

A Community Resilience Model for Understanding and Assessing the Sustainability of Forest-Dependent Communities

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Abstract

Recent decades have seen an evolution in thinking on the sustainability of forest-dependent communities from community stability to community resilience, which seeks to enhance communities' ability to respond to drivers of change in ways that sustain the multiple dimensions of well-being. However, the process of community response to drivers of change is not well understood and methods for assessing community resilience are not fully developed. This paper proposes a theoretical model to understand the structures and processes influencing the adaptation of communities and households to drivers of change and which can serve as a guide to the development of indicators for assessing resilience across multiple scales. The model synthesizes the interactional community theory from rural sociology and the theory of resilience in social-ecological systems from the field of applied ecology. The implications of the model for theory and methods are discussed.

Keywords: *Capabilities; Capital assets; Community capacity; Community resilience; Sustainable forestry*

Introduction

The concept of sustainable forest management has evolved over recent decades, referring to the goal of managing forest resources to meet society's present and future needs, without impairing ecosystem function (Wang, 2004). Central to definitions of sustainable forestry is the maintenance of both ecosystem health and human well-being (Colfer et al., 2001; Charnley, 2006). But principles of sustainability have been present in the field of forestry for more than two hundred years (Wiersum, 1995). What fundamentally differentiates current approaches to sustainability from those of yesteryears is growing understanding of the dynamics of coupled human-environment interactions.

For almost a century resource management approaches were influenced by the balance of nature paradigm that assumed that "undisturbed nature is ordered and harmonious

and that ecological systems return to a previous equilibrium after disturbances" (Wu & Loucks, 1995: 439). However, these stability assumptions have been critiqued as flawed and hence, responsible for various resource management challenges that pose a threat to sustainable development (Holling, 2000). Since the 1970s, there has been a shift from the equilibrium assumptions of the balance of nature paradigm towards the adoption of non-equilibrium theory in what Scoones (1999) refers to as the "new ecology" (p. 481). Key components of this shift include adoption of a complex systems view of the world, integration of humans in nature, and recognition of cross-scale interactions among various levels of social and ecological systems (Berkes, 2004; Folke, 2007).

These paradigm shifts are now receiving recognition in many spheres of resource management and studies on resource-dependent communities. In North America for instance, ideas on the sustainability of forest-dependent communities have evolved from community stability to community adaptive capacity and community resilience (Nadeau et al., 1999; Beckley et al., 2002; Charnley et al., 2008). Although there is lack of consensus among researchers on the conceptual relationships between community capacity and community resilience, both concepts represent a broader conceptualization of community well-being, as well as recognition that forest-dependent communities are complex and dynamic entities that are constantly exposed to social and ecological forces of change to which they must adapt in order to be sustainable (Donoghue & Sturtevant, 2007).

However, the relevance of these new perspectives on community sustainability to scientists and policy makers is being hindered by theoretical and methodological weaknesses. A widely recognized problem in the literature on community resilience and adaptation in general is the lack of theoretical understanding on how communities adapt to various drivers of change (Beckley et al., 2002; Beckley et al., 2008). In the literature on forest-dependent communities for instance, there is inadequate understanding of how forest-dependent communities respond to and are impacted by forest policies (Donoghue & Sturtevant, 2007). Another related problem is the lack of robust measurement instruments for

assessing community resilience (Parkins et al., 2004; Cutter et al., 2008; Magis, 2010). There is a need for the development and operationalization of conceptual frameworks that provide insights into the dynamics of community resilience, as well as provide the theoretical foundation for the development of resilience assessment indicators.

This manuscript seeks to build on existing work on forest-dependent community sustainability by proposing a general theoretical model for understanding the structures and processes influencing the responses of communities and households to social and ecological drivers of change, as well as the outcomes of the adaptation process. The model is also intended to guide the choice of indicators and methods for assessing community resilience. The first section draws largely from sociological work on forest-dependent communities in the North American context to critically analyze the evolving concepts that have been used to describe and promote the sustainability of forest-dependent communities, such as community stability, community capacity, and community resilience. Well-being, defined as “the experience of good quality of life” (Chambers, 1997: 1744), although not explicitly discussed here, is a central focus of these evolving concepts. The second section draws on the interactional community theory from the field of rural sociology and the theory of resilience in social-ecological systems from the field of applied ecology to propose a synthesized theoretical model of community resilience. The theory of resilience in social-ecological systems is presented to clarify the conceptual relationship between community capacity and community resilience and also to explain the structural sources of community resilience, while the interactional community theory is used to explain the social processes that account for the differential responses to drivers of change within and across communities in the adaptation process. The third section discusses the theoretical and methodological implications of the model. Conclusions are then drawn in the final section of the paper.

Evolving concepts of forest-dependent community sustainability

Community Stability

The concept of community stability originated from Germany in the 18th century as a policy for the development of isolated timber-dependent communities (Waggener, 1977). It was borrowed and applied in the U.S. upon the inception of modern forestry and has since been an implicit goal in major policies, from the Organic Act of 1897 to the Northwest Forest Plan of 1994. Community stability was strongly tied to policies of sustained yield forestry — a forest policy that also originated in Germany (Lee, 1990). Both presumed that a predictable supply of timber would enhance community well-

being (Schallau, 1989). An alternative perspective conceptualized community stability in broader and more dynamic terms (Kaufman & Kaufman, 1946). Nevertheless, the application of community stability in forest policy has always reflected notions of constancy in income, employment, price and output of wood and other economic measures (Machlis & Force, 1990).

Over the years, research has revealed several flaws associated with the community stability approach to rural development. First, it presented a static approach to community sustainability, insofar as it sought to control internal and external forces of change to maintain timber production and timber-related jobs in forest-dependent communities (Beckley et al., 2002). Second, the community stability concept demonstrated a limited understanding of the complexity of human interaction with forests beyond narrow economic terms (Lee & Field, 2005). Finally the underlying economic assumption that a sustained yield of timber leads to the stabilization of local and regional economies has also been challenged (Power, 2006). These criticisms paved the way for the alternative approaches of community resilience and community capacity in the 1990s.

