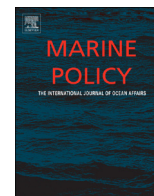




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Social bonds and recovery: An analysis of Hurricane Sandy in the first year after landfall



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ABSTRACT

Hurricane Sandy was one of the most devastating hurricanes to hit US shores. The brunt of the impact was felt in New York and New Jersey, especially among coastal towns such as fishing communities. A survey of these two states assessed social and economic impacts to 958 commercial and recreational fishermen and fishing-related business owners 12 months post-storm. Many businesses and communities were still struggling, due to heavy infrastructure damages and revenue losses with low insurance coverage, but also to disrupted fishing patterns for some species. Social bonds were credited by many as a key aid to recovery. Social bonds (sometimes called bonding social capital) have been shown to be critical for evacuation and recovery in other disasters. However, few studies examine social bonds and disasters within the context of fisheries. This paper expands upon that topic.

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1. Introduction

Hurricane/Post-Tropical Cyclone Sandy (hereafter, Sandy) made landfall in the U. S. at the town of Brigantine, New Jersey on 29 October 2012. While many U. S. states were affected, the worst impacts in terms of deaths and property damage occurred in the New Jersey and its neighboring state, New York [1,2]. Because of their proximity to the coastline and strong dependence on both coastal infrastructure and ocean structure, fishing communities were among the hardest hit. In fact, the US Dept. of Commerce declared fishery disasters¹ for both New York and New Jersey on November 16, 2012 [3].

With climate change, coastal disasters from hurricanes, as well as flooding due to sea level rise, are expected to increase in severity and/or frequency [4,5]. Federal fishery managers will need to plan for and cope with these and other impacts of climate change on fisheries. One key aspect to community resilience and recovery is the strength of social bonds [6]. This article describes the importance of social bonds to the recovery process of the fishing industry in New York and New Jersey following Sandy, using

results from a survey of 958 fishing and fishing-related businesses that was administered in February through March of 2014 and requested information on conditions one year after Sandy (i. e., November/December 2013). Interviewees were fishermen (commercial and recreational for-hire), seafood dealers, bait and tackle store owners/managers, marina owners/managers, and aquaculture facility owners/managers. The disaster literature on social bonds covers topics ranging from preparation/evacuation to impacts, recovery, and future planning. This survey, however, focused primarily on social bonds in relation to impacts and recovery. The survey was organized in five defined sections: 1) general demographics, 2) business impacts, 3) community recovery, 4) individual well-being and preparedness for future natural disasters, and 5) views on climate change [7]. Here we discuss an issue that arose in response to a question² within the business impacts section on attribution of recovery: the importance of social bonds.

Given the well-documented independence of commercial fishermen in particular e. g., [8–12], social bonds might have been less important in fishing communities than other communities. Cooperatives, for instance, are often proposed but rarely successful [13–19]³. Tempering this is a longstanding tradition of information-sharing networks e. g., [20–26], though there is always a

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¹ There were two types of declarations made for each state, a fishery resource disaster (under Sec. 308(d) of the Interjurisdictional Fisheries Act) and a catastrophic fishery resource disaster (under sec. 315 of the Magnuson-Stevens Fishery Conservation and Management Act).

² The specific question was: "If affected by Hurricane Sandy, what do you credit your level of recovery to?"

³ It is important to note that cooperatives fail for many reasons, and not just due to the value fishermen place on independence [9;17;18;11;19.]

balance between expected economic gain/loss from sharing versus social gain/loss from forming bonds that tie people and communities together [21,27,28]. Similarly, a commonly found belief in the importance of equity and fairness [29–33] could lead to strong social bonds, as stronger bonds are common in more homogeneous communities [34–36].

2. Social bonds

The first contemporary analysis of social capital dates to Bourdieu, who defined it as “the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance or recognition” [37]; [though the idea that social cohesion can be beneficial goes back at least to Durkheim and Marx], [38]. Putnam [34,39] sees these inter-personal relationships as the fabric of society, their most important function being to support and enhance prosperity. Coleman [40] extended the possible possessors of social capital from natural persons to corporate persons. For our purposes, Adler and Kwon [41] most clearly describe the concept: “the breadth of the social capital concept reflects a primordial feature of social life – namely, that social ties of one kind (e. g., friendship) often can be used for different purposes (e. g., moral and material support, work and non-work advice).”

Social capital, which can include or overlap with the concepts of social bonds and social networks re. [38,42], helps to reinforce the cohesion and resilience of a community and thus its ability to respond and adapt to a disruptive event, returning to the original or a more desirable state [43,44]. *Social bonds*, specifically, have been shown to be a key aspect of resilience in times of disaster or other disruption [45,46,47,6]. The same is true of *social networks* [48,46,49,50] and *social capital* [51,52,53].

