

Response to Tompkins and Adger. 2004. "Does Adaptive Management of Natural Resources Enhance Resilience to Climate Change?"

## Network Structure, Diversity, and Proactive Resilience Building: a Response to Tompkins and Adger

*Lenore Newman<sup>1</sup> and Ann Dale<sup>2</sup>*

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**ABSTRACT.** Although community social networks can build resilience, and thus, aid adaptation to unexpected environmental change (Tompkins and Adger 2004), not all social networks are created equal. Networks composed of a diversity of "bridging" links to a diverse web of resources and "bonding" links that build trust strengthen a community's ability to adapt to change, but networks composed only of "bonding" links can impose constraining social norms and foster group homophily, reducing resilience. Diversity fosters the resilience needed to adapt to unexpected change, and can also enlarge the ability to proactively make collective decisions that optimize future options.

**Key Words:** *precautionary principle; resilience; social capital; sustainable development*

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### INTRODUCTION

In their recent paper "Does Adaptive Management of Natural Resources Enhance Resilience to Climate Change?" Emma Tompkins and W. Neil Adger (2004) argue that community social networks can build resilience, and thus aid adaptation to unexpected environmental change. Although we agree with this general statement, we wish to point out that research suggests that not all social networks are created equal; networks composed of "bridging" links to a diverse web of resources strengthen a community's ability to adapt to change, but networks composed only of local "bonding" links, which impose constraining social norms and foster group homophily, can reduce resilience. Diversity, we believe, is critical to a community's ability to move beyond adaptive management to proactively maintain and enhance resiliency. Maintaining a dynamic interplay of bonding and bridging links allows for proactive resilience building, and supports the diversity needed to adapt to unexpected changes, many of which are outside of any one community. Diversity can also enlarge the scope of vision necessary to proactively make

collective decisions that optimize future choices.

### DIVERSITY, RESILIENCE, BONDING, AND BRIDGING NETWORKS

Members of a network are bound together by diverse interaction ties, which can be classified as "bonding" and "bridging" ties, also known respectively as "strong" and "weak" ties (Putnam 2000, Woolcock 2001). Bonding ties are relations between family members, friends, and neighbors in closed, tightly connected networks. Bridging ties give access to resources and opportunities that exist in one network to a member of another network (Granovetter 1973). Bonding ties create dense network structures and strong but localized trust, but can impose strict social norms that discourage experimentation and encourage increased homophily, which is the tendency of a group to become less diverse over time, and to distrust "others." Bonding ties, although needed to provide trust, can reduce a group's diversity, and thus decrease resilience by limiting accepted options for the group. As Adger (2003) notes, social capital does not necessarily

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<sup>1</sup>Postdoctoral Scholar, Royal Roads University, <sup>2</sup>Professor, Science, Technology and Environment Division, Royal Roads University

encourage proactive adaptation. Only when social or network capital encourages diversity and experimentation will increased resilience be realized.

Social capital is an engaging concept, as it stresses the positive aspects of sociability while putting aside less attractive features (Portes 1998). The outcome of attempts to initiate adaptive behavior will depend on the nature of the social capital present; the structure and group dynamics of a network will either facilitate or constrain the ability to gather information and innovate, and most critically, increase access to different forms of capital, particularly intellectual capital. Social ties can imprison actors in maladaptive situations or facilitate undesirable behaviors (Borgatti and Foster 2003). In addition, bridging social capital appears to be central to the initial departure from convention during an innovation (Reuf 2002); bridging ties can also act as vertical links, facilitating a network's ability to access more vertical power relationships.

There are many potential negatives within social networks that can hinder adaptation. A densely developed social capital network can, for example, lead to the exclusion of outsiders, make excess claims on group members, and restrict individual freedom (Portes 1998). Bonding social capital has the potential to hinder innovation by 1) cutting off actors from needed information, and 2) imposing social norms that discourage innovation. Bridging social capital allows actors to access outside information and overcome social norms with support from outside the local network, in addition to increasing access to diverse forms of other capital. Because bridging capital brings in new and potentially novel information, it is here that bonding capital provides the group resilience needed to absorb the benefits of bridging capital; the two capitals are complementary. The sheer amount of social capital is not likely to be a good indicator of how well a community will be able to engage problems. It is a dynamic balance of bonding and bridging social capital that builds resilience and makes the difference between a small community "getting by" or "getting ahead" (Dale and Onyx 2005).

