

Linking Land-Use Science to Decision Making: Strategies and Opportunities

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Abstract:

Land-use science provides the scientific information needed to inform and advise the decision-making process by considering, at several scales (populations, ecosystems, and biomes), the effects of changing the condition of the land. Integrating land-use-science research results with decision making enhances understanding of the underlying processes and of the implications of management. In such an integration, a systems perspective can identify the most effective management actions and common grounds for stakeholder groups. In addition, management actions can be treated as experiments that provide future management guidance in selecting the most effective management options for minimizing the impacts of land-use change and for taking advantage of opportunities under the new land-management policies. Often, management that adopts an ecosystem perspective rather than an organismic perspective provides better options because land management changes species demography and diversity, juxtaposes different land covers, produces disturbance regimes, and alters biogeochemical cycles. Land-management plans may address (1) the system prior to the change, (2) the change itself, (3) the system immediately after the change, or (4) the recovery process. Where ecological systems are intact and near their original status, land-management and policy decisions can be designed to enhance resilience or resistance. Because reclamation or restoration is costly and difficult to implement successfully, proactive steps to reduce negative environmental effects may be the most effective strategy. By careful site selection and design, strategies can be developed to take advantage of natural features while reducing adverse impacts. Where land use and management have degraded ecological conditions, coping strategies should promote ecological restoration and mitigate further harmful impacts even though restoration to the original ecological state may be impossible. In all cases, ecological understanding in land use and management should be based on scientifically sound ecological principles.