Rural Connections

A Publication of the Western Rural Development Center

$9.95
Sept. 2010
wrdc.usu.edu

Healthy Communities
Improving Health and Well-Being
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Millions of Americans enjoy a standard of living that previous generations and people living in other parts of the world only dream of. To a large extent, hunger in America has been eliminated. Americans are spending smaller proportions of their income on food than at any time in the past and less than any other nation in the world. Advances in health care are astonishing. Yet, health and wellness are becoming issues of growing concern. Unfortunately, it seems that many Americans are translating high incomes and material comforts into sedentary lifestyles and food consumption patterns that are resulting in steadily growing rates of both physical and mental health problems. As a consequence, as noted by Linda Kruger, our guest editor for this volume, 17.3 percent of the total economic output in the United States went for health care in 2009 and this proportion has been steadily growing. In fact, it seems that for the first time in U.S. history, the average life expectancy for the average American is likely to decrease. In particular, skyrocketing rates of obesity among both adults and children are having significant implications that include much higher rates of diabetes and other chronic illnesses, reduced worker productivity, more absences from work and school, more pain and suffering for individuals and families, and a reduced quality of life. Linda Kruger and the other contributors to this issue argue convincingly that increased levels of physical activity and more contact with nature could be a solution to many of these problems.

The mission of the Western Rural Development Center is to improve the quality of life for the residents of the rural West. At the center, we spend a great deal of time seeking to improve economic and employment opportunities in rural communities. However, improved health and wellness are a critical aspect of rural development. As such, we encourage federal, state and local governments, and the private sector to provide opportunities and develop programs that encourage individuals and families to make physical activity and contact with nature a regular part of their lives. It is vital that parks remain open and programs retain their funding even during economic downturns when budgets become tight.

One of the great advantages of living in the West in general and the rural West in particular is the fabulous natural environment. Individuals and families will benefit extensively by spending more time with nature and less time with TV and video games. Additionally, when visiting nature, it is important to follow the advice of Edward Abbey and get out of the car and really discover the natural world. The articles in this issue do an excellent job of describing why this is important and how to do it.

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Introduction

Working Upstream: Focusing Attention on Health and Other Benefits of Nature

BY LINDA E. KRUGER

Having enjoyed camping with my family while growing up on a farm in Michigan, then working as a state park ranger in Michigan and later in Alaska, and now completing my 20th year doing research on recreation and communities, I have a very personal interest in what is happening in outdoor recreation. It is frightening! I am also very concerned about our country’s declining health conditions and escalating health care costs.

Budgets for many local and state park and recreation departments have been substantially reduced. Signs that say “Park closed due to budget reductions” are springing up across the country. At the same time, we are spending an ever increasing amount of money on health care with 17.3 percent of the total economic output in the U.S. going to health care in 2009, up from 14 percent in 2008, and forecast to be 20 percent in 2011. That is one in five dollars! This is happening at the same time that research is identifying a variety of mental and physical health benefits that can be experienced from beneficial contact with nature. Beneficial contact ranges from wilderness therapy, to benefits of hospital, school, and community gardens, urban nature centers and neighborhood parks, and includes something as simple as a walk in a forest. Healthy people and healthy forests and healthy recreation programs depend on each other.

In support of upstream efforts that motivate people to stay healthy, the Centers for Disease Control and Prevention (2009) recommends translation of scientific findings into community and school practices to protect the health of people where they live, work, learn, and play. The articles included in this issue of Rural Connections respond to this call by the CDC. I appreciate the Western Rural Development Center’s interest in this topic and their invitation to be guest editor for this issue. I’d also like to thank the contributors who have made this issue of Rural Connections so diverse and comprehensive.

In the first article I summarize the many reasons I agree wholeheartedly with the Forestry Commission of England that forests are “Nature’s Health Service.” From physical and mental health disorders to stress, injuries, and even cancer, spending time in nature has been shown to improve health conditions, and time spent together in nature, can build community capacity while improving the individual health of participants. Other articles in this issue cover these topics in much more depth.

