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COMMUNITY DISASTER
MANAGEMENT RESOURCES:
A CASE STUDY OF THE FARM COMMUNITY
IN SUSSEX COUNTY, DELAWARE

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STUDY REPORT

Community Disaster Management Resources:

A Case Study Of The Farm Community
In Sussex County, Delaware

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Summary

While the expansion of government institutions and programs over the past fifty years has resulted in government taking primary responsibility for emergency management, there is a growing recognition that government cannot do it all alone. This has, among others, led to a quest for a better understanding of societal capital that makes contributions to disaster management, such as the private sector, partnerships with volunteer organizations but also local communities and individual citizens themselves, as is currently pursued through the FEMA's Ready campaign and Whole Community approach. However, before devising strategies of how to better engage and support communities in disaster management as active participants, the nature of their disaster management resources needs to be better understood. Therefore, this case study examined the disaster management assets of one community group, namely the farming community in Sussex County, Delaware, and the process of how the resources of this particular group have contributed to local disaster management. The conceptual framework for this study was based on the concept of community assets that currently recognizes eight types of community capital and comprises of "active", "inactive", "positive" and "negative" resources – and in conjunction with a simplified classification of the eight categories of Resource Inventory Management for Rural Communities, as defined by the National Incident Management System (NIMS). The study found that there was a striking discrepancy between actually used and perceived community resources. Out of the four broad categories – coordination, assessment, communication, implementation – used to capture the main functional areas, the survey found congruence of perceived and actually used resources in communication and assessment. However, they diverged for implementation and coordination. Farm community resources were primarily used for implementation activities during disaster preparedness. Moreover, the types of resources used by the farm community crystallized into three broad categories: (1) equipment/supplies; (2) experience/lessons learnt; and (3) access to other community and professional networks. While there was an overlap with the NIMS categories of rural community emergency management resources, they did not facilitate an overview and understanding of all of the actual and potential resources of that particular community group. Conceptually, the findings highlight the use of four community capitals – i.e. physical, human, financial and social – as well as the existence of both active and inactive as well as negative and positive resources. Policy recommendations propose, among others, resource mapping strategies to uncover both active and inactive resources, the use of existing communication channels and community networks to reinforce, in particular, mitigation messages and information, as well as a re-conceptualizing of the NIMS categories to allow for the identification of all relevant local community resources.

Table of Contents

ACKNOWLEDGEMENTS	II
SUMMARY	III
LIST OF FIGURES	V
LIST OF TABLES	VI
INTRODUCTION	1
LITERATURE REVIEW	3
1. THE THEORETICAL CONCEPT OF COMMUNITY DISASTER MANAGEMENT RESOURCES	3
2. PUBLIC POLICY CONCEPTUALIZATION OF COMMUNITY DISASTER MANAGEMENT RESOURCES	8
METHODOLOGY	11
LIMITATIONS	14
SUSSEX COUNTY, DELAWARE: DISASTER PROFILE	16
FINDINGS	18
1. PERCEIVED VERSUS ACTUALLY USED RESOURCES	18
2. WHEN RESOURCES WERE USED FOR COLLECTIVE ACTION	22
Coordination	22
Assessment	24
Communication	28
Implementation	30
3. WHAT TYPES OF RESOURCES WERE USED	33
Equipment/Supplies	33
Experience/Lessons Learnt	34
Access to Other Community Networks	34
DISCUSSION	37
POLICY SUGGESTIONS	42
CONCLUSION	43
REFERENCES	45
APPENDIX 1	47
QUESTIONNAIRE	47
APPENDIX 2	57
GENERAL VERSUS EXHIBIT QUESTION BY DISASTER MANAGEMENT PHASE	57
AND CATEGORY OF DISASTER MANAGEMENT ACTIVITY	57
APPENDIX 3	64
PERCEIVED VERSUS ACTUALLY USED RESOURCES BY DISASTER MANAGEMENT	64
PHASE AND CATEGORY OF DISASTER MANAGEMENT ACTIVITY	64

List of Figures

Figure 1	Sussex County Survey: Geographical Overview	vii
Figure 2	Community Resources in the Context of Community Assets	7
Figure 3	Townships Surveyed	9
Figure 4	Age Group of Respondents	10
Figure 5	Respondent's Position at Farm	12
Figure 6	Farm Community Resources: Response/Implementation	16
Figure 7	Farm Community Resources: Preparedness/Coordination	17
Figure 8	Farm Community Resources: Implementation	18
Figure 9	Farm Community Resources: Coordination	18
Figure 10	Farm Community Meetings on Disaster Preparedness	21
Figure 11	Farm Representative Leading on Mitigation	22
Figure 12	Consultation with External Experts on Best Practices	23
Figure 13	Self-Reported Types of Events - Sussex County Farms	24
Figure 14	Is there a Preparedness Plan for the Farm?	25
Figure 15	After 2006 Floods, did Farm's Damage Assessment Feed into a Larger Recovery Plan for the Community?	25
Figure 16	Communications Network on Mitigation Ideas?	26
Figure 17	Resources to Organize Own Emergency Response?	28
Figure 18	Additional Safety Measures not Legally Required	29
Figure 19	Types of Farm Community Resources Used in Disaster Management	31
Figure 20	Potential NIMS Linkages with the Farm Community	35
Figure 21	Who Responds to a Disaster?	36

List of Tables

Table 1	Survey Results by Location	viii
Table 2	Questionnaire Structure	10
Table 3	Sussex County - Probability of Future Events (All Hazards)	16
Table 4	Overview - Questionnaire Results in Relation to the Disaster Management Cycle	22
Table 5	When Resources Were Used for Self-Reported Collective Action	32

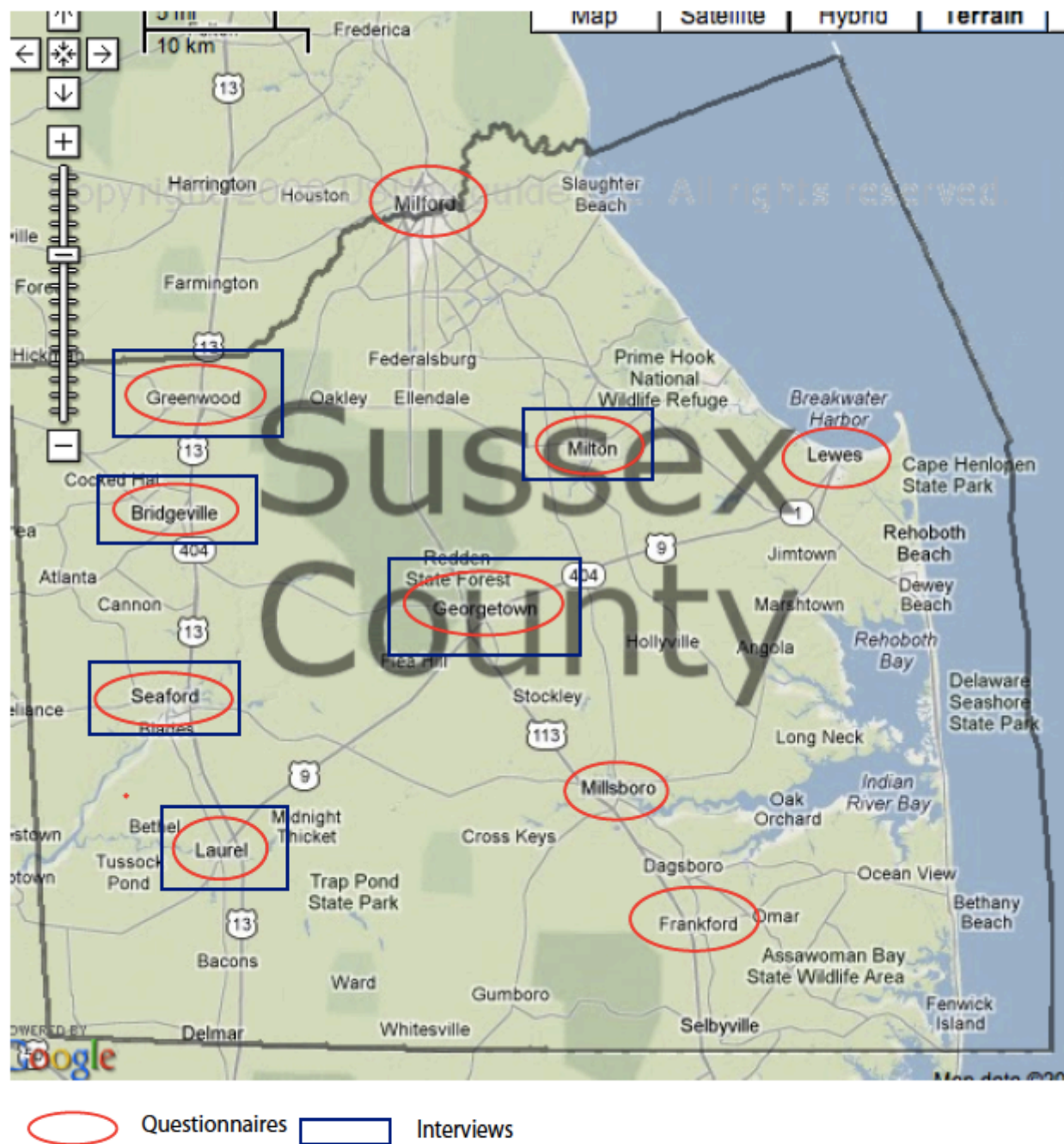


Figure 1 Sussex County Survey: Geographical Overview
(background map retrieved on April 26, 2012, from website www.google.com/maps)

Table 1
Survey Results by Location

	# of Questionnaires	# of Interviews	
		Farmer	Non-Farmer
Bridgeville	5	1	
Millsboro	6		
Greenwood	4	1	
Georgetown	2	2	2
Lewes	3		
Laurel	3	1	
Milford	1		
Seaford	2	1	
Milton	1	1	
Frankford	1		
undeclared	5		
total	33	7	2

Introduction

Statistics show that disaster losses and the number of complex disasters are on the rise in the United States, as in the rest of the world (Board on Natural Disasters, 1999; Cutter & Emrich, 2005; UN, 2011). Government acknowledges that it cannot meet these challenges alone (DHS 2009). In order for the Whole Community to effectively manage disasters, information about the availability of all resources from every stakeholder is critical. While government collaborates closely with the voluntary sector and now also increasingly and more comprehensively with the private sector, we know little about the resources of the rest of the community – of individual citizens and the range of community groups that it comprises – apart from anecdotal evidence of social capital after the occurrence of a disaster. At present, there are no practical survey tools at the disposal of local emergency management to identify the full range of local assets prior to a disaster. Consequently, there also has been no targeted exploration into what particular functional areas of disaster management could – in a systematic fashion – benefit from the resources of the Whole Community.

It is not sufficient to only consider those physical assets, skills and experiences, which citizens individually and community groups collectively have employed as a result of a disaster in the past. These may not be representative of all societal capital that exists and has the potential for activation. For the process of planning with community disaster management resources to be meaningful, it is important to understand the full scope of potential resources that are available in a community, who possesses them, and how they have been used in the past. This will lead to a better understanding of the full range of community resources and may, at the same time, serve as the starting for a roadmap to strengthen local disaster management – comprehensively and systematically. Consequently, the issue at hand is identifying community resources that exist prior to a disaster and are – or have the potential of being – activated in preparation and response to a disaster.

While practitioners and scientist have long acknowledged the existence and significance of social capital as an important contributor to disaster management (Dynes, 2002; Murphy, 2007), the question remains how to systematically take advantage of these resources. However, before attempting to answer the *how* question and devising mechanisms of *how* to tap into the currently unused or, as the case may be, underused resources relevant to the various functions of disaster management, an understanding first has to be gained into *what types* of resources are available, i.e. *the nature of the societal capital* that has the potential of contributing to disaster management. With this knowledge, we can then look into ways of *how* to best make use of them.

Thus, the purpose of this case study was to further examine this knowledge gap of the identification process of local community disaster management resources. The farming community in Sussex County, Delaware, was selected for this inquiry – primarily because the project was supported by the Community Outreach program of the School of Public Policy and Administration of the University of Delaware, aimed at benefitting local communities in Delaware. Moreover, the agriculture sector has had experience with all types of disasters for centuries, even before government had started assuming responsibilities and set up institutions to manage them, and was therefore of particular interest. Sussex County is the agriculture center in the state of Delaware, and farmers represent a majority group in the local population. The

community was easily accessible to this researcher because of its geographical closeness as well as because of the support available through the Agriculture Extension of the University of Delaware. This had the advantage of easy follow-up inquiries.

In order to shed light on this issue, the following specific research questions were pursued for this case study:

1. How does the farming community in Sussex County perceive its own capacity to engage in disaster mitigation, preparedness, response and recovery?
2. How has the farming community in Sussex County employed its own resources in past disasters?
3. How do the resources of the farming community in Sussex County relate to the functional areas of institutional disaster management?

The significance of this study is multifaceted. Firstly, it intends to advance research into the use of social capital in disaster management. Through a better understanding of the nature of community resources, a new perspective may also be gained into other related concepts such as disaster vulnerability and resilience. Better information on the nature of community resources may shed light on a communities' resilience in certain areas to withstand the impact of a disaster, and it may also highlight weaknesses in terms of a lack of resources that will require attention. Secondly, the findings of this study – by example of a prominent community group such as the farming community – might assist with translating the scientific recognition of the value of community groups in times of disasters into a practical application where this knowledge may improve concrete disaster management performance. Thus, this study was also an attempt of bridging the gap between science and practice. Last but not least, society cannot afford to further delay where significant advances can be made in managing disasters better – particularly through the inherent resources of major stakeholders such as communities themselves. An increase in the complexity of disasters requires significantly more local self-sufficiency. This necessarily will have to entail greater community involvement. In order to slow or even halt this trend of increasing economic losses, measures need to be taken without delay to boost the resilience of communities. Finally, in the current political and economic climate, an expansion of government services taking on all of these challenges is unlikely and unrealistic. Thus, the joining of forces of the Whole Community is required.

Literature Review

A review of the current literature was conducted in preparation for this study, as well as throughout the data collection, analysis and synthesis phases. In seeking answers to the three research questions, this review focused on the conceptual understanding of community disaster management resources. In this context, the academic literature was complemented by a review of current public policies vis-à-vis community resources. Accordingly, two major areas were critically reviewed: (1) theoretical concepts of community disaster management resources; and (2) public policy conceptualization of community disaster management resources.

In order to carry out this selected literature review, multiple information sources were used, including books, academic journals, news articles and government reports. These sources were primarily accessed through the Enrico Quarantelli Resources Collection at the Disaster Research Center, the University of Delaware Library, and FEMA's website. As also the historical development of key definitions and concepts was explored that have led to the current understanding of community resources, no time limitations were placed on the selected two bodies of literature. Setting a timeframe might have precluded the review of relevant material.

Throughout the ongoing literature review, the researcher attempted to highlight conceptual gaps, which are critical in understanding community resources in disaster management. In addition, the review discusses issues, which remain contested amongst the community of science and require further investigation. Each review section of the two bodies of literature concludes with research implications for this and other future studies. This chapter finishes with an interpretive summary that explains how the literature to date informed the researchers understanding of the material and how it related to the development of the theoretical framework.

1. The Theoretical Concept of Community Disaster Management Resources

Research into community disaster management resources is currently seen through three distinct but closely intertwined lenses, namely: (1) "social vulnerability" – focused on those social factors, which create inequality and unequal access to resources for segments of the population and, thus, leaving some more susceptible to the impact of disasters; (2) "resilience" – focused on a community's positive recovery capacities and the degree to which it is capable of bouncing back from the effects of a disaster with its own resources; and (3) the concept of "social capital" – a component of community assets that constitutes the aggregate of positive as well as negative community resources and represents the actual community capacity to cope with disasters, in essence reflecting the characteristics of social vulnerability and resilience (Figure 2).

While early disaster research (e.g. Quarantelli and Dynes, 1971) studied social cohesion and community strength – what was later comprehensively developed and conceptualized in social science by Coleman (1988, 1990) and Putnam (1993) as "social capital" – in terms of response capacity in times of calamities, the focus has shifted since the late 1970s to a perspective of pre-disaster social vulnerabilities that negatively affect a community's capacity to respond (O'Keefe,

Westgate, and Wisner, 1976; Cutter, 2003). One of the underlying views at the time had been that the social cohesion approach was only conceptually appropriate for natural disaster but not sufficient enough to also adequately capture the rapid changes in society and the new threats of man-made toxic and technological disasters. The proponents of the vulnerability approach believed that “rather than leading to the emergence of solidarity, technological disasters have helped create a ‘corrosive community’ ... “Blame, mutual recrimination and conflict are presented as the consequence of technologically driven disasters” (Furedi 2007) that has led to a breakdown of social cohesion, thus leaving communities more vulnerable to disasters. However, a closer look at community behavior in actual disasters has demonstrated that vulnerability as a concept is not sufficient either to explain a community’s capacity, or lack thereof. Consequently, interest has returned to “social capital” and, specifically, the conceptual development of “resilience” as the positive antidote to social vulnerability. This shift in thinking is supported by an increasing body of research over the last two decades into case studies that have uncovered disaster myths, which have – and often still do - described communities and their members largely as victims, ‘vulnerable’ and ‘panicked’ – while in fact it is the solidarity of community networks and the courage and calmness of individuals as first responders who make significant - but unmeasured and largely unacknowledged – contributions to search & rescue and initial response activities (Quarantelli and Dynes, 1971). As Dynes (2006, p. 2) further explained:

The vocabulary of ‘command and control’ suggests chaos rather than citizen adaptability and creativity ... while we calculate damage to physical and human capital, we usually ignore the social capital available within communities to deal with emergencies. Social capital is our most significant resource in responding to damage caused by natural and other hazards, such as terrorism.

