

How to Assess and Map Risks to Coral Reefs.

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Overview

- We propose to use natural and socioeconomic coastal variables specific to Puerto Rico to generate spatially explicit estimators of risk.
- Then combine this information within geographic information systems to produce an overall risk ratio scale.
- Using these data within GIS, we map the coastal areas for their cumulative risk, specifically related to the degradation of coral reef ecosystems.

Threats

Coastal Pressures

Effects



Turbidity

Pollution

Eutrophication

Fishing pressure

River Plume

Sewage

Land uses

Ports

Fish Landings

Development

Temperature

Algal blooms

Oxygen depletion

Stock (Yields)

Nursery areas

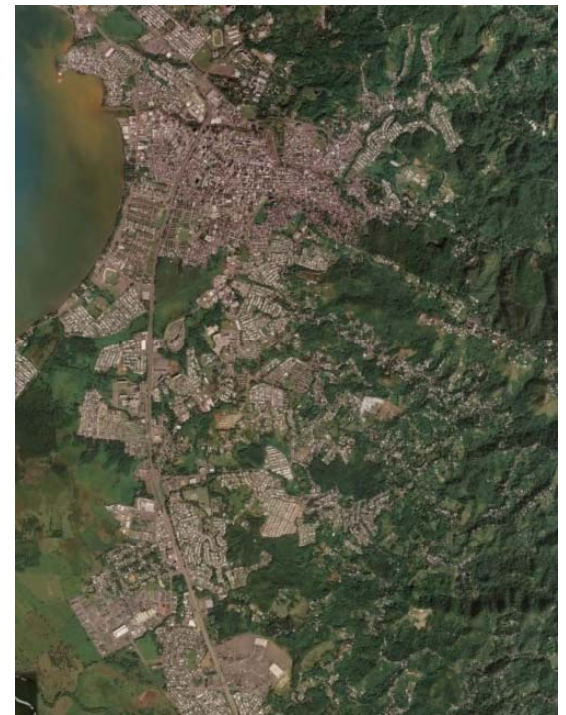
Social and Biophysical Stress



Plume
(sediment and pollution)

