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"Community Work" in a Climate of Adaptation: Responding to Change in Rural Alaska

Philip A. Loring[1] · **S. Craig Gerlach**[2] · **Henry J. Penn**[3]

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Abstract We draw on our research experiences with municipal workers in Alaska, where the impacts of climate change are already extensive, to examine adaptation and related concepts, such as resilience and vulnerability, which have become widely used in science and policy formulation for addressing climate change despite also being subject to multiple critiques. We use local people's experiences with environmental challenges to illustrate limitations of the climate change adaptation paradigm, and offer the additional concept of "community work" — analogous to niche construction — as a counterpart to the adaptive process at the community level. Whereas climate change adaptation insinuates active and purposive change, the reality we have repeatedly encountered is that people in these communities focus not on changing but on building and maintaining capacity and achieving stability: keeping aging and overtaxed infrastructure running while also working toward improving quality of life and services in their communities. We discuss how these findings are congruent with recent calls to better situate climate change adaptation policy in the context of community development, and argue that scientists and policymakers need to understand this context of community work to avoid the pitfalls that potentially accompany the adaptation paradigm.

✉ Philip A. Loring
phil.loring@usask.ca

[1] University of Saskatchewan, Saskatoon, SK, Canada

[2] Department of Anthropology and Archaeology, University of Calgary, Calgary, Canada

[3] Water and Environmental Research Center, University of Alaska Fairbanks, Fairbanks, AK, USA

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Introduction

> What we are doing out here, it's not adaptation. We are reacting, coping with the changes that we are seeing. It takes every resource we have to keep things running as they are and maybe make little improvements as we go. I am not thinking about what I need to do differently in the future. I am thinking about how to keep the animal control building funded so we do not have to put down all those dogs. I am thinking about how to keep my employees from quitting when they are sick of having to fix broken sewer pumps and getting people's shit all over them in the process.
> –Rural community manager

Climate change is just one of several environmental challenges affecting people worldwide (Parenti 2011; IPCC 2014), and many scientists and policymakers are working hard to support people and communities in coping with these challenges. Much of this work draws on concepts such as resilience, vulnerability, and adaptation (Moser 2009; IPCC 2014), science-based concepts that are regarded as useful for guiding the development and implementation of mitigating strategies (Walker and Salt 2006; Hinkel 2011). However, these concepts (adaptation in particular) have received multiple critiques with respect to their theoretical rigor, limits and inconsistencies in their definition and use, and their implications in practice for social and environmental justice (Hornborg 2009; Davidson

2010; Thornton and Manasfi 2010; Hinkel 2011; Haalboom and Natcher 2012; Bassett and Fogelman 2013; Loring 2013; Yanarella and Levine 2014).

Among these critiques is concern that approaches based on concepts of resilience and adaptation put too much emphasis on external factors and novel conditions, consequently misconstruing how communities change (Thornton and Manasfi 2010; Yanarella and Levine 2014). While the ability to absorb, be resilient, or otherwise respond effectively to unexpected change is essential to community sustainability, the manner in which people live and pursue goals when they are *not* confronted with change matters as much, if not more to a community's trajectory of development. Since the effectiveness of social programs for development depends largely on the extent to which the underlying theories of change reflect the realities of community functioning (Stein and Valters 2012; Valters 2014), and given also that poorly conceived development programs invariably cause more problems than they solve (Kottak 1990; Scott 1998; Checker 2007), these critiques should be seriously addressed.

In this context, we describe here ongoing research in Bristol Bay region of Alaska (Fig. 1), an area already experiencing myriad challenges associated with environmental and climatic change (Brubaker *et al.* 2014). People in these communities report their goal is stability more often than it is change, and they work daily and tirelessly to keep aging and overtaxed infrastructure running while at the same time taking all opportunities to improve local capacity, quality of life, and services. We call this "community work," a term we select for its parallels to anthropological notions of housework and kin work, and which we define as a hybrid of environmental management and community capacity management. The relationship of community work with adaptation in a formal sense can be compared to the concept of niche construction — a parallel process to adaptation through which organisms create, modify, and manage their environments (Laland *et al.* 1996; Odling-Smee *et al.* 1996). Community work in this sense captures individual agency and intentionality while also revealing change over time as the product of a push-and-pull between stability and change. We conclude with a discussion of community work's relevance to research and theory in human ecology and, in an applied context, to climate change policy and sustainable development.