Community Resilience and Community Capacity

Machlis & Force (1990) suggested resilience as a more appropriate concept to replace the notion of stability in the study of forest-dependent communities, because the former recognizes the ability to cope with change. Community resiliency, alongside the concept of community capacity, gained popularity in the literature on forest-dependent communities in North America following three large scale ecosystem assessment projects undertaken in the U.S. in the early 1990s.

Community capacity has been defined as “the collective ability of residents in a community to respond (the communal response) to external and internal stresses; to create and take advantage of opportunities; and to meet the needs of residents, diversely defined” (Kusel, 1996: 369). This definition recognizes that forest-dependent communities are exposed to various forms of forces of change to which they must respond (Beckley et al., 2002). Significant research efforts have gone into identifying the sources of community capacity and how these can be measured. Community capacity has been associated with various forms of capital, namely social capital, economic capital, physical capital, human capital, and natural capital (Wall & Marzall, 2006; Parkins & MacKendrick, 2007). These capitals constitute the resources that communities need to mobilize within existing institutional relations in responding to various drivers of change (Beckley et al., 2008).

In one of the early works on resilience in forest-dependent communities, Harris et al. (1998) defined community re-

silience as “a town’s ability to manage change and adapt to it in positive, constructive ways” (p. 13). The authors identified factors influencing community resilience to include population size, community leadership, infrastructure base, community autonomy and economic diversity. Magis (2010) recently defined community resilience as “the existence, development, and engagement of community resources by community members to thrive in an environment characterized by change, uncertainty, unpredictability, and surprise” (p. 401). She identified the resources required for community resilience to comprise the various types of capital assets, such as social capital, economic capital and natural capital.

Thus, at the level of measurement, there appears to be minor differences between community resilience and community capacity since both concepts can be measured by capital assets (Donoghue et al., 2007). Community resilience and community capacity address the shortfalls of the community stability concept in fundamental ways. First, both deal with communities’ ability to adapt deliberately to change (Donoghue & Haynes, 2002), thus recognizing the agency of forest-dependent communities. Second, both concepts offer a multi-dimensional and integrated conception of well-being to encompass economic and non-economic measures (Haynes, 2003) as represented by the various capital assets. Third, the new concepts also reflect an enhanced understanding of the complex and dynamic relationships between rural communities and the forests that surround them (Daniels, 2004).

The applications of these concepts have, however, been critiqued. First, while there appears to be consensus on the sources and measures of community resilience and community capacity, there has been no generally accepted explanation of the conceptual relationships between these two concepts. As such, they are used differently by different authors. For instance, Paveglio et al. (2009) assert that “While resilience often focuses on returning a community to some original state following a disturbance, adaptation focuses on moving a community on to something new” (p. 1086). A contrasting position is offered by Magis (2010: 408) that “while community capacity can be developed for virtually anything, including stasis in the face of change, CR [community resilience] specifically exists within and because of change.” Such inconsistency in the literature on forest-dependent communities creates confusion and impedes the accumulation of knowledge on community sustainability. Hence, there is the need for further refinement of the theoretical relationships between the two concepts.

Second, existing work on community resilience has been critiqued for failing to establish a theoretical understanding of linkages between community resilience and drivers of change, such as change in forest policy (McLain et al. 2008). While considerable research effort has gone into identifying

the sources of community capacity and community resilience, not much is known about the process through which these resources are differentially mobilized within and across communities in the adaptation process. Donoghue & Sturtevant (2007) made a useful distinction between mobilizing assets that represent community interaction processes, and foundational assets that are mobilized in community responses to change. However, their analysis on these interaction processes did not go far enough. Thus, there is the need for theoretical models that offer a better understanding of the social processes that account for how communities act.

Third, an implicit assumption in discussions on community resilience and community capacity is that community response to change occurs primarily through community collective action (Magis, 2010). Thus, the existing literature appears to have been influenced by the popular notion of community as a homogeneous group of people with shared norms and interests within a bounded geographic area. As such, the implication of social diversity for community response to change events has not received serious theoretical consideration. As Paveglio et al. (2009) noted, understanding social diversity within and among communities is important for understanding how they can adapt to various drivers of change, as well as the differential outcomes within a community.

This review of the literature on forest-dependent communities in the North American context has demonstrated an evolution in thinking from community stability to community resilience and community capacity, reflecting broader paradigm shifts about human-environment interactions and a more dynamic and holistic understanding of the well-being and sustainability of forest-dependent communities. The review has shown that capital assets are widely used as measures of the capacity and resilience of communities to sustain their well-being in the face of surprise. Thus, community resilience and community capacity have been treated as more or less the same at the level of measurement. However, more work appears necessary in establishing the theoretical relationship between the community capacity and community resilience concepts and in understanding the structures and processes influencing community response to change. These issues are addressed next.

Foundations of a proposed theoretical model of community resilience

A model is useful in research to the extent that it presents key constructs and variables, as well as the relationships among them, in a way that simplifies the study of a complex phenomenon (Shoemaker et al., 2004). Given the flaws identified in current approaches to the study of the resilience of forest-dependent communities, this paper proposes a theoret-

ical model intended to serve as a heuristic tool for the study of community resilience and adaptation. The model presented here is informed by the interactional community theory (Kaufman, 1959; Wilkinson, 1991) and the theory of resilience in social-ecological systems (Holling, 1973; Folke, 2006). Together, these two theories provide structural and process components that offer a fuller explanation of community resilience and adaptation processes. Below, these theoretical components are presented, followed by an overview of the model.

Social-Ecological Resilience

Resilience theory (Holling, 1973) offers an alternative approach to sustainability that is informed by a complex adaptive systems view of the interactions between social and ecological systems. Complex adaptive systems exhibit characteristics such as non-linearity, emergence, scale-sensitivity, and surprise (Berkes, 2004). Although there are various types of resilience, this proposed model is concerned with social-ecological resilience because it adopts the view of forest communities as complex social-ecological systems (Ostrom, 2009) whose human communities and economies are deeply interconnected with the surrounding forest ecosystem in a co-evolving fashion. According to Folke et al. (2002: 438),

“Resilience, for social-ecological systems, is related to (i) the magnitude of shock that the system can absorb and remain within a given state, (ii) the degree to which the system is capable of self-organization, and (iii) the degree to which the system can build capacity for learning and adaptation.”

