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The Uneven Social Landscape of Flood Risk: Implications for Outreach & Local Decision-Making

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Images: Troy, New York, in 1911 and 2013.

Abstract

The purpose of the project includes developing a better understanding of (1) the dimensions of flood *risk* in a estuarine system – critical with climate change related impacts, (2) how *perceptions* of flood risk are related to adaptation and mitigation strategies, (3) how *responses* to risks vary from one community to another, and (4) how varying perceptions of risk should inform/influence outreach strategies at the local level. The exploratory work has been focused on our central goal of developing an understanding of the social landscape of flooding risk and perception in the target cities -- honing in on Troy, NY as our initial in-depth point of exploration. The work in Troy has entailed a review of local press coverage, 10 semi-structured interviews with local professionals and residents, and 2 neighborhood-based focus groups. Predominantly informed by interviews, focus groups, and relevant literature, our work thus far suggests a series of insights that fall into four thematic areas: (1) Unknown flooding risk; (2) Uneven exposure to material and financial risks; (3) Factors influencing perceptions of risk; (4) Community/Civic capacity. This project seeks to provide valuable insights to inform local outreach strategies around flood risk, adaptation and mitigation.

Three Summary Points of Interest

- ***Flood risk* is multidimensional and not well understood, lacks universally accepted measures within technical as well as community frameworks - and particularly in relation to *future* risk, is relative, and not uniformly salient;**
- ***Perception* of risk is influenced by many factors, including demographics, geography, ideology, awareness, and how specific risks are framed;**
- **Community and civic capacity can enhance or limit flood resiliency – efforts need to be responsive, coordinated, visible, and easily accessed.**

Keywords
Flood risk, resiliency, flood risk outreach, flood insurance, climate migration, risk perception, flood adaptation, flood mitigation

Policy implication statement

This work seeks to inform new and improved outreach approaches to more effectively engage community residents and policymakers on the topic of flood risk, resiliency, and mitigation strategies.

Introduction

The eastern US coast, including inland estuarine areas, has experienced an increase in severe weather impacts in recent years. The Hudson River is rising with the sea. Scientists project river levels to rise up to 10" by the 2020s and up to 27" by 2050 (NYS Sea Level Rise Task Force 2010 and Rosenzweig, 2012). Higher sea levels worsen flooding and put coastal and estuarine communities at risk. People, businesses and governments located in high risk areas are increasingly confronted with the question of what to do in anticipation or in response. Many will try to adapt, using a variety of strategies, in order to stay in place. But increasing frequency and cost of damage also raises the probability of "climate migration", the planned or unplanned move to what are perceived as lower risk locations. This is important to consider at many levels, e.g. individual, neighborhood, and community. Our on-location collaborators (HREP) confirm that they currently have few resources and even less relevant research-based information to offer their constituencies on the subject of climate-based relocation and migration. Trends in federal policy only enhance the benefits of considering local, regional and state roles in planning for climate change. Such planning includes explicit climate disaster and hazard mitigation planning, but also more comprehensive forms of community planning.

Based on knowledge from existing literature about general responses to environmental risk, our research assesses Hudson River Valley residents' perceptions of near/longer term vulnerabilities, their perceptions of local government responsiveness, how this varies by income and access to other resources, and factors they weigh in decisions to migrate or adapt in place. A better understanding of these will be critical for many NYS coastal and estuarine communities as they anticipate, plan for, and are subjected to more frequent disruptive climate driven events related to sea-level rise and related flooding.

New York's Community Risk and Resiliency Act, signed into law in 2014, specifically requires the state to update science based sea level rise projections at five year intervals. It is already clear that higher sea levels will worsen flooding and put coastal and estuarine communities at risk. People, businesses and governments located in high risk areas are increasingly confronted with the question of what to do in anticipation or in response and highlights the need to consider local and state roles in both climate disaster response and more proactive planning. Moreover, the uneven distribution of costs and benefits at the subnational level clearly influences national policy: for example, implementation of the national Biggert Waters National Flood Insurance Reform Act of 2012 was slowed due to strong regional resistance to its financial and political implications (National Research Council, 2015). In many ways, our knowledge of the psychological and socioeconomic effects of policy-supported relocation are in their infancy. For example, one recent study on post-Sandy Staten Island buyouts paid close attention to the location and well-being of residents who participated in the buyout. The author cautions that at least this relocation (buyout) policy has not, as intended, reduced resident vulnerability as broadly defined: "overall vulnerability, measured in terms of exposure and social vulnerability, increased for 321 of the 323 buyout participants considered by this study". (McGhee, 2017). More specifically, while only a few residents moved somewhere that increased their "exposure" vulnerability, all but a few moved to areas with a higher social vulnerability index as measured in particular by higher concentrations of the elderly and/or of poverty.

Conceptualizing risk and adaptation

Our work draws upon the long history of US and global scholarship into the role of risk factors, direct and mediated, in responses to resident perceptions, behaviors, residential preferences and migration behaviors. At least since the appearance of Wolpert's (1966) "stress-threshold" model and its explicit invocation of "danger-security" stressors, researchers have been concerned with the role of noneconomic worries in moving plans and noted the premium that urban dwellers, in particular, place on mobility to escape from peril (Little, 2006). Risk and fear can degrade property values (Hipp, Tita, and

Greenbaum, 2009; McClelland, Schulze, and Hurd, 1990; Runge et al., 2000), prompt urban homeowners to seek suburban refuge (Bayoh, Irwin, and Haab 2006; Cullen and Levitt, 1999), and scatter employers while prodding working families to relocate or lose their jobs (Stehr, 2006). More abstractly, accumulating risk and disamenities may heighten "topophobia," or fear of place (Janz, 2008), and stoke the yearnings of city dwellers burdened with "stage fright" (Janz, 2008) for the security they associate with lower-profile, lower-density places (Low, 2003; Newman and Hogan, 1981).

