



# Surviving Sandy

## Stories of Urban Environmental Stewardship

Elizabeth Dutton



## Acknowledgements

*“It takes a thousand men to invent a telegraph, or a steam engine, or a phonograph, or a photograph, or a telephone, or any other important thing-- and the last man gets the credit and we forget the others. He added his little mite--that is all he did.”* Mark Twain

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## Executive Summary

Expanding upon social-ecological system (SES) resilience literature that challenges traditional and fear-cultured images of chaos and destruction in the aftermath of disasters, *Surviving Sandy: Stories of Urban Environmental Stewardship* examines the catalysts and inhibitors of resilience in the form of civic ecology practices in New York City after Hurricane Sandy. Conducted two months after Hurricane Sandy swept New York City, civic ecology practices took resilient forms in reparation efforts within urban green spaces, such as community gardens, parks, and street trees. Working in collaboration with the Civic Ecology Lab, this report hopes to affirm the need for a resilience-focused disaster mitigation framework and cultural ideology that emphasizes community involvement. Drawing on interviews with community organization employees and New York City residents as well as an online survey, this report first examines how Hurricane Sandy and the damage it caused affected place attachment (topophilia), connection to nature (biophilia), and social-ecological networks. It then addresses how changes in topophilia, biophilia, and social-ecological networks were able to transfer into SES resilience in the forms of social learning and improvisation, and in cases where it didn't, what the barriers to resilience were.

## Introduction

Though we may not remember the specific instant, we confront our human identity at an early moment in our lives. In this moment of initial confrontation, we begin to construct a thick web binding the concepts of humanity and nature that we then spend the rest of our lives attempting to untangle. Filled with questions (Are humans a part of nature? What makes us human? What do humans share?), this web conceptualizes the human/nature binary where nature is on one end and humans are on the other; we are left to bathe in a curiosity we are both addicted to and frustrated by. The quest to discover the relationship between humanity and nature, then, becomes less about finding an answer and more about learning to ask the right questions. In a way, humanity's dissociation from nature has allowed us to connect to it more deeply – while a relationship depends on the dualistic notion of two initially separate parts, the substance of a relationship is the character of this connection. Our curiosity then is not in how we are separate from nature, but how humanity and nature ultimately come together. This communion of humanity and nature is evident from a young age, as we strive to understand how to reach it. Take the popular children's book, *Miss Rumphius*, a story about environmental stewardship:

In the evening Alice sat on her grandfather's knee and listened to his stories of faraway places. When he had finished, Alice would say, "When I grow up, I too will go to faraway places, and when I grow old, I too will live beside the sea."

"That is all very well, little Alice," said her grandfather, "but there is a third thing you must do."

"What is that?" asked Alice.

"You must do something to make the world more beautiful," said her grandfather.

[Alice grows up to be Miss Rumphius who is ill and bed-ridden. In her bedside window are lupines, her favorite flower. After recovering, she sees that the flowers spread from her window to a nearby hill with the help of birds and the wind. She decides to plant lupines herself.]



All that summer Miss Rumphius, her pockets full of seeds, wandered over fields and headlands sowing lupines. She scattered seeds along the highways and down the country lanes. She flung handfuls of them around the schoolhouse and back of the church. She tossed them into hollows and along stone walls. The next spring there were lupines everywhere.

*-Miss Rumphius by Barbara Cooney<sup>1</sup>*

The lasting message of the book is that – just as Miss Rumphius has done – we should do something that will make the world more beautiful. The book ends, and we are left embracing this responsibility to plant our own version of Miss Rumphius's lupines.

<sup>1</sup> Cooney, Barbara. *Miss Rumphius*. New York: Viking Press, 1982.

At a time when climate change discourse saturates academia, pop culture, and the media, the responsibility to not only make the world more beautiful, but to keep it beautiful is present. Yet in our rapidly urbanizing world, this responsibility and humanity's role within larger social-ecological systems is complicated, often lacking a desired light at the end of an increasingly dark tunnel of questions. Have I fulfilled my responsibility to make the world more beautiful? Am I separate from nature? Are we doomed? Cynicism becomes an easy fix in the enveloping darkness.

The chronic cynicism noticed in both others and myself was the inspiration for researching positive outcomes from disaster situations. The Civic Ecology Lab (CEL) at Cornell University investigates the relationship between nature and social resilience with a vision to “understand ways in which humans are reconnecting to nature under the most difficult of conditions, and in so doing are making meaningful and measurable change to their communities and the environment.”<sup>2</sup> Keith Tidball and Marianne Krasny, directors of CEL, frame their research around the concept of civic ecology, a concept that explores how environmental stewardship activities and ecosystem services work to enhance social-ecological resilience after a disaster, in turn challenging the pervading cynicism and common dystopian imagery. In conjunction with CEL and their vision, this report discusses human re-connection with nature in the wake of Hurricane Sandy, in which community gardens were flooded, old and familiar trees felled, and park landscapes permanently altered. After Hurricane Sandy, how did civic ecology practices, in the form of relief, clean-up, and recovery activities, act as resilience builders or enhancers?

## Hurricane Sandy's Impact

Hurricane Sandy devastated thousands of families, killing at least 253 people across seven countries within its path and inflicting damage in 24 U.S. States. The storm hit New York City on October 29, 2012, flooding tunnels, streets, and the New York Subway as well as cutting off power in parts of New York City.<sup>3</sup> Along with the destruction of many homes, Hurricane Sandy damaged community parks, including the New York Botanical Garden, Sister Mary Grace Burns Arboretum, Brooklyn Botanical Garden, and Green-Wood Cemetery. Over 40,000 trees were damaged in parks and along streets. Community gardens and urban farms were flooded and destroyed.<sup>4</sup>

Governor Andrew Cuomo estimated that the damage from the storm would cost New York State nearly \$42 billion, with more than \$15 billion for New York City alone.<sup>5</sup> On January 28, 2013, the United States Congress approved an emergency aid package of \$51 billion that would provide aid for people whose homes were damaged or destroyed as well as business owners affected by the storm. The package would also pay for replenishing shorelines, repairing subways, fixing bridges and tunnels, and reimbursing local governments.<sup>6</sup> Fourteen weeks after Hurricane Sandy, on February 6, 2013, the first installment of the federal aid package was released.<sup>7</sup>

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<sup>2</sup> <http://civicecology.org/about.php>

<sup>3</sup> "Superstorm Sandy blamed for at least 11 U.S. deaths as it slams East Coast." *CNN*, October 29, 2012.

<sup>4</sup> Gonzalez, Ramon. "5 Public Gardens Damaged by Hurricane Sandy." *TreeHugger*, November 12, 2012.

<sup>5</sup> Thomas Kaplan and Raymond Hernandez, "Cuomo, in Aid Appeal, Cites Broad Reach of Storm." *The New York Times*, November 26, 2012.

<sup>6</sup> Raymond Hernandez, "Congress Approves \$51 Billion in Aid for Hurricane Victims." *The New York Times*, January 28, 2013.

<sup>7</sup> David W. Chen, "U.S. to Release First Installment of \$51 Billion in Hurricane Sandy Aid." *New York Times*, February 5, 2013.

## Methodology

In order to visualize those impacts and talk directly to those engaged in recovery efforts, I spent the period from January 3 – January 19 in New York City using methods that included participant observation, photographic journaling, interviews, and a survey distributed to participants at a clean up site. After this first period ended, I realized the necessity for an extended period of research that would culminate in Los Angeles, CA at Occidental College. This second stage, away from New York City, included methods of an online survey and additional interviews conducted on the telephone. Although unintentional, the research evolved in such a way that the New York Stage yielded insight into the organizational perspectives, whereas the Los Angeles yielded insight into community perspectives.

### NEW YORK STAGE

The first period began with photographic journaling of a cluster of community gardens in the East Village, Battery Urban Park, Prospect Park, Red Hook Community Farm, and Coney Island. I chose observation sights from a wealth of online articles and blogs that described green space damage, selected for their accessibility (convenience sampling). The objective of this initial observation stage was to gain a visual, tangible understanding of remaining damage in January as well as to gauge visible volunteer activity within the visited areas. In consideration of the cold weather and the timing of this report I sought to answer: What could be visually expected with regards to the parks, trees, and community gardens that suffered damage? Are clean up efforts within NYC green spaces (parks, community gardens, street trees) visible and transparent? Are they still happening? Are volunteers everywhere? What does it look like?

I intended to use participant observation as a main source of information but due to time and communication restraints, participant observation became a secondary source of data. Regardless, participant observation was conducted at Red Hook Community Farm, an urban farm run by a local non-profit in Red Hook, Brooklyn, and Conference House Park, a NYC park at the southern tip of Staten Island. At Red Hook Community Farm, I participated in two open composting sessions over a two-day period, discussing Hurricane Sandy and reparation with other participants. I visited Conference House Park under a NYC Parks Department organized clean up that was advertised online. At this clean up, I distributed a preliminary survey to participants that asked questions about their involvement in the clean up. This survey served as an initial evaluation of SES resilience and was used later used as an initial format for the online survey.

