4.2.3 Sustainable Transportation Planning for Rural, Recreational and Park Landscapes: Calibrating Levels of Service for Multiple Modes

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Sustainable transportation is a multi-dimensional concept. For example, it can infer mobility by modes and networks that mitigate pollution and promote health. It can also mean transportation for sustainable endeavors and settings like tourism and parks. Adaptive, diverse, equitable and resilient planning and governance are also elements of sustainable transportation. These many dimensions of sustainable transportation manifest in multi-modal transportation systems operated for utility and pleasure in landscapes noted for aesthetic and experiential quality. Such transportation systems can be found at the local level in community green-ways and trail networks (e.g. Burlington bike path), the state level in the high-ways and scenic by-ways (e.g. Scenic Route 100 By-way), and at the national level in federal lands transportation planning and management (e.g. park roads like the Acadia Loop Road). The quality of both system function and traveler experiences are important measures of sustainability for transportation at all of these scales.

Often, planning and managing for the quality of transportation system functioning and traveler experiences have been independent. However, recent research has begun to describe connections between transportation planning and management focused on system performance and traveler experience. This work has culminated in conceptual integration between the levels of service (LOS) framework prominent in transportation studies and indicators and standards of quality frameworks of leisure, recreation and public land management (Pettengill et al, 2012; Pettengill, Lee & Manning, 2012). The research presented here builds quantitative relationships between LOS and indicators and standards of quality that will compliment and extend the conceptual work, developing a robust and fully parameterized sustainable transportation planning and management framework for a diversity of landscapes and travel modes.

Modeling is a powerful and flexible research approach for addressing such complex challenges. Models enable analysis of alternative scenarios, facilitating adaptive management and providing insight about future service and quality conditions. This research develops a spatially explicit modeling approach that integrates regional GIS-based network models for assessing whole system function with local agent- based microsimulation models for assessing the quality of individual pedestrian experiences. Pedestrian facilities are modeled with vector spatial data. Pedestrian agents are parameterized by behavioral data including preferences, tolerances and contingent decisions. Based on these inputs, network models estimate pedestrian demand for network links. These demands serve as inputs for the microsimulation models, which evaluate functional and experiential quality for localities. The models are iteratively operated to identify optimum conditions. Such a modeling approach integrates system and individual levels, enabling efficient and flexible pedestrian planning and facilitating holistic evaluation of transportation policy.