Thus, instead of treating any of the three approaches in isolation, there is more and more a consensus that all three in conjunction provide invaluable insights into the weaknesses (vulnerability and negative social capital) as well as strengths (resilience and positive social capital) of a community’s capacity to cope with disaster hazards. While all three are indisputably indispensable in understanding the role of communities in the entire cycle of disaster management, the focus of this study was on all of the possible community assets and factors that influence the mobilization of community resources. Its findings suggests that – instead of focusing on social capital as the only community capital significant to disaster management – a broader view of community assets may be more appropriate.

In the literature, particularly related to community development, community resources are described to be embedded in the various types of capital that comprise a community’s assets – i.e. physical, human, social, financial, environmental, political, cultural (Green and Haines, 2012, p. 12), and now also spiritual capital (Guest, 2007). As discussions among scientists persist on definitions for these different types of capital, their linkages and overlaps, for the purposes of this study, they are used and defined as follows:

1. Human: including education, labor market experience, artistic development and appreciation, health, other skills and experiences (Green and Haines, 2012)

2. Social: trust, norms, social relationships and networks (Green and Haines, 2012)
3. Physical: possession of and capacity to maintain roads, buildings, railroad tracks, bridges, vacant land etc. (Green and Haines, 2012)
4. Financial: access to tangible monetary assets, including loans and credits (Green and Haines, 2012)
5. Environmental: natural resources: air, water, land, flora and fauna (Green and Haines, 2012)
6. Political: access to decision making through instrumental (influencing policies in one's one interest) or structural (participatory attributes of the political system) political capital (Green and Haines, 2007)
7. Cultural: embodied, objectified and institutionalized cultural assets (Bourdieu, 1986)
8. Spiritual: flow of ideas and values that emerge out of tradition and may be embodied, objectified and institutionalized assets (Guest 2007)

In the disaster science literature, there is an abundance of studies on social capital, i.e. community networks and relationships, that are used pre and post disaster. However, little research has been carried out into these other types of community capitals – let alone a comprehensive study on all of a community's assets.

Moreover, resources that reside in these different capitals can be categorized into “active”, “inactive”, “positive” and “negative”. For instance, Hyman (2008, p. 226) – aggregating the conceptual approaches of social capital as developed by Putnam, Portes, Bourdieu and Coleman – defines positive social capital as “an asset representing actionable resources that are contained in, and accessible through a system of relationships.” By qualifying community resources as “actionable” or capable of being acted upon, this definition recognizes not only those resources that have in fact been used but also those that have the potential of been accessed through a system of relationships in the community. Stone (2001) and Weissbourd (2005) explored the importance of this broadened definition further. Stone explains that locating and measuring social capital has focused, misguidedly, on “outcomes of social capital as indicators of social capital itself” (pp. 4-5). Social capital has been said to exist whenever the outcome indicator is positive, which Stone describes as a “tautological fallacy”. While Stone focuses on conceptual issues of measurement of social capital that should not only consider outcomes but instead all contributing dimensions potentially leading to the formation of social capital, Weissbourd (2005, p. 8) approaches the same issue through the lens of economics. He explains that “... assets do not have a value per se; they are passive, or idle, until they are “acted on,” or leveraged by businesses and investors. Neighborhood assets become valuable only to the extent that they are deployed or incorporated in a market-based economic process.” If social capital, as Hyman says,

is an asset, then by extension – according to Stone’s and Weissbourd’s findings – social capital compasses both active, i.e. used, as well as dormant, i.e. potential, community resources.

Moreover, there is extensive interdisciplinary research on another attribute of community assets that explores both its positive as well as negative characteristics. The most well-known of these is negative social capital. Portes (1998, p. 15) explains that “it is our sociological bias to see good things emerging out of sociability ... However, the same mechanisms appropriable by individuals and groups as social capital can have other, less desirable consequences.” Instead of only focusing on the positive impact of community networks, social control and collective sanctions, Portes finds that it can also lead to “exclusion of outsiders, excess claims on group members, restrictions on individual freedoms, and downward leveling norms” (p. 15), thus leading to what he describes as negative social capital. For instance, social networks can foster an environment conducive to criminal behavior that leads to a deterioration of human capital in the form of educational underachievement, deteriorating physical and mental well-being, and progressive exclusion from the work force. This literature demonstrates that each type of community capital has inherent in it the potential for positive as well as negative actionable resources. Moreover, it also shows how closely the various capitals are impacting on each other and can trigger the activation of either positive or negative resources in another type of capital.

This current state of research into community assets (overview Figure 2) – comprised of “actionable resources” as developed by Hyman, Stone and Weissbourd, as well as Portes’s “positive” and “negative” community resources – has helped inform the conceptual framework for this study, as further explained below and reviewed again in the Discussion section.

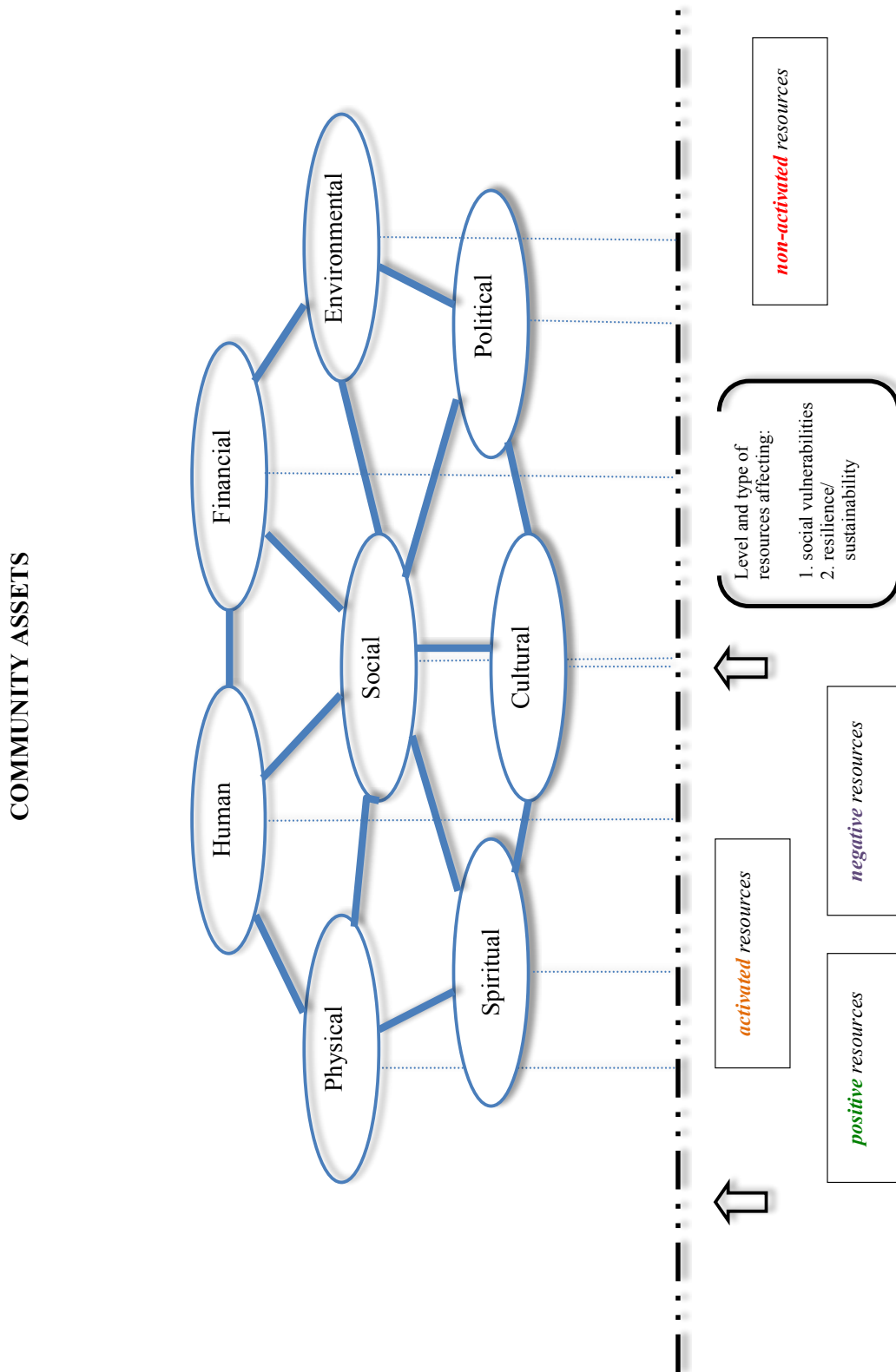


Figure 2 Community Resources in the Context of Community Assets

2. Public Policy Conceptualization of Community Disaster Management Resources

In the public emergency management system, the Federal Emergency Management Agency (FEMA) addresses rural resource management through NIMS (National Incident Management System). NIMS was established in 2003 with the aim of bringing together government, private, and non-governmental organizations for more coordinated emergency management through a five-pronged approach: (1) preparedness; (2) communications and information management; (3) resource management; (4) command and management; and (5) ongoing management and maintenance. Particularly relevant for this study were NIMS activities under item 3, i.e. resource management. This third component involves the establishment of a resource management process, which is guided by five principles: (1) planning; (2) use of agreements; (3) categorizing resources; (4) resource identification and ordering; and (5) effective management of resources. Of interest for this study were principles (3) and (4), i.e. categorizing resources and resource identification and ordering.

NIMS defines and uses eight broad categories of rural emergency management resources. They are: (1) animal health; (2) emergency management; (3) emergency medical services; (4) fire/HazMat; (5) helicopters, firefighting; (6) law enforcement; (7) public works; and (8) search and rescue. These eight functional categories are further broken down into “kinds”, which include trained personnel as well as equipment and supplies such as, for instance, public safety dive teams, hydraulic truck cranes and air curtain burners.

FEMA (2010) explains that its rural emergency resource management system plays a role in mitigation, preparedness and response. However, its resources management is focused on preparedness and response. Moreover, policies and guidelines related to resources management under item 3 of NIMS do not explicitly state what resources are needed in each phase of the disaster management cycle. It is unclear if policies and programs related to item 3 of NIMS consider all eight categories applicable to all phases of the disaster management cycle. In order to shed more light on this, further literature and emergency handbooks were reviewed, notably “Introduction to Emergency Management” by Haddow et al. (2008) as well as “Introduction to Emergency Management” by Lindell et. al. (2007).

For the purposes of this study, which intended to look at the community’s resources in all four phases of the disaster management cycle, NIMS’s eight broad categories of resource management were eventually juxtaposed to the typologies of emergency response and recovery functions that are summarized by Lindell et al. (2007), including the functional areas they identify for mitigation and preparedness. In order to simplify the data collection process and capture resources that could be provided not only by technical experts but also by non-professional community members with relevant experience, skills and equipment, the functional areas were grouped together into four broad categories of activities that can be observed in and are relevant to mitigation, preparedness, response and recovery. They are: (1) assessment; (2) coordination; (3) communication/information management; and (4) implementation/operations. For the purposes of this study, they were defined as follows:

1. Assessment

This covers (1) recognizing that a threat exists; (2) assessing the magnitude, location, and

timing of import; (3) loss and damage evaluation; as well as (4) recommending how to respond and recover.

2. Coordination

For this study, “coordination” is defined as the process by which relevant group members consult with each other internally as well as externally with the objective of agreeing on and synchronizing a joint course of action to ensure the most efficient use of communal resources in pursuit of specified objectives.

3. Communication/Information Management

This covers mechanisms of timely and relevant information sharing between group members as well as with outside actors on the nature of threats, events that have taken place, any action taken by whom, how and when, as well as information on outstanding needs and gaps.

4. Implementation/Operations

Implementation covers the process of deployment of personnel, equipment and supplies, as well as in a broader sense, the application of knowledge and expertise, with the aim of either mitigating, preparing for, responding to or recovering from a disaster event.

The conceptual framework for this study drew on the literature of academic research as well as government policies related to the concept and use of community resources, as summarized above. Consequently, a three-dimensional framework (Table 2) was designed with the following components: (1) the four phase of the disaster management cycle, i.e. mitigation, preparedness, response and recovery; (2) perception as well as actually used resources; and (3) the four broad categories of disaster management activities, i.e. coordination, assessment, communication, and implementation.

Table 2
Questionnaire Structure

		Resources		Mitigation		Preparedness		Response		Recovery	
		General	Exhibit	General	Exhibit	General	Exhibit	General	Exhibit	General	Exhibit
Coordination	perceived	Q18	Q19	Q34	Q35	Q50	Q51	Q66	Q67		
	actually used	Q26	Q27	Q42	Q43	Q58	Q59	Q74	Q75		
Assessment	perceived	Q20	Q21	Q36	Q37	Q52	Q53	Q68	Q69		
	actually used	Q28	Q29	Q44	Q45	Q60	Q61	Q76	Q77		
Communication	perceived	Q22	Q23	Q38	Q39	Q54	Q55	Q70	Q71		
	actually used	Q30	Q31	Q46	Q47	Q62	Q63	Q78	Q79		
Implementation	perceived	Q24	Q25	Q40	Q41	Q56	Q57	Q72	Q73		
	actually used	Q32	Q33	Q48	Q49	Q64	Q65	Q80	Q81		

Methodology

The identification process of disaster-relevant resources in this farming community was carried out through a three-pronged approach. A survey was conducted that looked into (1) the farm community's own perception of their disaster management resources, (2) the actual use of their resources in previous disasters, and (3) how these resources may relate to the functional areas of institutionalized disaster management. It was important to understand in how far the perception of the resources by the community and their actual use coincided. This was anticipated to provide valuable insights into the types of resources that could be anticipated and for which integration into the existing disaster management framework could be devised. The survey included both a questionnaire as well as in-depth interviews.

The definition of "farmers" used in this study included anyone who worked or had worked on a farm in Sussex County, recognizing that there is a range of employees, workers as well as family members beyond the farm owner, who may have had valuable information for this study and, ideally, were able to provide multiple perspectives on the same events. However, for the purposes of this study, "farmers" did not include those, who were engaged in farm support services, such as feed or equipment providers, who fall into separate professional categories. The definition of "farm" used to locate potential respondents was borrowed from the 2007 Census of Agriculture (USDA, 2009, p. viii), which classifies a farm as "any place from which \$1,000 or more of agriculture products were produced and sold, or normally would have been sold, during the census year."

In order to capture the historical context of previous disasters and resources used in response, a combination of sampling strategies was employed. During Ag Week in Harrington from January 16 to 21, 2012, a maximum variation strategy was employed to target participants with the widest possible range of experience – spatially across the county exposed to possibly different types of hazards but also in terms of type of farm operation. This was supplemented by a random sample survey in the five major townships, i.e. Seaford (population: 6,928), Georgetown (population: 6,442), Milford (population: 5,779), Millsboro (population: 3,877), and Laurel (population: 3,708). Farmers were asked to complete a questionnaire and invited to a follow-up in-depth interview.

In total, 298 questionnaires were used. With an expected return rate of between 10 to 15 percent, 30 to 45 completed questionnaires were expected. At the end of the survey, eleven percent, or 33 questionnaires, had in fact been completed (Figure 1, Table 1). They represented 33 farms in ten locations (Figure 3), covering all ages (Figure 4), types of farming, and a diverse topography from inland and river to coast. The sample size of 298 was determined as follows: a population size of 1,312 was used, representing the total of 1,312 registered farms in Sussex County according to the 2010 US Census. With a margin of error of 5%, a confidence level of 95% and a response distribution of 50%, a sample size of 298 resulted. While this study recognizes that a sizeable number of people are involved in the activities on one farm alone, no statistics could be obtained, however, on how many people altogether in fact worked on those 1,312 farms, which would have also included seasonal workers. Consequently, the anchor

population of registered farms in Sussex County was chosen as the survey population. The questionnaire targeted farmers, their families and employees over the age of 18 years.

