

2019 Sustainable Raritan River Conference Lightning Talk

Defining a Threshold for Delineating Hydrologically Sensitive Areas in a Landscape: A Regional Perspective

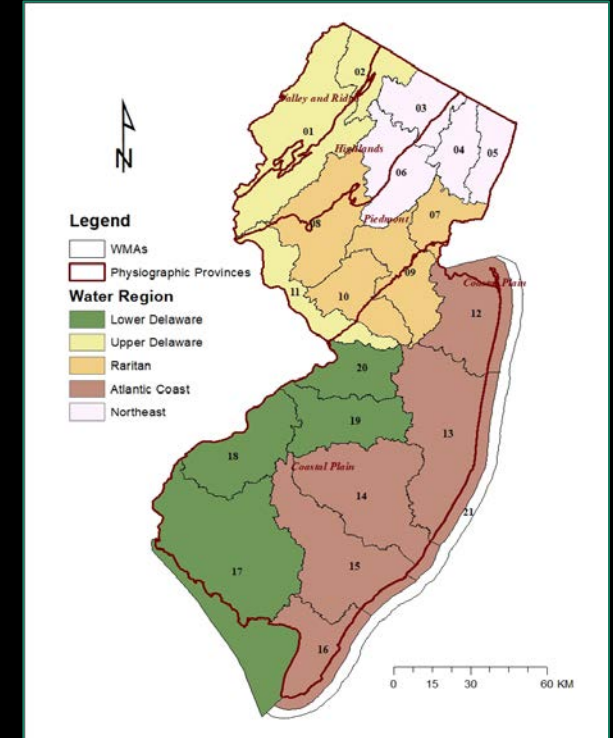
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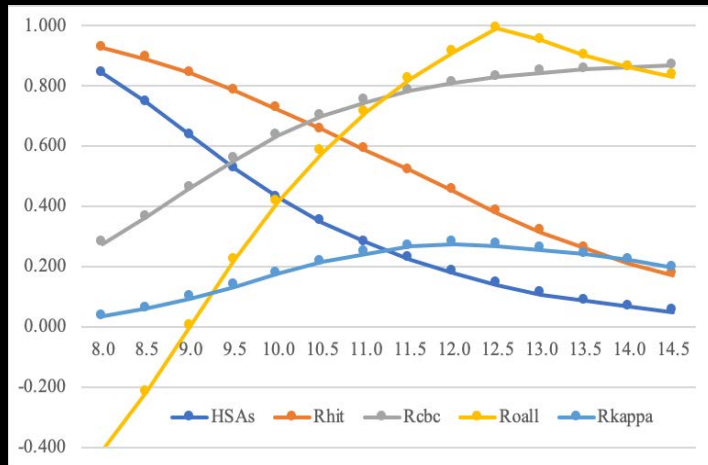
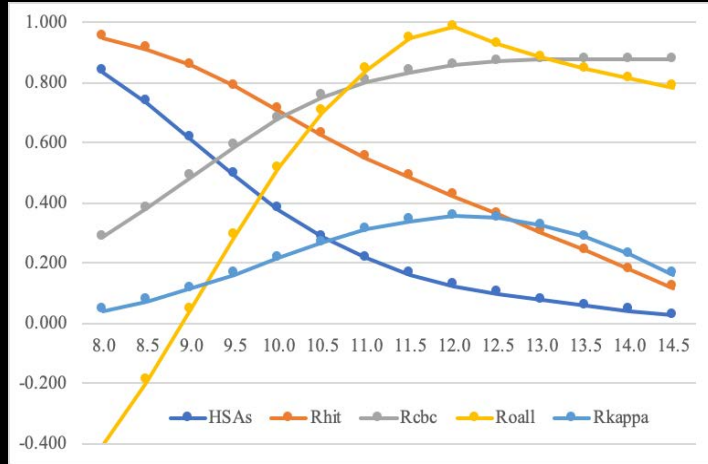
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Objective and Methods

- Hydrologically sensitive areas (HSAs) represent parts of the landscape that produce disproportionately high amounts of runoff and be mapped as areas in a landscape with topographic index (TI) greater than a certain threshold level; however, landscape managers are often frustrated with the seemingly arbitrary nature of selecting the threshold.
- The objective of this study to develop a method of defining the threshold by comparing the delineated HSAs using topographic wetness index (TWI) and soil topographic index (STI) to the Federal Emergency Management Agency (FEMA) 100-year floodplain map in New Jersey both at the scale of the entire state and regionally for five water regions (Atlantic Coast, Lower Delaware, Northeast, Raritan, and Upper Delaware).
- The HSAs and FEMA Floodplain are compared using four spatial comparison indicators: hit rate, agreement rate, overall comparison rate and kappa value.



