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Viability theory and agent-based modeling: a new, synergistic approach to modeling environmental conflict

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Abstract: In this presentation, we will introduce a conceptual and theoretical framework that unifies several complex systems modeling approaches for the purposes of better understanding, representing, exploring, and resolving environmental conflict. This method, which we call the VIABLE framework (*Values and Investments from Agent-Based interaction and Learning in Environmental systems*), builds on techniques from agent-based modeling (ABM), evolutionary game theory, system dynamics (SD) modeling, and network analysis. We will introduce viability theory, the mathematical basis of our VIABLE modeling method, as well as approaches to re-conceptualizing conflict states using this theory. We will also discuss the wide range of participatory processes that could inform our approach, including qualitative and quantitative empirical approaches. Finally, we use the VIABLE framework to mathematically explore the conditions for conflict and cooperation, offering a conceptual example, as well as briefly presenting three applications of our technique, including a fishery conflict, an emissions trading system, and an analysis of biofuels introduction.

Keywords: Agent-based modelling; viability theory; system dynamics modelling; environmental conflict