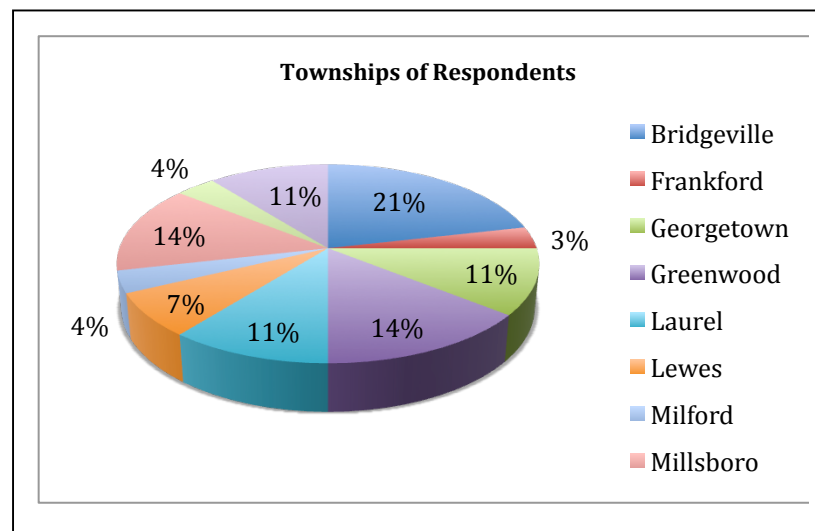


Figure 3 Townships Surveyed

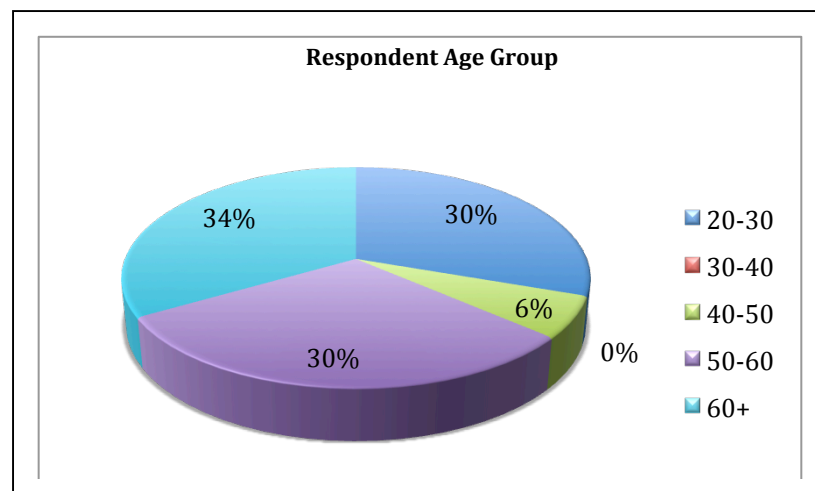


Figure 4 Age Group of Respondents

The questionnaire – composed of a total of 81 questions – was used to capture the diversity of the farm community spatially but also in terms of variety of functions carried out on the farms and the type of agricultural business the participants are engaged in, e.g. poultry versus crop farming, which may involve different skills and assets. The questionnaire was designed to capture basic farm community profile data and then asked participants to respond to questions with regard to their perception of farm community resources as well as how those resources were actually employed in past disasters. The main part of the questionnaire was divided into four segments representing the four phases of the disaster management cycle, i.e. mitigation,

preparedness, response and recovery. Those four segments were each further subdivided into four broad functional areas of disaster management: coordination, assessments, communication, and implementation. Two questions were attached to each functional area: one question about general resources for that specific functional area, and another more specific question on resources related to a particular activity in that disaster management phase. These two separate types of questions – general and exhibit – intended to confirm that the questions had been understood. Moreover, however, they also served as an entry point for further clarification during the in-depth interview. Keeping in tradition with qualitative research, some open-ended questions were also included.

In addition and also taking into account the time constraints of this study, a maximum of 25 contextual in-depth interviews were anticipated depending on the availability of interviewees. It was expected that about ten of these would take place during Agriculture Week from 16 to 21 January 2012, i.e. two interviews per day. In the following two weeks from 23 January to 3 February, ten more interviews were planned during the random sampling of the five major townships. Besides the 20 participants from the questionnaire pool, five semi-structured in-depth interviews were requested with the following 5 community stakeholders: (1) county emergency services, (2) fire department in the county's capital, Georgetown, (3) Delaware Department of Transportation, (4) Sussex Amateur Radio Association (SARA), and (5) Sussex County newspaper, *Delaware Wave*. Their participation was solicited with the objective of further triangulating information received from the farming community itself, thus gaining a more in-depth understanding of the overall context of community resources. Their knowledge of how they perceived the community's assets would be informative. Of interest was also their perception of whether there were other resources that existed but were not employed, or self-reported. Thus, interview questions for this group were two-fold: on the one hand, they were asked about their experience with the farming community acting collectively in times of disasters; on the other hand, they were asked about other resources that the farming community may have had but did not employ. Overall, these 25 in-depth interviews were designed in such a way so as to provide further perceptual and contextual insights into the phenomenon of farm community resources. The questions for these in-depth interviews were individually tailored around the questionnaire responses to seek (1) further elaboration on the information provided in the completed questionnaire, and (2) additional information on specific disaster events and the community's responses.

At the end of the survey, a total of 9 in-depth interviews had been carried out. Seven of those had been with farmers themselves, and two others were conducted with Sussex County emergency services/CitizenCorps and the Georgetown fire department. DelDOT, SARA and *Delaware Wave* did not respond to requests for an interview.

Data analysis involved both a deductive and inductive process, informed by the initial categories of the conceptual framework – based on the categories of functional activities in emergency management - as well as through additional codes that emerged from the data interpretation. In keeping with qualitative research tradition, the relationship between the deconstruction of data and its re-composition was an ongoing and interactive process for the duration of the data processing phase.

Limitations

Careful thought was given to account for any limitations that may affect this study. Subjectivities in developing the research design and data collection instruments were a reflection of the researcher's work experience in emergency management for a period of over twelve years. They are the inherent foundations of this study, which include the research questions themselves.

Some limitations were experienced in terms of conducting statistical analyses. Although the number of completed questionnaires still fell within the expected minimum range, it largely confined the analysis to descriptive statistics. It was initially anticipated that, during Ag Week, about 20 questionnaires could be collected per day. Instead, a total of only 21 completed questionnaires were received during that entire week. Ag Week is an annual event for the state of Delaware and, thus, attracts farmers from all counties as well as some from out-of-state. On average, it took the researcher two hours to find a farmer from Sussex County willing to complete the questionnaire.

After Ag Week, random sampling was carried out in the five major townships of Sussex County, where also there it was difficult to find participants. Usually, only one person per farm was available to complete the questionnaire, instead of the anticipated 5-10. With the increasing use of machines, farm labor has become less and, of course, seasonal. On arrival at the farm, the researcher was referred to the owner or manager, who was generally male (88% of respondents were male). Wives were reluctant to complete the questionnaire and referred to their husbands. This limited the range of perspectives on farm resources to mainly male owners or managers (Figure 5).

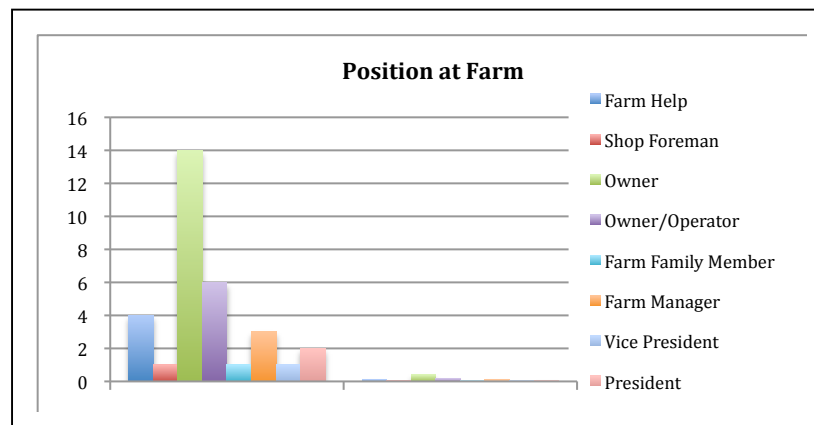


Figure 5 Respondent's Position at Farm

There was great concern among respondents that the survey was going to be used "to inspire" more government regulations, which farmers strongly object to. It took the researcher extensive time to explain the project and for what purposes the data was going to be used. Again, on average, it took two to three hours to find a participant and have one questionnaire completed. Moreover, there seemed to be some degree of "survey fatigue". Some farmers showed the

researcher other questionnaires they had just received by mail from various research institutes.

Furthermore, this study was not about developing a survey tool for all community groups or individual citizens in Sussex County, who may have disaster management resources. This study was focused on the farm community alone. This study also did not intend to suggest that its findings would necessarily be applicable to other farm communities. Every community will have its own distinct set of assets and challenges and, correspondingly, different types and levels of resources. It was anticipated, however, that this study would provide an insight into how farming communities use their own disaster management resources and provide a starting point for discussion on how these community resources could be made better use of in current local disaster management systems.

Sussex County, Delaware: Disaster Profile

According to historical data compiled by Sussex County Emergency Services, Sussex County with a total population of 197,145 residents (U.S. Census Bureau, 2010) has faced the impact of a spectrum of disasters over the past 250 years: ranging from floods, severe storms, tornados, earthquakes and droughts, to human-made disasters such as the release of hazardous material. In 2004, Sussex County was also affected by an avian flu outbreak that resulted in significant economic losses (Amis, 2007). Table 3 provides an overview from the County's 2010 Disaster Mitigation Plan on the top ten recorded events to date as well as the probability of their future occurrence. The ten five hazards in terms of probability of future occurrence for the county include: (1) release of hazardous material; (2) extreme temperature; (3) severe thunderstorm; (4) winter storm; (5) flood; (6) drought; (7) wildfire; (8) hail; (9) earthquake; and (10) tornado. Exhibit questions for the questionnaire were designed with reference to some of the more severe events that affected Sussex County over the past 10 years, such as the 2004 avian flu outbreak, severe floods in 2006, and the winter storm of 2010/11 – with the expectation that more recent events would result in more comprehensive recollections. However, during the in-depth interviews, historical events as far back as Hurricane Hazel in 1954 were reviewed.

Table 3
Sussex County - Probability of Future Events (All Hazards)

	Hazard	Number of Events	Time Period	Events per Year	Probability of Future Occurrence
1	Hazardous Material Release	132	2004-2008	26.4	high
2	Extreme Temperature	78	1995-2009	5.3	high
3	Severe Thunderstorm	287	1950-2009	4.9	high
4	Winter Storm	66	1993-2009	4.1	high
5	Flood	57	1993-2009	3.6/0.01	high/low
6	Drought	45	1995-2009	3.2	high
7	Wildfire	8	1993-2009	0.5	low
8	Hail	28	1950-2009	0.5	medium
9	Earthquake	59 (1 MMI \geq VI)	1871-2009	0.4	medium/low
10	Tornado	18	1950-2009	0.3	medium

Adapted from: "Sussex County Emergency Operations Center. (March, 2010). 2010 multi-jurisdictional all hazard mitigation plan update – Sussex County, Delaware. Table 4.2-10 "Probability of Future Events", Section 4.2, p. 39.

While the extent of the impact of these different events has varied across the county over time, its residents have individually as well as collectively gained experiences from them, on which this study intended to draw. Moreover, the decision of whether or not to activate community resources is, among others, also largely a result of risk perception. The type of events experienced in Sussex County and the probability of their future occurrence, which this disaster profile summarizes, was therefore important to understand in order to analyze and interpret the findings of this study.

Findings

This section is organized in three parts. The first part looks at the first two research questions of perceived versus actually used disaster management resources throughout the entire disaster management cycle. The second and third parts review the findings in response to the third question. They take a closer look at when and what types of resources are used in relationship to institutional emergency management.

1. Perceived versus Actually Used Resources

The first two research questions asked:

1. How does the farming community in Sussex County perceive its own capacity to engage in disaster mitigation, preparedness, response and recovery?
2. How has the farming community in Sussex Country employed its own resources in past disasters?

The survey found that, overall, perceived versus self-reported actually used resources were congruent with regard to the functional areas of communication and assessment. However, strikingly, they diverged for implementation and coordination.

However, before delving into the specific findings of perceived versus actually used resources, a comment is necessary on an observation related to general and exhibit questions. General and exhibit questions were used in the questionnaire in order to ensure that questions were understood, but also to better triangulate data. The responses showed that there were no apparent discrepancies between the ratings of general and exhibit questions (e.g. Figure 6) – with the exception of preparedness/coordination (Figure 7), preparedness/assessment, as well as response/assessment, and recovery/assessment (Appendix 2).

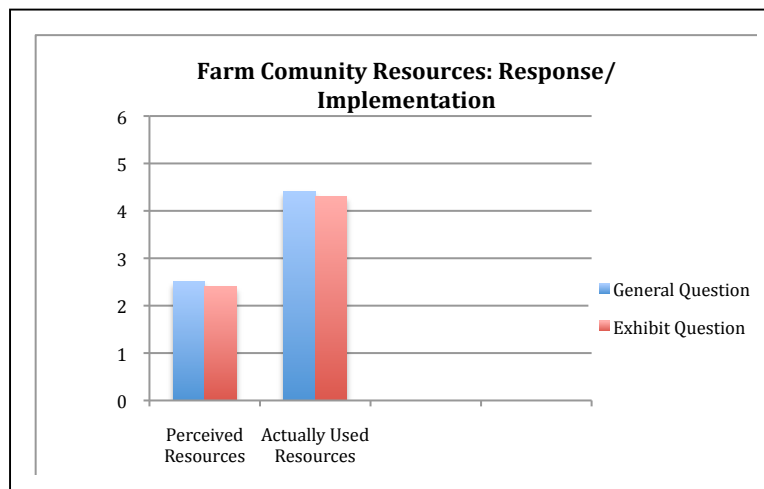


Figure 6 Farm Community Resources: Response/Implementation

For preparedness/coordination (Figure 6) as well as response/assessment, answers to the exhibit question for actually used resources showed a positive response while the general question did not. This indicates that the farm community in fact has and has used positive resources for both preparedness/ coordination as well as response/ assessment, which is not reflected in their perception. It suggests that there may be an underestimation of resources in these areas of community activity.

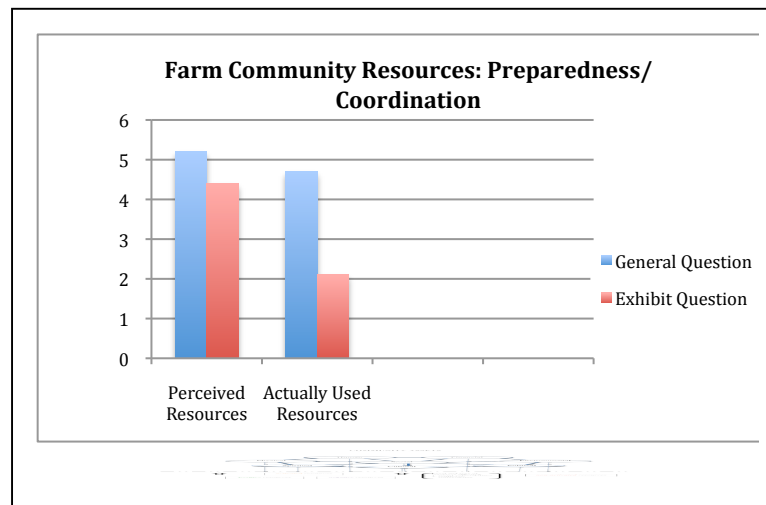


Figure 7 Farm Community Resources: Preparedness/Coordination

Similarly, for assessment activities in both the preparedness as well as the recovery phase, overall positive answers were received to the exhibit question on perceived resources but not for the general question. This suggests that the farm community believes that it has positive resources for preparedness and recovery assessment. However, this has not been confirmed through instances of actual deployment of resources. It may suggest either an overestimation of resources or a lack of opportunity to deploy resources for this particular category of disaster management activity. It was beyond the scope of this study to investigate any causal relationships. Thus, this area requires further analysis in future studies.

These observations on general and exhibit questions are important for the interpretation of the aggregate data on the four categories of activities throughout the disaster management cycle, which may conceal some of these nuances. This is going to be taken into consideration in the findings section below, where the mean score point of the perceived and actually used responses was used to arrive at the aggregated results, and served as the basis for the interpretation of the quantitative data. Overall, there were few discrepancies in terms of perceived versus actually used resources throughout the entire disaster management cycle – i.e. mitigation, preparedness, response and recovery – that were uncovered by this study (Appendix 3). The two categories of activities that displayed divergent results related to implementation and coordination activities.

As Figure 8 shows, the perception of available implementation resources was significantly higher during the preparedness and response phases than the respondents confirmed in their answers to the questions on the resources they actually used before and after an event. As mentioned above, since the data does not offer any causal explanations, various reasons could

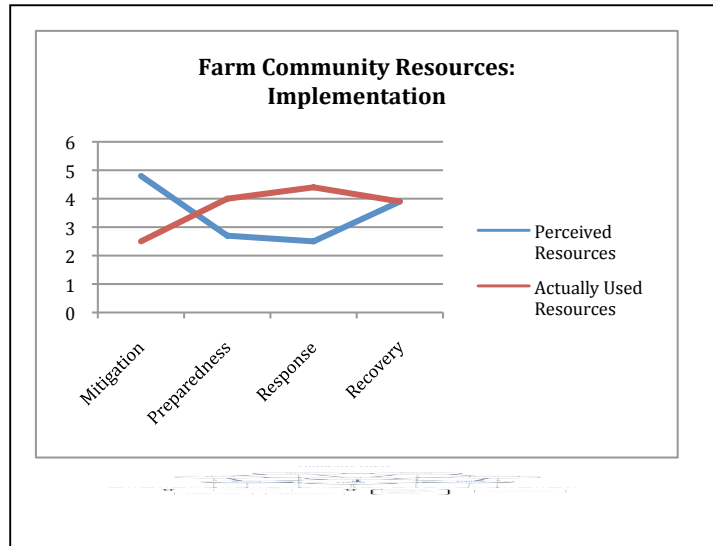


Figure 8 Farm Community Resources: Implementation

account for this discrepancy such as: (1) the community has significantly more resources than it employs; (2) the community has potential resources but has not had an opportunity to activate them; or (2) the farm community overestimates its implementation resources. As mentioned above, this could not be determined by this study and requires further investigation.

