Sustainable transportation in national parks: A Review and synthesis

Robert Manning, University of Vermont, USA, Robert.Manning@uvm.edu
Steven Lawson, Resource Systems Group, Inc., USA
Peter Newman, Penn State University, USA
Jeffrey Hallo, Clemson University, USA
Christopher Monz, Utah State University, USA

Transportation and national parks are intimately and inextricably linked. For example, nearly 300 million visitors per year travel to and within the U.S. national parks. Moreover, American national parks comprise over 80 million acres of public land and include extensive networks of transportation corridors – roads, trails, bike paths, waterways, public transit – that link a vast array of iconic attraction sites – viewpoints, historical and cultural sites, visitor centres, campgrounds, gateway communities. In many cases, transportation is an important form of recreation itself (e.g., driving for pleasure). Transportation can also be an important park and outdoor recreation management tool, helping to deliver the "right" number of visitors to the "right" places at the "right" times. The inherent complexities of the intersection between transportation and national parks demand explicit management attention that includes a coordinated, systematic, and informed approach.

Given the importance of relationships between transportation and national parks, a review and synthesis of the scientific and professional literature on sustainable transportation in national parks was conducted by the authors. The review is divided into five parts. Part 1 begins by outlining the history and associated issues of transportation in national parks. A conceptual model is presented that suggests an evolution from conventional demand-driven transportation management to sustainable transportation management in national parks (Figure 1).

Part 2 addresses the relationship between transportation and national park resources and the quality of the visitor experience. Park resources include wildlife, air quality, noise, soil, and vegetation. The quality of the visitor experience includes crowding/congestion and associated stress, freedom of movement, and ease and convenience of travel. A range of potential indicators and standards of quality for park resources and the visitor experience are identified and illustrate the ways in which these indicators and standards may need to be revised as transportation in national parks evolves from conventional modes of travel to more sustainable forms and systems of transportation.

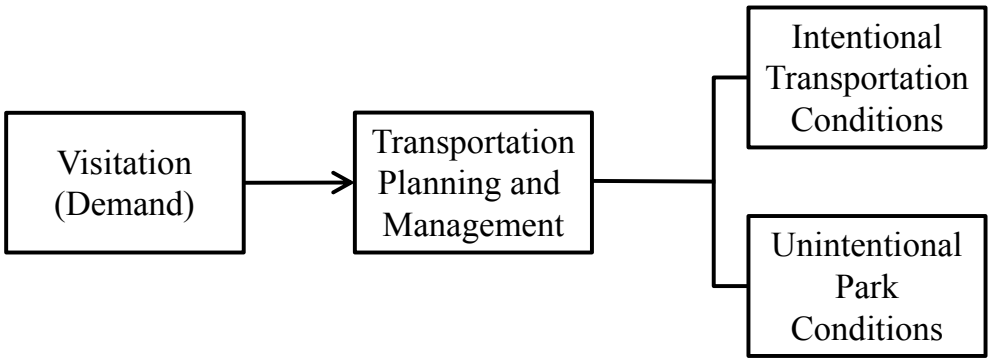
Part 3 addresses transportation as a tool for managing parks and outdoor recreation, including managing visitor use in a sustainable manner. Issues addressed include the environmental and social carrying capacity of national parks, alternative transportation systems, and intelligent transportation systems. This material suggests how transportation in national parks is evolving

from its conventional demand-driven model to an approach that is aimed at protecting park resources and the quality of the visitor experience.

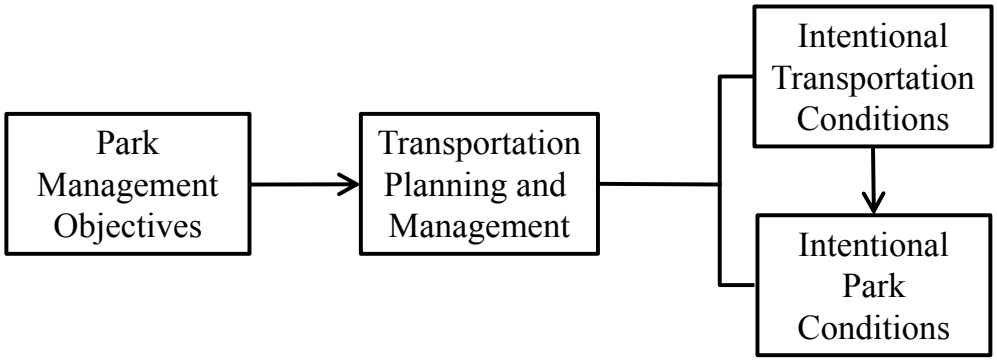
Part 4 presents a series of case studies that illustrate many of the issues outlined above. These case studied describe state-of-the-art transportation research, planning, and management at diverse national parks, including Denali National Park and Preserve, Yosemite National Park, Cape Cod National Seashore, and Zion National Park. These case studies offer successful and attractive models of how transportation can contribute to the sustainability of national parks.

Part 5 integrates and synthesizes much of the information outlined above. It begins by describing how the literature review and synthesis reaffirms the premise that transportation and national parks are intimately and inextricably linked. A series of 21 principles or best management practices is derived that can help guide planning and management of sustainable transportation in national parks and related areas. The study concludes with some observations on the increasing urgency of sustainability in the contemporary world; the leading role that national parks can, should and are playing in this regard, especially in the area of transportation; the importance of alternative transportation systems; and the need for integration across the professional fields of transportation and national parks.

This literature review and synthesis can help guide transportation planning and management in the context of parks and related areas. It can also help the scientific community in identifying important research questions.



a. Conventional (Demand-Driven)Transportation Management Model



b. Sustainable Transportation Management Model