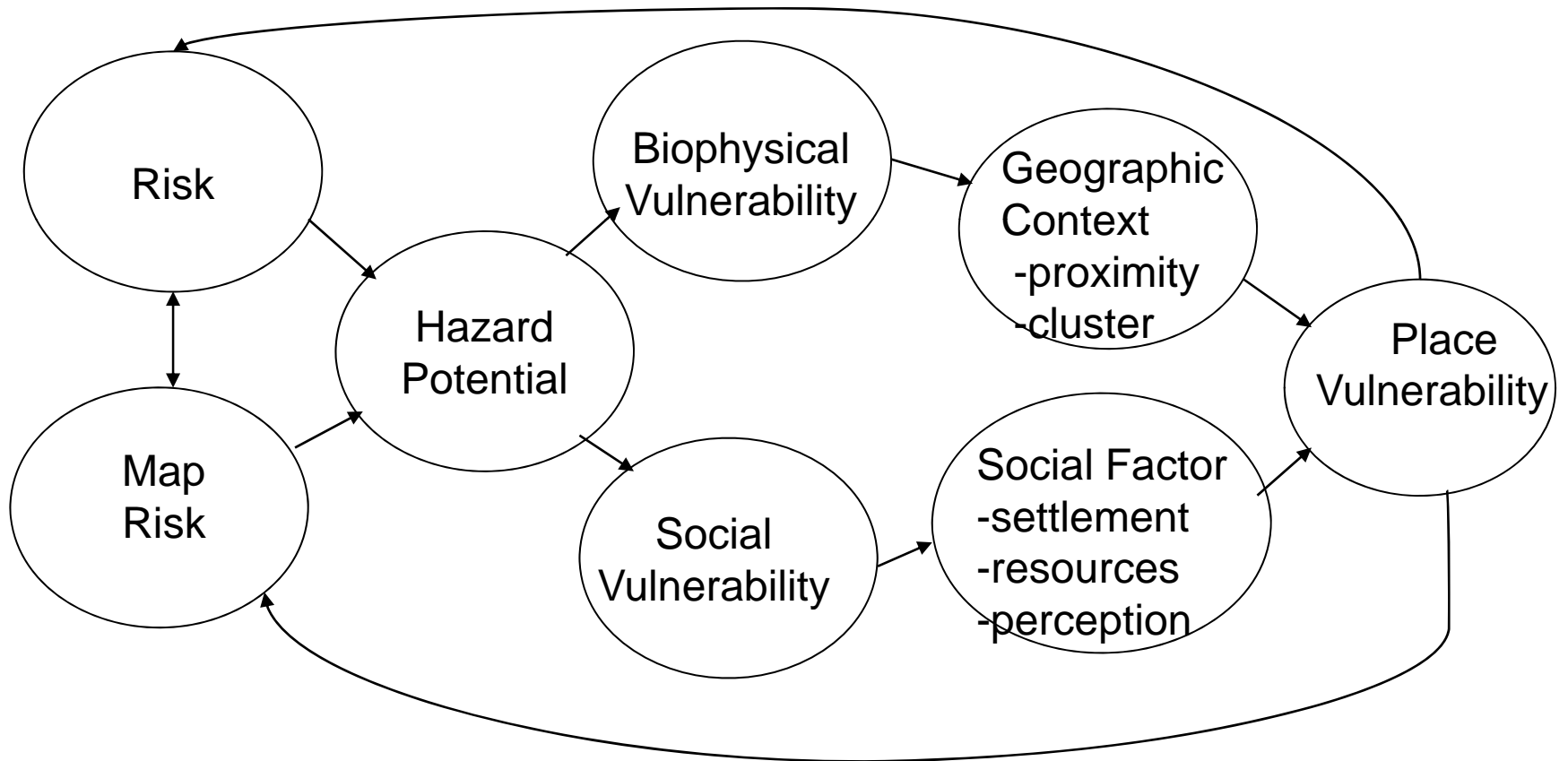


Sewage



Land use

Model approach

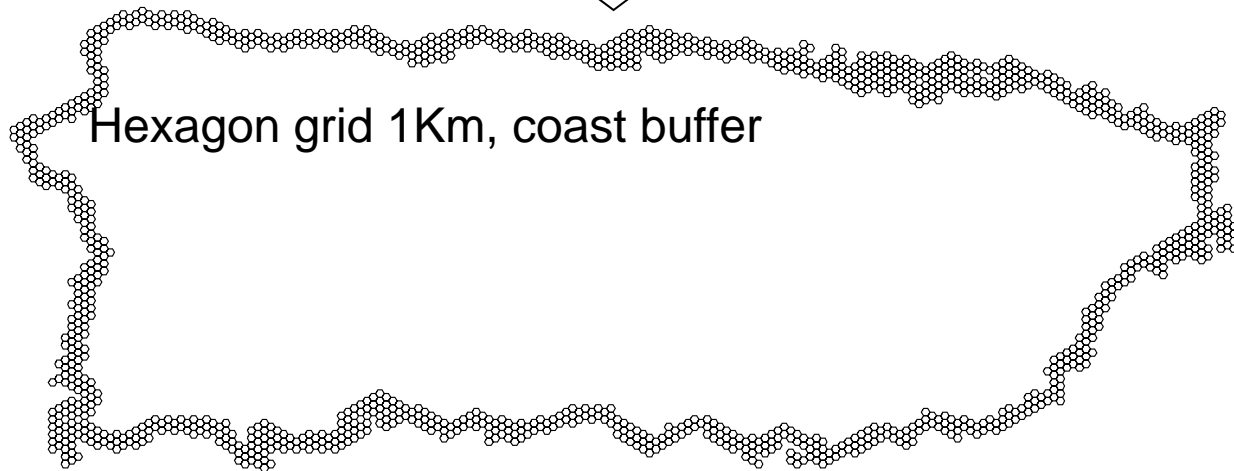