In order to devise effective strategies to mitigate some level of risk and to adapt to risk that remains, it is important to understand both the risk itself and localized perceptions about risk. For decades, researchers have been studying risk perception, devising strategies to disentangle the often-complex assessments of risk, or of what is, in fact, "risky", and what levels of concern and response different kinds of risk evoke. The fields of behavioral economics and decision research have been profoundly shaped as this research has evolved (Kahneman, 2011). Policy makers have also increasingly paid attention to the lessons of research (Thaler and Sunstein, 2008). Those involved in health and safety promotion, for example, have sought this information in order to ascertain how people recognize and react to hazards in the hopes of improving education and communication strategies for risk management (Slovic, 1987). Because "individuals do not always share the same perception about the meaning and the underlying causes of different risks… understanding how the risk perception affects risk-coping and adaptation strategies is [becoming] increasingly important" (Iwama et al., 2016: 94-95).

Researchers often categorize risk perception on more than one dimension. For example, the UN Office for Disaster Risk Reduction (UNISDR, 2009) has classified risk as: (1) the likelihood of an outcome, and (2) the potential consequences or losses that accrue following an event. In a meta-analysis of risk perception and behavior, Brewer and colleagues (2007) examined the relationship between belief about disease risk and its relationship to vaccination on dimensions similar to the UNISDR's: (1) the likelihood of being harmed and (2) the severity of the apparent threat, along with a third: (3) apparent susceptibility to harm. The meta-analysis concluded that all three were important predictors of behavior.

In inquiries pertaining specifically to climate change-related risk, one line of research has assessed the ways in which people feel psychologically distant (geographically, socially, and temporally) from or proximate to climate risk (Spence, Poortinga, and Pidgeon, 2012). Similarly, Iwama et al. (2016) have examined place-specific contextual information, along with social, psychological, cultural factors, and the availability and sources of information concerning risk. All of these factors are potentially important in determining the likelihood that members of the public will engage in more sustainable future-oriented behavior (Spence, Poortinga, and Pidgeon, 2012); and they are likely to be critical in the development of effective adaptive responses to potential threats.

Like risk perception, adaptive responses to climate-related risks are often classified in the literature on multiple, often overlapping dimensions. For instance, adaptation has been classified as (1) reactive or anticipatory; (2) technological, behavioral, managerial, or policy-implementing; (3) autonomous or planned; characterized by (4) protection, retreat, or accommodation; and focused (5) in the public or private sector; and (6) on human or natural systems (Francisco, 2008; IPCC, 2001; UNFCCC, 2006). Examples of adaptive responses that are anticipatory, that work on human systems, and operate through the public sector could include developing early warning systems, building dykes, and devising new building codes. Examples of technological adaptations can include those that protect (dykes, seawalls), retreat (setback zones, relocation), and accommodate (early warning systems, hazard insurance, upgraded drainage systems, desalination projects) (UNFCC, 2006).

Leiserowitz (2006) has argued that theorists generally believe that individual decisions about climate-related

risk and adaptation are made cognitively and are less influenced by emotion or affect. He has found, however, that fundamental worldviews very much affect both the ways in which risk is understood by the American public, and the ways in which public policy solutions to climate change are prioritized. In addition, an individual's adaptive response to a perceived threat is likely to be influenced by whether or not available solutions are thought likely to be effective (and likely to produce greater benefits than costs, as in an evacuation, for example). Responses may also depend on whether or not certain options are open to individuals or groups, or are seen as within their capacity to act (Eiser et al., 2012). Our research considers both environmental risk and potential adaptation in New York State, with a particular focus on perceptions of risk *and* perceptions of local government responsiveness to risk.

Migration, risk, and response

Migration as a response to environmental risk has been at the center of work by many authors including Hunter (2005); Mueller, Loomis, and González-Cabán (2009); Petersen (1958); and Wolpert (1966). In relatively recent work, McLeman and Hunter (2010) highlight a number of important dimensions that shape the extent and nature of climate induced migration: environmental causes that include an array of both pushes and pulls; temporal dimensions that range from short term to permanent relocations; spatial dimensions including localized, intraregional, and interregional migration patterns; and the choice set of possible adaptations of which permanent migration, in polar contrast to "nonmigration", is often an option of "last resort". Myers et al. (2008) are among those who have highlighted the role of social vulnerability in post disaster migrations in the US -- they conclude that outmigration has correlated most strongly with the proportion of disadvantaged populations and the extent of housing damage.

Although extensive future displacement from flooding events is considered likely by numerous climate scholars, many "reject the deterministic view that directly links climate change to mass migration. Instead, they recognize that the linkages are complex and operate through social, political, economic, and demographic drivers, with migration being just one of many possible adaptations to environmental change" (Fussell, Hunter, and Gray, 2014: 182; McLeman and Hunter, 2010). Similarly, a recent review of the literature by Hunter et al. (2015) argues that sociologists can add to the base of knowledge concerning the relationship between migration and environmental conditions by focusing on "issues of inequality, perceptions, and agency". Their review affirms that there is a growing consensus in this literature that a) migration is often a household strategy to diversify risk, b) decisions are influenced by household composition, and c) that household migration choices depend significantly on individual characteristics; social networks; and historical, political, and economic contexts.

