



RELEVANT RESEARCH FOR PRACTICE 2017: FOCUS ON CONSERVATION AND RESILIENCY

Relevant Research for Practice 2017: Focus on Conservation and Resiliency

**A Summary of Recent Research Articles with a Direct Application for
Public Parks and Recreation Agencies**

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**Compiled for the National Recreation and Park Association (NRPA)
through contract with North Carolina State University
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Purpose

One of the ongoing challenges for the field of parks, recreation and conservation (P&R) is the ability to translate current high-level academic research to the everyday practice of P&R management and application. P&R research is often conducted and disseminated by faculty and graduate students at universities, primarily for publication in academic journals. The language and complex methodologies required by these outlets are often ill-suited for the practice-level settings of most professionals (practitioners) working in the field. Further, academic journals typically are not freely accessible to practitioners interested in reading this research, as most journals are only available through paid subscriptions.

There are thousands of articles published in journals and other scholarly sources each year. To help summarize the wealth of research findings generated each year, the National Recreation and Park Association (NRPA) contracted through North Carolina State University (NCSU) with Teresa L. Penbrooke to serve as compiling editor. See more about the approach and creation of this brief in Section II.

This summary report is intended to help bridge the current research–practice gap for practitioners in the field and their decision makers by identifying peer-reviewed published research articles from 2015 to 2017 that provide an *evidence base* and/or could have a potential impact on the practice of P&R. A thematic literature search conducted in Spring 2017 focused on the broad category of NRPA’s **Conservation Pillar (of course, the Conservation Pillar interacts with the other two NRPA Pillars: Health and Wellness, and Social Equity)**. The summary content provided includes references for 33 articles. They included both review articles and empirical research articles that effectively illustrate relevant themes, organized under the following key conservation topics and keywords.

Community Resiliency and Capacity Building

Covers research and practices related to how agencies can address natural and human-made disasters and change, including preparation and conservation of natural areas to withstand, protect, and revitalize the communities they serve.

Human Restoration from Natural Areas

Includes effects of health impacts, nature “dosing,” park prescriptions, and the potential return on investment from providing natural environments in communities.

Measuring and Communicating the Role of Conservation

Includes research related to the development of updated evaluation metrics and measurement tools to help communities determine how their parks and conservation areas are performing and providing service. This includes evaluating and communicating the role of education and stewardship to promote conservation, quality of life, and community capacity building.

Research Brief Organization

Section I explores these three broad themes, with selected summaries of research on specific topics, followed by a brief summary discussion of *So What? – What might this mean for the practitioners in the field?*

Section II describes more on the approach and background for this translational research brief.

Section III includes a full listing of references for those who want to delve more deeply into the topics.

I. Key Themes Identified from Recent Literature on Conservation, 2015 to 2017

Major relevant topics identified from the literature review are summarized below with a focus on research and practices related to conservation by local P&R agencies.

Note: Highlighted text boxes are included as key summary ideas for each topic and represent the editor's *practitioner key takeaway* from the research, but may not have been explicitly stated as such in that research.

A. Resiliency and Community Capacity Building

There is a strong trend in the research related to addressing how a community can prepare for and respond to natural disasters, including systematic planning methods for (and evaluation of) environmental, cultural, and social resiliency related to conservation in those communities.

Looking at Conservation in Communities Through an Ecosystem Lens

In recent years, the management of community services (including P&R) has shifted toward a *systems approach*, wherein more urban environments are looked at under an *ecosystems* lens. As outlined in a systematic review of related topics, Luederitz et al. (2015) identified 3,266 research articles from 2002 to 2012 to closely examine 201 different studies. The definition of **ecosystem services** is “the conditions and processes through which natural ecosystems, and the species that make them up, sustain and fulfill human life.” The article identifies that in the context of a rapidly urbanizing world, understanding complexity and managing human–environment interactions within urban areas is vital if we are to balance the interdependent social and ecological goals of sustainability. Urban planning can tackle these sustainability challenges by addressing the inherent linkages between the interacting economic, environmental, and social components of coupled human–environment systems. A comprehensive planning approach has the potential to harmonize human–environment interactions and mitigate the harmful impacts of urbanization. Such an approach requires planners to understand and value nature’s multiple contributions to the quality of urban life. This work provides a framework for conceptualizing and managing human–environmental interactions within the broader context of sustainability.

A comprehensive planning approach has the potential to harmonize human–environment interactions and mitigate the harmful impacts of urbanization.

