

Repetitive flood victims and acceptance of FEMA mitigation offers: an analysis with community–system policy implications

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Of all natural disasters, flooding causes the greatest amount of economic and social damage. The United States' Federal Emergency Management Agency (FEMA) uses a number of hazard mitigation grant programmes for flood victims, including mitigation offers to relocate permanently repetitive flood loss victims. This study examines factors that help to explain the degree of difficulty repetitive flood loss victims experience when they make decisions about relocating permanently after multiple flood losses. Data are drawn from interviews with FEMA officials and a survey of flood victims from eight repetitive flooding sites. The qualitative and quantitative results show the importance of rational choices by flood victims in their mitigation decisions, as they relate to financial variables, perceptions of future risk, attachments to home and community, and the relationships between repetitive flood loss victims and the local flood management officials who help them. The results offer evidence to suggest the value of a more community–system approach to FEMA relocation practices.

Keywords: FEMA, flood loss, flood mitigation, place-based attachment, rational choice, risk

Introduction

Of all natural disasters, flooding yields the greatest economic burden and claims the most lives (Mileti, 1999; Brody et al., 2008). In the United States, Hurricane Katrina (August 2005) alone is estimated to have taken 1,836 lives and resulted in USD 25 billion of insured losses (Plummer, 2005) and a total cost in excess of USD 100 billion (Wolk, 2005). Furthermore, unquantifiable disruption and damage affected communities, homes and the well-being of families and individuals. Katrina's impact is but one illustration of the widespread distress flood victims around the world experience annually.²

Since the early 1990s scholarly reports to the US Federal Emergency Management Agency (FEMA) have focused to an important degree on strategies for dealing with one specific flooding challenge: non-catastrophic, repetitive flooding. Non-catastrophic floods do significant but repairable damage, in contrast to those that destroy properties and structures completely. FEMA strategies for repetitive flooding situations, nevertheless, often include a form of cost-sharing between FEMA and state or

local government agencies or property owners themselves for the *permanent* relocation of flood victims (National Academy of Public Administration, 1993; National Performance Review, 1993; Interagency Floodplain Management Review Committee, 1994).

The costs of FEMA's interventions have been high and are rising. In total, the National Flood Insurance Program (NFIP) has paid out USD 4.6 billion in meeting repetitive loss claims since 1978 (US GAO, 2004; American Rivers, 2006). In fact, when the US Congress passed the Bunning–Bereuter–Blumenauer Flood Insurance Reform Act (FIRA) of 2004, a transparent goal was to reduce the economic burden that severe repetitive loss properties had imposed on the NFIP. The legislation warrants a brief description here, since the mitigation activities examined in this study were conducted under its auspices.

The FIRA created a pilot programme authorising the expenditure of up to USD 40 million annually to mitigate severe, repetitive loss properties in an effort to make the NFIP more financially sound. Under the programme, funds are allocated to states in proportion to the relative percentage of severe repetitive loss properties within them. While repetitive loss properties comprise approximately one per cent of NFIP properties, they make up 25–30 per cent of claim losses. Therefore, this relatively small group of properties offers a unique opportunity to reduce the programme's financial costs. While there are 4.4 million NFIP policyholders nationwide, there are some 48,000 repetitive loss properties (based on a broad definition of 'repetitive loss'). A subset of these properties, roughly 10,000 in total, falls into a more stringent category of 'targeted repetitive loss'. The latter group is the population from which the present study draws its sample.

To encourage local responsibility for flood prevention, the FIRA specifies the provision of funds to local governments through the states to support flood intervention activities, including property elevation, flood-proofing of repetitive loss properties, property buyout, and resident relocation. Property owners who refuse these offers of mitigation must pay increased insurance rates. Under these circumstances, it is anticipated that homeowners will adopt the apparently rational course and accept the mitigation offer to secure their property or relocate out of harm's way. Their risk-related choices also are coupled with the added disincentive of increased insurance premiums should they not opt to mitigate.³

FEMA (2007, 2008) emphasises that, aside from risk management, mitigation lessens the financial impact of natural disasters on individuals, communities and society as a whole. Yet, within this context of financially-driven concern is the need to assess a broader set of reasons *why* some repetitive loss property owners find it difficult to accept offers of flood mitigation. FEMA admits that most of what is known about mitigation decision-making is based on conjecture rather than systematic research (FEMA, 2003), although FIRA strategies appear to be based to an important degree on the probability of repetitive loss victims making rational choices in their decision-making. In a bid to inform and improve the success of future mitigation as well as the basic welfare of victims, FEMA sponsored, in 2004, a competitive funding opportunity to determine what factors motivate victims of

repetitive flooding to mitigate and relocate, or cause them to have difficulty in reaching such decisions. This funding opportunity led to the present study. The substantive interests of FEMA are reflected in the survey and the interview questions put to repetitive loss victims and local flood management officials. These questions elicited the responses used by the authors to investigate the various determinants of decision-making by repetitive loss victims facing permanent relocation choices. A central theme running through this study is that flood victims base their decision-making on 'rational choices' of various types. When their decision-making is rational, calculable and predictable, public policy in principle can be much better directed and a great deal more effective in ameliorating the negative impacts of flooding events (see Kunreuther, 2006).

Literature review

The theoretical and empirical literature on hazards generally, and flooding in particular, addresses a broad spectrum of dynamics relevant to mitigation decision-making. Although the decisions of repetitive loss victims may fail when it comes to careful calculations of costs and benefits (Kunreuther, 2006), many of them appear to be based on reasoned financial, risk-related, place-related, and trust-related rationalities. Much of the empirical literature on flooding and mitigation focuses intensively on a restricted set of these rationalities. In contrast, this study treats them serially, addresses the methodology, and then offers findings that tackle the four relevant dimensions of rational decision-making simultaneously, and in some cases, interactively. Coupled with findings from other efforts, this leads to the presentation of some tentative directions for public policy. The community-based approach advocated by the authors extends some long-standing themes and is consonant with current thinking in some sections of FEMA and the nation generally.

Economics and mitigation choices: literature review and hypotheses

Economists, psychologists, and sociologists, among others, for a long time have theorised that the making of rational decisions or choices is fundamental in understanding human and group decision-making. Generally, people make rational choices from among multiple alternatives, selecting the options that maximise their financial benefits while minimising their costs (Coleman, 1966, 1990; Becker, 1976; Cook and Emerson, 1978; Cook et al., 1983), and they appear to be more apt to do so when presented with other 'models' of such behaviour (Schelling, 1978). The rational choice or 'cost-benefit' formulation has been applied to explain behaviours as diverse as individual microeconomic decisions (Becker, 1976; Sen, 1987), 'bargaining' in families (Scanzoni, 1972), mass collective behaviour and social movements (Olson, 1971; Hechter, 1987), the macroeconomic operation of the world system (Wallerstein, 1974),⁴ and, of course, human decision-making with regard to disasters (Kunreuther, 2006).

Financial rationality is key to decision-making on repetitive loss flooding, although the authors acknowledge that the relationship between economic rationality and disaster decision-making is not always straightforward (Viscusi, 2009). Consider that even the *FEMA Strategic Plan: Fiscal Years 2008–2013* (FEMA, 2008) itself expressly focuses on very rational, financial criteria, including cost reductions, in its flood mitigation programming.⁵ It is perhaps noteworthy that Rose et al. (2007) examine cost–benefit ratios for FEMA mitigation grants for a range of natural disasters, including earthquake, flood and wind hazards, and show that the highest cost–benefit payoffs are for FEMA’s flooding programmes.

Financial rationality is important to homebuyers and developers and townships contemplating the purchase of a home or property that is flood-prone. Loucks and Stedinger (2007) adopt a cost–benefit approach to examine both the downsides to and the incentives for flood property ownership and utilisation. These rational choices are pertinent to those flood victims who discover belatedly that they are, indeed, living in a flood-prone area, those considering the purchase of flood-related insurance, or those facing the need to flood-proof their home.

