Tipping Points and the Human World: Living with Change and Thinking about the Future

Mark Nuttall

Abstract The term “tipping point” has become increasingly popular in scientific and media usage to refer to the world in which we live, to describe the probable effects of the processes arising from the consequences of the ways we live with and transform the world, to describe our relationships with the environment, and the effects of our actions. Through this shift in scientific thinking, climate is talked about and represented as having the power to influence our lives in ways we have never before experienced or imagined, suggesting something transformative, disruptive, and decentering. Yet, in doing so, the complexity of the human world is explained in terms of scientific models that suggest a return to climatic determinism that simplifies our understanding of human–environment relations. How is anthropology to contribute to this discussion and to research and policy action on climate change? This article reflects on this and other questions as a way of contributing to the discussion of tipping points: are tipping points and thresholds metaphors, are they to be understood within contexts of speculative forecast, or are they descriptions of real events and indications of future change? What do we mean when we use these terms to imagine, describe, and represent the world? What relevance do they have for anticipatory knowledge and anticipatory practice? Indeed, how does anticipation guide us through a world of shifting conditions and sudden surprises and influence ways we orient ourselves toward the future?

Keywords Arctic · Tipping points · Environmental discourse · Human–environment relations · Representations · Anticipation

INTRODUCTION

Climate change in all its local, regional, and global dimensions, and how we approach it, study it, contextualise it, think about its

past, present, and future impacts, and contribute to policy processes, poses many challenges to social sciences such as sociology and anthropology. Some of these challenges include how sociologists and anthropologists should consider their roles in studying and evaluating climate impacts on society, culture, and everyday human life, as well as the advocacy and policy positions they take (e.g., Crate and Nuttall 2009; Urry 2011). While we can define climate change as a variation in climatic parameters attributed directly or indirectly to human activities, we seem to think and worry about it, and seek to understand it through a complexity of different narratives, explanations, discourses, and myths, all of which say something about our relationships to the planet, to one another, to the future, and our place in it. In recent years, the ways in which we think about climate change have been shifting in terms of the increasing use of a vocabulary of forewarnings of imminent danger, of hazards, crisis, and risk. Hulme (2008) has argued that we are living in a climate of fear about climate change, the public discourse about which is peppered with words such as “catastrophe”, “terror”, “danger”, and “collapse”. This shift has been exemplified recently through the use of the term “tipping points”. In this article I reflect upon one of the challenges climate change—and I include in this not just the science of climate change, but the narratives and discourses surrounding it—poses to anthropology; that is the contribution the discipline can make to current thinking about, and to representations of, the future, which, according to recent climate science, may be characterized by “tipping points” beyond which there will be irreversible change.

APPROACHING THE TIPPING POINT

Recent climate science literature (as well as recent media reporting on climate change) is replete with references to

“tipping points”, “thresholds”, and “points of no return”. Although the term “points of no return” was used in the 1990s, and scientists talked about “breaking points” in the early 2000s, the term “tipping point” is virtually absent from climate science publications before 2005 or so when NASA scientist James Hanson is credited with using it (see also, Russill 2008). Since then, the increasing occurrence of the term “tipping points” suggests both a different approach to visualizations of time and space and an increase in scientific confidence and certainty about the acceleration of the pace and nature of climate change. New horizons of expectation are also coming into view that present challenges to our thinking about the future. According to the narrative of the tipping point we are not just heading toward the future, it is approaching us with increasing speed. While the tipping point suggests we will cross a point of no return (although in some cases scientists use the term to refer to the destabilization of a system which can eventually recover) the future remains nonetheless characterized by its unknown quality. To gaze into a world beyond the tipping point, therefore, is to be confronted with something outside our collective experience.

