

Changing Cities for a Changing Climate: Mitigating Localized Flood Risk through Small-Scale Green Infrastructure in Wooster, Ohio

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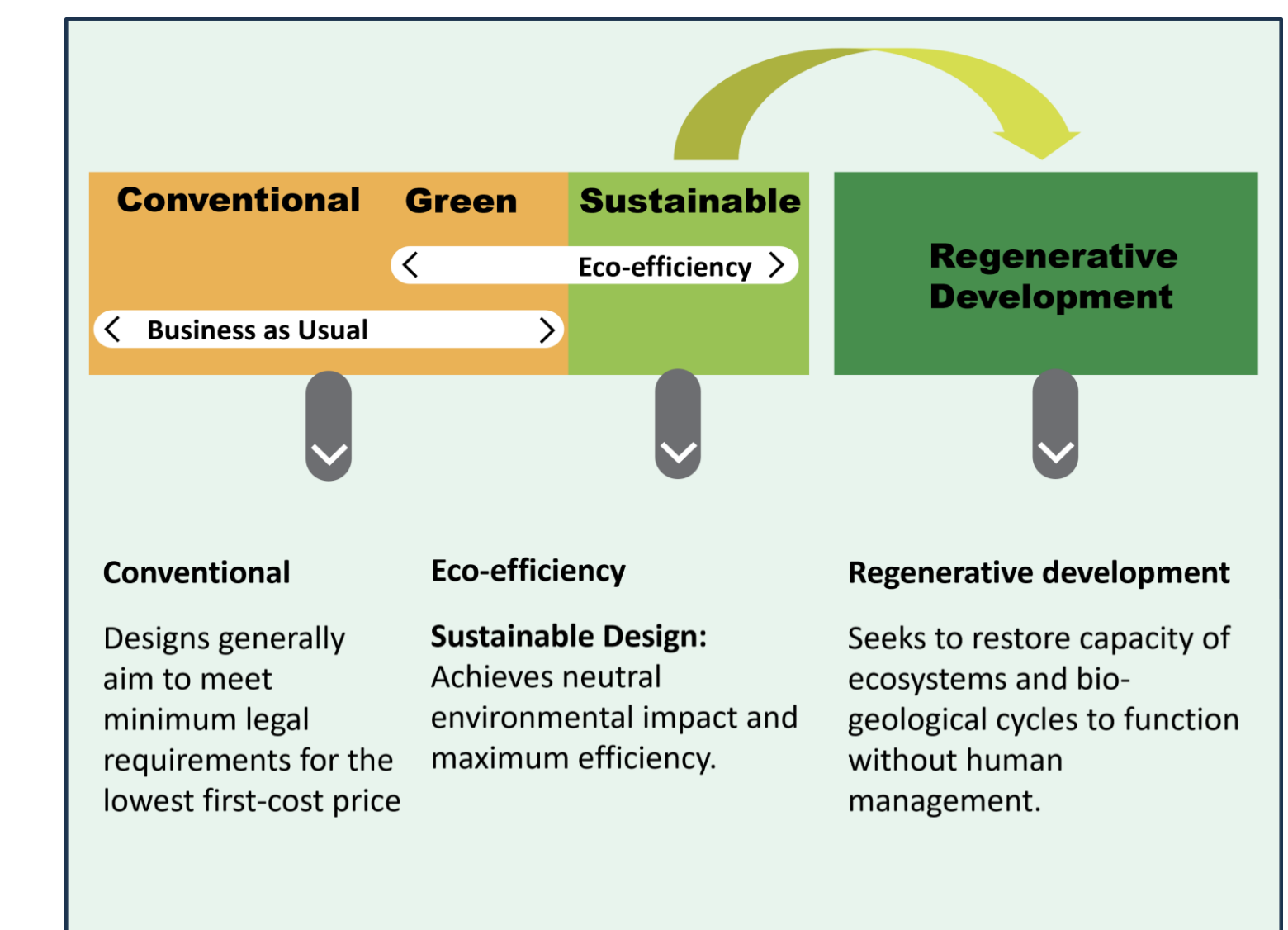


Urban Responses to Changing Climate

As climate change intensifies, cities are becoming increasingly vulnerable to frequent flooding events. This study examines the role of small-scale green infrastructure (GI) in mitigating urban flood risk. It explores how small-scale GI can effectively manage stormwater and enhance urban resilience. This paper provides the foundation for a future project to evaluate the extent to which small-scale GI can mitigate urban flood risk. Using the Soil and Water Assessment Tool (SWAT) and Wooster, OH as an area of interest, this research combines modeling and theoretical frameworks to look at flood mitigation on a site scale.

