

Recreation Ecology Research in the Americas

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From its origin in the United States and United Kingdom, recreation ecology as a field of study is over 70 years old and has grown to include a large international audience of scientists and protected area managers. Though there are few full-time recreation ecologists, the number of studies investigating recreation and visitor impacts has grown substantially in the past decade and a recent annotated bibliography included 1108 references (Leung, 2005). This paper provides a brief characterization and review of recent recreation ecology research in the Americas. Due to the large number and diverse array of relevant studies this review is largely limited to characterizing the recent research topics and publications of those scientists most active in recreation ecology research. Recent reviews providing a more comprehensive discussion of this literature include Cole (2004a), Hammitt and Cole (1998), and Leung and Marion (2000).

Canada

The most active recreation ecology research in Canada has been at the University of Guelph, Ontario, where Dr. Doug Larson directs a Cliff Ecology Research Group. This program has been very active in investigating the ecological impacts of rock climbers (Kelly & Larson 1997, McMillan, Nekola & Larson 2003, McMillan & Larson 2002). Other recent recreation ecology studies include investigations on visitor impacts to the intertidal zone (Alessa, Bennet, & Kliskey 2003), using GIS to determine suitability for hiking trails (Bridgland, Lemky & Allen 2001), mountain biking impacts to vegetation and soil (Thurston & Reader 2001), campsite impact monitoring (Peregoodoff 1998), chemical

impacts to soils from campfires and dishwashing (Arocena, Nepal & Rutherford 2006), and a study of human disturbance on duck nests (Olson & Rohwer 1998).

United States

Land management agencies of the federal government are the primary source of funding for recreation ecology research in the U.S. Specifically, the National Park Service and Forest Service are the primary sponsors, with relatively few dollars available from other federal agencies, conservation foundations, state parks and forests, and private sources. Only the U.S. Forest Service has provided permanent "hard money" funding supporting recreation ecology research; most funding is for specific studies requested by land managers. Consequently, recreation ecology research continues to be very applied, generally focused on providing information for carrying capacity decision making or resolving recreation impact problems.

Numerous government and university scientists conduct occasional recreation ecology studies. However, only four U.S. scientists consider the primary focus of their program of research to be recreation ecology; two of these are employees of the federal government. The following discussion describes their recent and current research studies to illustrate the focus of the most active research programs. Many other studies have been conducted and published but are too numerous to include here.

David Cole is a U.S. Forest Service scientist with the Aldo Leopold Wilderness Research Institute in Montana. While the bulk of his research has focused on camping impacts and experimental trampling, he has recently broadened his work to

include studies of wilderness visitors and non-recreational threats to wilderness ecosystems. Recent recreation ecology studies include studies of camping impacts (Cole & Monz 2004a,b) and basic research on factors that limit natural recovery of campsites (Zabinski & Cole 2000) and evaluating the effectiveness of alternative restoration techniques (Zabinski, Wojtowicz & Cole 2000, Zabinski et al. 2002). He has also authored many recent syntheses of recreation ecology knowledge, including Hampton and Cole (2003), Cole (2004 a,b), Newsome, Cole and Marion (2004), and Gutzwiller and Cole (2005).

The author is a U.S. Geological Survey scientist stationed at Virginia Tech, a university in Virginia. He conducts studies in wilderness, national park backcountry and frontcountry settings, and in international protected natural areas. His early research and some continuing studies investigate camping impacts (Marion & Farrell 2002, Reid & Marion 2004, Reid & Marion 2005). Recent research has focused on trail degradation and management (Marion & Leung 2004), particularly soil erosion (Aust, Marion & Kyle 2005, Marion & Olive 2006), and methodological innovations for assessing trail conditions (Marion & Leung 2001, Marion, Leung & Nepal In Press). Other recent studies have investigated the efficacy of low impact education (Daniels & Marion In Press a, Marion & Reid In Press) and how visitors gauge the appropriateness of site management actions to limit visitor impacts (Cahill, Marion & Lawson In Press, Daniels & Marion In Press, b). Two current studies are examining rock climbing impacts, including collaboration with Chris Carr, a recreation ecology doctoral candidate at the University of Cincinnati.

Yu-Fai Leung is an Associate Professor at North Carolina State University in their Parks, Recreation, and Tourism Management program. His recent studies have focused on trail degradation (see studies cited in preceding paragraph), the selection and monitoring of recreation impact indicators (Leung, Marion & Cole 2002, Leung & Meyer 2004) and the efficacy of low impact education (Leung & Attarian 2002, Leung

& Attarian 2003, Wirsching, Leung & Attarian 2003). Other recent and related research has examined the application of geospatial technologies to visitor impact assessments (Leung, Shaw, Johnson & Duhaime 2002).

Chris Monz is an Assistant Professor at St. Lawrence University, New York, in their Environmental Studies program. His current research interests include the assessment and management of human impacts to parks with a particular focus on backcountry visitor use in high latitude or elevation environments (Cole & Monz 2002, Forbes, Monz & Tolvannen 2004, Monz & Twardock 2004, Monz 2002) and shoreline use on the Atlantic coast (Monz, Young & Leung 2004, Monz, Leung, Ingle & Bauman 2004).

Richard Knight, a wildlife scientist at Colorado State University, is also active in recreation ecology research, including several recent studies investigating visitor impacts to wildlife (Miller, Knight, & Miller 2001, Taylor & Knight 2003, Camp & Knight 1998).

Central and South America – Numerous recreation ecology studies have been conducted in Central and South American countries over the last decade though most are not reported in the more widely available peer-reviewed literature. The author has been involved in several studies of trail impacts in Belize, Costa Rica, Chile and Peru (Farrell & Marion 2000, 2001, 2002b, Marion & Linville 2000), recreation site impacts in Belize, Costa Rica and Mexico (Farrell & Marion 2000, 2001, Olive 2005), and development of a simplified carrying capacity decision-making process for protected natural areas (Farrell & Marion 2002a). Other similar studies include a study of soil erosion on trails in Ecuador and Costa Rica (Wallin & Harden 1996), trail and recreation site impact assessments at popular tourism sites in Dominica (Christian 1996), campsite monitoring in the Baja region of Mexico (Monz 1998), and recreation impact assessments related to implementation of carrying capacity planning at a park in Patagonia, Argentina (Encabo, Torre & Bergallo 2001).

Other studies have examined the impacts of visitation on wildlife, which are a principal feature of interest for nature-based tourists. These include

scuba diving impacts to Caribbean coral and fish communities (Hawkins et al. 1999), the effects of motorized tourboats on flamingos in Yucatan, Mexico (Galicia & Baldassarre 1997), impacts to wild pygmy marmosets in Ecuador (De la Torre, Snowdon & Bejarano 2000), and an assessment of wildlife densities in visited and unvisited areas of a popular Mayan ruin park in Guatemala (Hiding-er 1996).

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