Another inconsistency that the survey highlighted related to coordination activities in the preparedness phase specifically (Figure 9). Apparently, there was a positive identification of coordination resources that had been used in the past, but the perception of this category was negative. This seems to indicate an underestimation of potential coordination capacity, which was also revealed in the observations on answers to the exhibit versus general questions, as discussed at the beginning of this section.

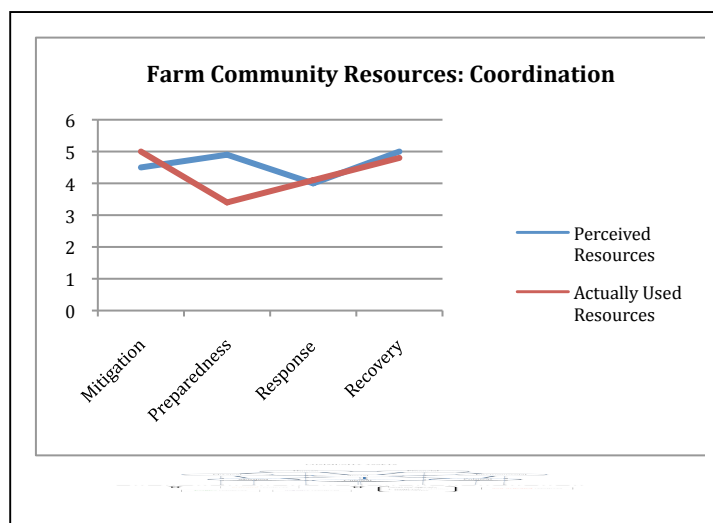


Figure 9 Farm Community Resources: Coordination

In conclusion on the findings of this study on perceived versus actually used resources of the farm community, they overlapped with the exception of coordination in the preparedness phase, and assessment capacity in the response and recovery phases. Overall, in relation to the four disaster management phases and categories of activity, the farm community showed active collective engagement in:

- (a) mitigation – implementation;
- (b) preparedness – coordination, assessment, implementation;
- (c) response – implementation; as well as
- (d) recovery – assessment.

Perceived versus Actually Used Resources

Finding No. 1: The questionnaire responses showed a discrepancy between the ratings of general and exhibit questions for: (1) preparedness/coordination, (2) preparedness/assessment, (3) response/assessment, and (4) recovery/assessment. It suggests that the farm community in fact had and had used positive resources for both preparedness/coordination as well as response/ assessment, which was not reflected in their perception. It also indicates that the farm community believed that it had positive resources for preparedness and recovery assessment, but had not yet deployed those in actual disasters. These nuances are concealed in the aggregate data scores.

Finding No. 2: Overall, perceived versus actually used resources were congruent with regard to the functional areas of communication and assessment. However, they diverged for implementation and coordination. The perception of available implementation resources was significantly higher during the preparedness and response phases than the respondents confirmed in their answers to questions on resources they actually used. Also, there was a positive confirmation of coordination resources used in the past, but the perception of this functional category was negative.

2. When Resources Were Used For Collective Action

This second part takes a closer look at when disaster management resources were used by the farmers for the benefit of the community, outside and complementing institutional emergency management. Most of these related to implementation activities, a few others to assessment and coordination. Table 4 provides a detailed visual overview indicating when farmers activated their individual resources for the good of the community. Positive results were received for (1) implementing mitigation measures; (2) implementing and coordinating disaster preparedness, (3) implementing a response and (4) carrying out assessments for recovery. These findings of the questionnaire were further supported by contextual and background information received during the various interviews and other data collected as part of this study.

Table 4

Overview - Questionnaire Results in Relation to the Disaster Management Cycle

	Resources	Mitigation		Preparedness		Response		Recovery	
		General	Exhibit	General	Exhibit	General	Exhibit	General	Exhibit
Coordination	perceived	4.5	4.5	5.2	4.5	4.3	3.6	5	4.9
	actually used	5	5	4.7	2.1	4.4	3.7	4.7	4.9
Assessment	perceived	4.2	3.7	3.5	2.4	3	3.3	4.3	2.4
	actually used	4.3	5.4	4.6	3.4	5.2	3	4	5.4
Communication	perceived	3.3	3.9	3.9	3.6	3.3	4	4.4	3.6
	actually used	4	4.3	3.8	3.4	3.5	3.7	4.4	4
Implementation	perceived	4.5	5	2.7	2.7	2.5	2.4	3.9	3.8
	actually used	2.5	2.5	2.3	5.7	4.4	4.3	3.7	4

Note: Answer choices for questions 18 to 81 ranged on a scale from 1 signifying “strongly agree”, 2 “somewhat agree”, 3 “neutral”, 4 “somewhat disagree”, 5 “strongly disagree”, 6 “don’t know”, to 7 “doesn’t apply”.

Coordination

The farm community in Sussex County did not use a formal coordination mechanism for disaster management. There were no formal or organized meetings convened specifically for disaster-related activities (Figure 10). Throughout the fieldwork for this study, farmers themselves and other stakeholders emphasized their independent work style and the fact that

there was no leadership structure. Everybody assumed whatever function needed to be filled whenever necessary. For instance, fire services explained that, when there was a field fire, farmers converged spontaneously to help and, depending on what needed to be done to contain the fire upon their arrival on the scene, they would immediately take on that role. There were no pre-assigned roles and responsibilities. When functions were assumed, they were largely carried out independently and without supervision. One farmer commented that responses to incidents like field fires had been experienced so many times that farmers knew what needed to be done. This knowledge and experience continued to be handed down to the next generations of farmers.

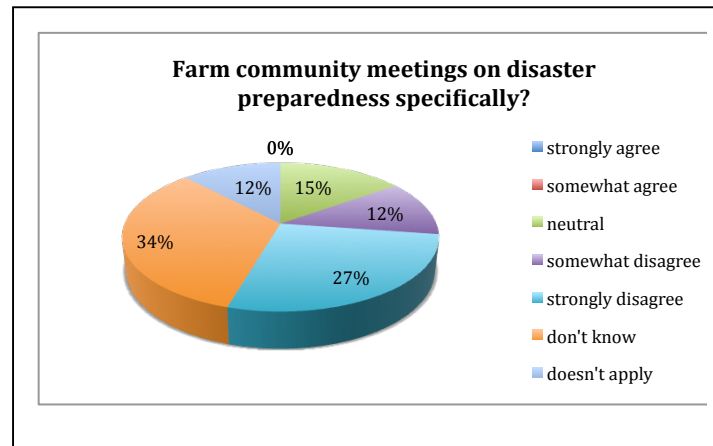


Figure 10 Farm Community Meetings on Disaster Preparedness

However, when there was an imminent need that could not be managed by a farmer alone, farmers would informally meet to discuss what course of action to take. According to a number of respondents, farmers considered their everyday network to be within an approximately five-mile radius. This was what they consider to be their local community, where they knew everybody and helped each other. For instance, in advance of a snow storm, they usually knew who of the farmers in the neighborhood would clear the roads close-by, if they did not fall under the responsibility of the Delaware Department of Transportation (DelDOT).

Coordination with emergency services in the preparedness and immediate response phases was more formalized. Some farmers had, for instance, contracts for snow removal services with DelDOT, which clearly laid out their responsibilities and coordination requirements with the government. However, there were other farmers, who did not wish to be bound by a contract but still provided equipment and assistance to local emergency services. In those instances, there was, however, still structured communication with emergency services in the same way as was the case for contracted farmers. On requests for assistance, farmers communicated their availability. Sometimes they were reimbursed. However, as fire services explained, some declined reimbursements and, generally, the amount was in any case not commensurate with the services provided.

However, a minority but yet significant number of respondents answered positively on some questions related to collective coordination activities. For instance, 39 percent agreed that there

was a forum to decide on mitigation measures collectively and some 28 percent confirmed that there was a farm representative to lead on mitigation (Figure 11). While the questionnaire did not provide details on the nature of those coordination fora referred to, subsequent interviews and other information collected made reference to the role of the Farm Bureau, the Agriculture Extension as well as other local and regional farm meetings – such as those organized by the Fruit and Vegetable Growers Association of Delaware and the Delmarva Poultry Industry, Inc. – as venues to exchange information and discuss mitigation strategies. However, actual decision-making to implement mitigation measures seemed to remain at an individual farm level within statutory requirements and standards.

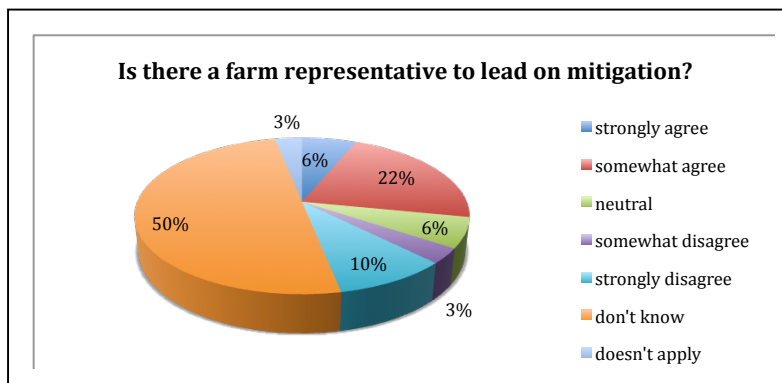


Figure 11 Farm Representative Leading on Mitigation

Regardless, the only positive results for collective coordination activities could be confirmed for the preparedness phase. Specific questions related to knowledge of equipment available in the community for specific tasks. For example, over 72 percent responded that they had knowledge of who in the community had road-clearing equipment that was ready to be deployed. The importance of knowing what equipment was available for emergency response was also confirmed and repeatedly made reference to during the interviews.

In conclusion, there is no formalized coordination structure for the use of farm community resources throughout the entire disaster management cycle. However, there are some formal and informal mechanisms that become active in the immediate preparedness and response stages of an emergency, particularly where resources are deployed in support of efforts by local emergency services.

Assessment

The study found that farmers drew on previous assessments, knowledge and experience to make decisions during the preparedness stage. In addition, they used their own lessons learnt but also drew on outside expertise to inform their recovery strategies. For instance, 86 percent of farmers queried during this study confirmed that they consulted with external farm experts on experiences in other places in order to improve their own practices following an event (Figure 12). Some 50 percent of all respondents affirmed that they had sufficient resources to carry out their own damage assessment after a disaster.

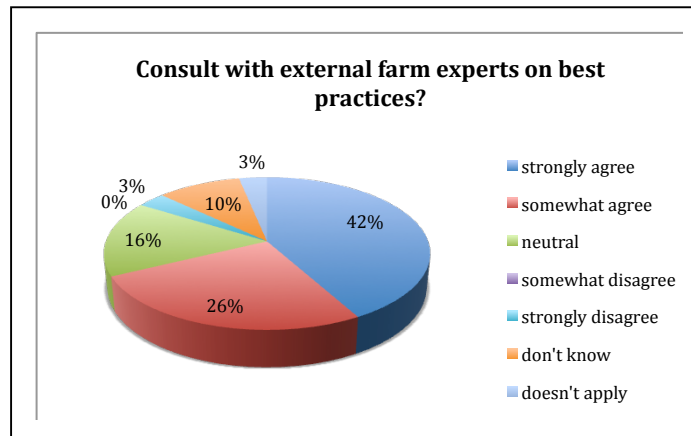


Figure 12 Consultation with External Experts on Best Practices

While the questionnaire only uncovered perceived but not actually used assessment resources for preparedness and recovery, interviews confirmed actually used resources in both of those two phases as well as in the response phase. The analysis of the qualitative data concluded that most activities related to assessments were carried out either in preparation of an insurance claim or in order to modify farming practices and rebuild farm buildings with more disaster-resilient technology following an event.

Moreover, it has to be noted here that – with the disaster management phases being cyclical and often running concurrently – the distinction between recovery and mitigation activities is often blurred. Consequently, some recovery activities, which take into consideration lessons learnt and best practices and in essence “build back better”, can equally be classified as mitigation measures, as illustrated by the examples of modified farming practices or the rebuilding of farm buildings. Consequently, assessment activities could in fact be concluded to span the entire disaster management cycle.

Assessment activities are a reflection of threat perceptions. Consequently, what resources are deployed, when, for what types of events and to what degree – both for assessment purposes themselves but also in response to the specific results of an assessment – are indicators of a community’s risk identification. One of the researcher’s assumptions prior to undertaking this study had been that any farming community would have a risk perception more closely aligned with data on historical events and their probability of future occurrence and would, therefore, be more proactive in terms of disaster mitigation and preparedness than other segment of society – considering their hundreds of years of professional experience as individual farmers as well as a community responding to disasters collectively. However, the findings of this study unveiled an unexpected reactive approach to disaster management in general. Repeated comments ranged from: “Why prepare for a disaster? If it’s this bad, there is nothing else we can do but run”; to “Luckily we are not in the Mid-West or California, and don’t have to worry about that [tornados, earthquakes]”; and “Flooding? We don’t have any flooding problems in Sussex County!” Thus, their risk assessment of a more severe event was low, but so was also their risk perception of frequent and recurring emergencies, such as county-wide flooding. This was a surprise as, for instance, severe storms and floods ranked among the top five hazards both in the Sussex County

Mitigation Plan as well as among the top five in the survey itself on self-reported types of events affecting farms in Sussex County (Figure 13). Moreover, within 15 months prior to carrying out this study, Hurricane Irene had barely spared a full hit on Delaware, an earthquake with its epicenter in Virginia had reminded everyone that the Mid-Atlantic region – including Delaware – was located on a ridge between two of the earth’s major tectonic plates. Also, considering that Sussex County is located on a sea-level plain with its highest elevation at 74 feet (23m) and experiences frequent and wide-spread flooding, comments by respondents that they did not understand the survey questions related to flooding and insisted that Sussex County was not affected by any flooding problems or threats were unexpected. One person commented that, during bad weather, including coastal storms, she would lock herself into her basement, what she considered to be the safest place on the property. Their house was located on the coastal river at sea level.

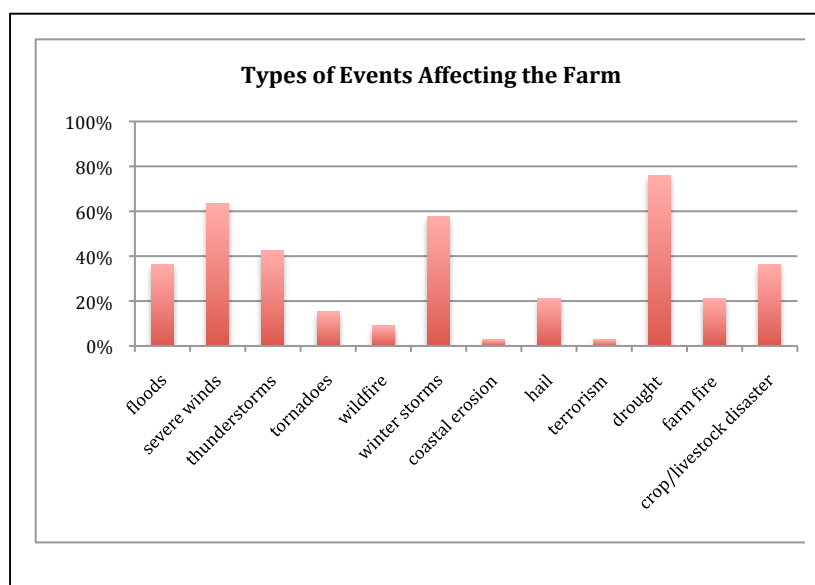


Figure 13 Self-Reported Types of Events - Sussex County Farms

Low risk perceptions were also repeated with regard to questions on drought issues. Droughts rank number six in the County Disaster Mitigation Plan but were put in first place on self-reported disasters affecting farms in Sussex County. Yet, some farmers insisted that the county did not suffer from drought conditions, as it was located on a plentiful aquifer and there was “more than enough water” available.

On other specific question related to assessment activities, the following answers were provided. Responding to whether there was a preparedness plan for residents on the farm, livestock, and/or crop, only 40 percent of farmers answered affirmatively (Figure 14). Also, only 42 percent reported that they had used previous experience to assess risks to their farm before the arrival of last year’s winter weather.

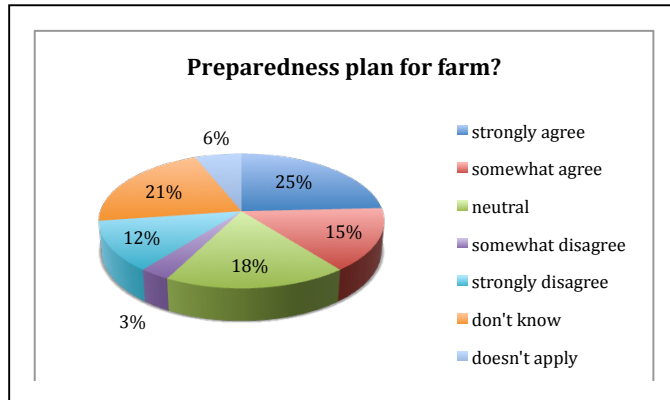


Figure 14 Is there a Preparedness Plan for the Farm?