Background: Adaptation and its Discontents

Over the decades, the concept of adaptation has been defined, debated, and re-defined to suit different academic disciplines and subjects of analysis, from the natural and biomedical to the social sciences (Darwin 1859; Mayr 1982; Bates 2004). As used in biology, adaptation generally has two related meanings: a description of traits or behaviors that persist through time because they have proven necessary or beneficial to an organism's fitness and survival (i.e., adaptations), and/or a description of the process by which those adaptations emerge (Mazess 1975). In the social sciences, the concept is similarly split; it is generally defined as the

Fig. 1 Map of Bristol Bay Communities

process by which people make behavioral adjustments that facilitate their reproductive success and therefore survival, but is also used encompass specific behaviors and cultural technologies. As with biological adaptations, behavioral and cultural adaptations are generally understood as somehow directed toward the environment. Netting (1993), for example, describes adaptations as specific strategies for coping with or managing environmental conditions. Bennett (1969), however, notes an important difference between adaptive *strategies*, which are devised by individuals to utilize resources and solve immediate problems, and adaptive *processes*, which produce 'patterned deviations' in society and culture over long periods of time (see also Thornton and Manasfi 2010). The former, Bennett clarifies, are not necessarily examples of or logically linked to the latter; and, as Bates (2004) and others have noted, the success or failure of adaptive strategies can only be observed retrospectively and over long timeframes.

Use of the adaptation concept in science is widespread, but scholars in both the biological and social sciences have noted important limits (not always heeded) to the explanatory usefulness of the concept. In evolutionary biology, Mayr (1983) and Gould and Lewontin (1979) critique what they called the "adaptationist program," wherein scientists indiscriminately apply the concept of adaptation to any and all observable traits, potentially allowing for misinterpretation of the existence of a trait as evidence for its adaptive significance. Mayr (1983) argued similarly against conflating the current advantages conferred by adaptations with their original causes (i.e., the teleological fallacy). In his words, "considering the strictly *a posteriori* nature of an adaptation, its potential for the future is completely irrelevant" (p. 324).

A perennial critique of the adaptation concept in the social sciences stems from concerns regarding environmental determinism (Friedman 1974; Netting 1986). While the 'adaptiveness' of people's behaviors and technologies has regularly been the focus of anthropological research (Rappaport 1968; Bennett 1969; Robson 1978), some social scientists have been circumspect in using the concept because of the implication that people's behaviors and strategies are determined or given meaning by environmental constraints (Friedman 1974). Rather, they favor probabilistic and, more recently, co-evolutionary approaches to human-environment interactions, wherein a combination of human ingenuity, values, and collective goals determines how people modify their behaviors and their environments to meet their needs and aspirations (Netting 1993; Bennett 1996; Smith 2011).

In a sense, the critiques of applications of the concept of adaptation from the natural and social sciences both stem from the same problem: faulty inferences regarding causation. In the former, the concern focuses on teleological arguments and the attribution of adaptive significance to traits where there may be none; in the latter, an overemphasis on the role of environmental factors in determining the emergence of human behavioral and cultural strategies.

Climate Change Adaptation

Unlike biological and behavioral adaptations, understood as involving a long-term process of change, in climate change literature adaptation usually describes any actions taken to plan for, cope with, or respond to the impacts of climatic or environmental change, regardless of their outcomes in the short or long term (Nelson *et al.* 2009). (Tracing climate change adaptation in its progression from these origins to its current uses is beyond the scope of this paper, but see Adger 2006; Smit and Wandel 2006; Gallopín 2006.) Adaptation has clearly come to dominate climate change discourse (Thornton and Manasfi 2010), though with a broader and more informal meaning and with a different temporal focus. That is, whereas biological and behavioral adaptations are observed *a posteriori*, climate change adaptation is an anticipatory concept geared toward planning and policy (Thornton and Manasfi 2010; e.g., Ford *et al.* 2010).