Five interviews were conducted in New York City: four interviews at non-profit and government program headquarters with employees of Trees NY<sup>8</sup>, GreenThumb<sup>9</sup>, and New York Restoration Project (NYRP)<sup>10</sup> and one interview at Red Hook Community Farm<sup>11</sup> with a Red

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<sup>8</sup> Trees NY is an environmental non-profit that works to “plant, preserve and protect New York City’s urban forest” with community residents. (<http://www.treesny.org/>)

<sup>9</sup> GreenThumb is an off-shoot of the NYC Parks Department that works with community residents in caring for their urban community gardens. (<http://www.greenthumbnyc.org/>)

<sup>10</sup> New York Restoration Project is an environmental non-profit that works with undeserved communities in transforming unused spaces into green and sustainable spaces. (<http://www.nyrp.org/>)

<sup>11</sup> Added Value is a non-profit organization that runs Red Hook Community Farm. Red Hook Community Farm is an urban farm in Red Hook, Brooklyn that “serves as the primary platform for youth empowerment programs” as well as

Hook resident who participated in volunteer clean up. The organizations were chosen based on accessibility and involvement with green spaces (community gardens, parks, trees) in New York City. Interviews were conducted with the goal of gaining in-depth information about organizational responses to Hurricane Sandy, including initial steps, inter-organizational communication, and volunteer co-ordination, as well as the personal opinions of those interviewed. Contact with Trees NY, GreenThumb, and NYRP also provided a foundation for future correspondence that ultimately led to the survey portion of research.

## **LOS ANGELES STAGE**

To address the need for contact with community members and the lack of time in New York City, a survey was designed using Qualtrics software (See Appendix B and E). The survey gauged levels of green space damage, awareness of green space maintenance, and green space activity prior to and after Hurricane Sandy. The survey also gauged involvement in cleanup efforts as well as the opinions and personal responses of community members. Overall, the survey attempted to draw correlations in an attempt to understand different reasons why some people were involved in cleanups and others weren't. The personal opinion questions allowed space for community members to write, which provided important details as to the difficulties, frustrations, and positive moments for those who took the survey.

Six interviews were conducted from Los Angeles on the telephone with community members who participated in the online survey who left their contact information at the end of the online survey. These interviews contextualized survey responses, designed to expand upon the opinions of community members, given the limitations of the online survey.

## **Limitations**

Multiple limitations should be taken into account. Two inevitable limitations that pervaded all methods were evident in the aspect of timing: that this study was conducted within a short period of time and that this short period of time happened to be in the middle of winter. In effect, this report may be considered an initial analysis of SES resilience within the first 3 months after Hurricane Sandy. Although valuable as an almost instantaneous temporal picture of SES resilience at the moment in time it was conducted, this report fails to contextualize within the larger SES resilience framework, where a majority of literature has called for longer studies that encompass multiple spatial and temporal layers. For example, found SES resilience barriers may develop into resilience enhancers. What happens after this report, however, is unknown. Although the temporal problem exists within all studies (hence, the necessity to record so that others may then expand), this report in particular is sensitive to this limitation, as possibilities for resilience may present themselves after the study was conducted. Conducting research in the middle of winter presented itself as both a limitation and a finding in that the existence of resilience may depend on weather, temperature levels, and growing season. I believe that, though unavoidable, searching for SES resilience in the form of civic ecology practices in the middle of January was in itself an undeniably fruitless venture from the beginning, as gardens, parks, and trees remain dormant



during the winter in New York City. This limitation was echoed as a finding when community members indicated that springtime would be the major period for resilience and recovery. A sort of waiting-it-out mentality held, which then begs a few questions: If Hurricane Sandy had happened before spring, would SES resilience look different? Would there be increased resilience in the form of improvisation and social learning? (Yes) How have resilience-related projects changed or adapted to new problems? Additional research of existing SES resilience in the aftermath of Hurricane Sandy would contextualize this report in a larger temporal framework.



Photo 1: "Hope Garden is closed for the winter season."

Limitations also existed within the survey. One such limitation was the reach of the survey. The online survey reached participants by way of GreenThumb, NYRP, and Trees NY and their list-serves. This immediately filters out residents who may not have participated with these organizations in the past but are involved with civic ecology practices or have opinions about the place of these activities within their communities. Though represented in the data, a bias resulted in that most respondents were people who were previously involved with civic ecology practices. Thus, people who may experience SES resilience by forming new relationships with their community green spaces were not reached by the survey or interviews. Other groups were also prevented from taking the survey. As one respondent wrote, "this survey is geared towards people that have Internet, and it assumes that a person can use a computer and read English."<sup>12</sup> The survey, therefore, is not representative of an entire New York City resident perspective. Rather, it is a small sampling. A comprehensive study of SES resilience in New York City may use the survey in this report as a skeletal frame by which to construct a more in depth, mixed methodological (quantitative and qualitative) analysis of resilience that reaches across all economic classes. A survey of such magnitude may not solely rely on the internet for its respondents. A small glitch in the survey also prevented consistent data. This glitch existed in the design of the survey, when some community gardeners, depending on previous answers, were prevented from answering Q20, Q27, and Q28 (Appendix E). Quantitative data from these questions was not used due to this discrepancy. For details on the survey design, see Appendix B.

<sup>12</sup> Dutton, Elizabeth. "Hurricane Sandy and Our Green Spaces." Survey.

## Literature Review

A review of academic terminology regarding post-disaster resilience is necessary in order to place civic ecology practices within the resilience conversation. A great starting point is to ask, what *is* resilience? According to the Oxford English Dictionary, resilience is “1. The ability of a substance or object to spring back into shape; elasticity” or “2. The capacity to recover quickly from difficulties, toughness.”<sup>13</sup> Yet for many of us, resilience extends beyond definitions as implicit with feelings and memories. Using definitions such as the one above proves difficult as these feelings and memories are diminished by the limitations of human language. Indeed, resilience is so fundamental to human existence, it may be best understood outside of academic discourse. However, in understanding the importance of SES resilience and the ways in which we have perceived the human-disaster relationship, a review of the academic definitions of resilience is imperative.

### DEFINITIONS

Resilience is an interdisciplinary concept that remains individually defined within different fields. While literature overwhelmingly agrees that Holling (1973) was the first to define and use the concept of resilience as “the ability to absorb change and disturbance and still retain the same relationships,”<sup>14</sup> it was Timmerman who first applied the concept of resilience to a post-disaster framework, defining it as “the measure of a system’s or part of the system’s capacity to absorb and recover from an occurrence of a hazardous event.”<sup>15</sup> Many more nuanced definitions have since emerged since Timmerman’s, as is evident in the following table that was developed by Christopher Burton for his PhD dissertation:<sup>16</sup>

Author	Definition
Timmerman 1981	Resilience is the measure of a system’s or part of the system’s capacity to absorb and recover from an occurrence of a hazardous event.
Wildavsky 1988	Resilience is the capacity to cope with unanticipated dangers after they have become manifest, learning to bounce back
Buckle 1988	Resilience is the capacity that people or groups may possess to withstand or recover from the emergencies and which can stand as a counterbalance to vulnerability
Mileti	Local resiliency with regards to disasters means that a local is able to withstand an extreme natural event without suffering devastating losses, damage, diminished productivity, or quality of life without a large amount of assistance from outside the community
Kulig and Hanson 1999	Community resilience is the ability of a community to not only deal with adversity but in doing so reach a high level of functioning
Comfort 1999	The capacity to adapt existing resources and skills to new systems and operating conditions
Paton et al. 2000	Resilience describes an active process of self-righting, learned resourcefulness and growth – the ability to function psychologically at a level far greater than expected given the individual’s capabilities and previous experiences

<sup>13</sup> [http://oxforddictionaries.com/us/definition/american\\_english/resilience](http://oxforddictionaries.com/us/definition/american_english/resilience)

<sup>14</sup> C.S. Holling, "Resilience and Stability of Ecological Systems," *Annual review of Ecology and Systematics*, 4 (1973): 1-23,

<sup>15</sup> Christopher Burton, *The Development of Metrics for Community Resilience to Natural Disasters*. (PhD diss., University of South Carolina, 2012)

<sup>16</sup> Ibid.

Buckle et al. 2001	Quality of people, communities, agencies, and infrastructure that reduce vulnerability. Not just an absence of vulnerability rather the capacity to prevent or mitigate loss and then secondly, if damage does occur to maintain normal condition as far as possible, and thirdly to manage recovery from the impact
Alwang et al. 2001	Resilience is the ability to exploit opportunities and resist and recover from negative shocks
Bruneau et al. 2003	Resilience is the ability of social units (e.g., organizations, communities) to mitigate hazards, contain the effects of disasters when they occur, and carry out recovery activities in ways that minimize social disruption and mitigate the effects of future disasters
Cardona 2003	The capacity of a damaged ecosystem or community to absorb negative impacts and recover from these
Pelling 2003	The ability of an actor to cope with or adapt to hazard stress
UNISDR 2005	The capacity of a system, community or society potentially exposed to hazards to adapt, by resisting or changing in order to reach and maintain an acceptable level of functioning and structure. This is determined by the degree to which the social system is capable of organizing itself to increase this capacity for learning from past disasters for better future protection and to improve risk reduction measures.
Paton and Johnson 2006	Resilience is a measure of how well people and societies can adapt to a changed reality and capitalize on the new possibilities offered
Pendall et al. 2007	A person, society, ecosystem, or city is resilient in the face of shock or stress when it returns to normal (i.e. equilibrium) rapidly afterward or at least does not easily get pushed into a new alternative equilibrium
Cutter et al. 2008	Resilience is the ability of a social system to respond and recover from disasters and includes those inherent conditions that allow the system to absorb impacts and cope with an event, as well as post-event, adaptive processes that facilitate the ability of the social system to reorganize, change, and learn in response to threat.
Norris et al. 2008	Resilience is a process linking a set of adaptive capacities to a positive trajectory of functioning and adaptation after a disturbance
Zhou et al. 2009	Resilience is broadly defined as the capacity to resist and recover from loss

