the definition of values provided by the Royal Commission on Environmental Pollution (RCEP) is also relevant. The RCEP (1998) defines values as "beliefs, either individual or social, about what is important in life" (p. 52).

These definitions suggest that the SIA and EIA literatures consider social values to be associated with the quality of people's everyday activities and the places in which these occur, as well as the significance people attach to these activities and places. A number of empirical studies support this perspective, finding that individuals value: quiet living environment; rural character of the living environment; facilities in the neighbourhood; large nature area; different species of plants and animals (Stolp et al., 2002); green space; child-friendly environment where going to school is safe (Peltonen and Sairinen, 2010); living off the land; slow pace; sports; education; jobs (Canan and Hennessy, 1982, Olsen et al., 1985); and vitality (Córdova, 2011). The results of these studies also reveal that social relationships are an important element of social values, with individuals valuing: family together; everybody knows everybody (Canan and Hennessy, 1982, Olsen et al., 1985); and male-female relations (Walker et al., 2000).

In addition to social values, the SIA literature refers to at least four other categories of values: ecological; economic; political; and cultural (see Slootweg et al., 2001 for definitions of ecological and economic values). While these types of values may also be affected by sea-level rise, the potential impacts on these values are more likely to be accounted for by conventionally measured metrics. For example, economic values are likely to be captured by metrics that calculate changes to

[1] Note that the SIA literature provides definitions for other types of values, such as ecological and economic values (e.g. Slootweg et al., 2001). We consider social values to be those that are referred to as 'social values,' include the term 'social' in the definition, or incorporate social actors, activities or settings within the definition (e.g. 'citizen values' studied by Stolp et al. 2001).

property prices, household incomes and gross regional products (Slootweg et al., 2001). For this reason, we focus on social values.

It is important to note that the SIA literature also differentiates values by relating them to the individuals or groups who hold the values. For example, a distinction is made between individual, personal, group, collective, community, local and public values. Such distinctions do not help to conceptualise values for the purposes of evaluating the social impacts of sea-level rise because all of these groups are likely to be affected by changes in sea-levels. Nonetheless, it is important to acknowledge that while an entire community may be affected by sea-level rise, this does not mean that the entire community shares the same values, or that the values at risk are equally distributed across a community.

The way values and social impacts are conceptualised within the SIA literature suggests that research into the impacts of sea-level rise may benefit from considering how changes in sea levels, as well as adaptation policies, affect individuals' lives, living environments and social relationships. As Vanclay (2002) notes, the impacts on these values may not necessarily be negative, even though there is a tendency in the SIA literature to focus on negative impacts. The SIA literature also recognises that social values not only determine how people respond to environmental changes, but are themselves affected by environmental changes and associated policy interventions (Slootweg et al., 2001), thereby indicating a need to consider the dynamic nature of social values and the way they are intimately intertwined with the biophysical environment.

2.2. Climate adaptation

In the climate adaptation literature, Adger et al. (2009) defines values to be "the personal or societal judgement of what is valuable and important in life" (p. 388) and Novaczek et al. (2011) defines landscape values as "the social and cultural values that people attach to places" (p. 12). These definitions are consistent with the main concepts included in definitions of values in the SIA

literature; they refer to judgements people make about the quality of their lives and living environments. The definitions also reflect the two main ways that values are discussed in the climate adaptation literature. The first sees values as posing limits to adaptation. The second sees values as being associated with particular physical places, rather than a more holistic interpretation of values.

Adger et al. (2009) argue that climate adaptation should be concerned with values because they enable or constrain action, and thereby either encourage or limit adaptation. Examination of empirical findings confirms that the climate adaptation literature assumes values to be important because they can act as barriers to adaptation (e.g. Coulthard, 2008, Kuruppu and Liverman, 2011), and if they are considered during the development of adaptation strategies, may facilitate the design of more socially-acceptable strategies (Mortreux and Barnett, 2009). Thus the significance attached to values in the climate adaptation literature is similar to the SIA literature because it assumes that understanding values is important for developing and implementing socially acceptable adaptation projects.

The values that have previously been found to constrain uptake of climate adaptation strategies include: personal independence (Wolf et al., 2010); religious values (Kuruppu, 2009); attachment to high social status; and standard of living (Coulthard, 2008). Cultural values have also been used to explain why some cultural groups have been less successful in adapting to climate extremes than others (Nielsen and Reenberg, 2010). For example, Neilson and Reenberg (2010) argue that the *Fulbe* in rural Burkina Faso have been less successful in adapting to climate extremes because they value living in the bush rather than in the village and prefer cattle herding to farming activities. Prioritising such values makes them more reliant on climate sensitive activities and gives them less access to alternative livelihood strategies.

