

**CULTURE AND RESILIENCE AMONG SHRIMPERS ON THE GEORGIA COAST
(USA):
Responses to Globalization¹**

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Abstract The increasing globalization of the seafood industry has severely stressed local, small-scale fisheries, transforming them and threatening their existence. Stress has been especially acute in the shrimp fishery in Georgia in the past few years, due largely to the increased volume of imported farm-raised shrimp. The objective of this paper is to describe the ways in which Georgia shrimpers have responded to stress, characterizing the responses as resilience and examining the role of culture in the responses. Resilience is a widely used concept to address adaptations of ecological systems to stress. Although social and ecological systems are often jointly considered in accounts of resilience, culture is usually not given similar attention. Culture is included within the theoretical framework of panarchy, a hierarchical, embedded arrangement of ecological and human systems, but it tends to be considered within the theory only as a conservative force, providing stability through long-term institutional constraint. The central argument of the paper is that culture as a local information system can contribute to resilience through adaptations across more diverse time-frames and scales than are represented by institutions. The Georgia shrimp fishery serves as a case study in which the importance of culture is made more visible, allowing for a more complete integration of culture into resilience theory and thereby into conceptualizations of the importance of human agency within ecological systems.

Introduction

The volume of shrimp imported into the United States increases substantially each year, severely depressing the market value of wild-caught shrimp and decreasing profit margins of shrimpers. Shrimpers were already experiencing economic stress, due to rising operating costs and expanding governmental regulations. Those livelihood stressors occurred during a decade of relatively flat wholesale price for shrimp, further re-

ducing income levels. Shrimpers along the southeastern Atlantic coast of the United States have responded in a number of ways. Many, in desperation, have left the fishery altogether. Others continue to shrimp in the hope that conditions will eventually improve, relying marginally on other sources of income for survival. The Georgia Shrimpers Association (GSA), which includes most of the shrimpers in the state of Georgia, has attempted to expand their operations from a local to a more global scale. A small group of shrimpers has taken an even more innovative approach, attempting to create a niche market. This latter group, the Georgia Shrimp Company (GSC), well aware of the long-term implications of the increasing volume of imported shrimp, began to develop a niche market for their catch, realizing that a restricted but small specialty market might be the only possibility for continuation of shrimping as a way of life.

The various efforts of the Georgia shrimpers to respond to global pressures can be described historically, but their experiences are not entirely unique, and a more inclusive theoretical framework would be descriptively and analytically useful. Local and global interactions are complex, occurring across different scales and involving multiple factors, including local knowledge, cultural constraints, cultural brokerage, entrepreneurship, and innovation. An account of the events among the Georgia shrimpers presents theoretical and methodological challenges, especially the need for understanding how cultural systems are situated within ecological systems.

This paper is intended to contribute to discussions about people and their culture within social-ecological systems and ways in which those adapted systems interface with larger global systems. It takes for granted that people and their culture are integral parts of ecological systems, while recognizing that the interrelations require specification and explanation (Blount 1999). A large literature is devoted to questions about social-ecological models and how their features are related, including the role of human agency (Vitousek, Mooney, Lubchenco, and Melillo 1997; Petersen 2000), characteristics of social systems (Berkes and Folke 1998; Folke, Berkes, and Colding 1998, 2003; Scoones 1999; Adger 2000; Carpenter *et al.* 2001; Redman, Grove, and Kuby 2004; Redman 2005; Walker *et al.* 2006), and global-local impacts and consequences (Gibson, Ostrom, and Ahn 2000; Robbins 2005; Perry and Ommer 2003; Armitage and Johnson 2006; Cumming, Cumming, and Redman 2006).

Comparatively less attention has been paid to culture in ecological systems. Culture has been a central part of the identification and description of local or indigenous knowledge, as discussed below, but human information systems have been less integral to discussions of social-ecology. Much of the problem is that culture, even more than social networks and community organization, tends not to be readily apparent to

analysts or even necessarily to its practitioners. Culture as an information system however, can be made conceptually visible through examination of assumptions underlying behavior. Culture can thus be seen as integral components of ecosystem organization, process, and outcome, requiring description at various levels and scales. In the discussion here, culture is couched within resilience theory, and an overview of resilience theory is thus a prerequisite to further accounts of culture.

