

What does economic anthropology have to contribute to studies of risk and resilience?*

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The 2016 annual meeting of the Society for Economic Anthropology, held in Athens, Georgia, brought together speakers and poster presenters around the theme of risk and resilience. In this introduction to the corresponding issue of Economic Anthropology, we briefly summarize the landscape of past approaches to risk and resilience to situate the nine papers in this issue. These papers represent three themes: (1) how persons and communities with limited means evaluate and cope with risk and seek resilience; (2) how persons and communities cope with governmental and organizational strategies to reduce public risks; and (3) shared, meaning-rich cultural understandings of the causes and consequences of risk. We conclude that anthropology offers fruitful avenues for future research because anthropological studies (1) take a critical (but not dismissive) view of Western cultural biases in risk and resilience research, (2) take seriously the perspectives of non-Western others, (3) are often multiscalar, and (4) bridge to new topics and perspectives.

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Risk and resilience are related concepts having to do with variability within economic, ecological, and social systems. Both topics have received ample scholarly attention. A topic search within Web of Knowledge finds 6,782,232 articles for risk and 110,192 articles for resilience.¹ There are numerous published reviews for both topics (Bernstein 1996; Bliege Bird 2015; Chibnik 2011, 60–89; Folke 2006; Kahneman and Tversky 2000; Lansing 2003; Miller et al. 2010; Nelson, Adger, and Brown 2007; Panter-Brick 2014; Pelling 2010; Redman 2005; Renn 1992; Rohrman and Renn 2000; Winterhalder, Lu, and Tucker 1999; Winterhalder 2007; Wu, Zhang, and Gonzalez 2007) as well as existing volumes about anthropological approaches to these topics (Cashdan 1990; de Garine and Harrison 1988; Faulseit 2015; Halstead and O’Shea 1989; *Annual Review of Anthropology* 43 [2014]). One may very well ask why there is so much to say about risk and resilience and, furthermore, what is left to say. We address these questions in this introduction to this special issue of *Economic Anthropology* containing research presented at the 2016 annual meeting of the Society for Economic Anthropology in Athens, Georgia, from April 14 to 16.

In brief, risk and resilience are significant topics because they apply to a wide range of situations, those characterized by variability, uncertainty, unpredictability, fluctuation, disturbance, disaster, danger, harm, misfortune, worry, anxiety, and fear. Variable and harmful situations are omnipresent in human experience and in the natural world, whether drought, flood, crop failure, poor fishing returns, low profit at the flea market, a bout of flu, or a poor exam grade. Much of the work of human societies is focused on controlling risk, through anticipation, preparation, and recovery strategies (Cashdan 1990; Halstead and O’Shea 1989). Much of human culture is dedicated to finding meaning in fluctuating fortunes, through traditional ecological knowledge, forecasting, rituals, and invocation of cosmological causes (Evans-Pritchard 1937; Frazer 1922; Malinowski [1948] 1992).

*This issue is dedicated to the memory of Ashley Block.

Because risk and resilience are large and inclusive topics, the terms are defined in multiple ways depending on the situations to which they are applied. We review definitions in detail subsequently. Succinctly, *risk* refers to variable processes or outcomes or to probable dangers or harms. Depending on the literature, risk may refer to predictable or unpredictable variation, and risk may be good (a chance to win a bonanza), bad (dangerous), ugly (dreadful or worrisome), or ambiguous (random). *Resilience* is the amount of change a system can undergo and still retain its function, structure, identity, and the ability to develop (Folke 2006; Nelson, Adger, and Brown 2007). It captures the notion of susceptibility or proximity to significant change. When used in relation to human and natural systems, the change it refers to is large: persistent change in cultural, social, or ecological characteristics and relationships and for which a return to a previous state is difficult or unlikely. When applied to communities or livelihoods, resilience is considered as a positive, desirable characteristic and references the ability of individuals and communities to weather insults and deprivations.

Both topics are older than their modern vocabularies. Peter Bernstein (1996) begins his history of theories of risk by describing games of chance in classical Egypt and Greece played with dice made from sheep phalanges. Modern probability theory is typically traced to the writings of Blaise Pascal in the seventeenth century. The contemporary concept of resilience emerged in the 1970s in ecology (Holling 1973) and anthropology (Vayda and McCay 1975) and has steadily increased in usage over the succeeding decades. Resilience is a recent conceptual and analytical approach to a question that has concerned economists and naturalists since at least the nineteenth century, whether we should expect equilibrium or disequilibrium in economies (Hunt 2002, 248–85) and ecologies (Darwin [1859] 1968).