With regard to contact with emergency services during assessments, different experiences were reported during the response and recovery phases. In the immediate response phase, for instance, over 53 percent of farmers reported that they had been engaged by emergency services in some form in needs assessments. Examples that were mentioned or made reference to during the interviews related to reporting requirements and insurance claims where the farmer had been asked to help with information on damages and losses sustained. For instance, after a field fire, the farmer and the fire chief would conduct a damage assessment together. In one instance, a farmer's prompt updates on damages and losses after a major storm had reportedly helped with providing the needed information to help extend the state of emergency in the County. However, in contrast, for recovery and on the question whether the farm's damage assessment after the 2006 floods fed into a larger recovery plan for the community, only 9 percent agreed, while a significant number of 41 percent said they did not know, and 19 percent disagreed (Figure 15).

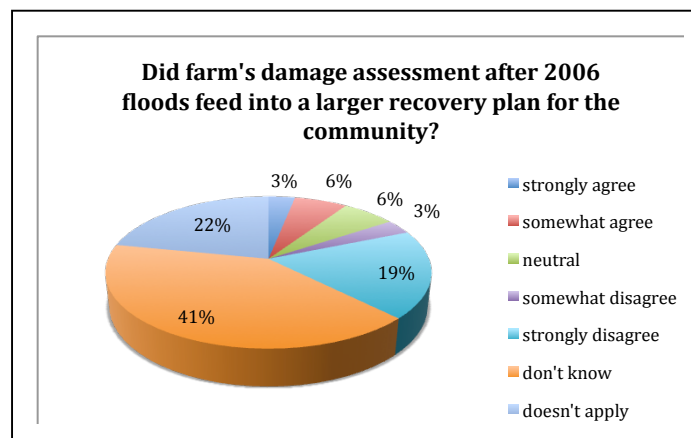


Figure 15 After 2006 Floods, did Farm's Damage Assessment feed into a larger Recovery Plan for the Community?

In conclusion, farm community activities related to assessments are mainly individual activities spanning all phases of the disaster management cycle. However, communal channels are used to take advantage of outside assistance to inform recovery and mitigation strategies. Also, individual but also community experience and lessons learnt are used in the preparation phase. Contact with local emergency services on joint assessment activities is limited to the immediate response phase and then mainly for insurance claims.

Communication

Out of the four categories, communication was the one that showed the least activity, both in the questionnaires as well as in the interviews. Farm life in Sussex County, as in other places, has changed much over the past fifty years. Most respondents made reference to how an improved infrastructure – in terms of telecommunications and transportation - had changed the cohesiveness of their community life. The reliance that used to exist on neighbors helping each other in a remote countryside did not exist anymore to the degree that it used to, and occasions to congregate and exchange had become less frequent. For example, the tradition of taken the scrapple pot from farm to farm has died out. This tradition used to be one of the main social events and also used to define one's understanding of neighborhood. Also, in case of an emergency, farmers – like anyone else – now dialed 911. According to this respondent, there were few instances noted, where someone would run to the farm next door for help. One farmer explained that his first reflex was to dial 911. Professional emergency services arrived quickly and there was, thus, no need to approach any of the neighbors.

The only specific question, which received a positive majority response related to information exchange on mitigation measures. Over 53 percent agreed that there was some communications network in the community that they made use of to exchange information on mitigation measures (Figure 16). While no majority responded affirmatively to any of the other

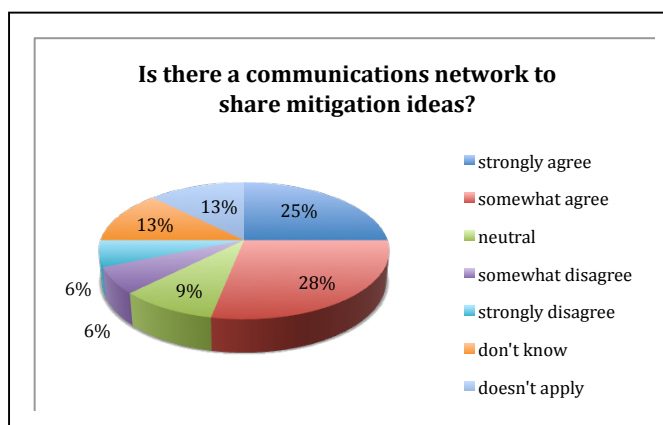


Figure 16 Communications Network on Mitigation Ideas?

questions in the communications category, there were still a number of questions that received a considerable number of positive answers. For instance, over 41 percent confirmed that they had a

contact list of all farmers in their community, but only 33 percent agreed that there was some communications network among farmers to communicate on an imminent disaster. This percentage for the preparedness phases increased to 43 percent on communications network for farmers to exchange information on the response to a disaster. A communications network was clearly distinguished from a communications system. Only 26 percent agreed that they had some emergency communications system to exchange information with the rest of the farm community. This was also a conversation item during the interviews. Anecdotal evidence showed that farmers had informal communication networks – such as the truck stop in Laurel, where some made their way early in the morning to hear about the latest news and where they found out if help was needed anywhere – or they discussed an issue that needed to be tackled among neighbors informally over a cup of coffee. However, when it came to the means by which information was channeled, farmers continued to use face-to-face contact or telephone calls. There was no emergency communications system per se. Many farmers use basic walkie-talkies or two-way radios to communicate with farm personnel for day-to-day work in the field. However, these were not set up to speak with other farmers, and they also did not link with communication channels used by emergency services. When farmers worked with emergency services during an emergency, they – depending on the situation and individual arrangements – would receive a hand-held radio from emergency services to participate in the team’s communication for that particular deployment only.

Communication venues and channels other than these *ad hoc* informal meetings initiated by individual farmers themselves included opportunities for exchange at farm association meetings and such fora as the annual Delaware Ag Week, organized by the Agriculture Extension of the University of Delaware, which among others offer presentations and discussions on best farming practices. The media, particularly farm newsletters and newspapers such as “The Delmarva Farmer” and “The Mid-Atlantic Poultry Farmer” also played an important role in information sharing. However, none of these are designed to address disaster issues specifically. However, farmers interviewed commented that, in relation to disasters, the media was an important source of information to learn about best practices, particularly with regard to recovery and mitigation initiatives in other places.

One interesting finding that the data analysis of the questionnaire responses uncovered vis-à-vis communication issues concerned the perception of farmers with varying number of years of farming experience in the community and the degree to which they perceived information exchange. While one could assume that old established community relationships also corresponded to a higher degree of perceived and actual information exchange, the questionnaire responses dispelled that assumption. The majority of those who had only lived or worked in the community for less than 20 years – as opposed to the average of over 40 years – responded more positively to having a communications network and venues for information exchange available, in particular during the mitigation phase, but also in preparedness and response. Nevertheless, conversations with and anecdotes of farmers who had only established themselves in the community over less than ten years or so highlighted the difficulties they experienced in integrating into this old established farm community. This, as the data showed, was however not a result of having less access to the farm community’s communication and information exchange channels on disaster management issues.

In conclusion, communication and information exchange on disaster related activities in the farm community was ad hoc and also a reflection of how the cohesiveness of the farm community has changed with institutionalized emergency services usually now being the first point of contact and with better infrastructure facilitating increased mobility and self-sufficiency. Information sharing on recovery and mitigation strategies took place through more established channels, such as farm associations and the media.

Implementation

The strongest responses for perceived and actually used resources were received in the implementation category, covering all phases of the disaster management cycle with the exception of recovery. However, one of the few strongly agreed responses in the entire questionnaire referred to the question “Has the farm you are associated with learnt from a previous disaster and taken measures to prevent damage and loss in the future?” This in essence was an implementation question linking recovery with mitigation. A total of 66 percent answered on this question affirmatively. Consequently, as mentioned above, the distinction between recovery and mitigation is difficult to delineate and an argument could be made that this response was evidence of the community’s resources in both recovery as well as mitigation.

On specific implementation questions, for example, more than 58 percent believed they had sufficient resources themselves to protect farm assets and farm residents ahead of a disaster, and an equal percentage confirmed a communal stock of gasoline/diesel that would be available in the event of a disaster. In fact, over 69 percent reported to have taken measures to protect the farm before the start of the previous winter. Moreover, 63 percent were confident that they had adequate resources to organize their own emergency response (Figure 17). This corresponded with interview responses and other field observations that the predominance of collective

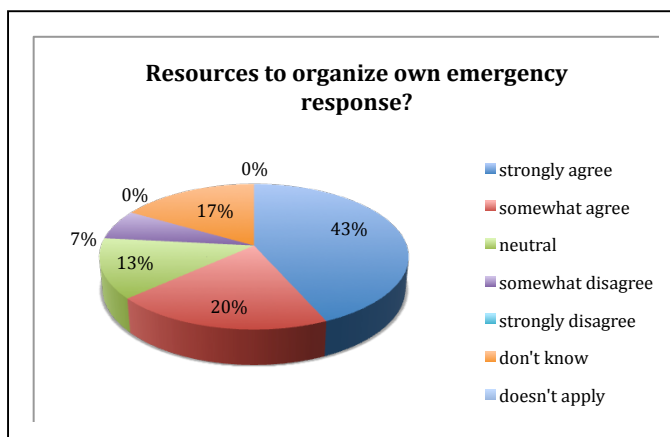


Figure 17 Resources to Organize Own Emergency Response?

implementation activities took place in the immediate preparedness and response phases, but that also lessons learnt were converted into mitigation measures. Preparedness activities included

such measures as boarding up and securing farm assets on their own farms but also for neighbors who needed assistance. Mitigation strategies reflected those already mentioned under “Assessments”. Examples that were given involved switching to more flood or drought resilient crop – depending on what event had just taken place and resulted in significant losses – buying of additional farm machinery attachments (e.g. snowplows) to clear roads, and reinforcing farm buildings. Moreover, with regard to statutory requirements, 62 percent of farmers had put in place additional safety measures for chemicals that had not been legally required (Figure 18).

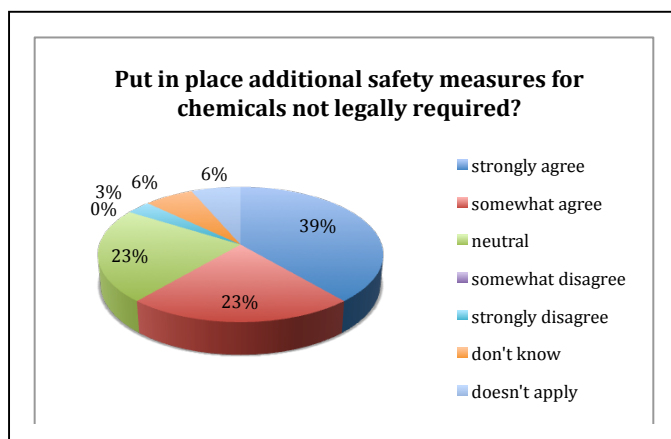


Figure 18 Additional Safety Measures not Legally Required

In the preparedness section above, the relationship with emergency services through contracted or non-contracted support services was already discussed. Another important finding in the “implementation” category of this survey was that respondents decided to pool resources for the benefit of their local community when either (1) individual resources had been exhausted; and/or (2) the government response was too slow. Some of these findings will be further explored in the “Discussion” section below.

In conclusion, implementation activities by the farming community focused on preparedness and response but took place in all four phases of the disaster management cycle. Confidence in own implementation resources was high. Table 5 provides a summary overview.

Table 5
When Resources Were Used for Self-Reported Collective Action

	Mitigation	Preparedness	Response	Recovery
Coordination	—	✓	—	—
Assessment	?	✓	✓	✓
Communication	—	—	—	—
Implementation	✓	✓	✓	?

Note: The question mark signifies a negative score in the questionnaire responses. However, some recovery activities can equally be qualified as a mitigation measure, and vice versa.

When Resources Were Used For Self-Reported Collective Action

- Finding No. 3: There was no formalized coordination structure for the use of farm community resources throughout the entire disaster management cycle. However, there were some formal and informal mechanisms that became active in the immediate preparedness and response stages, particularly when deployed in support of efforts by local emergency services.
- Finding No. 4: Farm community activities related to assessments were mainly individual activities spanning all phases of the disaster management cycle. However, communal channels were used to take advantage of outside assistance to inform the recovery and mitigation strategies. Individual but also community experience and lessons learnt were used in the preparation phase. Contact with local emergency services on joint assessment activities was limited to the immediate response phase.
- Finding No. 5: Communication and information exchange on disaster related activities in the farm community was ad hoc and also a reflection of how the cohesiveness of the farm community had changed with public emergency services now being the first point of contact and with better infrastructure facilitating increased mobility and self-sufficiency. Communication on recovery and mitigation strategies took place through more established channels, such as farm associations and the media.
- Finding No. 6: Implementation activities focused on preparedness and response but took place in all four phases of the disaster management cycle. Confidence in own implementation resources was high. Resources were pooled for the benefit of the local community when either (1) individual resources were exhausted; and/or (2) the government response was too slow.

3. What Types of Resources Were Used

The section above looked at when farm community resources were deployed in relation to the four phases of the disaster management cycle and found that there were (1) few but significant discrepancies between perceived and actually used resources; and (2) community activities focused on implementation activities in preparation and response. Some of the findings of the data analysis showed how these activities related to the work of local emergency services. This following section takes a closer look at the specific nature of the farm community's resources and how they relate to the traditional functional areas of disaster management.

The survey revealed three broad categories of disaster management resources: (1) equipment/supplies; (2) experience/lessons learnt; and (3) access to other community and professional networks. An overview is provided in Figure 19.

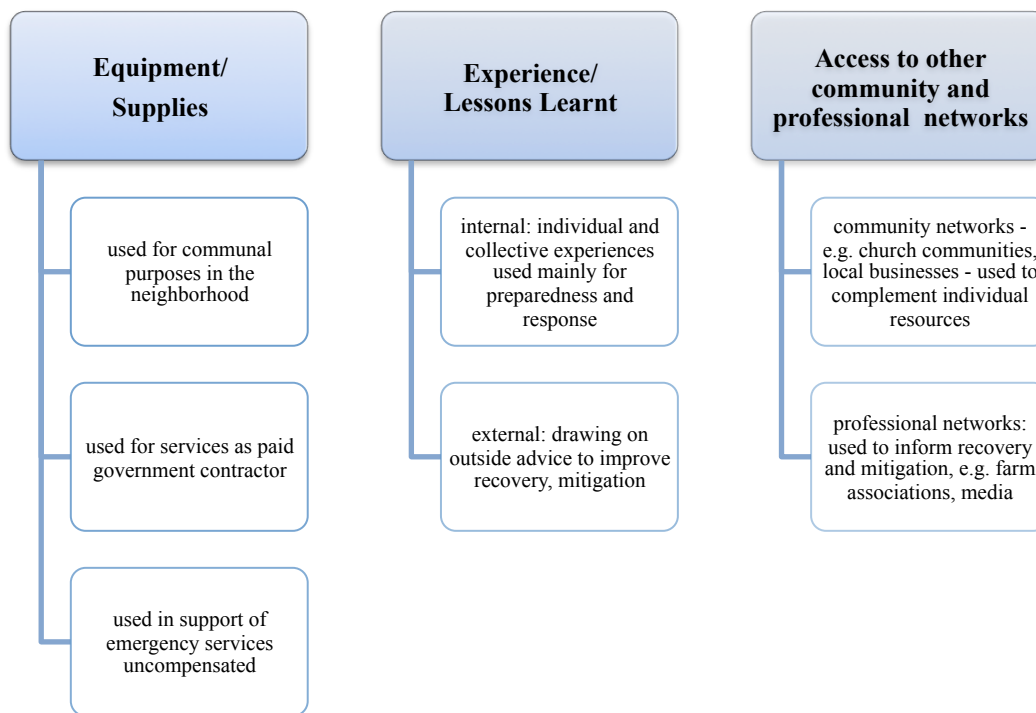


Figure 19 Types of Farm Community Resources Used in Disaster Management

Equipment/Supplies

Equipment and supplies were the most often self-reported resources, which farmers deployed or declared as potentially actionable. This mainly related to heavy farm machinery used for road clearing, emergency vehicle recovery and search & rescue. Examples included snowplowing, accompanying fire engines to ensure clear and safe passage and rescue them – or other vehicles –

when they get stuck, help electricity companies reach difficult to access areas after a storm and during power outages, as well as using machinery to lift heavy items off trapped farmers or others in need. One emergency worker commented: “We never have a farmer tell me no. And they always seem to volunteer and show up ... Actually, they help us probably more than we help them.”

Experience/Lessons Learnt

Some expertise was developed and carried forward over time and generations. At the same time, experiences of the same disasters also led to the processing of different lessons learnt. For instance, the way in which farmers responded to a field fire was practiced behavior that hardly required instructions or communication anymore. Everyone knew what to do and assumed their role virtually automatically. This expertise was handed down to the next generation of farmers.

However, other disaster experiences led to divergent responses, which determined whether more responsibility and a higher level of self-sufficiency was assumed or not. For example, one farmer was so impressed as a young man by the impact of the 1979 snowstorm that he decided to heavily invest in mitigation measures. He calculated that the investment would pay off in the long to reduce future damages and losses. Others, who had experienced the same event, made a more short-term profit calculation that did not take into consideration larger-scale impacts and losses in the future. They, for instance, decided against investing in more resilient farm structures or additional equipment, such as a snowplow. In essence, some of these farmers would then rely on their neighbors, who had made those investments to assist them, or expect government to provide those services. This was not only the case for century events but also for more regular emergencies like snow storms and floods.