In view of conflicting perspectives within the risk response, residential mobility, and migration literatures (Bickers, Salucci, and Stein, 2006; Goldhaber, Houts, and Disabella, 1983; Hunter, 2005; Regoeczi, 2002; Sunstein, 2003), Kay et al. (2010) have proposed that responses to risk can be organized through the competing psychodynamic lenses of salience and resilience (many factors other than risk can dominate location decisions; cf. De Jong and Sell, 1977; Lu, 1999; Bonanno, 2005; Sheppard et al., 2006), stress/risk aversion (most populations are risk averse, particularly in the face of "fearsome" events, cf. Halek and Eisenhauer, 2001; Palsson, 1996; Sunstein and Zeckhauser, 2008), and stability: when people feel vulnerable, the importance of affiliation (Rofe, 1984), connectedness (Reich, 2006), and sticking to familiar routine (Kunreuther et al., 2002) increases. Our research examines these and the above-mentioned dimensions of risk and response in the state of New York.

Our Contribution

The project with the Cornell Water Resources Institute and the Hudson River Estuary Program seeks to assess flood risk perception and the relationship of risk perception to individual, household, neighborhood and municipal policy responses in the City of Troy, New

York. Specifically, the purpose of the project includes developing better a understanding of (1 the dimensions of flood *risk* – critical with climate change related impacts, (2) how *perceptions* of flood risk are related to adaptation and mitigation strategies, (3) how *responses* to risks may vary from one community to another, and (4) how varying perceptions of risk should inform/influence outreach strategies at the local level. The exploratory work has been focused on our central goal of developing an understanding of the social landscape of flooding risk and perception, and implications for outreach by the Hudson River Estuary Program and others. We are currently exploring the role of economic and related policy incentives (e.g., FIRM mapping designations, implementation of the national Biggert Waters Flood Insurance Reform Act, government "buy-out" negotiations as are currently underway with several Staten Island communities, etc.).

We draw on the literature on climate change related risk assessment and adaptation, and on field observations, focus group interviews and key informant interviews to address initial questions such as the following: (1) how are people who live in flood-prone communities experiencing gradual change on a regular basis and dramatic events on an occasional basis? (2) What changes, if any, are they making to prepare for ongoing or worsening conditions? Is out-migration one of the changes they currently envision making? (3) What steps are being taken at the local level to reduce risk for community members, and what do local officials report as their greatest accomplishments and challenges when it comes to gradual environmental change, as well as to more abrupt events? A better understanding of these and other questions are critical for many New York State communities as they plan for more frequent disruptive climate change-related events, and the potentially significant impacts of induced migration. Our long term goals are to conduct a systematic assessment of multiple New York State places facing climate risk, and to develop recommendations for more effective adaptive responses.

Methods

The work in Troy to date has entailed: an analysis of demographics, flood zone maps, and other related documents; a review of local press coverage; 10 semi-structured interviews with local professionals and residents (including a city council member, a local activist, academics, the deputy mayor, a city engineer, the

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commissioner of public utilities, and the head of public housing); and two neighborhood-based focus groups with residents (North Central and South Troy, see map below).

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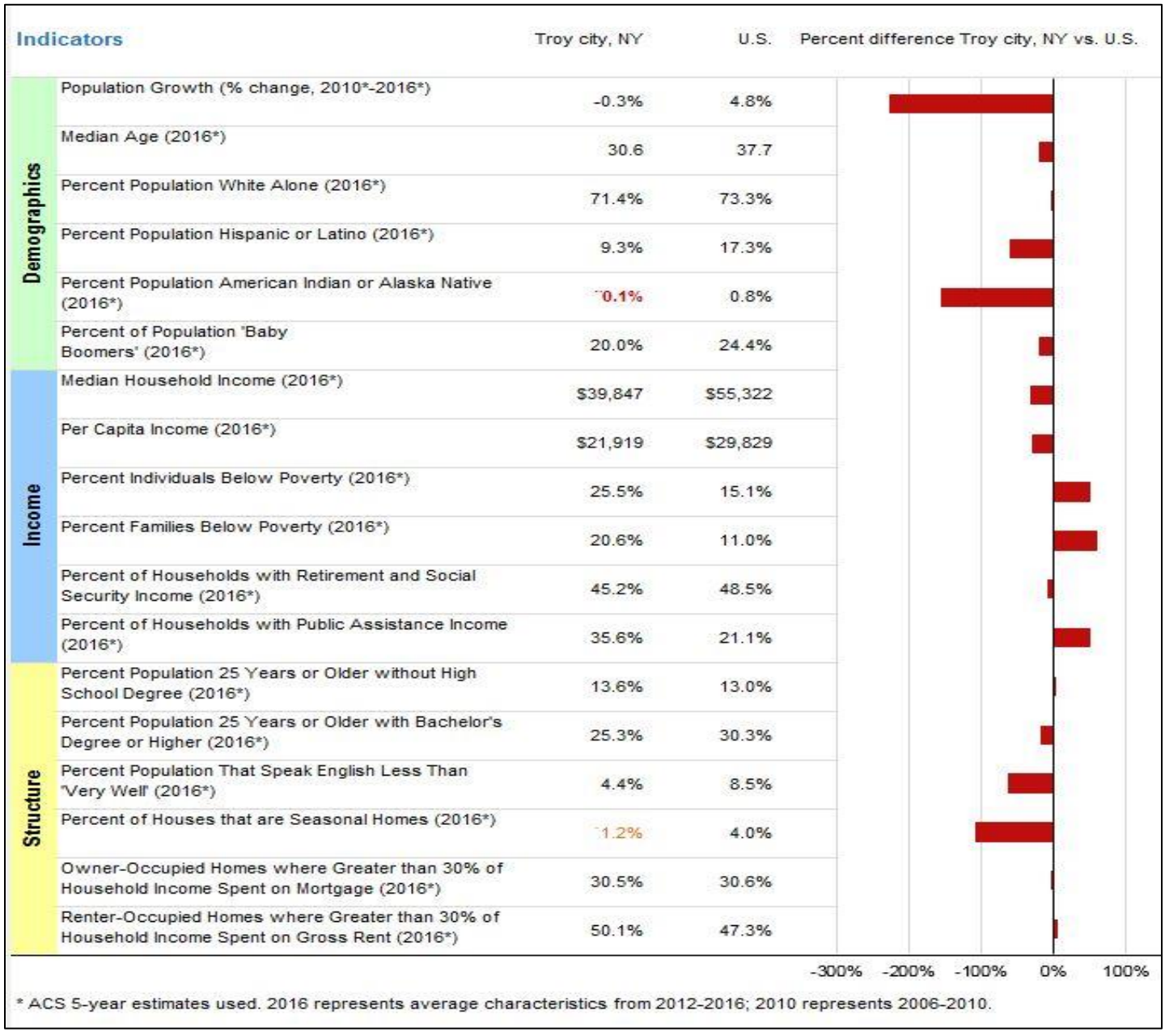
Results & Discussion