Beyond this list of values that constrain climate adaptation, Novaczek et al. (2011) found that recreational and aesthetic values of the coast were highly valued by coastal residents of Prince Edward Island. They argue that these place-specific values are the most vulnerable to the effects of

climate change, indicating that policy responses need to take these values and priorities into account. Similarly, Mortreux and Barnett (2009) found that Tuvaluans deeply value their way of life—the landscape, lifestyle, sense of community and their family connections—and that these values are irrevocably tied to place. They argue that, in the interests of avoiding maladaptation, greater effort needs to be invested in implementing adaptation in ways that sustain the population and their way of life (Mortreux and Barnett, 2009).

These empirical examples of values found to be important for climate adaptation are all associated with people's everyday activities. Mortreux and Barnett (2009) and Novaczek et al. (2011) also highlight the importance of place in shaping these values. This suggests that a definition of values that is appropriate for future climate adaptation research may benefit by focusing on the values people attach to their everyday lives and the places that they live in.

2.3. Decision analysis, public policy and urban planning

The importance given to public values within the intertwined disciplines of urban planning, public policy and decision analysis is similar to the SIA and climate adaptation literatures. For the most part, this is because the planning literatures are concerned with the ways public values and needs can be understood and fed into planning outcomes (Brody et al., 2003, Chakraborty, 2012, Tyrväinen et al., 2007). Urban planning is focused on the process of consultation, which implicitly and explicitly seeks to consider community values in shaping plans as well as addressing conflict resolution (Gobster, 1999). Decision analysis explicitly considers how values can be defined, established and used in the framing and development of public policy.

Few definitions of social values were found in these planning literatures. A notable exception is Keeney, from the field of decision analysis, who defines general public values as "anything that the public cares about regarding possible consequences that may result from the decision to be made" (Keeney, 2004, p.97). From this definition, as well as Keeney's (1992) widely utilised 'value-

focused thinking' approach to decision-making, it is apparent that decision makers should be concerned with public values in as much as they shed light on individuals' and communities' responses to particular projects and government policies. This conceptualisation is more narrow than the one offered by the SIA literature because it is solely concerned with "the scope of public interest in a decision" (Keeney, 2004, p. 97), rather than what the public considers to be important in their lives overall. In the context of sea-level rise, such a definition may be more useful for considering the social values that are relevant to adaptation policies, rather than the biophysical change of rising sea levels.

Through the description of value trees, Keeney et al. (1990) suggest that there are subcategories of general public values. These include, but are not limited to, social, political, economic, environmental, and health and safety values. Keeney argues that each of these values can be translated into objectives for a project, that trade-offs need to be made regarding which policy alternative will better meet objectives, and recommends using a multiple objective utility function to assess these tradeoffs (Keeney, 2004). It should be noted that this requires economic values to be placed on factors that are not market-based (e.g. environmental or social resources). We acknowledge that such a conceptualisation may be useful for considering the material impacts of adaptation to sea-level rise. However, using such an economically-focused approach would only serve to reinforce the current bias in the climate adaptation literature towards conventionally measured metrics that only assess material aspects of well-being (Adger et al., 2011). For this reason, as well as Keeney's narrow definition of values, we do not feel this approach to values is suitable in this context.

2.4. Psychology

The extensive literature on values within the discipline of psychology predominantly considers values to be "a stable meaning-producing superordinate cognitive structure" (Rohan, 2000) that

provides a basis on which people make judgements about how to live the best possible life. In line with this conceptualisation, the focus in psychology is on understanding: the motivational domains that influence values (e.g. the ten motivational domains identified by Schwartz (2006) of self-direction, universalism, benevolence, conformity, tradition, security, power, achievement, hedonism, stimulation); the ways values relate to one another; how particular values come to be prioritised by individuals; and the implications differing value hierarchies have for attitudes and behaviours (e.g. Axelrod, 1994, Schwartz, 2006, Stern, 2000, Stern et al., 1993).

This psychological approach contrasts with the SIA, climate adaptation and planning related literatures, which are concerned with value judgments individuals make about aspects of their environment, everyday lives, social relationships or about particular policy or planning decisions. Nevertheless, there is some recognition in the psychology literature that value constructs lead to the valuing of objects:

> when people say that they value (verb) a thing, person, action or activity, they are expressing a *deeper meaning* associated with that entity. So they do not simply like the entity: they feel that it is *good*… and relates to or somehow expresses their underlying values (noun) (Rohan 2000, p.256, italics added).

