

# Using the Marine Learning Partnership to Better Understand Social Resilience in MPAs and MPA Networks

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## Abstract

The topic of social resilience has been identified as one of three key priority learning areas for NGO field staff faced with scaling up marine conservation practice to the level of marine protected area networks. During 2005 and 2006, members of the Marine Learning Partnership, a global group of marine conservation professionals with a diversity of expertise and experience, have collaborated on ideas and exploration of the concepts and variables of social resilience as it applies to our regions and immediate work. We will share the most recent findings from our joint efforts, including what is social resilience and why it is a critical area for consideration as a response to climate change and other factors, such as political and economic conditions and MPA management regimes. Finally, we describe how we are working on ways to use insights from academia and field-based case studies to help us devise a framework for measuring and building social resilience within large-scale marine protected and managed areas.

## Introduction

The international community has recently placed high priority on expanding the area of coastal and marine habitats protected under ecologically-coherent networks of marine protected areas (MPAs). This is reflected in national and global targets such as the 2010 target of establishing MPAs to conserve at least 20% of all US coral reefs specified in the US Coral Reef Task Force's National Plan of Action to Conserve Coral Reefs, the '2012 target' to establish representative MPA networks specified in the Plan of Implementation of the 2002 World Summit on Sustainable Development, the '2012 target' approved by the 2003 Fifth World Parks Congress, and the related outputs of the 7th Conference of the Parties to the Convention on Biological Diversity. However, the emphasis on MPA networks is new, and we have much to learn about how to effectively design, adaptively manage, monitor, and finance such networks. In particular, there has been a paucity of effort put towards understanding the social conditions that may benefit or hinder the establishment of MPA networks.

The Marine Protected Area Networks Learning Partnership (MLP), a collaboration between The Nature Conservancy (TNC), World Wildlife Fund (WWF), Conservation International (CI), and Wildlife Conservation Society (WCS), and local partner organizations seeks to increase the use of networks of Marine Protected Areas (MPAs) as a tool for marine conservation across the globe. At the Learning Partnership's 1<sup>st</sup> full workshop in Philip Island, Australia in October 2005, participants identified three main issues on which to focus: social resilience, economic valuation / sustainable financing, and the biophysical criteria required for effective MPA network design. A Social Resilience Working group formed for the purpose of better understanding the concept

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of social resilience and its relationship to the effective design, implementation, and management of MPA networks.

### **Background**

In many marine environments around the world, major stresses and changes have already caused dramatic phase or regime shifts which are often long-lasting and irreversible (Hughes et al. 2005). A most familiar example is the phase shift occurring in many coral reefs following the destruction of habitats and the collapse of many coastal and oceanic fisheries. These undesirable ecological shifts have profound effects on human communities dependent upon these marine environments. Thus there has been a tremendous challenge globally to protect these habitats and conserve the remaining marine species that provide food, livelihood and well-being to many societies. Coastal communities are often dependent on multiple resources, thus they may be differentially able to adapt to environmental and social change. However, there are events which will impact many activities in any one ecosystem (such as oil spills or unpredictable climate change) which necessitate building resilience into these communities (Adger 2000).

Among a suite of options for managing coastal resources sustainably, one popular tool for marine conservation and fisheries management is the establishment of MPAs. Marine Protected Areas (MPAs) are a useful tool for addressing change because, when well-designed, they provide an opportunity for economic diversification, allow communities to structure their social organizations in response to environmental and social change, and clearly define resource use thus reducing conflicts. In most cases, MPA design and its impacts are examined largely from a biological perspective. Research suggests, however, that social factors, not just biological or physical variables, are equally important determinants of MPA success or failure (Christie et al. 2003; Mascia 2003; Wahle et al. 2003; Christie 2004). Because MPAs involve a degree of restriction on human resource use, they can generate considerable stress and conflict among affected stakeholders. MPAs that fail to integrate social dimensions into their design and implementation downplay the evolved relations of human communities with their environment. This results in a poor understanding of social interactions operating on multiple levels, user conflicts, unreceptive stakeholders, unintended negative consequences, and missed opportunities for positive change and reallocation of resources (Christie et al. 2003; Wahle et al. 2003). Thus the principles of MPA design are extremely important in determining the success or failure of these resource management systems. Well-designed MPAs are successful not only at regulating resource use but they also have the potential to increase community capacity to adapt to a variety of environmental and social changes.

### **The Marine Learning Group**

The Marine Learning group currently consists of 22 members from a diverse range of international and national organizations, including NGOs and government. All members work in the field of marine protected area management, although differences exist in political, cultural and social settings. Despite these differences, the group has identified in their work a set of common themes that apply to each of their areas.

Common to the array of MPAs where members work are the major changes brought about by MPAs, including reallocation of user rights, altered resource use, changed social relations, and increased resource protection. In a resilient community, these changes should have the potential to create opportunity for development, novelty and innovation among stakeholders (Folke et al. 2002; Olsson 2003).