Thornton and Manasfi (2010) question whether this understanding of adaptation provides an accurate representation of how societies change and respond to change. They echo the deterministic critique of adaptation noted above, and argue that contemporary adaptation literature focuses too much on environmental and climatic change as a driver and too much on adaptation as a goal: "… [H]uman adaptation is not a single strategy but rather a set of diverse intersecting processes that may evolve autonomously or through planning in response to the panoply of climatic and non-climatic stressors" (p. 148). Climate change is no doubt an important component here, but it should not necessarily be conflated with people's goals when responding to change. Invoking an axiom from evolutionary biology known as Romer's Rule, Thornton and Manasfi discuss how long-term behavioral and societal changes tend to be the result of conservative actions taken for the purposes of maintaining an existing way of life rather than creating a new one (see also Simpson 1967).

A second critique of the climate change adaptation paradigm focuses on social and environmental justice concerns, specifically the socially-constructed nature of climate change and people's vulnerability to it (Haalboom and Natcher 2012; Bassett and Fogelman 2013). Hornborg (2009), Loring (2013), Neocleous (2013), and Yanarella and Levine (2014) all argue that too much focus in science and policy formulation on adaptation can allow for a political acquiescence to problems such as climate change and to the unjust impacts on poor regions of unsustainable consumptive behaviors in the developed and developing world more generally. It is clear that many impacts of changing climate are already happening and cannot be ignored, but these authors are concerned that a political emphasis on climate change adaptation can (further)

erode local capacity to address the fundamental economic and social inequalities that are the root causes of these problems (see also Parenti 2011).

Given these critiques, Thornton and Manasfi and others have also raised concerns that state-led initiatives for addressing climate change based on adaptation as it is currently conceived will fall into a common development planning trap: failure due to inadequate or inaccurate theoretical understanding of how lasting social change occurs (see also Nelson *et al.* 2009; Stein and Valters 2012). They argue that adaptation initiatives can focus too much on superficial assessments of local problems, resulting in 'tech fix' solutions that reflect the state's values for rural development but ultimately fail to address local needs, values, and aspirations (see also Kottak 1990; Scott 1998). Further, Thornton and Manasfi also raise a concern that top-down programs for climate change adaptation can overlook and even obscure "ongoing processes of autonomous adaptation at the local level" (p. 133). It is these ongoing processes that we seek to better illuminate here.

Background and Methods

In the following sections we explore the local context in which people experience and respond to climate induced environmental change, through our experiences working with people in remote rural communities of Bristol Bay, Alaska (Fig. 1). Bristol Bay is a coastal region in the southwest portion of the state, which includes the watersheds of the Nushugak, Kvichak, and Naknek Rivers. Dillingham is the largest community in the region (population ~ 2800), and it serves as a primary hub to the region's 34 other villages for provisioning (food, fuel, supplies), air travel, and healthcare services. Fisheries, in particular salmon fisheries, represent the major economic activity in Bristol Bay, to the order of 80 % of local revenues. Numerous large canneries operate in the region during the summer, causing a spike in local populations from seasonal fishers and cannery workers. Most of the salmon caught is for commercial use, although a significant subsistence catch is taken by individuals who fish from boats or simply place set-nets along the shore of the river. As with much of rural Alaska, federal transfer payments are important to local economies, and there is also a noteworthy tourism sector in the regional economy that includes adventure tours, hunting, and sport fishing.