Our exploratory work this past year has been focused on our central goal of developing an understanding of the social landscape of flooding risk and perception in the target cities -- honing in on Troy, NY as our initial in-depth point of exploration.

To better understand the general context within which we were working, we first conducted a basic demographic analysis of the City, finding some notable differences compared to U.S. averages. The population of Troy has declined slightly in recent years, compared to the almost 5% growth at the national level between 2001 and 2016. The median household income and per capita income for the city also lag significantly behind national levels. Poverty is a significant issue in Troy, with one in five families living below the official poverty threshold. A significant proportion of the City's population relies on public assistance income. In addition, over 15% of the housing stock in Troy is vacant, compared to 12% at the national level (not shown here).



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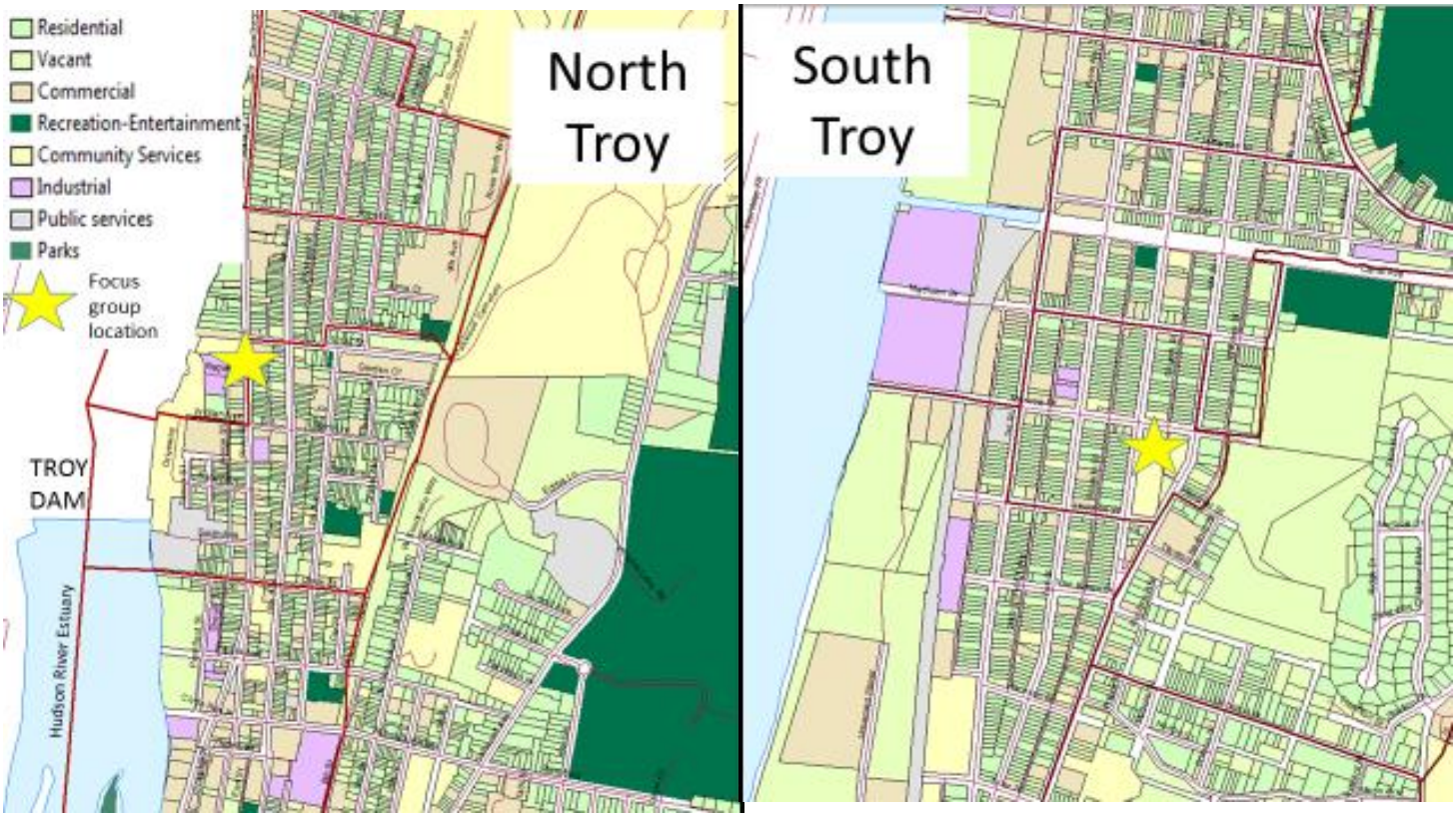
The Built Environment

The maps below shows the various land uses in North and South Troy. Of particular interest is the relative lack of residential property immediately adjacent to the river in South Troy as well as in North Troy below the dam (mostly vacant, industrial and commercial), compared to North Troy above the dam which has a mix of commercial and residential property near the river.