The ecosystem services concept is transitioning from a model for understanding human–environmental interactions to an explicit management tool. This stresses the need to reassess how urban ecosystem services research is undertaken and linked to practice. The review highlighted six key challenges for urban ecosystem services to consider going forward, including needs for:

1. More comprehensive spatial and contextual coverage of research
2. Stronger clarification of definitions across disciplines
3. Addressing challenges of having limited transferability of data
4. Stronger stakeholder engagement (especially in planning)
5. More integrated research efforts across boundaries of all types
6. Closing the feedback loop between benefits and subsequent management of urban ecosystem services in the context of sustainable urban planning agendas

Ecological Changes from Human Impact

The impacts of bringing visitors onto protected lands are not without challenge. A review of 80 years of research and synthesis was conducted to analyze this field of study, known as *recreation ecology*, and defined as the scientific study of environmental changes associated with visitor activities, including the role of influential factors (Marion, Leung, Eagleston & Burroughs, 2016). This review focused on recreation impacts on vegetation, soil, water and wildlife, including the role of key influential factors. Findings indicate that most of these impacts occur on or near recreation sites (e.g., campsites, picnic sites, boat launches, and vista points) and trail corridors. The key aspects include soil impacts (such as compaction), vegetation impacts (such as trampling), water impacts (degradation of water quality), and wildlife impacts (changes to habitat, migration patterns, etc.). The synthesis concluded that to integrate wilderness protection and recreation objectives, managers should require objective information on recreation impacts so they can evaluate the ecological and social significance of impacts as well as their control. The results suggest that advances in recreation ecology have gone further with vegetation and soil, and research on wildlife impacts has gained momentum in recent years. Recreation impacts on water quality remains a less active research area. The body of knowledge on recreation impacts has demonstrated a potential for informing visitor planning, management, and education strategies, and actions for implementation in the wilderness and other protected natural areas.

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Climate Change and Resilience Planning

The existence of climate change is uniformly accepted by peer-reviewed researchers in P&R and related fields. As summarized from Campbell, Svendsen, Sonti & Johnson (2016), municipalities across the world are attempting to address climate adaptation, resilience planning, and green infrastructure investment, focusing on the role of the environment in enhancing the quality of life for urban dwellers. In this era of climate change, policymakers and land managers increasingly view parks as potential natural buffers to help mitigate the effects of storm surges, sea level rise, and combined sewer overflow.

However, these researchers focused more on parklands as space for cultivating *social resilience* through civic engagement, active use, and stewardship activities. They found that urban parkland is a crucial form of *nearby nature* that provides space for recreation, activities, socialization, and environmental engagement and supports place attachment and social ties. Their findings indicate that parks, through use by and interactions with humans, are producing vital cultural ecosystem services that may help to strengthen social resilience.

Parks are producing vital cultural ecosystem services that may help to strengthen environmental and social resilience.

Certain services were more easily detectable than others through the assessment technique, including recreation, social relations, and sense of place. The assessment method was designed to be spatially explicit, scalable, and replicable so that natural resource managers engaged in park management and/or resilience planning could apply this method to individual sites, in particular districts, such as vulnerable waterfront areas, and citywide. The researchers from the USDA Forest Service, working with New York City Parks, used ecosystems assessment tools to evaluate the elements of parks as a key element in cultural and environmental ecosystems. They present that understanding patterns in park use, function, and meaning at the site scale can inform resilience planning at the district and citywide scales. By addressing planning at these multiple scales, such data can bridge management arenas and enhance governance. The study includes a relevant literature review, various assessment tools, and characteristics to consider for better resiliency planning.

Creation of Natural Coastlines to Protect Communities

There is evidence that shorelines that have intact, natural coastal habitats (e.g., wetlands, dunes, mangroves, and coral reefs) experience less damage from severe storms and are more resilient than hardened (built out) shorelines. These findings can help communities prepare for and recover from impacts from storms and sea level rise (NOAA, 2015). Quite often, these areas are managed by parks agencies. Areas with natural coastal habitats also have higher populations of fish and other living organisms that are important for shorebirds, recreation, and commercial purposes.

Living shoreline is a broad term that encompasses a range of shoreline stabilization techniques along estuarine coasts, bays, sheltered coastlines, and tributaries. A living shoreline has a footprint that is made up mostly of native material. It incorporates vegetation or other living, natural “soft” elements alone or in combination with some type of harder shoreline structure (e.g., oyster reefs or rock sills) for added stability. Living shorelines maintain continuity of the natural land–water interface and reduce erosion while providing habitat value and enhancing coastal resilience. Park and recreation agencies that manage coastal shorelines can make a case for maintaining and/or creating living shorelines as opposed to hard (built out) coastlines to enhance coastal community resilience.