The papers presented at the 2016 Society for Economic Anthropology annual meeting represented a variety of approaches and interpretations of risk and resilience. We have selected nine presentations to feature as full-length articles in this special issue. These nine articles represent three themes. The first is how persons and communities with limited means evaluate risk and strategize to reduce risk and seek resilience. In the second theme, large governmental and corporate organizations seek to minimize public risks. The articles explore how people cope with new landscapes of constraint and opportunity resulting from externally imposed risk mitigation programs. The final theme involves how cultures make meaning out of uncertainty, anxiety, and misfortune.

We begin with a brief review of major theories of risk and resilience and a discussion of how these theories informed the presentations at the 2016 annual meeting. Then we introduce the nine papers featured in this issue, organized by the three themes just described. We conclude by considering future research directions, addressing the question of what is left to say about risk and resilience.

A brief outline of theories of risk and resilience

Risk and probability

In a history of risk titled *Against the Gods*, economic historian Peter Bernstein (1996) tells the story of how European and Arab-world scholars invented modern mathematics as a way to evaluate and control risk, resulting in modern probability theory. This story begins with mathematician Blaise Pascal, who argued that a rational person should judge the value of a variable option, such as a lottery ticket or an agricultural crop, by considering the variance of outcomes (the risk) relative to its average value (the expected value), where expected value is equal to the sum of the probability-weighted stakes of each possible outcome. If two potential crops promise the same expected value but one has a higher variance than the other, the higher-variance crop has greater risk. This formalization of risk remains at the core of modern scientific models and risk-management applications within economics, epidemiology, operations research, engineering, and actuarial studies. It provides a yardstick by which to measure and compare the risks of disease outbreak, a bridge collapsing, a part wearing out before the end of a machine's use-life, or a demographic group living to the age of ninety.

Risk and choice

Daniel Bernoulli ([1738] 1954) argued that human decision makers do not base their choices strictly on variances and expected values. He argued that decision makers subjectively value risk according to the utility value of gains and losses, which is related to one's wealth status. A gain of one additional unit of wealth is a bigger deal for a poor person than a rich person, so a poor person should be more willing to gamble for such a gain. Economists Friedman and Savage (1948), Arrow (1971), and Pratt (1964) elaborated this concept by positing utility curves to describe a decision maker's "risk preferences" and thus why an individual might be more or less risk averse (or risk prone) in different circumstances.

But to apply probability theory to economic decisions, economists had to discriminate situations where outcomes are unknown because they are probabilistic from those that are unknown because of imperfect information. Economist Frank Knight (1921) referred to the former as risk and the latter as uncertainty. Anthropologist Michael Chibnik (2011) has charged that an unfortunate result of this distinction is that economists have primarily studied risk while neglecting uncertainty. Many real-life scenarios are best characterized as a mix of risk and uncertainty.

While economists popularized and extended Bernoulli's expected utility calculus to predict economic decisions, experimental psychologists found ample evidence that actual human beings consistently make choices that deviate from the predictions of formal theory. Human decision makers overestimate the frequency of rare or extreme outcomes, judge likelihood from small samples of observations, systematically ignore some relevant information, are swayed by how information is presented, and expect to see patterns in randomness (Kahneman and Tversky 2000; Soman 2007). These biases make humans naive statisticians, but they probably facilitate fast and effective decision making in most ecological circumstances. Human minds may function less like utility calculators and more like puzzle decryptors, simplifying cues and sorting options using heuristic algorithms (Gigerenzer and Selten 2001). Anthropologist Naomi Quinn (1978), for example, argues that fishermen in Ghana do not estimate utility functions but rely on a set of if-then rules to decide whether to transport and sell fish today versus smoke the fish to preserve them for future sale.

Risk minimization and mitigation

How individuals, households, and communities prepare for and cope with shortfalls and misfortunes is the topic of many anthropological studies of risk, including the chapters in three edited volumes: Cashdan's (1990) *Risk and Uncertainty in Tribal and Peasant Economies*, de Garine and Harrison's (1988) *Coping with Uncertainty in Food Supply*, and Halstead and O'Shea's (1989) *Bad Year Economics*. Many of these studies are reviewed in Winterhalder, Lu, and Tucker (1999, 326–30). Risk in these studies is not simply variability; rather, it is the likelihood of not producing sufficient resources to meet a household's needs, known as a "safety-first" concept of risk (Roy 1952).