Of course, financial considerations are particularly important to repetitive loss flood victims who must seriously contemplate mitigation and home relocation. As noted earlier (see also Wamsley and Schroeder, 1996), some flood victims, such as those in the state of California, are required to provide a 25 per cent match to the 75 per cent provided by FEMA in order to promote flood victim relocation. On the face of it at least, this appears to be a powerful financial disincentive to relocate, relative to ‘non-match’ alternatives offered to others. But this is not the only way in which financial rationality might affect mitigation. In a relatively straightforward application of rational choice theory, it is plausible that relative to others, wealthier homeowners have invested more heavily in their property and in home upgrades, which creates greater disincentives for them to agree to relocation. Put differently, in the form of a hypothesis for testing, the greater the perceived value of the home, the harder it is for the repetitive loss victim to agree to mitigation and relocation.

Risk and mitigation choices: literature review and hypotheses

Whether they are offered a match, or are deeply invested financially in their homes, repetitive loss victims must balance rational economic choices with another type of rational decision: the perceived costs or ‘risk’ of being flooded again. Granted, ‘risk’ assessment can have an economic component, but risk is a multidimensional dynamic that includes perceptions of future physical harm and distress. A number of empirical studies emphasise the importance of perceptions of risk in individual decision-making, such as risky behaviour among youths and criminals (see, for example, Cornish and Clarke, 1986; O’Donoghue and Rabin, 2000), organisational decision-making (see, for example, Sitkin and Weingart, 1995), and societal-level decision-making (see, for example, Hirschleifer, 1994). Other treatments address specifically rational perceptions of risks in disasters and their impacts (Busby and Alcock, 2008; Loucks et al., 2008; Pennings and Grossman, 2008; Raaijmakers, Krywkow and van der Veen, 2008).

Burningham, Fielding and Thrush (2008) utilise quantitative and qualitative data on flooding in the United Kingdom to show that risk awareness is a function of class, prior flood experience, and length of residence. While conceding there is ambiguity in the evidence (see Camerer and Kunreuther, 1989; Kunreuther and Pauly, 2004; Revkin, 2006), this research draws on the Burningham, Fielding and Thrush (2008) study, and hypothesises that as repetitive flood victims perceive risks, they will find it easier to reach mitigation decisions. In addition, it follows the lead of Burningham, Fielding and Thrush (2008) and posits that higher income groups may identify greater risk and be more ready than others to respond favourably to mitigation and relocation opportunities, despite countervailing economic disincentives. Furthermore, it hypothesises that perceptions of risk and willingness to mitigate will be greater for longer-term residents.

However, the literature suggests risk assessments may be at some variance with objective circumstances. This can culminate in apparently rational, albeit misdirected, resistance to relocation, leading to susceptibility to yet another round of repetitive loss (Burningham, Fielding and Thrush, 2008). Kunreuther (2006) and Burningham, Fielding and Thrush (2008) also show that, in addition to 'risk awareness', residents may underestimate the impact of such rare, but risky, events. Flood victims may do so in part because other infrastructural changes (such as the creation of building levees) undertaken by the federal government may lull repetitive loss victims into a false sense of security (Burby, 2006). These authors hypothesise that when perceptions of risk are relatively lower, it will be more difficult for repetitive loss victims to reach a decision favourable to relocation. The converse of course is that perceptions of risk make the repetitive loss victims' decision to mitigate easier.

Place attachment and mitigation choices: literature review and hypotheses

Financial and risk rationality assessments are central to all human decision-making, but in conjunction with such choices, consideration of social and psychological attachments to the surrounding environment is necessary as well. Generally speaking, attachments to home and community, or 'place-based attachments', contain an important component of rational predisposition that affects decision-making, including the willingness to relocate physically to other areas. For example, Giddens (1986), Altman and Low (1992), Dupuis and Thorns (1998), Wakefield and Elliott (2000), Manzo and Perkins (2006) and Padgett (2007) emphasise the positive effects of home or community attachments on feelings of security and psychological well-being. Blunt and Dowling (2006) similarly conceptualise the home, in particular, as both a material and emotional object that fulfils important human needs in tangible and intangible ways. The emotional embeddedness, and feelings of security, fondness, satisfaction, happiness and well-being associated with such settings, are well-documented⁶ (Brown and Perkins, 1992; Chawla, 1992; Brown, Perkins and Brown, 2003; Manzo and Perkins, 2006).

For many, place-related attachments go beyond the home and embrace the local community. Community is the foundation for all societies, whether traditional or

modern (Toennies, [1887] 1963; Durkheim, [1897] 1997). Shared space and habituated routines involving supportive others foster the development of trust, exchange, and an undeniable sense of security. In many communities with long-standing emotional ties, neighbours come to 'count on' one another to aid in the most difficult of times. The nature and importance of this support is amply documented in the literature on both rural and urban places (Brown and Perkins, 1992; Manzo and Perkins, 2006). Furthermore, there is long-standing theorisation (see, for example, Park and Burgess, 1921) about the *negative* consequences of disorganised or disrupted neighbourhoods and communities, including those where community character is changed or when residents are relocated physically to other areas. Changing physical locations can disrupt routinised patterns of behaviour and communication, while adversely affecting the very basis for individual identity (see Altman and Low, 1992; Blunt and Dowling, 2006).

As an illustration relevant to flooding, Litts' (2008) study of evacuation decisions during Hurricane Katrina shows that networks of trusted community members motivated threatened residents to evacuate, even those who otherwise would not have left despite repeated government warnings. Moreover, a number of other hazard studies have linked strong community ties, community capacity, community networks, community organisations and 'bottom-up' community initiatives both to successful preparations for natural disasters and to community resilience in their 'aftermath' (Ikeda, Sato and Fukuzono, 2008; Jennison, 2008; Kapucu, 2008; Redlener, 2008; Zevenbergen et al., 2008).

When attachments to home and neighbourhood are disrupted, temporarily or permanently, a range of serious personal consequences for residents emerge (see, for example, Altman and Low, 1992; Brown, Perkins and Brown, 2003; Manzo and Perkins, 2006). These dynamics suggest that place-based attachments to home and community serve as both a counterpoint and possible complement to the rational choices made by flood victims, who must also balance the circumstances of finances and risk. In a relatively straightforward application of these arguments and the research on place-based attachments, we hypothesise that the more strongly attached flood victims are to their 'place', both their home and their community, the more difficult it is for them to reach a mitigation decision favourable to relocation.

Trust in officials and mitigation choices: literature review and hypotheses

Another dynamic mentioned earlier is the role played by local officials and the 'bureaucracy' in the mitigation decision-making of residents. Weber's ([1921] 1968) pioneering work on bureaucracy and its sometimes overly rational and pernicious effects is pertinent here. So too is Ritzer's (1995) extension of the work of Weber to reveal the 'McDonaldisation' of modern society, characterised by heightened efficiency, calculability, predictability and control. These characteristics replace humans in the roles they might otherwise play in the highly nuanced context of day-to-day organisational operations. According to Ritzer (1995), these patterns of increased rational and bureaucratic systems threaten to offer irrational, template

solutions for society that are counterproductive and frequently demonstrate the 'irrationality of rationality'. With respect to flooding and decision-making, a number of disaster researchers have pinpointed the procedural difficulties created by burdensome bureaucracies such as FEMA itself (Westley, Murphy and Anderson, 2008), and the key, facilitating role that can be played by local officials (Gill, 2007; Kapucu, 2008). Indeed, the role of trust in facilitating all human relationships, whether economic or emotive, has been well established (see, for example, Lewis and Weigart, 1985; Hurley, 2006; Fehr, 2009). Repetitive flood loss victims who may have rather negative views of the bureaucratic effectiveness of FEMA may nonetheless trust their local FEMA officials to help them. Under these circumstances it is quite rational for them to be more favourably disposed to officials' recommendations. As a consequence, we hypothesise that local officials viewed as 'helpful' will ease the difficulty that flood victims have in reaching favourable mitigation and relocation decisions.