Living shorelines reduce erosion, while providing habitat value and enhancing coastal resilience.

Balance of Conservation and the Role of Tourism

There is a continuing challenge of balancing conservation and human recreational use of parkland around the world, whether that use is for local community residents or for attracting and accommodating tourists. In 2017, a research article compiled and compared the summary topics from the decennial World Parks Congress (WPC looks at the most common topics discussed in 2014 in Sydney, Australia, as compared to those in 2003 (Spenceley, 2017)).

Key findings from the research indicate that, on the global stage, there is greater acceptance that tourism can be a major contributor to conservation. The summary indicates a variety of key topics for future application related to conservation of natural areas balanced with tourism. The summary states that there are 10 key areas for protected area tourism research and planning in the future. These include visitor use monitoring; park tourism economic impact monitoring; park finance; professional competencies for tourism management; building public support; visitor satisfaction; licenses, permits, leases and concessions for tourism; pricing policies; management capacity; and park tourism governance.

The importance of tourism is being increasingly acknowledged as a potential major contributor to conservation.

Sustainable Tourism: Development Toward Resilience

Cheer & Lew (2017) further explored how the study of tourism is inherently multi-disciplinary and related to conservation and sustainability. The research covers traditional disciplines, such as geography (physical and human), environmental science, and a wider range of subdisciplines that includes cultural studies, regional and international development, economics, anthropology, politics, mobilities, hospitality management, community development, and poverty alleviation. The authors assert that an academic area known as *Tourism Geography* is especially pertinent, given the focus on people

Tourism Geography is especially pertinent to the conservation realm, given the focus on people and place, time and space, and the many variables that inhabit the tourism system.

and place, time, and space, and the many variables that inhabit the *tourism system*. Their work examines *sustainable tourism* and identifies three essential approaches: (1) maintaining stability and growth of tourism economic activities; (2) greening the tourism industry by aligning its business activities (individual hotels, attractions, services) with the goals of sustainability, as is seen in Green Globe types of certification; and (3) employing comprehensive approaches to sustainable development that involve the tourism industry.

Building Coastal Climate Readiness Relative to Tourism Impacts

Based on a study of Minnesota’s North Shore of Lake Superior, Bitsura-Meszaros et al. (2015) reviewed relevant literature on how climate change may alter conditions of natural resources and recreational infrastructure. The research includes a review of the impact on the behavior of outdoor recreationists and tourists and subsequently the economies of local communities. The term *community climate readiness* refers to (1) local communities’ current ability to respond to climate-driven environmental changes (adaptive capacity) and (2) climate-related risks to nature-based recreation resources and tourism destinations (destination risk).

The research explored an interdisciplinary approach to determining community climate readiness, through the integration of *hydroclimatic modeling*, economic analysis, and social science to determine and improve coastal communities’ climate readiness. A primary goal of the project was to identify opportunities for North Shore nature-based recreation and tourism providers to either mitigate or cope with risks to local recreation resources and tourism destinations. The project’s framework was designed to be helpful to practitioners and policy-makers in their own explorations of coastal climate readiness. The research team’s approach reflected the multifaceted nature of climate readiness and was designed to include a replicable framework. The authors concluded that using hydroclimate scenarios to frame and inform economic projections help capture the interrelatedness of various related components to help assess and mitigate risk for communities and destinations.

Hydroclimate scenarios can help frame visitor surveys and inform economic projections to help assess climate readiness and mitigate risk for communities and destinations.

Climate Change and Increasing Wildfire Potential

The research of Abatzoglou & Williams (2016) indicated that the likelihood of wildfires appears to be increasing due to climate change. There is increased forest fire activity across the western United States in recent decades, which has contributed to widespread forest mortality, carbon emissions, periods of degraded air quality and substantial fire suppression expenditures. Although numerous factors aided this rise in fire activity, observed warming and drying have significantly increased fire-season fuel, which has increased the likelihood of fires. Human-caused climate change was responsible for more than half of the documented increases in fuel aridity since the 1970s and has doubled the cumulative forest fire area since 1984. The analysis suggests that climate change will continue to increasingly promote wildfire potential across western U.S. forests in the coming decades and pose threats to ecosystems, the carbon budget, human health, and fire suppression budgets.

