



A values-based approach to vulnerability and adaptation to climate change

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Values play a significant role in climate change debates. To date, however, the use of the term values has been narrowly focused on monetary worth, relative worth, or fair return on exchanges. This article argues that another, broader interpretation of values, one concentrating on intrinsically desirable principles or qualities is needed to understand and respond to climate change. How to respond to climate change impacts depends importantly on what the effects of climate change mean to those affected. Similarly, what is considered as effective and legitimate adaptation depends on what people perceive to be worth preserving and achieving. How to adapt to climate change therefore hinges on the values underlying people's perspectives on what the goals of adaptation should be. This article examines what a values-based approach is, why it is needed, and what its benefits for understanding adaptation are. The implications for research and policy are discussed. © 2010 John Wiley & Sons, Ltd. *WIREs Clim Change* 2010 1 232–242

The concept of values has played a significant role in climate change debates. There have been many discussions about present and future values, discounted values, the value of climate policies, the value of a human life, the utility value of a project, and so on.^{1–4} Yet all of these usages relate to very narrow definitions of values, namely monetary worth, relative worth, or a fair return on exchanges, all of which are typically measured or calculated as numerical quantities. Only recently has another interpretation of values entered into climate change discourses—values relating to principles or qualities that are intrinsically desirable. The emergence of this broader and subjective interpretation of values is not surprising, given that it is now understood by many scientists and policymakers that climate change is occurring, and that, regardless of efforts to mitigate greenhouse gas emissions, societies will both experience and have to adapt to impacts.⁵ Conditions and experiences that are subjectively and differentially valued will be affected by climate change.

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Despite growing recognition that a broader conceptualization of values needs to be considered in relation to climate change, the dominant approach to valuation today still stems from economics.⁴ The contributions that welfare economics have made to understandings of how societal values are prioritized, for example, through efficiency, utilitarian, or distributional approaches, are without a doubt considerable, and they have crucially shaped the discourse on climate change. Indeed, much of the debate about responses to climate change focuses on assessments and measures of the costs of goods, services, and technologies to reduce future impacts. However, applied welfare economics and cost-benefit analyses seldom take into account nonmaterial aspects of human welfare, which has been the basis for critiques and challenges to traditional economic approaches. For example, Sen and others^{6–8} work on capabilities and freedoms have emphasized the multidimensional nature of welfare, and the importance of promoting the 'substantive freedoms' that people have reason to value, such as the freedom to live to old age, or to participate in political processes. In relation to climate change, what are still missing from economic-oriented and welfare-based approaches to valuation are the differential subjective values of individuals, societies, and cultures regarding the experience and consequences of environmental

transformations. Economic concepts such as utility and efficiency cannot capture the often subjective and nonmaterial values affected by a changing climate. As a result, research on adaptation and vulnerability must take full account of values, beyond what has been offered by dominant methods of economic valuation. Such an approach is paramount to understanding how adaptations can be made equitable, legitimate, and culturally sensitive in the face of potentially irreversible losses.

Notions of vulnerability and adaptation are increasingly discussed in terms of subjective values.^{9,10} For example, Berkes (Ref 11, p. 163) pointed out that, from the perspective of Inuit values, the loss of sea ice in summer months is significant because it played a central feature in their lives—leaving some people ‘lonely for the ice.’ The realization that something greater than money is at stake is also feeding into political discussions of both mitigation and adaptation to climate change. In the aftermath of hurricane Katrina, for example, questions arose as to whose values were upheld through emergency planning decisions, and whose life and property were protected. This realization that something greater is at stake opens up for ethical debates, philosophical arguments, and political controversies over climate change,^{12–14} all of which are increasingly overshadowing utilitarian debates about the costs and benefits of different strategies and responses. From the perspective of values, climate change means different things to different individuals and groups. Understanding these meanings and their significance suggests that a more integral approach to research on climate change vulnerability and adaptation is needed, i.e., a values-based approach.