Culture as information will be reconsidered later in the paper as an integral component of ecological systems and in relation to development of propositions for understanding resilience in social-ecological systems (Walker *et al.* 2006). Special attention will also be given to culture and resilience in relation to rapid change introduced by global impacts on ecological systems. In a recent publication on topics related to the present paper, Armitage and Johnson (2006) pose the question of the usefulness of resilience when global impacts produce rapid and massive change. The resilience exhibited by the Georgia shrimpers suggests that culture may be an important factor to take into consideration.

Resilience Theory and Culture

Reduced to essentials, resilience refers to the response capacity of a system to an input that alters its state. The concept of resilience was initially developed in engineering, in which resilience is the speed of return of a system to steady state following a perturbation. Resilience has been extended to ecological systems and developed into a broad and comprehensive theory, primarily through the work of Gunderson (2000) and associates (Gunderson and Holling 2002; Gunderson, Holling, and Light 1995; Gunderson *et al.* 2002; Gunderson and Pritchard 2002; Holling 1973; Peterson, Allen, and Holling 1998).

Ecological Resilience

In cases of ecological resilience, initial conditions are not assumed to be near-steady state (Holling 1996; Gunderson and Pritchard 2002). To the contrary, conditions may be far from a steady state, one in which instabilities can result in a radical change to a new system and in which resilience is measured by the amount or magnitude of disturbance that can be absorbed before restructuring into a different system. In contrast to engineering, where efficiency of function is maintained, resilience in ecology maintains existence of function. The virtue of the distinction is the recognition: (1) of inherent variability within large-scale ecological systems, as for example in fisheries, forests, and grasslands; and (2) of the need for research methods to empirically measure flexibility within the system.

The particular importance of variability within ecological systems is that an understanding of the sources and importance of variables, such as price levels, requires a broad research perspective, typically transgressing the theoretical and methodological approaches of the traditional academic disciplines (Gunderson and Pritchard 2002).

Resilience theory in ecology derives in large part from the Resilience Project, a five-year collaborative effort among an international group of ecologists, economists, social scientists, and mathematicians (Holling 2001). The research group developed a theoretical perspective referred to as panarchy, a hierarchical structure in which systems of nature, including human-nature systems, ‘...are interlinked in adaptive cycles of growth, accumulation, restructuring, and renewal’ (Holling 2001:392). Panarchy thus refers to a complex set of interactive structures across space/time, that is, hierarchies which, in turn, change through adaptive cycles. Within panarchy, ecosystems have adaptive capacity, that is, resilience, which varies in strength and character depending on phases within a cycle or in cycles themselves. Within ecosystems, human systems can have similar cycles and resilience changes within them. When panarchy focuses on human-nature systems, the human components – social, economic, and cultural – can be seen to play a conservative role, inhibiting rapid and unexpected change (Gunderson and Pritchard 2002). Normative behavior tends to reduce and stabilize variability, thereby promoting stasis within systems. Cultural patterns as represented in tradition and institutions, such as law and religion, are organized and perpetuated over long time spans, leveling variability, promoting continuity, thereby reducing shocks to systems.

Culture and Cultural Models

Embedded long-term in institutions, culture likely acts as a buffer to stressful inputs and thus inhibits change and contributes to resilience. However important culture may be in that perspective, culture is a much more complex and dynamic phenomenon, contributing to resilience in a variety of ways. In contrast to earlier perspectives, in which culture was seen monolithically as a directive, even determinant, property of societal institutions, culture now can be viewed as a more local and dynamic property of smaller-scale social aggregates, as information known and shared among the members of the aggregate (Quinn and Holland 1987; Weller and Romney 1988; Romney 1997; Borgatti 2001; Quinn 2005).

Culture as information contextualized and shared by specific social aggregates is foundational for behavior, motivating directing and constraining behavior in relation to organization and content of informational structures and cultural models (D’Andrade and Strauss 1992; Strauss and Quinn 1997; Gragson and Blount 1999; Paolisso and Maloney

1999). Within this informational framework, knowledge tends to be local, domain-specific, and experientially based. Shrimp fishers, for example, acquire knowledge within and across multiple domains about how to shrimp, and since much of that knowledge is gained through repetitive experience to guide behavior, the knowledge also serves to direct future behavior. The knowledge is held individually, but it is similar in content and organization across individuals, in the form of cultural models.