Climate change will continue to increasingly promote wildfire potential across western U.S. forests.

Using Social Interactions to Mitigate Wildfires

Wildfires always have happened and, likely, will continue to happen or increase. Parks and fire management agencies often seek to engage residents, as well as local entities, neighborhood groups and neighbors, in their goals to prevent fires and mitigate potential damage. Social interactions occur in formal, organized settings (such as community meetings), and informal contexts (such as conversations between neighbors).

Recently, Dickinson, Brenkert-Smith, Champ & Flores (2015) researched social interactions associated with beliefs about wildfire risk and mitigation options, and which may effectively shape wildfire mitigation behaviors. They found that mitigation actions should specifically target vegetative fuel reduction, especially in populated areas. Perceived wildfire probability may mediate the relationship between types of social interactions and vegetative mitigation behaviors, while perceptions of aesthetic barriers and a lack of information play a mediating role in the case of fire-specific formal interactions. These study results suggest that social interactions may allow mitigation and prevention behaviors to “catch fire” within a community. Wildfire education programs can leverage these interactions to enhance programmatic benefits.

Social interactions may encourage mitigation and prevention behaviors to “catch fire” within a community, and wildfire education programs can effectively leverage these interactions.

B. Human Restoration from Natural Areas

Attributes of Nature Areas for Health – Restorative Effects

There is a strong recent body of work examining the *restorative effects of nature* on humans, especially regarding stress reduction, reduced attention deficit disorder, and other forms of psycho-emotional restoration. The TDK Foundation has produced an open-source summary research brief that provides an overview of the elements that have been shown in the research to be correlated with access to nature and green space, such as those found in parks and other natural areas (Wolf & Housley, 2013; Larson, Jennings & Cloutier, 2016).

This summary review of more than 100 studies confirms that living near green areas, having a view of vegetation and spending time in natural settings provide benefits. Some studies indicate that even watching images of nature on a computer or television monitor can be restorative. Green spaces, such as parks and natural areas, including those in the most built-up cities, provide restorative settings that offer people respite and recovery from daily and chronic stressors. The EPA has provided the following model of the interactions of *Ecohealth Relationships*.

Stress reduction, mental restoration, and other health benefits are significantly associated with living and being near green areas.

Ecohealth Relationships



Source: EPA, 2017

https://enviroatlas.epa.gov/enviroatlas/Tools/EcoHealth_RelationshipBrowser/index.html

Design Elements for Enhancing Visitor Preference and Restoration Response

Recent research has focused on trying to determine the precise design elements and visual cues that produce the health benefits (Hunter & Askarinejad, 2016). These insights are valuable to designers who can consider them when planning and building. This research provides a method for identifying which specific physical attributes of an environmental setting are most likely to influence preference and restoration responses. From this integration, a list of physical attributes emerged that define aspects of spatial structure and environmental content found to be most relevant to the perceptions involved with preference and restoration.

Design elements, attributes, and visual cues have been identified to help create and manage environments that produce health benefits.

The physical attribute list offers a starting point for deciphering which scene stimuli dominate or collaborate in preference and restoration responses. To support this, functional definitions, and metrics, as methods for attribute quantification are presented and can provide an expanded evidence base for designers and stewards of the built and natural environments.

Human Response to Nature Dosing and Park Prescriptions

In addition to determining the attributes that influence response from natural environments, researchers are evaluating the amount of nature one needs to get the response — called *dosing* (Shanahan, Fuller, Bush, Lin & Gaston, 2015; Shanahan et al., 2016). These studies have shown that human well-being responds to the presence of nature and that the scale of response can vary with duration of exposure.

However, a simplistic approach to defining nature limits the understanding of how its variation influences the scale of the health response. Variation in the types of nature, not just its presence, can be important for delivering a range of well-being outcomes. There are a number of variables at play, but, in general, the studies have found evidence to suggest that a very rapid improvement in psychological well-being is possible in response to very low durations of nature dosing, after which the rate of response may either plateau or decline. In other words, having access to nature is beneficial, but it may not take too much, and the benefits may lessen or plateau over time.

Primary moderating factors appear to be socioeconomic, cultural, personal preferences, knowledge, perception of safety, demographic, and physiological. Urban nature may provide a cost-effective tool to reduce health risks because there is a growing body of evidence showing it has links to improved physical, psychological, and social well-being. Brown et al. (2016), examined the association between measures of vegetation and chronic medical conditions in a large population sample of Medicare beneficiaries in Miami-Dade County, Florida. That study found that *greenness* or vegetative presence may be effective in promoting health in older populations, particularly in poor neighborhoods, possibly due to increased time outdoors, physical activity, and/or stress mitigation.

