

Chapter 7: Technology and Outdoor Recreation in the Dawning of the Age of Constant and Instant Digital Connectivity

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Purpose

This chapter investigates the effects and potential of evolving technology, especially digital connectivity, on outdoor recreation managers, participants, and nonparticipants. My goal is to conceptualize and demonstrate the role of such technology in the context of larger cultural developments such as changes in values and in modes of experiencing the out of doors, the ways that these experiences are shared, and the management challenges they may bring to public agencies. Additionally, I will identify management and research strategies to leverage new and emerging technology to improve recreation management and sustainability.

Problem Statement

Rapidly evolving technology creates changes in the social context of outdoor recreation and affects the amounts and kinds of participation and potential recreation outcomes, including meanings and values that people attach to them. The management question is what the appropriate or best response of public land outdoor recreation providers is to such technology. There may be fundamental issues in how managers now understand the recreation experience, particularly the “wilderness or primitive experience,” that may require a paradigm change. With the increasing diversity of users now constantly connected and consuming vast amounts of data and constant personal performance monitoring, the diversity of experiences and benefits may be changing.

Technological change creates new tools, skills, and methods that can be used to expand or enliven outdoor recreation experiences, as well as to accomplish such management objectives as facilitating recreation participation, improving communications, and protecting the environment. Public land managers need to understand how this technology can be leveraged to facilitate communications, collaboration, co-management, and monitoring to ease burdensome processes such as collecting fees, providing recreation information, and implementing regulations to achieve desired recreation experiences. Developments in digital interconnectivity provide both opportunities and challenges for researchers to better understand recreation use and values.

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Recreation managers and users have a long history of both responding to and adapting technology to better manage public lands or create opportunities for people to enjoy them. In a rapidly changing environment, managers find themselves responding to public pressure, often viewing these new technologies within the existing paradigm of outdoor recreation management, which often slows their adoption and results in reactive instead of proactive management. A proposed model of technological impacts on backcountry recreation found that technology influenced recreation participation in five interrelated categories—access and transportation, comfort, safety, communication, and information—all leading to increased recreation use (Ewert and Shultis 1999). If increased recreation use is the primary effect, this may lead to the conclusion that technology in the end is good for outdoor recreationists. This paradox of technology reflects a dilemma that grips many outdoor recreation managers, one that can be solved only with a different perspective on this issue.

Outdoor recreation occurs within the larger human social evolution now fueled by technological change. The understanding of technology as simply a useful tool misses the effect it has on human perception and understanding of the natural environment. Using modern technology to explore nature can frame nature as an object of research, to reveal the real as a standing reserve or a “recreation resource.” Heidegger described this as “enframing” and the essence of modern technology (Heidegger 1977). Looking at satellite images of a forest or understanding location in terms of global positioning system (GPS) coordinates are new ways of understanding and interpretation, revealing aspects of nature outside of our normal senses. Specific place-based understanding of outdoor recreation experience and the sustainability of these places can through technology be thought of as not a living complex ecosystem but instead an understandable object to be redesigned to accomplish outdoor recreation purposes. This simplification a temptation for both the manager and the recreation user.

When technology creates new senses and abilities, and communication creates new modes of social thinking, technology then begins to change the nature of the modern recreation visitor. This technological human has been called a “cyborg,” a cybernetic organism (Haraway 1985, Thompson 2015). Such cyborg users, linked by satellites and cellular towers to other users and to what in the past was a vast but unreachable source of outdoor information, paradoxically may feel less secure or may feel alienated from their own human senses and mental abilities. The use of GPS physically changes the activity of the brain, reducing the role of the hippocampi in creating internal maps of our environment and planning journeys to future possible destinations (Javadi et al. 2017). This has deep implications for one’s ability to remember one’s travels, and as our senses and cognitive abilities become

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impoverished, to create greater dependence and resultant anxiety. This dependence has led users to make very poor and even fatal decisions as they are being led by the technology instead of their sense experience and cognition, resulting in what park rangers at Death Valley National Park called “death by GPS” (Milner 2016).

