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CALUMPANG (Comprehensive Adaptive Land Use Management and Urban Planning for Nature-Based Growth): A Blue-Green Infrastructure Framework for Flood-Resilient Urban Development Along the Calumpang River Corridor in Batangas City

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Abstract

CALUMPANG (Comprehensive Adaptive Land Use Management and Urban Planning for Nature-based Growth) is a spatial planning framework intended to steer development in the Calumpang River Corridor towards flood-resilience. Escalating flood risk due to rampant development and climate change-exacerbated extreme precipitation events have affected the Calumpang River Basin and disrupted traditional planning approaches. CALUMPANG lays out a framework for blue-green infrastructure, adaptive land use planning, and sustainable urban design principles to address flood risk while optimizing socio-environmental gains. An analysis of key opportunities for interventions informed by spatial mapping and stakeholder interviews was conducted. Recommendations include important areas for expanded or preserved greenspaces such as retention ponds, pervious surfaces, and restored riparian buffers that could significantly increase water retention capacity and prevent flooding. The framework outlines nature-based solutions to work with gray infrastructure to increase resilience, protect biodiversity, and cultivate liveable communities. CALUMPANG supports climate-resilient urban planning and hopes to provide solutions to other Philippine River cities undergoing development.

Keywords: Blue-Green Infrastructure, Flood Resilience, Urban Planning, River Corridor Development, Batangas City

Introduction

River basins have long been human settlements, typically surrounded by a life source, fertile areas for agriculture, and transportation routes. As urbanization occurred at a rapid rate in many cities worldwide, urban river systems have become threatened due to environmental deterioration. Urban river systems in Batangas City, such as Calumpang River have become more prone to flooding with poor water quality and encroachment along river easements because of unplanned growth and hazards related to climate change. Current measures applied in flood management utilize gray infrastructure which most times

disregards the ecological and spatial contributors of flooding. This study aims to identify possible implementation of Blue- Green Infrastructure (BGI) as alternative planning methodologies that marry ecological restoration and flood management while addressing urban development.

Research Methodology

In addressing the issues of flooding and environmental problems around the Calumpang River Corridor of Batangas City, a mixed-method research methodology was employed. This involved the use of both qualitative and quantitative approaches to explore the situation on site through observations, interviewing relevant stakeholders, and reviewing relevant documentation. In addition, surveys and questionnaires were also employed among the targeted respondents to know their level of understanding regarding the use of blue-green infrastructure in solving these flooding problems.

Results and Discussion

Findings indicated that the flooding problem in this area was not just related to the heavy rains but rather it is due to urbanization processes, improper land utilization, waste management, and degradation of the natural drainage system. Most areas near the Calumpang River were experiencing encroachment and reduced vegetation cover, thus contributing to surface runoff resulting in flooding. From the survey results, it appeared that most people agreed on the implementation of environmentally-friendly approaches such as river rehabilitation, green open spaces, efficient drainage system, and reforestation.

Conclusion

The findings of this research show that environmental deterioration, urban sprawl, and poor land use have an impact on the occurrence of floods in the Calumpang River Corridor. The current flood control mechanisms are not enough to solve the problem. The CALUMPANG model is a better solution since it uses Blue-Green Infrastructure for flood prevention and development within cities.

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