Data and methods

Data were collected in 2004 as part of a FEMA-supported study designed to address how the organisation could motivate effectively repetitive loss victims to agree to mitigation. The mounting costs of the NFIP, and the opinion that the programme simply was not sustainable in the longer run, led to efforts to understand better the perceptions and actions of repetitive loss flood victims.⁷ Qualitative data were collected in interviews during site visits to 38 state and municipal officials. Information gathered during the interviews was used to build a sampling frame from which repetitive loss property owners were randomly chosen to participate in a telephone survey, in which quantitative and qualitative data were collected. The interview and survey methods used were designed to permit confirmation or disconfirmation of a range of plausible hypotheses of why repetitive loss victims have difficulty in reaching decisions favourable to mitigation. Coupled with open-ended questions that were non-directive, this information-gathering process led to a field of responses that in several respects parallel a number of themes in the hazards literature. Of course, as is the case for all such studies, it is likely that some thematic issues were missed by the project. Furthermore, as is true of many studies such as this one, our quantitative and qualitative results rest on data based on individual's selective perceptions, memories, rationalisations and feelings of cognitive dissonance, as well as their tendency towards social desirability in responding to questions. While these issues are endemic to comparable studies, we hope that the triangulated methodologies employed minimised many of these issues, but we must view our findings as preliminary, although suggestive, provocative, and potentially useful for policy.

Sample

Eight sites were selected for the study based on a range of theoretical and practical criteria, including NFIP history, mitigation outreach records, type of mitigation,

socio-demographic characteristics of the repetitive loss population, and geographic diversity (see Table 1 and Figure 1). Public domain data provided by FEMA were used to categorise sites. The site selection process entailed a visual inspection of the targeted repetitive loss structure map provided by FEMA, interviews with 18 mitigation and insurance specialists at FEMA in Washington, DC, an evaluation of a data set of the top 101 target sites provided by FEMA, evaluation of the Bureau of Statistical Agent's NFIP repetitive loss data, and an assessment of selected sites based on Census 2000 data as well as FEMA Community Rating System data measuring site mitigation performance. Sites were selected if they had a significant number of targeted repetitive loss properties relative to all repetitive loss properties, a high amount of total paid insurance claims per NFIP policyholder, and a large number of insured repetitive loss properties relative to the total number of repetitive loss properties. The sample included communities that have both successful and challenged track-records in promoting mitigation and outreach. This track-record was based on the scoring of the NFIP's Community Rating System (CRS) (CRS, 2009).

The CRS is a 'voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements' (CRS, 2009, p. 1). Flood insurance premium rates are discounted when community actions meet the goal of reducing flood losses, facilitate accurate insurance ratings and promote awareness of flood insurance. Specific codings are provided by FEMA (2009). The sample included sites performing elevation and buyouts, as well as structural approaches such as storm water management projects, in their general strategies for mitigation. The individuals sampled were, however, those affected by buyout and relocation mitigation. The sites represented the socio-demographic diversity present in the US population, including wealth and ethnicity. In addition, the sites were located in areas that have unique biophysical properties and at a minimum included both riverine and coastal flooding.

For the readers' inspection, data on socio-demographics, flooding source, repetitive loss profile, and sampling for all sites are provided in Appendix 1. The selected sites are depicted in Figure 1: the Town of Felton, California; Sacramento County, California; Jefferson Parish, Louisiana; St. Tammany Parish, Louisiana; the City of Savannah, Georgia; City of Washington, North Carolina; Beaufort County, North Carolina; and the Town of Belhaven, North Carolina.

After choosing the eight sites, mitigation officials at the state level (California, Georgia, Louisiana and North Carolina) and city/county levels were interviewed. These interviews were conducted during site visits to obtain mitigation officials' perspectives on repetitive loss mitigation efforts generally, and the decision-making of repetitive loss victims specifically. The interviews also were conducted to collect the most current lists of repetitive loss property owners within their jurisdiction who had received a mitigation offer. Local mitigation officials proved to have the most current repetitive loss property owner data of all possible sources. In total, there were 668 repetitive loss property owners to whom mitigation and relocation offers had been made at the eight study sites. From this list, a sample of 300 households

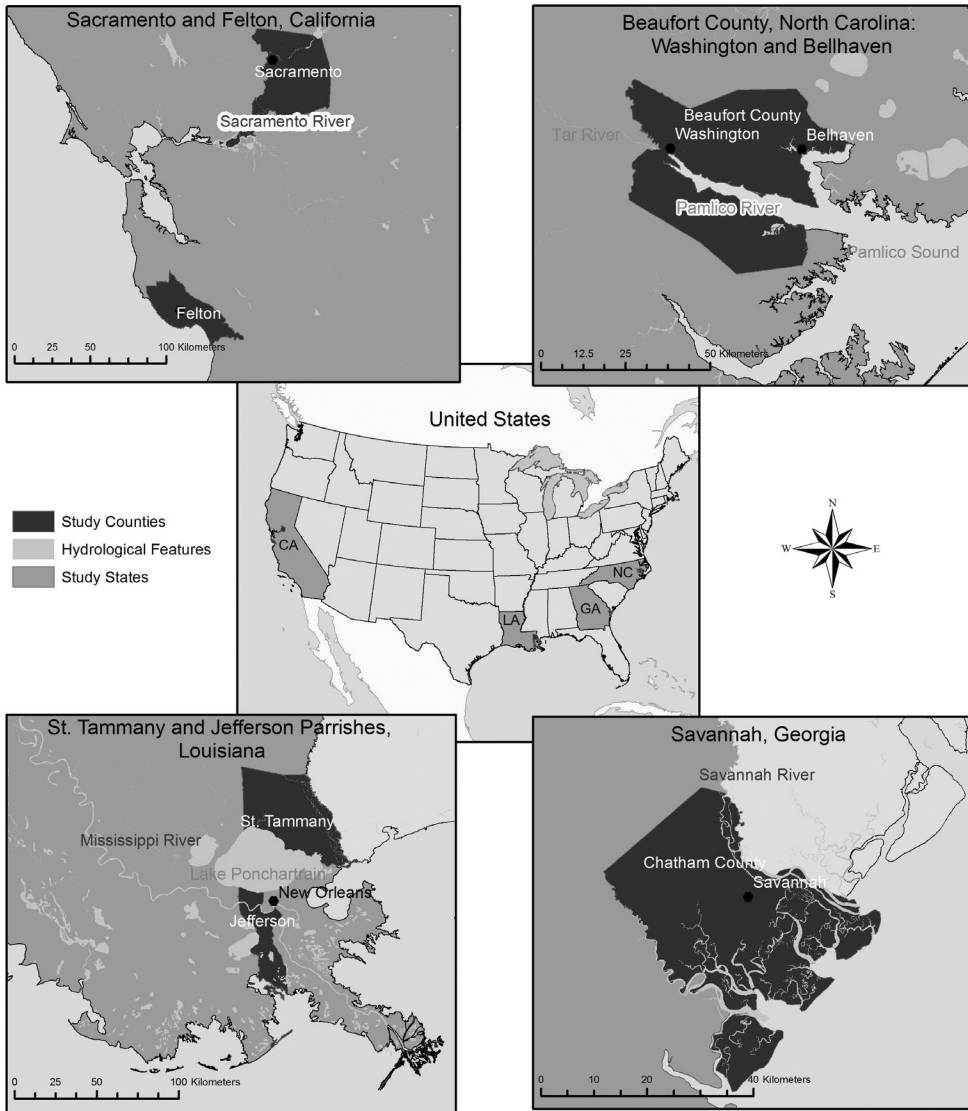
Table 1 Population, mitigation history and survey numbers for selected study sites