For some users, a hike is now fully monitored by a device that reports pulse rate, speed, time in motion, location, and instant comparison with others who have done the same hike or physical test. Such new technologically aided users are among those for whom we are now providing recreation opportunities. Electronic technology has been called total and inclusive. As McLuhan (1969: 49) observed, “Now man is beginning to wear his brain outside his skull and his nerves outside his skin; new technology breeds new man.” The significance of this is that the experience of nature itself is now changing, and the old paradigm that the experience of nature is the result of unmediated direct experience needs to be questioned.

Dimensions of the Problem

As people’s experience of nature is moderated, shared, and experienced through the use of digital technology, large changes may occur in the character of human connections to nature. The benefits of outdoor recreation activities and these changes need to be better understood. Most technological development in the recreation field has been focused on improving comfort using new materials and more advanced recreational vehicles to ease travel within public lands. Now the digital revolution has lessened barriers to communication and networking. Technology now provides a source of real-time information, potentially altering and expanding one’s perceptions of the recreational experience by providing new affordances while presenting new challenges and opportunities for managers. Digital technology now allows for the creation of virtual or enhanced outdoor environments. The problem is that although digital communication may be changing the very nature of the human experience, we do not understand well what these changes mean to both recreation managers and users.

Technology creates new experiential opportunities. For example, there are no mountain biking experiences without mountain bikes, no snowmobiling fun without snowmobiles, and no scuba diving without scuba gear. Scuba diving, one of the most technologically dependent outdoor recreation activities, allow humans to experience the beauty of the oceans, their reefs teeming with life. Consequently, these activities can be enhanced by improvements in the underlying technologies. Managers then struggle with questions of compatibility or conflict with the natural environment or with other traditional users. Sometimes, this can become a moral

dilemma of great magnitude, such as whether mountain bikes should be allowed in the National Park System. The title of a paper about the issue, *The War for the Future: Mountain Bikes and Golden Gate National Recreation Area* (Rothman 2001), conveys the drama of this debate.

In the past, most technology challenges to public land recreation management came from new motorized and mechanical conveyances such as snowmobiles, all-terrain vehicles, and mountain bikes. Although these technologies are continuing to evolve (e.g., mountain bikes with battery-assisted propulsion), the smartphone represents a more significant agent of change. The iPhone™² was launched in 2007 (Farber 2007) as a combination of three devices: a “widescreen iPod™ with touch controls,” a “revolutionary mobile phone,” and a “breakthrough Internet communicator” (Cohen 2007). Roughly three-quarters of Americans now own a smartphone. Among younger adults, 92 percent of 18- to 29-year-olds own a smartphone. Twelve percent of Americans say they are “smartphone dependent” because they lack broadband Internet access at home, and smartphone reliance is especially pronounced among young adults, non-Whites, and those with relatively low household incomes. Nearly 7 of 10 Americans now use social media, which is especially popular among younger adults, as 86 percent of 18- to 29-year-olds are social media users (Smith 2017).

Although the business community has embraced this change and encouraged it as part of our consumer society, government land managers have yet to fully acknowledge this new environment. Smartphone users want and expect information to be provided when they need it in a form that suits their needs, and they want to network with others to share and gain even more information. The smartphone is a platform on which companies engage with users and communities, not just a communication tool (Schadler et al. 2014).

A smartphone is a tool that integrates a post office, camera, compass, map, guidebook, and GPS. A beautiful photo or video gone viral with a geolocation tag can create a recreation hotspot overnight. This instant overuse can be a serious problem because many recreation planning processes take years to implement, while environmental and social impacts begin to occur almost immediately. For example, visitation to Oregon’s Tamolitch Falls, famously known as “Blue Pool,” soared overnight after a posting on social media, but many new visitors were not seasoned outdoor people. Some were wholly unfamiliar with the hazards of wild environments, and fatal accidents resulted when the “pool” was misperceived to

² The use of trade or firm names in this publication is for reader information and does not imply endorsement by the U.S. Department of Agriculture of any product or service.

be something like a developed swimming pool rather than a frigid, dangerous section of the McKenzie River. Another consequence of technology is that some recreationists now feel overly safe. When they perceive their safety to be threatened, they can call for help at the least discomfort, even at times when help is not needed. A prime example was an incident in Grand Canyon National Park in which four backcountry visitors who thought their water source had a salty taste recklessly used their personal locator beacon to trigger three costly helicopter search and rescue operations (Pope and Martin 2011).