Research on cultural models attempts to provide accounts of experience-based knowledge within specific domains and shared among members of a social group or community (Blount 2002; Dailey 1999; Paolisso, Maloney, and Chambers 2000; Paolisso and Chambers 2001), including fishing communities (Blount 2003, 2004; Cooley 2003; Garcia-Quijano 2006; Gatewood 1985; Greenawalt 2006). Knowledge is related to and derived from experience within a specific type or kind of activity, such as 'life on the water', 'fishing for a living', 'positioning the TEDs', 'setting crab traps', 'following the fish', 'mending fish nets', and 'sorting by-catch', among many others. The more widely shared the knowledge is among members of the community, the more cultural it becomes, both in the sense of being constitutive of the knowledge fundamental to the group and of an information system. The more centrally important the knowledge is to the group, the more likely it will contain sets and sub-sets of other knowledge, each labeled by a keyword or set of words (Blount 2002). 'Life on the water', for example, includes 'fishing for a living', which in turn, includes 'catching fish', which then includes numerous sub-sets of knowledge relating to type of fish, location to fish, habitat, gear, weather, and regulations, among other sets.

The Georgia shrimpers constitute a cultural group through common experience and shared knowledge. They all have specific experience and knowledge about shrimping, related to their boats and gear, to environment and habitat, to weather conditions, to processing catch, to relations with other shrimpers, and to the obligations and responsibilities to the owners of the fish houses where their catch is unloaded and sold and where they 'tie up' their boats. In fact, the boundary of the system is clearly defined by the fish houses where their shrimp catch is sold. Once the shrimp is sold, shrimpers tend not to be interested in what happened to the shrimp from that point. They know, of course, that mid-level distributors buy the shrimp from the fish house owners and then sell them to various businesses, but they have no particular interest in those events. A typical response was 'our job is to catch and sell the shrimp, not to distribute the catch once it is sold'. The cultural system can be seen as embedded within an ecosystem with ecological services – catch of shrimp – and bounded by the fish houses, where shrimping begins and ends. Shrimping is cyclical within the ecological system, following the seasonal

maturation of shrimp and their dispersal from the sounds into open, off-shore waters. Shrimpers have 'packaged information', that is, cultural models about those cycles. There are also lunar cycles, affecting the tides and the impact of the tides on the movement of shrimp into open waters, where they can be caught. Daily cycles also exist, as for example in the location where trawling will be predicted to be most successful, given weather conditions and recent trawling history. Cultural models exist for each of the cycles.

Shrimpers' culture also included knowledge that could be utilized to buffer negative inputs into the ecosystem, to adapt and thereby express resilience. The shrimpers' resilience served them well for several decades, but it began to fail noticeably by the turn of the century, with a sudden upswing in the volume of imported, farm-grown shrimp. New measures, based on expanded knowledge bases, became necessary, if continuation of shrimping as a way to make a living was to continue. A brief historical account is given below.

History and Change in the Georgia Shrimp Fishery

The commercial shrimp fishery in Georgia began in the 1920s, with the advent of the otter trawl and fuel-powered boats powerful enough to pull them (Fleetwood 1995:197). By 1934 Georgia had 149 registered shrimp boats, and that number continued to increase to approximately 1,100 in 1958 and reached a peak of 1,562 in 1976 (Fishery Statistics of the United States [1950-1976] and National Marine Fisheries Service [1977-1989]). During the next ten to fifteen years, the number of registered shrimp boats began to decline substantially, due to a confluence of several factors, in particular a relatively flat rate for the wholesale price of shrimp and increased operating costs. Shrimpers had also agreed in the 1970s to cease trawling in the sounds along the Georgia coast, in response to environmental concerns about degradation of nursery areas for shrimp, crab, and finfish. Rich areas for trawling were thereby closed. The combined pressures on the fishery had reduced the number of licensed boats to approximately 450 by 2000.

Federal Regulations

The defining events of the late 1980s and 1990s were new federal regulations imposed by the National Marine Fisheries Service and the state Department of Natural Resources, principally to protect endangered sea turtles (Blount 2000). Protection of sea turtles became a legal mandate following the passage of the Endangered Species Act in the US in 1972. Within the next decade, all shrimp boats were required to have turtle-

excluder devices (TEDs) installed in their nets to minimize the risk of entrapping and drowning turtles. Shrimpers reacted negatively, often angrily, and more than a decade of conflict followed, not just on the Georgia coast but throughout shrimping communities in the United States. The history of the conflict is complex, addressed by a substantial literature on the history of the requirements for TEDs and resultant conflict and controversy (see for example Company 1990; Durrenberger 1990; Margavio, Laska, Mason, and Forsyth 1993; Moberg and Dyer 1994; White 1989). A similar set of issues arose over modification of shrimp nets in the late 1990s. Smaller 'escape holes', called by-catch reduction devices, or BRDs ('birds') had to be placed in the nets to facilitate the escape of endangered species of fish. Many shrimpers saw BRDs as yet another requirement that diminished their catch levels, at a time when economic pressures were acute.