There are several ways to reduce risk within the logic of safety-first (Winterhalder, Lu, and Tucker 1999, 331). One is to reduce variability in production (or when times are particularly rough, to increase variability with hopes of higher-than-average outcomes). Activity diversification averages production among multiple activities, just as generous exchange averages among producers, storage averages food supply across units of time, and mobility averages resources across units of space (Cashdan 1992; Tucker 2007; Winterhalder 1986). Farmers diversify crops and field locations (Goland 1993) just as herders diversify livestock breeds (Mace 1990), and many peoples practice a mix of farming, foraging, fishing, herding, and marketing activities (O'Shea 1989; Tucker 2007; Tucker et al. 2010). Hunter-gatherers and horticulturalists reduce risk by food sharing (Cashdan 1985; Hames 1990; Kaplan, Hill, and Hurtado 1990; Wiessner 1982) and exchange with neighbors (O'Shea 1989). Farmers rely on storage to carry them from one harvest season to the next, while herding is basically storage "on the hoof" (Colson 1979; Rowley-Conwy and Zvelebil 1989). Mobility strategies involve shifting people and livestock across heterogeneous landscapes of income-earning possibilities (Bernus 1988; Legge 1989).

The safety-first model also suggests that people may avoid underproduction by reducing their needs. Jongman and Dekker (1989) describe how the classical Roman and early modern Dutch states reduced risk of food insufficiency during famine by evicting politically marginal segments of their populations. One may also reduce risk by producing or acquiring more, through theft and raiding (Colson 1979), agricultural intensification (Garnsey and Morris 1989; Jongman and Dekker 1989), price fixing (Ortiz 1990), or conquest and colonialization (Garnsey and Morris 1989).

Resilience in human well-being

While the preceding literature describes how people seek to avoid risk, the literature on resilient well-being explores the capacity of individuals, households, and communities to anticipate and recover from trauma, shocks, disasters, and change. Scholars of international development and disasters examine the capacity of households and communities to recover from climate disasters, food insecurity, and poverty and consider policies and programs that may enhance probable resilience, or “adaptive capacity” (Carpenter et al. 2001; Davies et al. 2013; Field et al. 2012). Historians and cultural anthropologists have described cultural resilience, the ability for people to maintain their sense of identity and tradition in the face of rapid social changes (Couch 2016; Fixico 2013; Wanga-Odhiambo 2013). Scholars of mental health use the term *resilience* to refer to individuals’ psychosocial capacity to cope with life traumas associated with violence and poverty (Betancourt, Stichik, and Khan 2008; Wong 2008).

Risk and society (risk perception)

Risk assessment professionals using formal models based on expected value calculus often come to very different judgments of risk than does the public (Hansson 2005; Slovic 1987; Sjöberg 2002). Anthropologist Mary Douglas and economist Aaron Wildavsky (1982) argue that how a society evaluates risk depends on the society’s shared values and worldview. Psychologists have explored folk evaluations of risk by asking informants to list the things they worry about and then rank them by frequency and severity (Fischhoff, Slovic, and Lichtenstein 1982; Slovic 1987). In this literature, risk is defined as danger or harm, and “risks” are dangerous or harmful activities or forces, such as pollution, disease, crime, or skiing. Early studies conducted among subjects in the United States (Fischhoff, Slovic, and Lichtenstein 1982; Slovic 1987) found that people tend to underemphasize high-probability risks that are within their control, like skiing or swimming, while overemphasizing low-probability risks that are unknown (are novel or have unobservable effects, such as radiation) or dreadful (potentially catastrophic and nonvoluntary, such as accidents at nuclear power plants). Cross-national comparisons reveal that members of different nations evaluate risks somewhat differently depending on their shared values of equity, voluntariness, and social change (Rohrman and Renn 2000). Some recent studies have applied this method to explore how East African pastoralists evaluate the risks of animal disease, human disease, conflict, access to forage and water, crop failure, conflicts with conservation agendas, and so on (Baird, Leslie, and McCabe 2009; Smith, Barrett, and Box 2000).