Visitors can now follow virtual trails, find virtual treasures, and chase virtual creatures. Virtual reality (VR) and especially augmented reality (AR) technologies are creating new ways for people to enjoy the outdoors either at home in the case of VR or in nature in the case of AR. Augmented reality is an interactive experience of a real-world environment in which objects are enhanced by computer-generated perceptual information. A number of AR applications and devices are now available to recreation users. As Jaron Lanier said of his HoloLens™, an AR headset made by Microsoft, “...the coolest thing to do with the HoloLens for me is to take it into the wilderness. Some people might be horrified—Oh my God, how could you take a HoloLens into the wilderness? But if you augment a forest and then take off the display, it pops into reality. It’s an amazing palate cleanser” (Rubin 2017). It is likely that these two technologies, along with improved GPS navigation and other technologies, will create more senses, in the same manner that night vision devices allow people to see in the dark. New technologies may create more intimacy with both nature and other recreationalists through increased ability to share one’s experience and deepen that experience. Combining technologies will create more immersion, for example, by being able to see through the eyes of a drone or moving back and forth in time, being able to visualize what was and what will be (Kelly 2016).

This kind of technology is potentially a double-edged sword. Some users may be satisfied by an indirect experience of nature that has been mediated by technology, often enhancing the drama and shortening the length of time “immersed” in nature and altering their perception of what is real (Shultis 2001). As in commonly oversaturated digital photography in which our view of nature is enhanced, we cannot directly experience that saturation with our eyes.

The direct experience of nature usually begins with the five human senses of first-person perception of the natural environment (Merleau-Ponty 1962). Once that first-person perception is mediated through technology, the actual experience of nature can become profoundly changed. Perceptions of both time and space can be altered. This could lead to enhanced recreation experiences of a new reality, bringing about a deeper comprehension of one’s understanding of natural environments

and relationship to them or an entrancing world of brighter colors and phantom creatures unmoored to the natural world.

Sustainable recreation focuses on building a sustainable relationship between humans and the nonhuman world. This relationship is one of enjoyment, love, appreciation, and stewardship. The relationship is reciprocal in that the ecosystem benefits enjoyed by the visitor are repaid to the nonhuman world through actions that sustain those communities. Well-being is one of the clearly documented benefits of being in the outdoors (Wolf et al. 2020) and is based on how humans connect with nature through knowing, perceiving, interacting with, and living in these natural communities (Roly et al. 2013). The concern is whether technology deepens these connections and helps visitors better enjoy these benefits of physical and mental well-being or if technology itself becomes the focus of the recreation experience and even replaces nature as some believe is already happening (Kahn et al. 2009). Rock climbing gyms provide much enjoyment to their users and for many is now a total substitute for the fickle outdoors, but is it really better for their well-being than climbing outside? Today, for many users of these facilities, they have transformed an outdoor recreation activity into an indoor sport, like any indoor sport that has no direct tie to outdoor recreation. Are the wild climbing areas better off with fewer visitors who may not stand up for these areas when they are proposed to be turned into economically valuable quarries? Indoor skiing and surfing are now possible as well; there may be a trend toward turning outdoor recreation into indoor recreation through the construction of built environments.

Barriers and Challenges

These changes are engendering debates about appropriate technology as well as conflict between traditionalists and the new generation of users. There are serious philosophical concerns that the benefits from wilderness recreation in developing virtuous character and our ability to live a good life will be lost if we fail to practice responsible simplicity when recreating in the backcountry (Pohl 2006). There is debate regarding whether technology improves the recreation experience and whether it facilitates or worsens management (Pohl 2006, Shultis 2001). One disturbing conclusion is that the growth of technology will bring about the end of the true wilderness experience (Martin and Wagstaff 2012).