Building a Prepared Wooster

Combining the Prepared Cities framework, composed of human-focused and environment-focused planning, and a hydrologic model for Wooster, specific GI can strategies can be assigned to a land use based on effectiveness



Adapted from Girardet (2016)

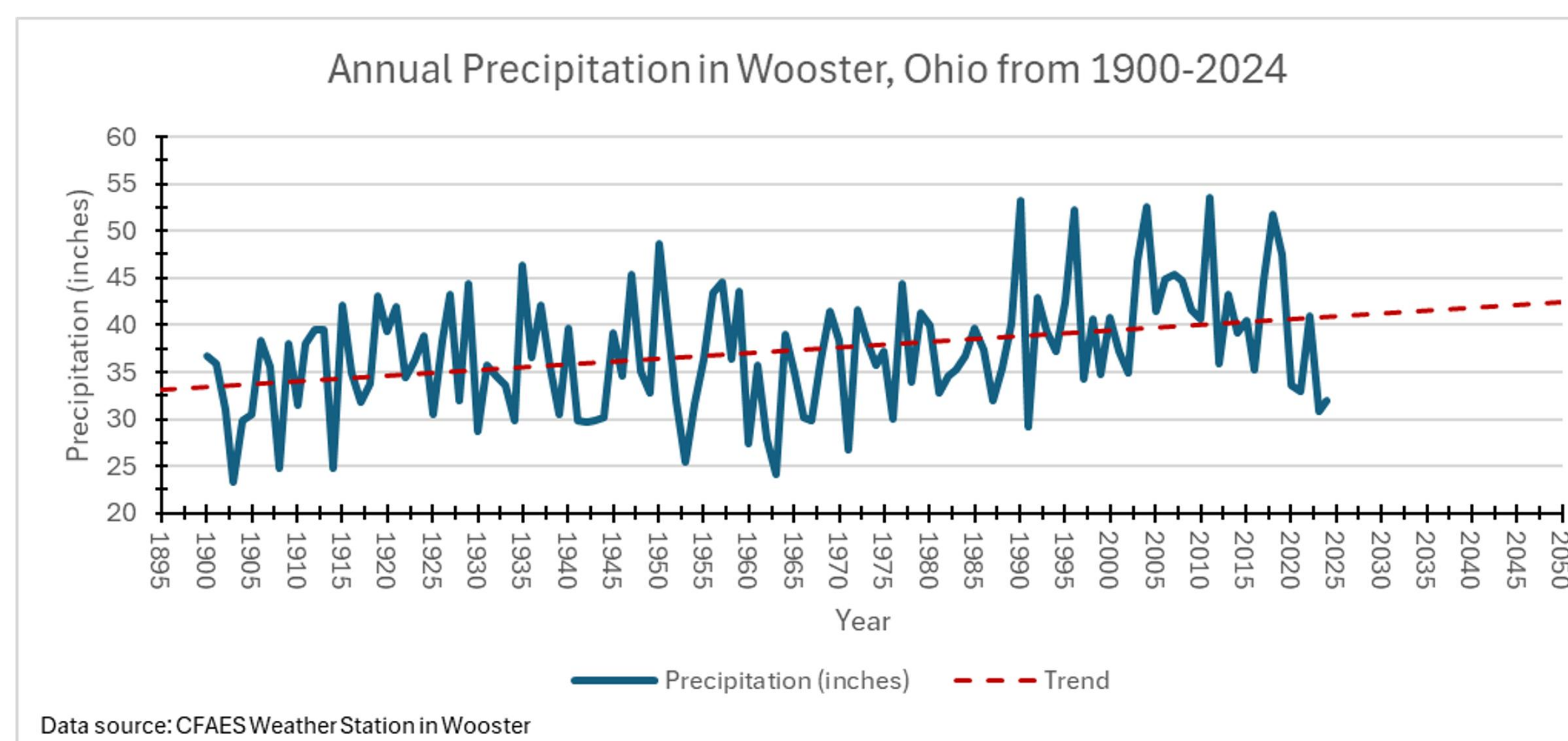
Research Questions

How can small-scale GI mitigate localized flood risk?