The link between liking a thing and people's value constructs has been demonstrated empirically, including in research on changing environments (e.g. Ford et al., 2009). The claim is that the objects people value relate to their value constructs (Alicke, 1983, Stern, 2000), even if there is not much theoretical basis for predicting how value constructs give rise to valued objects (Ford et al. 2009). There is also some recognition that culture affects the things people value in as much as people adapt their values to their experiences and life circumstances (Veroff, 1983), which are products of culture (broadly defined), and because normative group pressure can influence people to behave in ways that are not consistent with their values (Bardi and Schwartz, 2003).

This explanation of the role of value constructs in creating valued objects stands in stark contrast to the view of anthropologists, human geographers, and sociologists who typically see culture as having an independent causal role in the ascription of value to objects. For example, Swidler (1986) argues that culture influences action not by providing the values that people act on, but rather by providing the skills, habits and styles that people use to construct means of acting. In this schema people come to value what they can get and do—which is determined by culture—rather than according to a pre-ordained values construct.

For our part, we are primarily interested in this paper in the specification of things that are valued. So, though interesting and important, there is a fundamental difference between the way psychologists understand values (i.e. as a noun) and the ontology of valued objects and valuing what we have (i.e. as a verb), which is more aligned with that of human geography.

2.5. Human geography

Writings in critical human geography, and especially feminist geography, over the past three decades have highlighted the social relations in everyday life that people develop through their interactions in environments and places that are meaningful to them (e.g. Dyck, 2005, Mitchell et al., 2003). In this way of thinking, values held about constancy or change in environments or places are usefully understood as practices grounded and enacted in everyday material realities, rather than as ideas or opinions espoused generally. As can be seen from the preceding discussion, this conceptualisation of values aligns more closely with the definitions and interpretations of values offered by the SIA and climate adaptation literatures.

One of the main differences between the perspective taken in human geography and that discussed or implied in the SIA, climate adaptation and planning related literatures is the extent to which values are considered to be articulated versus practised. A basic research premise that follows from the human geography perspective is that the ‘values’ people hold about a place are

best measured by accounts (even 'data') of what they actually do in their daily/weekly practices. While there is some acknowledgement that people are able to make statements about what is important to them, the focus in human geography is on their 'enacted' values, rather than their 'articulated' or 'espoused' values (Pred, 1981).

In support of this idea, the geographic literature on everyday life comes from several influential authors and the distinctive ways of thinking that they pioneered. Everyday life is seen as a grounded material reality, in which on the one hand constraints of time and space shape behaviours, but on the other hand those constraining times and spaces are also habitually created by people's behaviours and routines. We can understand 'time-spaces' as 'environments' for our purposes. It is important to note that in this thinking, people create environments actively and repeatedly in their everyday practices—environments are 'socially' as well as 'naturally' formed (Edensor, 2010, Lefebvre, 1991, May and Thrift, 2001, Pred, 1981, 1984).

Adaptation to sea-level rise may involve alteration to the everyday uses people make of their environments and places, to the meaningful socio-spatial roots of their lives. Thus the values that they hold, as exhibited in their everyday lives and practices, may be challenged. This suggests that it is important for researchers and policy makers to understand what people actually do and rely upon in their lives rather than just what they say their attitudes are. It may be useful to not only consider individual's espoused values, as suggested by the SIA, climate adaptation and planning related literatures, but also their enacted values.

2.6. A definition of values

This review of various perspectives on values, within five bodies of literature, has revealed a number of conceptualisations of values that may be useful for understanding the social impacts of sea-level rise. The definition and operationalisation of values in the SIA and climate adaptation literatures suggest that values are at the heart of individuals' opinions about what is important in

life. The decision analysis literature is narrower covering only things the public cares about that are linked to a particular decision. In these areas of research, values are important because they determine responses to environmental change, and to government policies and planning decisions. While such a conceptualisation of values provides an understanding of espoused values that may be disrupted by environmental change, it provides limited consideration of the enacted values of people's everyday lives that may also be impacted.

The interpretation of values that emerges from the human geography literature helps to address this gap. By focusing on the activities people undertake in their everyday life it is possible to reveal important activities that are invisible in many accounts of people's behaviour (Burkitt, 2004), and thus shed light on a greater range of values that may be affected by environmental change and associated government policies. Thus, the definition of values provided by human geographers highlights the importance of considering both espoused and enacted values and considering how these may be produced and reproduced through everyday activities, interactions and other forms of knowledge, taking into consideration temporal and spatial dimensions.