In the second article Dr. Kurt Beil, a professor of Environmental Medicine, and practitioner of naturopathic and Chinese medicine in Portland, Oregon, explores the positive effects of nature on mental health, mental activity, cognitive attention, and stress reduction. Beil also discusses the benefits of nature for recovery from mentally and physically stressful situations including surgery and post-traumatic stress disorder (PTSD). The next two articles draw our attention to obesity—now a global pandemic.

In support of upstream efforts that motivate people to stay healthy, the Centers for Disease Control and Prevention (2009) recommends translation of scientific findings into community and school practices to protect the health of people where they live, work, learn, and play. The articles included in this issue of Rural Connections respond to this call by the CDC. I appreciate the Western Rural Development Center’s interest in this topic and their invitation to be guest editor for this issue. I’d also like to thank the contributors who have made this issue of Rural Connections so diverse and comprehensive.

Next, Debra Kollock, a Washington State University County Extension Director, touches on prevention of childhood obesity while drawing attention to the improved natural, social and human capital that resulted from a community clean-up and community garden. Both activities brought people in the community together and engaged them in outdoor activities. Kollock finds that youth are learning about the environment while gaining “skills and knowledge that will break the cycle of childhood obesity and diabetes.” Henderson and her colleagues at North Carolina State University and Texas A&M University report on IPARC—a North Carolina State University initiative to explore and measure the ways communities promote physical activity. They report on findings from a survey of Parks and Recreation Directors in North Carolina that provide a baseline for facilitating promotion of physical activity in community settings.

Bricker et al. discuss the results from a study of Forest Service recreation managers. The study found 90 percent agreement that...
Forest Service managed lands increase the quality of life for surrounding communities. Respondents identified a connection between healthy communities and sustainable recreation on Forest Service managed lands. In her article, Sue Goodwin dispels the myth that rural children inherently have a healthy relationship with nature and the outdoors. She suggests that with increasing demands on parents in both rural and urban environments “developing a positive relationship with nature and increasing outdoor physical activity is equally important for rural and urban youth.”

Finally, Daniel Dustin and his colleagues at the University of Utah draw our attention to the importance of understanding the broad benefits of nature by taking us on a trip to Yellowstone National Park and providing a history of the discovery of DNA matching. To echo these authors “we must employ creative approaches...that illustrate complex ecological interrelationships and interdependencies, make environment-health connections explicit, and motivate us to get back to nature, learn from nature, and live our lives in harmony with nature.” I hope this issue of Rural Connections gets us all moving in that direction.
While we rarely talk about it, I suggest that caring for the land and serving people, long a Forest Service motto, includes being a provider of health benefits. I think I have found support in one of the guiding principles of sustainability—to contribute to a healthy population. I believe the economic return on nature and wild places, by increasing wellness and quality of life, has the capacity to reduce health care costs. Agencies are talking about planning for and implementing sustainable recreation. I hope these discussions include attention to the health benefits of spending time in nature, because delivering health benefits contributes to a healthy future for both people and the natural landscape. Emphasizing the health benefits of forests, parks, and open space is one way to draw attention to the importance of access to these vital resources.

Recreation providers and land managers need to join with health care and medical professionals in encouraging people to spend more time in nature. This is what Professor John Crompton (2008) referred to as “joined up thinking.” Spending time in forests can improve physical, psychological, and social well-being (Maller et al., 2008). I’m also borrowing from the Forestry Commission of England who suggested that we start thinking in terms of trees and woodlands as “Nature’s Health Service.”

Sustaining health requires effective medical approaches coupled with healthy environments and lifestyles. A Presidential Proclamation (June 1, 2009) to kick off America’s Great Outdoors Month stated: 

“Exploring the great outdoors can also help improve one’s health. These spaces provide

“The function of protecting and developing health must rank even above that of restoring it when it is impaired.” Hippocrates

By Linda E. Kruger
countless venues for walking, hiking, running, swimming and boating among other activities. Americans can combine the enjoyment of being outside with the exercise we all need to stay healthy.”

In addition to facilitating healthy lifestyles and improving mental and physical health, other benefits of leisure (including recreation and tourism) are community regeneration, cultural and historic preservation, achieving higher levels of educational attainment, alleviating deviant behavior, alleviating unemployment distress, fostering friendships and a sense of belonging and connectedness (Crompton, 2008), and reducing effects of Post Traumatic Stress Disorder (Maller et al., 2008).

