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Games of corruption in preventing the overuse of common-pool resources

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Abstract

Maintaining human cooperation in the context of common-pool resource management is extremely important because otherwise we risk overuse and corruption. To analyse the interplay between economic and ecological factors leading to corruption, we couple the resource dynamics and the evolutionary dynamics of strategic decision making into a powerful analytical framework. The traits of this framework are: (i) an arbitrary number of harvesters share the responsibility to sustainably exploit a specific part of an ecosystem, (ii) harvesters face three strategic choices for exploiting the resource, (iii) a delegated enforcement system is available if called upon, (iv) enforcers are either honest or corrupt, and (v) the resource abundance reflects the choice of harvesting strategies. The resulting dynamical system is bistable; depending on the initial conditions, it evolves either to cooperative (sustainable exploitation) or defecting (overexploitation) equilibria. Using the domain of attraction to cooperative equilibria as an indicator of successful management, we find that the more resilient the resource (as implied by a high growth rate), the more likely the dominance of corruption which, in turn, suppresses the cooperative outcome. A qualitatively similar result arises when slow resource dynamics relative to the dynamics of decision making mask the benefit of cooperation. We discuss the implications of these results in the context of managing common-pool resources.

Keywords: resource management, illegal logging, overfishing, delegated enforcement, bribe

1. Introduction

The emergence of corruption in parallel with the exploitation of common-pool resources should hardly come as a surprise. The reason is that common-pool resources are subject to the tragedy of the commons [1] which occurs when agents exploit a resource at an unsustainable rate by acting rationally from the perspective of one's own self-interest. To protect the resource from overuse and thus avoid the tragedy, curbing behaviours that threaten sustainability by means of punishment may, at least in principle, seem as a straightforward solution. Field studies and laboratory game experiments alike [2, 3] suggest that it is essential to define a scale of graduated sanctions for those individuals who overuse the resource [4, 5, 6]. However, who is to administer punishment? Oftentimes the need for a dedicated enforcement agency arises because the access to common-pool

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