TED and BRD regulations continued to engender resentment as making a living from ecosystem productivity became more and more difficult. In interviews with shrimpers on the Georgia coast in 1997-1998, regulations were seen as the number one problem affecting the industry (Blount 2002). Shrimpers saw them as an ultimate, cumulative set of pressures, piled on top of ever-escalating operating costs. The impact of the regulations, however, was minor compared to what was to follow in the form of increased volume of imported shrimp and its negative impact on wholesale prices of wild-caught shrimp.

Crisis in the Fishery

Importation of shrimp into the United States was not a new development. Already by 1995, 267,910 metric tons were imported, and the volume increased yearly, almost doubling by 2003. Table 1 covers the nine-year period of 1995-2003, showing the continued rise of imports to 502,722 metric tons in 2003. The increase from 2002 to 2003 alone was 75,268 metric tons, a rise of almost eighteen percent. During the same period, as shown in Table 1, the volume of commercial landings in the United States fluctuated around an average of 16,101 metric tons annually but showed no overall increase. Compared to the U.S. landings, imports were higher by increasing magnitudes. In 1995, the volume of imports was almost twelve times as great as commercial landings, but by 2003 this had increased to thirty-eight times.

Table 1. *United States Commercial Landings of Shrimp Compared to Imports (Metric tons)*. Source: National Marine Fisheries Service, *Statistics, Annual Landings Results (2005)*

	United States	Imported
1995	22,609	267,910
1996	14,358	262,591
1997	17,815	292,435
1998	4,835	313,897
1999	12,899	330,371
2000	14,954	343,418
2001	17,833	398,398
2002	25,541	427,454
2003	14,067	502,722

The imports came from several countries, principally in Asia and Latin America. Table 2 lists the top seven nations that exported shrimp to the U.S. in 2002, and the table shows that each nation exported more shrimp than total collective landings in the U.S. The increase in the sheer volume of imported shrimp post-2000 eventually shifted market prices downward, creating a crisis for shrimpers in the United States, including the Georgia coast.

Table 2. *Shrimp Imports by Country of Origin, 2002 (Metric tons)*. Source: National Marine Fisheries Service, *Statistics, Shrimp Imports (2004)*

Country	Metric Tons
Thailand	97,610
Vietnam	48,136
India	36,356
China	29,757
Mexico	26,407
Ecuador	19,911
Indonesia	15,309

The impending crisis finally arrived at the Georgia coast during the autumn months of 2003. During the summer, the ex-vessel price for thirty-count shrimp (approximately thirty shrimp per pound) was in the range

of 4.50-5.00 US dollars per pound, where it had been for several years. In late 2003, however, the price began to fall rapidly. By October, it had declined to 3.60 US dollars per pound. By mid-December it was only 1.90 US dollars per pound, and by late December, the price was 1.00 US dollars per pound, far below the cost expended in catching shrimp. The collapse of the price structure coincided with the end of the shrimp season, foreshadowing a very difficult six-month off-season. The crisis was evident. Even if the prices rebounded somewhat the following season, as in fact they did, the long-term outlook for shrimpers was bleak.

McIntosh County, Georgia, was hit especially hard. Of the six counties in Georgia that have coastlines on the Atlantic Ocean, McIntosh is the most economically depressed, the most rural, and the most involved in commercial fishing. McIntosh is one of the ten poorest counties among 159 in the state, based on per capita income (Blount, Greenawalt, and Mueller 2000). The population in 2000 was approximately 14,000, contributing only eight-nine percent to the total population of the six coastal counties. The entire county is rated by the US Census Bureau as 'rural', including the county seat, Darien, which has a population of approximately 2,000 people.