A values-based approach to vulnerability and adaptation recognizes that economic assessments of impacts and responses, as exemplified in the Stern Review,⁴ cannot capture the full significance of climate change. The experiential and cultural dimensions of climate change, largely ignored in assessments by the Intergovernmental Panel on Climate Change (IPCC), examine the meaning and relevance of climate change for individuals and groups. Vulnerability is not only simply about the negative material outcomes associated with climate change, but also about how these outcomes are differentially valued, and how they influence the lives and well-being of both humans and other species.¹⁵ From this perspective, people are vulnerable to the extent that climate change influences not only their objective, exterior world, but also their subjective, interior world. Consequently, what is considered legitimate and successful adaptation depends on what people perceive to be worth

preserving and achieving, including their culture and identity.¹⁶ A values-based approach recognizes that there are different conceptualizations of ‘the desirable,’ and that interests and political power can influence whose values are prioritized, and whose are disregarded.

In this article, we first define values and discuss some of the diverse ways that they are understood. We then consider what a values-based approach contributes to understandings of climate change. We discuss how a values-based approach differs from outcome-based approaches and contextual approaches to climate change vulnerability and adaptation, and argue that it can potentially promote a more integrated understanding of climate change and the responses to it. Several examples are discussed to illustrate the importance of a values-based approach. We conclude by identifying four implications of a values-based approach for research and policy. First, it has implications for how research on climate change vulnerability and adaptation is carried out, and what types of knowledge are considered. Second, it has political implications, particularly if some people’s values are subordinated to those of others and value conflicts result. Third, it has implications for our understandings of the limits to adaptation. These limits are likely to be defined not just by biophysical impacts, but also by subjective values. Fourth, it has implications for the practice of adaptation. A values-based approach can potentially foster an inclusive process in local adaptation practice that openly reflects the diverse values represented in communities, building common ground for adjusting to change. All in all, we show that there is a need to shift attention away from an exclusive focus on economic and material values to a deeper understanding of what climate change means for society.

WHAT ARE VALUES?

In everyday usage, the term ‘values’ is used to refer to interests, pleasures, likes, preferences, moral obligations, desires, wants, goals, needs, aversions, and attractions.¹⁷ It is a word that can be used to generically describe subjective, intangible dimensions of the material and nonmaterial world. Values ‘serve as standards or criteria to guide not only action but also judgment, choice, attitude, evaluation, argument, exhortation, rationalization, and, one might add, attribution of causality.’ (Ref 18, p. 2). The links between values and behaviors have received considerable attention in the psychology literature,^{19,20} including in relation to climate change.^{21,22}

Values can be associated with individuals, groups, institutions, organizations, and cultures.^{18,23} Williams (Ref 17, p. 20) defined a value system as ‘an organized set of preferential standards that are used in making selections of objects and actions, resolving conflicts, invoking social sanctions, and coping with needs or claims for social and psychological defenses of choices made or proposed.’ Cultural value systems are a type of social value system. Although there is a close relationship between the value system that an individual internalizes and societal goals and demands that are imposed on an individual, there is no consensus on whether cultural values represent the average of group members’ personal value priorities or group leaders’ beliefs about what the value priorities should be.²⁴

Values do not exist or arise randomly or haphazardly, but instead are organized in integrated, coherent structures or systems and linked to motivations.²⁵ The desire to construct a system of values by understanding, systemizing, organizing, and analyzing motivations can be traced to Maslow,²⁶ who developed a holistic-dynamic theory of motivation (often referred to as ‘Maslow’s hierarchy of needs’). This hierarchy ascends from physiological needs, to safety needs, to a need for belongingness and love, to esteem needs, to the need for self-actualization. This theory holds that an individual’s dominating goal at any motivational stage is a strong determinant of his or her worldview and philosophy of the future, as well as of his or her values.²⁶ Schwartz²⁵ identified 10 types of basic and universal values—security, tradition, conformity, power, achievement, hedonism, stimulation, self-direction, universalism, and benevolence—and the characteristic motivations that organize them into value systems. These motivations are represented by two orthogonal dimensions: self-enhancement versus self-transcendence and conservation versus openness to change.²⁷ Other similar conceptualizations of values include self-determination theory, which distinguishes between intrinsic values (e.g., personal growth, social connection, societal contribution) and extrinsic values (e.g., success, popularity, beauty).²⁸ Both Schwartz’s value types and self-determination theory are useful in examining values in relation to climate change, as will be shown below.