Results

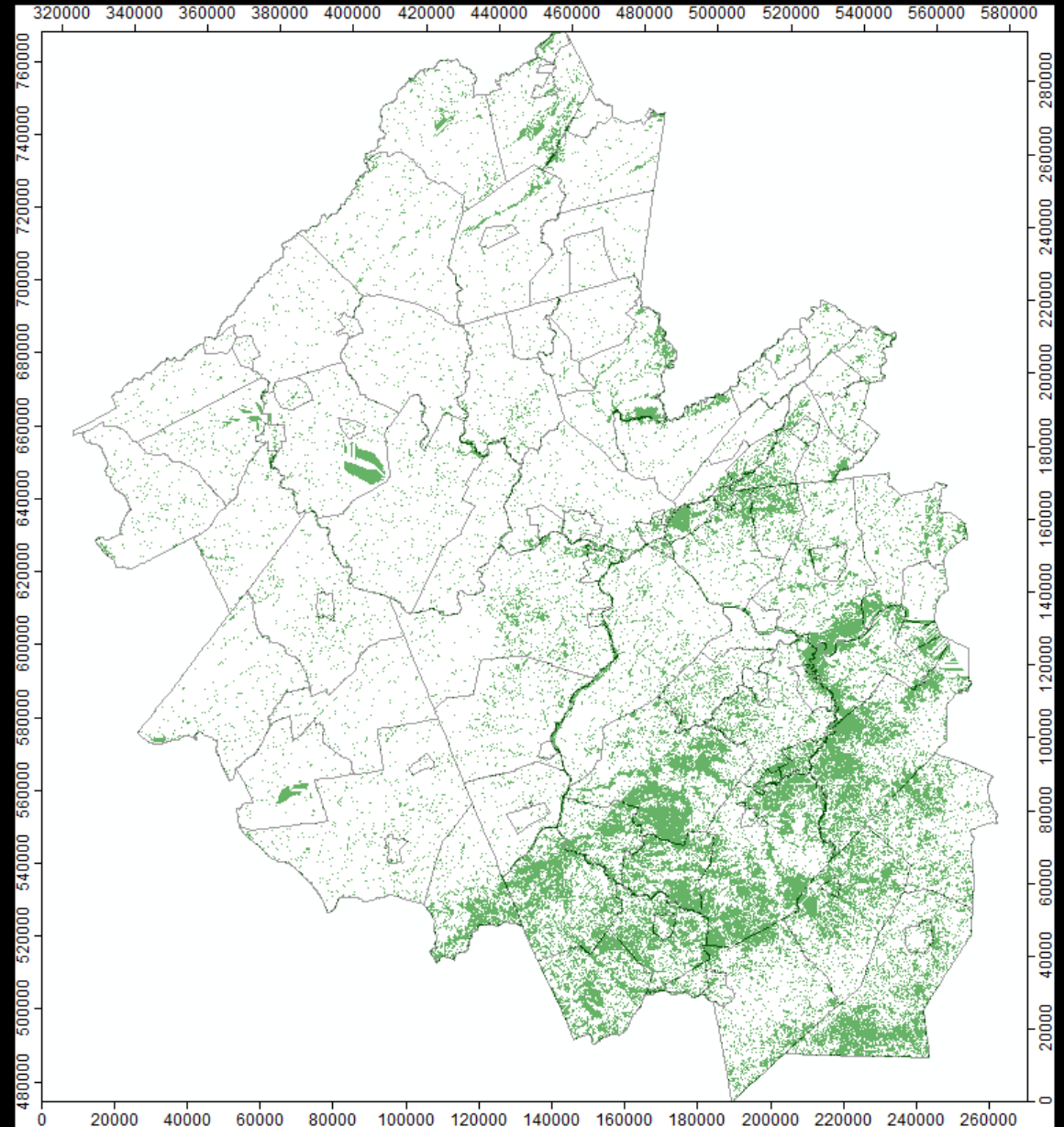


Raritan Water Region

		State of New Jersey	Water Regions				
			Atlantic Coast	L Delaware	Northeast	Raritan	U Delaware
By Agreement Rate	TWI	12.5	12.5	–	–	–	–
	STI	–	–	–	–	–	–
By Overall Comparison Rate	TWI	11.5	12	11.5	11.5	12	12
	STI	13.5	14	13.5	12	12.5	13
By Kappa Value	TWI	12	12	11.5	11.5	12	12
	STI	13.5	14.5	13.5	11.5	12	12
Floodplains in the Region (%)		23.0	34.5	25.6	20.5	13.3	8.4
Selected TI and its Threshold		TWI: 12	TWI: 12	TWI: 11.5	STI: 11.5	STI: 12	STI: 12
Resulting HSAs in the Region (%)		20.5	32.2	27.2	22.9	17.7	14.0
Resulting Hit Rate (%)		54.9	63.5	57.4	58.8	44.7	44.1
Major Physiographic Provinces		All four provinces	Coastal Plain	Coastal Plain	Highlands ; Piedmont	Highlands; Piedmont	Valley/Ridges; Highlands; Piedmont

Conclusions

- Certain comparison indicators were converged to their peak values around certain TI thresholds. Such convergence varied by water region in New Jersey.
- Such information can be combined with other local knowledge such as flood extent and local topographic and soil conditions to identify HSAs in a landscape that contributing to the 100-year flood.
- The kappa value is the best tool to be used for spatial comparison to identify TI and its threshold for HSA delineation.
- Such a tool helps reduce the ambiguity of selecting TI threshold for HSA delineation and improves the efficiency of managing landscapes for water improvements



Delineated HSAs in Raritan River Basin Townships