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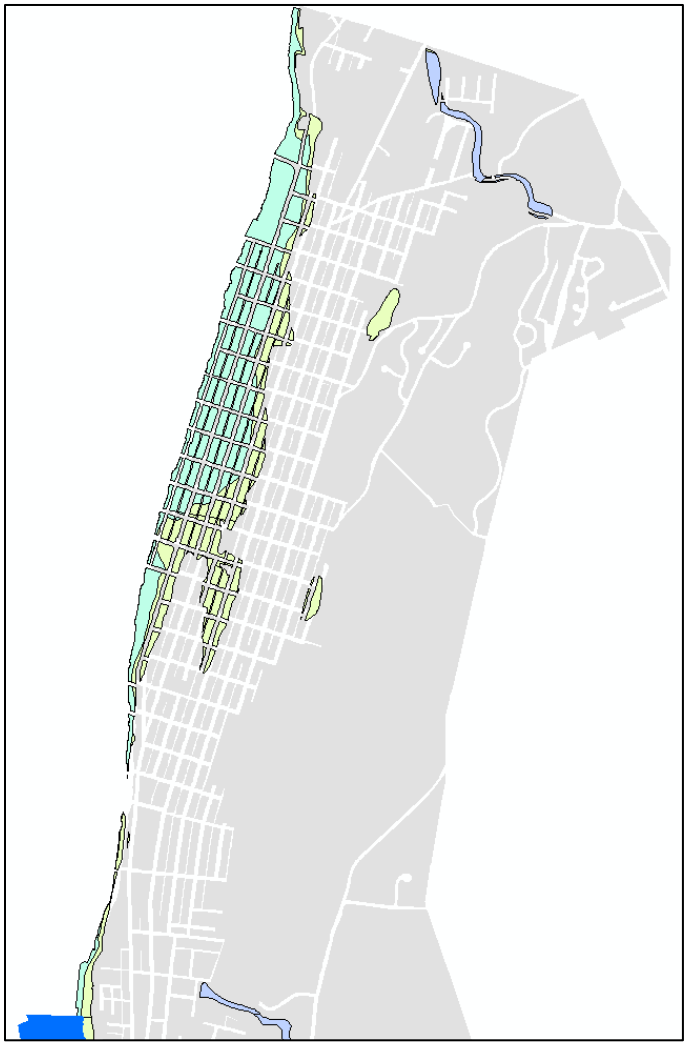
Flood Risk

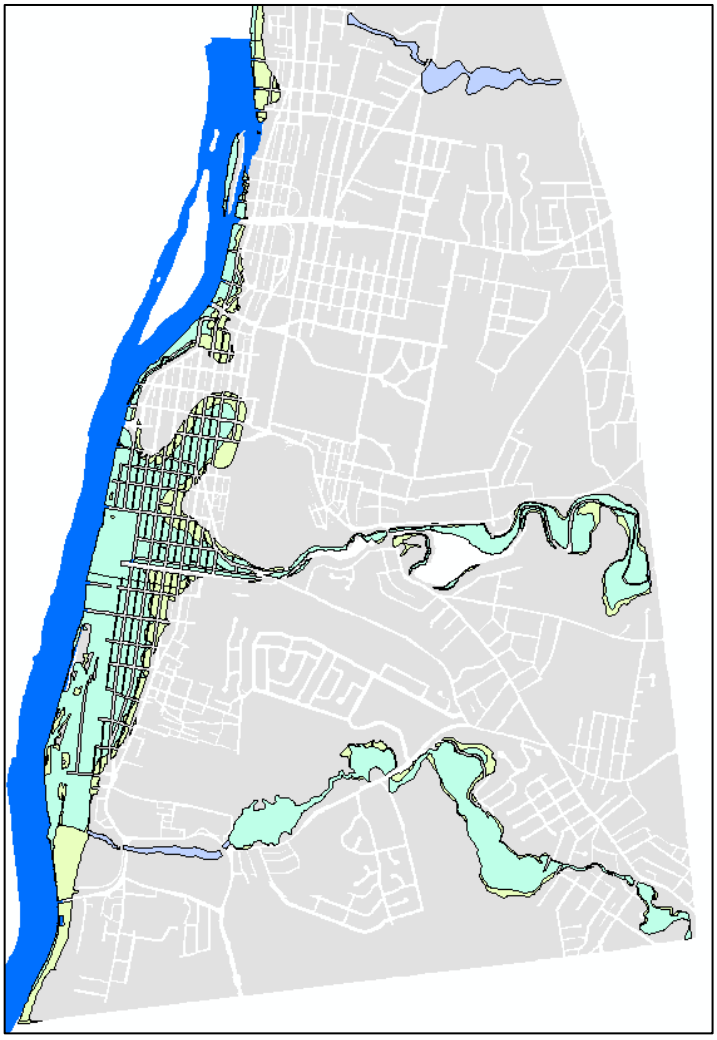
FEMA maps indicate the federally designated flood risk areas of North and South Troy. Though there have been several dozen amendments over the years, the flood map dates from March of 1980.