Values have been closely associated with worldviews, which describe the basic assumptions and beliefs that influence much of an individual or group’s perceptions of the world, their behavior, and their decision-making criteria.^{24,29} Rohan²⁴ noted that worldviews, or people’s conscious beliefs about the world, are a function of their value priorities, and thus

she argued that value system structures can be used to guide investigations of people’s worldviews. This ‘inescapable link’ between people’s personal value priorities and the way they view the world has led to studies on correlation between values and traditional, modern, and postmodern worldviews (see Ref 24, p. 269; see also Refs 30,31).

Worldviews—and correspondingly, values—change over time, often gradually and over generations,³¹ but also within the lifespan of an individual.^{32,33} Empirical studies based on self-determination theory suggest that value changes, particularly a shift from extrinsic to intrinsic values, can take place in individuals.³⁴ Intrinsic values are positively correlated with both increased subjective well-being and ecologically responsible behavior.³⁵ Using results from the World Values Survey, Inglehart³⁰ showed that there are strong linkages between values, worldviews, and political and socioeconomic variables such as democracy and economic growth rates, resulting in some predictable patterns of change in values and belief systems. This body of research finds that fundamental value changes most often take place as a younger generation replaces an older one in the adult population of a society.³¹ These findings are not uncontroversial, in that they recall some critiques of modernization theory and underplay the role of power. From the postmodern perspective of Foucault, a worldview can be neither true nor false in any objective sense, but is instead linked to relationships between knowledge and power.^{36,37}

Research in development psychology has linked worldviews to cognitive structures, whereby ‘[t]he root or ‘deep structure’ of any principle of mental organization is the subject–object relationship’ (Ref 33, p. 32). ‘Object’ refers to cognitive elements that an individual can reflect on, handle, look at, be responsible for, relate to each other, take control of, internalize, assimilate, or otherwise operate upon. It is something, that is distinct enough from the individual that he or she can reflect on it and utilize it.³³ ‘Subject,’ in contrast, refers to the cognitive elements that an individual is identified with, tied to, fused with, or embedded in (Ref 33). Changes in subject–object relationships that are associated with stages of human development are closely linked to worldviews, in that they influence the perspective that an individual has on a situation, including what is considered absolute and relative, and where distinctions are drawn between ‘me’ or ‘us’ and ‘the other.’ This cognitive mode of interpretation combines with an emotionally driven mode of information processing (the latter being more holistic, affective, and intuitive), to influence the way

that the risk is perceived in the context of a particular worldview.³⁸

The meaning and significance of climate change and the responses to it are embedded in values and worldviews. For example, Leiserowitz (Ref 38, p. 63) suggested that 'underlying values and worldviews strongly condition the way many members of the American public currently think about this risk and public policy options to mitigate global climate change.' This, of course, is true not only for the general public but also for scientists who engage in climate change research. The significant differences in how climate change is perceived have also been explained by cultural theory, which identifies four predominant worldviews: hierarchical, fatalistic, individualistic, and egalitarian.³⁹ These distinct worldviews are founded on conflicting sets of values. Many debates about climate change, therefore, are not necessarily about whether the science is right or wrong, but about conflicting values and worldviews. Similarly, distinct value systems drive different types of inquiries of the changing climate, its consequences and responses to them. It is therefore just as important to expose the values of scientists involved in climate change research so that they are transparent and can be assessed in relation to both research findings and proposed responses and solutions to climate change.