Risk and culture

Human minds in their social contexts do more than just judge the value of potential gambles. Under conditions of risk and uncertainty, people search for meaning behind the deeper questions of why some people experience good outcomes while others experience bad outcomes.

Members of a culture may share idioms of causality by which they understand the workings of the world. Azande people of southern Sudan suspect that many misfortunes, from a broken pot to sick livestock, are caused by the jealous thoughts of secret witches (Evans-Pritchard 1937). Trobriand Islanders of Melanesia have rituals and magic associated with food-gaining activities, but they perform more magic to prepare for highly risky and dangerous activities, such as sailing and fishing in the open sea, and less magic when preparing for lower-risk activities, such as gardening or trap fishing in lagoons (Malinowski [1948] 1992). Azande know that broken pots are caused by impurities in clay and that livestock illness is caused by pathogens, just as Trobrianders know that poor fishing

returns are caused by bad winds and rough seas. Witchcraft and magic provide meaning-rich answers to ultimate questions of why a particular misfortune befalls a particular person at a moment in time.

Witchcraft and magic are neither primitive nor exotic. Geschiere (1997) documents the high prevalence of witchcraft explanations in urban Cameroon, at sites of uncertainty such as political campaigns and soccer matches. Magic is applied to risk among fishermen in New England (Poggie and Pollnac 1988) and Texas (Mullen 1969) and among U.S. athletes (Gmelch 1971) and test takers (Rudski and Edwards 2007).

Probability theory is itself a cultural model of causality. It works pretty well, assuming that the future resembles the past; but when it comes to ultimate-level questions, such as why a misfortune is happening to me, probability theory provides no better answer than “because of randomness.” Ulrich Beck (1992, 2006) and Anthony Giddens (1998, 25), among others, have argued that probability theory is among the tools of modernist culture by which governments and corporations make social and environmental risks legible and legitimate. Probability calculus masks sociopolitical causes and solutions of risks by highlighting technical solutions instead.

Resilience in socioecological systems

Resilience is intimately concerned with risk and uncertainty, factors that stimulate change and affect abilities to maintain structures and identities. The different ways in which people conceptualize, value, and incorporate risk into their lives and decision making influence resilience and, consequently, human well-being (Leslie and McCabe 2013). The contemporary construct of resilience, as applied to socioecological systems, emerged from empirical observations that questioned an assumption of stable, equilibrium systems (Holling 1973). This long-held assumption posited that ecological systems tend to be stable and that stability is undermined through human behavior. A resilience framework, however, begins with an understanding that systems fluctuate, that they are characterized by instability, and that humans are integral parts of the overall system (Gunderson and Holling 2002; Zimmerer 1994). Fluctuations and instabilities give rise to risks and uncertainties, and the ability of a society to manage these confers a measure of resilience at a given point in time.

All societies develop ways to manage risks and uncertainty. Turkana of Kenya, for example, regularly respond to high variability and uncertainty of natural resources and sociopolitical circumstances (McCabe 2004). They have diversified livestock holdings and move across the landscape in response to changes in forage availability and threats of conflict. Their resilience derives from the ability to manage these ecological and social risks that challenge their physical and cultural survival. Risk management is not the same as resilience, but rather, it contributes to a level of resilience. Changes internal to the system, such as reduced labor availability due to outmigration, and external changes, such as greater access to guns for neighboring populations, can limit the effectiveness of risk management and decrease overall resilience. Risk management itself can also undermine resilience by narrowly focusing on particular risks at the expense of others (Adger et al. 2011).

Early conceptualizations of socioecological resilience were correctly criticized for underemphasizing the fundamental differences between humans and other system elements (Cote and Nightingale 2012; Westley et al. 2010). By definition, social-ecological systems are arenas in which humans play a fundamental role and therefore underscore the importance of culture, power relations, knowledge, identity, and risk. Resilience is a framework for understanding a system state, but the practical value of the framework is in understanding a given state relative to other desired or undesired states. This normative element gives rise to concern with ways in which risks and other resilience-related narratives are framed and presented (Leach, Scoones, and Stirling 2010).

Risk and resilience at the 2016 SEA meeting

Many presentations combined the themes of risk minimization, risk perception, and resilience in well-being described earlier. A common motif was that differences in risk evaluations among stakeholders, including local

communities and organizations, often lead to misunderstanding and conflict. A second motif was that risks are often “double-edged” (Chibnik 1990, 2011), so that protecting oneself from one risk means exposing oneself to another.