The limited research in this area seems to indicate that technology is a mostly positive addition that may improve visitors' recreation experiences (Gimple 2014, Lindell 2014). However, some managers are concerned that it represents a threat to wilderness (Borrie 1998, Wilderness.net 2017). The greatest challenge may be a generation gap among recreation managers that prevents senior managers from understanding the magnitude of change; if they see technology as a threat rather than an opportunity, they may fail to adapt to it. When a wilderness hiker uses a

smartphone to get the latest weather information or network with others, it changes the recreation experience. But whether this is a good or bad development is not clear. The current situation is that some recreation managers cannot see a silver lining in this new world (Martin 2017).

The other barrier is how the wilderness experience itself is conceived. For some users, wilderness is the “other,” in direct contrast to urban spaces, and is a place that lacks technology. In such a place, a user must be self-reliant, an idea that dates to Euro-American settlement of the of the American West. That degree of self-reliance most likely ended decades ago, although some wilderness managers still struggle to revive it. Technology held in one’s hand cannot, as some claim, threaten the wilderness, but it can threaten the wilderness experience if we continue to define the wilderness experience as a lack of technology. The best example of this is the e-bike, a bicycle assisted by an electric motor. Recreation planning/conceptualization systems like the Recreation Opportunity Spectrum (ROS) explicitly divide the recreation experience into motorized versus nonmotorized settings to reduce conflict and enhance the range of recreation experiences (Shilling et al. 2012). The e-bike breaks the paradigm by being a motorized vehicle with no visible motor or motor sound. So, conflict now becomes not a conflict based on blocking goal achievement or not wanting to see, hear, or smell an internal-combustion engine, but purely ideological, a conflict over differences in social values (Vaske et al. 2007). Evolving social values is a challenging area for managers to work in. For recreation planners, the binary choice of motorized versus nonmotorized may no longer be so useful. These mental models block us from imagining a technology-enhanced wilderness experience.

Consequently, there is a great deal of uncertainty not only about the consequences to visitor experiences from technology, but how public land managers should respond to these consequences in recreational settings. The lack of knowledge regarding how to respond may create a sense of justifiable paralysis for decisionmakers. This may be partly a result of the lack of a vision, clear roles, or experience objectives, as they relate to how we have conceptualized some recreation settings in the past as modern technology-free zones. Technology—particularly communication, information, and media technology—is now converging and is strongly linked to freedom of speech rights protected in the United States by the First Amendment. This linkage makes the managers’ ability to take action that limit the use of these forms of technology extremely limited.

The role and challenge of recreation managers may be not to protect individuals’ recreation experiences from their own technology, but instead in some settings to protect one set of users from the technology being used by other groups. Managers can use technology to help people experience the world in different ways and to care about the natural world and protect their public lands.

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New Conceptual Approaches

We can use the new technological environment stored in the cloud to research the real activities, recreation use, values, needs and benefits visitors seek by studying the statements and queries people make on a daily basis. This includes the use of big data and research into network information flow (Stephens-Davidowitz 2017). There is also a rapid increase in research that examines or estimates visitor use patterns in parks and protected areas using data and geotagged photos shared on social media platforms such as Flickr and Instagram (Tenkanen et al. 2017).

We can also embrace these advances in technology, because this cultural change is a given and focuses on leveraging technology to create community and a platform for engagement with public land managers. In other words, we can evolve and adapt to the changing environment instead of resisting it, using social media and reviews to better engage with recreation users. We live in a time when many of our sociocultural and ecological systems are unraveling. The complexity of this environment makes the future very difficult to predict. In this chaotic environment, we should consider approaching change from the same perspective adopted by the U.S. Department of Defense, one characterized by the acronym VUCA (volatile, uncertain, complex, and ambiguous) (Kohl and McCool 2016). We can use the power of digital media to achieve management objectives. Technology really has two distinct influences on sustainable recreation: the first relates to how people connect to the land, and the second to how the agency can collect data for research and management. The second can be as simple as counting visitors and monitoring change (for which techniques are being developed), or gathering more qualitative data-like preferences (Fisher et al. 2018, Sachdeva 2020).