	Jefferson Parish	St Tammany Parish	Sacramento County	Town of Felton	Beaufort County	Town of Belhaven	City of Washington	City of Savannah
State	LA	LA	CA	CA	NC	NC	NC	GA
FEMA region	6	6	9	9	4	4	4	4
Repetitive flooding source	Severe rainfall	Severe rainfall	Riverine	Riverine	Coastal, riverine	Coastal	Coastal, riverine	Coastal, riverine
Population ¹	455,466	191,268	1,223,499	1,051	44,958	1,968	9,583	131,510
% White ¹	70%	87%	64%	91%	68%	37%	52%	39%
% Black ¹	23%	10%	10%	1%	29%	61%	45%	57%
% Hispanic ¹	7%	2%	16%	7%	3%	3%	3%	2%
% Rural ¹	1%	25%	2%	0%	68%	100%	2%	1%
Median age ¹	35.9	36.3	33.8	34.3	40.2	40.6	39.5	32.3
Housing units ¹	187,907	75,398	474,814	517	22,139	1,015	4,399	57,437
% Vacant housing ¹	6%	8%	4%	24%	17%	19%	10%	11%
Median household income	\$38,435	\$47,883	\$43,816	\$48,102	\$31,066	\$22,057	\$16,674	\$29,038
Historical repetitive loss properties ²	5,755	853	114	No data	675	297	136	317
Actual repetitive loss properties ²	5,724	851	83	15	637	198	112	218
% repetitive loss housing	3.1%	1.1%	0.02%	2.9%	2.9%	19.5%	2.5%	0.4%
Federal share buyouts/elevations ⁴	\$3,426,566	\$7,804,402	No data	No data	\$7,763,188	\$7,040,553	\$3,342,281	\$14,654,372
Total approved buyouts/elevations ⁴	11	52	No data	No data	223	376	110	385
CRS class ³	7	9	5	None	8	8	8	8
Available telephone numbers ⁵	45	46	192	21	101	369	61	46
Repetitive loss homeowners surveyed	21	18	63	6	35	59	17	18

Notes:

¹ US 2000 Census.
² As of 29 February 2004.
³ As of 1 May 2003, all NFIP, not only repetitive loss.
⁴ As of December 2003.
⁵ Homeowners offered mitigation.

Figure 1 Study sites for FEMA data collection



Source: author (James C. Fraser); data from US Census Bureau (2000).

was randomly chosen through computerised selection. The target of 300 was the maximum sample size that was possible with the funding provided. A total of 237 households completed telephone interviews, yielding a respectable 79 per cent return rate. When we telephoned we spoke to the repetitive loss victims identified by the local officials as the responsible party, except in a handful of cases (such as two in California) when responsible adults supplied the information because our contact person was either deceased or now domiciled in a nursing home. Of the households surveyed, there were 190 repetitive loss households that accepted the mitigation offer and 47 repetitive loss households that refused it. In each group there

was significant variation in the reported degree of difficulty in making the mitigation decision. Most of the remaining 63 victims of repetitive loss could not be reached after repeated efforts to contact them, because they did not answer their telephones, had made their number confidential or had changed their number. In just a few cases they were reached but were unwilling to participate.

Variables

The survey of repetitive loss homeowners who had made a mitigation decision permitted the construction of a measure of the degrees of difficulty flood victims experienced in doing so. They were asked: ‘How difficult was the decision to accept the offer of mitigation?’ Variations in the scores for the ‘difficulty’ flood victims experienced in making their relocation decisions were statistically distributed in a way that satisfied the normality assumptions of our analytical strategy. Respondents also reported on several social or demographic factors, rated the condition of their property, disclosed their household income, and indicated whether their mitigation offer required a financial match on their part. We asked them also to identify how important the likelihood of future flooding was in their decision to mitigate, how helpful the local official was in guiding them through the mitigation process, how attached they were to their property, and how concerned they were about leaving their neighbours.

Many of the close-ended questions posed, and later used in the construction of variables, were based on a ‘four-point’ Likert scale. By way of illustration, we asked: ‘How important were financial considerations in making your decision about the offer of mitigation?’; response choices were: ‘Very important’, ‘Somewhat important’, ‘Not very important’, and ‘Not important at all’. The questions used in our analyses are reproduced in Appendix 1.⁸ In addition to the battery of close-ended questions, open-ended questions were included in the survey, too. Among other things, answers to them provided a deeper understanding of processes vital to the respondents’ mitigation decision-making. The open-ended questions included a generic question requesting that the repetitive loss respondents ‘provide any additional information that they wanted to’. Open-ended answers are part of the narrative analysis data presented below.

We omit from present consideration a number of factors, some suggested by FEMA and others emphasised in the literature, that proved to be inconsequential in our quantitative and qualitative analyses (such as age, household size, gender, race/ethnicity and years of education).⁹

Analytical techniques

Structural equation modelling (SEM) and qualitative narrative data helped us to identify relationships between explanatory variables, and their degree of impact on the dependent variable, that is, the ease of reaching a relocation mitigation decision. We employed a technique from the regression family to test the hypothesised

relationships covered above and treated in other empirical studies, and to judge causal impacts *net* of each other's influence. While ordinary least squares (OLS) regression would permit one to make some of these judgements, too, it, among other things, does not facilitate the estimation of indirect or mediating effects treated earlier. SEM offers this important advantage, allowing one to test somewhat more indirect causal links that the literature and respondents indicated were important.¹⁰

Narrative analysis is a commonly used technique that allows for recounting of the spoken viewpoints of interviewees (Riessman, 1993). When the narratives of officials and repetitive loss respondents are analysed, in tandem with the evidence from quantitative modelling, the methods utilised constitute a 'triangulated methodological' approach. This approach synthesises data from different sources, facilitates the corroboration of findings across data sets, and permits a more deeply informed understanding of the dynamics of interest (Bachman and Schutt, 2007).

Findings: structural equation model

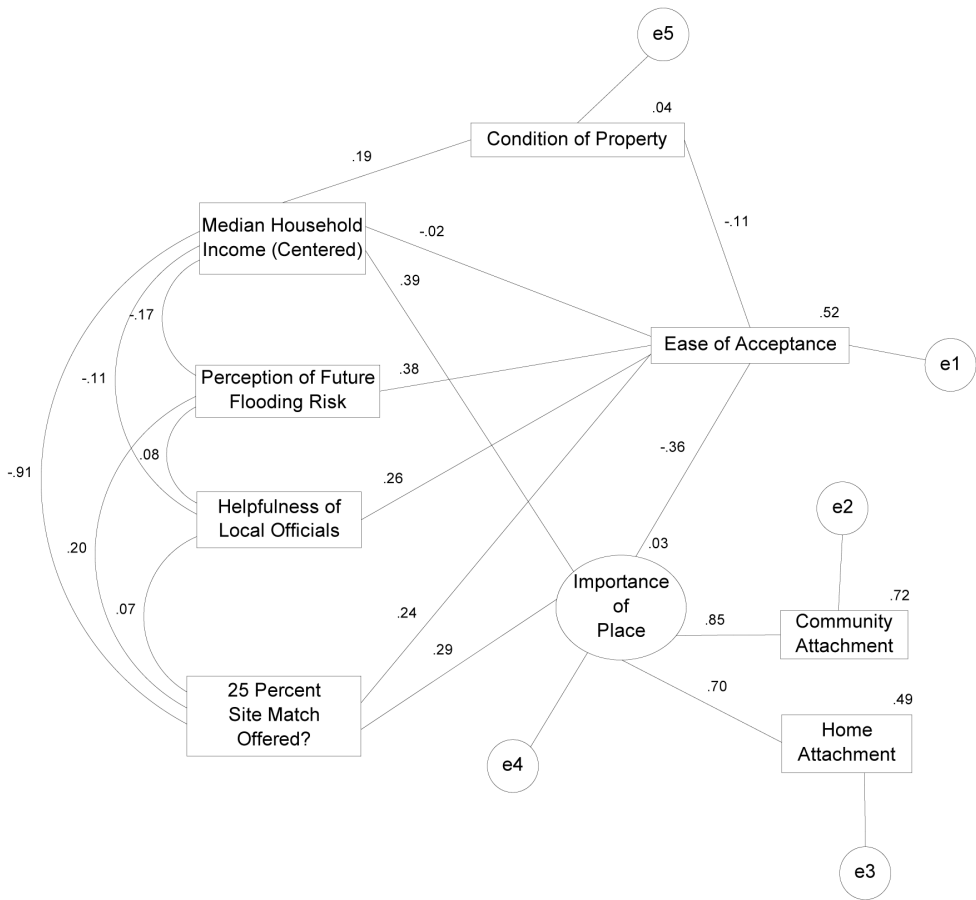
We turn first to the quantitative results presented in Figure 2, which are subsequently expanded and refined by the qualitative narrative findings.¹¹ Our analysis of the household questionnaire data leads to a valid structural equation model, indicated by a good fit to the data,¹² according to a commonly accepted package of goodness of fit statistics (Bollen, 1989). The model explains approximately one-half of the variation in the dependent variable, the respondents' ease in making mitigation decisions. An examination of the model paths reveals the relative strength of direct and indirect effects for each independent variable, controlling for the others, with each path coefficient varying from a maximum positive (1.00) to a maximum negative (-1.00) relationship.

