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research highlights

ENVIRONMENTAL SCIENCE

A chain of cooperation

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GOODSHOOT

It is well-observed that patterns of self-organized complexity can emerge from natural systems and may impact functionality on the ecosystem level. In a paper by Lansing *et al.*, the authors ask whether similar phenomena occur in human–environment interactions.

The study examines patterning in the iconic rice fields on the island of Bali. The topography of the island means that individual farmers are highly dependent on water from their upstream neighbours. Unsynchronized planting also encourages rice pests, which can migrate to neighbouring fields. The authors initially constructed a simple two-player coordination game, with an up- and downstream neighbour. They found that when the risk of pest damage offset the risk of water damage, it was sensible for the dyad to cooperate on irrigation control. When the model was scaled up, cooperation spread from local to global (landscape) scale and harvests reached an optimal fair distribution within about five simulation years. Analyses of satellite imagery confirmed that the mosaic patterning of fields predicted in the model closely matches that in the real landscape. The findings are further supported by surveys of farmer attitudes to risk and historical records showing a centuries-old tradition of cooperative irrigation management, designed to balance drought and pest risks.

This work suggests that culturally informed, local-scale decision-making in human–environment interactions can lead to optimized maintenance of the commons on a regional scale.

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