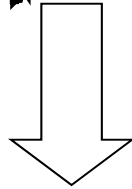
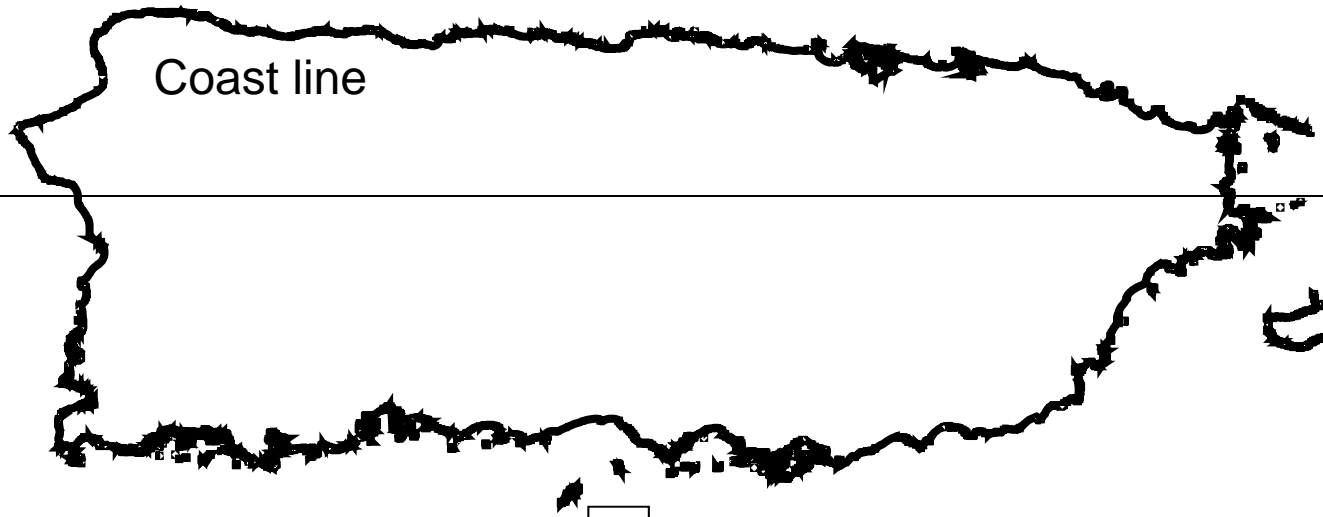


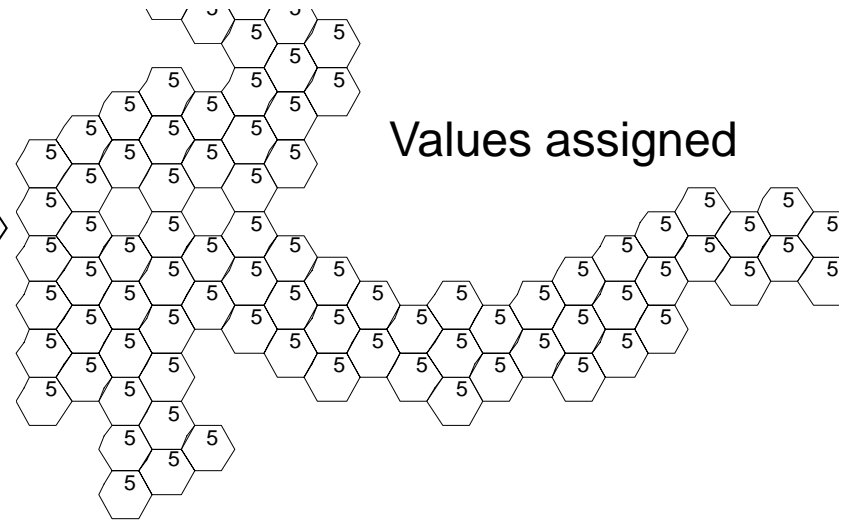
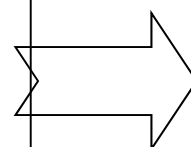
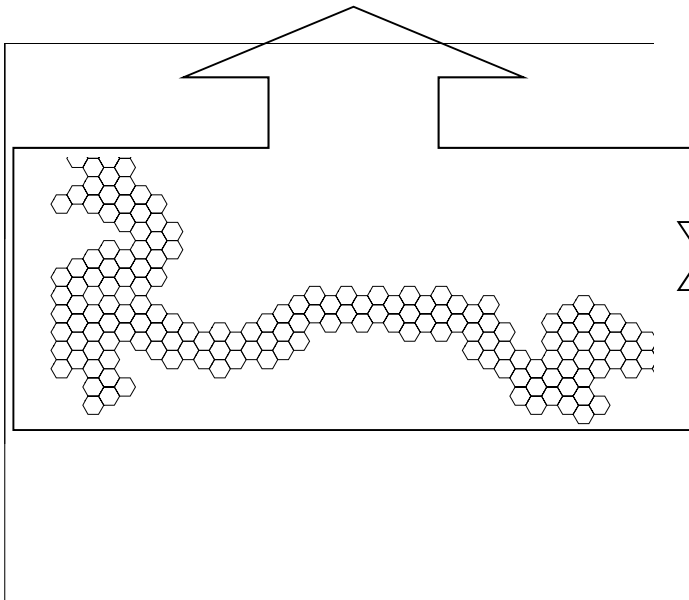
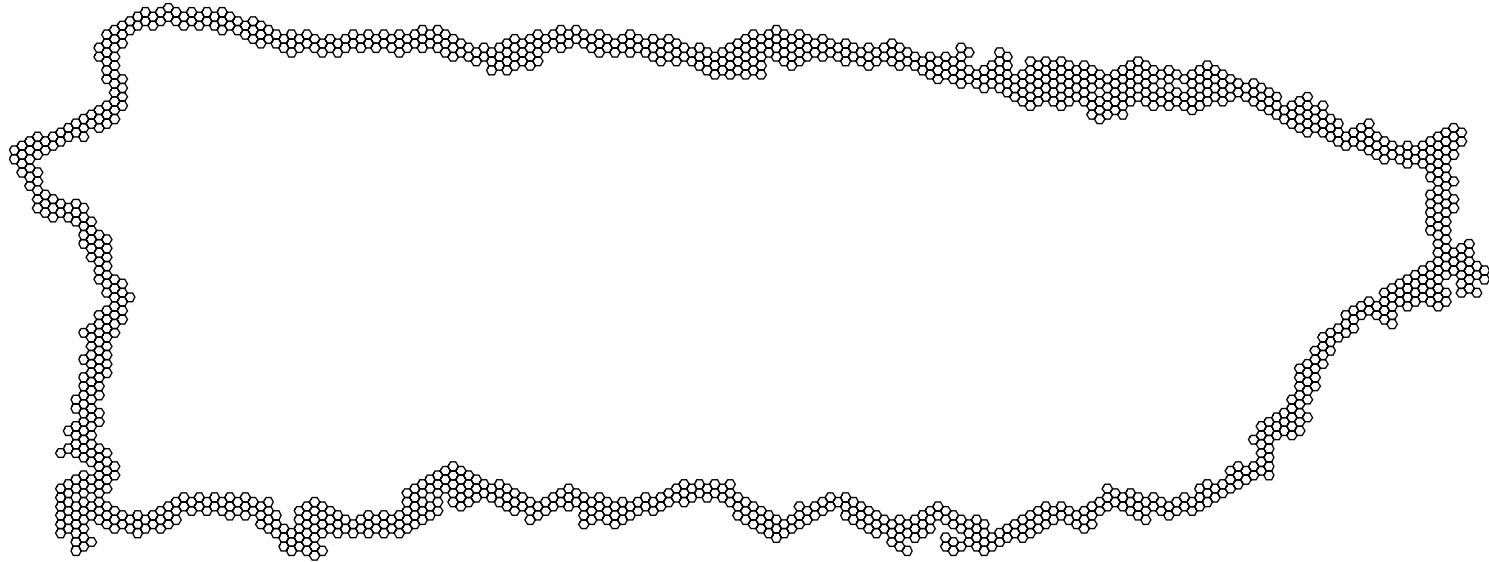
Vulnerability Ranking

Variable	None (0)	Low(1)	(2)	Moderate (3)	(4)	High (5)
Land use	Forest			Shrub	pasture	Urban
River discharge	0	<43304	1674	323907	774935	4714614
Relative Erosion	0	15	16-60	51-125	126-200	201-220
Fisheries pressure	0	1-13	14-21	22-32	33-48	49-125

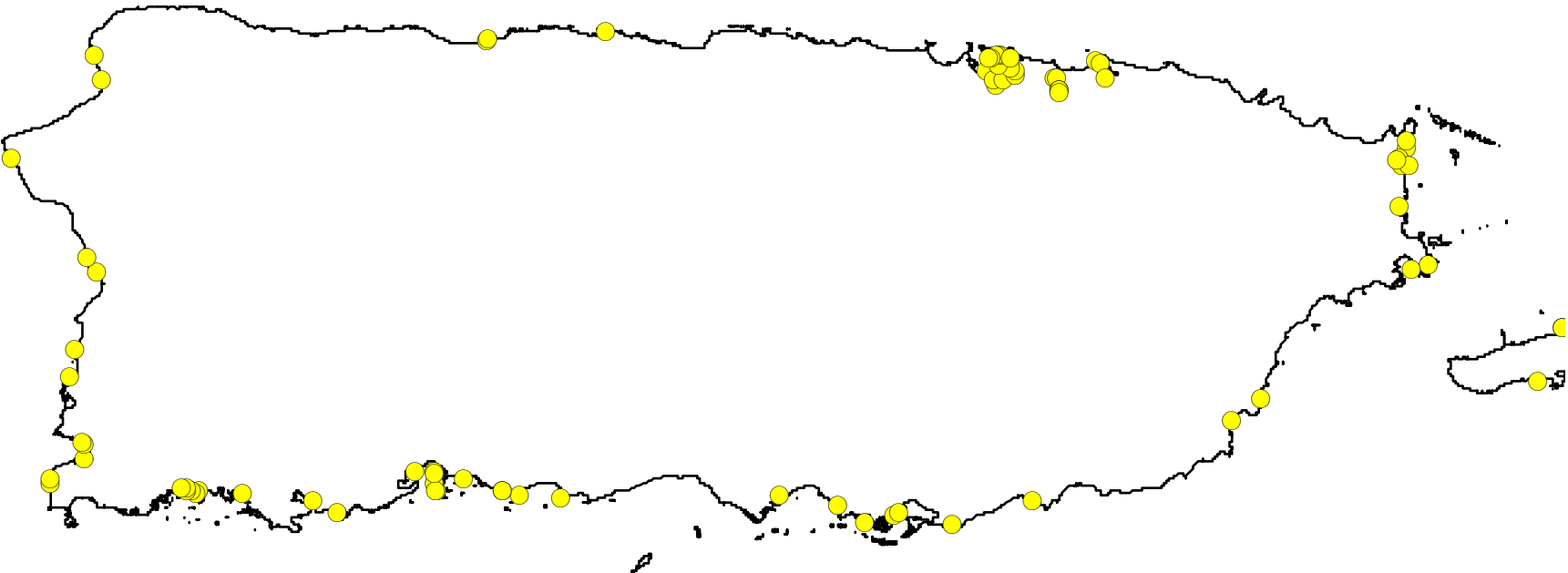
$$VR = \frac{X_A + X_B + X_C + \dots + X_n}{N}$$

Layers

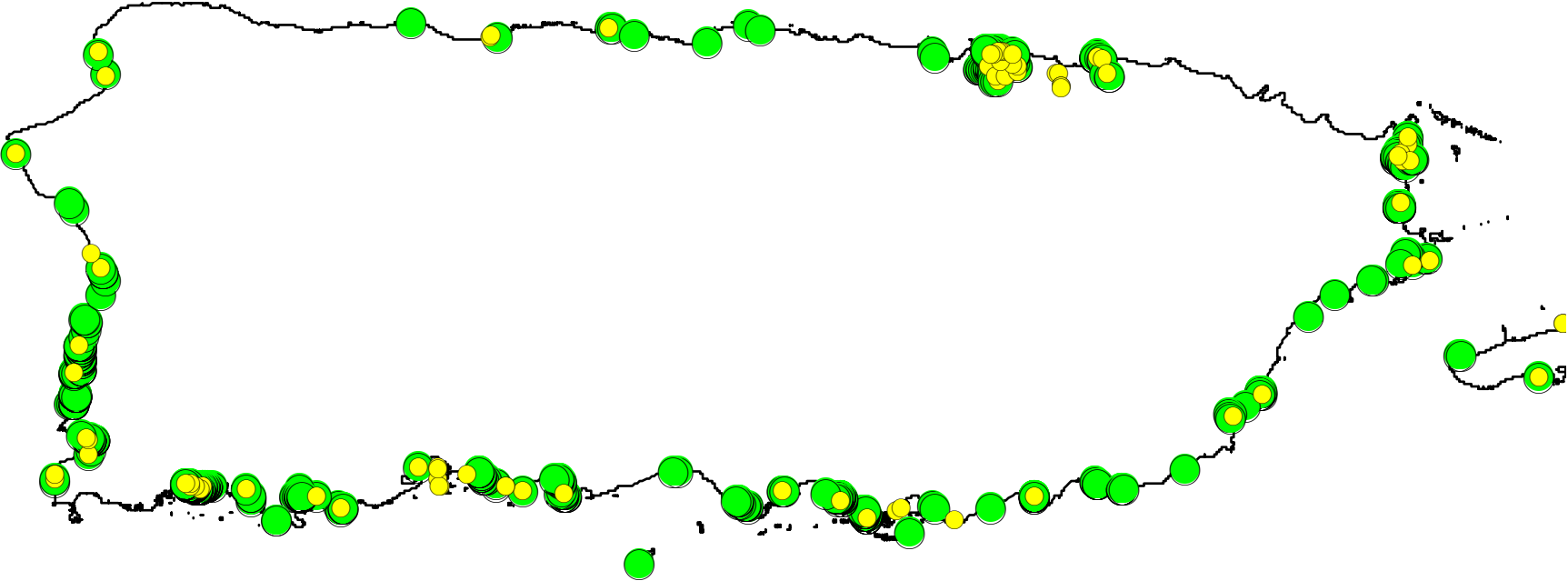




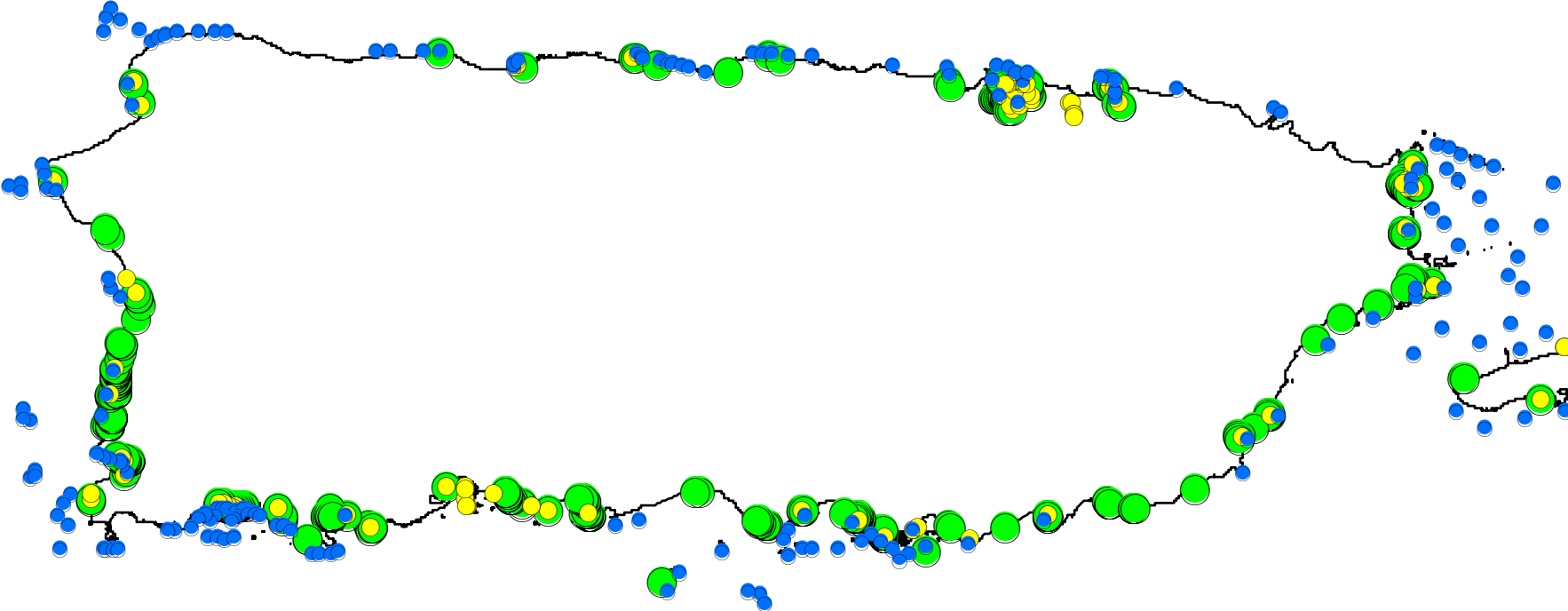
Commercials and Recreational Pressure:
Ramps+ Marinas + Port