Forty percent of the commercial fish landings annually in coastal Georgia, however, are in McIntosh County. The county relies on family-based commercial fishing much more than in any other coastal county. Since ninety-five percent of the commercial landings are shrimp (most of the remainder is blue crab, with only a very small percentage of finfish), it is accurate to say that shrimping is a way of life, a cultural system, and that it has persisted longer than in any other coastal county in Georgia. In many regards, McIntosh County is 'old coastal Georgia', continuing to represent what much of the coast was like in former times, poor, rural, and dependent for livelihoods on the coastal marine ecosystem. Small residential clusters scattered throughout the county arose initially as localized fishing communities, and only in the last few years, have they begun to change.

Responses to Crisis

Some members of the shrimping community on the Georgia coast may have become aware of the danger posed by imports prior to the actual crisis, but overt response was not readily apparent and certainly was not widespread. A few individuals, however, those most attuned to the business principles of the shrimp industry, began to take some precautionary steps prior to 2003, presaging later developments.

Public Relations and Marketing

In the late 1990s, members of one multi-generational shrimping family in McIntosh County, the Boone family, began to seek special markets for their shrimp catch, modeled on the marketing strategy of 'dolphin-safe tuna', tuna caught with nets that would not endanger dolphins. In the case of the shrimp, the market slogan was 'turtle-safe shrimp', shrimp caught with nets that would not endanger sea turtles.

The idea for 'turtle-safe shrimp' may have originated with the Boone family, but it was facilitated by the Earth Island Institute, an ocean conservation organization that originated in California. A representative from Earth Island Institute from Costa Rica visited McIntosh County in 1997 to aid shrimpers in their struggles with regulations about TEDs. He was invited by the entrepreneurial shrimping family, noted above, who endorsed and supported the initiative. The Institute had developed a procedure to certify shrimp boats as 'turtle-safe' if TEDs were properly installed and used. An Earth Island Institute decal was affixed to boats that had been certified. Aware that they had a negative public image, shrimpers saw the certification as a way of announcing to the public that they were environmentally conscious and that they were cooperating with the authorities to save sea turtles. Certification was also a way to establish specialty markets. Within the next year, a limited amount of 'turtle-safe shrimp' was shipped to California and sold at prices considerably exceeding 4.50 US dollar per pound (the exact amount was not revealed). The idea of 'turtle-safe shrimp' became a catalyst for further marketing strategies.

In 2002, the Georgia Shrimp Association (GSA), a formal organization of Georgia shrimpers, enlisted for the first time the services of an executive director, Mr. George Marra, an individual who, according to our interview with him, had recently retired to McIntosh County, attracted to the natural beauty of its coastal areas. Prior to retirement, he had managed a banana plantation in Belize, and he was well acquainted with international business practices. He became interested in the shrimpers' flagging economic conditions and volunteered his services to assist them. In particular, his plan was to help them market their shrimp in ways to maximize their own gain, rather than simply responding to market conditions as those arose. The core of the plan was a public relations campaign to market Georgia wild-caught shrimp locally, within the state, and nationally as superior to imported shrimp. The central strategy was to promote 'wild' or 'sweet' Georgia shrimp as having a better taste thus more desirable than imported, farm-raised shrimp. Also the strategy paralleled the more widespread 'organic is better and healthier' marketing strategy more broadly pursued within US society.

Not all members of the GSA were convinced of the need for the public relations plan. Some of them still resisted the idea that marketing was a part of shrimping, adhering to the established cultural pattern, but the Director and a number of the shrimpers continued to work assiduously to promote 'Wild Georgia Shrimp.' Advertisements were placed in newspapers, on bill-boards and on the internet. 'Spot' announcements appeared regularly on the radio, including National Public Radio in Georgia. Restaurants locally and throughout the state were contacted and encouraged to purchase Georgia shrimp and to advertise its virtues as wild-caught and more flavorful.

Progress was very slow at first, but there are indications that the promotion has been successful to some extent. For instance, at the beginning of the shrimp season in June, 2005, the ex-vessel price of Georgia shrimp returned to 4.50-4.75 US dollars per pound, 1.50 to 1.75 US dollars higher than shrimp caught in the Gulf of Mexico. The current president of the GSA, Mr. John Wallace, credits the difference to the increased public valuation of Georgia shrimp (Darien News 2005a).

Under the leadership of Marra, Wallace, and several other entrepreneurial shrimpers, the GSA has undertaken a number of additional initiatives. One was to have two bills introduced into the state legislature, thereby placing two items on a state-wide referendum in 2003 to seek tax relief for Georgia shrimpers and dock owners. Although the items received majority support in coastal counties, they were defeated state-wide, reinforcing shrimpers' views that they are a small, regional group highly marginal to society at large.