Skrimshire (2008) has written how both science and media have become enthralled with the “apocalyptic overtones” of climatic tipping points, while Russill (2008) has argued that public understanding of climate change is being structured by issuing tipping point forewarnings of danger with increasing frequency. Russill suggests that this trend announces a shift in the way we are likely to perceive and respond to climate change dangers. A significant dimension of this trend is its enrollment of epidemiological terminology to communicate urgent and uncertain threats. Russill calls this the “epidemiological imaginary” in the discourses about tipping points, by which he means “a loose set of metaphors, images, and cultural references evoking a sense of viral contagion with increasing regularity since the 1990s. The techniques, style of reasoning, and institutions addressing epidemiological phenomenon are hardly new, but the scope and power of its imaginative reach—of this way of seeing and explaining the world—appears unprecedented” (Russill 2008).

Both the tipping points discourse and its narrative about the future, I argue, prompt discussion characterized by a nervous anticipation of a future shaped by dramatic, far-reaching, and irreversible climatic, environmental, economic, political, and social change. Such discussion influences the development of narratives and policy debates concerning ecological catastrophe and humanity in crisis (e.g., Brown 2011). The tipping point thus becomes tremendously powerful in discursive, rhetorical, and metaphorical senses. However, we need to be attentive to how tipping points could be used indiscriminately to explain changes in physical processes, life systems, society, and the

human world. While a scientific focus on tipping points may be appropriate when talking about ecosystem changes, applying it to social behavior and human life may be fraught with methodological and theoretical difficulties and, worse, reduce our understanding of the complexity of social life to positivistic models.

THE IDEA OF THE TIPPING POINT

The term “tipping point” has a longer history in social science than in climate change science usage. Sociologists and, to some extent, anthropologists tend to define a tipping point as a phenomenon or rare event that becomes more common. In sociology, the tipping point idea has been applied to the study of different kinds of social phenomena and has inspired considerable theoretical work on “threshold behavior” and critical mass models, as well as influencing game theory and complexity theory. It may also be of interest to note that Immanuel Wallerstein wrote about tipping points and tipping mechanisms in describing the politics and economics of state creation (Wallerstein 1976). Although journalist Malcolm Gladwell is often considered to have popularized the use of the term “tipping point” through his discussion of social trends, social epidemics, and power and influence (Gladwell 2000), we can trace its origins in social sciences scholarship to political scientist Morton Grodzins who, in 1957, described demographic change in suburban neighborhoods in the United States. Since then the term has been associated in the social sciences with thresholds and social change. More accurately, Grodzins used the term “tip point” to refer to a threshold he identified as the percentage of non-white residents in a previously white neighborhood that would precipitate a “white flight,” a process that would switch the neighborhood to total occupation by non-whites (Grodzins 1957). A few years later Eleanor Wolf (1963) used the phrase “tipping point” to describe the same phenomenon, and economist Thomas Schelling (1978) applied it to his analysis of white flight, the dynamics of racial segregation, and other social phenomena.

In the case of white flight, Schelling argued that, once started, the process of tipping often appears to be accelerating and irreversible. In a more general sense, as Schelling points out, tipping refers to a process where something disturbs the original equilibrium. This “something” may not be “big” in any sense. It is sufficient to tip the system as long as it starts a chain reaction that moves the system further and further away from the original equilibrium situation. The idea of “tipping” explaining segregation is widely accepted in the academic literature and popular media. However, William Easterly recently used census data for metropolitan areas of the United States

from 1970 to 2000 to test the Schelling model and found there is more “white flight” out of neighborhoods with a high-initial share of whites than out of more racially mixed neighborhoods (Easterly 2009), meaning that the reasons for demographic change are far more complex than can be explained by the tipping points argument alone.

In recent years, the use of the term “tipping point” has refigured perceptions of climate change and influenced the media response to scientific reports of climate change and the public imagination concerning it. Although the idea of abrupt change in climate systems and ecosystems is not new, a growing body of scientific evidence points to ecosystems having multiple stable states that implies tipping points, meaning they undergo sudden changes in response to external factors. Scientists increasingly talk about non-linear dynamics and tipping points in nature. Lenton (2011), for example, has written that there are many components of the earth system that could display non-linear behavior and transitions, i.e., tipping points, under human climate forcing. Lenton and colleagues have recently introduced the term “tipping element” to describe the components of the earth system that can be switched—under particular conditions—into a qualitatively different state by small perturbations (Lenton et al. 2008). The term tipping point is then used to refer to the critical point at which such a transition is triggered. However, once we have reached these tipping points and crossed thresholds, it is suggested, we will have reached a point of no return and there will be tremendous social and economic consequences arising from these ecosystem transformations.

