

Dynamics of Urban Utility and Urban Change: a Case of New Orleans

Munsung Koh (Republic of Korea)

Key words: Geoinformation/GI; Risk management; Spatial planning; Urban renewal

SUMMARY

Abstract: This study introduced an innovative concept to appreciate urban changes in case of a flood disaster and its subsequent recovery. Floods bring mostly negative impacts to any group of residents. The group under the poverty line is more susceptible to the floods than any others primarily due to their vulnerable housing types and mobility constraints. This study is not explaining preemptive actions required for those under the poverty line. The goal of this study is to examine the dynamics of urban utility, which changes urban growth affected by flood disaster and recovery activities. Through regression models and simulations, this study not only identifies the relationship between urban utility and a flood disaster, but also provides policy issues related with urban area and human.

Disasters occurring in an urban area affect urban growth. New Orleans suffered one of the most damaging flood events in terms of social, economic perspectives in U.S. history. It was estimated by the impact of 90,000 square miles along the Gulf Coast and displacement of 400,000 individuals which include 200,000 from New Orleans (FEMA, 2005). Flooding is one of the most damaging and frequent disasters, generating more than 30 percent of all disasters between 1945 and 1986 (Glickman et al., 1992). While the death rate from flooding is relatively low, economic losses per capita appear high (Richardson et al., 2014). In particular, the total economic loss in New Orleans is estimated as \$62.1 billion, according to a recent study on the Hurricane Katrina damage (Park et al., 2008). In July 2005, 9,592 people applied for unemployment services and the payroll of metropolitan firms declined by 13.6% between July 2005 and July 2007, indicating an estimated loss of 70,000 jobs (Vigdor, 2008). These impacts are the immediate economic loss after the hurricane. To repair such damages, the Federal Government enacted funds of \$114.6 billion, but the actual amount spent was estimated \$69.4 billion until August 2007 (Fessler, 2007).

Urban utility is one of the main factors that determines the city size. The utility concept has been

used for a long time by urban economists to explain the dynamic change of urban size. In this study, the utility is defined as a net benefit of a resident living in an area is measured with earnings subtracting housing and commuting costs. These variables are essential living components for any workers. On the individual level, the utility affects the individual's location decision. On a regional level, utility is one of the most important components determining urban growth, because individuals are likely to be located in the area where their utility can be maximized. While New Orleans had lost population after the Katrina, the population of the city increased steadily since 2007 mainly due to utility increase, but the population has not yet fully recovered to the economic status of pre-Katrina equilibrium; it seems to reach about 90 percent level of 2016 according to American Community Surveys (ACS, 2018). It is not surprising that studies dealt with floods' impacts on urban destruction are numerous. However, most of the studies did not investigate urban utility change. Further, it has not been investigated how government support could contribute to the recovery of an urban area as time goes on.

Based on the individual data, this study applied regression models to test the relationship between urban flooding and urban utility. Using American Community Surveys' microdata between 2001 and 2016 collected from IPUMS USA, the study collected 16 time samples (2001-2016) and 12 variables of two regions: the City of New Orleans and Louisiana State. As microdata, each annual sample represents data density approximately 1% (2005 – 2016), 0.43% (2001), 0.38% (2002), 0.42% (2003) and 0.42% (2004). In the regression models, two hypotheses could be tested: urban utility decreased by urban flooding while increased by recovery activities. Katrina and the subsequent flooding immediately declined individual utility of the state in the following year as expected. However, the flood positively affected individual utility of the city until negative impacts were shown in 2007. This positive impact is because of the increased average income driven by government funds directed to recovery activities. Responding to surging housing costs in New Orleans, the government executed housing policies, which positively affected utility in 2006.

The study also simulated multiple scenarios to split the total effect into flood effect and recovery effect. With additional in-depth analyses, various policy implications useful for planning are suggested. Firstly, New Orleans becomes a less livable city from utility perspectives. The utility increase is significantly smaller in New Orleans (5.6%) than the rest of Louisiana (10.3%) between 2005 and 2016 mainly because rent price increased relatively high in the city. Secondly, a disaster prevention policy could have not only been cost-effective but also led New Orleans to be a more livable place. Lastly, government support positively affected urban utility. For example, the Katrina Emergency Tax Relief Act of 2005 could contribute to one percent increase in urban utility of New Orleans.

Therefore, policy makers and stakeholders will be informed of the change in urban utility associated with disasters by adopting various quantitative approaches provided from this study, which is especially important in the era that global climate change increases disaster risk and vulnerability.

The probability of floods is expected to increase due to global warming, which increases the days of heavy rain and the amount of rain. Floods clearly affect individuals in urban areas by declining urban utility, which in turn, fosters population migration. Therefore, this study can generate a useful conversation as planners and policy makers develop plans for urban growth issues associated with urban flooding.

Dynamics of Urban Utility and Urban Change: a Case of New Orleans (9898)
Munsung Koh (Republic of Korea)

FIG Working Week 2019
Geospatial information for a smarter life and environmental resilience
Hanoi, Vietnam, April 22–26, 2019