Table 1: History of Definitions

Here, we see that while scholars use distinct definitions of resilience, the *concept* of resilience remains fairly similar. In general, we may think of resilience as the ability for a system to either **return** to equilibrium, or **adapt** into a new equilibrium, maintaining the ability to function after some disturbance. While some resilience scholars focus on the returning to the initial stable state, others focus on the changes and adaptations that take place to form a new state. For the purposes of this report, this report will consider resilience as a changing idea that encompasses all of these definitions, with a focus on those definitions of resilience that encompass recovery and adaptation instead of just the return to initial stability. Importantly, Carpenter et al. encourage a critical application of resilience thinking to include assessing resilience over temporal, social, and spatial scales. They argue that the resulting confusion due to the lack of a universal definition of resilience within the SES literature is cleared when “answering the question, ‘Resilience *of what to what?*’”<sup>17</sup> Accordingly, the analysis of resilience within this report will take into account the temporal, social, and spatial scales in which civic ecology practices either led or did not lead to resilience.

In addition to “resilience,” other equivalent terms have been utilized within the SES literature. Many scholars use the term social-ecological system (SES) to describe the groupings of

<sup>17</sup> Steve Carpenter, Brian Walker, J. Marty Anderies, and Nick Abel, "From Metaphor to Measurement: Resilience of What to What?," *Ecosystems*, 4 (2001): 765-781, [http://eprints.icrisat.ac.in/4240/1/Ecosystems\\_4\\_8\\_765-781\\_2001.pdf](http://eprints.icrisat.ac.in/4240/1/Ecosystems_4_8_765-781_2001.pdf) (accessed April 17, 2013).

different networks that undergo change before, during, and after a disaster or disturbance.<sup>18</sup> These SES are then classified as more resilient or less resilient. While scholars use slightly varying definitions of social-ecological systems, they are universally recognized as the interaction between social and ecological networks, hyper-realized within the urban setting. To break down this definition, Ernstson et Al. defines *social networks* as “self constructed by society in a process of ‘alignment’ or ‘coordination,’ best described as a continual recursive communication process that eventually allows different people to understand each other, share values and beliefs, and generally work together to achieve their aims” and *ecological networks* as “food-webs (or plant-pollinator networks, or species-habitat networks) that transfer energy and genetic information.”<sup>19</sup> Thus, social-ecological systems are systems where these two networks interact on different spatial-temporal scales, often within cities.

Although definitions are helpful in conceptualizing meaning within the breadth of the SES resilience literature, the lack of a consensual definition of resilience necessitates our discussion of resilience not as a specific word, but as a larger theory. As Norris et al. suggest in their paper, “Community Resilience as a Metaphor, Theory, Set of Capacities, and Strategy for Disaster Resilience,” resilience may best be understood as a theory, set of capacities, and a strategy “for promoting effective disaster readiness and response.”<sup>20</sup> By this suggestion, we may consider resilience as a continuing process rather than existent within the binary of resilient, not resilient.

## **SOCIAL RESILIENCE**

While this report focuses on how civic ecology practices foster SES resilience, a review of social resilience literature is necessary to place civic ecology within the wider post-disaster resilience conversation. Responding to Norris et Al.’s call for a framework that considers resilience as a theory, set of capacities, and a strategy, rather than a concrete definition, we will explore how different theories identify the causes and characteristics of social resilience.

### CAUSES & CHARACTERISTICS OF RESILIENCE

Norris et al. explore the idea of *collective efficacy* as an identifying contributor to resilience. It is defined as the “shared belief that a group can effectively meet environmental demands and improve their lives through a concerted effort.”<sup>21</sup> Citing Benight, who found that those persons with high collective efficacy were less adversely affected by their losses than those with low collective efficacy, Norris et Al. expand ideas of collective efficacy to include a sense of community and place attachment. They argue that attachment to place can “increase the likelihood

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<sup>18</sup> Marianne Krasny, Alex Kudryavstev, Keith Tidball, and Thomas Elmqvist, "Civic Ecology Practices: Participatory approaches to generating and measuring ecosystem services in cities." (unpublished manuscript., Cornell University, 2012).

<sup>19</sup> Henrik Ernstson, Sander E. van der Leeuw, Charles L. Redman, Douglas J. Meffert, George Davis, Christine Alfsen, and Thomas Elmqvist, "Urban Transitions: On Urban Resilience and Human-Dominated Ecosystems," *AMBIO: A Journal of the Human Environment*, 39 (2010): 531-545

<sup>20</sup> Fran H. Norris, Susan P. Stevens, Betty Pfefferbaum, Karen F. Wyche, and Rose L. Pfefferbaum, "Community resilience as a metaphor, theory, set of capacities, and strategy for disaster readiness," *American Journal of Community Psychology*, 41, no. 1-2 (2008): 127-50

<sup>21</sup> Ibid.

that the community as a whole will rebuild.”<sup>22</sup> In other words, those communities who feel a strong attachment to physical place and have a sense of community within that place are more likely to be resilient. At the same time, place attachment also has the ability to disrupt resilience. For some with strong attachment to place, Norris et al. found “such disruptions more devastating.”<sup>23</sup> Thus, strong psychological attachment to place can have either adverse or positive affects on individuals and their communities.

Another cause of social resilience is strong pre-existing social networks. Patterson et al. argue that social networks are the skeletons for social resilience. Communities with stronger social networks, recognized in the presence of community organizations and a sense of community, will have a higher *adaptive capacity*, or “the collective adaptability, coping capacity, and resilience of a population.”<sup>24</sup> Social resilience is then achieved with a high adaptive capacity encouraged by increased social capital, or the ability of residents to achieve interpersonal trust and ultimately “accomplish greater things than they could by their isolated efforts.”<sup>25</sup> Patterson et al. importantly note potential weaknesses and vulnerabilities of increased social networks and sense of community. For example, intense community cohesion may prevent members from moving to less vulnerable locations in response to a disaster. Therefore, valuing community solidarity can both contribute and inhibit SES resilience.

Many theories of social resilience include models that help us visualize the different actors and conditions that cause social resilience. Cutter et Al. created a disaster resilience of place model (DROP model, see Figure 1) to measure social resilience across different spatial and temporal units at the community level.<sup>26</sup> In their research, Cutter et Al. argue that adaptive capacities in vulnerable communities may be exceeded in the face of a disturbance, resulting in disaster and low recovery. However, an opportunity for resilience arises when the adaptive capacity is exceeded and communities are able to improvise and socially learn from the disturbance. Thus, while improvisation is manifested in community actions that aid the recovery process, social learning occurs when these improvised actions are incorporated into policy-making and/or a form of preparation for future events. Cutter et Al. conclude with a call for the testing of the DROP model and an integration of the fragmented literature that often separates ecological, social, economic, institutional, infrastructural, and community resilience.<sup>27</sup>

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<sup>22</sup> Charles C. Benight, "Collective efficacy following a series of natural disasters," *Anxiety Stress and Coping*, 17, no. 4 (2004): 401-420

<sup>23</sup> Fran H. Norris, Susan P. Stevens, Betty Pfefferbaum, Karen F. Wyche, and Rose L. Pfefferbaum, "Community resilience as a metaphor, theory, set of capacities, and strategy for disaster readiness," *American Journal of Community Psychology*, 41, no. 1-2 (2008): 127-50

<sup>24</sup> Olivia Patterson, Frederick Weil, and Kavita Patel, "The Role of Community in Disaster Response: Conceptual Models," *Population Research and Policy Review*, 29 (2010): 127-141

<sup>25</sup> *Ibid.*, 129

<sup>26</sup> Susan L. Cutter, Lindsey Barnes, Melissa Berry, Christopher Burton, Elijah Evans, Eric Tate, and Jennifer Webb, "A place-based model for understanding community resilience to natural disasters," *Global Environmental Change*, 18 (2008): 598-606

<sup>27</sup> *Ibid.*

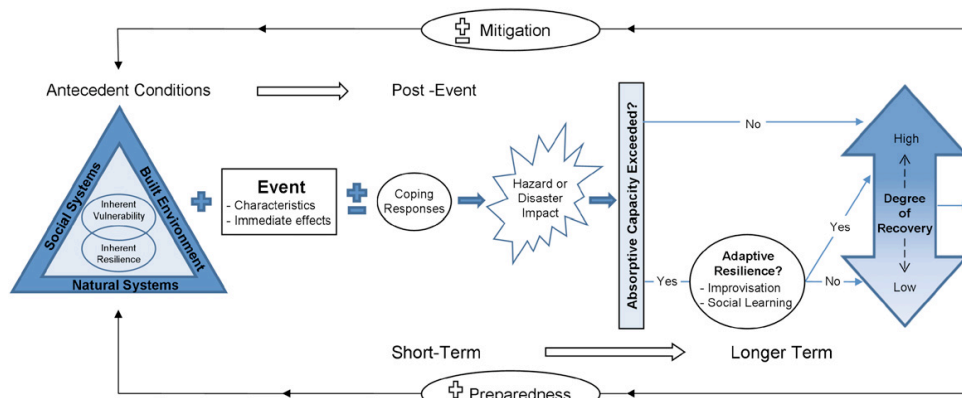


Figure 1: DROP Model <sup>28</sup>

A closer examination of the DROP Model reveals the temporal scale by which it functions. On the left side, we see the pre-existing SES. Moving left to right, we see how low coping responses create the possibility for events to transform into disasters. Most importantly is the proceeding question: “absorptive (adaptive) capacity exceeded?” This report will focus on this area of the DROP Model, when adaptive capacity is exceeded and opportunities for resilience are presented in the forms of improvisation and social learning.