A VALUES-BASED APPROACH TO CLIMATE CHANGE

A values-based approach to climate change vulnerability and adaptation is one that recognizes and makes explicit that there are subjective, qualitative dimensions to climate change that are of importance to individuals and cultures. These dimensions are closely linked to the impacts of observed and projected climate change that are described in IPCC research assessments, for example, the decrease in glaciers and sea ice, or the potential disappearance of low-lying islands to sea-level rise. Nonetheless, the subjective dimensions of climate change have been noticeably absent from such assessments. A values-based approach acknowledges that the impacts of climate change cannot always be measured and assessed through objective, scientific means, or through economic analyses. Integrating perspectives on human values into assessments of vulnerability and adaptation thus requires the inclusion of the new literatures and methodologies in climate change assessments, for example, the literatures that examine the relationship between climate change and culture, religion, worldviews, ethics, and psychology. These literatures have not yet been integrated into mainstream

understandings of climate change. A values-based approach to climate change can be considered important for at least four reasons: climate change cannot be assessed or responded to in only one way; there may be value conflicts between different actors' responses; future generations may judge based on different value systems; and climate change itself challenges worldviews and values.

First, acknowledging that people see the world differently and may prioritize different values makes it clear that climate change cannot be assessed, interpreted, and responded to in one particular way. The meaning and significance of climate change is not the same for everyone⁴⁰; recognizing that different things are at stake for different individuals or groups adds complexity to the climate change problem, and to the solutions. It suggests that one metric (e.g., costs, lives lost, etc.) may not be suitable for evaluating impacts and responses, and that multiple metrics may need to be adopted to capture the full significance of climate change.⁴¹

Second, a focus on values and worldviews draws attention to the possibility that efforts to satisfy one group's values through climate policies and responses can create conflicts with the values of other groups. In Schwartz's^{25,27} value structure, opposing values tend to generate conflicts, whereas contiguous values are generally more congruous. For example, responses motivated by self-enhancement values (e.g., power and achievement) may conflict with responses motivated by self-transcendence values (e.g., universalism, benevolence). Taking the Arctic as an example, those promoting efforts to access oil and gas reserves in previously ice-covered areas may face value conflicts with those working to establish an international conservation area. Responses to climate change will give rise to a new set of impacts and consequences. These consequences in turn will affect people, communities, businesses, regions, and other actors differentially. Climate change impacts, as well as any mitigative and adaptive responses to it, will affect what people value. Considering value conflicts expands debates about climate change beyond questions of occurrence and attribution, and beyond discussions of resource scarcity and conflict. It includes questions of why climate change matters, to whom, who wins, who loses, and whose values count.¹⁶

Third, values and worldviews are temporally dynamic, and this suggests that present-day actions or inactions may be seen and judged quite differently by future generations. Given that the irreversible impacts of climate change will be felt most strongly by future generations, it is worth questioning

whether today's prioritized values can be applied to future generations.^{42,43} Current policies are often made under the assumption that prioritized values associated with modernity (namely, economic values) will be equally relevant in the future, and that they can simply be adjusted using a discount rate.⁴⁴ Anticipating the values of future generations involves some speculation, yet it is also to some degree predictable, based on understandings of social development and human psychology.^{30,31,33} Over time, individuals and groups are likely to develop a 'post' postmodern worldview that takes a broader perspective (based on changes in subject–object relationships), including a more holistic understanding of nature–society relationships. As Inglehart (Ref 30, p. 338) argued 'Just as Modernization eventually gave way to Postmodernization, we can safely assume that Postmodernization is not the final state of history.'