This new experience set, enhanced via both onsite and virtual technology, could help transform people into citizen conservationists (Miller et al. 2020). The path could be to encourage and engage with technology that enhances people's connection to the real world instead of alienating people from it. Managers should also begin discussions about individual choices regarding technology and its use, and in some cases the voluntary simplicity and the benefits of forgoing technology to build one's sensitivity and awareness of place.

Another area to pursue is researching the effectiveness of place-based websites that invite people to upload comments related to their experiences. For example, the Chugach National Forest has a "Stories of the Sound" website and a number of Facebook pages. The Forest Service's "Talking Points" program allows people to upload comments related to specific management issues, conflicts, and needs regarding national forests and grasslands as well as other public lands.

The use of enhanced representations of reality can help address the problem of “landscape amnesia.” The baseline perception of what should be deemed natural, healthy, or desirable is shifting with the generations. Landscape change is often such a slow process that our temporally limited perception is not able to make well-reasoned judgments about what constitutes desirable or acceptable conditions (Diamond 2005, Wuerthner 2008). Using VR and AR technology, simulations could be made that allow the public to see what the landscape looked like 200 years ago, well before the collective impacts of timber removal, overgrazing, fire suppression, and invasive species—or to look 200 years into the future after a forest treatment. This simulated time travel could also include human cultural elements that include the built environment.

Recreation design including desired conditions in natural settings and in specific locations could also benefit from human-computer interaction. Computers could help support positive relations within ecosystems and recognize the limits of technical control and how natural features and process can “talk back” within the contexts of social construction and interaction. Recreation planners could help reveal the consequences of interactions with nature, allowing participants to experience a heightened awareness of the effects of agency and visitor action as an intrinsic part of the world. These simulations could even be done from the perspective of other actors such as natural features and wildlife and help planners and the public alter or expand their experience of place and habits of perception by creating situations that combine scientific models and felt life experiences (Bidwell and Browning 2010).

Education is needed in our digital age. It is important to know when to use technology and when to avoid it. Technology has cognitive affects, social implications, emotional outcomes, and even ethical consequences. There should be ongoing dialogue, and in some cases education, to help visitors make good decisions about technology and even to overcome the increasingly common condition of technology addiction (Yamamoto and Ananou 2015). We can use social media to start this dialogue about appropriate technology and individual restraint to help gain important recreation benefits and reduce conflict with others.

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Compelling Questions

1. How does management take new technology into account and then use this technology to enhance visitors’ connections with nature and place-based stewardship?
2. What new quantitative data collection methods can be developed that use the data-rich technological environment to research the activities, economic value, and levels of recreation use?

3. What new qualitative data methods exist that can anticipate changing values, needs, and benefits that visitors are seeking and how people connect to the land?
4. How can social media be mined for new quantitative data methods that take advantage of the growing use of geotagged photos shared on social media platforms such as Flickr and Instagram?
5. How can land managers effectively use technology to create community and as a platform for increasing citizen engagement?
6. How can recreation satisfaction monitoring be replaced by methods that use social and other digital media, including reviews?
7. What new technology allows public land managers to crowdsource much of the data now being gathered by employees? This includes natural resource conditions, built facilities condition, visitor satisfaction and preferences, evaluation of management actions, and prioritization of place-based recreation benefits.
8. How can managers anticipate and mitigate the impacts to outdoor recreation resulting from new technology and social networking?
9. How do we engage with the commercial development of technological tools to help citizens be better stewards of the environment while recreating in the outdoors?
10. What policies do we need that consider the legal environment and ethics of accessing or requesting information from GPS, social media platforms, and other personal information and smartphone apps in natural areas?
11. How should existing planning frameworks for wilderness management or the ROS framework consider the effect of digital technology and connectedness on the primitive recreation experience?

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