Walker et al. argue that the length of time it takes for communities to find opportunities for resilience will affect resilience. They write, “the longer a community or society stays in a disturbed state after a disaster the more difficult it becomes for that community to recover, and eventually it may not be able to recover.”<sup>29</sup> Maintaining existence within a disturbed state gradually erodes the capacity to organize and respond, and induces new feedbacks that tend to keep the system in the disturbed state. Similarly, quick fixes to the problems disasters pose can also inhibit resilience, as they can also fail to produce a resilient culture. Additionally, Walker et al. argue that in SES resilience, “it is in the social part of the system that conservative caution dampens [resilience].”<sup>30</sup> What causes resilience, then, is the ability for an SES system to improvise both socially and ecologically in a time system that does not progress recovery too quickly or prevent action.

While timing and opportunities for improvisation may be important causes of SES resilience, the characteristics of SES resilience are harder to identify. Whether it be returning to an initial state of being or adapting into a new stable state, Norris et al. argue that resilience is best observed in community wellness, defined as a “high and non-disparate levels of mental and behavioral health, role functioning, and quality of life in constituent populations.”<sup>31</sup> While this report did not attempt to measure levels of community wellness, conceptualizing the resilience of a community beyond the inner layers of social networks and outwardly to behavioral health, role functioning, and quality of life allows a visual landscape by which we can see resilience in action.

<sup>28</sup> Ibid., 602

<sup>29</sup> Brian Walker, “Perspectives on Resilience to Disasters across Sectors and Cultures,” *Ecology and Society*, 16, no. 2 (2011), <http://www.ecologyandsociety.org/vol16/iss2/art4> (accessed April 8, 2013).

<sup>30</sup> Ibid., 3

<sup>31</sup> Fran H. Norris, Susan P. Stevens, Betty Pfefferbaum, Karen F. Wyche, and Rose L. Pfefferbaum, “Community resilience as a metaphor, theory, set of capacities, and strategy for disaster readiness,” *American Journal of Community Psychology*, 41, no. 1-2 (2008): 133

## WHO IS THE COMMUNITY?

When a disaster occurs, we often think of victims as those who are physically and relationally closer to the disaster. However, there is evidence of an extensive underlying network of victims and relationships that can be exposed by disasters. To fill a gap in the resilience literature, Wright et al. searched for such networks between “previously non-existent groups” following a disaster who “organize, coordinate, and lead in the immediate post impact disaster phase.”<sup>32</sup> The culmination was a case study of an air crash in Gander, Newfoundland, which killed 248 U.S. Army soldiers on December 12, 1985. In the aftermath of this disaster, these underlying networks became evident: a group of police officers designated to assist widows after the crash were exposed to the dead bodies, one of the most stressful aspects of recovery; teachers of children who lost fathers had deep concern about these children and held meetings to identify those students experiencing distress and discuss how to monitor classroom dynamics between their students; surrounding towns contributed food and money, showing up at the gates of installations with food for the mortuary workers and mourning families. These examples support the existence of an initially concealed, but extensive network of victims of the disaster. Indeed, Wright et al. found that level of exposure and direct involvement with the Gander air crash *did not* correlate with the participants’ involvement in the aftermath of the crash. Instead, there existed a larger social system by which many individuals were affected.<sup>33</sup> (do they provide explanation?)

## COMMUNITY & ORGANIZATIONAL ROLES

Patterson et Al. argue that a local community, defined as an autonomous, unified actor (as opposed to a conglomeration of individuals), plays an equally important role to larger managerial and policy-related organization counterparts in social resilience after disasters. In other words, the community itself can act as a resource for resilience. The below model is used to identify the role of local communities in disaster resilience or mitigation, where public agencies, experts or specialists, *and* local groups are actors within the existing social network that create resilience. For example, the Vietnamese community in New Orleans began rebuilding almost immediately after the water ceded from their neighborhood. When the city did not provide water and electric service, the community organized to prove their residency, pressing for the return of city services.<sup>34</sup> These acts of organizing that solve unique problems onset by Hurricane Katrina show the community’s social resilience, as can be visualized in the model below.

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<sup>32</sup> Kathleen M. Wright, Robert J. Ursano, Paul T. Bartone, and Larry H. Ingraham, "The Shared Experience of Catastrophe: An Expanded Classification of the Disaster Community," *The American Journal of Orthopedics*, 60, no. 1 (1990): 35-42, <http://www.ncbi.nlm.nih.gov/pubmed/2407129> (accessed April 5, 2013).

<sup>33</sup> Ibid.

<sup>34</sup> Olivia Patterson, Frederick Weil, and Kavita Patel, "The Role of Community in Disaster Response: Conceptual Models," *Population Research and Policy Review*, 29 (2010): 127-141



Figure 2: Patterson et Al. Model<sup>35</sup>

A question that arises is of specific organizational roles within community resilience. A paper published in 1970 by Russell Dynes argues that community organizations are the “problem solving arms of the community.”<sup>36</sup> After an initial impact, task subsystems are created to solve the problems that disasters pose for communities. In turn, there is a re-organization of structure and patterns of decision making within the organizations. For example, organizations that may traditionally have one role in the community may take on several roles, as a question of “who represents the community?” emerges and organizations are forced to acknowledge existing networks and coordinate with each other. Dynes argues that within this re-organization there develops a sequential interdependence, where certain tasks are prioritized while other tasks are dependent on the completion of the initial ones.

To complete the tasks, there are shifts within existing resources, one of which is manpower, or the involvement of the community through physical volunteer activities. Normally passive citizens then become active within their communities and there are signs of civic engagement. This shift may be seen as one from private to public as disasters provide “the opportunity, the motivation, and the structural conditions whereby widespread participation is possible.” This increase in civic engagement is later referred to as a “high point in community life” when a seemingly disorganized community was able to organize by re-arranging existing networks to solve local problems. Thus, Dynes calls for a top down and bottom up response in order to prevent stagnant states in disaster situations.

This re-organization is evident in Peter Lawther’s case study of the British Red Cross Maldives post during a tsunami recovery program in 2008.<sup>37</sup> Lawther found a variety of benefits when incorporating the community into an international organization’s reconstruction program. These benefits included cost effectiveness, empowerment, restoring confidence in those who were traumatized by the disaster, skills training, capacity building for future employment within the community, and relationship building opportunities between agencies and the local community. Although not explicitly stated in the article, these benefits express theories of resilience. However, risks for organizations were also evaluated in this case study, as it is possible to attempt to involve

<sup>35</sup> Olivia Patterson, Frederick Weil, and Kavita Patel, "The Role of Community in Disaster Response: Conceptual Models," *Population Research and Policy Review*, 29 (2010): 136

<sup>36</sup> Russell R. Dynes, "Organizational Involvement and Changes in Community Structure in Disaster," *The American Behavioral Scientist*, 13, no. 3 (1970): 430

<sup>37</sup> Peter M. Lawther, "Community Involvement in Post Disaster Re-Construction - Case Study of the British Red Cross Maldives Recovery Program," *International Journal of Strategic Property Management*, 13 (2009): 153-169.



the community and fail (and perhaps disrupt previous relationships). An important initial step is defining roles and responsibilities for the community and organizations. Without doing so, there is an increased risk in time, cost, and quality of the attempted project lost, which may adversely affect the community. Similarly, Lawther found that the community may have its own political objectives, with some community actors using the larger organizational structure to push forward their agendas. Again, this risk can be ameliorated with increased communication between the agency/organization and the community, as the British Red Cross Maldives program was eventually found to be a successful integration of community into the post-disaster reconstruction period that contributed to a more sustainable, robust, and resilient community.<sup>38</sup>

## MEASURING RESILIENCE

Yet how to measure resilience? With government agencies in mind, scholars have proposed a new resilience rhetoric would include a scale by which all communities could measure resilience, providing a context “for action to further reduce vulnerability.”<sup>39</sup> Yet Norris et al. cite argue that the complex networks of adaptive capacities and collective efficacies that underlie resilience are near impossible to measure. Rather than in the process of measuring, the value of resilience lies within its ability to inform “novel hypotheses about the characteristics of – and relations between – stressors, various adaptive capacities, and wellness over time.”<sup>40</sup> Similarly, there is a call for community resilience narratives and qualitative data to complement the individual resilience narratives. Norris et al. see the power of narratives in their ability to “provide insight into how communities see themselves and see others.”<sup>41</sup> Instead of relying on concrete, quantitative methods to measure resilience, we may realize social resilience in the context of community narratives and the stories they tell.