Finally, climate change itself is a challenge to worldviews and belief systems, which may in turn lead to value changes. Climate change is likely to become increasingly visible and evident in the coming decades, and it is likely that generations growing up in years ahead will have a very different understanding of human–environment relationships. Currently, a significant part of the world's population attributes climate change to external natural forces, or to a higher supernatural power or God, rather than to human activities.^{45,46} Rather than dismissing these views as ill-informed, they need to be made explicit and addressed with legitimacy. The perspective that humans are part of their environment and can influence it is radical to some worldviews. Thus, as temperatures increase and other direct and indirect impacts are felt, climate change may become a catalyst for changes in beliefs, worldviews, and values.

A VALUES-BASED APPROACH TO VULNERABILITY AND ADAPTATION RESEARCH

Within climate change science, most research on vulnerability and adaptation has focused on one of two distinct approaches. These approaches are rooted in different discourses, corresponding to different framings of the climate change problem.⁴⁷ The first approach, which can be thought of as an 'outcome' approach, draws attention to reducing the direct and indirect impacts of climate change. The emphasis here is on reducing the specific damages associated with climate change (or realizing the positive benefits) through vulnerability reduction and/or adaptation. The second approach, which can be referred to as a 'contextual' approach, focuses on the context and

underlying social, economic, political, institutional, technological, cultural, and environmental conditions that influence exposure, sensitivity, and adaptive capacity.

An outcome approach to both vulnerability and adaptation has tended to prioritize sectoral adjustments or interventions that reduce the negative impacts of a particular change in climate, such as temperature changes, precipitation changes, or sea-level rise.⁴⁷ This approach depends on identifying the specific impacts of climate change, which are often based on model projections. An outcome approach has been most widely used for planning sectoral interventions in response to projected changes in specific parameters, mainly temperature, rainfall, and sea levels. Adaptations often focus on infrastructure and technological changes that reduce vulnerability to climate change impacts. There are, however, numerous limits to this approach. First, the uncertainties associated with climate scenarios have made it difficult to design robust adaptation strategies.⁴⁸ Second, climate change is seldom the only change influencing outcomes. In most cases, multiple processes of change interact, making it difficult to clearly distinguish climate impacts from other effects, or to isolate measures that can reduce vulnerability to climate change. Finally, it has not been a successful means for addressing societal and community adaptation, where risk perceptions often differ, and financial, cognitive, and institutional barriers hinder adaptive actions or strategies.^{49,50} Often driven by regional or downscaled climate change scenarios, outcome-oriented approaches tend to ignore the local factors and changes that may be perceived by locals as important, and hence valued. As such, vulnerability reduction strategies and adaptation measures are frequently difficult to operationalize.

The contextual approach to vulnerability and adaptation takes vulnerability as the starting point of the assessment.^{47,51} Future biophysical changes in the climate are considered, but only after the vulnerability of a place or group has been assessed.⁵² Often, societal responses to current climate variability and extreme events are used as proxies for understanding climate change vulnerability and adaptation.⁵³ Alternatively, 'place-based' approaches to the vulnerability of social–ecological systems can serve as a basis for developing adaptation strategies, which often involve reducing the key factors that underlie vulnerability.⁵⁴ This approach draws attention to the processes and structures that contribute to vulnerability, may increase exposure and reduce the capacity to adapt.⁵¹ This contextual approach highlights the differential vulnerabilities across gender, class, race, urban versus rural, and other characteristics of places.

It draws attention not only to the climate change impacts, but also to the role of rights and entitlements, governance and institutions, thereby identifying the context of changes in climate as an important role. A limitation of this approach, shared with the outcome approach, is that it pays little attention to the subjective factors that influence vulnerability and adaptation. Cultural, psychological, religious, and spiritual factors are often disregarded in contextual approaches.

Neither context- nor outcome-oriented approaches can say much about what the effects of climate change mean for what people value, for example, their cultural identity and way of life, their sense of place, their visions for their future, and their human security. Yet there is evidence that climate change will affect what people value in terms of survival, security, identity, and self-actualization.⁹ Moreover, these two approaches do not identify which types of adaptation pathways are perceived as most desirable, effective, and legitimate by individuals and communities. This can be significant, as disagreements about what type of adaptations are considered effective often stem from conflicting sets of values and distinct ideas about what the goals of adaptation should be. By focusing on values, the types of adaptation perceived as effective and legitimate by individuals, groups, institutions, or governments become explicit. In making these potentially diverse perspectives explicit, adaptation decisions and pathways can be developed through a more transparent process that exposes the underlying goals of distinct actors.