At a more ambitious level, the GSA joined with shrimper organizations in other South Atlantic and Gulf of Mexico states in two endeavors. The first of those was to push for US congressional action to expand TED requirements to areas of Latin America, arguing that protection of sea turtles only in US waters was a limited strategy and that shrimpers in the US were at an unfair advantage in catch levels relative to operating costs. The idea did not originate with Georgia shrimpers, but they were pleased to participate. The actual impacts are difficult to ascertain, given that monitoring is difficult at best, but actions have been taken such as the banning of importation of shrimp from Honduras in 2003 on the grounds of violation of TED requirements.

The second and even more ambitious collective action was to challenge the importing of shrimp from other nations as 'dumping', that is, as flooding the market to undercut local price structures. The case was taken to the International Trade Commission in 2004, and the ITC voted unanimously on the side of the US claim. Tariffs were imposed on major importing nations – Thailand, India, Brazil, Vietnam, and Ecuador – and the collected duties were to be returned to domestic shrimpers to help

offset their past losses. The case, however, is likely to be appealed and thus delayed, and it is by no means clear that the Georgia shrimpers will ever receive any remunerative funds. At least the ITC case is seen by the shrimpers as a moral victory, a relatively rare occurrence (Darien News 2005b).

Entrepreneurship and Niche Marketing

In 2002 a group of shrimping families in McIntosh County began to hold discussions about forming a company to market their shrimp. The goal was to establish a business to export shrimp primarily to niche markets. The group formed the Georgia Shrimp Company (GSC) in early 2003, with twenty-eight families purchasing equal shares in the company. They built their own processing and distribution center and began to operate in the 2003 shrimp season. The company's initial objective was to make contracts for niche markets. They were soon successful in negotiating a contract with a firm in Monterey Bay, California, and they later signed contracts with distributors in the two major cities of the state, Atlanta and Savannah. Contracts with restaurants have also been made at local, regional, and state levels.

It should be noted that all members of the new company, the GSC, are also members of the GSA, including the President of the GSA and the Executive Director of the GSA. The GSA and the GSC have central overlapping interests, in particular success in persuading consumers that Georgia shrimp have better taste and are more desirable than imported shrimp. The difference between the two groups lies in the distribution of landed shrimp. The GSC is obligated to meet its niche market contractual obligations while the GSA still works primarily within the earlier, established system, selling its catches directly to the fish houses.

The obligation to meet contracts necessitated a radical change in the way business was conducted. The time-honored way was for shrimpers to sell their catch to the owner of the fish house where they tied up their boats. Contractual niche markets cannot follow that procedure, since a pre-established amount of shrimp has to be kept in reserve and shipped periodically to the contractual distributors. Shipments can not be skipped, or slighted, and the quality of the shrimp must remain uniformly high. Those requirements meant that a reserve of fresh-frozen shrimp also had to be maintained for off-season shipping. Since the season runs from approximately mid-June through mid-December, inventory of shrimp had to be carefully maintained. Once the annual inventory needs were met, then 'excess' shrimp could be sold to distributors in a more business as usual manner, but the company's goal was to eventually manage all of their landed shrimp in relation to niche markets.

Implementation of the new procedures was not always smooth. The manager of the GSC was the former manager of a family owned and operated long-successful fish house. He thus had much experience of the usual ways of conducting business, and once in the new fish house, he evidently continued to honor his networks, including selling shrimp to local operations on an opportunistic basis. That practice, however, was against company policy, which necessarily eschewed local, opportunistic sales. Tension was created among the 28 shareholders, since 'business as usual' depleted inventory needed for the niche market enterprise. The outcome was the manager's resignation from his position. The President of the GSA took over the management temporarily, until a new manager could be hired. The dissension within the GSC was widely known within the larger shrimping community and probably also precipitated disagreement and conflict, but no systematic information is available.