These dimensions indicate that social-ecological resilience entails a balance between change and stability in an on-going process of learning and responding to various social and ecological drivers of change. According to Adger et al. (2005), the resilience perspective is fundamentally different from traditional approaches to sustainability because it seeks to build the adaptive capacity of social-ecological systems to respond to future surprises, whereas traditional approaches have sought control over systems assumed to be stable. The resilience framework assumes that change will always occur, but the drivers of change are not necessarily predictable (Nelson et al., 2007).

It is important to distinguish between the process and outcomes of resilience. The process of responding to drivers of change can be grouped into three categories or strategies: coping mechanisms, adaptability, and transformability. Coping mechanisms are typically short term or emergency responses taken by people to address situations that threaten their livelihoods (Berkes & Jolly, 2001). In the face of a driver of change, coping mechanisms are critical because they

can either lead to adaptive capacity or to a state of vulnerability (Adger, 2000). For example, in their study of the Inuvialuit people in western Canada, Berkes & Jolly (2001) found that coping with the impact of climate change included adjusting when, how, and where subsistence activities, such as fishing and hunting, were done.

Adaptability or adaptive capacity refers to the means by which individuals, households and communities renegotiate local institutions and modify their production practices so as to sustain their livelihoods (Berkes & Jolly, 2001). The difference between adaptability and coping is that coping is short term, whereas adaptability is oriented towards the long-term (Smith & Wandal, 2006). Coping and adaptability may overlap across temporal scales such that coping could develop into adaptability over time (Berkes & Jolly, 2001). Examples of adaptability that Berkes & Jolly (2001) found among the Inuvialuit people were flexibility in the use of local resources, application of local environmental knowledge and skills, sharing through social networks, and intercommunity trade. The use of community capacity in the literature on forest-dependence is conceptually the same as adaptability or adaptive capacity (Parkins & MacKendrick, 2007).

The third type of social-ecological response to change is transformability. This refers to the capacity of the system to create a fundamentally new system or untried beginnings when ecological, economic, or social conditions make the existing system untenable (Walker et al., 2004; Folke, 2006). It depicts the ability of the social-ecological system to re-organize and transition into a more desirable state by taking advantage of opportunities created by the existence of crises. Transformability is fundamentally different from coping and adaptability to the extent that transformability results in a different social-ecological system altogether, whereas coping and adaptability are incremental responses that occur within the existing social-ecological regime. Folke et al. (2002: 438) contend that “when massive transformation is inevitable, resilient systems contain the components needed for renewal and reorganization.” For instance the transition of the economy of northern Arizona from an agrarian economy to a tourism-based economy has been cited as an example of system transformation (Nelson et al., 2007).

This discussion on the broader meaning of social-ecological resilience offers promise for reconciling the on-going community resilience versus community capacity debate in the literature on forest-dependent communities. From the social-ecological resilience perspective, community resilience could serve as the general framework for pursuing the sustainability of forest-dependent communities in unpredictable futures, while community coping, adaptability and transformability are specific variants of community resilience. Coping and adaptability are geared toward stability through

the ability to absorb shocks, whereas transformability is geared toward change.

With regard to outcomes, resilience is a value-neutral concept (Fernandez-Gimenez et al., 2008). Thus, coping, adaptability and transformability can lead to either desirable or undesirable outcomes. Assessing the resilience of a system, therefore, requires specification of desirable system attributes (Carpenter et al., 2001). Although what constitutes desirable system attributes is subjective and context-dependent, the concept of well-being or quality of life is increasingly used in the assessment of resilience (Marschke & Berkes, 2006). While several measures of well-being abound, the use of the capital assets framework to represent these desirable system attributes is widespread (DFID, 1999; Plummer & Armitage, 2007; Resilience Alliance, 2007). Thus, from the sustainability perspective, the outcomes of community resilience can be operationalized as change in well-being within a defined spatial and temporal scale in response to some driver(s) of change. In the proposed model, resilience outcomes are described using the terms adaptation and maladaptation (Bennett, 1976, 2006) to depict positive and negative outcomes respectively.

The process and outcomes of resilience are influenced by community structural characteristics. The availability of resources and networks of relevant institutions, have been established as critical factors influencing communities' ability to respond to drivers of change and to achieve desirable outcomes (Tompkins & Adger, 2004; Nelson et al., 2007). The logic is that communities that have higher stocks of capital assets and institutions are able to absorb larger amounts of disturbances while maintaining their existing condition. Such communities also have the capacity to transformation into an alternative state when the existing situation becomes undesirable. As such, they have higher capacities to cope, adapt and transform.

While capital assets are critical to community resilience, their mobilization requires the availability of appropriate institutions (Tompkins & Adger, 2004). Institutions comprise the formal and informal constraints that mediate human interactions with one another (North, 1990). Institutions also play a critical role in mediating the cross-scale interactions between social and ecological systems (Folke et al., 2007). Flexible, multilevel institutional mechanisms that comprise a diversity of institutions across multiple scales are increasingly being shown as vital to the resilience of communities because they offer opportunities for information sharing and learning, resource mobilization, as well as dynamic responses to unpredictable futures (Berkes & Jolly 2001; Berkes, 2008).

Despite attention to resilience in recent years, specific issues require more attention. First, resilience theorists tend

to focus more on structural dimensions of the community, such as the interplay between resources and institutions that account for resilience. However, the social processes that account for the adaptation process are much less understood. Second, resilience theorists have predominantly focused on coarse scales, such as regional social-ecological systems. As a result, human-environment interactions occurring at fine scales, such as the individual, household and community levels have received little attention (Asah, 2008). Thus, a deeper understanding of how adaptation occurs at fine scales, such as the individual and household levels is critical for enhancing community resilience (Coulthard, 2008). To fill these gaps, the interactional community theory is discussed next to explain the social processes.