Park prescriptions are gaining in popularity, as researchers learn more about the benefits of spending time in nature. There is more to learn, however, about the ways in which nature imparts these benefits and the *dose* of nature required to achieve them.

These types of studies are aligning with a whole newer body of research related to physicians or other medical professionals *prescribing* parks and natural areas for health. Seltnerich (2015) provided a concise, open-sourced, available summary of some of this burgeoning research, including the collaborative work on the *Healthy Parks Healthy People* initiative by the National Park Service (NPS) and NRPA. Many other researchers (e.g., Mowen, Barrett, Graefe, Kraschnewski & Sciamanna, 2017; Sallis et al., 2016; and Zarr, Cottrell & Merrill, 2017) have continued the call to action for encouraging physical activity, including prescribing activities on public parks, natural areas, facilities, and trails, as a standard of care by physicians.

Ecosystem Services, Health and Equity

While urban green spaces provide an array of ecosystem benefits and services that support physical, psychological, and social health, these benefits frequently are not distributed *equitably*. Jennings, Larson & Yun (2016) explored the relationships between cultural ecosystem services provided by urban green space and the *social determinants of health*, as outlined in the United States *Healthy People 2020* initiative (www.healthypeople.gov). Specifically, they (1) explored connections between cultural ecosystem services and social determinants of health, (2) examined cultural ecosystem services as nature-based health amenities to promote social equity, and (3) recommended areas for future examination of links between urban green space and public health within the context of environmental justice.

Strategically integrating ecosystem services, health indicators, and environmental justice concepts is critical to sustainable development.

The approach informs how environmental and public health professionals can assess environmental conditions within communities and achieve mutual goals. The resultant framework links urban green space and public health, capitalizing on some of the inherent strengths of ecosystems services approach (such as interdisciplinary origins, communication tools), and helps to highlight opportunities for additional progress (such as enhanced alignment with existing policies and established methodologies). These researchers concluded that strategically integrating concepts such as ecosystem services, the indicators from Healthy People 2020, and environmental justice to address pressing environmental and public health challenges is critical to sustainable development.

Connections between social determinants of health benefits linked to cultural ecosystem services

Social Determinants of Health	Benefits linked to Cultural Ecosystem Services
Health and health care	Physical Well-Being Psychological Well-Being
Neighborhood and built environment	Sense of Place Community Satisfaction Reduced Crime and Incivilities Access to Healthy Food
Social and community context	Social Cohesion Social Capital
Education	Academic Performance Cognitive Functioning
Economic Stability	Property Values Community Revitalization Socioeconomic Status

Adapted from Jennings, Larson & Yun, 2016

C. Measuring and Communicating the Role of Conservation

Many researchers have closely examined different *metrics* and measurement tools to help communities assess the performance and extent of services from parks and conservation areas. Others are evaluating and communicating the role of education and stewardship in our communities to promote conservation, quality of life, and community capacity building.

Advances in Metrics and Analysis of Levels of Services

There are mixed results and the research continues, but there are several strong tools that may provide metrics for local P&R active and conservation planning and management. As summarized and addressed by Kaczynski et al., (2016), access to and use of parks are associated with diverse environmental, economic, social, psychological, and physical health benefits. They described that despite enthusiasm among researchers and planners in several fields (e.g., urban planning, parks and recreation, public health), it remains unclear which park metrics correlate with park use and how best to combine diverse indicators into a strong measure of park access and exposure.

A lack of comprehensive and standardized metrics for measuring park exposure limits park-related research and health promotion efforts. These researchers developed an empirically derived and spatially represented index of park access (called *ParkIndex*) to allow researchers, planners and citizens to evaluate the potential for park use for a given area. Results from Kansas City, Missouri, showed that two park summary variables — the number of parks and the average park quality index within one mile — were positively associated with park use. *ParkIndex* could provide standardized metrics of park access that combine elements of both park availability and quality, and they can be represented spatially.

Standardized metrics and methods are now available to analyze park access and functionality, including geospatial analysis of park availability, proximity, and quality.