The overall relationship of the company to the association is an interesting question. Since they share the major goal of promotion of Georgia shrimp, with economic survival on the line, strong incentives exist to minimize or avoid conflict. However, potential for conflict is certainly present. Shrimpers who are not members in the GSC seem to regard it as an experiment with as yet unknown results. A number of them declined the invitation to become members at the outset, seeing it as an expensive and risky endeavor. The reality of the current situation is that one group of shrimpers has begun to dissociate from the larger group, and the potential for sharper separation certainly exists. The members of the GSC themselves indicate that they are not sure that the company will succeed, but they see niche marketing as the only long-term solution to the problem of market collapse due to the volume of imported shrimp. One member referred to the company's efforts as 'our last hurrah.' Their view is that the future of shrimping in Georgia depends directly on the success of advertising and marketing, and that unless a sufficient demand is created for Georgia wild-caught shrimp, market conditions will drive all of the shrimpers out of business in the near future..

Discussion

The ecosystem from which Georgia shrimpers extracted ecological services in the form of landed shrimp, included information systems based largely on common experience and sharing. While the systems allowed shrimpers to pursue relatively successful livelihoods, they were not static and unchanging. Catch levels varied from year to year, and operating costs climbed steadily at increasing rates, making predictions of annual income difficult. Major impacts external in origin to the systems also

occurred, introducing additional pressure and stress. Closure of the sounds in the 1970s meant loss of productive shrimping areas, and the imposition of federal and state regulations in the form of TEDs and BRDs added substantially to shrimpers' difficulties.

The concepts of culture and resilience help to understand the ways in which Georgia shrimpers attempted to deal with the inputs to and perturbations within the ecosystem. Shrimpers exhibited resilience by responding to stress in a number of ways, including efforts to curb operating costs by reducing trips back and forth to the fish houses, by dropping exorbitantly costly insurance on their boats, and remaining on the water for longer periods of time to catch more shrimp. They also sought to reduce or remove stress through resistance and protests against the regulations that lowered upper limits on extraction of the resource and increased their operating costs at the same time, although their efforts were often misunderstood by fishery managers as sheer resistance to change or failure to see the need for any management (Blount 2003). In the meantime, they effected changes in gear design and use, adding TEDs and BRDs. The protests and gear alterations can be seen as adaptive responses that constitute resilience within the limits of the information systems within which they operated. The limits of their responses fell almost exclusively within the cultural system within which they typically operated. Marketing strategies were not included, until the external pressures had begun to overwhelm the cultural system. A few individuals recognized that in order to continue to shrimp for a living, the information system had to be expanded and the cultural scope thereby increased.

While the shrimpers' ecosystem was one element of a panarchy system that extended hierarchically from the Georgia coast into regional, national, and global levels, the Georgia shrimpers drew the boundaries of their system at the point where that extension began. The transformation was to enlarge the scope of their cultural and ecosystem and to tie it into the global system through extending their activities as shrimpers into arenas beyond their experience and information bases.

This transformation was a means by which the shrimpers sought to enhance the resilience of their culture. By moving beyond the confines of their daily, cultural operations, the shrimpers opened up new possibilities for response and adaptation to external stresses. The idea of niche markets was present before the transformation became an open, visible strategy, but action was required to move outward from the extant cultural base. The Boone family may have been instrumental in the development of the idea, but the defining event was the hiring of the Executive Director and his more extensive history of experience in marketing. The transformation depended on cultural brokerage.

Steps by the GSA into new arenas to confront and reduce stress took several forms, as discussed. One effort was to seek tax relief within the state of Georgia. Another effort was to join with other regions and to extend TED requirements beyond US territorial waters. Still another effort was to join other regions of the US to prohibit 'dumping' of farm-raised shrimp. However, the success of those efforts has been limited. That is not surprising, given the magnitude of the scale of differences between local, regional, levels and global levels (Held and McGrew 2003) and the fact that local systems necessarily accommodate to larger ones (O'Brien and Leichenko 2003). Global operations by definition are on a massive scale, as is global change (Robbins 2005). Unprecedented population growth within the past few decades has led to the need for expanding food resources, and the recent rapid growth of aquaculture on an international scale is one response to that need. Aquaculture has substantially increased the availability of fish as a major source of food, but it has also affected small-scale fishing communities worldwide, often negatively (Armitage and Johnson 2006). The crisis in the shrimp industry on the Georgia coast is clearly a case in point.