The Interactional Community Theory

The concept of community is one of the most difficult sociological ideas to define (Bender, 1978). Common meanings revealed in definitions of the community include the view of the community as a relatively small place, community as a local society, and community as collective action (Lee & Field, 2005). Luloff (1990) classified studies on the community into four: the social systems approach (Warren, 1978), the ecological approach (Hawley, 1950), the typological approach (Toennies, 1957), and the interactional approach (Kaufman, 1959; Wilkinson, 1991). Given the focus of this paper on the dynamics of community resilience, the interactional conception is the most useful for understanding how communities act or respond to drivers of change. Kaufman's (1959) outline of the interactional community was intended for the analysis of community dynamics. Its starting point is that communities are constantly acting to solve various community problems, and that such actions are almost always change-oriented as opposed to maintaining the status quo. The focus of the interactional community theorist is the dynamic social processes through which people who share common geographic space come together to address their common concerns (Flint et al., 2010). A central component of the interactional community theory is the notion of the interactional arena or field. According to Kaufman (1959), fields or arenas for social interaction representing the various interests within the local society serve as the medium through which individuals and groups mobilize resources and act to address their needs. While there are several fields of social interaction within the community, a central concern of interactional theorists is the analysis of the community field. The community field is the arena for social interaction that is oriented towards the needs or general interests of the larger community rather than the attainment of special interest (Wilkinson, 1991).

It is also important to note that the community field is not a given, but emerges from the interactions of interests

where conditions are right (Flint & Luloff, 2007). Bridger & Luloff (1999) have noted that the emergence of the community field is often constrained by barriers to social interaction such as race, ethnicity and gender. Thus, the interactional community theory does not assume that communities always act through collective action (Flint & Luloff, 2005). Outcomes of the interactional process also are not deterministically given. Community change may partly result from community actions, but Wilkinson (1991: 85) also cautions that “chance and natural evolution must be recognized as powerful forces in community change.” This reflects notions of surprise and unpredictability that are also characteristic of the community resilience and adaptation process.

The interactional approach seems appropriate for the analysis of community resilience because it deals with community dynamics, as opposed to viewing the community as a fixed and stable entity. Also, as opposed to the dominant view that community resilience occurs primarily through community collective action (Kusel, 1996; Magis, 2010), the interactional community theory allows for a reconceptualization of the community resilience process as a phenomenon that has room for both community collective action, as well as autonomous actions as the level of individuals, households and groups.

The theory has already received widespread application in studies on community response to change events, especially in the area of risk and disaster research (Flint & Haynes, 2006; Flint & Luloff, 2007). However, with the exception of a few studies (Brennan, 2008), the interactional community theory has not yet received much attention in work on community resilience. Unlike risk and disaster research that posits drivers of change as threats to community well-being (Flint & Luloff, 2005), the resilience perspective allows for an investigation of the broad range of opportunities and threats that various drivers of change present to different segments of the local society.

However, there is a key shortfall in the way the interactional community theory is currently presented. While interactional theorists recognize that the structure of community resources and institutions, as well as other external factors, could enable or constrain opportunities for social interaction within communities, their focus is primarily on the interaction among individuals in the community that lead to community action to address common concerns. As a consequence, the interactional community theory, in its current form, offers only a partial explanation of the dynamics of change and stability that is entailed in community resilience and adaptation. Consequently, Wilkinson (1991) called for greater attention to the structural issues influencing the community rather than focusing solely on interaction processes among community members. A synthesis of the interactional

community theory with the theory of social-ecological resilience provides a more holistic understanding of the interactions between the structural aspects of the community and community socio-cultural attributes that account for differential access to resources and institutions, as well as diversity in responses to drivers of change within and across communities.

Overview of the community resilience model

In the community resilience model (CRM), the forest-dependent community is depicted as a system that is itself nested within larger systems and it is constantly influenced by multiple internal and external drivers of change (Beckley, 1998; Force et al., 2000; Colfer, 2005). In Figure 1, these drivers of change are represented by culture, politics and policy, demography, economics, technology, as well as natural ecosystem dynamics (Tuler et al., 2008), as contained in the box labeled “external drivers.” These drivers of change vary in terms of their frequency, duration, intensity, magnitude and other characteristics (Cutter et al., 2008), and their impacts within and across communities vary both positively and negatively. Also, changes in the community may impact the external drivers of change. These cross-scale interactions are represented by the two arrows connecting the community sub-system with the external drivers.

From the interactional community theory, the community can be seen as comprising groups of individual households with similarities as well as differences in characteristics such as interests, social status, ethnicity, occupation age, and gender (Kaufman, 1959; Bridger & Luloff, 1999). Communities