Layton (2016) found that characteristics of the green space environment within proximity (1/3 mile) of an individual's home may not be reliable predictors of either opinion of overall green space adequacy in the community or the number of park visits. However, characteristics of the participant, including age and gender, relative importance assigned to parks and community lived in were found to be reliable predictors. Layton has used digital *composite-values methods* (CVM) in a geospatial levels-of-service (LOS) analysis system called *GRASP*® to address park and recreation components for more than 100 U.S. communities (www.dcla.net).

Layton's study validated some methods and findings, combined with quantitative survey needs-assessment results from several detailed communities. Findings aligned with other research in the literature, indicate that perceptions of green space do not reliably align with objective measures. This suggests that strategies matching green space allocation with neighborhood demographics may be more reliable than those based on normative standards or perceived needs. The results also suggest that subjective variables, such as green space quality, awareness, design, and aesthetics, may play a stronger role than objective variables, such as quantity of green space and distance from home, in predicting behavioral outcomes associated with green space. Other recent research has suggested similar findings, especially as related to park usage in low-income urban areas (Cohen et al., 2017).

Advances in Geospatial Analysis for Protected Areas and Destinations

As explored by Supak, Brothers, Bohnenstiehl & Devine (2015), understanding *geospatial demand* for destinations can improve management decisions affecting destination planning, marketing, natural preservation, and resident and visitor experiences. Visualization and analysis of demand markets are significantly enhanced by the capabilities of *geographic information system* (GIS) technology and help to support management objectives.

Their study implemented traditional desktop GIS as well as a free, web-delivered decision-support tool for tourism planning and marketing to assess approximately 7.5 million overnight accommodation reservations made for federal recreational facilities. The study provided an overview of analysis methods and concluded that market profiling using GIS analysis, including local, regional, and national customer origin demand markets, can be valuable for any tourist or visitor destination. This type of analysis can help both national parks and local gateway communities make smarter management and marketing decisions.

GIS-enhanced demand analysis can help both federal and local destination and park managers make better management and marketing decisions.

New Online Geospatial Tools for Tracking Environmental Change

The Environmental Protection Agency (EPA) has created an online open tool called *EnviroAtlas*, which includes both current and future drivers of change, such as land use and climate, for addressing issues of adaptation, conservation, equity and resiliency (Pickard, Daniel, Mehaffey, Jackson & Neale, 2015). In addition to geospatial data, EnviroAtlas includes geospatial and statistical tools and resources that support research, education and decision-making to facilitate the practice of ecosystem services science by providing a framework to track conditions across political boundaries and assess policies and regulations.

EnviroAtlas includes a growing, free, online dataset of geospatial and statistical tools and resources that can support research, education and decision-making.

The researchers conclude that EnviroAtlas is a robust research and educational resource with consistent, systems-oriented information to support nationally, regionally, and locally focused decisions. In addition, EnviroAtlas includes a browser specifically related to Eco-Health Relationships and a strong inter-relational model and reference bibliography of health benefits from a variety of factors (see section on health factors related to nature on following pages), many of which are managed by P&R (EPA – EnviroAtlas, 2017; Jackson, Daniel, McCorkle, Sears & Bush, 2013). The number of local municipalities with data represented continues to grow and can be found at www.epa.gov/enviroatlas/municipalities-within-enviroatlas-boundaries.

Using Social Indicators to Provide Insights for Prioritization of Conservation

In spatial planning and management of protected areas, there is increased priority given to research that integrates social and ecological data. However, public viewpoints of the benefits from ecosystems have not been easily quantified for natural resource management decisions.

Social value indicators have been sometimes sidelined in decision-making. This study elevated the importance of these metrics, with insights as to how they can inform natural resource management.

Van Riper, Kyleb, Sherrousec, Bagstadc & Sutton (2017) provided a strong integrated history of this research and a summary of *ecosystem indicators*, along with methods for surveying visitors to identify values and beliefs when visiting parks. The researchers provided compelling evidence of ecological and economic values that may help better understand changing resource conditions. This study integrated social values for ecosystem services and environmental conditions across spatial scales. The results illustrated reasons how stakeholders derived benefits from resources in a national park. Given that social value indicators sometimes sidelined in decision-making, this study elevated the importance of these metrics to support spatial prioritization of conservation and provided insight into how social and ecological data can be blended to inform natural resource management decisions.