As hypothesised, property condition has a significant negative, albeit rather weak, effect on the ease of acceptance (-.11)—property owners who perceive the condition of their property as higher find it more difficult to mitigate and relocate. Wealth does not affect ease of acceptance directly, but as hypothesised, the effect of median household income on perceived property condition is modestly positive. When coupled with the equally modest negative impact of 'condition', the pathways support the inference that wealthier residents find it harder to reach decisions favourable to mitigation. This tendency is strengthened even more by the impact of income on place attachment (.39), which as discussed below makes mitigation harder. Economic rationality surfaces as well in the form of the effect of provision of a match (.24) on difficulty of mitigation decision-making. Wealthy or poorer, it is financially rational for property owners who must pay the match to have a harder time deciding to mitigate.

Perceptions of risk matter as well. Fear of future flooding risk facilitates the ease of acceptance (.38). This finding corroborates what would be expected from the 'risk rationality literature'—natural circumstances viewed as risky tend, quite rationally, to motivate repetitive loss victims to avoid them by mitigation.

SEM results show that attachments to the community and to the home jointly serve as appropriate indicators of the place-based attachment variable. Put another

Figure 2 Structural equation model predicting the ease of accepting a mitigation offer*



Notes:

* Model fit statistics: χ^2 (degrees of freedom) = 20.51 (11), NFI (Nomad Fit Index) = 0.971, RFI (Relative Noncentrality Fit Index) = 0.903, IFI = 0.989, TLI (Tucker–Lewis Index) = 0.953, CFI (Comparative Fit Index) = 0.986, RMSEA (Root Mean Square Error of Approximation) = 0.061. The R² values of each endogenous variable appear in the upper right-hand corner of each independent variable.

** All relationships in the model are significant at the $p < 0.05$ level or less.

way, for those sampled, ‘place’ is one construct composed of two identifiable components: attachment to the home and attachment to the community. We had not hypothesised this finding, but an advantage of SEM is that as the researcher tries to optimise model fit, unanticipated but useful results emerge. In line with expectations, the importance of place makes it harder for place-attached flood victims to accept mitigation offers that cause them to relocate (-.36). The single construct nature of this variable suggests that efforts to address only home attachment, or only community attachment, could very well meet with only partial success.

The perceived helpfulness of local officials also exerts a moderate, positive effect (.26) as hypothesised. When there is trust in officials, and consequently, we assume, the mitigation process, repetitive loss victims can quite rationally feel more secure

in their decision-making. Positive bonds between residents and local officials in all probability ease what otherwise might be distrust by some residents of the distant, centralised authorities of FEMA.

SEM demonstrates that there is one causal relationship that was not hypothesised, but which is statistically significant: the impact of the match on the importance of place attachment. While speculation on this linkage is possible, we think that more concerted examination of this statistical tie is required. Nonetheless, the site match offer appears to be critically important, both in direct and indirect ways.

Narrative analyses: interviews with local officials and residents

The narrative analyses of local officials and residents provide more expansive and refined information. In general, this information is supportive of the structural equation model results, identifying the importance of the four dimensions of rationality and their significance with regard to ease of mitigation decision-making.

Financial rationality

Twenty-five per cent site match offered?

Officials essentially mirrored the logic of economic approaches to rational choice when they reported that when the state government does not satisfy the 25 per cent match, cost becomes a barrier to relocation decisions for many property owners. In response to a question asking ‘Why do people decline offers of mitigation?’, one official, representative of most officials, replied:

Official #2: If they sell, they have to leave the community; really leave. Take a home in [Site 1]. Say they bought it for \$200,000 ten years ago. They do all they can to pay the mortgage. We give them 75 percent, \$150,000 or so, which is not even a down payment around here. You are talking about a \$450,000 mortgage. There is no way.

Effectuated residents similarly expressed concern over the financial match requirement, which for them raises issues of personal debt and future financial stability. As one resident stated:

Resident #79: [I] could have gotten a loan but I would have gone into debt if I had taken it.

The narrative data also confirm the quantitative findings in other ways related to financial rationality. For instance, officials and residents alike understood that improvements undertaken can add value to a home, or the ‘condition of the property’, but often not in proportion to the market value of the improved home. Under these circumstances repetitive loss victims may be unwilling to accept the appraised value of their home, and therefore feel that they must reject a mitigation offer, despite the physical hazards of doing so. As officials put it:

Official #6: *Then there are people who overbuild their house for the neighborhood. We ran into that not too long ago. She had a \$160,000 house but she got a \$110,000 neighborhood. They just add-on and build and build and build. Well, we can't give that. But we went out and I was like, 'I won't exactly blame her for not selling'. She has made the house beautiful. I think the appraisal might have come in at \$150 to \$160 [thousand]. She might have put, between adding all that stuff, close to that in it. She wanted us to give her \$200 [thousand] or more, and we can't do that. We can't if the appraisal comes in at \$160 [thousand].*

Official #13: *Even with the lower interest rates there is such a boom in housing now. Even in rehabbing stuff. I would say probably it is a challenge to find a house, especially if everyone thinks their home is their castle. They say, 'I can't find anything comparable'. There is things out there, but I think there is a lot of components going into 'I can't find anything comparable', because there is a lot of sentimental value that they are attached to their house. Like, we had a guy who had built an in-ground pool. I mean, you know, a sunroom, a deck. We had the appraiser coming back and saying, 'boy was his house nice', and he [the homeowner] is like 'no way am I going to be able to find something like this'. So if you start making those types of improvements then it's hard.*

A number of residents echoed these themes:

Resident #172: *[Flood victims] should get replacement value for [the] home. I question the fairness of the price offered for my home . . . [I] got assessed value instead of replacement value. It cost an extra \$50,000 to rebuild the same floor plan.*

Resident #137: *Because our house had not been reappraised, we lost all the investment we made in remodeling.*

Risk-based rationality

Officials had a uniform position on 'risk'. Risk was treated as the risk of future flooding and the damages associated with that risk, but it was contextualised as claims made on the NFIP by people who had made previous claims. Certainly, officials demonstrated their empathy with the many residents who had experienced the extreme duress of flooding and home damage or loss. However, they adopted overwhelmingly the stance of FEMA, with the financial well-being of the organisation as a paramount concern.