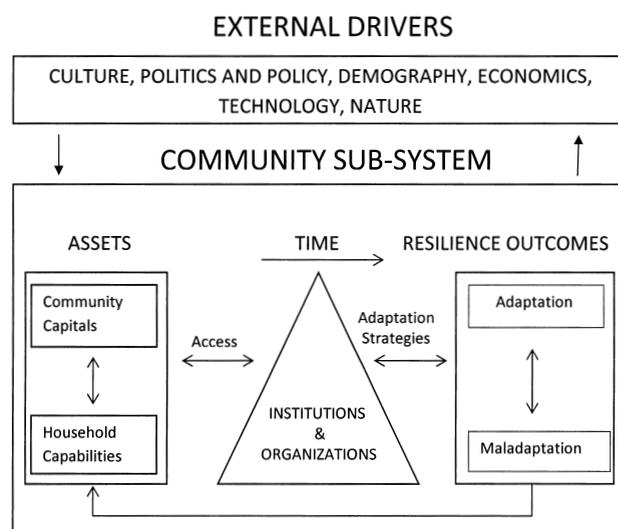


Figure 1. The community resilience model

are endowed with a set of resources that constitute community capitals, as represented in the box labeled “assets” in the model. Community capitals (social capital, natural capital, economic capital, physical capital, and human capital) represent the multiple dimensions of community well-being, as well as the capacity to respond to change events (Bebbington, 1999; Donoghue & Sturtevant, 2007). Natural capital refers to the resources in the biophysical system that provides goods and services to support livelihoods (DFID, 1999). As such, natural capital is critical to rural community sustainability. The metrics used for assessing natural capital comprise both the stock of resources, as well as access to those resources. Human Capital comprises the skills, knowledge, health and other attributes that enable individuals and households to make informed decisions and engage in productive activities that enhance their well-being. As such, it is a measure of human agency (Sen, 1997). Social Capital refers to the norms, as well as those networks of trust and reciprocity that promote co-operative behavior among individuals and groups (Fukuyama, 2001; Beckley et al., 2008). Social capital represents the quality of social relations, and high social capital is critical to communities’ ability to engage in collective action in response to drivers of change. Physical capital comprises all forms of infrastructure that support the well-being of people. It is a function of access to services, such as water and sanitation, effective transportation systems, education, health, and housing. Economic capital refers to opportunities for income and employment, as well as other sources of livelihoods that contribute to the well-being of communities and their households. It comprises financial assets, as well as other factors that enhance economic development (Wall & Marzall, 2006). Together, these assets serve as the means, as well as the ends of communities’ social interaction processes. The differential levels of endowment of these resources across different communities imply that communities may be differentially impacted by similar drivers of change. For instance, in their evaluation of the Northwest Forest Plan that was implemented in the Pacific Northwest US in the early 1990s, Charnley et al. (2008) found that while measures of socio-economic well-being had improved in some communities, some communities had experienced a decline in well-being while others were relatively stable. The authors concluded that “forest management policy affects different communities differently, depending on their individual characteristics and circumstances” (p. 758). While the stock of these capital assets is an important indicator of the resilience of the community as a whole, it does not offer adequate insights into the dynamics of resilience at the level of individuals and households within communities.

At the household level, “household capabilities” is used in this model to represent the distribution of capital assets

within the community. Sen (1997) defines capability as “the ability of human beings to lead lives they have reason to value and to enhance the substantive choices they have” (p. 1959). The capability construct offers a broader conceptualization of well-being beyond the use of narrow economic measures and other material concerns (Alkire & Black, 1997). Apart from its relevance in discussions on well-being, the capability construct has also been posited as a key ingredient in the analysis of social change (Sen 1997). The capability construct was used by Kusel (1996) as a measure of the well-being and capacity of forest-dependent communities to adapt to change, although he chose to focus his analysis at the community level to the neglect of the household or individual level.

Based on previous works (Bebbington, 1999; Leach et al., 1999), a key construct in understanding the interactions between community capitals and household capabilities is “access” as depicted in the model. Ribot and Peluso (2003) conceptualize access as a process through which actors are able to gain, maintain, and control resources from which they derive benefits. At any given time, the pattern of access in a community may be explained as the outcome of a dynamic process of interaction among a broad range of factors occurring across multiple spatial and temporal scales that enable or constrain people’s ability to benefit from resources. These factors include individual or household level socio-demographic characteristics, such as wealth, status and membership in social groups (Berry, 1989), community level relationships, as well as institutional arrangements within and outside the community (Bebbington, 1999). The unequal power relationships associated with these historical interaction processes engender uneven distribution of resources, and hence, differentiated capabilities among actors within communities. This discussion shows that the stock of community capitals is only one of several factors that influence household level capabilities, and that a focus on access as a function of social and institutional interaction processes within and outside the community might offer better insights on the varying abilities of individuals and households adapt to change.

Beside the resources, institutions and organizations are also critical to how communities respond to drivers of change. Institutions are the system of rules that shape social interaction, whereas organizations are “groups of individuals bound by some common purpose to achieve objectives” (North, 1990: 5). A community’s network of institutions and organizations may exist in different types, such as market-based, community-based, or centralized institutions, and they may occur at multiple levels of scale with vertical and horizontal linkages among them occurring within and outside the community (Dietz et al., 2003; Akamani & Wilson, 2011). Access to institutions or individuals in positions of authority

may consequently enhance access to information and other critical resources (Ribot & Peluso, 2003). Hence, access to organizations that are specialized in dealing with a particular driver of change and the initial resources available to the actor are critical for designing response strategies to deal with that driver of change (Bebbington, 1999). The network of institutions and organizations is represented by a triangle in the model.

Individual households and communities that are exposed to a particular driver of change may respond in various ways, such as coping, adaptability and transformability. These responses are represented by “adaptation strategies” in the model. The process by which communities cope, adapt and transform may take various forms ranging from community collective action to autonomous responses by individuals and households and is a function of the resources, institutions and organizations, and the nature of the drivers of change. Resourceful members of the community who are affiliated with different organizations and who are impacted by a particular driver of change may be driven by their private interests to come together to address their common concerns (Summers, 1986). Interest in these joint responses may initially be based largely on actors’ perceptions of the costs and benefits of their actions (Ostrom, 2009). But once this field, comprised of self-interested actors, is mobilized, interactional community theory suggests that subsequent actions may be based less on self-interest, because repeated interactions among members of the field may give rise to the emergence of a sense of community (Wilkinson, 1991) that engenders cooperative behavior in the collective interest. It must be added that the emergence of this sense of community is not guaranteed, as it is based in part on the availability of avenues for communication and interaction among community members (Brennan, 2008). Even when the conditions for the emergence of collective action exist, not all drivers of change will require collective responses at the community level. Collective responses are more likely when the magnitude of the driver of change is high and pervasive, thus surpassing the capacity of individuals to cope, adapt or transform through autonomous responses.

Given that the essence of the resilience and adaptation process at the community and household levels is to address emergent problems so as to sustain or enhance well-being the outcome of the process can be measured in terms of adaptation or maladaptation (Bennett, 1976, 2006). Adaptation represents an increase or maintenance of well-being, measured by change in household capabilities or community capital assets over time. Maladaptation, on the other hand, depicts a decline in those capabilities and capital assets over a given temporal scale. These outcomes are not static, as communities and households may be fluctuating between adaptation

and maladaptation over time. These outcomes are represented in the box labeled “resilience outcomes.”

The arrow leading from “resilience outcomes” to “assets” shows that outcomes of the resilience process serve as the conditions that influence community and household responses to future drivers of change. Thus, the community resilience process, as well as its outcomes, follows a path-dependent trajectory (Berkes, 2007) whereby present and future community responses and their outcomes are conditioned by the historical context of that community and its households.

Implications of the community resilience model

The proposed community resilience model presented here could be of potential utility in addressing a number of theoretical and methodological challenges in the study of forest-dependent communities in particular, and resource-dependent communities in general.