By way of example, in the Arctic it is now widely reported that sea ice is thinning, permafrost is melting, there are significant reductions in seasonal snow, glaciers are receding at a rapid rate, terrestrial and marine animals are being affected, and the cultures and livelihoods of northern residents are under threat (ACIA 2005). In western Alaska, several Iñupiat communities in low-lying coastal and island areas, including Shishmaref, Kivalina and Little Diomedé are experiencing severe problems due to coastal erosion and thawing of discontinuous permafrost, as well as the increased frequency and severity of storms (e.g., ACIA 2005, Fig. 1). In northern Greenland, unstable sea ice is beginning to make ice-edge hunting more difficult and dangerous. Hunters there report that travelling to the edge of the ice (*sinaaq*) makes them anxious in a way it has never done—they say it is “more slippery” (*quasarpoq*) than they have known it, and that they feel more secure using a dogsled on the solid ice that is attached to the shore (*qaanngoq*). Changes in snow cover are also causing difficulty in accessing hunting and fishing areas by dogsled or snowmobile, making local adjustments in winter travel, hunting practices, and fishing strategies necessary. In addition to local observations and experiences, worries

over the loss of polar bears and their habitat and talk of the last days of the Arctic hunter have captured public attention and provoked the alarm of conservationists and indigenous activists (Nuttall 2009, 2010). The Arctic, of course, is not alone in facing such dramatic change. Around the world, the local and regional consequences of ecosystem transformation arising from global climate change have profound and far-reaching implications for people and the environment. The Arctic, however, has become emblematic of severe and rapid change. Arctic ecosystems are, according to climate science (e.g., see Duarte and Wassmann 2011), characterized by the presence of multiple tipping elements that may lead to abrupt, catastrophic changes. Furthermore, the Arctic is significant because it contains some of the key tipping elements of the earth system and these, if set in motion, may generate far-reaching global changes.

THE SHIFTING GROUND OF CLIMATE SCIENCE

One distinguishing feature of climate change science, specifically when it feeds into assessments with the intention of providing scientific advice to decision makers, has been its careful use of a terminology of likelihood and probability. This goes hand-in-hand with the caveat that, while climate change is happening and is going to be more pronounced, there are elements of uncertainty about its extent and its impacts. Discussion of future events and conditions must take into account the likelihood that these events and conditions will occur and therefore a lexicon of terms is used in describing this likelihood. Yet scenarios, forecasts, and simulations do suggest that the future is partially knowable and that we can gaze into it, or at least gaze upon the representations of it, or imagine ourselves into it because the future is part of a temporally structured story about life on this planet that also involves a past and a present. Given that scenarios are forward looking, scientific predictions and projections of trends are actually based on the past, on what has been a trend in climate. The future is thus modeled on replicas of the past—replicas that nonetheless must convey some feeling of authenticity. Despite this, the future remains uncertain and open. Over the last 6 years or so, however, the tipping points discourse illustrates how there has been a significant transformation in the way climate change science has begun to talk about and represent the future. Uncertainty is giving way to strident statements of certainty and greater degrees of probability. Scenarios and forecasts, which are based on replicas of the past, are giving way to predictions and statements not about the future but about the very end and extinction of human life on this planet, often made with the weight of authority and scientific gravitas. The UK’s Astronomer

Fig. 1 Coastal erosion is threatening communities in several parts of the Arctic, such as in Tuktuyaaqtuq in Canada's Northwest Territories. Photo: Mark Nuttall

Royal Sir Martin Rees, for example, in his book *Our Final Hour* predicts that humankind will not exist beyond the end of this century, and in offering us this glimpse of the future and of our supposed fate his writing tends toward divination rather than scientific speculation. Yet, as Hulme (2008) points out, “humanity will retain its precarious and ambiguous relationships with climate, relationships which have a long history and unknown future. The prediction of future climates will remain tantalizingly out of our grasp, just as the prediction of the path of human cultural development will remain elusive”.