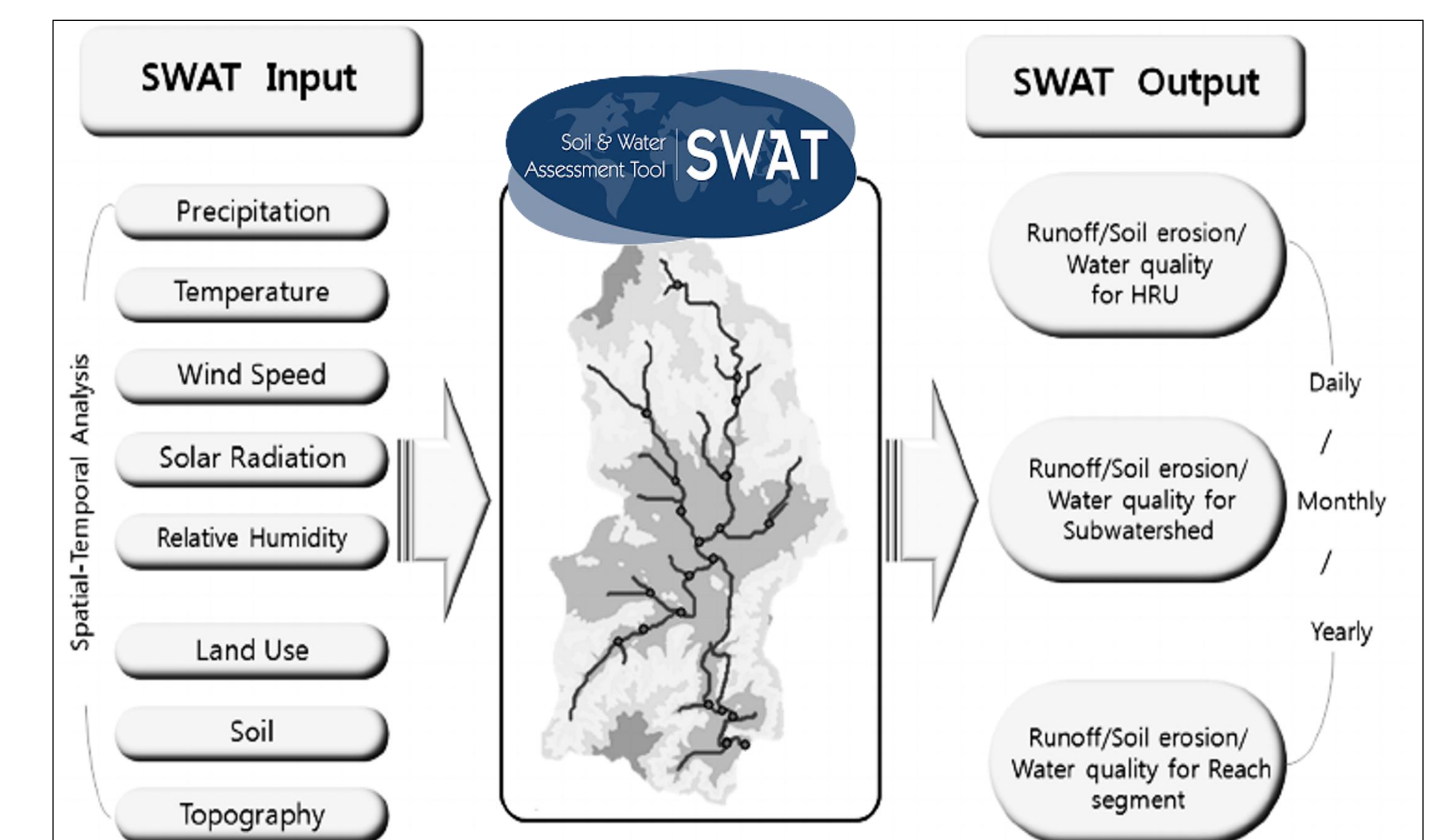
Supporting Research Questions:

- How do land use patterns impact localized flood risk?
- What types of GI are most effective at reducing runoff and peak flow in small basins like Wooster?
- To what extent can small-scale green infrastructure reduce localized flood risk in Wooster, Ohio?
- How can SWAT modeling inform the most effective implementation of small-scale GI to mitigate localized flood risk?