Theoretically, the model could serve as a useful tool for studying how various factors interact across multiple scales to influence the process and outcomes of responses to drivers of change within and across communities. While past research on the resilience of forest-dependent communities has focused mainly on collective action at the community level as the mode of community response to change, this model has shown that the process of community response to change is a multi-level phenomenon that occurs not only through collective action at the community level but also through autonomous responses at lower levels, such as individuals, households and groups. Such an approach broadens the scope of studies on community resilience from a focus on the structure of community capitals and institutions to include the processes by which these resources are differentially mobilized within communities in the resilience and adaptation process. This view of the resilience process is consistent with recent calls for consideration of both individual and collective agency in the study of community resilience (Davidson, 2010).

Methodologically, the model could serve as the conceptual basis for the development and testing of measurement instruments for assessing the resilience of forest-dependent communities. Guidelines in the development of psychometric scales (DeVellis, 1991) suggest a number of steps. The first step is to conduct a comprehensive review of the literature to select indicators that are relevant to the context of the research and consistent with the constructs in the proposed model, such as community capitals and household capabilities. The second step is to design and administer questionnaires to a representative sample of respondents based on the selected indicators. The third step is to analyze the validity

and reliability of the selected indicators using factor analysis and multiple regression analysis among other statistical techniques. Using these guidelines, the model was operationalized in developing a valid and reliable scale for assessing the resilience of households in forest-dependent communities in Ghana (Akamani, 2011).

Closely related to the point above, the model could also serve as a guide in evaluating the impact of forest policies on the sustainability of forest-dependent communities. For instance, in the study conducted by Akamani (2011), indicators derived from the model were used in quantitatively assessing and comparing the conditions of households before and after the implementation of Ghana's collaborative forest management program to determine the magnitude and direction of changes in the various capital assets during the implementation of the program. Community level patterns of change in capitals were also analyzed using qualitative methods.

Finally, the model tentatively suggests three policy guidelines on building the resilience of resource-dependent communities. First, policies should provide support and incentives for improving the various capital assets in communities. Second, policies should ensure equity in the distribution and access to community resources. Third, inclusive community decision processes and institutions with links to relevant external institutions should be promoted. In the end, a resilient community is one whose members have both the capability to act on their own and the opportunity to participate in inclusive institutional mechanisms within and outside the community that aim at securing the common interest.

Conclusion

This paper sought to develop a conceptual model that would address theoretical and methodological challenges in the literature on forest-dependent community sustainability. Based on a critique of the existing literature, the interactional community theory was integrated with the theory of social-ecological resilience to produce a theoretical model on the structures and processes influencing community response to drivers of change, as well as their outcomes. Through the integration of ideas from different disciplinary perspectives, it is hoped that studies and policies on community resilience can be better informed. Although the model was developed largely through a review of the literature on forest-dependent communities, it is potentially useful for studying the resilience of communities and regions to diverse sources of social and ecological drivers of change, such as the implementation of forest policy or the impacts of climate change. Richer insights on resilience may emerge if the model is operationalized using multiple methods across multiple scales to understand how the processes outlined in the model at the

community and household levels manifest at different levels of scale, such as the regional scale. Challenges are to be expected in the process of gathering and analyzing data to make sense of this complexity. Perhaps, the use of interdisciplinary research teams, as well as focusing on specific components of the model within well-defined spatial and temporal scales may help overcome these challenges.

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Endnote

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References

- Adger, N. W. (2000). Social and ecological resilience: Are they related? *Progress in Human Geography*, 24(3), 347-364.
- Adger, N. W., Hughes, T. P., Folke, C., Carpenter, S. R., & Rockstrom, J. (2005). Social-ecological resilience to coastal disasters. *Science*, 309, 1036-1039.
- Akamani, K. (2011). *Community resilience to drivers of change: An analysis of community and household participation in the collaborative forest management program of Ghana*. Ph.D. dissertation, University of Idaho.
- Akamani, K., & Wilson, I. P. (2011). Toward the adaptive governance of transboundary water resources. *Conservation Letters*, 4(6), 409-416.
- Alkire, S., & Black, R. (1997). A practical reasoning theory of development ethics: Furthering the capabilities approach. *Journal of International Development*, 9(2), 263-279.
- Asah, S. T. (2008). Empirical social-ecological system analysis: From theoretical framework to latent variable structural equation model. *Environmental Management*, 42, 1077-1090.
- Bebbington, A. (1999). Capitals and capabilities: A framework for analyzing peasant viability, rural livelihoods and poverty. *World Development*, 27(12), 2021-2044.
- Beckley, T. M. (1998). The nestedness of forest dependence. *Society and Natural Resources*, 11(1), 101-120.
- Beckley, T. M., Martz, D., Nadeau, S., Wall, E., & Reimer, B. (2008). Multiple capacities, multiple outcomes: Delving deeper into the meaning of community capacity. *Journal of Rural and Community Development*, 3(3), 56-75.
- Beckley, T. M., Parkins, J. R., & Stedman, R. C. (2002). Indicators of forest-dependent community sustainability: The evolution of research. *The Forestry Chronicle*, 78(5), 626-636.
- Bender, T. (1978). *Community and social change in America*. New Brunswick, NJ: Rutgers University Press.
- Bennett, W. J. (1976). *The ecological transition: Cultural anthropology and human adaptation*. New York: Pergamon Press Inc.