Access to Other Community Networks

Instances to augment their own response capacity by accessing other community and professional networks were also observed in this study. An incident of the avian flu outbreak in 2004 provided particularly informative insights into this phenomenon. Those affected and quarantined were, among others, supported by their church community, who delivered meals and groceries and also provided emotional support. Moreover, local businesses, including utility companies, agreed to defer – and even reduce – payments for those particularly hard hit by the financial losses. Schools facilitated home schooling for affected children. The ability to access these other community networks was considered an important response mechanism to address basic immediate needs. These usually functioned without contact and coordination with local emergency services.

One farmer commented that the combination of collective experience as well as access to other community networks ensured what he called “business continuity.” In his view, local emergency management was sometimes “short-lived” – with managers and other key personnel changing positions every few years and needing to re-establish relationships in the community. By contrast, the farm community and its approach to managing emergencies was firmly

established and easier to manage because people knew each other and were clear about their respective roles.

Various sections above already made reference to where at least two of these three categories of resources came in touch with the work of local emergency services. Notably, access to other community or professional networks was not one of them. In order to gain a better understanding of how these three types of resources related to the traditional functional areas of disaster management as classified by NIMS and its categories of rural emergency management resources, the survey data was analyzed juxtaposing the three areas of the farm community's resources with the eight categories of NIMS. Results of their linkages are represented in Figure 20.

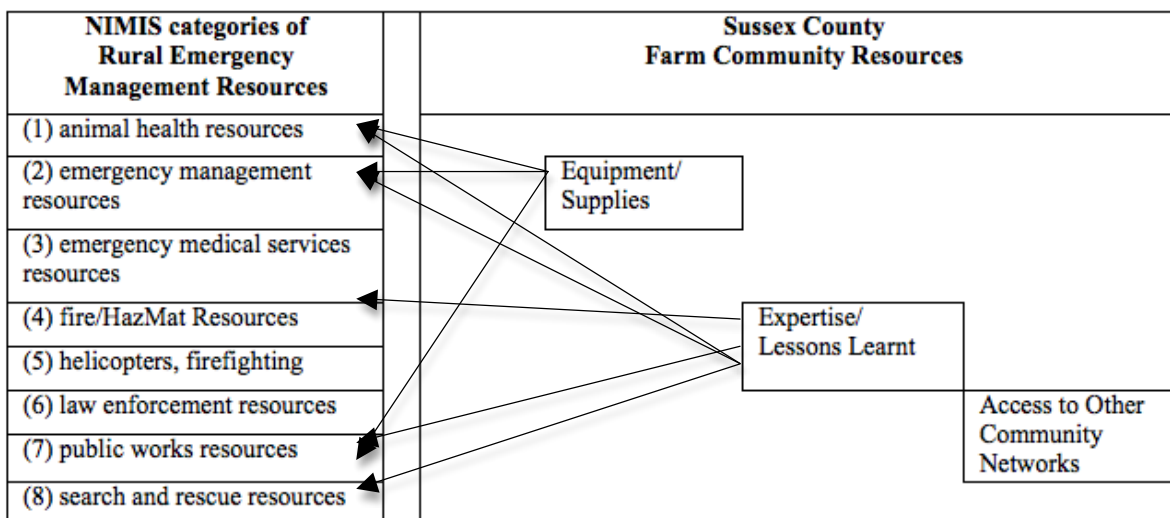


Figure 20 Potential NIMS Linkages with Farm Community Resources

In conclusion, in response to the third research question “How do the resources of the farming community in Sussex County relate to the functional areas of disaster management?”, there were clear areas of contact and overlap. However, the categorization of professional resources as defined by NIMS did not facilitate an overview and understanding of all of the actual and potential resources of a community.

What Types of Resources Were Used

Finding No. 7:

The survey revealed three broad categories of disaster management resources: (1) equipment/supplies; (2) experience/lessons learnt; and (3) access to other community and professional networks.

Finding No. 8:

In response to the third research question “How do the resources of the farming community in Sussex County relate to the functional areas of institutional disaster management?”, there were obvious areas of contact and overlap. However, the categorization of professional resources as defined by NIMS did not facilitate an overview and understanding of all of the actual and potential resources of community resources.

Discussion

Hyman's construct of actionable social capital and Stone and Weissbourd's exploration of measurements and contributing factors leading to the formation of community assets assisted with the conceptual design for this study. The findings confirmed the importance they stressed vis-à-vis: (1) active versus inactive but potential community resources; as well as (2) other "market forces" that influence the deployment, scale and scope of community resources. While other "market forces" – e.g. the availability of crop insurance, an expanding public emergency management system, and a more accessible and expansive public infrastructure in general – have been encountered in this study and are examples of how the deployment of individual and collective farm disaster management resources has changed, it was not within the scope of this study to look into the specifics of this decision-making process. As Weissbourd (2005, p. 10) commented "market environments have distinct dynamics and levers of change that can affect what gets produced for whom and where." In order to better understand the phenomenon and dynamics of community disaster management resources, Weissbourd's proposition demands further examination. Therefore, future research may wish to investigate

- the discrepancies between active and inactive but perceived farm disaster management resources in all of the four phases of the disaster management cycle; and
- the various "market forces" in the local disaster management economy, which influence the deployment of a farm community's resources.

In relation to Green and Haines's conceptualization of community assets, four out of the eight original types have emerged as the disaster management capitals of the farm community in Sussex County. They are: human, social, physical, and financial. The farm community's resources, as identified in this study, may however fall into more than one category of community capital at the same time. The study also uncovered dormant resources, as well as some that may be both positive as well as negative in their impact on the community's capacity to manage a disaster (Figure 21).

The community's human capital draws on the experiences and skills acquired by the group while preparing for and respond to a disaster collectively. It also includes the demonstrated capacity to adapted mitigation best practices from other locations to the local context. The community's equipment and supplies, which help maintain access to the local transport infrastructure, represent the physical capital. Moreover and at the same time, equipment and supplies also contribute to human capital, i.e. the physical safety of community members. Financial capital – the ability to overcome a disaster through one's own resources but also the tapping into the social and professional networks of the community to receive assistance in times of crisis – was one of the most mentioned resources in this study. Possibly because of a lack of opportunity, but not precluding overestimation, the study also located self-reported dormant resources for such activities as assessments and implementation. This poses a pertinent question in relation to those policies and strategies that are intended boost only those capabilities, which have "proven" to work. They may focus on active resources, which have been used by the community in recurring emergencies and local disasters – such as, in the case of the farm

FARM COMMUNITY ASSETS

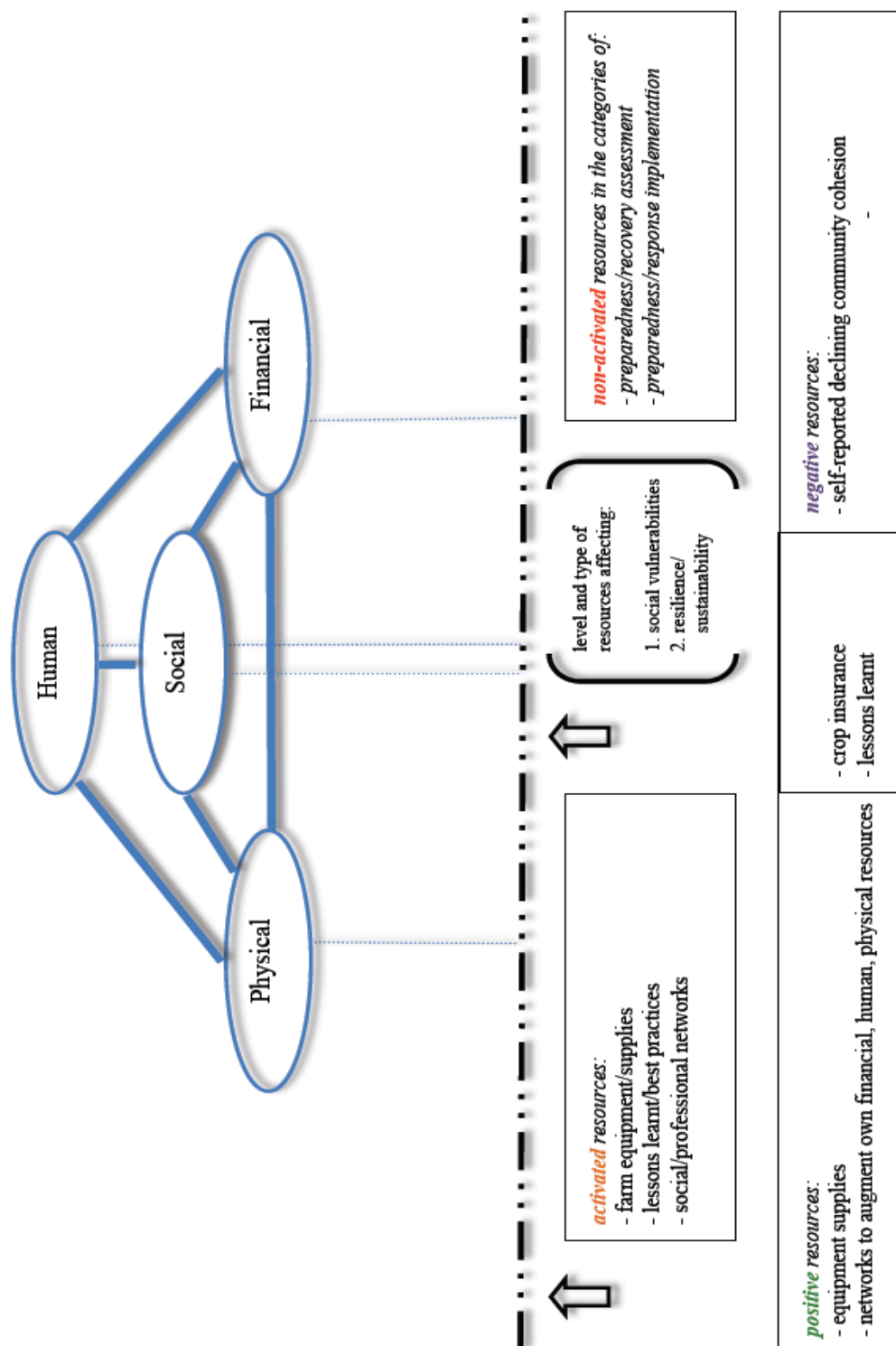


Figure 21 Overview - Farm Community Assets

community in Sussex County, winter snowstorms. However, this approach may overlook the scale and range of community capitals, which are required for larger-scale national disasters and, indeed, catastrophes, where the population may have to fend for itself for days, if not weeks. The powerful Tohoku earthquake/tsunami in Japan in 2011 was a stark reminder of this, and so is scenario planning on such issues as cyber terrorism and civil unrest.

In addition, the findings of this study also illustrate Portes's elaboration of positive and negative community resources. This became particularly apparent in relation to experiences and information processing on risks. While a modification of behavior may be suitable to a particular type of hazards – such as a basement safe room during a tornado – this may not be the best course of action for another type of hazard, such as coastal flooding. In this sense, experience could be both a positive but also negative resources. Another example that was widely cited as the community's primary disaster response tool is crop insurance. Although it without doubt is a tremendously critical mechanism to save farmers from financial ruin and soften the economic impact of a disaster, as many of the respondents to this survey explained in response to questions on what mitigation and preparedness measures they used or intended to implement, they were not thinking about those too much since they had crop insurance. In fact, the response presented often was that crop insurance itself was their disaster preparedness and mitigation strategy. This raises the issue whether crop insurance may be a deflection from other preparedness and mitigation measures, which are not attempted because of it. Consequently,

- any planned disaster management activity should include a thorough analysis and understanding of its impact – positive but also negative – on a community's individual resources.

Moreover, the understanding of this group to perceive their local farm community to be within an approximately 5 mile radius has implications for any policy proposals that may wish to strengthen their capacity or connection to the institutional emergency management structure. It also has implications for any policy proposals that relate to the various community networks they use to augment their own capacity. The jurisdictional variations raise questions on what is to be understood by

- the definition of “community” in the context of disaster management; and
- how various community groups can be supported that are not located within congruent jurisdictions.

Furthermore, as this study has found, the NIMS categorization of Resource Inventory Management for Rural Communities did not capture all of the actionable assets the community possessed. Consequently, when pursuing a disaster management approach that is intended to encompass the “Whole Community”, as is currently pursued by FEMA, a re-conceptualization of these categories may be helpful to more systematically tap into a community's disaster management assets. The current categorization may be suitable to classify professional skills, equipment and supplies but does not facilitate the inclusion of all other available resources. The extensive research that has been carried out to date into community assets may help inform such a process. Consequently, consideration should be given to

- re-conceptualize the NIMS categorization of Resource Inventory Management for Rural Communities.

Last but not least, although rapid changes in society over the last fifty years have noticeably also affected the cohesiveness and the level of self-sufficiency of the farm community, their willingness to assist each other in times of immediate crisis seems to have remained undiminished. One respondent recounted a situation where one farmer had had a bad harvest and, as a result, suffered significant financial losses that forced him to consider selling the farm. The respondent commented that, in the past, farmers would have helped each other through a financial crisis like this. But, instead, he explained, the farming business environment had become so intensely competitive that the farmer would now get a call from the neighbor not offering help but asking to have “first dips” on the farm in the event it went up for sale. Some of these anecdotes provide insights into the changed cohesiveness of the farm community in general. This was also reflected in answers to some of the survey questions. For instance, 56 percent of farmers responded that their farms themselves responded to a disaster, with 17 percent indicating joint activities by emergency services and farms together. The farm community collectively came in third place with 11 percent (Figure 22). At the same time, however, where

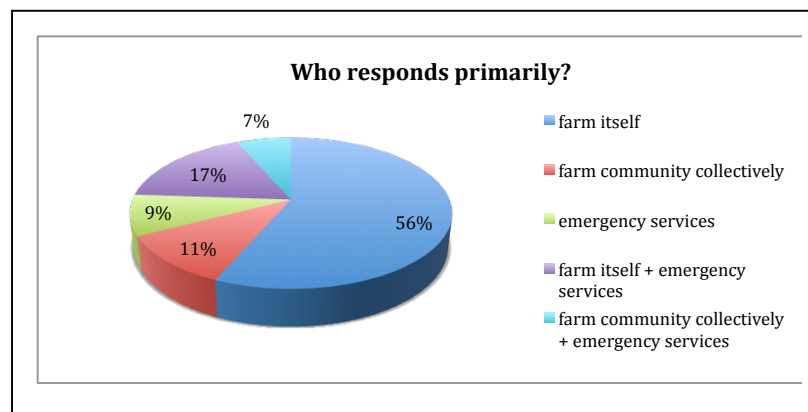


Figure 22 Who Responds to a Disaster?

lives and livelihoods are immediately threatened – such as in farm fires – neighbors continue to respond promptly and without being requested to do so. Again, it was beyond the scope of this study to examine specifically the relationship of the apparent changes in the cohesiveness of the farm community and the deployment of disaster management resources to the benefit of the whole community. This, however, is clearly an important dimension in understanding the phenomenon and changing nature of the availability of community disaster management resources. Extensive research into other types of community assets such as, for instance, related to the decay and revitalization of urban community neighborhoods as well as an expansion of the social vulnerability concept, could help establish a conceptual framework for examining and monitoring the changing dynamics in community disaster management assets. Based on this important finding, further research and policy developments may consider

- developing a framework for monitoring changes in a community that impact on the availability of disaster management assets.

Policy Suggestions

On introducing this survey to prospective respondents, the majority of farmers queried how the findings were going to be used. There was a concern that the results would lead to the creation of additional government regulations and place additional responsibilities on farmers – a notion that was strongly objected to. There was also opposition of a formal mapping process that would itemize individual resources to be potentially commandeered for collective action. Survey results and field observations indicate a preference towards voluntary engagement as opposed to a superimposed formal integration into the existing institutional emergency management structure. The following recommendations have been formulated taking these concerns and preferences into consideration. Specific policy recommendations to consider are:

1. Mapping of Farm Community Disaster Management Resources
 - Any plans for mapping farm community disaster management resources should put the farm community itself in charge of the mapping design, with the support of emergency services and an independent facilitator.
 - Mapping methodology should include a careful review of not only obvious and apparent resources that have been demonstrated in the past but should include careful consideration of other actionable but dormant assets.
2. Support to Existing Farm Community Disaster Management Mechanisms
 - Mitigation measures help reduce disaster damages and losses. This survey has shown a significant degree of farm community interest in mitigation. Also, survey participants have expressed a high degree of openness to learning about mitigation experiences in other locations. Existing communication channels – e.g. through the Farm Bureau, crop insurance companies, the Agriculture Extension as well as the media - could be used to reinforce mitigation messages and information.
 - Equipment/supplies and access to other community networks are primary farm community assets to manage disasters. Policies to strengthening community disaster management resources could focus on supporting the ideas of the farm community itself on helpful initiatives to increase their capacities.
3. Re-conceptualizing public policies related to community disaster management
 - As long as public emergency management does not recognize all categories that comprise a community's disaster management assets, public support for them will remain unachievable and a comprehensive "Whole Community" approach unattainable. As a starting point, a re-conceptualizing of the NIMS categories that currently classify rural emergency management resources should be undertaken to allow for the recognition of all relevant community resources.