Data from the former East Germany support the argument that bridging ties are needed to mobilize community. The oppression against speaking out during the communist era caused people to stick to a tightly knit social group. Bridging ties were

avoided, and extremely tightly connected networks of strong ties were formed (Volker and Flap 2001). Communities were densely nucleated with bonding ties, and it was believed that these dense networks would allow eastern communities to adapt well to the changes posed by unification with the West. However, these communities had very poor abilities to solve complex social problems that spanned jurisdictions. After East Germany opened itself to the West, these very closed social networks proved inadequate to address the vast changes that occurred, and East German communities proved much less adaptive than those in the West, and much less adaptive than was expected (Volker and Flap 2001).

## **PROACTIVE ACTION: THE NEED FOR RESILIENCE BUILDING**

A good mix of bonding and bridging networks will, as suggested by Tompkins and Adger (2004), lead to greater resilience and an increased ability to adapt. Adaptation is only half the advantage gained by such social networks; the greater strategic imperative lies in the capacity of the collective for creative innovations that enhance resiliency. We wish to stress that the creation of this resilience is a proactive exercise. We see the proactive side of managing environmental change as the "development" component of "sustainable development." As C.S. Holling (2001) argues:

*Sustainability is the capacity to create, test, and maintain adaptive capability. Development is the process of creating, testing, and maintaining opportunity. The phrase that combines the two, "sustainable development," thus refers to the goal of fostering adaptive capabilities and creating opportunities. It is therefore not an oxymoron but a term that describes a logical partnership.*

We see the proactive act of optimizing future choices by not foreclosing options through opportunity creation as proactive resilience building; human societies can make choices that will limit the need for adaptation in the future, and create space for future options. This proactive behavior can take two dynamic forms: the adoption of new innovations, and the practice of a precautionary principle to eliminate unknown negative scenarios through avoidance and, ideally, fundamental changes in behavior.

Innovation within a complex society occurs at many levels and scales. At the smaller scale, we see

incremental innovations, which are small refinements that occur relatively continuously. At a larger scale, there are radical innovations. These are very large shifts in existent technologies or societal paradigms, myths, and metaphors. These are not predictable, and may happen at any time. Lastly, there are systematic innovations. These are innovations that create entire new fields (Pereira 1994). They cannot be predicted, and when they occur, they radically reshape society.

Although we cannot predict innovation, we can foster it by providing environments that encourage it, and its learning. Necessity is not always the mother of invention; innovation is a very emergent property. Innovations can shift our resource use from one resource base to another, allowing us the freedom to abandon problematic unsustainable behaviors with the necessary political will and enabling conditions. Research is showing that social capital may prove to be a necessary and sufficient condition for these enabling conditions, provided it also enhances functional diversity (Dale and Onyx 2005).

Once innovations appear, we can choose to use them or not use them, or use them in negative ways, and these choices will influence whether we merely adapt to our future or deliberately design our futures. One method used to mitigate the uncertain effect of new innovations is to evaluate them according to a precautionary principle. However, the very complexity that makes a precautionary principle desirable also makes it contentious and hard to define.

Precautionary principles are also an important strategy for building resilience, and they follow a variety of models. Strong precautionary principles suggest that one take no action unless sure it will do no harm. A weak precautionary principle allows one to proceed with diffusion of an innovation even if there is a lack of certainty about its effect. Many people argue that, where catastrophic risk is involved, a strong precautionary principle should be used (Morris 2000). Various degrees of the precautionary principle have been suggested. In the Rio Declaration (UNEP 1992), the use of a weak precautionary principle is urged. Principle 15 of the Rio Declaration states that, where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing cost-effective measures to prevent environmental degradation (Morris 2000).

## CONCLUSION

Human societies are grappling with environmental changes that are often are impossible to “see” until they reach critical thresholds; they are messy, wicked problems beyond the capacity of any one group, sector, or in many cases, nation, to solve in isolation. The ability for collective action and collaborative solutions has never been so paramount in human civilization, thus, social networks have a key role to play in our adaptation to unexpected change. But surely human societies have a greater ability to move beyond adaptation to a more proactive and dynamic response to these changes. Thus, our ability to innovate and to understand the nature of environmental challenges also demands the adoption of a strong precautionary principle in order not to foreclose future options and decrease resiliency. Building proactive resiliency depends on a better understanding of the positive and negative aspects of social networks if we are to develop more robust and proactive responses to environmental challenges. In many cases, this may involve the deliberate development of bridging and social capital to create vertical integration between communities and links to power brokers and the strengthening of networks that are globally interconnected in new and novel ways.

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