- Bennett, W. J. (2006). *The ecological transition: Cultural anthropology and human adaptation* (Second ed.). New Brunswick, NJ: Aldine Transaction.
- Berkes, F. (2004). Rethinking community-based conservation. *Conservation Biology*, 18(3), 621-630.
- Berkes, F. (2007). Community-based conservation in a globalized world. *PNAS*, 104(39), 15188-15193.
- Berkes, F. (2008). Commons in a multi-level world. *International Journal of the Commons*, 2(1), 1-6.
- Berkes, F., & Jolly, D. (2001). Adapting to climate change: Social-ecological resilience in a Canadian western Arctic community. *Conservation Ecology*, 5(2), 18 (online). <http://www.consecol.org/vol5/iss1/art18>.
- Berry, S. (1989). Social institutions and access to resources. *Journal of the International African Institute*, 59(1), 41-55.
- Brennan, A. M. (2008). Conceptualizing resiliency: An interactional perspective for community and youth development. *Child Care in Practice*, 14(1), 55-64.
- Bridger, J. C., & Luloff, A. E. (1999). Toward an interactional approach to sustainable community development. *Journal of Rural Studies*, 15, 377-387.
- Carpenter, S. R., Walker, B. H., Anderies, J. M., & Abel, M. (2001). From metaphor to measurement: Resilience of what to what? *Ecosystems*, 4(8), 765-781.
- Chambers, R. (1997). Editorial: Responsible well-being — A personal agenda for development. *World Development*, 25, 1743-1745.
- Charnley, S. (2006). The Northwest Forest Plan as a model for broad-scale ecosystem management: A social perspective. *Conservation Biology*, 20(2), 330-340.
- Charnley, S., McLain, R. J., & Donoghue, E. M. (2008). Forest management policy, amenity migration, and community well-being in the American West: Reflections on the Northwest Forest Plan. *Human Ecology* 36, 743-761.
- Colfer, C. J. P. (2005). *The complex forest: Communities, uncertainty, and adaptive collaborative management*. Washington, D.C.: Resources for the Future Press.
- Colfer, C. J. P., Byron, Y., Prahbu, R., & Wollenberg, E. (2001). History and conceptual framework. In C. J. P. Colfer & Y. Byron (Eds.), *People managing forests: The link between human well-being and sustainability* (pp. 1-45). Bogor, Indonesia: Center for International Forestry Research.
- Coulthard, S. (2008). Adapting to environmental change in artisanal fisheries — Insights from a Southern Indian lagoon. *Global Environmental Change*, 18, 479-489.
- Cutter, S. L., Barnes, L., Berry, M., Burton, C., Evans, E., Tate, W., et al. (2008). A place based model for understanding community resilience to natural disasters. *Global Environmental Change*, 18(4), 598-606.
- Daniels, M. J. (2004). *Assessing socio-economic resiliency in Washington counties* (Vol. Gen. Tech. Rep. PNWGTR-607). Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.
- Davidson, D. J. (2010). The applicability of the concept of resilience to social systems: Some sources of optimism and nagging doubts. *Society & Natural Resources*, 23(12), 1135-1149.
- Department for International Development (1999). *Sustainable livelihoods guidance sheets*.
- DeVellis, R. F. (1991). *Scale development: Theory and applications*. Newbury Park, CA: Sage Publications.
- Dietz, T., Ostrom, E., & Stern, P. (2003). The struggle to govern the commons. *Science*, 302(5652), 1907-1912.
- Donoghue, M. E., & Haynes, R. W. (2002). *Assessing the viability and adaptability of Oregon communities* (Vol. Gen. Tech. Rep. PNWGTR-549). Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.
- Donoghue, M. E., & Sturtevant, V. E. (2007). Social science constructs in ecosystem assessment: Revisiting community capacity and community resilience. *Society and Natural Resources*, 20(10), 899-912.
- Fernandez-Gimenez, E., Ballard, H. L., & Sturtevant, V. E. (2008). Adaptive management and social learning in collaborative and community-based monitoring: A study of five community-based forestry organizations in the western USA. *Ecology and Society*, 13(2), 4 (online). <http://www.ecologyandsociety.org/vol13/iss2/art4>.
- Flint, C. G., & Haynes, R. (2006). Managing forest disturbances and community responses: Lessons from the Kenai Peninsula, Alaska. *Journal of Forestry*, 104(5), 269-275.
- Flint, C. G., & Luloff, A. E. (2005). Natural resource-based communities, risk, and disaster: An intersection of theories. *Society and Natural Resources*, 18(5), 399-412.
- Flint, C. G., & Luloff, A. E. (2007). Community activeness in response to forest disturbance in Alaska. *Society and Natural Resources*, 20(5), 431-450.
- Flint, C. G., Luloff, A. E., & Theodori, G. L. (2010). Extending the concept of community interaction to explore regional community fields. *Journal of Rural Social Sciences*, 25(1), 22-36.
- Folke, C. (2006). Resilience: The emergence of a perspective for social-ecological systems analyses. *Global Environmental Change*, 16, 253-267.
- Folke, C. (2007). Social-ecological systems and adaptive governance of the commons. *Ecological Restoration*, 22, 14-15.
- Folke, C., Carpenter, S. R., Elmqvist, T., Gunderson, L., Holling, C. S., & Walker, B. (2002). Resilience and sustainable development: Building adaptive capacity in a world of transformations. *Ambio*, 31(5), 437-440.
- Folke, C., Pritchard, L., Berkes, F., Colding, J., & Svedin, U. (2007). The problem of fit between ecosystems and institutions: Ten years later. *Ecology and Society*, 12(1), 30 (online). <http://www.ecologyandsociety.org/vol12/iss1/art30>.
- Force, J. E., Machlis, G. E., & Zhang, L. (2000). The engines of change in resource-dependent communities. *Forest Science*, 46(3), 410-421.
- Fukuyama, F. (2001). Social capital, civil society and development. *Third World Quarterly*, 22(1), 7-20.
- Harris, C. C., McLaughlin, W. J., & Brown, G. (1998). Rural communities in the Interior Columbia Basin: How resilient are they? *Journal of Forestry*, 96(3), 11-15.
- Hawley, A. (1950). *Human ecology: A theory of community structure*. New York: Ronald Press.
- Haynes, R. W. (2003). *Assessing the viability and adaptability of forest-dependent communities in the United States* (Vol. General Technical Report PNWGTR-567). Portland, OR: U.S. Department of Agriculture Forest Service, Pacific Northwest Research Station.
- Holling, C. S. (1973). Resilience and stability of ecological systems. *Annual Review of Ecology and Systematics*, 4, 1-23.