A - 1% annual risk, no elevations
AE - 1% annual risk, elevation exists
X500 - 0.2% annual risk

North Troy



South Troy



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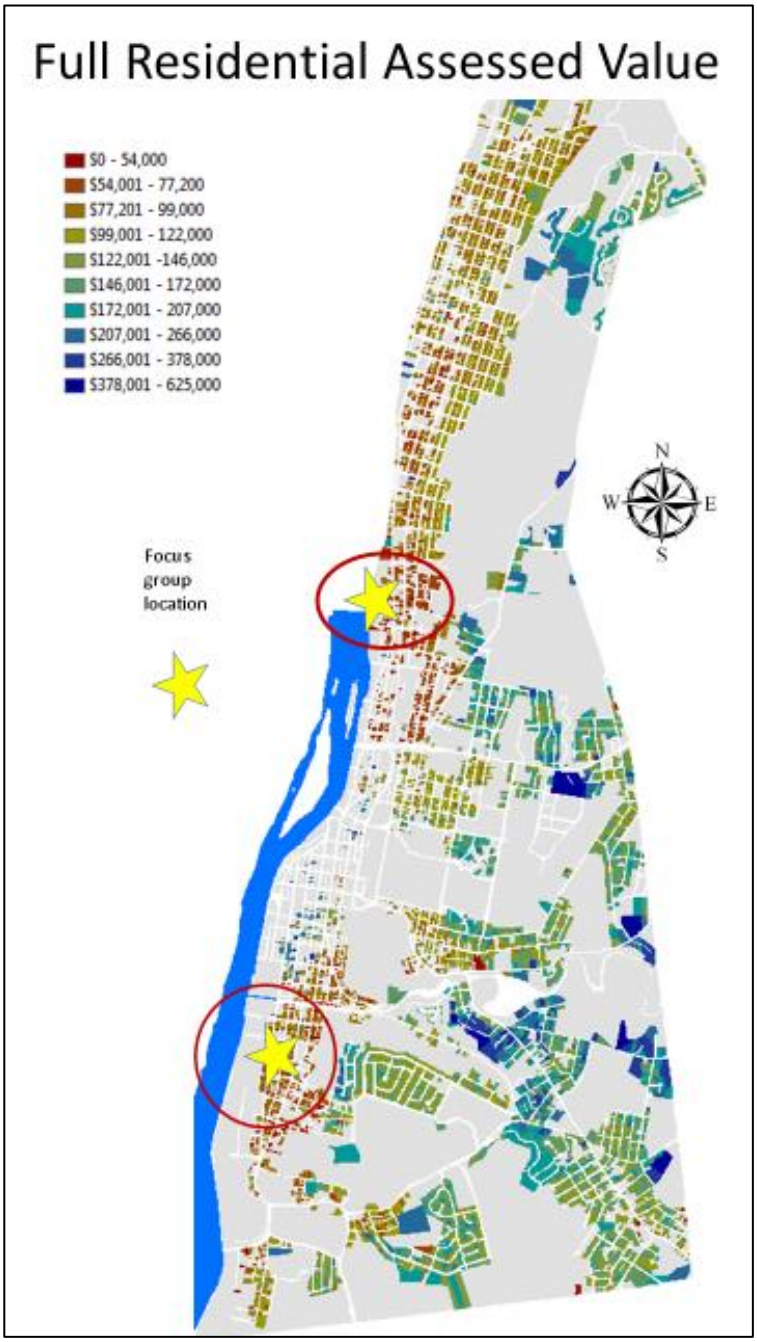
Varying Socioeconomic Landscape of Troy

Basic GIS work highlights the spatial patterns and uneven distribution of various metrics of socioeconomic status in Troy. The map below provides the full residential value of property. Of note is the lower assessed values that are located to the north and along the Hudson River, compared to the properties further away to the east. These properties are also located at a higher elevation than those along the river, and many are closer to Rensselaer Polytechnic Institute. The properties along the river at lower elevation face flood risk not only due to proximity to the river, but also due to run-off from the higher elevations, run-off exacerbated by non-permeable or non-porous surfaces higher in the watershed.



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Predominantly informed by interviews, our work thus far suggests a series of insights that fall into four thematic areas:

Unknown flooding risk:

- The exact natures of the risks in Troy are still not well understood.
- Even with official measures of risk such as SLR projections and their influence on FEMA flood hazard areas, "risk" remains relatively abstract and subjective for many resident. There appears to be no single, well understood, universally accepted "objective" benchmark for defining the extent and nature of *future* flood risk.
- We will need to account for this in the ways we think about, represent, and interpret "subjective" perceptions of risk.

Uneven exposure to material and financial risks:

- Many residents perceive little choice about where they might live or the responsiveness of their local government.
- Perception that lower income neighborhoods (and residents' interests) are not being protected in the same way as are higher income areas, especially compared to the downtown area also subject to flooding. Nonetheless, some also attribute a special citywide significance to the downtown.
- Many of the city's lower income families live closer to the water while the more affluent neighborhoods are on "the hills." Development in these higher areas reduces absorption and increases the quantity and velocity of runoff to areas of lower elevation, hence into the lower income neighborhoods.
- The risks of rising flood insurance rates impacts property owners and renters:
  - Property values may be impacted; thus, selling current properties may be difficult and purchasing new properties in designated floodplains may become unaffordable. This may be as great a concern as risk of flooding itself.
  - Expense, complexities, changing designations, and availability of flood insurance is confusing and may lead to being under-insured, particularly for the vulnerable.
  - Renters may not be aware of or informed of flood plain designations and may be less likely to be protected.