Empirical evidence of social resilience reveals a need for community-based disaster mitigation to be formally recognized, while simultaneously rejecting the dystopian post-disaster image of chaos, isolation, and destruction as represented in popular culture. In her book, *A Paradise in Hell*, Rebecca Solnit re-evaluates these images in her analysis of five historical disasters in which communities came together and experienced “paradise”-like moments that allowed individuals to “reset themselves to something altruistic, communitarian, resourceful, and imaginative.”<sup>42</sup> Contrasting negative government and positive civilian responses to the 1906 San Francisco Earthquake, Solnit defends social resilience built at the community level. The Mizpah Café, for example, was an ad-hoc community center and kitchen in Golden Gate Park that fed thousands of people after the earthquake. Dorothy Day, eight years old at the time of the earthquake, remembered the “human warmth and kindness of everyone... While the crisis lasted, people loved each other.”<sup>43</sup> However, the government acted in direct opposition to this communal solidarity, often deeming the public their enemy and promoting images of chaos in the wake of the

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<sup>38</sup> Peter M. Lawther, "Community Involvement in Post Disaster Re-Construction - Case Study of the British Red Cross Maldives Recovery Program," *International Journal of Strategic Property Management*, 13 (2009): 153-169.

<sup>39</sup> Fran H. Norris, Susan P. Stevens, Betty Pfefferbaum, Karen F. Wyche, and Rose L. Pfefferbaum, "Community resilience as a metaphor, theory, set of capacities, and strategy for disaster readiness," *American Journal of Community Psychology*, 41, no. 1-2 (2008): 127-50

<sup>40</sup> Ibid.

<sup>41</sup> Ibid.

<sup>42</sup> Solnit, Rebecca. *A Paradise Built in Hell: The Extraordinary Communities That Arise in Disasters*. New York: Viking Press, 2009. 2-3.

<sup>43</sup> Ibid.

earthquake. For example, the government used dynamite to bring down buildings “safely”, which led to the fire that swept San Francisco. There are also reports of soldiers threatening to kill women and children, and shooting innocent citizens in anticipation that they were looting stores. The example of the San Francisco Earthquake unveils the ironic occurrence of civilian co-operation and governmental dissonance taken out on the public. In times of disaster, it is often the community that steps up and is able to take care of itself. In answering to the challenges and scholarly discrepancy in how to measure resilience, turning to empirical evidence and qualitative data akin to Solnit’s exploration of the San Francisco Earthquake may provide a solution. Indeed, the compelling nature of Solnit’s story and the characters we meet illuminates aspects of resilience that may otherwise be glanced over.

## **SOCIAL-ECOLOGICAL RESILIENCE**

Albrecht et al. explore the concept of solastalgia, or “the distress that is produced by environmental change impacting on people while they are directly connected to their home environment.”<sup>44</sup> Through a qualitative analysis and case studies, Albrecht et al. found that people living near an expanding coal mining industry and near drought-stricken areas had significant impacts on their sense of place and sense of power, with changing landscapes and negative health and ecological effects. Most notable were emotional effects felt by farmers and residents in these rural communities. While the study focused on how larger environmental changes affected the psychologies of residents, one finding included that the loss of a garden (due to drought) caused distress with farmers as it removed the barrier between business and home. One resident is quoted saying, “Our gardens have had to die because our house dam has been dry...so it’s very depressing for a woman because a garden is an oasis out here.”<sup>45</sup> Thus, widespread environmental disruptions can have intense psychological affects on people as their local social-ecological systems drastically change.

A wealth of scholarly literature focuses on these psychological effects, often times in a discussion of the lack of personal resilience and the resulting trauma in post-disaster situations. George Bonanno challenges such trauma literature to extend and include multiple pathways to resilience:

Because so little attention has been devoted to resilience, when loss and trauma theorists have looked for resilience, they have tended to look in the wrong places. Indeed, the assumption that all adults exposed to loss or potentially traumatic events experience prolonged distress and disruptions in functioning goes hand in hand with the belief that resilience must be rare and found only in exceptionally healthy people.<sup>46</sup>

Resilience, then, is not a unique phenomenon among individuals and communities that are lucky or healthy, but rather something attainable by all communities that have experienced loss or a traumatic event.

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<sup>44</sup> Glenn Albrecht, Gina-Maree Sartore, Linda Connor, Nick Higginbotham, Sonia Freeman, Brian Kelly, Helen Stain, and Anne Tonna, "Solastalgia: The Distress Caused by Environmental Change," *Australasian Psychiatry*, 15 (2007): 95-98.

<sup>45</sup> *Ibid.*, 97

<sup>46</sup> Bonanno George, "Loss, Trauma, and Human Resilience: Have We Underestimated the Human Capacity to Thrive After Extremely Aversive Events?," *American Psychologist*, 59, no. 1 (2004): 20-28.

## RESILIENCE ATTITUDES

The language we use in the resilience discussion must be chosen wisely. Tidball and Stedman address attitudes within academic literature concerning urban social-ecological systems. They argue that common negative and deficit-based perspectives of human-nature relationships act as barriers to social-ecological resilience.<sup>47</sup> These negative perspectives often depend on a human-nature binary in which humans either transcend or act as anathemas to nature. For example, Tidball and Stedman review Dunlap (1980) and his analysis of social science literature. This analysis concluded that social science literature focuses “more on values, economic organization, culture, or technology, and *not* on the relationship between society and its biophysical environment,”<sup>48</sup> thus contributing to the ideas that humans sometimes consider themselves anathemas to nature. Tidball and Stedman write,

It is as if we as individuals – and indeed, entire societies – have forgotten our ecological identities, or are suffering a kind of environmental amnesia, enduring a self-imposed humanity-nature apartheid... This exclusive prioritization of human inhabitants actually contributes to erosion of resilience in urban SES.<sup>49</sup>

In other words, *total system* resilience depends on a holistic view of SES that prioritizes and reintegrates humans *and* local ecologies. Flipping the deficit-based, negative perspectives of human dependence can open our eyes to a more positive understanding of dependence and the social-ecological system.

In doing so, Tidball and Stedman call for an exploration of the positive characteristics of humans within the urban SES.<sup>50</sup> The authors remind us that the traditional idea of human dependence used within the deficit-based descriptions of SES can also be applied to positive perspectives. These ideas of dependence can surprisingly lead to drastically positive perspectives according to the authors. Tidball and Stedman reinterpret dependency: “if the word ‘depend’ is allowed to also encompass its more positive meanings and domains, the conclusion that resource dependency leads to depleted social-ecological system resilience is more difficult to defend, and open to reflection and theoretical and empirical examination.”<sup>51</sup> One popular argument is that human dependence on natural resources contributes to SES vulnerability and therefore decreases resilience.<sup>52</sup> However, if we re-evaluate ideas of resource dependency as the relationship between “users of environmental attributes and the environmental attribute itself,” we might find positive aspects of such a relationship that lead to resilience.<sup>53</sup> Tidball and Stedman do not deny that resource dependency may sometimes bring negative consequences; rather they call for a more

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<sup>47</sup> Keith Tidball, and Richard Stedman, "Positive dependency and virtuous cycles: From resource dependence to resilience in urban social-ecological systems," *Ecological Economy*, 86 (2012): 292-299.

<sup>48</sup> Dunlap (1980) in Keith Tidball, and Richard Stedman, "Positive dependency and virtuous cycles: From resource dependence to resilience in urban social-ecological systems," *Ecological Economy*, 86 (2012): 292-299.

<sup>49</sup> Keith Tidball, and Richard Stedman, "Positive dependency and virtuous cycles: From resource dependence to resilience in urban social-ecological systems," *Ecological Economy*, 86 (2012): 292-299.

<sup>50</sup> Ibid.

<sup>51</sup> Ibid.

<sup>52</sup> W. Neil Adger, Terry P. Hughes, Carl Folke, Stephen R. Carpenter, and Johan Rockström, "Social-Ecological Resilience to Coastal Disasters," *Science*, 309, no. 5737 (2005): 1036-1039, 10.1126/science.1112122 (accessed April 18, 2013).

<sup>53</sup> Keith Tidball, and Richard Stedman, "Positive dependency and virtuous cycles: From resource dependence to resilience in urban social-ecological systems," *Ecological Economy*, 86 (2012): 292-299.

complete picture that includes how resource dependency may enhance social prosperity and in effect, contribute to community resilience, especially in the context of disaster.

#### TOPOPHILIA AND URGENT BIOPHILIA

Sources of resilience enhancing positive dependency include restorative topophilia and urgent biophilia. Topophilia is a notion that emphasizes a social actor's "attachment to place and the symbolic meanings that underlie this attachment."<sup>54</sup> Existence of topophilia, therefore, becomes restorative when a community facing disaster shares and attempts to restore this attachment to place. Tidball and Stedman contend that topophilia is a form of positive dependence in which both the biophysical environment is improved and trust, social learning, and capacity are facilitated. Whereas topophilia describes a symbolic attachment to place, biophilia is the existence of an instinctive bond between human beings and other living systems. For example, Miss Rumphius experiences a biophilia with the lupines she sees in her bedroom window and recovers in order to plant more lupines. Expanding on existing research of the presence of individual biophilia during times of personal hardship, Tidball explores the concept of an *urgent biophilia*, or a surge in existence of biophilia within the post-disaster context that begins with a process of remembering an already existent biophilia. Tidball argues that in times of shared and widespread disaster, such as Hurricane Sandy, positive emotions elicited by nature manifest into "immediate and conscious actions, often beyond merely individuals to include neighborhoods, communities, and whole societies."<sup>55</sup> Thus, those communities who experience an urgent biophilia are more likely to be resilient, as they attempt to understand the shifts within the social-ecological system. Indeed, the nature that destroys our communities can also heal us.