A “tipping point” suggests something transformative, disruptive, decentering, and fatalistic. In climate change science it seems to point to a revival of forms of climatic and environmental determinism used to describe human–environment relations that ignore human agency and the complexity of social life. Both the idea of abrupt climate change and the suggestion that we are approaching points of no return pose challenges to decision-making and also raise questions about what people believe about the

apparent stability of the world, prompting discussion, and raising fears of uncertainty, danger, risk, disasters, and catastrophe. Approaching a point of no return injects a sense of anxiety into much climate change discourse. If no one knows what it is going to be like beyond the tipping point, then how can we prepare for it? Indeed can we, as Lenton (2011) asks, anticipate tipping points? Žižek (2009) has written recently that one of the forms of apocalypticism today, namely secular ecologism, sees the approach of the catastrophic self-destruction of humanity. This is one aspect of the narrative of the tipping point; as we approach it nothing can be done, once past it, nothing can be done about it either. As such, it implies epistemological certainty.

One of the difficulties of the tipping points discourse in science that becomes apparent to social scientists is that social life and culture—indeed the entire human world—are reduced to positivistic models which explain social change and human behavior in terms of climatic determinism and climate forcing, thus ignoring the complexity

of social, and cultural processes. Lenton (2011), for example, has considered some events in Earth history that he argues indicate the existence of tipping elements and tipping points, such as the Great Oxidation (the first significant rise in atmospheric oxygen), snowball earth events around 700 million years ago, and Dansgaard–Oeschger events during the last ice age. Lenton also argues that where was a non-linear transition when much of the Sahara switched from being vegetated to the present desert around 5000 years ago. One of the consequences, he suggests, was to force people to settle around rivers and their deltas, ultimately giving rise to the first city states, the “hydraulic societies” in Egypt and Mesopotamia. Lenton argues that this may be the best historical example of a tipping point in human systems linked to a tipping point in the climate system.

My worry is that understanding social change and past events in the human world in terms of tipping points as Lenton suggests is far too simplistic. Archaeologist Hassan (2009) argues that we are far from certain of the probable impact of climate change on the trajectory of human history—our methodologies and interpretive strategies are limited. Hassan’s work, along with recent significant research in anthropology and historical ecology, elucidates the intractable and complex interrelationships between climate and human societies and makes a plea to overcome simplistic notions of determinism and indeterminacy. Case studies from North Africa and South West Asia do indeed show that climate change played a major role in the origins of agriculture and the emergence of state societies; however, the impact of any climate event depends on local ecological settings and the scale and complexity of local social and cultural settings. Furthermore, domestication and agriculture were multi-stage, long-term transformations. Despite Lenton’s suggestions that people were forced to settle around rivers and their deltas, abrupt climate events alone do not determine culture change or influence human movement around and across a landscape—one has to consider a number of possible social, cultural, political, economic, and environmental processes (the demise and eventual disappearance of the medieval Norse settlements in Greenland is one excellent Arctic/North Atlantic example of how we must consider the impacts of climate change with reference to regional and global economic and societal pressures (Fig. 2). If there is one thing that historical ecology teaches us it is that the world has been transformed by human action in a constant process of engagement between people and the environments they inhabit, forcing us to question the idea of the “natural world”. When people decide to change land use practices or modes of livelihood, or to move, these decisions are often made for social, cultural, political, and economic reasons, not just environmental ones. For example, people

may modify their environments for easier access to hunting grounds, to reclaim land for agricultural production, or to make an area better for pasture, but they may also do so in response to stable or even unstable climate. People attribute social, cultural, and economic value to their local environments, they make strategic choices and decisions about their environments, and they modify their environments.

