

SUSTAINABLE REDEVELOPMENT OF FASHION SQUARE MALL

**THE EFFECT OF GREEN INFRASTRUCTURE ON EQUITABLE ACCESS TO
ECOSYSTEM SERVICES**

An Undergraduate Thesis Portfolio
Presented to the Faculty of the
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By

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SOCIOTECHNICAL SYNTHESIS

With the effects of climate change disrupting increased amounts of society, it is imperative that communities invest in infrastructure that responds to future climate. As such, the technical research report proposes a redevelopment plan that transforms an underutilized commercial mall into a resilient multi-use space. This proposal is centered around improving the site's stormwater management to prepare for the increased frequency and intensity of rainfall that is associated with climate change. The science, technology, and society (STS) research paper examines why the supply of ecosystem services is unequally distributed across urban communities. This research explores the effects of past development practices on community's ability to access the essential services provided by the environment. These tightly coupled topics seek to understand what disrupts access to ecosystem services, while providing a model for how they can be incorporated through the development of green infrastructure.

The technical report's proposed redevelopment of Fashion Square Mall improves the site's outgoing stormwater volume and quality through a multi-faceted solution. Moreover, the site is located within the Meadow Creek watershed and its significant percentage of impervious surfaces contributes to the waterbody's impairment and overall decline in ecosystem stability. As such, the site's impact on downstream health and commercial decline made it an appealing site to adapt for current and future needs of the surrounding community. The overall changes and their impact on stormwater management were assessed using hydrologic modeling software that included i-Tree and the Environmental Protection Agency's Storm Water Management Model.

As a result of the proposal's land use changes and best management practices, the site's outgoing volume and quality of stormwater was significantly improved with respect to current and future climate models. While these improvements exceed minimum stormwater

redevelopment requirements, the mall's increased capacity to withstand the effects of climate change gives the site a high level of resiliency. In addition, the transition towards "highest and best use" creates the opportunity to provide recreation space, economic opportunity, housing, and solar production within a space that was previously underutilized parking lots. The conclusions of this technical work show that considerable progress on stormwater management can be achieved solely through the restoration of pervious and vegetated landscapes.

The STS research is oriented around understanding how ecosystem services are supplied to urban residents and what influences residents accessing the benefits of these services. The different stakeholders involved with these questions were outlined using Callon, Latour, and Law's framework of Actor Network Theory. This analysis was guided through the examination of scholarly articles related to green infrastructure, land use planning, climate change, and environmental justice.

This research revealed that past and continuing practices, such as redlining and community disinvestment, are barriers that prevent ecosystem service access by marginalized groups of society. Low-income and minority communities are particularly susceptible to these practices and larger trends of environmental injustice. However, there is tremendous opportunity to reverse these effects while adapting to climate change through investment in green infrastructure in society's most climate vulnerable communities.

Together, the technical and STS research demonstrate how society can provide ecosystem services to right past exclusions, while protecting from future climate effects. This work concludes that considerable stewardship is needed to execute equitable ecosystem service supply. Governments, citizens, and designers all hold key roles in ensuring that the interrelated and essential services of the environment are preserved and provided for within urban communities.

TABLE OF CONTENTS

SOCIOTECHNICAL SYNTHESIS

SUSTAINABLE REDEVELOPMENT OF FASHION SQUARE MALL

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THE EFFECT OF GREEN INFRASTRUCTURE ON EQUITABLE ACCESS TO ECOSYSTEM SERVICES

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