As is the case for most of the residents of the high-latitude North, people in Bristol Bay are facing several climate change-related concerns. Warming and ocean acidification, for example, pose risks given the region's extensive reliance on fisheries (Mathis *et al.* 2014). Coastal erosion in communities on both the south and north shores of Bristol Bay is also a commonly identified problem with significant ramifications for community infrastructure. In some cases, coastal erosion is threatening water/wastewater infrastructure such as sewage mains, pumps, and lagoons, and in others, coastal inundation threatens freshwater supplies (Brubaker *et al.* 2014; Loring *et al.* 2015). The frequency and intensity of marine storms are also increasing, and bringing both heavy waves and water level surges that can worsen coastal erosion (Atkinson 2005; Atkinson *et al.* 2011). Further, changes in land cover are also occurring, including the expansion of shrubs in the tundra and a northward and westward drift of the Arctic tree line (Beck *et al.* 2011). Projections for the region include warmer temperatures and higher precipitation (SNAP 2014). though in concert with these land cover changes it is unclear whether overall wetter or drier conditions will prevail. In the case of the latter, community water sources may be threatened as they already are in other parts of the state.

Our research in Bristol Bay involved a mixed set of ethnographic methods including informal interviews, direct observation, and participant observation performed from 2010 to 2014 in 11 communities that range in population from 100 to over 2400. Each community has diverse assets and needs with respect to civic government and infrastructure (e.g., water and wastewater systems) (Loring *et al.* 2015).[1] All participants in this research quoted here are (or were) employees of local municipalities or non-profit organizations, working in positions such as city planner, city manager, and water plant operator, and were recruited purposively with the aid of city officials or similar representatives from regional tribal governments or consortia. The research is phenomenological, in that we recognize that the experiences of individuals, in this case municipal experts, can inform generalizable insights into the nature of climate change and climate change adaptation. Interviews were informal, guided only by general talking points about the challenges facing community infrastructure, management, and planning. Participant observation often took the form of community tours and afternoons spent shadowing or assisting participants as they attended to their daily responsibilities. Invariably, the first questions that we raise in these meetings relate to local needs, our goal being to adapt subsequent research activities accordingly (McGowan *et al.* 2014).

Discussion

Participants in this research identify a long list of issues that they are working to address every day, including environmental quality, food and water security, domestic abuse, alcoholism, and economic issues such as a lack of job opportunities and the price of food and fuel. This list is in line with other

[1] Note that in our discussion below we will not refer to specific communities by name for reasons of privacy.

studies and reviews of environmental and socioeconomic challenges in the North (e.g., ACIA 2005; Ford *et al.* 2006; Gerlach *et al.* 2011). Given that the majority of our interviewees' expertise is in municipal operations and planning, our conversations not surprisingly emphasized issues of land use, water resources, and the operations and maintenance (O&M) of sanitation and solid waste infrastructure. Among the specific issues described to us are (listed in no particular order):

- The need to relocate a failing sewage main from an eroding beach
- Municipal water and wastewater systems operating past end-of-life and/or over capacity due to community expansion and seasonal population influxes
- Insufficient budgets for community works and debates over the implementation of a new, region-wide "fishing tax" to pay for maintenance of the local port, roads, etc.
- Lack of data regarding regional hydrology for the purposes of siting new wells and planning community water systems
- Rural outmigration and its impact on employee retention in municipal jobs
- Employee training and certification
- Seasonal flooding of landfills and sewage lagoons and impacts on environmental health
- Toxic wastes disposal and recycling

This list provides a snapshot of the panoply of challenges facing rural communities in Bristol Bay and across the state. The list is not comprehensive, but in our experience it is representative of the wide range and diversity of issues that must invariably be fielded by one or perhaps two overburdened individuals (see also Lynch and Brunner 2007). While climate change has a hand in many of these issues, adaptation is rarely the goal that people have in mind when they are engaged in such tasks as repairing sewer pumps or working to start new waste backhauling programs. In fact, from the Yukon River communities where we have worked previously to the Bristol Bay region described here, we have heard it stated many times that "we do not need scientists to tell us the climate is changing, but right now that is the least of our problems."