Several fundamental questions confront any serious attempt at multidisciplinary research into tipping points. For example, is it feasible and indeed valid to apply the term to the physical world and the human world in the same way? Indeed, can we even talk about a social system in the same way that we talk of ecological systems? Many anthropologists would probably answer that we cannot. My point is that we need to be attentive to how we disentangle the various reasons for and effects of climate- and social-change. Climate change must be understood in broader context. For example, Arctic communities have long-experienced stress from a number of different forces, not just climate-related ones, that threaten to restrict local economic activities (for example, hunting, fishing, and herding) and precipitate social and economic transformation. The Arctic regions are tightly tied politically, economically, and socially to the national mainstream and are inextricably linked to the wider global economy. Rapid social, economic and demographic change, resource development, trade barriers, and animal-rights campaigns have all had their impacts on hunting, herding, fishing, and gathering activities. Climate change perhaps magnifies these issues, brings them into sharper focus and adds to them (Nuttall et al. 2005). Yet in science models and scientific research all of this is ignored—instead, climate change is said to be shaping and influencing human life in ways we have never imagined and anything extraordinary in the environment is explained as happening because of climate change (see Crate and Nuttall 2009, for a critique).

ANTICIPATING CHANGE AND THINKING ABOUT THE FUTURE

The future may not yet be here, but the ecological, social, political, and economic processes that will affect, influence, and shape it are underway. However, many anthropologists may argue that since the future cannot be experienced in terms of materiality, it is the “not yet” and thus not knowable. But whether anthropologists are concerned with evolution and innovation, or with social change, or with futures studies and anticipatory anthropology, or whether anthropologists look at new reproductive technologies, genetic testing, predictive medical knowledge, and the way that biotechnology is implicated in

Fig. 2 The demise and eventual disappearance of the medieval Norse settlements in Greenland is one excellent Arctic/North Atlantic example of how we must consider the impacts of climate change with reference to regional and global economic and societal pressures. Photo: Mark Nuttall

the future in the making, or whether they are concerned with anthropology and science fiction, or with apocalypticism or millenarianism, or the very category of human, the future is something that falls within the purview of our scholarly enterprise and its attempt to understand the human condition and the nature of human being; specifically, who and what we are, where we have come from, and where we are going, as well as the relationships we have with the environment and other animals.

In the course of their work on understanding society and human nature, anthropologists and sociologists show that much of everyday life is embedded and extended in time and that much of what people do and think about, and how they act and behave, is concerned with things in the near, short-, or long-term future. People are constantly projecting themselves into the future, and the future, as Wallman (1992) has written, is in some ways contemporary because action is taken in the present in the hope of realizing a future course of events. Much of what anthropologists are interested in, however, is concerned less with an ontology

of the future—in other words what it is and what it looks like—but with a concern for understanding how the future figures in people's lives and social relationships, as well as the kinds of social relations people have with the future.

In elaborating George Herbert Mead's phrase "the present is the locus of everyday life" to the present being "the locus of the human world", Richard Jenkins (2002) argues that the stabilization of the present in the everyday human world is important as a collective working time-space providing people with secure horizons within which they go about their daily lives. In Mead's theorizing, the past and the future are considered aspects of mind related to memory and anticipation; as such they are not the locus of everyday reality. Recent sociological and anthropological approaches to time and space, however, show us the multiple contexts, spatial dimensions, and temporalities in which people go about their daily lives. The future thus also becomes a locus of everyday life in terms of how people think of what lies beyond those secure horizons—we think about the future and imagine ourselves into it. But

when we talk about futures, we refer to a range of multiple possible situations not one single future fixed at a particular point in time. If we attempt, therefore, to peer into the future it must be from several vantage points. Therefore any attempt to examine the future, including speculation about tipping points, must be destined to acknowledge its own limits because how the future looks depends on where one is standing at the time.

Much of what anthropology sets out to do is about making sense of experience as well as seeking to understand the human world as a fundamentally social one that is comprised of different, yet intersecting temporal and spatial modalities. In preparing for the future, and whether we are approaching tipping points or not, I suggest that a focus on anticipation and anticipatory knowledge may help bring greater clarity to understanding how people think about the world around them and the changes they notice and are affected by, how they engage with the world and move around in it, how they think ahead and imagine the future, and how they create and enact change within a world that is also undergoing a constant process of remaking and reshaping. For example, local understandings of time and seasonality shape livelihoods in agricultural, pastoral, fishing, and hunting societies and a range of local predictive and forecasting activities are used. Local knowledge of weather and climate is often inscribed in community memory to inform the present and provide a way to think about the future. As Roncoli et al. have shown in Burkina Faso, for example, local forecasts use a combination of farmers' predictions about rainfall from extensive experience and observations of natural phenomena and the predictions of ritual specialists who use divinations, visions, and dreams. This is particularly crucial in a context where weather and climate variability involve balancing risk and uncertainty in one area with those of other areas (Roncoli et al. 2001).