POTENTIAL BENEFITS OF VALUES-BASED APPROACHES

To date, there have been very few explicit values-based assessments of vulnerability and adaptation. We argue here that such an approach can contribute to a better understanding of the risks of climate change, as well as the responses necessary to secure what individuals and societies value. This approach is particularly important because climate change is likely to negatively affect the physiological needs of vulnerable populations—including access to food, water, and shelter. If these survival needs are not met, it is unlikely that more universal values, such as social justice and equality, will be prioritized. Yet equally important, climate change is likely to affect safety needs. Maslow²⁶ discussed human preferences for a safe, orderly, predictable, organized world in which the unexpected, unmanageable, chaotic, and other dangerous things do not happen. The biophysical impacts of temperature, increases of 4°C or more in

the coming century, are considerable.⁵ As Maslow²⁶ suggested, a threat of chaos or nihilism should be expected to produce a regression in most human beings from higher needs to more prepotent safety needs. A values-based assessment of vulnerability thus focuses on the dynamic changes in value priorities that are associated with both impacts and responses to climate change.

Satisfaction of both physiological and security needs is a key aspect of human security, a concept that draws attention to the importance of food security, health security, and peace as global priorities in a changing climate. Although it is easy to focus on objective, measurable indicators of food security (e.g., number of calories per day, crop productivity, access to markets), a values-based approach reminds us that food is more than just calories, tonnes per hectare, or market exchange rates. It is an integral part of culture and identity, and it plays a role in social relations, rituals, and celebrations. Changing crops, for example, without considering their cultural importance, could arguably be met with resistance by societies who have relied on a particular staple for centuries or longer. Therefore, adaptation strategies that focus on technological interventions (such as new crops or varieties), without taking into account qualitative and subjective dimensions of food, are unlikely to be met with success. A values-based approach to adaptation points to the need for greater community involvement in adaptation decisions, and suggests that cultural factors may, in fact, be a limit to adaptation.¹⁰

When it comes to health security, a values-based approach to vulnerability and adaptation goes beyond objective measures of mortality and morbidity, life expectancy, or infant mortality. It considers not only these factors but also how health interventions in response to changing climate conditions are perceived by individuals and cultures with diverse values and worldviews. Preventing malaria through bed nets or prophylactics may be considered a sound adaptation to climate change, but the experiential and cultural implications for individuals and societies must also be considered. A key question is, how are such interventions perceived, and do they align with local customs, myths, or belief systems. This may raise some unexpected challenges to adaptation, as demonstrated by Wolf et al.⁵⁵ Looking at the vulnerability of the elderly people to heat waves, the authors suggest that subjective factors can influence the capacity of elderly people to take action in response to warmer temperatures. First, few elderly people interviewed for the study considered heat to be a problem, and did not think they were at risk for heat stress. Second, both

those who lacked a sense of self-efficacy and those who exhibited some self-efficacy took very few actions to prevent heat stress. Third, the social contacts of elderly people did not generally perceive the elderly close to them to be at risk. Social contacts reported that they relied on the elderly to ask for help, but the elderly indicated they would only ask for help when absolutely necessary. These subjective factors relate to how people perceive risk, perceive themselves in relation to this risk, and how those around them perceive them in this risk context. A values-based approach emphasizes the role perceptions, beliefs, traditions, and cultural identity play in shaping responses to risk.