Rather, we find that people are trying mainly to keep things running, and where and when possible, to make improvements for their communities. Further, obstacles created by the legacy of past decisions, usually made by outsiders implementing top-down rural development schemes, prove to be among the most ubiquitous challenges facing people in the region. In other words, people are regularly constrained from fully attending to goals such as community improvement because they are addressing more pressing issues that relate to maintaining the status quo. "I am always standing on my back foot," explained one city manager, "it's not that we do not have a plan, but that we do not ever have time to work toward it. It takes most of my day and all of my employees' time to keep that [water plant] running."

The city planner in one community explained, for example, that because it has a water treatment facility in operation, despite the fact that it is aging and already operating many years past its planned end-of-life, they are unlikely to receive financial support from the state of Alaska for new capital projects because there are many other rural communities who lack any form of water infrastructure at all. This is a compelling example of how the relationship between a community's assets and ability to respond challenges as they arise is quite nuanced: a multi-million dollar water treatment facility, which might appear to some outsiders to be a source of capacity for the community, is in practice a liability that keeps people from working on other issues of community improvement.

In another community, the water manager is trying to create better employment opportunities for his neighbors, with the ability to respond to environmental challenges such as climate change a subsidiary goal:

> I need skilled laborers to implement new projects or to fix thing when they fail. The thing is, people want long-term jobs, so I need to find a way to keep them in the village, instead of going to work on the [North] Slope or somewhere else because it has a regular check. We are trying to organize a home plumbing and handyman service for people here, and maybe that work will be enough to keep them around.

The city planner and city manager of yet another community related concerns regarding the sustainability of fresh water supplies that also speaks to the matter of how climate change, while a component, is not a driver of local initiatives. The "downtown" area of the community uses water from two groundwater wells, but the remaining two-thirds of the population rely on private wells. The community is growing, and the city planner has concerns about where private wells and septic systems are being located, particularly because of a lack of regulations regarding siting and because there are no available data regarding the hydrogeology of groundwater in the region. The community does not have the resources to complete a groundwater model on their own, so there are also no plans for where new wells might be located if the public wells dry up or become contaminated. Climate change is a factor here to be sure; as noted earlier there is uncertainty about how hydrology in Alaska will change as a result of warming, but that it will change is generally accepted. Currently, the city planner is trying to establish partnerships with researchers and agencies to improve their baseline data about local water resources.

In each of these examples, climatic and environmental changes play a role in local actions, but in none of these cases

would it be accurate or even informative to describe the work these people are doing as climate change adaptation. It is noteworthy too that in the three communities discussed above, none have a formal climate change adaptation plan, and none report having the resources or pressing interest to develop one. The largest community in the region does maintain a 'comprehensive plan': the first was written in the 1960s and it has received updates every 2–5 years since the 1980s. The most recent update to the plan was completed in 2010, and climate change is never mentioned in the document, though weather and shoreline erosion are mentioned once. By comparison, sustainability is mentioned 22 times in the document, with respect to such diverse topics as fisheries, tourism, energy costs, and public facilities. As the city water manager explained,

> I have a lot of things going on here, a lot of things on my to-do list. Climate change is not on there. Now, I am not denying it's happening. We see it here better than most people. We just do not want to be talking about climate change because we got a lot of other things to be working on. Let us talk about Pebble Mine. Let us talk about the pollock fishery crashing the Yukon [River] Kings. These are problems we need to solve.

Community Work as Niche Construction

These cases illustrate how local people are constantly working to maintain the quality of people's homes, lives, and lived environments, attending to various O&M needs and addressing short-term challenges such as infrastructure failures, while also seeking to develop and implement plans for improving quality of life in their communities. Netting (1993) describes this day-to-day milieu simply as environmental management, and the observation that is implicit in Netting's choice of terms is that the goal of this work is not systematic change but system maintenance and qualitative improvement of people's lived environment (Romer's Rule). As one city manager repeated several times,

> Amenities, amenities, it is all about the amenities for people, making this city a nicer place to live. We want to build a new ball park over there, and a sidewalk along the main drag that runs to the cannery so all the workers do not have to walk out on the busy road. I do not always have time to think about that stuff though, but it's the best part of the job.

