

Defining and Applying Sustainability

Connecting Sociocultural, Economic and Biological Concepts

PATRICIA M CLAY
NATIONAL MARINE FISHERIES SERVICE

JULIA OLSON
NATIONAL MARINE FISHERIES SERVICE

Over the last decade anthropologists and other social scientists have become more common in NOAA's National Marine Fisheries Service (NMFS), the agency charged with governing US marine fisheries in federal waters. In the Social Sciences Branch of the NMFS Northeast Fisheries Science Center (SSB), five anthropologists, one social policy specialist and nine economists currently work on issues that include and intersect with sustainability. We seek to understand and explain what it means to sustain human communities (including their livelihoods, cultural identities and social networks), while also sustaining a set of fish stocks and their marine habitat. This occurs through multiple efforts.



A rustic crab dock at Mills Marina in Seaford, VA. Photo courtesy Edward J Pastula (NMFS) and National Oceanic and Atmospheric Administration/Department of Commerce

Ecosystem-Based Fisheries Management

To begin, we work to place humans squarely within the ecosystem equation. Though anthropology has long investigated ecosystem approaches, ecosystem-based fisheries management remains largely focused on what happens under the water—with humans entering the picture only as predators or users of technology that impacts habitats. Natural scientists commonly map ecosystem connections in a fishery management context prior to approaching social scientists (Clay and Olson in *Human Ecology Review* 2008), limiting the degree to which human communities (and social sciences) can be integrated into the management process. To overcome this constraint, we are working with natural scientists at our lab to find ways to insert social sciences into emerging ecosystem-

based management actions. For example, by coupling GIS techniques with qualitative methods we have explored differential spatial patterns of resource use, thus expanding the human dimensions of ecosystem-based fisheries management to include a broader suite of fishing practices and sociocultural values, as well as the diverse economies in which fishermen can be embedded (Pinto da Silva and Fulcher in *Marine Fisheries Review* 2007; Olson in *Geoforum* 2010; Olson in *Marine Policy* 2011).

Resilience and Vulnerability

The resilience and vulnerability of fishing as a way of life involves multiple scales of interaction. To begin to better understand the sustainability of fishing communities, we have created community profiles to provide initial baseline data, and used multivariate analysis to group communities by type (see www.nefsc.noaa.gov/read/socialsci/community_profiles and Smith, Pollnac, Colburn and Olson in *Marine Fisheries Review*, forthcoming). Further modeling of such efforts was the subject of Pollnac et al (see *Marine Fisheries Review* 2006), a joint SSB, NMFS-HQ, and academic project that created a conceptual model of a fisheries Social Impact Assessment (SIA). This approach to SIAs, which are one of our required regulatory tasks, produces a single output variable—well-being—that can be equivalent to the output variables used in economic and biological assessments (eg, Maximum Economic Yield and Maximum Sustainable Yield). This helps put social concerns on a more equal footing with these other assessments. Further, charting the connections among the variables and to the performance measures described below helps us define key areas for future research.

We have developed a framework of social and economic performance measures and associated indicators to assess different management strategies that, along with biological and other measures, can help support sustainable strategies for communities with differing levels of resilience (Clay, Kitts, Pinto da Silva in IIFET Proceedings 2010). Development of these measures was a lengthy process involving fishermen, academics and SSB staff. Workshops, interviews, literature reviews and rapid assessments all aided in capturing the varied perspectives necessary to create measures that all stakeholders could agree upon. Some indicators can be created using existing NMFS data. For others, new surveys are being created that include both individual and community resilience. New indicators for community resilience based on census data are also being explored by Colburn of the SSB and Jepson of the NMFS

Southeast Region. All will be supplemented with ethnographic studies to better understand vulnerability in its various forms and account for variability: not all fishermen or communities are the same, and the ones who benefit from new rules may not be those who pay the costs. Assessing that variability is at the heart of social and economic impact assessments. Beyond documenting impacts, understanding how people interact also helps in comprehending the complex systems of vulnerability and resilience of human communities and ways of life and thus potential vectors of change.

New Areas of Research: Sustaining Food Systems and Places

In an agency grounded in the concept of natural resource conservation, we are looking to keep the concept of food and food systems at the fore. Fisheries certification programs, for example, concentrate predominantly on sustainable fish stocks rather than



Unloading. Photo courtesy Northeast Fisheries Science Center, National Oceanic and Atmospheric Administration/Department of Commerce

sustainable fisheries (that include human communities). But fish is also food, and fishermen themselves are rapidly moving ahead on this theme by creating Community Supported Fisheries, based on the model of Community Supported Agriculture, to link themselves more directly to consumers. SSB scientists are conducting research on this topic, blending interests in spatial relations, new institutions, and community development. We are studying these efforts and their potential links to co-management theory, to better understand how incorporating fishermen's knowledge into such efforts might not only broaden the discussion of sustainability by including human communities and social relations, but might

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ment in decision-making, and an equitable sharing of resources. This proposal developed through an initial collaboration with a local community-based service and educational organization. This organization, Family Life Education, which provides services to low-income families, gang-involved teens, adolescent and other young mothers, and drug-involved women, has a growing commitment to addressing climate-related changes that threaten the community. Community involvement will be further enhanced in the project through the development of an oversight council composed of representatives of other community organizations.

Research shows that to make sustainability initiatives relevant for our target audience, we must adapt the culture and language of science to community cultures and languages of diverse groups. Additionally, we must transfer useful capacities to the community (eg, climate literacy and enhanced analytic ability for assessing and responding to risk and uncertainty). As a result, climate change will not be presented as one more burden but rather as a significant encounter that can be addressed with practical, science-based skills and perspectives. This approach has proven effective in overcoming community hesitancy to engage in collaboration with university personnel (Schensul, in *Community Building in the Twenty-First Century*, 2005). The project is further guided by recognition that climate change exacerbates existing social inequalities and that the formation of collaborative initiatives linking science-rich institutions, such as universities, with local programs is an effective strategy for inclusive, equitable climate-related learning in informal settings.