Wooster Site Selection



Data source: CFAES Weather Station in Wooster



Heo et al., 2008

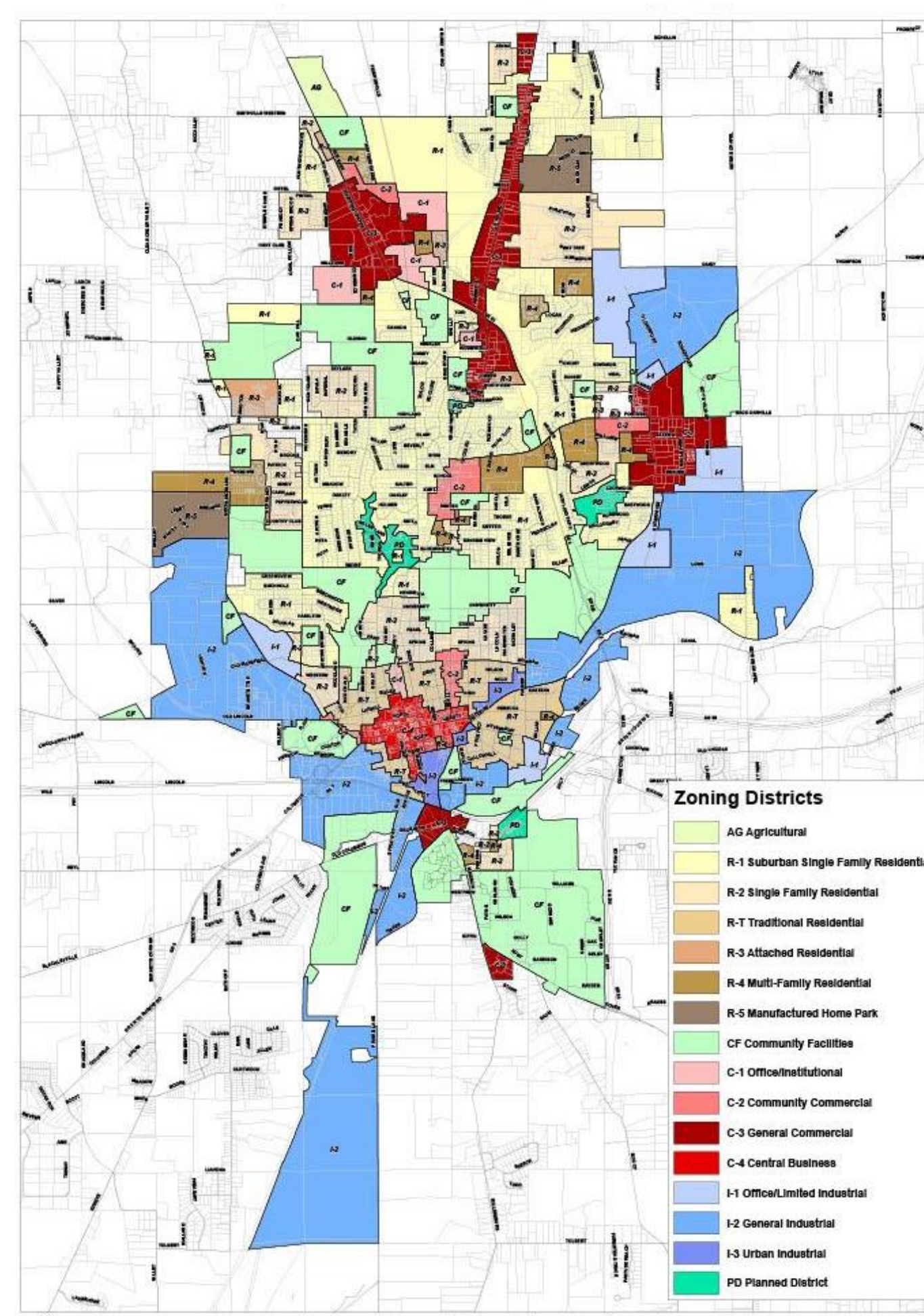
Evaluating Small-Scale GI

Significant research highlights the benefits of GI for flood mitigation, often relying on hydrological modeling. However, fewer studies explore real-world implementation of green infrastructure on a small scale. There is a gap in evaluating how small-scale green infrastructure mitigates flood risk in site-specific contexts.



Improve Infiltration	Temporarily Store Stormwater	Reduce TIA
Rain Gardens		
Bioswales		
	Green/Blue Roofs	
Permeable Pavement		Permeable Pavement

GRESB, 2023



City of Wooster Official Zoning Map, 2018

The City of Wooster, Ohio was selected as the area of interest due to increasing precipitation trends in the region as well as its varied land use.

Wooster's increasing precipitation rates make the area more susceptible to localized flooding, making it important to consider for future planning efforts.

Acknowledgements

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References

- City of Wooster Official Zoning Map, 2018, Wayne County, OH Planning Department, <https://www.wayneohio.org/wp-content/uploads/2023/10/Zoning-Map-10-1-18.pdf>.
- GRESB, 2023, *Green infrastructure: A strategic investment for climate resilience*: GRESB Insights, November 13, <https://www.gresb.com/nl-en/green-infrastructure-a-strategic-investment-for-climate-resilience/> (accessed April 17, 2025).
- Heo, S., Kim, N., Park, Y.S., Kim, J., Kim, S., Ahn, J., Kim, K., and Lim, K., 2008, Evaluation of effects on SWAT simulated hydrology and sediment behaviors of SWAT watershed delineation using SWAT ArcView GIS extension patch: *Journal of Korean Society on Water Quality*, v. 24, p. 147-155.