Factors influencing perceptions of risk:

- Built environment in Troy (industrial development by river) may affect how people relate to river and influence perceptions of risk.
- Little evidence that climate change has altered the conversation of risk in Troy.
- Few people see flooding as a major issue or one that is immediately salient.
- Outside of flooding events, there is little or no communication from professionals or officials regarding flooding or flood risk. The exception seems to be linked to flood insurance: people mentioned receiving notices about flood insurance rates or avoiding purchasing properties that would require flood insurance.
- Differences in risk perception do seem to be linked to different geographical risks, different levels of preparedness, different awareness, demographics, etc.
- Some of our readings, and to a lesser extent some interviews, suggest that we need to be cautious in how we frame and conceptualize the risk of flooding in relation to other risks and priorities faced by both individuals and by policy makers.
- People in both policy positions and in locations at risk of increased flooding are likely to situate this risk within an array of other categorically similar and dissimilar risks related to both "response/action" and "no response/action" alternatives. Our research approach must be sensitive to and explore the way flood risks are perceived and prioritized within a broader risk "portfolio."
- We need to understand the social landscape of the cities we are working in better than we do so far. For example, why do some local observers understand risk and policy in relation to class and race issues while others do not? Are these different kinds of perceptions based in personal attitudes and beliefs,

the more objective locations of actors in the social infrastructure and political hierarchies, etc.?

Community/Civic capacity:

- City engineers possess technical knowledge, although there no is central organization, repository, or person for more comprehensive local flood information.
- Perceived lack of social and civic organizations directly addressing flood risk – limits capacity for organized flood effort; though city also has very active organization of neighborhood groups.
- City engineers possess technical knowledge, although there no is central organization, repository, or person for more comprehensive local flood information.
- Recent city council election has resulted in a wave of new members who may bring alternate perspectives to the table. New members' terms begin in January.
- Disagreement between engineering experts about possible impacts of raising flood wall.
    - Municipal efforts to protect downtown. Some raise questions that these efforts are at the expense of North and South Troy and that city improvements aren't evenly distributed.
- Troy is among the top 50 New York communities (in number of flood insurance policies-in-force), but it is not among the few that participate in (or therefore benefit from) the Community Rating System. FEMA includes Troy among the top NY communities that "present an outreach opportunity for encouraging participation in the CRS." (FEMA 2017)

From our two neighborhood-based focus groups (North Troy and South Troy, respectively), the following themes emerged:

Attachment to Place/Attachment to River:

- Strong attachment to community among some, others see negative changes, decay, fragmentation, transience.
- Some place important personal value on proximity to river (views, sense of calm, fishing, etc.), others ignore it or see negatives (water quality, pollution, contaminants, etc.).
- River is largely seen as underutilized and undervalued.
- Some pride in river being unique, estuarine ("it makes me feel connected to the sea"), part of the Great American boat loop route.

Concerns about current neighborhood:

- Development can lead to gentrification and displacement of lower income residents.
- People moving in and out of city, different value structures, some distrust between groups.
- Some distrust and general unhappiness with local government and responsiveness.
- Perceived increase in absentee landlords has created "slum conditions", safety concerns.
- "a hipster bomb has gone off in parts of Troy".
- "..we have so much vacant housing….and so many homeless…..".

Perception of Risk:

- Flooding is seen as a real risk by some, but others face more immediate risks ("I have bigger problems than that")
- People hear warnings, take temporary measures and hope for the best
- Difference between home owners, those who live in flood plains, etc. More salient for those in flood plains, for those who have experienced firsthand.
- "Risk" is still somewhat contingent, and abstract, for some residents
- Sense of powerlessness

Flood insurance:

- Cost of flood insurance can be a burden, and may limit resale of home
- Some flooding as a result of CSO and poor/aging infrastructure
- Some flood insurance cancelled after claims filed, or rates increase significantly – problem!
- Hard to sell your house unless attract a cash deal
- "I can hardly pay my rent, you want me to pay flood insurance?!?"

Civic Capacity, etc.:

- "Everything is possible, but nothing is likely"
- Perception that the city doesn't always recognize the river as an asset, and some residents don't agree with development decisions relative to the river.
- Homeowners seem to have better access to information about flooding than renters
- Is Troy prepared for next flood? Our infrastructure is OLD.
- How issues are framed are important - "Don't talk about climate change!"
- DEC has used "climate change" in communications – important to do so – "my greater worry is climate deniers…..council members who don't support infrastructure (improvement)"
- CSO issues are also huge issue with flooding
- The City has great ideas, but the City is poor, can't make ideas happen

Questions for further exploration:

- How are different sources of information received and are they perceived as credible?
- With no unanimous understanding or benchmark for flood risk, could we explore whether there was a better way to represent flood risk – options HREP might consider implementing.
- How should differences among landlords, tenants, and owner-occupiers shape how risk and information about risk are distributed?
- How do different scenarios of risk influence residents' actions? i.e. what is the "tipping point" for different people?
- Explore scenarios of different interventions (buyouts, improved infrastructure, etc.)
- How do FEMA policies and risk mapping shape behavioral response? What other tools influence perception of risk and/or action?

Policy Implications

This work has increasing relevance, and, indeed, urgency in the face of climate-change related impacts. Recent and proposed changes in federal policy enhance the benefits of considering local and state roles in planning for climate change, including explicit climate disaster planning and other more comprehensive forms of community planning. Our work contributes to local, state and perhaps even federal policy discussions by providing evidence-based research to inform the policy dialogue process.

Intended general outcomes are increased awareness, especially within groups already concerned with climate change and/or long term planning, of the potential significance of dislocation and climate induced migration on individuals in at risk communities, on different community neighborhoods, and on the communities as a whole. In recent years there have been numerous articles in the popular press which point to the intersecting environmental, social and economic challenges experienced by communities due to climate change-related flooding (e.g., "My Drowning City is a Harbinger of Climate Slums to Come" (Eubanks, 2016); "When Rising Seas Transform Risk into Uncertainty" (Jarvis, 2017); "Where should you live to escape the harshest effects of climate change?" (Bromwich, 2016). Indeed, these stories highlight the disproportionately negative impacts borne by people of lower socioeconomic status, the dilemmas facing fiscally stressed local governments, and the often constrained set of options available to residents and policymakers alike. We anticipate the incorporation of new insights on perception around climate risks, dislocation and migration to be incorporated into education, community planning, and emergency response procedures and plans.