The conceptualisation of values within the psychology literature reveals that the ways values have been described from the other four perspectives assume values to be a verb, rather than a noun. This is because the other four perspectives are concerned with valuations of everyday life—expressed explicitly or through experiences—rather than exploring the underlying cognitive structures or cultural influences. The psychology literature provides little insights into the concept of values as a verb and as such does not provide a method for gauging how the things people value may be impacted by sea-level rise. Nonetheless, it does suggest the importance of considering similarities and differences between the ways people prioritise their values, and indicates that it may be possible to categorise social values.

Therefore, for the purposes of exploring the social impacts of sea-level rise we define social values as follows:

Valuations that individuals make, in isolation or as part of a group, about what is important in their lives and the places they live. These valuations may be articulated verbally or expressed through everyday activities.

The focus of this definition is on people's everyday lives and as such we consider this definition to reflect the idea of 'lived values'. Using this term (lived values) helps to differentiate this concept from other uses of the concept of values. The definition of lived values presented here has a temporal and a spatial element; values involve action and evaluation, they are produced and reproduced in various settings, and may be expressed verbally or through lived experiences. The term lived values encapsulates the variety of definitions described in the review and acknowledges the range of approaches that may be required to elicit the social values that are likely to be impacted by sea-level rise.

3. A framework for analysis of the social impacts of sea-level rise

Thus far we have argued that understanding social values is central to evaluating the social impacts of adaptation to sea-level rise. Having a clear definition of what is meant by social values is essential and has been the focus of the first part of this paper. With a definition of lived values articulated, we now turn to the issue of considering lived values that may be at risk of sea-level rise. In doing so we follow the lead of the SIA field of devising and categorising lists of general and specific social impacts to broaden the range of impacts that researchers and policy makers consider to be at risk (Vanclay, 2002).

To develop a list of lived values at risk, we began by considering variables that have appeared in past lists in the SIA (see van Schooten et al., 2003, Vanclay, 2002, Webler and Lord, 2010), climate adaptation (see Barnett, 2010, O'Brien and Wolf, 2010) and psychology literatures (see Kahle and Timmer, 1983, Veroff, 1983). We identified items that were consistent with our definition of lived

values and that may be impacted by sea-level rise, resulting in a preliminary list of 33 items. To ensure that these 33 items were internally consistent and comprehensive, we organised the list into broad categories.

The categorisation we chose was based on Maslow's (1943) hierarchy of needs, whose primary groupings were: physiological [health][2]; safety; belonging; esteem; and self-actualisation. The reasons for choosing this categorisation were three-fold. First, examples of values at risk from sea-level rise provided by climate adaptation researchers closely relate to the categories described by Maslow. For example, O'Brien and Wolf (2010) argue that "climate change will affect what people value in terms of survival, security, identity, and self-actualisation" (p. 237). Second, Maslow saw needs as being intimately intertwined with values, and often used the terms interchangeably (Kahle and Timmer, 1983). Although Maslow was a psychologist, his conceptualisation of values took into account experience and being (Maslow, 1968), thus providing a stepping stone between the mainstream psychological approach to values and that of the other four perspectives considered above. Third, this categorisation helped us to establish a more comprehensive list of lived values—with 38 items and 18 sub-items (Figure 1). We consider this revised list to be a work in progress that requires empirical research to ensure it is sufficiently comprehensive.

In proposing this categorisation of lived values, we are aware that others may group lived values differently. For example, we considered grouping the values according to disciplinary categories, such as those proposed by Gramling and Freudenberg (1992); however, we found that Maslow's categorisation[3] was more useful for elaborating the concept of lived values in the context of sea-level rise.

[2] We have renamed this category 'health' in our framework to reflect the social nature of the lived values that we associate with this category.

[3] We drew on Poston's (2009) contemporary description of Maslow's hierarchy of needs. In using Maslow's hierarchy of needs to categorise lived values we assume values to be relative rather than absolute.