Risk was differentially articulated by residents. Some flood victims essentially ignored future risk, claiming that their flooding circumstances were a 'once-in-a-lifetime thing' and/or saying that 'it wouldn't have flooded as badly again', especially if remedial actions, such as dredging rivers, were taken to prevent future flooding (Respondent #37, for example). Others, though, identified concretely the physical circumstance of risk, such as flooded or 'caved-in' basements, fallen attics, sinking neighbourhoods and overwhelmed levies, garages that floated away, or homes that floated off their foundations (Respondents #47, 165, 178 and 181, for instance). Still

others referred to specific causal agents, such as the risks of the return of a ‘hurricane’, cracks in the local dyke, proximity to now dangerous water sources, such as creeks, lakes, rivers and overflowing canals, insufficient drainage and inadequate pumps (Respondents #6 and 146, for example). Others perceived immanent risk and worried that ‘it would flood again the next time it rained’ (Respondent #165, for example).

Place-based rationality

Apart from rational economic and risk-related choices, virtually every local mitigation official thought that successful mitigation efforts depended on what we refer to as place-based attachments. These attachments, shown to be important in the quantitative findings, are found to be perceived as real, rational and consequential in the narratives too. In addition to the comments of officials noted above, two other officials offered appropriate explanations:

Official #3: A lot of people are people who have lived in these areas all their life, and they just don't want to live anywhere else. They love the community they live in, they like their neighbors. They like the area. They like what the area offers.

Official #4: They had that land three or four generations and it is their only life. Their kids seldom move away. They marry within the county so to speak. They just don't want to leave.

These sentiments are echoed in the residents’ interviews. Melancholy and nostalgia for the communities and neighbourhoods they occupied before their flooding experiences pervade resident interviews. For example:

Resident #13: [I] like my old neighborhood because it was secluded with big, old trees. It was close to work, quiet, and decent. People got along and took care of each other.

Many other respondents used descriptors such as ‘quiet’ (Respondent #167), ‘established area’ (Respondent #165), ‘good neighbors’ (Respondent #168), ‘mostly homeowners’ (Respondent #173) and ‘neighbors watched out for our property’ (Respondent #173) in demonstrating those fully rational, place-based attachments that became a disincentive to relocation.

Interestingly, a number of respondents advocated that future mitigation efforts aim to relocate whole neighbourhoods instead of individuals. They felt that this method would be preferable to current, fragmentary approaches. Some resident quotes capture these dynamics in a straightforward way:

Resident #144: [FEMA] never asked residents if they would be interested in neighborhood relocation.

Resident #42: I didn't like the way they did the buyout. They should have moved everyone together.

Helpfulness of local officials

Just as place-based rationality has at its core the rational security of attachment to home and community, so too can the relationship between local officials and flood victims facilitate the trust and clarity needed for an easier relocation decision, as shown in the quantitative results. Mitigation officials said developing relationships with residents and community-based organisations was absolutely crucial to the objective of repetitive loss mitigation.

Official #16: *Even though there are a million people here in the county we have kind of a small town way of dealing with each other as people. I think that has a lot to do with how we come across and how people are dealing with us.*

Official #11: *I am gonna tell you, I have a lot of interface with homeowners associations. Under the CRS process you are required to have a repetitive loss plan. This also has a structure you got to follow. You need to have a committee, comprised of county people and citizens, so it forces you to have an interface with homeowners associations.*

Residents tended to concur, (such as Resident #173: ‘Everything was handled well. Officials did a good job. I was pleased’), but unfortunately had disdain for the lack of organisation and accessible information available to flood victims during the buyout process. Amid charges of poor communication and the unnecessary complexity of the process, many residents revealed heightened frustration with the programme due to the disorderliness, and the seemingly opaque nature, of FEMA procedures, and sometimes the articulations of local officials. Residents experienced a bottleneck in acquiring an explanation of circumstances and receiving compensation. Three respondents, representative of much of the narrative data, stated:

Resident #115: *It was a little confusing and hard to get answers from FEMA and local officials. You didn’t have one contact, always talked to different people and so always had to start at the beginning in explaining circumstances.*

Resident #107: *There are too many caseworkers. Assign one caseworker to handle the household. Right hand doesn’t know what the left hand is doing. There is too much paperwork. We were like sheep going to slaughter.*

Resident #102: *The legal information is too confusing. [I] had to get a lawyer to help interpret it.*

These narratives support the quantitative findings that local officials matter. It is important to add that officials matter as trusted facilitators or as bureaucratic hindrances to easier decision outcomes. In either event they are a pivotal part of the process, which is highlighted below in the discussion of the policy implications of the results of this study.

Conclusions and policy implications

In many ways floodplain management in the US is at a crossroads, since flood risk and damage is increasing while the financial support available for their amelioration is moving in the opposite direction (see Loucks et al., 2008). FEMA's strategic planning to reduce the loss of life and property in hazard-prone areas thus assumes ever-greater importance (FEMA, 2007, 2008), but so too do economic efficiencies that may be realised by the effective relocating of repetitive loss residents out of harm's way. Truly, mitigation failures have a variety of financial costs associated with them, both direct and indirect, and in the short and longer term.

The quantitative and qualitative findings of this study show the importance of financial and risk-, place- and trust-related domains of rational choice as they pertain to mitigation decision-making. Insofar as mitigation choices are rationally made, in predictable and calculable ways, they are amenable to successful future interventions. In contrast, irrational, emotive and unpredictable decision-making on the part of repetitive loss victims is less tractable. In saying this, of course, we are fully aware that flood victims may be 'myopic' in reaching their cost-benefit conclusion (Kunreuther, 2006).

With regard to the dynamics of financial rationality, the findings of this study reveal that the requirement of a 25 per cent match by flood victims is directly and indirectly a powerful disincentive for residents contemplating the abandonment of a risky space for a safer one. The inference is rather effortlessly made that by removing this economic disincentive, repetitive loss victims would find it easier to mitigate and not continue a cycle of what have become repeated, costly, federal, state and local interventions in the past.

There are some relatively obvious points of intervention that could be used to address mitigation failures related to 'the match'. One, of course, would be to adjust costs (such as insurance premiums) to repetitive loss victims to the point that, economically, it is simply too painful for them to maintain the status quo. An equally apparent alternative where the cost is borne by the larger collective is to provide repetitive loss victims with more than the 75 per cent baseline adopted by FEMA, in those cases where the match would otherwise be required.

We assume our findings mirror real-world processes, and that this alternative, at a minimum, would help to eliminate future risk and loss. Consequently it may in the long run prove, on balance, to be financially rational as well. We do note that calculating such longer-term gains and losses is beyond our capabilities, but we hope this is already a key aspect of FEMA's economic analysis of the costs and returns associated with future sponsorship of match-related programmes. It should also be at the forefront of public domain cost-benefit analyses for entire communities, which in the future may be required as a system to bear the ever-mounting costs of flooding.

Indeed, another alternative for the problem of the match is to 'devolve' this responsibility entirely to states, or other, more local public actors. Many of the same disincentives and incentives that apply on the federal level apply to them too. However,

local actors would find the ‘devolutionary’ process financially untenable. This is especially true given the present economic downturn. In any case, greater sponsorship by federal, state and local public actors and/or private actors other than the victims themselves is a complex matter surrounded by considerable controversy (Meijerink and Dicke, 2008).

Yet another approach would be to involve a broader set of community actors, a local system, whether they are local institutions, foundations, non-profit organisations, churches, or others, in identifying and helping to supply the resources needed to eliminate this roadblock to favourable mitigation decisions. Except in cases where the costs are simply prohibitive, we would favour this more comprehensive ‘community-based’ approach. While it does not flow as a direct inference from our findings, we will develop this possibility more fully in upcoming discussions.