Another City Planner Explained:

> Planning is not the right word for what I do, what this job is. It's like steering a boat, sometimes in dense fog and while manually pumping the bilge and manning the mess. You have got to make sure everyone's fed and you want the food to be good, too. But you also do not want to sink, or capsize, or run aground. And I think it's like this everywhere, not just Alaska, bigger cities just have more people to do the job.

We use the term "community work" for what these people do in order to highlight the service aspect of the work, i.e., individuals working for the collective good, and also because like housework and kin work (Di Leonardo 1987; Schenone 2003), the importance of community work is currently overshadowed by more societally-privileged activities — by the man's work in the case of housework and kin work, and in this case, by climate change adaptation.

We define community work as a process wherein people take actions and enact strategies to improve quality of life for the community as a whole. Community work blends environmental management as described by Netting, with the management of community capacity in its various forms. Consider as one informative example the case noted above of the city manager seeking to create part-time job opportunities in order to keep skilled individuals (human capital) from leaving.

As noted, we define community work here as analogous to the process of niche construction in evolutionary biology (Odling-Smee *et al.* 2003): a process through which organisms "define, partly create, and partly destroy their own niches" (Laland *et al.* 1996; Odling-Smee *et al.* 1996: 641). Niche construction is a compelling metaphor here because it avoids the 'causal arrow' implied by adaptation (Lewontin 2001) —that environmental factors determine the traits of organisms. Instead, niche construction involves a more interactive interplay among people and the environment, addressing the concerns noted earlier about environmental determinism.

Niche construction has a complex relationship with adaptation, and the same is true for our proposed concept of community work (Fig. 2). When organisms modify their surroundings, they change the selective processes that will operate on future generations. Those changes may or may not prove adaptive in the future; they may create a habitat in which the organism can better thrive or they may create new constraints and challenges. Rural Alaska has many examples of poorly conceived infrastructure and natural resource policies that were well-intentioned when implemented but have locked people in to positions of food, water, and energy insecurity (Eichelberger 2011; Loring *et al.* 2013).

As a theoretical framework for understanding how societies change, niche construction has already had some uptake in archaeology and in studies of human-environment co-evolution (e.g., Laland and O'Brien 2010; Rowley-Conwy and Layton 2011; Smith 2011; O'Brien and Laland 2012; Codding *et al.* 2014). As Laland and O'Brien (2010) note,