#### SHARED MEMORY

In their exploration of resilience, Tidball et al. investigate the role of shared memory. In their research, Tidball et al. found that collective memories within a disaster-stricken community as well as previous memories from individuals' childhoods before the disaster stimulate civic ecology practices.<sup>56</sup> For example, following Hurricane Katrina, three NGOs planted over 6,000 trees in areas that suffered great damage, such as the lower 9<sup>th</sup> Ward. Community members had different memories and reasons for planting the trees. Some people had memories of error in natural resource management and desire to change these managing practices. Others shared memories of Claiborne Avenue, a street lined with oak trees prior to the construction of an elevated freeway that replaced them. However, when the community came together to plant the trees they created new memories together and collectively recalled gardening experiences from earlier in their lives. The joining of these different memories fostered an atmosphere of learning and sharing among community residents, and in turn community resilience.<sup>57</sup>

Shared memory of the actual disaster is another way for residents to recognize similarities that bring them together for civic ecology practices. For example, the Sunflower Project in NYC

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<sup>54</sup> Ibid.

<sup>55</sup> Tidball, Keith. "Urgent Biophilia: Human-Nature Interactions and Biological Attractions in Disaster Resilience." *Ecology and Society*. 17. no. 2 .

<sup>56</sup> Keith G. Tidball, Marianne E. Krasny, Erika Svendsen, Lindsay Campbell, and Kenneth Helphand, "Stewardship, learning, and memory in disaster resilience," *Environmental Education Research*, 16, no. 5-6 (2010): 591-609.

<sup>57</sup> Ibid.

was a Living Memorials project in response to 9/11.<sup>58</sup> Sunflowers were planted in a variety of places across New York City to remember those who lost their lives. Pre-existing gardens, such as the Endor Community Garden in the Bronx, was rededicated as a 9/11 memorial. Trees were also planted in memory of lost lives. These moments of planting allow those participating to acknowledge the relationship between death and life. CEL found that 25% of stewards engaged in the living memorials of 9/11 wanted to “promote stewardship and community engagement” and 48% would “hold events related to community stewardship and management at the site.”<sup>59</sup> Collective memory of loss, therefore, can stimulate environmental stewardship as well as revive existing civic ecology practices. The spaces where these activities take place, such as the Endor Community Garden, now hold a new meaning shared by the community.

### THE PLACE OF GARDENS

Gardens have images of delicacy, tracing all the way back to Eden in the bible. Yet not all gardens are surrounded by beauty, creation, and strength. Kenneth Helphand examines gardens maintained during war periods in his book, *Defiant Gardens*. He argues that gardens exhibit five attributes beneficial to humanity during times of crisis: life, home, work, hope, and beauty. Along with these attributes, defiant gardens serve as places of human connection to nature within an outside environment of destruction and chaos characteristic to war. Defiant gardens also challenge Maslow’s hierarchy of needs, which states that without basic needs, such as food and shelter, people do not desire higher needs, like friendship, acceptance of facts, and creativity. The existence of such gardens, in places such as the Jewish ghetto in Warsaw during World War II, “suggests that the definition of ‘basic’ needs revising.”<sup>60</sup> A garden is not only an external benefit during war, but they are essential to survival itself, harkening back to Tidball’s idea of urgent biophilia.

*Defiant Gardens* also shows that gardens are not only places of creation, but are also places to show a range of emotions, including anger. Children in the Lodz ghetto maintained a garden during the hardships they faced. Yet, when the children learned they were to be deported, their teacher reported the following:

A spontaneous fury seized them. They went to the gardens and, in a burst of anger, trampled the few beds of pathetic beets... This protest burst forth from the depth of their souls and they knew no other way to express their sense of betrayal and anger. They had no one to cry out to, in the moment of their pain, so they turned on the earth itself, for it had failed them. They had loved it, nurtured it and watched over it and it had not heeded them or responded to their loving care.<sup>61</sup>

This image complicates our understanding of topophilia and human attachment to community gardens and other green spaces. Although the garden is destroyed, and therefore unable to continue its previous function of growing plants, it functions as a place to express emotion in this moment. This expression of anger could be seen as a topophilic and urgent biophilic connection for the children, as their sense of place and community is challenged by their horrific reality. Looking

<sup>58</sup> Erika Svendsen and Lindsay Campbell. "Land-markings: 12 Journeys through 9/11 Living Memorials." *Living Memorials Project*, September 2006, 33.

<sup>59</sup> Keith G. Tidball, Marianne E. Krasny, Erika Svendsen, Lindsay Campbell, and Kenneth Helphand, "Stewardship, learning, and memory in disaster resilience," *Environmental Education Research*, 16, no. 5-6 (2010): 591-609.

<sup>60</sup> Kenneth Helphand, *Defiant Gardens*, (San Antonio: Trinity University, 2006), 31.

<sup>61</sup> Ibid.

beyond the literal destruction, we can see the children's reaction coming from a place of deep love and attachment.

## HURRICANE KATRINA

### *Social-Ecological Symbols*

Though Hurricane Sandy and Hurricane Katrina can be seen as distinctive events, reviewing SES resilience literature on Hurricane Katrina provides value in the potential resilience parallels that resulted from that catastrophic event. Keith Tidball, whose work with the CEL this report has heavily constructed itself by, focused part of his dissertation on characterizing certain tree-related resilience activities, such as tree plantings, as social-ecological symbols in the aftermath of Hurricane Katrina “by which interrelated social and ecological information is revealed and regarded as authoritative, and is thought of as dealing with crucial values of the community.”<sup>62</sup> Tidball found that trees positively represented “survival, stability, strength, and longevity” as well as “hope, commitment, and the expectation of a brighter future” when newly planted. Additionally, trees were found to be topophilic in nature, providing residents a sense of place. Negative symbolic meaning in trees was also found in resident descriptions of trees as hazardous or gentrifying (when newly planted trees increase property value). Most significant was the finding that many negative symbols for trees existed in the destruction of positive symbols. These were evident in trees “being uprooted, or snapping, or falling down,” as well as the removal of trees post-Katrina that contributed feelings of loss, tragedy, and passionate feelings of government neglect, “unfair punishment, penalty, reprisal.” In conclusion, Tidball posits that social-ecological symbols are a necessary part of social-ecological resilience, and calls for further research of how the symbols inherent within communities emerge in the post-disaster context.

Complementing Tidball's work, a student at the Harvard Graduate School of Design conducted a study on the role community gardens play in “augmenting more conventional mental health, social and ecological benefits” for those affected by the storm in February 2011.<sup>63</sup> In her study, Julia Africa had three insights relevant to resilience. In her search for the connection between mental health and community gardens, Africa found (1) that an influx of outside volunteers, such as AmeriCorps or undergraduate students, led to garden success, and (2) community residents are turned off of garden activities when they internalize a notion that they are victims.<sup>64</sup>

Noting that gardeners before Hurricane Katrina were mostly elders in their 60s to 80s, many of the gardeners did not come back to New Orleans or did not survive the Hurricane. This left the gardens to the hands of younger community members who were primary clean-up agents. The ability of those in the community who did garden to coordinate outside volunteers led to garden success, as the manual labor of clean-up is demanding. Still, Africa found it was these outside volunteers that cared for the gardens as opposed to the community members themselves. For example, at one of the research sites, there was only one neighborhood resident present who

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<sup>62</sup> Keith G. Tidball, and Marianne E. Krasny, *Greening in the Red Zone: Disaster, Resilience and Community Greening*, (Springer, 2013), 15.

<sup>63</sup> Africa, Julia. Harvard University Graduate School of Design, "Community Gardens as Healing Spaces: Addressing the Aftermath of Hurricane Katrina In New Orleans." Last modified November 28, 2012.

<sup>64</sup> Ibid.

was in the process of moving. Funds from governments, non-profits, and charities also played a role in revitalizing gardens to pay for supplies, from which we may draw the conclusion that resilience relies on accessibility to specific tools needed for recovery.

### *Victimization of residents*

Africa found that victimizing residents is an aspect of garden revitalization that unfortunately occurs, yet should be sensitively avoided. Mr. Fry, a community member, noted that New Orleans residents are aware of being victimized and “just want to move on with their lives.”<sup>65</sup> Especially in New Orleans, where poverty and racial segregation preceded Hurricane Katrina, it is important to envision communities as vibrant, instead of troubled. Thus, the positive mental health effects of working in a garden may be acknowledged by community organizers and even community members, but are avoided in discussion. While literature previously cited concluded that volunteers more efficiently under conditions in which they understand the benefits of gardening, in post-disaster scenarios these benefits may be seen as victimization and therefore may be negatively received by the community. In practice, victimization may be avoided with sensitivity to over-emphasizing needed benefits or deficit-based perspectives of the communities. The most successful garden in Africa’s study was instituted in a school. Because of the academic and youth setting, parents and teachers could openly discuss “nutritional, intellectual, and emotional benefits of engaging with tending plants, and mental health was a “visible component of that assessment.”<sup>66</sup> Africa concludes that schools are the easiest place to create a link between health and gardening, as mental health issues with children are “less loaded to address psychosocially and easier to monitor institutionally.”<sup>67</sup>

## **Findings & Analysis**

As discussed within the SES resilience literature, disasters provide a unique context to both realize existing social and ecological networks within the social-ecological system and form new networks through community improvisation, culminating in a moment of social learning and ultimately, resilience. Hurricane Sandy presented the task of repairing communities and the green spaces within them to community members and the organizations they belong to. This task created opportunities for resilience when residents experienced topophilia, urgent biophilia, and were able to use social-ecological networks to achieve SES resilience.