In recent years, there has been increasing attention to the relationship between climate change and peace, as reflected in the awarding of the Nobel Peace Prize to the IPCC and Al Gore in 2007. Within the climate change literature, much attention focuses on the relationship between climate change and conflict.^{56–58} However, violent conflict can also be seen as a source of vulnerability to climate change.⁵⁹ The conclusions from climate change and security research to date have been mixed, and suggesting that although there is minimal evidence to date of a strong relationship between climate and conflict, there is nonetheless reason for concern in relation to future climatic changes.^{60,61} An outcome-based approach to vulnerability and adaptation focuses on the number of conflicts, the number of deaths, and economic and social costs. A contextual approach points to the social and political factors that create vulnerability and insecurity. Building on these, a values-based approach draws attention to the subjective dimensions of peace and security, taking into account how climate change—and responses to climate change—may influence things that are differentially valued across individuals, groups, or societies. It is worth noting that values depend on social and cultural structures that may enlist particular value systems in order to preserve power relations in the favor of, for example, ruling elites. When instilled in societies, these value systems conflict with those of any groups attempting to change the power relations. A focus on values here does not mean endorsing oppressive value systems but rather explicitly focusing on how these value systems perpetuate the *status quo*. It then becomes conceivable, and indeed legitimate, to potentially allow adaptations that permit certain values or value systems that sustain such power relations to be lost. Although the tensions emerging from competing values are often not discussed explicitly, the capacity to reconcile value conflicts is likely to emerge as key to any response to climate change that promote peace

and security. Consequently, the potential for value conflicts and the resolution of these conflicts in a transparent and peaceful manner are important areas for research on climate change and peace.

A limited number of studies suggest that when values drive adaptive adjustments, the outcomes can be quite effective. Water use on a small island of 12,000 residents in western Canada relied heavily on voluntary demand management measures, implemented by households in the absence of regulation. An outcome-based approach to this issue would likely have involved projecting rainfall using a downscaled or regional model to aid a managerial decision about water use. A contextual approach might have first identified the vulnerability of the water resources, and the place as a whole, identified other related issues that could affect water resources, such as overlaps in local water management institutions' remits, and then recommended possible remedial actions to reduce the vulnerability. The rather different and even surprising results of a values-based approach, however, suggests that participants view water as a common resource worth conserving to ensure continued supply for all residents. Numerous households installed rainwater harvest and gray water recycling systems to augment their water supply in addition to demand reduction measures to reduce their use of water from common sources. The majority of participants in this study enacted ecological citizenship^{62,63} hoping to remediate some of the impacts their actions have on the global environment. Underlying this conceptualization of civic involvement and responsibility is a particular value system that prioritizes altruism and equity to ensure a fair distribution of resources.

Climate change has tremendous cultural implications, and can be considered arguably as largely a cultural phenomenon.⁴⁶ The cultural implications of climate change can seldom be measured by objective, quantitative indicators alone. While outcome approaches can be used to identify the physical impacts of climate change on a range of phenomena with cultural significance (e.g., changes in species distributions, events, snow, or ice cover), and contextual approaches can be used to situate these changes in a cultural context,⁴⁰ a values-based approach to vulnerability, and adaptation directs attention toward what matters to groups or societies. Examined from the perspective of different worldviews and belief systems, climate change impacts take on new meaning and significance.¹¹ By looking at what is valued by a particular culture, that is experiencing, or is likely to experience, changing climate conditions, it becomes

possible to identify some of the more subjective limits to adaptation as a response to climate change.¹⁶ Climate change is disrupting traditional knowledge and culture in Pacific islands and the Arctic, and will continue to do so for the foreseeable future. Irreversible damage is likely imposed on people relying on traditional ways of knowing and living; the implications are that there will be intangible losses of places, culture, and identity. As argued by Adger et al.,⁹ such intangible losses are underrepresented in the international discourse about climate change and related policies. A values-based approach here would illuminate just what is valued by those affected by the losses, what these losses might mean to these communities, and what this implies for adaptation.