For communities currently living in and around MPAs, or that may be impacted by the formation of new MPAs, social resilience can be defined as *the ability to cope with changes or stress brought about by environmental, social, and economic change without losing critical functions as a community concerning social relations, economic prosperity and political stability*. Our pragmatic approach is grounded in a field-driven inquiry regarding what is social resilience, how it can be measured and evaluated within our marine communities, and how an increased understanding of the principles and variables associated with social resilience can accelerate our efforts to establish networks of MPAs. Since October 2005, the seven members of this Working Group, including two co-leaders, have focused activities around a comprehensive literature review, exploration of field-based case studies, and the development of a survey instrument that will provide testing of hypotheses regarding social resilience and MPA networks.

Over the course of 2007, we will use the survey to conduct an in-depth exploration of information, data, and case studies from a global set of MPA network sites, including those represented by our Learning Partnership as well as others working within the conservation community. We anticipate that this analysis will provide insights on strategies for how to best manage for social and ecological resilience in the face of stressors such as government regime shifts, climate change, environmental disasters, and increased pressure for resources. Ultimately this work, in concert with the research efforts and results of the Biophysical Working Group, will help our field staff, partners, and the marine conservation community design MPA networks that are resilient to anthropogenic and environmental threats.

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## Discussion

Social resilience and its relation to MPAs: The concept of resilience has been widely applied to ecological systems but it is not as developed for social systems. In 1975, Andrew Vayda and Bonnie McCay drew from the work of Holling (1973) and suggested that the concept of resilience may be more useful to understand human adaptation than stability and resistance (as cited in Davidson-Hunt and Berkes 2000). They concluded that the resilience concept abandons the equilibrium-centered view and instead allows individuals and societies to adjust in response to environmental challenges. This thinking encouraged more investigations on processes of change through an examination of relationships between the environment, individuals and societies, and promoted studies that explored potential links between social resilience and ecological resilience.

*Social resilience* was defined by Adger (2000) as the *ability of groups or communities to cope with external stresses and disturbances as a result of social, political and environmental change*. This definition highlights the fact that social resilience has economic, spatial and social dimensions and thus requires interdisciplinary understanding and analysis at various scales. It differs fundamentally from ecological resilience by having the added capacity of humans to consciously design system elements; that is, to anticipate and plan for the future (Moberg and Galaz 2005).

Key principles for building social resilience: Emerging insights from adaptive and community-based resource management suggest that building resilience into both human and ecological systems is an effective way to cope with environmental and social change characterized by unknowable surprises and risks. It essentially involves enhancing the adaptive capacity and self-organizing ability of social-ecological systems. Though in particular societies certain factors may lead to community robustness, it is impossible to prescribe a simple list of actions that will lead all communities to be more resilient to change (Christie et al 2005; also Ostrom et al 1999). For this reason, it is most instructive to consider resilience in terms of *principles* which lead communities to robustness in the face of unpredictable change. Contextual variables support principles and provide a means to understand under which type of circumstances and how such principles apply.

From a synthesis of several case studies, Folke et al. (2003) identified and developed four critical factors as principles for building resilience.

### ***1. Learning to live with change and uncertainty (adaptability)***

This factor emphasizes the necessity of accepting change or crisis and living with uncertainty and risks. To enhance resilience, strategies for social-ecological management should take advantage of change and crisis and turn it into an opportunity for development.

Key factors include:

- *Multi-level social networks and building social capital*: Strengthen social capital by building social networks: create opportunities for trust-building among different organizations in MPA communities.
- *Leadership and vision*: Share leadership of management interventions to foster effective public participation.
- *Demographic changes (migration and population size)*: Migration and population size may have an impact on a communities' resilience, but the relationship is not well-understood.

### ***2. Nurturing diversity for reorganization and renewal (diversity)***

Diversity can take many forms, including functional (ie, number of occupations in a community) and response variations (ie, types of responses to disturbance) (Walker et al. 2006). Nurturing diversity also refers to diversity of social memory, or the components of history that make possible development and innovation after a crisis or change. Social memory is stored in individuals and institutions; diversity of social memory is important in linking an array of past experiences with present and future policies. Functional and response diversity will allow a community to redevelop, innovate and spread risks brought about by environmental, social, and economic change.

Key factors include:

- *Diversity of livelihood:* Encourage local economic diversification so that communities are equipped with diverse livelihood strategies.
- *Resource dependency:* Consider three elements (the resource, its governance system, and the associated infrastructure) when diversifying resource use in local communities.
- *Management interventions:* Integrate MPAs into broader coastal management by engaging in regional-level planning with other institutions.

### ***3. Combining different types of knowledge for learning (learning & knowledge)***

Scientific understanding of complex adaptive systems and ecosystem management can be enriched by experience and insights from local communities and traditional societies. Combining different ways of knowing and learning will allow different stakeholders to work together, even with much uncertainty and limited information. Social memory is also critical for building knowledge and learning because it links past experiences with present and future policies.

Key factors include:

- *Traditional and local knowledge systems:* Using local ecological knowledge in MPA management not only strengthens local cultural values and integrity but also provides local legitimacy that may encourage compliance with management interventions.
- *Collaborative planning & participation:* Include the local community in MPA design, implementation, monitoring and evaluation to ensure local support and build capacity.
- *Transformational learning:* Develop a management system which allows for adjustment of the rules that govern community behavior, according to local environmental and social dynamics.