Conclusion

This study set out to investigate the nature of community disaster management resources. The findings are particular to the farming community in Sussex County, Delaware. Farm communities in other locations may offer some different responses and possess a different set of community assets. Furthermore, disaster management resources of other community groups are likely to be entirely different. However, the findings of this study offer insights into venues for future research but also suggest policy recommendations to support the strengthening of community resources in pursuit of the Whole Community engagement.

The first two research questions of this study queried how the farm community perceived and had actually used its own resources. The study found that there was a striking discrepancy between actually used and perceived community resources. Out of the four broad functional categories of activities – coordination, assessment, communication, implementation – perceived versus actually used resources were congruent for communication and assessment activities, but they diverged for implementation and coordination.

The perception of available implementation resources was significantly higher for preparedness and response than was confirmed as actually used. Also, there was a positive confirmation of coordination resources used in the past, but the overall perception of this functional category was negative. Farm community resources were primarily used for implementation activities and focused on the preparedness phase of the disaster management cycle. Moreover, the types of resources used by farm community crystallized into three broad categories: (1) equipment/supplies; (2) experience/lessons learnt; and (3) access to other community and professional networks.

The third research question queried how the resources of the farming community in Sussex County related to the functional areas of disaster management used by institutionalized emergency services. While there was an overlap with the NIMS categories of rural community emergency management resources, they did not facilitate an overview and understanding of all of the actual and potential resources of the local community. Policy recommendations based on the findings of this study propose, among others, resource mapping strategies to uncover both active and inactive resources, the use of existing communication channels to reinforce, in particular, mitigation messages and information, as well as a re-conceptualizing of the NIMS categories of Resource Inventory Management for Rural Communities to allow for the identification of all relevant local community resources.

Positive social capital is only as strong as the aggregate of its individual capitals. Although this study did not intend to examine individual disaster management capital, already the process of the study design as well as the eventual findings clearly showed that community assets could not be delinked from individual capital. The stronger the individual capital, the more is available to share with the community as a whole. This recognition should question the current role of citizens assigned by the professional disaster management community as mere recipients of assistance. It infers that the strengthening of formal institutional structures alone is not sufficient.

Other community assets – primarily individual assets – need to be boosted simultaneously. A true “Whole Community” approach necessitates the engagement of all available community assets.

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Appendix 1

Questionnaire

COMMUNITY DISASTER MANAGEMENT SURVEY: SUSSEX COUNTY, DELAWARE

The Disaster Research Center (DRC) of the University of Delaware is currently carrying out a study on how farming communities perceive their own disaster management resources and how they have used those in past events. **This questionnaire is intended for those who are active in the farming community in Sussex County – either as farm owners, farm employees and workers, or family members.**

The results of this study will be published in a findings report in early 2012. Information will be available through the DRC's website at www.udel.edu/DRC. In addition, information may be used for educational purposes in professional presentations and publications, as well as for future research.

THIS IS AN ANONYMOUS QUESTIONNAIRE. WE WILL NOT ASK FOR YOUR NAME OR CONTACT DETAILS.

However, we understand that there is so much more experience and knowledge that we cannot cover in this questionnaire but that we would be interested in hearing about. We would like to conduct a follow-up interviews with anyone who is interested in sharing their experience and knowledge with us.

Are you willing to be contacted for a short follow-up interview? Yes ☐ No ☐

Would you like to receive information on the findings of this study? Yes ☐ No ☐

If yes on any of the two questions above, please leave your name and contact details:

Name: _____

Phone Number: _____

Email: _____

QUESTIONNAIRE

2

GENERAL INFORMATION

1. Date: _____
2. Sex: Female ☐ Male ☐
3. Age: 20-30 ☐ Age 30-40 ☐ Age 40-50 ☐ Age 50-60 ☐ Age 60+ ☐
4. Township in Sussex County, where you are engaged with the farming community: _____
5. Do you perceive yourself to be a member of the farm community? YES ☐ NO ☐
6. What is your position at the farm: _____
7. # of years worked/lived in this farming community: _____
8. Are you aware of either: emergency response or mitigation plan for Sussex County? YES ☐ NO ☐
9. If so, have you read any or both of the plans? YES ☐ NO ☐
10. Have you read the disaster response plan for Sussex County YES ☐ NO ☐
11. Are you part of a CERT (Community Emergency Response Team) team, voluntary fire fighters, or any other emergency service team in your community? YES ☐ NO ☐
If yes, which one? _____

FARM HISTORY

12. The farm you are primarily associated with, is a (check all that apply):
Family Farm ☐ Corporate Farm? ☐
crop farm ☐ poultry farm ☐ other livestock farm ☐ other ☐
13. How old, approximately, is the farm with which you are associated? _____
14. For how long, approximately, has the farm been under its current management? _____

QUESTIONNAIRE

3

15. Do you recall which of the following types of events have affected the farm over its existence, either from your own experience or through the account of another farm associate? Please, check any that apply.

Floods ☐ Severe Winds ☐ Thunderstorms ☐ Tornadoes ☐

Wildfire ☐ Winter Storms ☐ Coastal Erosion ☐ Dam/Levee Failure ☐

Tsunami ☐ Hail ☐ Terrorism ☐ Hazardous Materials ☐

Drought ☐ Nuclear Incident ☐ Farm Fire ☐

Crop/Livestock Disaster ☐ Earthquake, Sinkholes, Landslides ☐

16. Who primarily responds to the impact of such an event on the farm you are associated with?

Farm itself ☐

Farming Community Collectively ☐

Emergency Services ☐

Farm itself + Emergency Services ☐

Farming Community Collectively + Emergency Services ☐

17. Are those involved in the response the same actors for any type of event above - or do they differ depending on the nature of the event?

the same actors ☐ different actors ☐

If different actors dominate in different situations, give an example:

QUESTIONNAIRE

4

Mitigation Resources

Think about the resources that your farm community has collectively – i.e not only the farm you are associated with but all farms in your community together. Resources may include, for example, equipment, but also experience, knowledge and skills.

Independently from government instructions,

	<i>Strongly Agree</i>	<i>Somewhat Agree</i>	<i>Neutral</i>	<i>Somewhat Disagree</i>	<i>Strongly Disagree</i>	<i>Don't Know</i>	<i>Doesn't Apply</i>
18. Does the farm community have a forum where it can take decisions on whether to implement mitigation measures collectively?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19. Do you have a farmer representative who could lead disaster mitigation activities?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20. Does the farm community identify risks of potential hazards, such as the ones listed under question 15 above?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21. Does the farm you are associated with have the necessary equipment and resources to assess the best possible irrigation system to minimize flooding?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22. Do you have a communications network that you could use to share mitigation plans and ideas?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23. Do you have access to external information on best practices of mitigation methods?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24. Does the farm community collectively implement mitigation measures (e.g. flood protection, structural retrofitting/reinforcements etc.)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25. Do you build flood irrigation/ protection with your own resources, independent of government support?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26. Has the farming community collectively decided to implement disaster mitigation measures (e.g. flood protection, structural retrofitting) not prompted by government regulations or instruction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27. Has a representative of the farming community been involved in town/county mitigation planning?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28. Following a severe storm, has the farming community carried out an assessment together on how it can minimize future damage and loss?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

QUESTIONNAIRE

5

	<i>Strongly Agree</i>	<i>Somewhat Agree</i>	<i>Neutral</i>	<i>Somewhat Disagree</i>	<i>Strongly Disagree</i>	<i>Don't Know</i>	<i>Doesn't Apply</i>
29. Have there been discussions on what impact a tsunami might have on your farm community?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
30. Do the farmers share with each other information on areas that may be vulnerable to disasters?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
31. Has the farm you are associated with received information from any farm association on how to mitigate the impact of a winter storm?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
32. Has the farm you are associated with learnt from a previous disaster and taken measures to prevent damage and loss in the future?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
33. As the farm you are associated with put additional safety measures in place not required by government regulations for the protection of farm chemicals, e.g. special storage?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Preparedness Resources

34. Do you hold farm community meetings that discuss disaster preparedness issues specifically?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
35. Do the farmers meet ahead of a severe storm to discuss preparedness?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
36. Do you have a preparedness plan for residents on your farms, livestock, and/or crop?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
37. Would you know of different evacuation routes away from the farm that you are associated with?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
38. Does a communications network exist amongst farmers that warns the farm you are associated with of a potential disaster?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
39. Do you have a contact list for all farmers in your community?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
40. Does the farm you are associated have potential resources to protect your farm assets and farm residents ahead of a disaster?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
41. Do you keep a communal stock of gasoline/diesel in case of an emergency?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

QUESTIONNAIRE

6

	<i>Strongly Agree</i>	<i>Somewhat Agree</i>	<i>Neutral</i>	<i>Somewhat Disagree</i>	<i>Strongly Disagree</i>	<i>Don't Know</i>	<i>Doesn't Apply</i>
42. Did you have a farm community meeting last year before the first winter storm?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
43. Before last year's first winter storms, did you know who of the other farmers had road clearing equipment in case the farm you are associated with got cut off?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
44. Did you have a farm community plan for last year's winter weather?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
45. Did the farm you are associated with use previous experience to look at possible risk areas before the onset of last year's winter weather?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
46. Has the farm you are associated with received communications from a representative or another farmer warning of an imminent disaster?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
47. Has the farm you are associated with alarmed another member of the farming community of an imminent disaster?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
48. Before last year's winter weather, did the farm you are associated with take measures to protect its property and farm residents/workers?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
49. Has the farm you are associated with used stockpiled sandbags against flooding in the past?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Response Resources

50. Would you hold farm community meetings to organize a response once a disaster strikes?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
51. Would you know who to consider a leader to organize a response for the farming community in the event of a disaster?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
52. Would you have the resources to carry out your own assessment of disaster damage and/or loss to the farming community?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
53. Is the farm community represented with the local emergency services to participate in needs assessments?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

QUESTIONNAIRE

7

	<i>Strongly Agree</i>	<i>Somewhat Agree</i>	<i>Neutral</i>	<i>Somewhat Disagree</i>	<i>Strongly Disagree</i>	<i>Don't Know</i>	<i>Doesn't Apply</i>
54. Do you have your own communications network to exchange information with the rest of the farming community after a disaster?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
55. Do you have an emergency communications system you could use to exchange information with the rest of the farm community in the event of a disaster?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
56. Would the farming community have resources (e.g. equipment and skills) to organize its own emergency response, such as search & rescue, debris removal, road clearance?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
57. Do you have equipment at the farms to extinguish a fire yourselves?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
58. Did you have farm community meetings in response to the avian flu outbreak in 2004?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
59. If the farm you are associated with needed help after a disaster (e.g. protection of property, restoring access, safety of farm residents), would the first contact point be another farmer or farm association?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
60. Did the farmers carry out an assessment together of the 2006 flood damage?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
61. Has the farm community checked specifically on vulnerable members, such as the elderly or disabled in past disasters?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
62. Was information on the 2004 avian flu outbreak and how to respond to it circulated amongst the farm community by farm representatives/associations?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
63. Did the farm you are associated with contact other members of the farm community to check on their situation and safety during the 2006 floods?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
64. Did the farm community pool resources (e.g. equipment, material, accommodation) do respond to the 2006 floods?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
65. Did the farm you are associated with provided assistance to another farm/s during the 2006 floods?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Recovery Resources

	<i>Strongly Agree</i>	<i>Somewhat Agree</i>	<i>Neutral</i>	<i>Somewhat Disagree</i>	<i>Strongly Disagree</i>	<i>Don't Know</i>	<i>Doesn't Apply</i>
66. Do you hold farm community meetings on longer-term recovery after a disaster, e.g. how to restore livelihoods?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
67. Does a farm representative coordinate recovery efforts with the town/county emergency services?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
68. Do you develop ideas and plans together on how to restore land, structures and livelihoods?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
69. Would you consult with outside farm experts to draw from experience in other places?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
70. Are recovery plans shared with the entire farm community?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
71. Do the farmers reach out into the rest of the community (e.g. businesses, academia, emergency services) to strategize about best ways forward?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
72. Would the farm community pool resources to restore land, structures, and livelihoods collectively?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
73. If no government support was available, would the farming community collectively have the resources to restore key flood protection measures?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
74. Did the farm community meet to discuss in what ways it could assist with the rebuilding of any farm that was devastated by any previous disaster?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
75. Did the farm community itself devise a plan to restore land and livelihoods after the 2006 floods?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
76. Did the farming community integrate better mitigation strategies into its recovery efforts after the 2004 avian flu outbreak?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
77. Did the damage assessment of the farm you are associated with after the 2006 floods feed into a larger recovery plan for the community?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
78. Was information shared on the recovery needs of those farmers who lost poultry during the 2004 avian flu outbreak?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

QUESTIONNAIRE

	<i>Strongly Agree</i>	<i>Somewhat Agree</i>	<i>Neutral</i>	<i>Somewhat Disagree</i>	<i>Strongly Disagree</i>	<i>Don't Know</i>	<i>Doesn't Apply</i>
79. Did the farm you are associated with have access to information on best practices of how to improve flood protection after the 2006 floods?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
80. Has the farm you are associated with helped another farm to restore land or restart farm activities after a major disaster?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
81. Has the farm you are associated with considered switching to another type of livelihoods after a disaster?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Thank you for your time & valuable insights!

Appendix 2

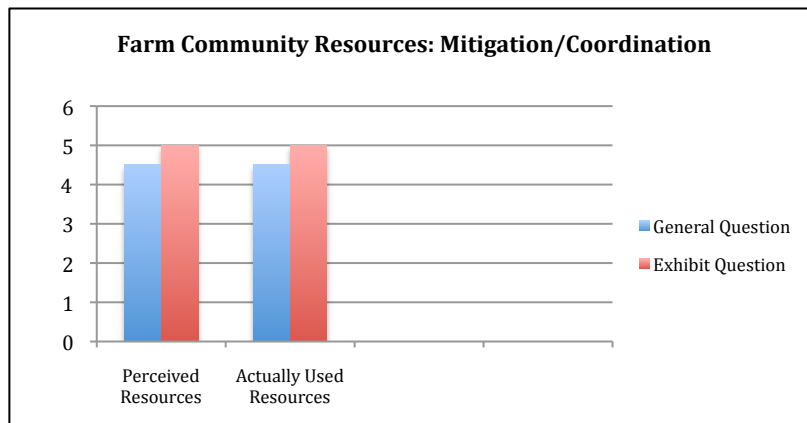
**General versus exhibit question by disaster management phase
and category of disaster management activity**

Key:

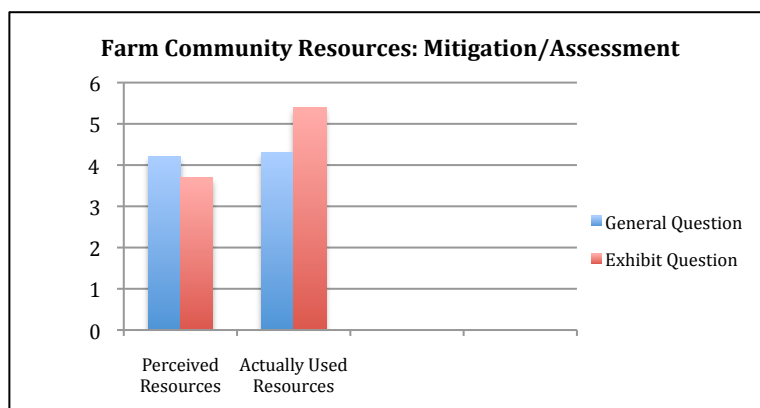
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strongly disagree: 5
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doesn't apply: 7