Assessing Soundscapes in Parks and Protected Areas

Most research on outdoor recreation environments focuses on wildlife, vegetation, soil, water and air domains, with less attention given to the acoustic environment. The latter can be an important aspect of a quality experience in the natural environment. A recent study (Li, Halim, Burroughs, Penbrooke, Smith & Seekamp, 2017) reviewed this critical component of the acoustic environment in parks and protected areas, using innovative *immersive virtual environment (IVE)* reality techniques and recorded audio sounds to gauge visitor preferences in varying *soundscapes* (which describes a sound environment in one location). The manuscript reviewed research on soundscapes conducted in other disciplines, such as physics, psychology, and sociology studies, and documented how soundscapes influence an individual's health, well-being and sense of place. The research aimed to identify people's soundscape preferences in parks and protected areas, their emotional perceptions toward these sounds, and the recreational activities that are impacted by these sounds.

Soundscapes can be viewed as a valuable natural resource and be assessed, as they have a significant impact on visitors' experience.

The study indicated that some researchers have advocated that soundscapes should be viewed as a valuable natural resource, as they have a significant impact on visitors' experience (i.e., satisfaction toward the environment, perceived crowdedness of the setting, perceived tranquility and relaxation) in parks and protected areas. Also, the research provides an overview of the IVE methods and potential implications for managers and planners, especially when looking to address or mitigate soundscapes in their areas of oversight.

Teaching the Next Generation to Address Climate Change

Along with their work to identify methods to measure the effects of climate change, a variety of researchers are also trying to understand what communities and educators can do about it. In recent studies, Stevenson & Peterson (2015) and Stevenson, King, Selm, Peterson & Monroe (2017) examined results from related studies and researched a variety of ways to engage and promote pro-environmental behaviors in youth, both through potentially negative methods (e.g., inciting fear) and positive methods at both in-school and out-of-school programs. References are provided for dealing with differing political and cultural viewpoints and beliefs.

The collective research suggests that understanding how to build climate concern in ways that lead to action may be particularly important to younger audiences, both because climate change is projected to be a defining issue of their generation and because they may be most susceptible to

Reaching current adolescents and children with climate change messages and education is important for community P&R, as they will soon become voters, scientists, industry leaders, and policymakers.

the negative effects of despair. Current projections estimate that the brunt of climate impacts, such as sea level rise; more severe storms, flooding and droughts; and the associated challenges related to food security and water distribution, will be felt in the mid-21st century, when current adolescents and children will become voters, scientists, industry leaders, and policymakers.

Accordingly, understanding how to unite future generations in climate action is critical to equipping future leaders to meet the challenges they will face, and special attention should be paid to how to avoid the counterproductive effects of despair. While not specifically focused on P&R, this body of work may provide community P&R agencies with a basis and suggested approaches for framing these topics and engaging youth in discussions on resiliency, climate change, and what they can do about it.

Quantifying Health Impacts from Parks and Conservation Areas

Because of their ubiquity across the country, many people recognize parks as important environments for promoting active lifestyles. According to Floyd, Suau, Layton, Maddock & Bistura-Meszaros (2015), a growing number of studies suggest that parks contribute significantly to physical activity among adults and children. Research conducted in parks demonstrates that particular areas or components within parks produce more activity than others. In reviewing various studies, researchers obtained baseline measures on park use and activity in a park before an improvement occurs and compare the measures to data obtained following the improvement.

Parks are used more often and users are more active following improvements or renovation. Now the changes can be estimated using evidence-based measures.

In general, there is greater use of parks following improvements or renovation. The researchers went beyond measuring activity levels to assigning *active energy expenditures* (AEE), along with estimates of capital costs for the components within the parks, using regionally adjusted estimates from across the United States. These estimates can help park planners and managers make estimates of potential increases of activity and return on investments for park improvements.

Understanding Drivers of Place Protecting Behaviors

While often viewed as conflicting behaviors, resource-based adventure activities have a unique potential to foster environmental stewardship. Researchers found that connections to place may promote adventurers (such as surfers) to assist park managers in simultaneously promoting enjoyable visitor experiences and achieving environmental sustainability. For example, Larson, Usher & Champon (2017) found and examined links among recreation, conservation, and *place attachment* by comparing the pro-environmental attitudes and behaviors of surfers and other types of recreationists at Cape Hatteras National Seashore.

Park managers should consider the powerful role that adventure recreationists may play as environmental stewards and advocates.

The research revealed that when compared to non-surfers, surfers were more frequent visitors and reported significantly higher levels of place attachment. When controlling for other variables, surfers were also more likely than other recreationists to engage in place protecting and pro-environmental behaviors, such as participating in environmental groups and picking up litter on the beach. Similar results have been observed among other types of recreationists, such as hunters and birdwatchers (Cooper, Larson, Dayer, Stedman & Decker, 2015), highlighting the potentially powerful role that recreationists may play as environmental stewards and park advocates.