Risk-based rationality emerges as important in our findings too. The ‘normalisation’ or minimising of threat is a fairly common human defence mechanism, as Burby (2006) and Kunreuther (2006), among others, emphasise. However, our findings support the hypothesis that as repetitive flood victims define risk as real, they are more amenable to decisions to mitigate. Decisions on risk may be reached without external input, but the sharing of the opinions of both experts and other community members who define future risk as real may be powerful (note the argument of Kunreuther, 1976), as would tangible relocation steps taken by close members of the community (Kunreuther, 2006). A related practical suggestion is that more ‘field time’ be invested by local officials and influential community residents, who can most effectively communicate risk to the entire community, including those residents who apparently deny the risk of their circumstances, minimise the risk, or simply do not engage with risk as an issue at all. Furthermore, we draw on Loucks et al. (2008, p. 549) in suggesting that the communication of risk perception might be reinforced successfully by introducing flood protection service fees to residents, in much the same way as residents normally pay for water supply and wastewater treatment. Again, this very rational approach is community-based in nature, and has appeal to us, at least, because of it.¹³

Our quantitative and qualitative data analyses suggest the strength of contemporary communities and homes as place attachments that may serve as rationally-motivated *disincentives* to relocation. Long-term community and home-based ties lead residents to be rationally attached to a place in ways that make it hard for them to leave behind all the favourable components of place, including an important part of their own identity. While arguably daunting in nature, policies that address the prospect of moving communities as a whole and creating spaces like ‘home’ might be accorded even more serious attention than they are at present. An added value to this approach is that *informal* social control through systematic, community networks favourable to mitigation and permanent relocation could effectively complement parallel measures adopted by more formal official agents in the process.

In principle it is possible that place-based attachments can be utilised even more effectively in ‘comprehensive community’ approaches. That is, we think that it might

be profitable for FEMA to steer a more community-nuanced, and system-based or 'whole-communities' course. Our findings do not naturally lead to this policy conclusion, but they do reveal that officials and residents alike are keenly aware of the value of trusted officials providing attentive, interpersonal and non-bureaucratic services to repetitive loss victims. Bronfman et al. (2008) identify the importance of such trust across a range of hazard situations in shaping public attitudes towards the hazard (see also the literature review of Visschers and Siegrist, 2008). Trust is a powerful tool that the whole community and authority networks can cultivate in advancing collective community change (Jennison, 2008; Kapucu, 2008; Redlener, 2008).

Heightened, individualised attention by trusted officials could have as its counterpart the use by officials of a variety of stakeholders from the community in a more communitarian mitigation effort. A comprehensive relocation plan based on the input of the multiple stakeholders of communities, including repetitive loss residents, may ensure the breadth of input and 'buy in' needed to reproduce the best of communities and homes in new and appealing spaces (see Rubin and Barbee, 1985; Srivastava, 2009).¹⁴

Once again, this recommendation, and, indeed, all of our recommendations, do not flow directly as implications of our results, yet they appear to square with our findings as possible policy alternatives. A necessary prelude to implementing the more comprehensive strategy is deeper theorisation of rational choices and decision-making by individuals and collectives, especially in the circumstances surrounding past or ongoing disasters. Thus, focused empirical attention is needed to assess successful and unsuccessful implementations of the past. For example, as a starting point, we call for a meta analysis of the conditions and outcomes of case studies conducted by FEMA and those analysed by a range of scholars in addressing the possible failures and successes of a rational, or cost-benefit, community-based approach. One axis of investigation would be studies of sites where highly bureaucratic, template approaches were employed that minimised stakeholder and resident involvement, compared with those oriented far more towards full use of the community as, at a minimum, a system of 'participating advisers'.

We recognise that this suggestion, which is but one interpretation of our findings, has been raised in one form or another for decades (Rubin and Barbee, 1985). We recognise as well that, at least recently, some efforts have articulated more precise strategic steps towards an effective analysis of community and repetitive loss victim costs and benefits (Kunreuther, 2006). We acknowledge too that this course for policy falls into a much larger arena of debate. For example, Meijerink and Dicke (2008) observe that now significant changes are occurring across the globe in relation to the public-private divide of flood management policies. These authors point to the increasing influence of the private sector in a significant number of instances. The results of our study provide no definitive directions, only speculative evidence, to inform this discourse. Bluntly put, we concede that the private sector may offer a number of solutions that simply are not likely, or even possible, with public sector interventions. Kunreuther (2006), in fact, argues rather persuasively

in favour of the potential effectiveness of a public–private partnership. Yet, a wide variety of treatments raise concerns about the more than occasional differences in goals and actions between entrepreneurs in the private sector and residents in communities slated for social change or relocation (see Domhoff, 1983; Logan and Molotch, 1987; Fraser et al., 2003; Loucks et al., 2008).

So, if public solutions are sought, we feel most comfortable advocating local capacity-building. Capacity-building as a system is especially needed for communities facing the circumstances of disaster, but also for the collective welfare of the country more generally (Putnam, 2000). Local awareness and local capacity are optimal for recognition of real threat and the collective ability to prepare for, and react to, a variety of forms of national disaster. This advice is demonstrated in part by empirical examinations of Hurricane Katrina, during which an estimated 100,000 people remained in the danger zone (Gill, 2007), although some were motivated to move due to local collective efforts to convince them to do so (Litts, 2008).

Essentially these recommendations significantly revolve around the power of local officials; who can be the most highly-trained disaster managers in the field, and on a more tightly integrated, or articulated, systematic, communitarian approach (Etzioni, 1993). This approach must be guided by the financial, risk, place-attachment, and trust concerns of repetitive loss victims individually, and of communities as a whole (see also Donner, 2008).

We recognise that our advocacy of this approach is lacking in specifics. We are aware that in recent years a great deal more emphasis has been placed on the roles of the community, since it is the community that can best identify local needs and provide a sense of connectedness to flood victims. We know also that the community is composed of individuals and groups with a range of important skills. These individuals include engineers, environmental experts, skilled labourers and medical and social service workers (Brennan, 2006). Effective coordination of local individual and organisation talent is a critical component of a community-based approach. It is noteworthy in this context that congressional investigators examining FEMA's performance during Hurricane Katrina concluded that 'FEMA decision makers understood FEMA's roles and responsibilities but not how to effectively collaborate with other agencies' (Brinkley, 2006). Fortunately they called on local citizens immediately to volunteer their time, money, and physical labour (Brennan, 2006), which reinforces our call for more community-based involvement. So, too, do recent personal conversations with FEMA officials, who see the benefits of augmented local involvement.¹⁵ We hasten to add that the rational choice (or cost–benefit) model, under these circumstances, implies a reasonable degree of parallelism between the many stakeholders involved in such community decisions.

It has been some time since Quarantelli (1988) elaborated on the difficulties of the one-way delivery of communication services that ignore the role of community in effective risk management strategies. Similarly, local-level emergency management research has been conducted for decades, focusing on 'integrated system perspectives' (Barton, 1969; Bolin, 1982). The view that community members should

be active agents rather than passive victims has long been recognised, therefore, as a possible corrective to the predominant top-down, command-and-control approach that dominates practice (Murphy, 2007). Furthermore, a number of case studies show the effectiveness of such approaches, although the nuances of 'context' suggest that their impacts may vary considerably across settings (Bolin and Stanford, 1998; Shaw and Goda, 2004).

In sum, our findings suggest that repetitive flooding victims facing mitigation decisions and officials responsible for implementations surrounding those decisions appear to converge in their opinions on the key factors that motivate acceptance of relocation in flood mitigation decisions. We organised these factors to form a set of concerns related to rational decisions across the dimensions of finance, risk perception, place attachment, and trust. Decision-making under difficult conditions is bound to evoke what can be viewed only as some 'irrational' responses or adaptations. Yet our aim has been to address the more tractable, rational arenas where policy interventions might have the most impact. We hope that our findings are complemented by results from a variety of related disaster studies, for it is in this context that they might be most helpful in alleviating problems related to repetitive loss decision-making and mitigation policy in the US and elsewhere. The goal of the community-based approach that we advocate is to reduce repetitive claims and the loss of life and property in disasters, while maintaining, and hopefully enhancing, the social fabric of communities as they respond to a range of serious natural and social forces.