Aldrich and Sawada [54], for instance, found in a quantitative study that social capital was a key factor in lowering deaths from the 2011 tsunami in Japan, while height of seawalls had no statistically discernible impact. Aldrich's [55] study also found social capital to be the strongest factor in recovery after the 1995 Kobe earthquake in Japan. In follow up studies after Sandy, Tompson et al. [56] similarly found that Sandy-impacted neighborhoods and communities with more “social resources” were more resilient, and AP-NORC [57] found that “family, friends, and neighbors” were the most important source of aid that individuals listed as helping in their recovery after Sandy. Delaney [58], studying a fishing community in Japan, found that “social connections” were important to neighborhood recovery after the 2011 earthquake and tsunami. Similarly, Ingles and McIlvaine-Newsad [59] found that in two fishing communities after Hurricane Katrina, the one with greater “social cohesion” was recovering more quickly.

Schellong [60] explores and recommends the use of local (rather than broader-based) social networking service software as one avenue to increasing social capital for resilience to disasters re. [61]. Magsino [62] reports that some practitioners and policy makers are already tapping into existing social networks to distribute disaster-preparedness literature, share coping strategies, and find partners to help staff emergency shelters. Research is ongoing to better understand how social networks are formed and leaders emerge, and the extent to which preparedness within one network (e. g., work) means preparedness within other networks, all this with an aim to create national programs to bolster resilience to disasters. Making communication between government and stakeholders two-way is also important. Adler and Kwon [41] note that “institutional e. g., [63] and synergy e. g., [64] views give an important role to government in fostering community-level social capital.” FEMA [65], meanwhile, has established a Neighbor-to-Neighbor program that includes a Community Preparedness

Toolkit providing ideas for coming together with neighbors around service projects for disaster preparedness.

However, social bonds are not uniquely positive in their impacts. When geographically close communities have unequal levels or strength of social capital, those communities with strongest social capital can capture disproportionate amounts of aid and actually hinder the access of less fortunate communities, leaving them worse off than they would have been in a situation where all communities had similar levels of social capital [66; 67; 68; 69; 70].

The literature on social capital further differentiates among bonding, bridging, and linking types of social capital [47; 6], each of which serves a somewhat different function in disaster recovery. Hawkins and Maurer [47] provide a particularly succinct and useful comparison of the three:

Bonding social capital refers to relationships amongst members of a network who are similar in some form [34]. *Bridging social capital* refers to relationships amongst people who are dissimilar in a demonstrable fashion, such as age, socio-economic status, race/ethnicity and education [71]. *Linking social capital* is the extent to which individuals build relationships with institutions and individuals who have relative power over them (e. g. to provide access to services, jobs or resources) [72; 71].

Here we concentrate on bonding social capital, based on relationships among those whose livelihoods depend on fishing, using the term social bonds. Social bonds (or bonding social capital) are defined as being primarily found in groups of friends, family, neighbors, or other close social connections. These are the connections that tend to be activated first [73; 50] and last [50] in a disaster. In fishing communities, crew (who may also be family, friends, or neighbors) and those within the same information-sharing networks (see above), food-sharing networks e. g., [74], fishing associations, or the few functioning cooperatives e. g., [75] may have such close social bonds.

3. Survey methods

The sampling frame for the survey consisted of 4,926 commercial fishing, recreational for-hire fishing, and fishing-related businesses operating in New York and New Jersey. The target sample of 1,158 interviews was calculated based on a 5% confidence interval and a 95% confidence level. A multi-mode survey administration approach including mail, telephone and in-person was used to maximize the number of completed surveys [76] because multi-mode sequential survey administration has been found to improve the response rate [77]. Concern for potential bias due to a multi-mode survey administration approach was considered outweighed by the improved response rate achieved.

Participants were selected for the mail survey using a stratified (by sector, i. e., commercial, for-hire, fishing-related business) random sample approach. A total of 355 responses resulted from the mail survey. The sample frame for the telephone survey consisted of both non-respondents from the mail survey and others who were not selected for the mail survey but had a telephone number. This resulted in an additional 569 completed surveys. Finally, thirty four in-person interviews were conducted with respondents who had not completed the survey by mail or telephone. All interviews, phone and in-person, were conducted by experienced personnel trained by the authors. In-depth ethnographic information, useful in the interpretation of the survey results, was also collected during the in-person survey administration. Overall, 958 respondents or 83% of the targeted number of respondents completed a survey.

The geographic distribution of survey results showed good coverage across both states. In some cases, the respondent contact

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