Due to the limitations of a small data set, the analysis of these findings should be viewed as a response to the existing literature, as examples that challenge theories of social-ecological resilience were found. But rather than attempting to prove or disprove the SES resilience literature by which this thesis was formulated, the findings may act as an extension of such literature that raises questions of the limitations for civic ecology practices in the aftermath of disasters and in turn the ability for resilience to occur. Data collected from the online survey, interviews, participant observation, and photographic journaling are incorporated in the findings.

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<sup>65</sup> Ibid.

<sup>66</sup> Ibid.

<sup>67</sup> Ibid.

## DAMAGE AND SOCIAL-ECOLOGICAL RESILIENCE

The resulting damage from Hurricane Sandy in New York City varied from neighborhood to neighborhood; some were nearly untouched by the storm, and others completely destroyed. Neighborhoods close to the water initially suffered flood damage and potentially disastrous chemical concentrations, such as salt.<sup>68</sup> Other neighborhoods sustained significant wind damage that knocked over trees and other built structures.<sup>69</sup> There was a large range in the levels of damage as well as the length of time it took to repair residences, parks, community gardens, and trees. Overall, it was found that residences were often repaired in a shorter period of time with parks taking much longer, many of them still not repaired.<sup>70</sup> However, in all categories (residences, parks, community gardens, trees), survey respondents noted existing damage that had not been repaired. A lack of complete reparation is a reminder that while much work had been done, not all reparation efforts have been finished and/or started. It is also important to note that the data for this report was collected in the dead of winter, blustery New York City January, when it might not be expected that repairs would be made to green infrastructures that for the most part operate in the spring and summer.

### RESIDENTIAL DAMAGE

#### *Disaster Propels Broad Community Involvement*

Although Wright et al. found that direct relationships to the disaster did not necessarily correlate with increased level of participation and/or ensuing psychological effects, an evaluation of topophilia and urgent biophilia among those who experienced residential damage is necessary due to the overwhelming amount of community-driven reparation efforts across New York City in the days and months following Hurricane Sandy. Small community groups traveled from across the U.S. and other countries:<sup>71</sup>

It's phenomenal to see the response that we had... Those people from those areas of the gulf coast [who experienced the damage from Hurricane Katrina] were volunteering for 6 weeks. There are some crews from Louisiana that are still here. And they still work, helping people.<sup>72</sup>

There were people here from all over the world... Here! Helping us to come back. It was incredible... You were behind a foreign license plate all of the time. In fact, Alaska sent a plane with trucks that came here... It was beautiful.<sup>73</sup>

[The volunteers] took two months out of their lives. They left their families to come here... they left their wives and kids to make a sacrifice to be here. And churches, all these church vans from Iowa and Kansas, it was mindblowing, wild, and crazy.<sup>74</sup>

For several weeks following the storm, there were people coming in from as far away as Texas and Montana. To volunteer and help clean up... stuff on their backs and gear, ready to work... They'd

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<sup>68</sup> Spencer, Interview.

<sup>69</sup> Dutton, Elizabeth. "Hurricane Sandy and Our Green Spaces." Survey.

<sup>70</sup> Dutton, Elizabeth. "Hurricane Sandy and Our Green Spaces." Survey.

<sup>71</sup> Wright, Interview., Spencer, Interview.

<sup>72</sup> Spencer, Interview.

<sup>73</sup> Maiorani, Interview.

<sup>74</sup> Maiorani, Interview.



come and work their butt off all day. A lot of people came from areas elsewhere, further upstate, Western Jersey... We had people coming down from the Adirondacks on a regular basis.<sup>75</sup>

Indeed, Wright et al.'s conclusion that a direct relationship with disaster is not correlated with participation in disaster relief is evident from the existence of the outside groups who traveled to NYC. However, is it possible that those who sustained higher personal damage due to Hurricane Sandy might experience an urgent biophilia, or need to be connected to the surrounding nature? How does a closer physical relationship with a disaster stimulate and/or inhibit one's ability to participate in clean up efforts unique to green spaces?

*Prioritization is a Barrier to Resilience, Individual vs. Community Repair*

The families and individuals suffering from residential damage were faced with questions of reparation priorities. Did residents react in congruence with Kenneth Helphand's defiant gardeners, prioritizing community green spaces alongside or above that of 'basic' needs such as food and shelter? Though varying on an individual basis, there was an overwhelming consensus that repairing individual space is more important than that of the community green space. A head farmer for a church food pantry explains his opinion:

The church has much bigger issues than the farm...there's so much going on [outside of the farm] that that takes priority over the farm...the people that volunteer have their own issues with their houses being flooded...they're busy putting their life back together.<sup>76</sup>

Yet, a paradox ensues for the farmer: "For me, personally, the farm is priority. But for the church, the pastor, I can't imagine it would be a priority at the moment." Thus, while the farmer personally prioritizes the success and reparation of the farm, he does not expect his peers to similarly prioritize farm repair due to the high levels of residential and personal damage. He continues, "everybody is just really busy, tending to their own personal issues. Just getting back on their feet. It's very chaotic...Everybody is busy with one thing or another related to Sandy."<sup>77</sup> While priorities may not be shared between residents, the individual choices of what to prioritize are accepted by the community at large in the face of overwhelming damage.

This acceptance was evident in the echoing of personal damage priority by those who did not experience residential damage: "I think you know in sense of the priorities the homes and people's lives, that takes the priority and I can understand,"<sup>78</sup> "Green Spaces are and will always be important to me. However, when you see and read about people and the loss of their homes and family members it doesn't seem that important."<sup>79</sup> A community gardener described his experience balancing priorities between repairing the garden, residences, and public spaces in his neighborhood: "It was tough getting people together at first so we couldn't do the garden immediately...everyone was really focusing on their community, the area...their immediate area."<sup>80</sup> This balancing could be considered a re-prioritization of spaces, similar to the re-organization of structure discussed by Dynes, where green spaces normally prioritized are shifted

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<sup>75</sup> Spencer, Interview.

<sup>76</sup> Bruney, Interview.

<sup>77</sup> Bruney, Interview

<sup>78</sup> Wright, Interview.

<sup>79</sup> Dutton, Elizabeth. "Hurricane Sandy and Our Green Spaces." Survey.

<sup>80</sup> Garcia, Interview.

down to make room for those spaces that suffered either increased damage or those spaces whose damage is more immediately threatening. However, one resident concluded that instead of a reprioritization, prioritizing residential space before green space reflects a pre-existing hierarchy:

Often, green space is not given a priority; it's not seen as an important part to people's living and life. And so I think that when you have such a tragedy like New York, what's happened, it's hard to put that into a priority when it was never an ultimate priority.<sup>81</sup>

Thus, reactions to green space may be representative of existing values within the community that are not changed, but highlighted by disasters.

For many, these values existed linearly by valuing residential repair before green space repair due to the lack of emotional and physical energy to address both at the same time. An inability to address multiple spaces at once delays immediate social-ecological resilience. However, it is also possible that this linear progression resulted from the timing of Hurricane Sandy before the cold New York City winter, the off-season for most gardeners. This timing may have eliminated a sense of urgency for repair that might otherwise be felt if Hurricane Sandy had occurred at the height of the growing season. One survey respondent wrote, "most members received extreme damage from Sandy. *We are more focused on our homes than the community garden at the moment.* (emphasis added) I don't even have a telephone! It's February,"<sup>82</sup> Though it is unclear whether the mentioning of February is in reference to the low temperatures or the length of time it is taking to repair residences, this quote in particular hints at how seasonality can affect urgent biophilia and resilience. In both instances (low temperatures and lengthy repair times), we find that the season and climate during the post-disaster stage will affect opportunities for resilience. Another respondent wrote that his community garden would "re-organize in the spring to begin garden repairs,"<sup>83</sup> further suggesting that because Hurricane Sandy hit during the winter, there was a distinct lack of priority for green space damage repairs.

In addition, the prioritization of residences before public green spaces does not reflect a complete denial of the need to repair green space damage. For instance, the above mentioned community gardener showed an acute awareness of the damage to his/her garden despite the delay in garden repair until spring: "Adjacent buildings needed structural, electric, gas repair. These repairs are on going and involve deconstruction of the community garden in certain areas. As we were all affected and tired, we will re-organize in the spring to begin garden repairs. *Our homes are our priority at the moment* (emphasis added)."<sup>84</sup> This awareness of the current state of his/her community garden shows that he/she was in contact with this space in the aftermath of Hurricane Sandy and therefore valued the knowledge of the community garden damage, despite failing to prioritize. I posit here the existence of separate ladders of priority; in addition to repair priorities, there are knowledge and awareness priorities. Prioritization, then, may not exist linearly, but rather within a multidimensional frame.