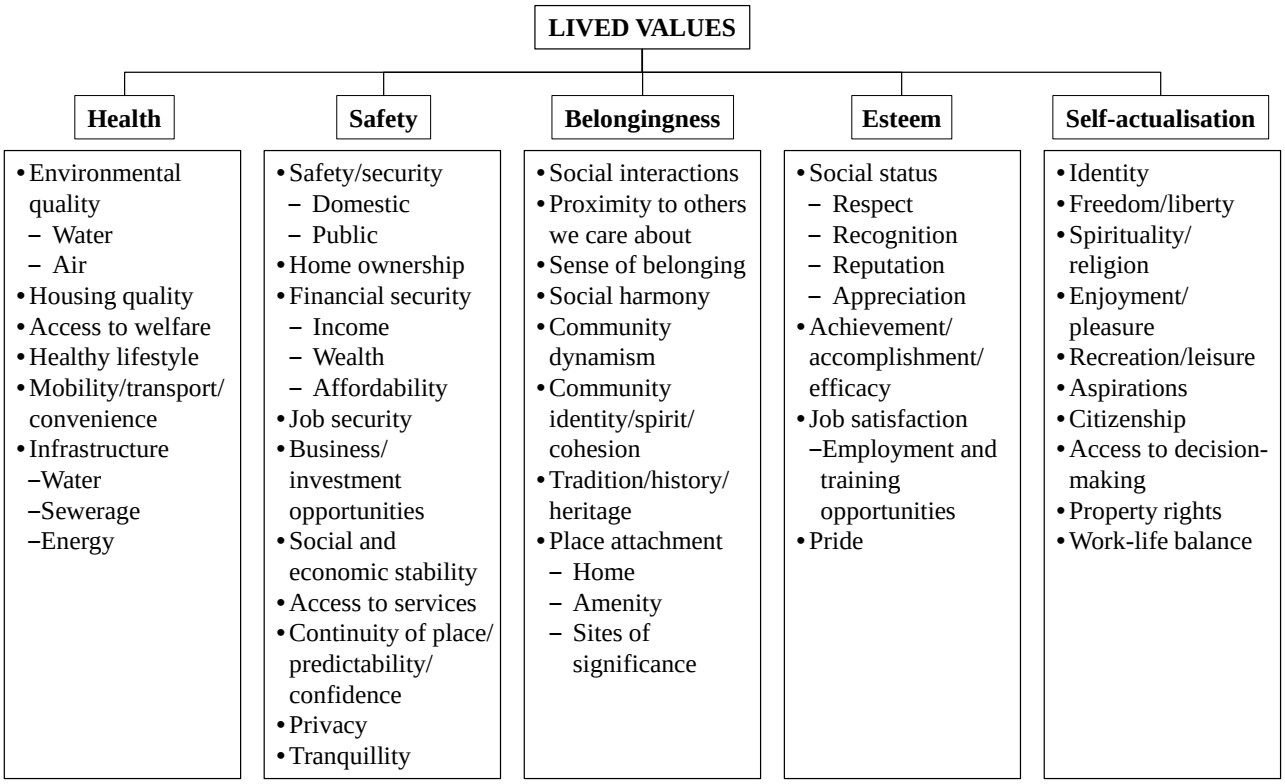

Figure 1. Categorisation of lived values that may be affected by sea-level rise.

The next paragraphs will explain how we interpreted Maslow's categories with respect to lived values, sea-level rise and adaptation. The climate adaptation literature offers three main options for adapting to sea-level rise (Klein et al., 2001, Misdorp et al., 1990, Thomsen et al., 2012): protection—through hard and soft structural options; retreat—through relocation of buildings and phasing out development in high risk areas; and accommodation—through emergency planning, insurance and changes to building codes and other planning policies. We acknowledge that the perceived benefits and impacts of these options, as well as sea-level rise, on lived values are likely to vary for individuals. Here we only discuss some of the potential effects of these adaptation options and environmental changes on lived values to illuminate some of the detail behind the conceptual map in Figure 1.

Health lived values correspond to Maslow's 'physiological' category and include values that relate to social determinants of survival. They concern issues such as environmental quality, housing quality, and a healthy lifestyle. Each of these may be directly affected by sea-level rise. The

quality of coastal resources, such as beaches and lakes, built infrastructure, including public and private housing, as well as other places where individuals engage in physical activities, as part of living a healthy lifestyle, may all be impacted by rising sea levels. If communities are relocated the air and water quality may be better or worse than their present place of residence, depending on the size, layout and location of the new settlement. Accommodating or retreating may also compromise or enhance housing quality and other infrastructure, depending on the amount of money available to invest in these adaptation strategies.