The most engaged response of the Georgia shrimpers to global stress was the effort to create a niche market through which some balance between continuity and change could be attained. Catching the shrimp still relied on local knowledge, but once they were caught, the distribution process was radically altered. Niche markets required advertising, marketing, and planning on a temporal and spatial scale which were beyond the experience of most shrimpers. Firstly, shrimpers had to recognize that the usual way of doing business would no longer work, that traditional means of adaptation would not be sufficient. The next and innovative step was to formulate a new goal, to seek a different outlet for their catch, in effect, to identify a new market. The only option seen to be available was niche markets. Once these were identified, particularly new Californian markets, the demand for understanding new operating procedures became a direct challenge. Traditional experiential bases for knowledge were not available or effective, and the solution was to seek a specialist, an expert, who had wider international experience. The hiring of the executive director with experience in international trade and who understood well the need for business planning, advertisement, and marketing was the answer to that need. In effect, the Executive Director became the shrimpers' cultural broker who was to make visible and to enact the cultural principles associated with niche marketing. A main point here is that hiring a cultural broker can be seen as adaptive, as contributing to resilience, at the cost of moving into new fields of play requiring new realms of knowledge and understanding, without the social group itself having the neces-

sary cultural knowledge base. Information necessary for success within the expanded ecological system had to be imported and then expanded.

Despite the director's leadership, conflicts occurred between the two cultural systems. In a particularly problematic case, the first manager of the GSC did not make the transition to the new business practices easily. Bowing to pressure from long established networks, he continued to sell shrimp to local distributors, putting himself at odds with the requirements of the new system, the need for a reserve supply of shrimp for periodic shipments to the niche markets. He eventually was removed as manager.

There were other cultural conflicts. The default perspective that shrimpers' work ended when fish were sold to fish houses or local distributors was not easy to overcome. A recommendation that shrimp could be attractively packaged to increase sales in grocery stores was seen as unnecessary, even superficial and silly. The use of bill-boards to advertise shrimp was at first resisted, since it engaged shrimpers with the general public in ways that they had always tried to avoid. When the idea was put forward to have cartoon-character shrimp on billboards dressed in bikinis, under the caption of 'Sweet Georgia Shrimp', lines of religious conservatism were crossed. The transition from the more circumscribed shrimper fishing culture to its extension into marketing culture was not seamless, requiring accommodation to new types and bases of experience to construct and support an expanded cultural system.

The future of shrimping on the Georgia coast following the form that it has existed in the past is not promising. The options utilized in the past, mainly protest and gear alteration, fail to adequately address the socioeconomic problems that shrimpers now face. The fishery is likely to diminish, shrinking to a small number of the more successful shrimpers, but even down-sizing is not likely to enhance the industry's resilience as the volume and price competitiveness of imported shrimp simply negates local attempts to enhance competition. Whether the niche market strategy will succeed is by no means clear. If it does succeed, then shrimping will continue as a way of life, but on a reduced and altered scale. If it doesn't succeed, then resilience will have been surpassed and the system will eventually collapse or else require some further innovation or entrepreneurship as yet not initiated or even foreseen. Any new developments would likely follow trajectories of adaptation evident from the recent past. The number of shrimpers has declined sharply during the past two decades, and the survivors have been those who have made adjustments to the system pressures at the time, that is, the ones whose efficiency improved, thereby allowing them to continue to work in the fishery. The changes have involved a move from part-time to full-time operations, staying on the water for longer stretches of time, adapting to new tech-

nology, especially the use of electronic devices, staying abreast of and adjusting to new regulations, enhancing social networks among kin and the more successful shrimpers, and recognizing that the need for cultural brokerage. In each instance increased efficiency promoted resilience.

Concluding Remarks

Panarchy, as an innovative and encompassing theory, provides a way of thinking about humans in ecosystems, providing a means for linking culture and resilience. Culture as shared knowledge constitutes information about ecosystem process and function, in effect, supportive memory. Memory may be in the form of long established institutions, but it may be more short term as derivative of experience, coded in shared models. Culture is in a direct sense an accessible record of how humans organize themselves within ecosystems, contributing to their resilience and thus sustainability.

Ultimately, culture is a conservative force, supporting institutions and keeping systems intact, but since cultural models are transportable across scales and into new systems, culture can also be innovative, bringing new means of adaptation and thus resilience into structure and process. Accumulated experience then anchors the information in cultural models, making it an interactive record of the ecosystem. The more experientially based knowledge becomes, the more cultural shape it assumes, and the more it can be communicated. To cast these processes in a different perspective, resilience as capacity to return to near-stable conditions requires information exchange. Response to input and adjustments of state conditions occur, as information flows through the system. Culture appears to serve that need.

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