

Modeling trends in forest management, exurban development, and biodiversity conservation under alternative policy portfolios in northern Idaho

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Abstract

The forested landscape of the Interior Northwest is a focal point of controversy due to the competing interests of timber production, biodiversity conservation, and exurban development. Escalating numbers of endangered species and fluctuating timber markets highlight the need for integrated planning efforts that balance conservation goals with regional socio-economic priorities. Long-term solutions will require landscape-level planning efforts informed by interdisciplinary research. Currently conservation efforts on private lands are influenced by legislation that landowners often perceive as arbitrary regulations that lead to a loss in economic production. We propose to evaluate the socio-economic and ecological impacts of portfolios of alternative economic and regulatory policies for biodiversity conservation within a 12,700 km² (4,900 mi²) landscape that encompasses forests and intermixed agricultural lands in northern Idaho. We will develop three different land management policy portfolios that include both economic incentives and regulations. Literature review, input from local stakeholders, and ecological studies will be used to develop spatially explicit scenarios of this forest-dominated landscape under different policy portfolios at 10, 25, and 50 years in the future. We will conduct ecological studies to develop fine-scale models of relationships between forest management, landscape patterns, and a diverse array of biodiversity and functional indicators. Indicators include amphibian genetic diversity and gene flow, butterfly species richness and diversity, native plant species richness, abundance of non-native plant species, tree growth rates, and foliar nitrogen levels. These data will be integrated with social survey results to evaluate long-term socio-economic and ecological impacts, and trade-offs among different scenarios. We will compare landscape patterns, biodiversity and functional indicators, social acceptability, economic policy thresholds, exurban development, and fire risk within and among scenarios. Resulting models will allow local communities and broad-scale planners to evaluate the most efficient mix of policies to achieve landscape-planning goals that minimize conflict and balance conservation and socioeconomic priorities in the region. Our research will demonstrate how multiple disciplines can be integrated to address landscape-level research questions. Resulting spatial data will be available to the public on an Internet Map Server. The ongoing IGERT project provides substantial matching funds and three highly qualified Ph.D. students, all of whom will base their dissertations, in part, on the research proposed here. Thus, the proposed research is part of a larger 4-year effort being conducted by an interdisciplinary team of P.I.s and three Ph.D. students. The results of the 4-year study will be used in feedback and evaluation workshops with the public and opinion leaders throughout the region, and will result in at least three (this project) and five (overall) manuscripts submitted to refereed journals, as well as three dissertations.

Keywords: forest management, landscape planning and policy, biodiversity conservation, social acceptability, spatially-explicit model, fragmentation, interdisciplinary, integrated, scenarios.