While adaptation can be taken to be seen as being reactive in the way it is concerned with responses to climate change, sharpening the focus on anticipation allows us to see the importance of intentionality, action, agency, imagination, possibility, and choice, but at the same time allows us to recognize that anticipation is also about being doubtful, unsure, uncertain, fearful, and apprehensive. While the anthropology of anticipation is relevant for understanding processes of rapid change and for discussions about preparedness for change, little of it appears to enter into the discussion of climate change (despite the talk that abounds about anticipating, predicting, and being prepared for future climate change and its consequences). This is all the more curious since tipping point warnings about the regional and wider global implications of climate change suggest we should be concerned with and anxious and worried about the future. In local communities faced

with environmental change, anticipation may be a social and cultural prerequisite for thinking about adaptation to climate change and I have argued elsewhere that researchers may well need to be attentive to its social and cultural forms, as well as with its cognitive aspects, within the context of local settings (Nuttall 2010).

In my own work in Greenlandic hunting and fishing communities, for example, I have been interested in how anticipation is a fundamental part of daily life. Anticipation is about perceiving the world, relating to it, moving around in it, making sense of it, thinking about what to expect from it, and what possibilities exist that one can gain from. It could be argued that Inuit have not just adapted to the Arctic environment, they have anticipated the possibilities and conditions for successful engagement with it. As Greenlanders talk about it, anticipation is at once an envisioning of possibility, an expression of curiosity, a pursuit of the desirable, and an avoidance of the undesirable. In the course of my work in Greenland over the years, in small villages along the north, south and east coasts, as well as in larger towns, I have come to appreciate that people consider that seeing the world around them as one of constant motion and movement, of uncertainty, flux, and surprise, is a fundamental prerequisite for insuring daily survival, for negotiating and understanding the social world, and for planning for the future (Nuttall 2009, Fig. 3). Assuming that tipping points exist, it may be that they are part of the human world, something that people have always lived with. By way of example, the word *pinngortitaq* is often translated from Greenlandic to mean “nature” or “creation” (*pinngortitsisoq* means “creator”), but its literal meaning is “to come into being.” It derives from *pinngorpoq*, a process of “becoming,” and “coming into existence,” referring to the unfolding of possibilities and opportunities. The world is thus a work in progress—it moves and shifts and comes into existence at all times and in all places. The sea ice is in constant flux and glaciers recede to reveal hitherto hidden landscapes. Movement, motion, and fluidity are not only apparent in the environment, but in the flow and circulation of social life and in the endless formulations of kinship and social relationships (Nuttall 1992). The world is perceived as one of constant becoming, a world of renewal and beginnings; it is a world in which imagination and creativity are put into daily practice. Nothing can be expected, much can be anticipated, and surprise is one thing one can be certain of.

In an ever changing environment, a world of movement and surprise that challenges people and requires them to be attentive at all times, a prerequisite for survival is awareness and acknowledgement of the reality of this shifting world of turning points and re-emergence. If the ice does not form, it is not necessarily explained away as the result of climate change, it is sometimes attributed to what people