- Holling, C. S. (2000). Theories for sustainable futures. *Conservation Ecology*, 4(2), (online). <http://www.consecol.org/vol4/iss2/art7>.
- Kaufman, F. H. (1959). Toward an interactional community conception. *Social Forces*, 38(1), 8-17.
- Kaufman, F. H., & Kaufman, L. C. (1946). *Toward the stabilization of a forest community: The Montana study*. Missoula, MT: University of Missoula. US Forest Service, Region One.
- Kusel, J. (1996). Well-being in forest-dependent communities, Part 1: A new approach. *Sierra Nevada Ecosystem Project: Final report to Congress* (Vol. 11, Assessment and scientific basis for management options, pp. 361-373). Davis, CA: University of California, Center for Water in Wildland Resources.
- Leach, M., Mearns, R., & Scoones, I. (1999). Environmental entitlements: Dynamics and institutions in community-based natural resource management. *World Development*, 2, 225-247.
- Lee, R. G. (1990). Sustained yield and social order. In R. G. Lee & D. R. Field (Eds.), *Community and forestry: Continuities in the sociology of natural resources* (pp. 83-94). Boulder, CO: Westview Press.
- Lee, R. G., & Field, D. R. (Eds.). (2005). *Communities and forests: Where people meet the land*. Corvallis: Oregon State University Press.
- Luloff, A. E. (1990). Community and social change: How do small communities act? In A. E. Luloff & L. E. Swanson (Eds.), *American rural communities* (pp. 214-234). Boulder, CO: Westview Press.
- Machlis, G. E., & Force, J. E. (1990). Community stability and timber-dependent communities: Future research. In R. G. Lee, D. R. Field & W. R. Burch, Jr. (Eds.), *Community and forestry: Continuities in the sociology of natural resources* (pp. 259-276). Boulder, CO: Westview Press.
- Magis, K. (2010). Community resilience: An indicator of social sustainability. *Society and Natural Resources*, 23(5), 401-416.
- Marschke, J. M., & Berkes, F. (2006). Exploring strategies that build livelihood resilience: A case from Cambodia. *Ecology and Society*, 11(1), (online). www.ecologyandsociety.org/vol11/iss1/art42.
- McLain, R. J., Donoghue, E. M., Kusel, J., Buttolph, L., & Charnley, S. (2008). Multiscale socioeconomic assessment across large scale ecosystems: Lessons from practice. *Society & Natural Resources*, 21(8), 719-728.
- Nadeau, S., Shindler, B., & Kakoyannis, C. (1999). Forest communities: New frameworks for assessing sustainability. *The Forestry Chronicle*, 75(5), 747-754.
- Nelson, D. R., Adger, W. N., & Brown, K. (2007). Adaptation to environmental change: Contributions of a resilience framework. *Annual Review of Environment and Resources*, 32, 395-419.
- North, D. C. (1990). *Institutions, institutional change and economic performance*. Cambridge, MA: Cambridge University Press.
- Ostrom, E. (2009). A general framework for analyzing sustainability of social-ecological systems. *Science*, 325, 419-422.
- Parkins, J. R., & MacKendrick, N. A. (2007). Assessing community vulnerability: A study of mountain pine beetle outbreak in British Columbia, Canada. *Global Environmental Change*, 17, 460-471.
- Parkins, J. R., Varghese, J., & Stedman, R. C. (2004). Identifying indicators of community sustainability in the Robinson Valley, British Columbia. *BC Journal of Ecosystems and Management*, 4(2), 1-19.
- Paveglio, T. B., Jakes, P. J., Carroll, M. S., & Williams, D. R. (2009). Understanding social complexity within the wildland-urban interface: A new species of human habitation? *Environmental Management*, 43, 1085-1095.
- Plummer, R., & Armitage, D. (2007). A resilience-based framework for evaluating adaptive co-management: Linking ecology, economics and society in a complex world. *Ecological Economics*, 61, 876-885.
- Power, T. M. (2006). Public timber supply, market adjustments, and local economies: Economic assumptions of the Northwest Forest Plan. *Conservation Biology*, 20(2), 342-350.
- Resilience Alliance (2007). *Assessing resilience in social-ecological systems: A workbook for scientists*. Stockholm University, Sweden.
- Ribot, J. C., & Peluso, N. L. (2003). A theory of access. *Rural Sociology*, 68(2), 153-181.
- Schallau, C. H. (1989). Sustained yield versus community stability: An unfortunate wedding? *Journal of Forestry*, 87(9), 16-23.
- Scoones, I. (1999). New ecology and the social sciences: What prospects for a fruitful engagement. *Annual Review of Anthropology*, 28, 479-507.
- Sen, A. (1997). Editorial: Human capital and human capability. *World Development*, 25(12), 1959-1961.
- Shoemaker, P. J., Tankard Jr., J. W., & Lasorsa, D. L. (2004). *How to build social science theories*. Thousand Oaks, CA: Sage Publications.
- Smith, B., & Wandel, J. (2006). Adaptation, adaptive capacity and vulnerability. *Global Environmental Change*, 16, 282-298.
- Summers, F. G. (1986). Rural community development. *Annual Review of Sociology*, 12, 347-371.
- Toennies, F. G. (1957). *Community and society*. East Lansing: Michigan State University Press.
- Tompkins, E. L., & Adger, N. W. (2004). Does adaptive management of natural resources enhance resilience to climate change? *Ecology and Society*, 9(2), 10 (online). <http://www.ecologyandsociety.org/vol9/iss2/art10>.
- Tuler, S., Agyemang, J., da Sylva, P. P., LoRusso, K. R., & Kay, R. (2008). Assessing vulnerabilities in fishing communities. *Human Ecology Review*, 15(2), 171-184.
- Waggener, T. R. (1977). Community stability as a forest management objective. *Journal of Forestry*, 75(11), 710-714.
- Walker, B., Holling, C. S., Carpenter, S., & Kinzig, A. (2004). Resilience, adaptability and transformability in social-ecological systems. *Ecology and Society*, 9(2), 5 (online). <http://www.ecologyandsociety.org/vol9/iss2/art5>.
- Wall, E., & Marzall, K. (2006). Adaptive capacity for climate change in Canadian rural communities. *Local Environment*, 11(4), 373-397.
- Wang, S. (2004). One hundred years of sustainable forest management. *Forest Policy and Economics*, 6, 205-213.
- Warren, R. L. (1978). *The community in America* (Third ed.). Chicago: Rand McNally.
- Wiersum, F. K. (1995). 200 years of sustainability in Forestry: Lessons from history. *Environmental Management*, 19(3), 321-329.
- Wilkinson, K. P. (1991). *The community in rural America*. New York: Greenwood Press.
- Wu, J., & Louck, O. L. (1995). From balance of nature to hierarchical patch dynamics: A spatial shift in ecology. *The Quarterly Review of Biology*, 70(4), 439-466.