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When mismatches don't matter: the dynamical consequences of divergent ecological and economic scales in coastal fisheries

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Conservation management decisions are often implemented at the scale of human communities, rather than the scale of the most relevant ecological dynamics. Research frequently points out the loss in efficiency that results from such "scale mismatches". However, the scale of management is influenced by socio-economic constraints on management actors - not all people want to cooperate with each other. While it is clear that objectives can be better achieved if management and ecological scales are aligned, it is not clear whether such benefits justify the costs of alignment, or how alignment can be achieved in multi-actor contexts.

On Manus Island in Papua New Guinea, small customary tenure areas define the scale of fisheries management decisions, but their fish stocks are connected by pelagic larval dispersal. We quantify the extent of this scale mismatch for the serranid *Plectropomus maculatus* by empirically estimating larval dispersal distances, and integrating this data into a bioeconomic model of the multi-actor fishery, and identifying the cooperative Nash equilibrium. Larval dispersal allows individual communities to externalise the costs of overharvesting, and export the benefits of cooperative behaviour, to non-cooperating groups. Despite these mismatched scales, the communities on southern Manus have recently created a tribal network for management and negotiation, emphasising the importance of social capital in avoiding suboptimal outcomes or the need for top-down governance.

Primary authors: Dr BODE, Michael (School of Mathematical Sciences, Queensland University of Technology); Dr ALMANY, Glenn (CNRS); Dr HAMILTON, Richard (The Nature Conservancy)

Presenter: Dr BODE, Michael (School of Mathematical Sciences, Queensland University of Technology)

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