Mitigation

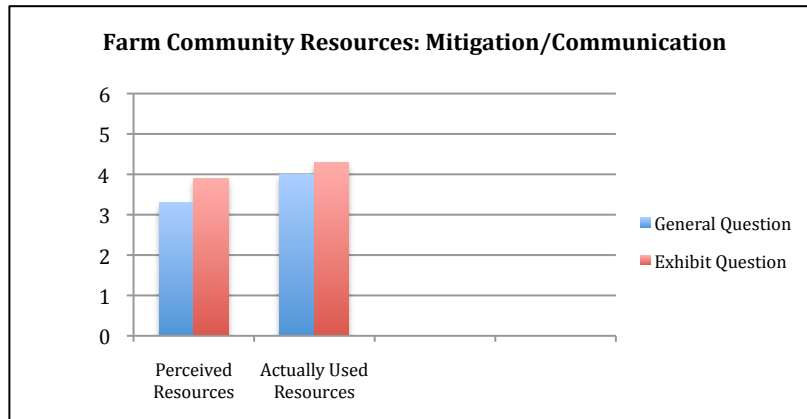
Coordination



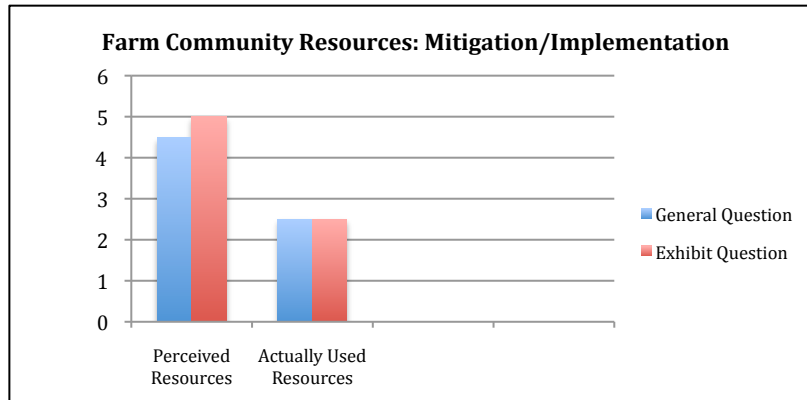
Assessment



Communication

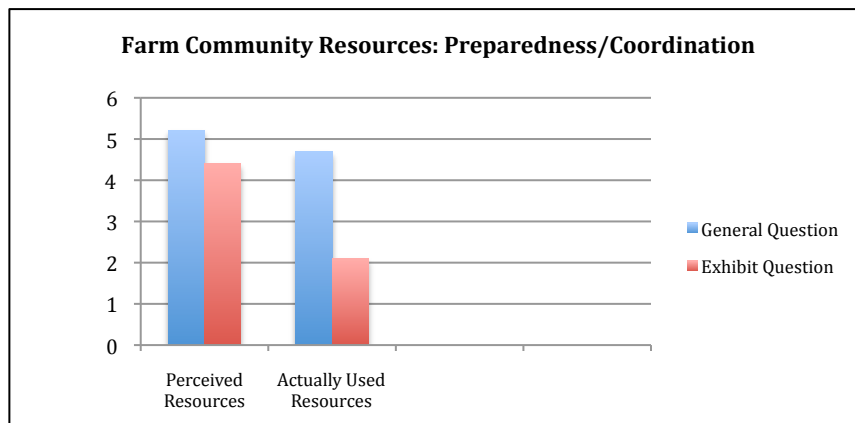


Implementation

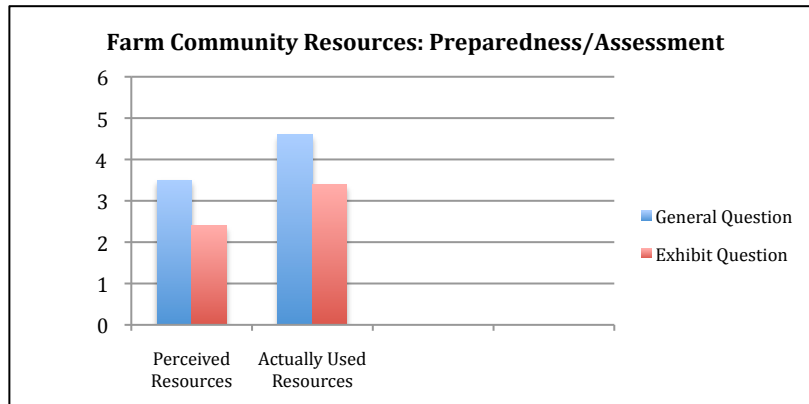


Preparedness

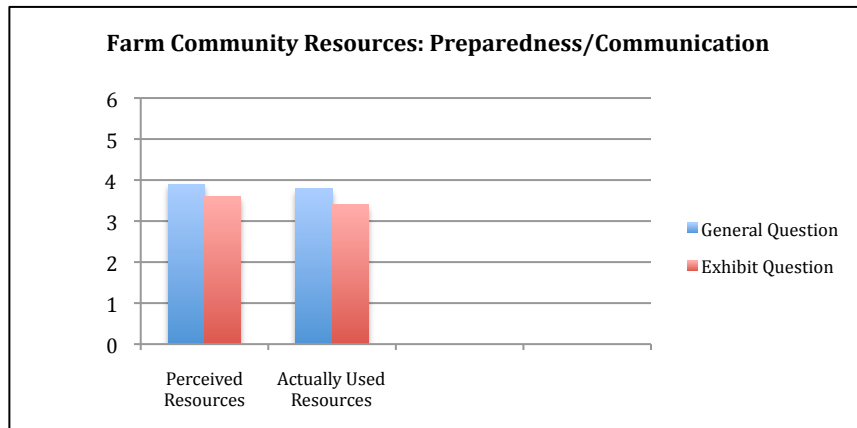
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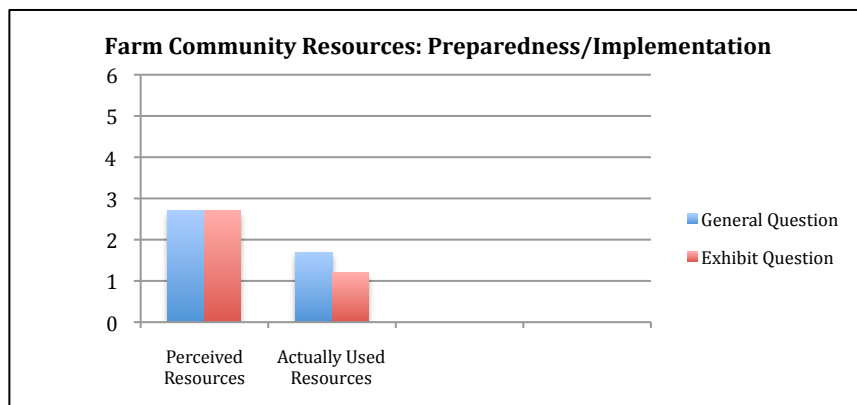
Assessment



Communication

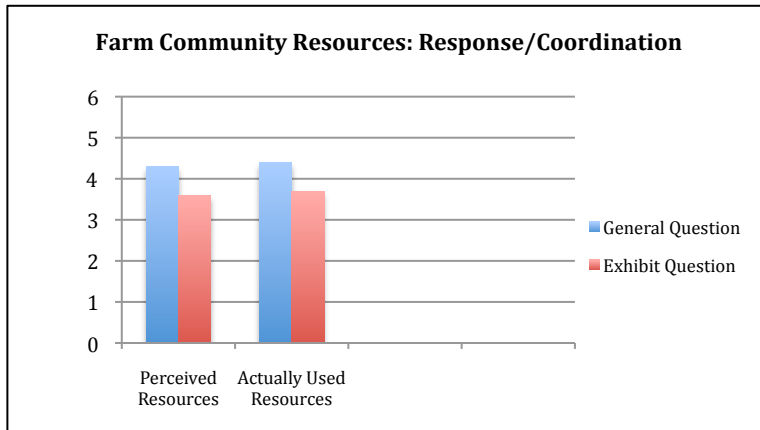


Implementation

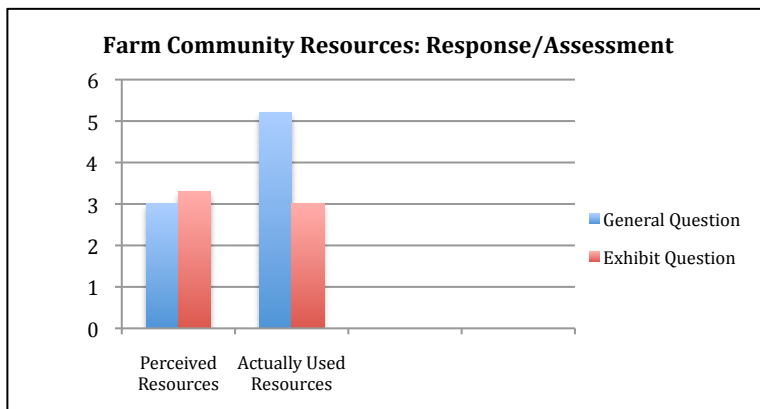


Response

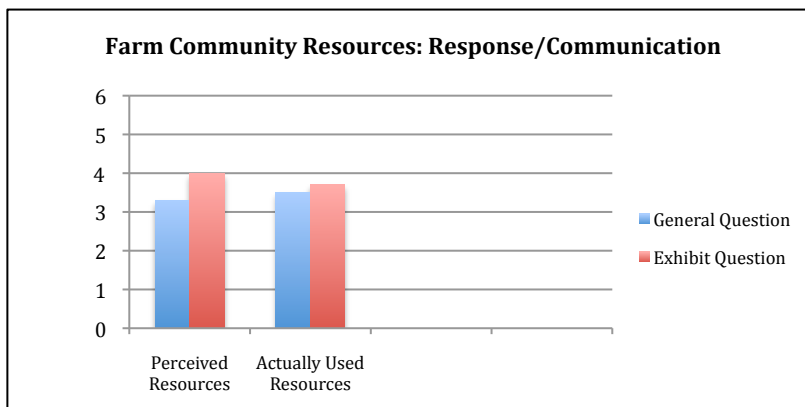
Coordination



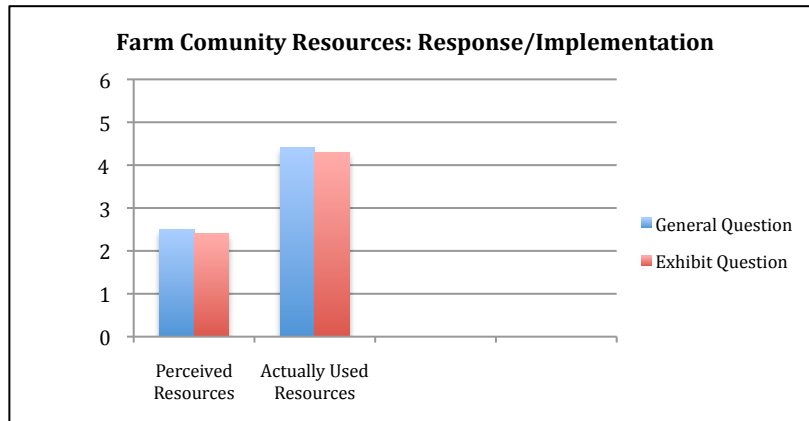
Assessment



Communication

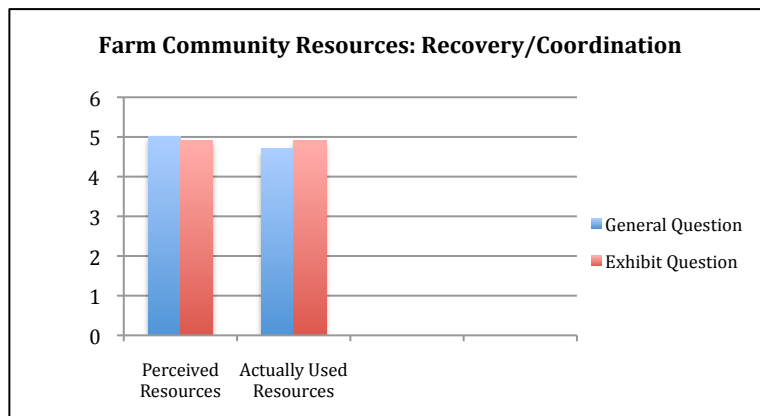


Implementation

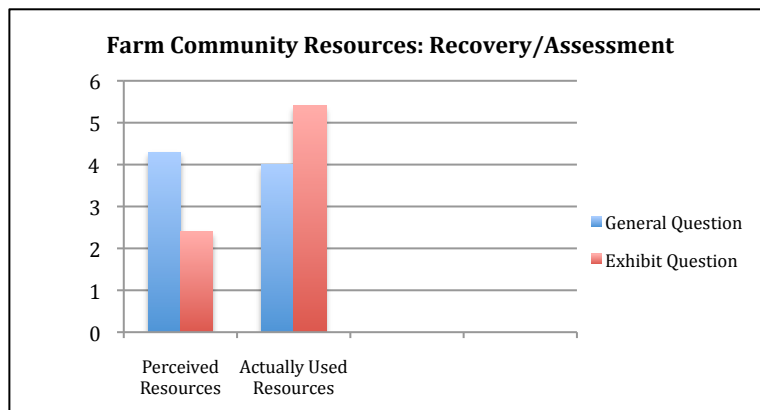


Recovery

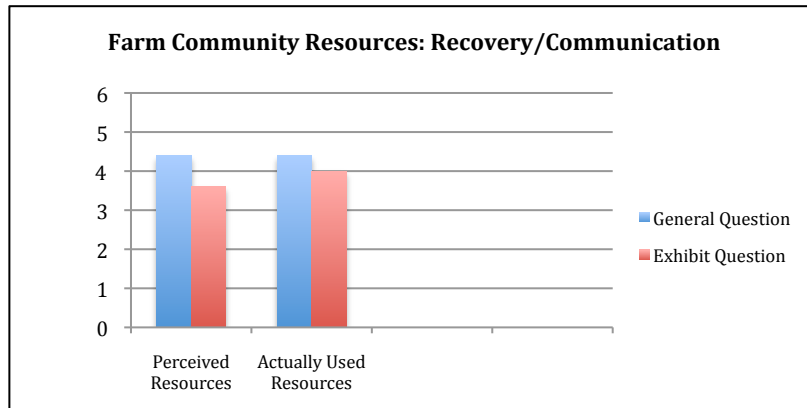
Coordination



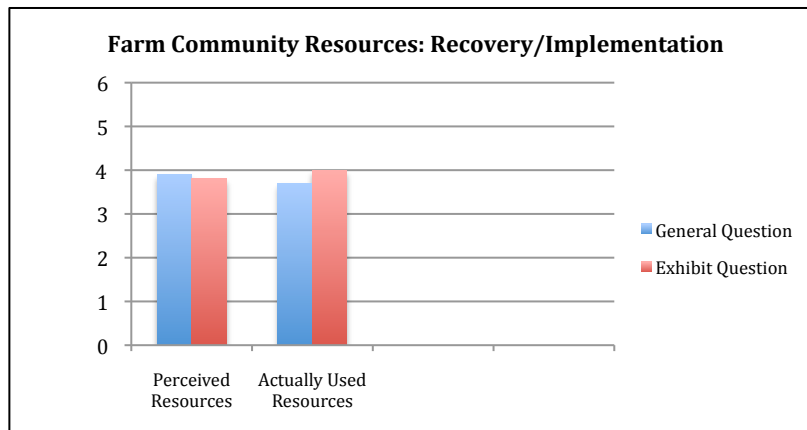
Assessment



Communication



Implementation



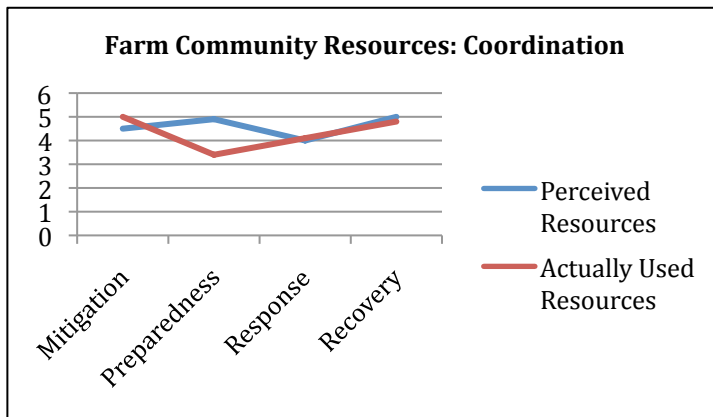
Appendix 3

**Perceived versus actually used resources by disaster management
phase and category of disaster management activity**

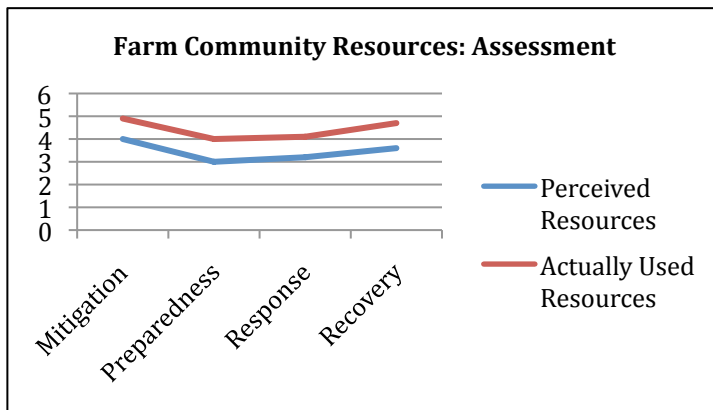
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somewhat disagree: 4
strongly disagree: 5
don't know: 6
doesn't apply: 7

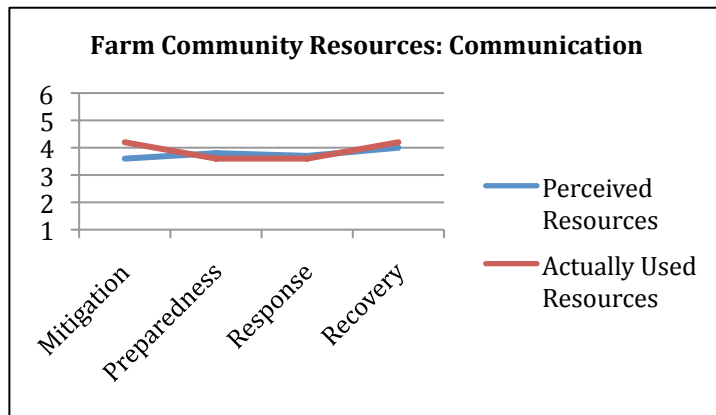
Coordination



Assessment



Communication



Implementation