This multidimensional frame was evident when the physical spaces of residences and green spaces overlapped. For example, many houses were damaged from trees that fell onto them. In one case, a community gardener's pond at his residence was destroyed from Hurricane Sandy. He found his fish scattered within a two-block radius of his home with two fish inside his community

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<sup>81</sup> Wright, Interview.

<sup>82</sup> Dutton, Elizabeth. "Hurricane Sandy and Our Green Spaces." Survey.

<sup>83</sup> Dutton, Elizabeth. "Hurricane Sandy and Our Green Spaces." Survey.

<sup>84</sup> Dutton, Elizabeth. "Hurricane Sandy and Our Green Spaces." Survey.

garden.<sup>85</sup> As disturbing an image as this is, it is a reminder that the damage sustained personally and communally cannot be isolated from one another. While residents may repair these spaces one at a time, coping with a physical reality that does not separate damage and spaces creates an atmosphere of resilience that is not separated so easily. As a result, resilience can exist across multiple spatial and temporal dimensions. This finding is important when considering models for resilience explored in this paper such as the DROP Model. In developing new models of resilience, there exists a need for a design that encompasses nonlinear paths and multiple venues. In other words, resilience does not manifest itself solely in the actions of a community. Rather, it is found in how communities acknowledge the disaster and move forward given the situation.

#### *Volunteer Activity Complicates Priority in the Residential Damage Subgroup*

Despite the priority to repair personal residences before public spaces, there was neither a significant drop or increase in levels of participation in park, community garden, and tree clean ups.<sup>86</sup> In some cases, clean ups involved repairing extensive damage. Descriptions included “sand and sewage in planting beds, damaged lawn furniture, signage, gazebos, and entertainment areas;” “Callery Pears fell in half, limbs torn off, Chinese Sequoias limbs broken;” “we were completely flooded from every direction the bay met the ocean and water came up from the sewers. I don’t think there is one tree that was spared by the salt. 10 feet of water;” “in one garden, the large plastic awning/tent structure was completely knocked down.”<sup>87</sup> Additionally, those who experienced residential damage felt more overwhelmed by this damage to trees, parks, and community gardens.<sup>88</sup> Recognizing priorities within a multidimensional scale as suggested in the previous section, may help us account for the previous descriptions of prioritization of personal residences, which signals a lack of opportunity for social-ecological resilience, and the increased psychological affect, which signals an increased opportunity for social-ecological resilience. It is not that residents prioritize repairing their homes because they are underwhelmed by the damage to green spaces. Rather, it seems that a focus on residences is the inevitable pragmatic choice when faced with extensive damage in both public and private areas.

A reading of the rigorous repair activity descriptions further indicates the complicated nature of prioritizing and resilience. Repair activity descriptions included “cutting up downed trees, rebuilding fences and planting areas, clearing debris and garbage,” “sand and debris removal with shovels and wheelbarrows and front loaders, using a power saw to cut limbs down to size, removing broken garden statue debris, making sure volunteers had access to gloves, food, water and toilet facilities.” Although many prioritized the reconstruction of their homes, the existence of participation in rigorous park, community garden, and tree reparation efforts displays the continuing reconsideration of priorities, or multiple ladders of prioritization within the larger social-ecological system.

#### *Adverse and Positive Psychological Effects*

High levels of residential damage can also evoke increased emotional intensity and psychological difficulties with repair efforts that both stunted and increased opportunities for

<sup>85</sup> Dutton, Elizabeth. “Hurricane Sandy and Our Green Spaces.” Survey.

<sup>86</sup> Dutton, Elizabeth. “Hurricane Sandy and Our Green Spaces.” Survey.

<sup>87</sup> Dutton, Elizabeth. “Hurricane Sandy and Our Green Spaces.” Survey.

<sup>88</sup> Dutton, Elizabeth. “Hurricane Sandy and Our Green Spaces.” Survey.

resilience. One respondent wrote: “I was devastated by the destruction this storm has caused. I have not yet gone to Coney Island...It is too difficult for me to deal with.”<sup>89</sup> Unable to visit neighborhoods that suffered especially high levels of damage prevents the social interactions and foundational knowledge necessary for resilience building. While the psychological affect of the destruction on this resident prevented visitation, for others, an emotional intensity related to the residential damage increased opportunities for resilience. One resident described her experience in the initial stages of clean up:

The fronts of people’s homes were not there...Imagine the ocean comes in and then drags the contents of your home back out to sea again and all this stuff, literally the contents of your home, is out in the middle of the street all the way to the shore...cleaning up people’s household items, their kitchen stuff, and their bedroom stuff, and their cds and their jewelry box...there were other parts of Staten Island that were underwater literally where there were boats...Disturbing...we’ve never had anything like that before...so I helped with that and the effort got better organized.<sup>90</sup>

In congruence with Norris et al., the physical closeness to destruction and the intense emotional connection to individual residences both adversely and positively affected individuals and opportunities for community resilience.<sup>91</sup>

### *Previous Connections Contribute to Resilience*

Overall, survey respondents who experienced residential damage disagreed that they sought out nature within their community green spaces after Hurricane Sandy for personal reflection and/or therapy. Similarly, they desired less than those who did not experience residential damage to connect to nature and become involved in their community after the storm. However, there was an increase in motivation to partake in volunteer and community driven activities to care for green spaces within specific subgroups with previous attachments to said spaces. For example, compared to arborists who did not experience residential damage, arborists who did were more motivated to care for trees after Hurricane Sandy.<sup>92</sup> This data suggests that while on average those who experienced residential damage may not desire to become more connected to the nature or their communities, they do on average find themselves motivated to connect to the spaces they were previously related to. Thus, previous connections to parks, community gardens, and/or trees play a role in increased connection to green spaces in the post-disaster context. Existence of social-ecological networks prior to a disaster situation may dictate how those who suffer residential and personal damage prioritize space and ultimately find opportunities resilience.

### COMMUNITY GARDEN, PARKS, AND TREES DAMAGE

In this section, we will examine how the varying levels of damage to parks, trees, and community gardens affected post-Hurricane Sandy civic ecology practices and social-ecological resilience. In this discussion, we may recall Norris et al.’s ideas of attachment to place and how increased attachment can both stimulate as well as prevent community resilience, as some people

<sup>89</sup> Dutton, Elizabeth. “Hurricane Sandy and Our Green Spaces.” Survey.

<sup>90</sup> Maiorani, Interview.

<sup>91</sup> Fran H. Norris, Susan P. Stevens, Betty Pfefferbaum, Karen F. Wyche, and Rose L. Pfefferbaum, "Community resilience as a metaphor, theory, set of capacities, and strategy for disaster readiness," *American Journal of Community Psychology*, 41, no. 1-2 (2008): 127-50

<sup>92</sup> Dutton, Elizabeth. “Hurricane Sandy and Our Green Spaces.” Survey. (+.52/5.00)

may be so psychologically affected that they do not want to participate in reparation. Did those who experienced increased green space damage respond differently to Hurricane Sandy? Did those who felt increased place attachment to the green spaces participate in more clean ups?

*High Levels of Green Space Damage*

Damage to parks, community gardens, and trees ranged throughout New York City. Some areas remained untouched, while other areas suffered significant loss of felled trees and damaged buildings, gardens, and pathways. Jeffrey described the loss to his church farm:

Everything was wiped out. I had 6 feet of water on the farm, so everything was gone. I had a nursery that was taken out. But the water, just the salt...I will not be able to plant in the soil unless I do some desalination of some sort...Everything was lost. All my tools. Everything I had. Everything I gathered over the years was gone...a lot of debris and everything was just tangled up, like I could not find anything in all this debris.<sup>93</sup>

Residents described similar astonishment and a sense of loss:

You had trees that were very old trees that were literally lifted up out of the ground. And they just fell over. You had trees that just snapped right in half and took a lot of concrete with them... Particularly in some of these parks, you know these really old beautiful trees, just snapped.<sup>94</sup>

Trees were down all over the park, making it very dangerous to visit, plus flooding in many paths.<sup>95</sup>

In a matter of days, Hurricane Sandy destroyed familiar landscapes and community spaces. Indeed, when asked of the amount of damage on a scale of 1-5, survey respondents gave the following averages:<sup>96</sup>

Neighborhood Parks	3.53
Neighborhood Community Gardens	3.20
Trees on Your Street	2.41
Trees in Your Neighborhood	3.30

**Table 2: Green Space Damage**

Although re-reading newspaper articles after Hurricane Sandy would similarly prove the extensive green space damage that resulted from the Hurricane, community testimony of the damage is significant in that there were varying levels of damage across the city, affecting every individual differently.

<sup>93</sup> Bruney, Interview.

<sup>94</sup> Hausner, Interview.

<sup>95</sup> Dutton, Elizabeth. "Hurricane Sandy and Our Green Spaces." Survey.

<sup>96</sup> The survey did not provide a rubric by which to measure levels of damage. Therefore, it is almost certain that one respondent's idea of what constitutes level 3 damage may differ from that of another respondent. However, while this process of self-identification may seem to inhibit concrete findings, it also illustrates a unique finding in how individuals perceived their own environments. Thus, the numbers in the below table do not show us the levels of damage, but rather reveal how the communities felt about these spaces. (See Appendix XXXXX)