FLOOD MONITORING AND MITIGATION STRATEGIES FOR FLOOD-PRONE URBAN AREAS

WHAT IS GREEN GENTRIFICATION AND HOW TO PREVENT IT

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A SOCIOTECHNICAL SYNTHESIS

Urbanization and climate change are causing traditional “grey” infrastructure to become unattractive and to be replaced by more favorable sustainable infrastructure that creates economic, social, and environment sustainability. As more land becomes developed and climate change triggers more flooding, stormwater infrastructure systems in cities will need to adapt to prevent the destruction of their neighborhoods. The technical project consisted of developing a city-wide stormwater infrastructure assessment system and a portable flood monitoring sensor for cities to utilize and quickly identify flood-prone areas. The STS portion of the project is a research paper that examines the effects of sustainable infrastructure, in particular the social effects, and how green infrastructure often causes the most vulnerable of residents to be displaced from neighborhoods in a process termed green gentrification. The main research revolves around understanding the complexities of green gentrification and compiling a solution to combat the displacement of low-income and minority residents. While the technical report focuses on developing smart and sustainable technologies for cities to adapt to the effects of climate change, the STS paper investigates the consequences of using such technologies and how to provide more social, economic, and environmental beneficial outcomes.

As flooding events are expected to increase due to climate change, cities need to implement flood modeling and mitigation strategies to preserve their neighborhoods. Having the capability to determine which areas of the city are vulnerable to flooding from extreme weather events would be extremely valuable to cities who would be able to efficiently deploy resources where needed. The technical research report details the development of two technologies that will allow cities to understand their vulnerability to flooding on a city-wide scale. For the first portion of the project, the team made a flood monitoring, optical sensor that multiple of which can be easily deployed throughout the city to create a network that will allow decision-makers to visualize flooding in real time. For the second portion, the team created a stormwater infrastructure system that uses geographic data to determine which stormwater inlets across the entire city are at risk of overflowing during storm events by identifying inlets that have significantly high peak water flows during storm events.

The optical sensor was successfully built and deployed on a local street in Charlottesville that allows the City of Charlottesville to determine the water level of several types of pipes without drilling into the pipe's structure. The portability, adaptability, and battery life of the sensor will allow any city to quickly install the sensor in a variety of scenarios to understand how a specific area is flooding in real-time. The stormwater infrastructure assessment consisted of two parts. The first part was to develop and revise a methodology that allowed cities to assess which stormwater inlets were most likely to flood, and the second part was to use the methodology on two neighborhoods in Charlottesville to successfully identify flood-prone inlets. The technical project resulted in a sensor system and a stormwater assessment tool that can be utilized by any city to improve their flood resilience.

The goal of the research project was to understand how to prevent the displacement of low-income residents in neighborhoods planning on developing sustainable infrastructure. To combat gentrification, cities should look to implement a multi-faceted approach around new green infrastructure projects that includes affordable housing and workspaces, resident job training, and more stakeholder inclusion in the planning process. To synthesize the solution, many case studies and journals were examined that detailed situations where green gentrification took place and other situations where the displacement of residents was mitigated.

Currently, many residents are left out of the planning for sustainability projects. To make sure sustainability projects also promote social benefits, residents must be involved in the planning process and have widespread knowledge of the benefits and consequences of green infrastructure. Community-wide planning will allow new plans to incorporate affordable housing to offset rising rent prices like the neighborhood Oak Park in Sacramento, job training programs such as the Lideres Verdes Leadership program in Cully, Oregon, and affordable workspaces to counteract increasing office space rents. This solution should be used as a framework to ensure that the added value from new green infrastructure projects are equally distributed throughout the neighborhood.

While sustainable infrastructure technologies such as flood monitoring systems are becoming necessary to combat the effects of climate change and urbanization, it is imperative to understand the effects using such technologies on the local society, economy, and environment. The STS paper presents a framework to allow sustainable technologies such as those developed in the technical project to achieve the three goals of increasing environmental quality, creating economic growth, and improving social equality without jeopardizing any one of the goals.

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