D. So What? What Might This Research Mean for Practitioners in the Field?

This review of recent literature relevant to *NRPA's Conservation Pillar* indicates vast areas of ongoing and newer research. Terms were included that may be new to some practitioners, italicized for emphasis. Park and recreation professionals may consider adopting this language when communicating to decision makers and the public. Much of the work presented focuses on validating findings on issues that some may perceive as controversial, including climate change and preparing for rising sea levels. This research can help to provide talking points and justifications for practitioners who often need to present on these difficult topics to boards, councils, commissions, and the public in a non-partisan way.

There appears to be a shift in the way many researchers are approaching conservation, adding context to important site-specific issues through evaluation at a community *systems level* (ecosystems and/or green infrastructure) approach. For practitioners, it is common that front line and newer staff members need to deal with the detail of important site-specific issues. Senior-level practitioners, however, may find that they have to think more broadly across the full community system. Often, decisions that impact conservation, health, and/or social equity outcomes require complex integration of many variables in the system (including environmental, social, physical, and financial aspects). Adopting a *systems approach* model for discussions and planning efforts helps to provide a big picture for tough decisions when the answer is, "It depends." Many of the newer evaluation methods, especially technology for complex geospatial and other data set analysis tools, allow for stronger quantitative and qualitative analysis for P&R. Practitioners can do well to adopt these methods and learn to use them as they become proven and available.

The biggest shift gleaned from this research brief is a growing focus on demonstrating how conserving natural areas is not only important for the environment, flora, and fauna in our natural world, but is also essential for human health and community vitality. Most P&R professionals already know this, but the newer identification of the benefits, such as the proven beneficial effects on physical and mental health from nature, heat island, and CO₂ reductions from increased tree canopies, and the benefits from natural shorelines on sea level rise, are providing quantifiable and measurable outcomes that demonstrate to decision makers how P&R assets can provide a return on investment beyond immediate financial return. As just one example, some communities are now using the active energy expenditure (AEE) metrics (Floyd et al., 2015) combined with enhanced component-based geospatial analysis to show how conservation and park areas can increase physical activity. Both Golden, Colorado, and Arlington Heights, Illinois, have used AEE research to try to improve community health in the long term.

Another welcome trend for practitioners is a growing trend for researchers and publishers allowing more open-sourced online publications, rather than publishing only in journals requiring paid subscriptions. In some cases, this is the result of research funders requiring easy access to research findings. Of the 33 articles summarized, 39 percent (13) included some form of open-source availability (others are available from the reference contact). Open access to research findings does not negate the importance for *translation of knowledge* to go both ways. While this brief provided digestible summaries for practitioners, the researchers included often voiced a desire to learn more about what the practitioners need and how their work is being implemented in the field. Readers are encouraged to take time to delve deeper into any area of interest, and make connections with those authors doing the research that seems most relevant to them.



II. Description of Approach to the Translational Research Brief Creation

To create this *translation of research to practice brief*, a literature search was conducted using relevant keywords, journal titles and active authors, as identified from the *CabAbstracts Journal Index*, *Google Scholar* and from outreach to identified experts working in this realm. Subjective judgments were made by the editor regarding the selection of articles with current application to practice or provision of information for agency decision-making using the key, guiding questions and a focus on NRPA's *Conservation Pillar*.

Key Questions Guiding Selection for Inclusion of Topics and Articles

- Does the article appear to have direct application to management or practice in the field of P&R administration, completed from 2015 to 2017?
- Does the article include a focus on a topic that aligns with the NRPA Conservation Pillar?
- Is it possible to translate the article to a more concise summary that makes sense in P&R professional layperson's language?
- Can practitioners get access to the full article if desired, either directly from the contact listed or through reliable open-source channels?

More than 200 articles were reviewed for this search. Thirty-three were selected for inclusion, due primarily to space and topic constraints. Thank you to the more than 30 academic and P&R practitioner professionals who reviewed this summary before publication.

Suggested Reference Citation:

Penbrooke, T.L. (2017). *Relevant research for practice – 2017: A summary of recent research articles perceived to have direct application for public parks and recreation agencies. Focus: NRPA's Conservation Pillar, protecting open space, connecting people to nature and engaging communities in conservation practices.* National Recreation and Park Association Publications. Ashburn, VA.

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