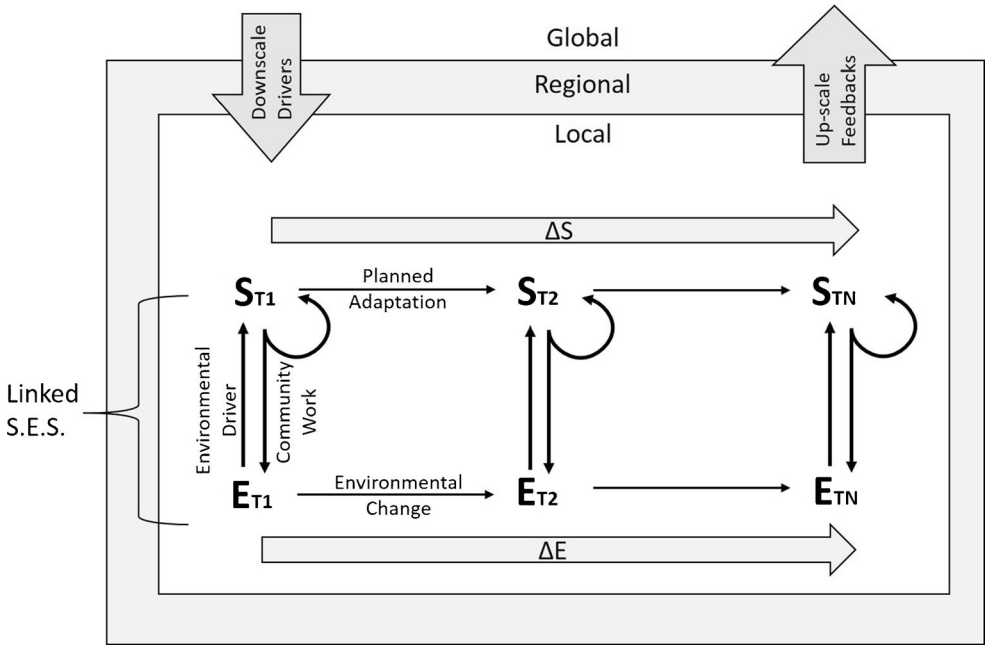

Fig. 2 Schematic of the relationships among community work and adaptation (adapted from Day et al. 2003). Environmental changes (ΔE) and social changes (ΔS) manifest over time as a result of these two interactive processes. Each point in time exhibits sociocultural and ecological legacies of past strategies and activities; over time, incremental changes made as a part of community work can lead to changes that, in hindsight, are understood as adaptive or maladaptive. Intentional, rapid and direct adaptation measures may also be necessary in response to external drivers, though the outcomes of these too will only be seen after the fact and over time. SES stands for social-ecological system

"[niche construction] encourages us to think beyond climate, instability, and external environment … and incorporate human activities as active variables" (p. 315). This is our goal for the concept of community work. People no doubt must often respond directly to environmental change and surprise, but they are also innovators and ecosystem engineers. The lesson that emerges from our fieldwork is that when people experiment and respond to change they tend to do so with conservative goals in mind, and within an inherited social and ecological niche that exhibits the built, social, and environmental legacies that can create vulnerabilities as well as constraints and opportunities (Laska and Morrow 2006; Eichelberger 2011).

The community work perspective, thus, turns focus to this interplay of historical legacies and people's short- and long-term strategies and how these develop into the long-term outcomes that we recognize as adaptation or maladaptation (Laland and O'Brien 2010). Likewise, it brings attention to the fact that human-driven processes of stability and change happen at multiple organizational levels.

Planning for Change

The community work/niche construction perspective supports provocative hypotheses about how short-term environmental management strategies and long-term adaptation processes are related:

- What are the tensions or synergies among specific strategies for achieving community stability and longer term adaptations?
- Can too many reactive responses to drivers such as rapid climate change entrench communities into maladaptive positions?
- What are the tensions or synergies among individual- and community-level strategies for stability and change?
- How diverse are people's responses to change and how does this response diversity impact community-wide outcomes?

We know, for example, that in some cases people make decisions that enhance their short-term security but create greater problems over the long term (Barnett and O'Neill 2010); the transition to living in fixed communities in rural Alaska has provided people with a number of modern amenities but it has also reduced their flexibility and mobility, resulting in issues of food and water security that are worsening as climate changes (Eichelberger 2011; Loring *et al.* 2011). With a better understanding of why people choose or are locked into making decisions that have long-term consequences, such maladaptive trade-offs might be better avoided through policies that focus on keeping people's options open.

An understanding of the dynamic among community work and adaptation is therefore essential for outside agencies and policymakers seeking ways to help communities plan

effectively for change. In part, this is because it mandates a different methodological approach for assessment and planning than typifies the climate change adaptation literature. Currently, quantitative indicator frameworks scoped around the concepts of vulnerability and adaptability are popular for forecasting societal impacts of climate change (e.g., Allison *et al.* 2009; Cinner *et al.* 2009; Mathis *et al.* 2014; Himes-Cornell and Kasperski 2015). These frameworks usually focus on some specific climate change-induced challenge, for example a decline in fisheries, and then model vulnerability and adaptability using mainly secondary sociological data and 'expert' opinions of what resources are most important for responding to that challenge. Because these indices are not always developed through a participatory process (Reed *et al.* 2006; Ray-Gadamus 2013) they often encode reductionist and in some cases paternalistic notions of people's abilities and what they need to respond—financial assets, for example, are regularly emphasized as important for responding to change, and average years of formal education per capita is often used as an indicator of a community's "capacity to learn" (Alessa *et al.* 2008; Cinner *et al.* 2009:7).