CONCLUSION

In this article, we have argued that there is a need to shift attention away from an exclusive focus on economic and material values to a deeper understanding of what climate change means for society. Definitions of values and their relationship to worldviews have been discussed, and a values-based approach to climate change vulnerability and adaptation has been described. This approach was distinguished from the 'outcome-oriented' and 'contextual' approaches that have thus far dominated the climate change literature, and the benefits of such an approach were considered. To conclude, we highlight four broader implications of a values-based approach, particularly for research and policy.

First, a values-based approach has implications for what research on climate change vulnerability and adaptation takes place, how it is carried out, and what types of knowledge are considered in this research. Scientific knowledge about climate change, as presented in leading journals, such as *Nature* and *Science*, or as assessed in IPCC reports, frequently disregards the subjective dimensions of climate change. These, one could argue, are precisely the dimensions that matter to most people, including decision-makers. Emerging and urgent questions for research include: what does climate change mean to individuals and groups who are experiencing unprecedented changes in their environments, i.e., changes that influence both culture and identity? Or to those who are suddenly faced with challenges to their beliefs and worldviews, including their understandings of nature–society relationships? What types of knowledge need to be included to capture the cultural, spiritual, and ethical dimensions of climate change? To answer these questions, research on vulnerability and adaptation needs to embrace a

more integral approach, an approach that goes beyond objective measures of the behavioral and systemic factors and includes subjective dimensions linked to experience and culture.⁵⁸

Second, a values-based approach has political implications, for it inevitably points to the role of power hierarchies and interests in prioritizing the values of some over those of others. As Williams¹⁷ argued 'We must never lose sight of the fact that values are continually used as weapons in social struggles.' While value conflicts may at first glance appear difficult to resolve, the normative, worldcentric concept of human security provides some simple ethical guidelines for the types of values that should be prioritized, i.e., those that enhance the capacity of individuals and communities to respond to threats to their environmental, social, and human rights, both in present and in future generations.⁶⁴ Human security encompasses physiological needs (recognized by many as human rights), safety needs (associated with traditional interpretations of security), needs for belonging and love, esteem needs, and needs for self-actualization. However, as a worldcentric concept, it follows that human security cannot be realized when esteem needs and needs for self-actualization are realized at the expense of the needs of others, and of future generations. From a values perspective, egocentric, ethnocentric, sociocentric, and arguably anthropocentric responses to climate change should not be prioritized over responses that benefit the largest interpretation of 'we' that is possible.⁶⁴ A values-based approach thus questions current discourses on climate change, and challenges political responses that do not expose values as important factors in adaptation and mitigation responses. A values-based approach to climate change raises not only the ethical question of 'Whose values count?', but also the important political question of 'Who decides?'

Third, a values-based approach has implications for understandings of the limits to adaptation.^{10,16} These limits are likely to be defined not just by biophysical and economic impacts, but also by subjective factors tied to differential and dynamic values. Adaptation strategies thus cannot be decided based on economic cost-benefit analyses, without taking into account what is valued and how those values might be affected by climate change. In other words, values may subjectively define the limits to adaptation for individuals and groups who experience profound losses related to climate change, or by future generations who inherit problems that could have been avoided.^{14,17}

Finally, a values-based approach has implications for the practice of adaptation. It means that

ensuring an inclusive process in local, regional, and national adaptation plans openly reflects the diverse values represented in communities, and builds common ground for adjusting to change. While research and policy has thus far focused on the types of adaptations that need to be carried out in response to climate change, there is a growing movement to look at how adaptation is carried out, ranging from community-based approaches to participatory processes.^{65–67}

The challenge for climate change research and policy is to promote deliberate transformations that respond to different values and address potential

value conflicts, while creating human security for present and future generations. Questions related to values are likely to become increasingly evident in discussions and debates about the implications of climate change for food security, health security, gender, equity, and culture. How these questions are answered and addressed will be extremely important in developing successful responses to the challenges of climate change. Perhaps most importantly, a values-based approach can help move the human face of climate change into the center of the discourse about climate change.

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