In detailing some inferences of our study results for policy implementations we recognise that, while our findings may be consistent with those presented in other studies, far more evidence is needed (see Murphy, 2007). The mitigation and relocation era for addressing flooding is relatively new and hence comparatively understudied, as is freely admitted by FEMA. In earlier phases, flood losses in the US focused on structural flood control measures (1917–65), or on flood control, building regulations and insurance (1966–92). It is only in the last 18 years or so that the federal government has increasingly taken responsibility to engage repetitive flood victims in coalitional strategies to share the challenges, including costs, of mitigation and relocation. We hope that the present study is helpful in offering an evaluation of some of the relatively more important causes that spawn a mindset among flood victims that is most agreeable to relocation. Our hope is that studies such as ours, including those of responses to natural disasters by whole collectives, can be replicated across a variety of settings to determine the breadth or generalisability of the findings presented here.

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- ² The disastrous consequences of recent flooding are evident in such countries as Bangladesh, Brazil, Chad, China, India, Indonesia, Iran, Japan, Korea (North and South), Pakistan, Sri Lanka, Thailand, Venezuela and Vietnam, as well as in Eastern and Central Europe, including the Czech Republic, Hungary, Poland, Romania, Slovakia and Ukraine. This study restricts its examination to eight repetitive flood sites in the US, although it seeks to provide information that applies to other settings. In addition, it recognises that, apart from natural disasters such as flooding, man-made development projects such as dams, natural resource extraction initiatives and urban renewal displace millions of people around the world annually, resulting in physical relocations that affect residents in many of the same, significant ways (see, for example, FMO, 2008).
- ³ Since essentially all of the properties in this study were full relocations, the circumstances pushing repetitive loss victims to mitigate appear to be especially strong.
- ⁴ For a critical appraisal of these approaches see Schram and Caterino (2006).
- ⁵ Unfortunately, it is also noteworthy that financial rationality motivates other stakeholders to move in alternative directions, such as developers who purchase and market flood-prone properties. This is not the locus of the attention of this study, but it does note that some entrepreneurs can reap the benefits but avoid the costs of such practices (see Loucks et al., 2008).
- ⁶ Although many scholars emphasise the positive affective experiences and emotions associated with places, some also explore the corollary—negative feelings of places (see, for example, Ahrentzen, 1992; Hummon, 1992). In addition, as many scholars across disciplines have shown, place-based attachments are varied, diverse, and complex concepts that integrate the cognitive and affective aspects of bonds between people and places. For instance, the development of place-based attachments has been linked to biological processes of evolutionary adaptation (Riley, 1992), ecological features of environments (Hufford, 1992), psychological factors and temporal associations (Rubinstein and Parmelee, 1992), as well as to socio-cultural and historical sources (Low, 1992; Pellow, 1992).
- ⁷ Preliminary interviews were conducted with 21 FEMA mitigation staff and related employees responsible for the NFIP to gather background information. Telephone interviews with five FEMA regional divisions as well as state and municipal mitigation officials also were completed. While not analysed in this paper, this information helped us to contextualise the buy-out process and to ensure that the interpretations presented here were not inconsistent with other evidence.
- ⁸ The battery of all questions is available upon request. Appendix 1 also details codings for the range of responses and the mean and standard deviation for each of the variables.
- ⁹ These ‘non-findings’ are available to readers on request.
- ¹⁰ In addition to the advantages noted, SEM, in comparison to OLS, is based on more flexible assumptions (particularly allowing interpretation even in the face of multicollinearity), use of confirmatory factor analysis to reduce measurement error through the employment of multiple indicators

per latent variable, the desirability of testing models overall rather than coefficients individually, the ability to model mediating variables rather than be restricted to an additive model, and the ability to handle difficult data. Moreover, where regression is highly susceptible to error of interpretation by misspecification, the SEM strategy of comparing alternative models to assess relative model fit makes it more robust (Bollen, 1989; Kline, 1998). This advantage was utilised through successive estimations of a wide range of plausible models, whose fit statistics proved inferior to the models selected for presentation.

- ¹¹ Readers are invited to request the information necessary to reproduce our findings, although they provide little in their own right that is valuable for present interpretations (for instance, all bivariate associations match the SEM results in coefficient sign).
- ¹² Only statistically significant relationships are reported in Figure 2. Non-significant paths are deleted. The causal impact of all independent variables was initially examined, and non-hypothesised paths were added based on their significant contribution to model fit (such as the path between income and 'importance of place'). Among the refused paths that we hypothesised were effects of length of residence and prior flood experience on the ease of decision-making. While SEM cannot be applied to dichotomous dependent variables, a replication of our design using logistic regression for the dependent variable (accept/decline mitigation offer) yielded results that were substantively the same as the direct effects in the SEM treatment.
- ¹³ The US Army Corps of Engineers even proposed in 2007 a regional buyout programme in the Gulf Coast of the US, with the massive relocation of up to 17,000 households and their long-standing communities (Lohr, 2007).
- ¹⁴ We are well aware of the position of many that communitarianism in the US is in steep but recoverable decline (Putnam, 2000).
- ¹⁵ Personal conversation with authors on 27 July 2009.

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Appendix 1. Selected survey items used in structural equation model predicting ease of acceptance

1. *Ease of acceptance*: mean = 2.75; standard deviation (SD) = 1.54

How difficult was the decision to accept the offer of mitigation? Was it _____?

Very difficult	1
Somewhat difficult	2
Not very difficult	3
Not at all difficult	4

2. *Condition of property*: mean = 2.79; SD = 0.89

At the time you received the mitigation offer, how would you rate the overall condition of your property _____?

Excellent	1
Good	2
Fair	3
Poor	4

3. *Importance of place—relocating home*: mean = 2.79; SD = 0.89

In making your decision about the offer of mitigation how concerned were you about being able to find affordable replacement housing? Were you _____?

Very concerned	1
Somewhat concerned	2
Not very concerned	3
Not at all concerned	4

4. *Importance of place—leaving neighborhood*: mean = 2.77; SD = 1.25

In making your decision about the offer of mitigation, how concerned were you about leaving your neighborhood? Were you _____?

Very concerned	1
Somewhat concerned	2
Not very concerned	3
Not at all concerned	4

5. *25% site match*: (proportion) mean = 0.54; SD = 0.50

Approximately, how much money, if any, did you contribute as part of the cost-share to pay for the proposed mitigation project [\$] _____?

6. *Helpfulness of local officials*: mean = 3.09; SD = 1.04

In guiding you through the application process, was the person [who made the final offer of mitigation] _____?

Very helpful	1
Somewhat helpful	2
Not very helpful	3
Not at all helpful	4

7. *Perceptions of future flooding*: mean = 3.82; SD = 0.48

How important was the likelihood of future flooding in making your decision about the offer of mitigation? Was it _____?

- Very important 1
- Somewhat important 2
- Not important 3
- Not at all important 4

8. *Median household income*: mean = 33,387.61; SD = 10,358.03

I would like to know your total household income before taxes at the time the mitigation offer was made to you. I am going to read a series of income ranges; please stop me when you hear the range that includes your total household income for that year. Was it:

- Under \$10,000
- \$11,000–\$20,000
- \$21,000–\$30,000
- \$31,000–\$40,000
- \$41,000–\$50,000
- \$51,000–\$60,000
- \$61,000–\$70,000
- \$71,000 and up

If specific income is mentioned, note here:

\$ _____

If question is declined, mark here: