

# Repackaging Risk in a Changing Commons: Spatial Policy Design under Uncertainty

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## Abstract

How does the value of spatial regulation change as ecological variability increases due to climate change? We develop a framework that decomposes the regulator's recursive problem into three structurally distinct efficiency conditions—intratemoral, spatial, and intertemporal—while allowing for spatial substitution, heterogeneous ecological shocks, and distributional concerns can play a role. Applied to detailed ecological and harvest data in the U.S. Atlantic sea scallop fishery, we find that the existing set of closures, harvest limits in certain areas, and day restrictions is too lax overall and has substantial spatial misallocation of harvests. Leakage destroys about 17% of the marginal value of future conservation. The regulations, meanwhile, implicitly under-value the resource stock year to year. Climate-induced changes in the resource amplifies each type of inefficiency, though slowing mean growth versus increasing variance and spatial correlation of ecological shocks play varying roles. The existing regulation can be rationalized statically by rather moderate inequality aversion and dynamically by a regulator using out-dated expectations over the level and correlation of resource growth over space.

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