Fig. 3 Hunters in East Greenland, as elsewhere along the north, west and south coasts navigate their way through shifting environments. Anticipation is about perceiving the world, relating to it, moving around in it, and making sense of it. Hunters in Greenland do not just adapt to the Arctic environment, they anticipate the possibilities of successful engagement with it. Photo: Mark Nuttall

perceive as the sentience and fickleness of the ice. *Sila*, the weather, has its own moods and I have been concerned in recent research with how local perceptions, concerns, preparedness, and responses to changes in the environment are dependent on understanding the social and cultural context of anticipation, how people learn to anticipate, and the nature of that anticipation (Nuttall 2009, 2010). Essential to this understanding of a world of becoming and of movement is an acute awareness of absence, or of the possibility of absence—of the absence of people, of the thinning of sea ice intimating its future absence, and the absence of animals, or at least in a Greenlandic sense the absence of the essence of persons, animals, and aspects of the environment at a particular moment. Yet, along with

this awareness of the absence comes knowledge that things return. In a recent excellent collection of essays called *The Anthropology of Absence*, Frida Hastrup has written of post-tsunami recovery in a South Indian village, where the villagers affected by the disaster planned to incorporate the effects of the tsunami into their future lives. Hastrup was struck by the way the villagers paid complete attention to missing, damaged or incomplete objects and how this testifies to the process of dealing with both the presence of disaster in everyday life and with the attendant absence of certainty (Hastrup 2010).

Dupuy (2005) in writing on threats of social and environmental catastrophe, argues that we must move away from the historical notion of temporality and introduce a

new notion of time in which we understand the future as being causally produced by past actions, “while the way we act is determined by our anticipation of the future and our reaction to that anticipation” (Žižek 2009). Žižek (2009) has written that Dupuy argues that catastrophic events need to be inscribed in the future as destiny, but also as contingent accident. So, Dupuy suggests that an approach to ecological crisis is not to appraise realistically the possibilities of catastrophe but accept it as destiny. By perceiving something as our fate, by considering something as being unavoidable and projecting ourselves into it—accepting we are doomed, in a sense, we can then mobilize ourselves to take action to change destiny. However, this blurs a distinction between whether we are fated recipients or protagonists and agents of change—the locus of responsibility is thus altered as well.

As we ponder the possibility of a future world characterized by a series of looming tipping points, a consideration of anticipation, I suggest, could be helpful in shedding light on how people think about the world around them, how they think, orient themselves and live toward the future, and how they create and enact change within a world that is also undergoing a constant process of becoming and being remade. Anticipation helps to orient human action—and emphasizes that people make the future, at least the immediate future and their concerns about what that future may bring, relevant in the present—whereas it could be argued that adaptation is a reaction or response to change that contributes to influencing or constraining human activity. This reactive aspect of adaptation is fundamentally different from the predictive or proactive aspect of anticipation, by which people can take possible future events including catastrophic ones into consideration and act on that anticipatory knowledge. Focusing on this in local settings would give us a greater understanding of a diversity of approaches to precaution, preemption and preparedness. Given the challenges (as well as opportunities) that climate change brings to environment and society, understanding how anticipation is inherent in everyday life and implicit in social relations and cultural practices, and how aspects of those relations and practices can emerge from anticipation, is a way to understand successful local strategies of adaptation, the nature of resilience and how people prepare themselves for uncertain futures.

Acknowledgments My thanks go to the three anonymous referees who provided considered, positive and encouraging comments on the first draft of this article, as well as to members of the audience of the annual Canadian Anthropology Society (CASCA) conference, held at St. Thomas University in Fredericton, New Brunswick in May 2011, at which I tried out some ideas about anticipation initially hinted at during the annual Arctic Frontiers conference in Tromsø 4 months earlier. I also thank Paul Wassmann for his editorial comments and his commitment to multidisciplinary conversation and debate.