Attendees to the 2016 meeting learned that Thai households cope with risk through migration (Gullette, Singto, and Thebpanya 2016); Archaic Period Native Americans through combining wild with domesticated resources (Hollenbach and Carmody 2016); Mongolian pastoralists by renegotiating land tenure (Murphy 2016); and small shop owners in Guinea-Bissau by exploiting social capital and cross-border ties and by keeping the business enterprises small (Lundy 2016). In Indian Kashmir, tourism-related shopkeepers balance financial risks against the risk of commoditizing and fetishizing their Kashmiri identity (Winterberg 2016). In Toronto, retailers of foreign handmade art at Ten Thousand Villages stores balance the risks of financial failure against the social and ethical risks of underpaying workers and producers while fetishizing commodities (Zwissler 2016). In Jamaica, male sex workers balance disease risk against financial risks within cultural gender norms of masculinity (L. Johnson 2016). In Nicaragua, trash pickers balance health risks against the financial gains of selling recyclables, as urban recycling programs reduce trash pickers’ incomes and diminish their health (Brahier 2016). In Sonora, Mexico, after Hurricane Odile flooded the Bacanuchi River with waste from the Buena Vista copper mine, farmers, government agents, and miners argued over risk and recompense, demonstrating different values for health, environment, and justice (Murphy et al. 2016). In Malawi, a choice experiment led farmers to realize that they play (and plant) to win individual rounds (to have large harvests each year) rather than to maximize average returns or net of costs (Lanning 2016). In the state of Georgia, farm-to-school programs make visible the messiness of agricultural production, paradoxically generating worries about food safety (Thompson, Brawner, and Kaila 2016).

Other presenters took a cultural approach, exploring how times of risk and uncertainty are associated with the creation of meaning and how this meaning allows people to gain a sense of control or to displace this control to external forces to relieve responsibility. Conference attendees learned that in Haiti, belief that some misfortunes are caused by “sent spirits” (dangerous spirits sent by jealous or angry neighbors) actually seems to reduce psychosocial symptoms of anxiety and bolster psychosocial resilience by displacing blame for misfortunes to others (Kaiser 2016). Families in the U.S. Midwest make sense of debts resulting from the 2008 housing and financial crisis through Christian-based financial planning courses that inspire feelings of personal control through financial literacy and faith in God (R. Johnson 2016). S. Hun Seog (2016) ascribed finance theories not to the purportedly rational epistemology of science but to culturally meaningful rituals that reinforce group solidarity, identity, and a culturally specific understanding of reality.

Conference presentations addressed resilience with system-level analyses and those that bridged household to system analytical scales. A common theme throughout the talks was how individuals or subpopulations, through purposeful adaptations, sets of cultural attributes, or unrelated behaviors, contributed to system-level resilience.

O’Leary (2016), for example, bridged system and community explorations of resilience to demonstrate that system-level resilience for water governance in Delhi is critically dependent on inclusive, local interpretations of risk and its mitigation. To understand the cognitive complexity associated with the changing identities of the sociohydrological system in Mexico City, Manuel-Navarette et al. (2016) analyzed the relationship between mental models and interpretations of risk to show how emergent narratives are reflected in identity. Based on participatory research in Tampa, Florida, Zarger et al. (2016) showed how climate scientists and community residents are beginning to recognize that climate change is fundamentally a social problem and that there is a need to develop tools to promote communication among a variety of stakeholders to support urban planning. Through an empirical analysis of livelihood changes in rural southern Mexico, Haenn et al. (2016) explored the ways in which livelihood networks both challenge and expand constructs of household resilience. Keegan (2016) presented examples from the Caribbean Island archeological record to explore how societies were able to increase sources of resilience in times of relative abundance. Finally, Hakansson (2016), through a political ecology lens, challenged attendees to reflect on not only what resilience thinking may illuminate but what it may conceal.

Articles in this issue

Theme 1: How persons and communities with limited means evaluate and cope with risk

The majority of the presentations combined the themes of risk minimization, risk perception, and resilience in well-being, as discussed in the previous section. We selected three case studies representing this theme for this special issue.