### ***4. Creating opportunity for self-organization (self-organization)***

The ability to self-organize is important in systems of adaptive co-management and is an essential element of adaptive capacity; in short, this is learning by doing (Folke et al. 2002). In the social domain, adaptive co-management is a way to operationalize adaptive governance. Maintaining multi-layered institutions (Ostrom 1990; Lebel et al. 2006; Moberg and Galaz 2005; Olsson 2003) makes governance less rigid, less vulnerable and more capable of self-organization. It also allows for improved decision-making and problem solving among individuals and organizations.

Key factors include-contextual variables:

- *Multilevel polycentric governance and accountability:* Create governance institutions which have diverse membership and are held accountable to the local community.
- *Conflict resolution mechanisms:* Ensure that conflict resolution mechanisms are affordable and accessible to local communities.
- *Capacity:* Create opportunities to build local capacity so that communities are prepared to deal with unpredictable environmental, social, and economic change.
- *Monitoring and feedback loops:* Integrate new scientific information into knowledge sharing networks and management actions.

## **Conclusion**

The MLP is now seeking a more thorough understanding of the principles of social resilience, their relationship to functional MPA networks, and the practicalities of applying these principles in the design and management of MPA networks. A literature review has been completed along with a pilot survey that was designed and subsequently completed by two of the Social Resilience Team members. The results of both of these activities has paved the way to not only enhance the larger group's understanding of social resilience but has provided a first attempt at implementing a program that will facilitate greater understanding of social resilience and how such an understanding can practically be applied to actual efforts now taking place around the world.

The principles that build social resilience - adaptability, diversity, learning and self-organization - have been applied to resource management systems in the past and can likewise be applied to MPA network management. As has been stressed by several authors, it is imperative to consider the social setting (culture, economy and politics) and improve the condition (economy, governance, social networks and social capital) of an area during the development and throughout the management of MPA networks. Enhancing the principles of social resilience in a community will help adaptation to unanticipated environmental, social, economic, and political impacts and will encourage communities to support long-term sustainable resource use.

Management can diminish or build resilience. Rigid control systems that seek stability, e.g. top-down approach to fisheries management, tend to erode resilience and facilitate the breakdown of social systems. Current MPA management practices around the world, however, appear to be building resilience elements into their areas, albeit unconsciously. The promotion of adaptive co-management regimes and community-based MPAs, the movement towards multi-level governance, the emphasis on stakeholder participation, education and capacity building, and the renewed interest in integrating local systems of ecosystem management are all significant steps towards enhancing resilience in human coastal communities.

## **Recommendations for Management**

The overall challenge is to actively strengthen the resilience of ecosystems and communities dependent upon them - i.e. their capacity to cope with the changes and disturbances brought about by a variety of environmental and social factors. The key findings from this review are that:

- Management should be based on a recognition that coral reefs and other marine ecosystems, as well as associated human communities, are complex and adaptive and seldom change in a structured or predictable way;
- Leadership should be developed across scales, allowing flexibility in institutions and politics and should encourage institutional and social memory at all levels (local to global);
- Social networks with a diverse set of actors (fishers, government agencies, religious groups, academic institutions, women, private sector, NGOs, tourism industry, etc.) should be developed aiming to connect institutions and organizations across local, regional and global scales;

- MPA sites and networks should be integrated into broader coastal management initiatives to increase public awareness and support of management goals;
- MPA managers should encourage local economic diversification so that communities are equipped to deal with an array of environmental, economic, and social changes;
- Policies should encourage stakeholder participation and incorporate their ecological knowledge in a multi-governance system;
- Culturally-appropriate conflict resolution mechanisms should be made affordable and accessible to local communities;
- Management should promote learning and communication among individuals, groups and sectors of society to encourage collaboration and active participation;
- Evaluation, monitoring and deliberation of the outcomes of management actions should be encouraged followed by change in practices if necessary; and
- Future social resilience research should aim to describe potential relationships between demographic variables and robustness of marine resource management systems, extend to a wider range of sites/areas and scenarios, and determine appropriate scales for social resilience indicators.

As a final point, strategies to build resilience in human coastal communities with MPA networks will take many forms. There is no single prescription or approach that will guarantee the robustness of marine protected area networks and associated communities in the future. Sometimes the system is already in a desirable state, and the challenge is to ensure that the state is not diminished (e.g. protecting pristine coral reefs from degradation). Other times, a social-ecological system may already be in an undesirable state and the challenge is to reduce resilience temporarily and move towards a more desirable state (e.g. using MPAs or other forms of closures and restrictions to prevent further damage and reverse the condition of already degraded coral reefs). In addition the principles for building resilience interact and are interdependent; focusing energy on increasing capacity for one principle while neglecting the others will not lead to social-ecological resilience. It will require a dynamic interplay of the principles of adaptability, diversity, learning, and self-organization and their contextual variables to direct society towards resilience. Strategies will have to be context- and scale-dependent, and will have to change over time. The key is to find a strategy that balances these principles and variables and that works best for a particular marine protected area network.

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