REFERENCES

- ACIA. 2005. *Arctic Climate Impact Assessment*. Cambridge: Cambridge University Press.
- Crate, S.A., and M. Nuttall (eds.). 2009. *Anthropology and climate change: from encounters to actions*. Walnut Creek: Left Coast Press.
- Brown, L.R. 2011. *World on the edge: how to prevent environmental and economic collapse*. New York: W.W. Norton and Company.
- Duarte, C.M., and P. Wassmann (eds.). 2011. *Arctic tipping points*. Bilabo: Fundación BBVA.
- Dupuy, J.-P. 2005. *Petite métaphysique des Tsunami*. Paris: Seuil.
- Easterly, W. 2009. Empirics of strategic interdependence: the case of the racial tipping point. *The B.E. Journal of Macroeconomics* 9(Contributions), Article 25. doi:10.2202/1935-1690.1492. <http://www.bepress.com/bejm/vol9/iss1/art25>.
- Gladwell, M. 2000. *The tipping point: how little things can make a big difference*. New York: Little Brown.
- Grodzins, M. 1957. Metropolitan segregation. *Scientific American* 197: 33–41.
- Hassan, F. 2009. Human agency, climate change, and culture: an archaeological perspective. In *Anthropology and climate change: from encounters to actions*, ed. S.A. Crate, and M. Nuttall. Walnut Creek: Left Coast Press.
- Hastrup, F. 2010. Materializations of disaster: recovering lost plots in a tsunami-affected village in South India. In *An Anthropology of Absence: materializations of transcendence and loss*, ed. Bille, M., Hastrup, F., and Sørensen, T.F. New York: Springer.
- Hulme, M. 2008. The conquering of climate: discourses of fear and their dissolution. *The Geographical Journal* 174: 5–16.
- Jenkins, R. 2002. *Foundations of sociology: towards a better understanding of the human world*. Basingstoke: Palgrave.
- Lenton, T. M. 2011. Tipping points in the earth system. <http://researchpages.net/esmg/people/tim-lenton/tipping-points/>. Retrieved January 2011.
- Lenton, T., M.H. Held, E. Kriegler, J.W. Hall, W. Lucht, S. Rahmstorf, and H.J. Schellnhuber. 2008. Tipping elements in the earth's climate system. *Proceedings of the National Academy of Sciences* 105: 1786–1793.
- Nuttall, M. 1992. *Arctic homeland: kinship, community and development in northwest Greenland*. Toronto: University of Toronto Press.
- Nuttall, M. 2009. Living in a world of movement: human resilience to environmental instability in Greenland. In *Anthropology and climate change: from encounters to actions*, ed. Crate, S.A. and Nuttall, M. Walnut Creek: Left Coast Press.
- Nuttall, M. 2010. Anticipation, climate change, and movement in Greenland *Etudes/Inuit/Studies* 34: 21–37.
- Nuttall, M., Berkes, F., Forbes, B., Kofinas, G., Vlassova, T., and Wenzel, G. 2005. Hunting, herding, fishing and gathering: indigenous peoples and renewable resource use in the Arctic. In *ACIA Arctic Climate Impact Assessment*. Cambridge: Cambridge University Press.
- Roncoli, C., K. Ingram, and P. Kirshen. 2001. The costs and risks of coping with drought: livelihood impacts and farmers' responses in Burkina Faso. *Climate Research* 19: 119–132.
- Russill, C. 2008. Tipping point forewarnings in climate change communication: some implications of an emerging trend. *Environmental Communication: A Journal of Nature and Culture* 2: 133–153.
- Schelling, T. 1978. *Micromotives and Macrobehavior*. New York: W. W. Norton & Company.
- Skrimshire, S. 2008. Approaching the tipping point climate risks, faith and political action. *European Journal of Science and Theology* 4: 9–22.
- Urry, J. 2011. *Climate Change and Society*. Cambridge: Polity Press.

- Wallerstein, I. 1976. *The modern world system: capitalist agriculture and the origins of the European world-economy in the sixteenth century*. New York: Academic Press.
- Wallman, S., ed. 1992. *Contemporary futures: perspectives from social anthropology*. London: Routledge.
- Wolf, E. 1963. The tipping-point in racially changing neighborhoods. *Journal of the American Institute of Planners* 29: 217–222.
- Žižek, S. 2009. *First as Tragedy, then as farce*. London: Verso.

Finland. He works on human-environment relations and the political ecology of the circumpolar North, with specific focus on Greenland, Canada and Finland.

Address: Department of Anthropology, University of Alberta, 13-15 HM Tory Building, Edmonton, AB T6H 2H4, Canada.
e-mail: mark.nuttall@ualberta.ca

AUTHOR BIOGRAPHY

Mark Nuttall (✉) is Professor and Henry Marshall Tory Chair of Anthropology at the University of Alberta, Canada and Finland Distinguished Professor at the Thule Institute, University of Oulu,