Jessica Chelekis describes how *caboclo* women in the Amazon who sell Avon and Natura beauty products balance financial risks against the social risks of not being sufficiently traditional (in gender roles) or sufficiently modern (successful at business). Profit margins are small and women risk not covering their costs, and risks are exacerbated by the unavailability of offering credit and the challenges of getting creditors to pay their debts. To minimize these risks, most women only do direct marketing if they have complementary sources of income. While husbands are generally supportive, women direct marketers risk appearing to neglect their traditional household duties. They also risk losing esteem if their entrepreneurial efforts fail. Chelekis argues that the reasons women do direct marketing are for the benefits of socially interacting with others, the prestige of handling foreign-made beauty products, and the feeling of freedom that comes from performing modern, urban, non-Caboclo roles.

Sarah Hitchner, John Schelhas, and J. Peter Brosius describe the case of a small town in rural southern Georgia for whom the promises of biofuel development led to hopes of a resilient future despite high risks and, ultimately, disappointment. Forestry is central to the cultural identity of Soperton, Georgia, nicknamed the “Million Pines City,” yet the collapse of traditional forest industries has led to high unemployment and outmigration. Two efforts to generate ethanol from pine trees brought dreams of a future of socioeconomic resilience with the production of sustainable energy. These dreams were pitted against a host of perceived risks, including pollution, industrial accidents, and corporate dishonesty. Financial risks ultimately contributed to the failure of the ethanol plants and the inability of the town to recover from previous shocks. The loss of Soperton’s Dairy Queen symbolized the town’s failed bid for resilience.

Alyson Young describes how mothers and public health professionals in rural Zambia navigate the risks of consuming peanuts that may be contaminated by *Aspergillus* fungi, which carry carcinogenic aflatoxins. Peanuts, traditionally considered women’s crops, supply much-needed dietary protein and fat but are also the most likely crop to be contaminated with aflatoxins. All of Young’s Zambian informants had attended public health awareness programs where they learned how health professionals evaluate the risks of aflatoxin exposure and potential mitigating strategies. They understood and retained this information. However, they discounted the risks of aflatoxins and frequently admitted to not following professionals’ advised risk-reducing strategies. Young argues that her informants do take aflatoxin risk seriously, but looming larger than this concern is the more pressing, daily risk of not meeting food needs.

Theme 2: How individuals and communities cope with governmental and market-based attempts to reduce public risks

This second theme differs from the first in that large organizations rather than persons and families are attempting to adapt to risk, leaving people to respond to new options. This theme combines elements of all the literature discussed earlier. Organizations work from formal models that often disagree with lay perceptions of risk in an attempt to generate systemic solutions to public health and environmental dangers. Probability theory makes organizations’ concepts of risk legible and authoritative, contrasted with people’s culturally meaningful risk experiences. We present three case studies on this theme.

Rebecca Adkins Fletcher explains how the Affordable Care Act (ACA), in seeking to reduce health risk in the United States, created a new landscape of options and risks for working-class families in southern Appalachia. From the perspective of the health insurance industry and the U.S. government, the choice to leave a job that offers health

insurance or to purchase insurance through the ACA involves trade-offs between financial and health risks. When workers fail to conform to the insurance industry's expectations, the insurance industry blames their apparently poor risk assessment on "fatalism." But actually, workers and their families perceive a broader landscape of risk trade-offs involving loyalties to family, coworkers, community, and cultural identity. Informants explained that they avoid sports and other healthy recreations that could cause costly injuries, consider divorce as a strategy to improve coverage, and stay loyal to otherwise unpleasant employers to avoid losing insurance. Whereas the insurance industry may see evidence of perverse incentives, from the perspectives of workers, such behaviors are risk-mitigating strategies.

Caela O'Connell and coauthors use the concept of risk to evaluate the potential outcomes of a water quality trading (WQT) program in North Carolina. WQT programs are increasingly used as a market-based mechanism for reducing water pollution and ensuring water quality. The programs are designed to provide the required incentives for farmers to participate in the program. Yet, these programs are not successful because of low levels of participation. The few program assessments that exist suggest that trading is a rational economic outcome and cite lack of trust and understanding of the program as the primary barriers to participation. Through the use of a risk perspective, the authors here argue that most farmers in the study rejected the WQT on the basis of potential economic risk versus economic or environmental risks. The study participants felt that risk and responsibility for future pollution were not addressed through the program. They expressed concerns about program feasibility. The results indicate that unless WQT programs consider the environmental and economic risk perceptions of the potential participants, the programs are unlikely to achieve widespread success.