Safety lived values are values that relate to feeling safe and secure in all aspects of life. They concern issues such as financial security, job security, and social and economic stability. Sea-level rise may affect the incomes and wealth of individuals, families, businesses and local governments through its impacts on property and other resources. This may be alleviated or exacerbated by all three adaptation options, which will require considerable financial investments by all social actors. Sea-level rise and adaptation may also affect the viability of key industries, such as tourism, thereby impacting employment, which may also affect financial security. Social and economic stability may be disrupted as a result of changes to the social and economic structure of communities that result from adapting to sea-level rise. The extent to which stability is re-established may depend on the rates of change of environmental and policy processes.

Belonging lived values are values that relate to a sense of belonging, tradition, history and heritage and feeling close and connected to others. An individual's sense of belonging may be affected by changes in natural, built and social settings. For example, rising sea levels may result in flooding of sacred indigenous sites, sites of historical significance or family heritage. Some adaptation options may also erode, or protect, these sites. Rising sea-levels and increases in the frequency of storm surges may affect the mobility of coastal residents and their ability to engage in various activities and social interactions. Some adaptation options, particularly relocation, may also affect the nature and frequency of social interactions and the proximity to others that we care about.

Esteem lived values are values that relate to self-esteem, including social status, job satisfaction and pride. Retreat and relocation of houses may impact on the social status of individuals within and beyond the communities where they reside. For example, proximity to water is considered to be a status symbol in some coastal communities in Australia. Furthermore, changes to the social structure of communities may affect individual's standing in the community and the self-esteem that they derive from the respect, recognition and reputation they have developed in their social relationships. The satisfaction individuals derive from the type of work they engage in and opportunities for career progression may be affected by changes in the social and economic structure of the community associated with various adaptation options. Overall, the changes in esteem lived values that arise from changes to the natural, built and social settings may affect an individual's sense of pride.

Self-actualisation lived values relate to people's endeavours to define who they are and better themselves. We considered these lived values to include identity, a sense of freedom and private property rights. An individual's identity and sense of self may be affected by sea-level rise and adaptation if it is intertwined with the natural, built or social setting where they live. An individual's or a community's abilities to make choices about their lives and futures—their freedom—may be constrained or enhanced by government adaptation policies. This includes, but is not limited to, the ability to make decisions about how to manage one's own property. Private property rights are already being affected by government policies on adaptation to sea-level rise in some coastal communities in Australia. For example, through the use of flooding overlays (see Macintosh, 2012).

4. Conclusions

Although both the SIA literature and research on climate adaptation identify the importance of values in the social construction of risks arising from social and environmental changes of various kinds, neither of these literatures offer a well specified and theorised understanding of values that can help guide research and decision-making. We have offered a re-theorisation of values that grounds an otherwise somewhat abstract concept in the everyday lives of individuals. This notion of

‘lived values’ includes the more conventional idea of values as expressions of things that are important, but also recognises the central importance of everyday activities as reflecting and remaking values.

From this definition of lived values we have identified many values that may be at risk from sea-level rise, and proposed a framework for organising these into five larger categories of value. This framework can help guide future research into the social impacts of sea-level rise and the policies designed to address this and other environmental changes . While we do not consider the list of lived values at risk provided in this paper to be final, it is derived from existing literature and thus we have a degree of confidence in its robustness. Empirical research will be required to ensure the list is sufficiently comprehensive and internally consistent.

Considering lived values provides a mechanism for exploring the equity implications of sea-level rise and various adaptation strategies for individuals and communities. We propose that evaluating which of these values may be more or less prominent in a particular community may help to develop adaptation strategies that are sensitive to the lived values of the community and will guide more equitable policy responses to adapt to sea-level rise. These strategies may need to go beyond the traditionally considered options of protect, accommodate and retreat.

This framework will be useful for policy makers concerned with place-changing problems other than sea-level rise, including environmental changes of various kinds (for example bushfires, or acidification of soils), proposals for large developments (for example marinas, or airports), changes in labour markets that affect key sectors of employment, or significant changes in the provision of public goods and services. Understanding the diversity of lived values makes it possible to appreciate and address the diverse interests within a community. The framework is therefore a mechanism to identify winners and losers from change processes, which is information that can be used to prioritise responses for those most at risk. It also enables policy makers to systematically elicit the range of values at risk, as counterpoint to the interests of the most vocal. So, while we have developed this framework to help us understand more equitable approaches for adapting to

sea-level rise, it can be used to develop more targeted and equitable policies in response to all sorts of change. Indeed, in our own research we are now using this framework to explore the way in which lived values, once identified, can be effectively incorporated into adaptation planning.

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