"A Win-Lose Situation for Floodplain Buyouts": Exploring the Impacts of Floodplain Buyouts on Participants in Illinois

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Abstract

Flooding disasters can strike at any time. Between 2005-2017, the U.S. spent nearly 500 billion dollars on hurricane recovery (NOAA, 2017). Between 2007 and 2014, the top five damaging storm events totaled $1.6 billion in Illinois (Winters, B., et.al, 2015). One mitigation solution is to implement floodplain buyout programs, which is where the Federal Emergency Management Agency (FEMA) purchases an owners' property in order to demolishes it and return the area to a natural state, such as a park or a wetland. While many communities have successfully completed floodplain property buyouts, there are several factors that complicate this widely used hazard mitigation strategy that have yet to be explored. First, the floodplain buyout process is long, and it can take years before property is acquired and demolished, leaving property owners in limbo in the meantime (Patterson, 2017; Moore, 2018). Secondly, there is little to no follow up with participants after the property has been purchased (Center for Oceans Solutions, 2018). Because of this, it is difficult to know the impact floodplain buyouts have on participants. Exploring both qualitative and quantitative methods, this paper analyzed data from the Illinois State Water Survey Floodplain Buyout Database for the state of Illinois and interviews with floodplain buyout participants in Illinois. The expected findings are that participants do not have the resources to relocate on their own, participants have moved back into high flood risk areas, and participants feel disconnected in their new community. This research utilizes geospatial data analysis, the ArcGIS software suite, and interviews to provide insight on the effects of floodplain buyouts on participants and to suggest policy changes to improve the floodplain buyout program.

Keywords: Floodplain buyouts, acquisition programs, flooding, Illinois, FEMA, Illinois State Water Survey, hazard mitigation

1. Introduction

Disasters can strike at any time. With the intensity and frequency of hurricanes increasing, planners and emergency management officials are still learning how to manage flooding disasters. Although Illinois does not face hurricanes, communities in Illinois still deal with reoccurring flood loses because of fluvial or riverine flooding. Fluvial or riverine flooding occurs when there is an excessive amount of rainfall for a long period of time and exceeding the river's capacity to discharge (Maddox, 2014). Each of these rivers and streams has the potential to cause major flood damage. Illinois's terrain is also very flat, causing water to sit in one area for a long period of time. Flooding damage costs taxpayer money for rebuilding. People's lives are also in danger because of flooding. These consequences of flooding will increase because of climate change (United Nations, 2019). Building codes and regulations have been implemented to raise structures on stilts to prevent water from entering. Land use planning and regulations have also been in effect to prevent development in restricted areas. There is no easy or right way in solve flooding issues, as they are something planners and respective stakeholders must keep doing for a long time. One favorable solution is floodplain buyouts from the Federal Emergency Management Agency (FEMA). The FEMA acquisition program is retroactive and tries to undo the mistake of developing the floodplain in the first place. The goal of FEMA's acquisition is to prevent repeated flood damage to properties by permanently removing properties in the floodplain. FEMA buys out properties in the floodplain, demolishes them and turns the area into green space, which cannot be developed later. Before discussing the background and purpose of this thesis, I will define terms in order to better understand the concept of floodplain buyouts. The terms "buyout" and "acquisition" will be used interchangeably throughout the paper.

- Acquisition- any program in which the government purchases private land for public use (Center for Oceans Solutions, 2018).

- Buyout program- a specific type of acquisition program in which the government purchases private land, demolishes property and maintains the land as open space for public use (Center for Oceans Solutions, 2018).
- Community- any area that has the authority to adopt and enforce floodplain management regulations for the areas within its jurisdiction (FEMA, 2018).
- Floodplain- a flat of low-lying area next to a river or stream. It stretches from the banks of the river to the outer edge of the valley (National Geographic Society, 2018).

2. Research Objective and Purpose

At first glance, the floodplain buyout process seems like a logical response to the problem of floodplain development and repetitive flood losses that would be attractive to homeowners in flood-prone area. The program prevents flood damage from reoccurring in that location, which are considers as the benefit or the "wins" in this paper. However, there are some major flaws and drawbacks that limit the appeal and effectiveness of the program, which are considered as "losses". First, each buyout is a slow process from start to finish. It can take years from the time that the floodplain buyout application is approved to the time when the property being acquired is demolished. This leaves many families at a cross roads wondering about if and when they will be able to move. In many instances, families end up paying for the place they are temporarily staying during the application process *and* their current residence that is the subject of the buyout process (Floodplain Manager French Wetmore, personal communication, Dec 2018). This can place a heavy burden on low income families because they don't have the resources to fall back on to cover these and other expenses during the long buyout process. Second, properties in the floodplain are prioritized over properties that are not in the floodplain. FEMA relies on flood maps to determine which property is in the floodplain, which is constantly updated because floodplains change. Although property in the floodplain has a higher chance of getting flooded, properties just outside of the floodplain can also face major flooding damages. And third, there is little to no follow up process after the property

has been bought out. Once the government buys out the property and completes the transaction between the property owner, they are no process to follow up with them afterwards. Because of this, it is difficult to know if families are better off participating in the buyout program or just restricting their property to code. The central research question is *How are communities affected by the floodplain buyout programs?* A series of related research questions must be investigated in order to address that central question: *(a) Did participants have the resources to relocate on their own during the buyout process? (b) Did participants move outside of high flood-risk areas after the buyout? (c) Did participants feel a sense of displacement after the buyout?* The purpose of this thesis is to answer these important questions and to challenge the thinking that floodplain buyout programs are an easy and adequate solution to repetitive loss flooding. Another purpose will be to change policy that will help improve the program.