Aneil Tripathy presents an analysis of the ways in which risk serves as a bridge between different economic and intellectual areas of expertise. In his analysis of climate finance, the concept of risk expands the boundaries of financial logic through encompassing forms of knowledge not previously analyzed by finance. Climate finance is a growing area that focuses on funding climate adaptation and mitigation activities. Within this area, green bonds serve as a mechanism to transfer investments into low-carbon infrastructure. Through market indices, long-term investments are translated into language that is readily legible to individuals in the world of finance. These must first include a translation of climate change and environmental uncertainty into scenarios with a calculable financial risk. These future risks motivate sustainable, green investments, which are included in the green bond market; however, market-driven policies favor singular measures of risk, which require new ways to manage the ambiguity and risk inherent in defining both future risk and what can be considered sustainable practices.

Theme 3: Risk and culture—making meaning out of uncertainty

In this issue, we present three articles on the theme of risk, culture, and meaning. Megan Steffen presents a case from Zhengzhou, China, where recent market crashes have created an atmosphere of great economic uncertainty within which would-be entrepreneurs make sense of their fortunes and failures through the construction of meaning-rich narratives about conformity, time, willfulness, laziness, and ambition. Steffen argues that metaphors such as schooling fish, looking at the sky, living in the present, frying, and being willful permit Chinese entrepreneurs to selectively ignore future risks over which they have little control and to focus instead on the control they have over the present.

John Millhauser describes how, in the market economy of the Aztecs at the dusk of their empire, Nahua farmers, traders, and craftsmen often buffered the risks of resource insufficiency by seeking loans from the wealthy. These loans carried the double-edged risk of potential failure to repay. In extreme cases, debtors could repay loans by selling themselves or family members into slavery. A critical reading of ethnohistorical sources leads Millhauser to the interpretation that within Nahua culture, debt was not viewed as a moral failure, even when it resulted in slavery, even though some economic behaviors that led to debt, such as gambling, were viewed as moral faults. Millhauser

then explains that many Nahua sacrifices were part of a negotiation of debt to other persons, rather than penance for unrepayable debts to the gods.

Peter Wogan brings us an account of a Mexican American shop owner in Oregon named Ranulfo who, upon contemplating whether to accept a bank loan to add a bakery to his grocery store, struggles to understand the significance of a particularly vivid dream. In the dream, Ranulfo and his family smuggle themselves from Mexico to the United States within a garbage truck. Ranulfo's interpretations of the dream reveal the anxieties that background the risky choice to accept the loan for the bakery addition: his marginality within the United States (despite being a U.S. citizen), his uncertainty about trading his cultural roots for mainstream financial success, and his quixotic efforts to keep his business physically and financially clean. Wogan emphasizes that Ranulfo's dream interpretation is not a mechanical application of formulaic traditional dream interpretation but represents a creative process that accompanies and assists Ranulfo's decision making under risk.

What is left to say about risk and resilience?

We live in a time of increasing popular awareness of global threats like climate change, overpopulation/overconsumption, nuclear annihilation, ideological intolerance, and loss of biological and cultural diversity. Perhaps this is why risk and resilience continue to be productive themes in the social, behavioral, and ecological sciences. Despite the promises of probability theory to understand and control risk, humanity continues to perceive and experience variability, uncertainty, disruption, and change.

We believe that the articles in this issue represent productive future directions in risk and resilience research because they combine theoretical approaches that were previously segregated by academic disciplines with an anthropological perspective. This distinctive perspective features the following elements:

1. a critical (but by no means dismissive) view of Western cultural bias in risk and resilience research
2. a multiscale approach to risk and resilience that pays attention to global trends, national policies, organizational cultures, regional norms and consensus, household experiences, and personal perspectives, often contrasting assumptions by stakeholders at different levels
3. an intimate and culturally deep perspective on how individuals and communities perceive and experience risk and generate meaning-rich explanations for changes and misfortunes
4. a bridging perspective on risk and resilience that not only connects social, behavioral, and ecological theories and data sets but also reaches outward to topics like identity, gender, ritual, cosmology, and mental and physical health

We hope that the articles presented here will inspire more anthropologists to study risk and resilience and contribute to a rich and growing intellectual heritage.

Note

- 1 Conducted on June 7, 2016.

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