Future Focus

In consultation with HREP, we identified several questions/issues to further consider:

- Kingston, a city that HREP has had significant attention from research, outreach, and programming, is an "outlier" in terms of significant capacity and coordinated response to flood risk. How might we think about moving Troy towards a scenario like Kingston, Piermont, or even Catskill, - places that have developed higher capacity, citizen awareness, etc.?

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- But we are also interested in seeing how a community responds in the *absence* of programming and outreach support (like Troy).
- What are the factors or characteristics in Kingston, Piermont, and Catskill that made them more amenable to working with HREP and Cornell in the first place?
    a. Cultural/social connections
    b. Infrastructure
    c. Increased flood risk
    d. Sea Grant office is in Kingston
    e. Partnership with other groups like Scenic Hudson, allowed them to stay in the conversation
    f. Presence of local champions – active and engaged committees and strong individuals
    g. Young leadership
    h. A combination of these factors was probably the key and not just one alone
- If some combination of the above characteristics is important in determining community/civic capacity, then what can lead to a community having a sufficient level?

One of the key issues that HREP was focused on when we embarked on the 2017 project was how to increase engagement and participation among specific socio-economic and demographic groups(such as lower income and minority residents) with regard to understanding flood risk perceptions, capacity to respond, and range of potential actions. This interest supplemented HREP's initially expressed questions about the distribution and incidence of the costs and benefits associated with changes in the federal flood insurance program. As a consequence, HREP expressed interest in neighborhood meetings in Troy to hear firsthand what residents perceived the critical issues to be, and to try to build initial acceptance and engagement as a supporting foundation for CAD or HREP to possibly work in Troy in another couple of years.

Specific questions asked by HREP included:

- Who should be included in focus groups, interviews, and/or neighborhood meetings in order for HREP to design more effective programming and outreach?
- HREP is interested in assessing the level of awareness and capacity in Troy around flood risk *before* engaging in any programming and outreach efforts. What would be the best way to measure HREP's impact and progress from baseline to post-engagement if they were to become involved in Troy?
- How are other risks (non-flood-related risks) perceived and how might these other risks influence how residents perceive flood risk specifically – could creating a process for dialogue that includes these other risks increase citizen involvement and build capacity for adaptation and mitigation of flood risk issues?

Proposed next steps for Phase II in 2018

Goal #1: *To measure impact of HREP programming in new site (Troy).*

In order to measure the impact of any single or sustained programming intervention, it is ideal to have a pre and post intervention comparison. Full implementation of even a statistically valid randomized "before" survey of Troy residents is beyond the scope of resources we are requesting at this time. Instead, we propose the more modest step of designing and pilot testing with residents a survey instrument that would be able to measure community member awareness, attitudes, knowledge, behavior and practices pertaining to flood risk. The process of designing and pilot testing the survey would itself provide useful new information about key issues, how to frame them, and the range of possible responses to key related questions. While attentive to Troy, possible adaptation for use in other communities would also be considered. If/when HREP elected to actively initiate programming in Troy, the instrument would be ready for timely implementation if HREP wished. Implementation would serve several purposes, including at least: a) provide a baseline measurement of attitudes, knowledge, etc. prior to any significant HREP programming, b)

provide information that would be useful in guiding initial implementation of planned HREP programming efforts, and c) serve as the core of an instrument that could be used for program evaluation purposes in future years to determine how HREP interventions might have affected the attitudes, knowledge, etc. of different kinds of city residents.

Goal #2*: To understand how different measures of flood risk get formalized, institutionalized, and communicated through different intermediaries (insurance agents, realtors, planners, emergency management officials, etc).*

Recognizing the importance to flood risk perception and to policy of FEMA's official flood mapping and map amendment processes, and of flood insurance costs and availability more generally, we propose to focus the next phase of our work on developing a comprehensive understanding of the role of the FEMA maps and of flood insurance to risk perception and policy initiative in Troy:

- Synthesize and write up a summary on flood insurance policies in Troy, who are the key stakeholders and how do they understand the implications of flood risk? Who has access to coverage, and at what cost? Who provides coverage? What happens to properties and owners when flood insurance becomes unaffordable? Is this a salient concern? How fully are Troy's most at risk properties insured?
- What is the federal flood policy and how is it being deployed in Troy? Are FEMA maps determinative? Have they been contested? How does the experience in Troy compare to that of other places in different phases of FEMA mapping processes?
- The primary methods for developing this information would be:
    - Assess through key informant interviews with individuals knowledgeable about flood insurance policies and impacts in Troy and elsewhere.
    - Assess through local focus groups and/or neighborhood meetings.
    - Assess through analysis of written flood insurance documents and policies at the local, state and federal level.

Student Training

For the past year we have had the benefit of working with Cornell graduate student Sarah Alexander (Department of Development Sociology, PhD candidate). Sarah has been instrumental in researching background documents, conducting the press coverage analysis, interviewing numerous local officials and residents, developing and strengthening key local contacts, and organizing our two neighborhood-based resident focus groups. Sarah has also attended several municipal meetings in Troy, written project updates, and has represented the project team in many other capacities.

Publications/Presentations

On June 13, 2018, David Kay and Robin Blakely-Armitage presented on this project at the *National Association of Community Development Extension Professionals* in Cleveland, Ohio. The presentation was entitled *The Uneven Social Landscape of Flood Risk: Implications for Outreach & Decision-Making*.

Additional final reports related to water resource research are available at http://wri.cals.cornell.edu/news/research-reports

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