Yet, we know that different groups of people will solve environmental problems in diverse ways despite similar constraints and resources (Barth 1956; Leslie and McCabe 2013), what one community may solve with financial resources, another may solve through collective social action, and so forth. Likewise, people's vulnerabilities are also often an important source of strength when pressed (Brown 2012; McGreavy 2015); by conflating vulnerability with deficit and negative risk, however, these indices and the policies they inform may altogether miss the mark of identifying what kinds of support communities need the most.

This is not to say that such indicator frameworks are not useful, but that they are limited methodologically. It remains to be established in a rigorous way whether ability to respond to change can be meaningfully assessed with quantitative or categorical data. Also, to our knowledge very few of these indicator sets, which are effectively deterministic models of human behavior, have been tested for goodness-of-fit (Blount *et al.* 2015 is an important exception). Thus, putting too much stock in these indices would be dangerously close to committing what Friedman (1974) called "mechanical" or "vulgar" materialism[2] (p. 456) wherein people's behaviors and social forms are misunderstood as being mere epiphenomena of their resources and environments.

Participatory and ethnographic approaches and the perspectives offered by political ecology are therefore essential if policymakers want to understand community work and how people respond to climate change from within that context. Policymakers, in general, seek quantitative and standardized ways to measure, compare, and prioritize community needs (Scott 1998). which is likely why the indicator frameworks discussed above are so ubiquitous; yet, people simply do not experience the impacts of climate change in standardized or comparable ways— they respond to environmental changes within a complex sociopolitical and socioecological milieu that is shaped both by historical legacies and their visions for the future. Whether people are enabled to plan and experiment or are locked into a position of coping with crisis after crisis are fundamentally questions of power and authority as much as they are of the resources people have at their disposal (Loring *et al.* 2011). The goal, then, should be to find ways to pair these quantitative models with qualitative frameworks that can account for such issues as agency, power, and path-dependence. We have had some success with a such framework, based on ecosystem services and path dependence theory (Loring *et al.* 2008, 2011), the goal of which is to look at so-called "response space" and "response pathways" (Tompkins and Adger 2005), and diagnose policy-related limits and bottlenecks to community experimentation and innovation in the face of change.

Conclusion

Ultimately, scientists and policymakers who work in the area of climate change seek to provide a science-based framework for decision-making and development, and adaptation and its related concepts have proven effective as a shared language. Many researchers have highlighted the various caveats and pitfalls of this vocabulary however. As one way to address these issues, we offer community work as a concept that, when paired with adaptation, more accurately represents how people and societies experience and respond to change than does the concept of adaptation alone. Community work avoids the implications of environmental determinism and victimization that presently muddle the discussion and contribute little to our understanding of how local people and communities cope with local problems, which is often from the bottom up and too often with limited human and financial capital. With a more robust theoretical understanding of human behavior that incorporates people's values and intentions for both stability and change, venues for supporting communities that do not fall into the developer's trap or issues of social justice noted above become possible. It has been argued that the best first step for addressing climate change impacts on communities is to fix existing problems that have ready solutions, such as food and water security and failing infrastructure (Gerlach *et al.* 2011). The perspective argued here requires only that policymakers reorient their attention toward these community goals, helping people to solve existing and

[2] Note that Friedman's critique was unfairly levelled at early ecological anthropologists (e.g., Harris, Rappaport), some of whose research was mischaracterized and misunderstood (Rappaport 1977). nevertheless, the critique is relevant if these indices are taken as ultimate mechanistic formulations of human behavior.

future problems on their own terms and regardless of whether these initiatives map in clear-cut ways to state prescribed and sanctioned modes of development.

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