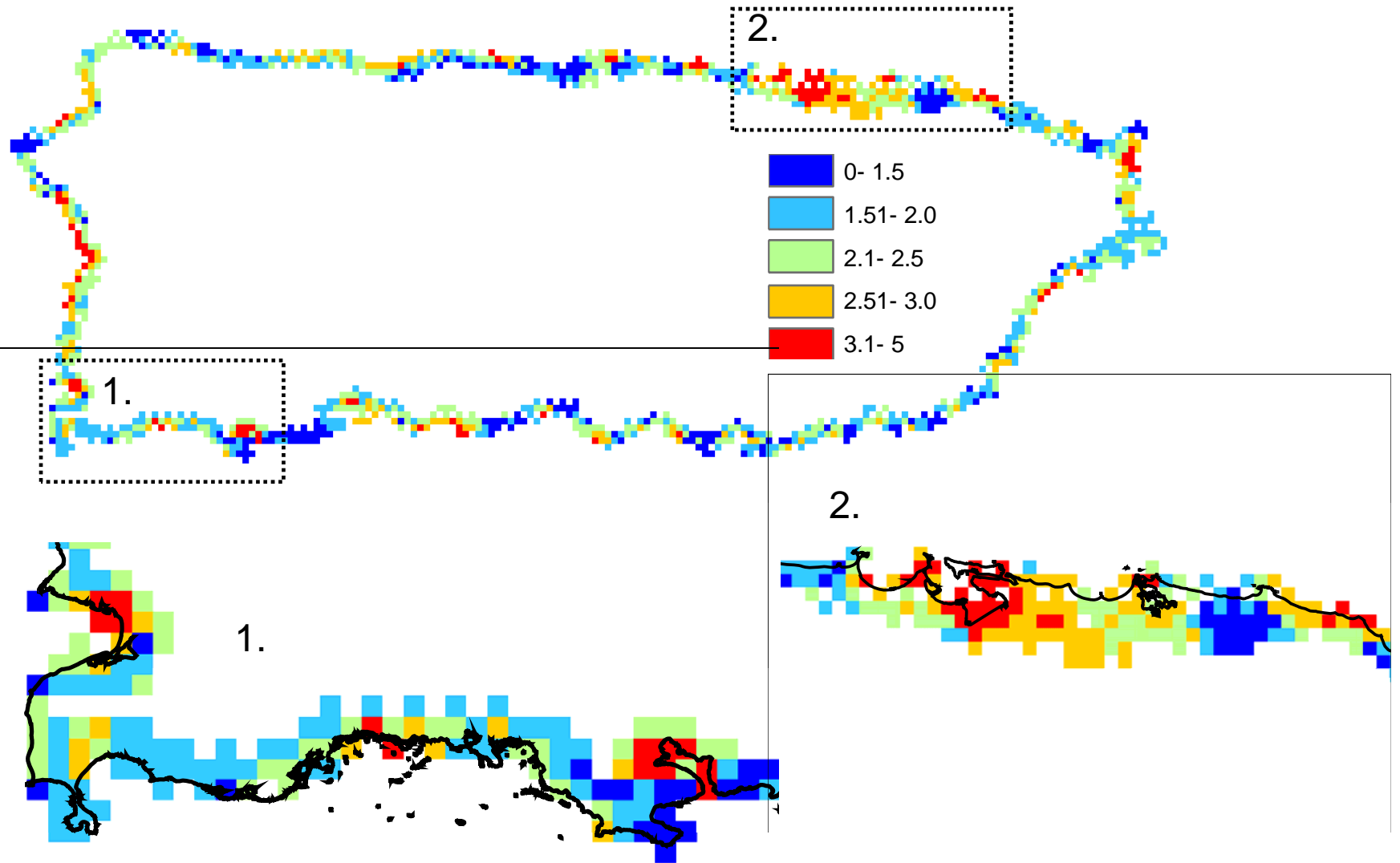
Commercials and Recreational Pressure:
Ramps + Marinas+ Port + Dock



Commercials and Recreational Pressure:
Ramps+ Marinas + Port + Dock + Fishing ground



Preliminary Results



Remarks

- Maps can then assist in the implementation of management strategies.
- Results can then combine with others mathematical model in the design of marine protected areas.

Acknowledgements

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GRACIAS