Our project is designed to use knowledge gained through working with community-based organizations to jointly produce interactive learning modules on climate change, impacts and adaptation. These modules (eg, interactive, highly graphic presentations by a trained educator from the community) will be implemented in nontraditional community learning environments to assess their feasibility, acceptability and effects on recipients' knowledge, attitudes and behaviors related to climate change and adaptation. The modules will be refined and made accessible to the community as general learning resources. Modules will also be supported by a locally oriented web-based community educational resource in a user-friendly format. Establishment of a community-based coalition, training of community organization personnel, and ongoing collaboration with university scientists will contribute to the continued impact of the project. Such an approach suggests one pathway for building anthropological involvement in sustainability initiatives and our discipline's capacity as a sustainability science.

Merrill Singer is professor of anthropology and community medicine at the University of Connecticut. He has received the George Foster Memorial Award in Practicing Medical Anthropology, the Prize for Distinguished Achievement in the Critical Study of North America, and the AAA Solon T Kimball Award for Public and Applied Anthropology.

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also "jump scales" between local and global systems.

Through such efforts, we seek to better understand the impacts of and responses to different fishery management tools. For instance, catch shares have wide-ranging and sometimes disparate consequences pointing to the important role of context and the social relations through which such privatization is constituted. While the negative impacts of privatization are well documented, these tools have also potentially opened up a creative space for groups trying to organize around goals like preserving fishing permits within a community (Olson in *Ocean & Coastal Management*, forthcoming). Other work has sought to understand these particular dynamics of group formation in more detail, looking at how different social networks and factors such as trust may facilitate building institutions for collaborative management (see Pinto da Silva and Kitts in *Marine Policy* 2006; Kitts, Pinto da Silva and Rountree in *Marine Policy* 2007). New research will extend these interests to look at newly developing sectors in the Northeast Groundfish fishery (similar to cooperatives), looking at differences among groups and the different experiences with and ideas about such topics as governance, networks and fishing practices.

Conclusion

Multiple research projects are underway and under development at the Social Sciences Branch of the NMFS Northeast Fisheries Science Center. These projects use varied methods, including oral histories, ethnographic studies and surveys, with the application of multiple methods providing convergent validation of results. New and sometimes unexpected themes have emerged while conducting oral histories, whose context and distribution can be examined further through regional surveys. While we have created quantitative social and economic indicators for fishery performance that complement the recently developed model of fisheries SIA, these efforts are coupled with fieldwork to flesh out our contextual understanding of the meaning and importance of fisheries to local participants. Through the deliberate creation of theoretical and analytic connections between these tools, the SSB is trying both to nail down a practical understanding of sustainability, and explore new management tools for sustainable fisheries.

Patricia M Clay is a sociocultural anthropologist with NMFS' Northeast Fisheries Science Center in Woods Hole, MA. Her PhD is in anthropology from Indiana University. She combines policy planning with research, currently exploring well-being, triangulation of methods, fishery performance indicators, and definitions of "fishing community" in social science and law.

Julia Olson is a cultural anthropologist at NMFS' Northeast Fisheries Science Center in Woods Hole, MA. She holds a PhD in anthropology and MA in economics from Stanford. Her current research focuses on cultural and spatial practices of fishing in the Northeast, including critical GIS, political ecology, and alternative management.

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ened, stability is undermined and neoliberal metrics of sustainability do nothing to ease fears. History, memory and experience shape present day perspectives, but the uncertainty associated with a pervasive sense of risk destabilizes the game. The result is a complex set of diffuse responsibilities—there are, after all, many players in this game, including individuals, families, communities and government agencies—and the uncertainty extends to who will ultimately be held responsible. We are left to consider the ways these logics and systems of neoliberal governance affect the lives and livelihoods of those who fall under its watchful eye—that is to say, all of us—as well as the ways they intersect and map onto the detailed contexts of our ethnographic research projects.

Ben McMahan and David Seibert are PhD students at the University of Arizona. Their dissertations both include analyses of environment, place, social memory and landscape; how identity and experience are shaped by the risks associated with these environments; how people inhabit or move through these landscapes; and how governing agencies prepare, react and mitigate when environment, people, risk and governance collides.

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spatial or temporal unit's capacity to convey information. Phenomena come into existence or disappear depending on the scale we employ to study them. At a macro-temporal and spatial scale, as in some social evolutionary models, Xaltocan's agricultural history is an insignificantly minor phenomenon in the progression toward greater population size and complexity, culminating in the Aztec Empire. At micro-level scales, however, the biography of Xaltocan's farmscape occupies an otherwise concealed centrality.

There is little doubt that many indigenous systems of environmental interaction are less destructive than those connected to capitalism. Appealing to tradition to explain sustainability, however, is like arguing for a singular meaning at the heart of a symbol that has existed for thousands of years, in thousands of places. Whether or not practices are deemed traditional is irrelevant if the historical reality cannot sustain them. Failures, including a past kingdom's farmscape or a modern eco-experiment, usually are not directly environmental. They are organizational. They stem from an uneasy juxtaposition between the social, political and economic spaces that people and environments co-occupy. If anthropologists focus only on end products, such as success or failure, or on empty signifiers, such as tradition, we cannot access the processes of interactions that were sustained regardless if they were sustainable.

Christopher T Morehart received his PhD in anthropology from Northwestern University. He studies historical and political ecology. He has worked in Belize, Guatemala and Mexico. His current research is on long-term landscape transformation and political economic change in central Mexico.