3. Methodology

The methodology for this study is broken into three major steps: Mapping, Spatial Statistics and Key Informants Interview via Telephone

3.1 Mapping

The Illinois State Water Survey (ISWS) compiled the geodatabase of the statewide floodplain buyouts from structure buyout data provided by the Illinois Emergency Management Agency (IEMA), Illinois Department of Natural Resources (IDNR)/Office of Water Resources (OWR), Illinois department of Commerce and Economic Opportunity (DCEO), and the Metropolitan Water Reclamation District of Greater Chicago (MWRDGC). The data came to ISWS as paper documents which were scanned and reviewed to extract data for entry into the Statewide Buyout Spreadsheet. This was used to geocode the addresses using the Google Geocoding method to populate the points into a geodatabase. In order to analyze the location of the floodplain buyout properties, the geocoded floodplain buyout locations were overlaid it with a world street map derived from ArcGIS online. After mapping all the buyout locations, the buyout points were separated into roughly three decades, 1989-1999, 2000-2009, and 2010-2018 as

shown in figure 2. This shows that FEMA's floodplain buyout program has increased over the three decades, brining prevalence to the flooding issue.

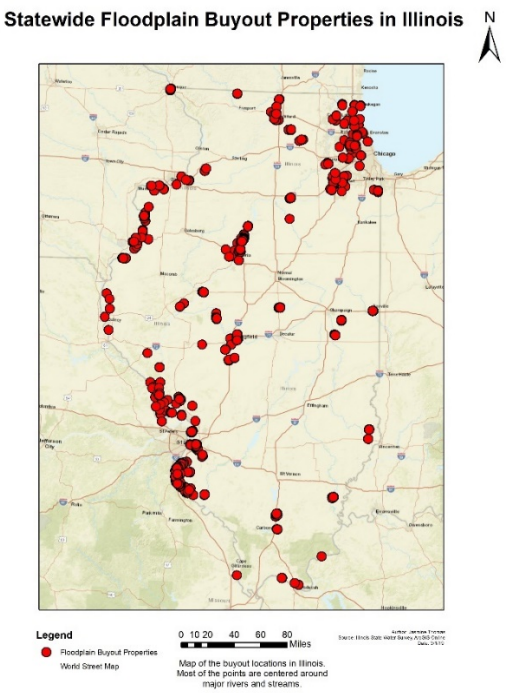

Figure 1 Statewide Floodplain Buyout Properties

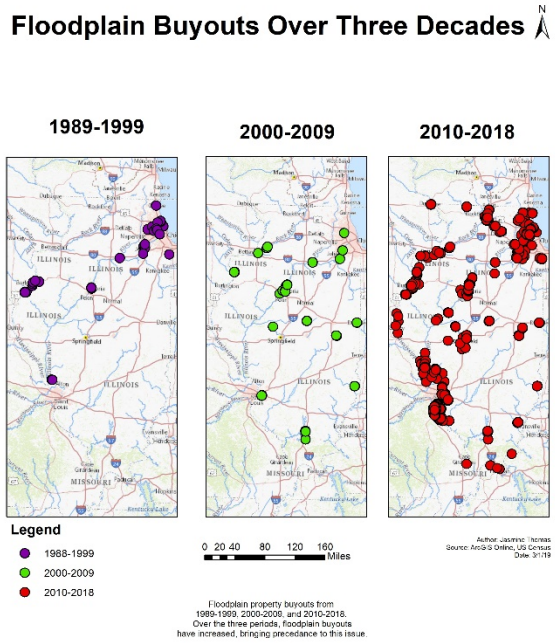

Figure 2 Floodplain Buyouts over three decades

3.2 Spatial Statistics

In order to determine spatial statistics of the buyout locations, a Spatial Autocorrelation (Moran's I) was conducted. Moran's I measures the autocorrelation based on feature locations and attitude values using the Global Moran's I statistic (ESRI, 2017). Figure 3 shows the results of spatial autocorrelation ran for the acquisition costs of the buyout properties, which is the cost given to participants after their property has been bought. Once the data showed that the locations are clustered, meaning that there is a relationship between the buyout locations and the acquisition costs. A Cluster and Outlier Analysis (Anselin Local Moran's I) was conducted to map out the hot and cold spots of the buyout locations. This was done by using Core Based Statistical Areas (CBSA) as the boundary. CBSA consists of a U.S. county or counties or equivalent entities associated with at least one core (urbanized area or urban cluster). Population of at

least 10,000 along with any adjacent counties having a high degree of social and economic integration. These geographic boundaries are used by federal agencies for policy purposes. The analysis was done by selecting the major statistical areas in Illinois, as shown in figure 4.

