A systems approach for modelling key environmental and socio-economic Sustainable Development Goals (SDGs)

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Abstract

The Sustainable Development Goals (SDGs) of the 2030 Agenda present a comprehensive set of environmental, social, and economic objectives for achieving sustainable development, but the complexity of analysing their interactions and spillover effects poses a challenge for their attainment. To address this, we employed a participatory model co-design process with local stakeholders to develop a system dynamics-based model, the Local Environmental and Socio-Economic Model (LESEM), for analysing and quantifying context-specific SDG interactions at the local level under a business-as-usual (BAU) scenario. Our focus was on quantifying the interactions among four high-priority SDGs in a case study in the north of Victoria, Australia, namely clean water and sanitation (SDG 6), agricultural activities (SDG 2), economic growth (SDG 8), and life on land (SDG 15). Our results suggest that agricultural lands are likely to decrease due to declining water resources under the BAU scenario, but agricultural production may still expand through agricultural intensification. However, agricultural intensification could help meet future food demand and lead to increased agri-food production, which could benefit the local economy. Conversely, this could lead to increased environmental threats due to the intensification process and reduced water availability. The LESEM enables policymakers to make holistic decisions and identify potential trade-offs and synergies that benefit other SDGs, ultimately promoting sustainability in local communities.