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An Assessment of the Effectiveness and Viability of Various Mitigation Technologies under Different Scenarios Using the PESERA-DESMICE Model

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Scenario analysis of policy options is one of the most valuable ways in which scientific models can be employed to inform decision-making process. This is particularly relevant for land degradation mitigation policies, which are rarely based on this kind of analysis. In this paper we show how the PESERA-DESMICE modelling framework can be used in the assessment of policy options to combat land degradation, illustrating the model analysis of policy options with scenarios for different study sites. The key assumption underlying our analyses is that technologies must be attractive in economic terms, i.e. have the potential to, from a land user perspective, lead to cost reductions, benefit enhancements or both. Trade-off and cost-effectiveness thus form integral parts of the framework. The sequence of options is explored by: (1) Determining which technologies are feasible in which locations. This includes an assessment of economic viability for the land user in each location; we term these the technology scenarios; (2) Determining how policy instruments such as subsidies and credit can have the potential to influence upfront investment requirements and economic viability and how they lead to reduced levels of land degradation on the other; we term these the policy scenarios; (3) Determining how technology adoption affects development issues such as food production and livelihoods; we term these the global scenarios. All types of scenario were found to be useful to policymakers in different ways. Technology scenarios may help focus the portfolio of land degradation mitigation technologies towards areas in need of policy support; policy scenarios further detail the types and levels of support necessary for promoting adoption of the technology; while global scenarios demonstrate how the changes envisaged contribute to the achievement of wider sustainable development goals.

Keywords: integrated environmental model, land degradation, mitigation technologies, scenario analysis, policy options