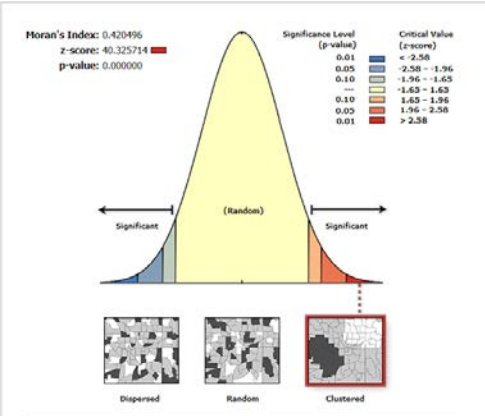

Figure 3: Spatial Autocorrelation

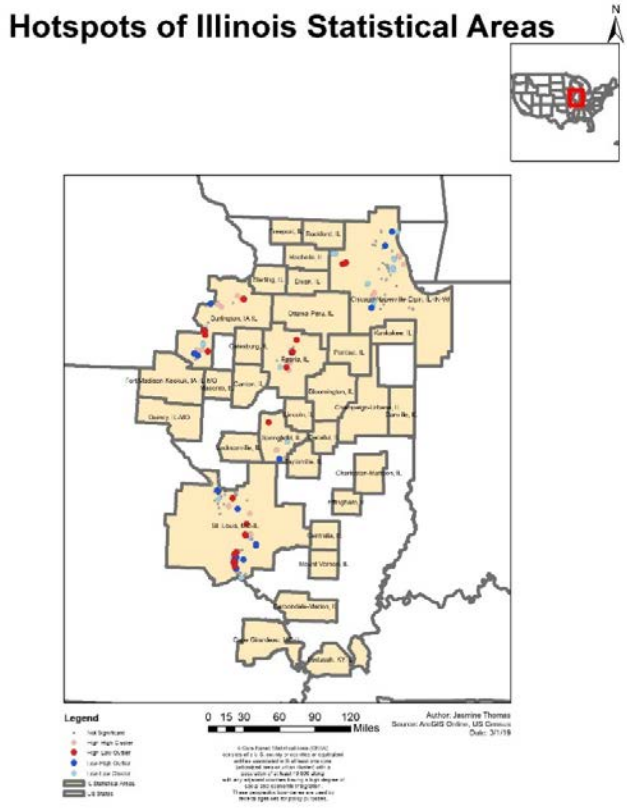

Figure 4: Hotspots Illinois Statistical Areas

3.3 Key Informant Interviews via Telephone

Since FEMA's acquisition program does not keep track of participants location after the buyout, it is difficult to interview the buyout participants directly. In the attempt to answer the question of how participants are impacted by the buyout program, key informants of the buyout program will be interviewed for the study. Key informants include floodplain managers, planners, local government officials, such as mayors, and participating agencies, such as IDNR and IEMA. Institutional Review Board (IRB) approval was granted for this study to conduct the necessary interviews. Based on performing a simple count of each of the buyout locations in ArcGIS, the top three communities with the most buyouts

were East St. Louis, Valmeyer, and Peoria. Through connections from interning with the Illinois State Water Survey, floodplain conferences, and professors, key informants were reached out to in each of the following communities via email and phone to participant in a phone interview of no longer than 60 minutes. A list of questions and a consent form, which is signed and returned before the interview can be conducted, is sent out to participants who agree to participate. Thus far, only a few key informants from Peoria County have positively responded to do an interview.

4. Results and Discussion

The results of the spatial autocorrelation were a p-value of zero and a z-score of over 40. This means that the acquisitions costs and location of the buyouts are statistically significant. The locations are "clustered" rather than "dispersed" to show that there is a relationship between the two. The Cluster and Outlier Analysis, also known as the hotspot analysis, shows that are buyout locations with low acquisition costs next to high acquisition costs. This data shows that there is inequality with how much participants are receiving for their bought-out property within communities. This result makes sense for areas with high property values such as Chicago, but it would be interesting to see what is causing these patterns in areas like Peoria County and East St. Louis. The results of this data have been expressed in the interviews conducted thus far, however, the sample is too small to make a full analysis.

5. Conclusion and Next Steps

The key takeaways from the preliminary results are that one, floodplain buyouts are becoming more frequent in Illinois, two, there are clusters of high-low acquisition costs in the same communities. The next step of this study is to continue to conduct telephone interviews with key informants from the selected study sites. I am also looking into expanding the study sites to Chicago, Des Plaines, Grafton, and Machesney Park. There is a limited number of available key informants to interview at the current designated study areas. Expanding the study area will increase the opportunity to interview key informants who can speak about the floodplain buyouts in their related community. Another next step is

to rerun the spatial statistics using watershed boundaries. This will hopefully give me a better insight on where the buyouts are occurring and influence ecology decisions and policy. As flood disaster become more prevalent, there will be an increased need for more floodplain buyouts a strong need to improve the effectiveness of this crucial program.

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