Nature plays an important role in the prevention of illness. According to the Centers for Disease Control and Prevention (CDC) (2009) the public health challenge of the 21st century is chronic disease, resulting in seven of ten deaths among Americans. In 2005, one out of two adults had at least one chronic illness with 25 percent limiting daily activity. Mental health and chronic disease are closely related, with chronic disease leading to impaired mental health including depression; and impaired mental condition leading to other chronic health issues in a vicious circle that can be hard to escape from.

The top three causes of death in the United States are cancer, heart disease, and stroke. Obesity, a common contributor to disease, can be an underlying factor for each of these conditions. Between 1991 and 2001 obesity increased 75 percent among adults. Today, one in three adults is obese and one in five young people between the ages of 6 and 19 are obese. If current trends continue one in three Americans born in 2000 will develop diabetes. Lack of physical activity, poor nutrition, and tobacco and alcohol use play a role in these diseases. Physical activity is directly related to recreation and spending time in nature; spending time in nature also has benefits for reducing the use and abuse of tobacco, alcohol and other drugs.

The World Health Organization predicts that diabetes will rise 50 percent in the next decade, with diabetes deaths doubling in the next ten years (WHO, 2010). Obesity, an underlying cause of diabetes, is skyrocketing globally. In a pre-emptive strike many employers are implementing health initiatives for their employees, and as a result saving millions of dollars in lost work time, productivity and health care costs.

Obesity is not the only health issue we face. According to the American Institute of Stress (2008) over 43 percent of U.S. adults have adverse health conditions due to stress. The same report estimated 75 percent of visits to primary care physicians are stress related. Stress puts people at risk for colds, heart attacks, cancer, obesity, high blood pressure, and elevated heart rates. Furthermore, stress can reduce blood flow to the heart, cause migraines, rheumatoid arthritis, chronic fatigue, increase receptiveness to allergies, suppresses immune system function, and lead to hormonal imbalances that increase production of abnormal cells (Godbey, 2009). Here again, spending time in nature can make a positive contribution by lowering stress.

“Empirical, theoretical, and anecdotal evidence demonstrates that contact with nature positively affects blood pressure, cholesterol, outlook on life, stress reduction, and behavioral problems among children” (Godbey, 2009). This is important because mental health and cardiovascular disease are expected to be the biggest contributors to disease worldwide by 2020 (Murray and Lopez, 1996).

Increasing diagnoses of attention-deficit disorder (ADD) and attention-deficit-hyperactivity disorder (ADHD) are also causing concern. Over two million youth have been diagnosed with ADD/ADHD in the U.S. There has recently been an explosion in diagnosis of adult ADHD with approximately four million adults diagnosed (Kessler, 2006). Research has shown that spending even a little time in nature reduces symptoms of ADHD and “could be a lifesaver for the ten percent of children whose symptoms don’t respond to medication” (Kuo & Taylor, 2004). Nature is important for both adults and children with ADD/ADHD. Activity in nature can give those with ADD or ADHD the ability to manage their symptoms without medications or troublesome side effects (and costs) of prescription medications (Hallowell & Ratey, 2005; Kuo and Taylor, 2004). Hallowell and Ratey (2005) suggest that regular walks in nature can be as effective as medications for some people. People with ADD report that being in nature increases their focus (Honos-Webb, 2008) and researchers suggest spending time in nature is necessary for optimal levels of attentional functioning for all children and adults (Kuo & Taylor 2004; Taylor et al., 2001). Studies of children with ADHD have shown that they may perform better throughout the day if they take “green breaks” and spend time in a natural environment (Taylor et al., 2001). This may hold true for all children ... and adults as well. For children with ADHD being outdoors every day significantly reduced their ADHD symptoms, with green outdoor activity more effective in reducing symptoms that other settings across age, gender, income, community type, geographic region, and diagnosis (Kuo & Taylor 2004). Nature areas near schools and housing developments have been found to foster...
Spending time in nature may also have positive benefits for injury prevention and control, diabetes, asthma, arthritis, musculoskeletal conditions, and other maladies, including cancer. In Japan, Shinrin-yoku or forest bathing is a short, leisurely visit to a forest providing a natural aromatherapy session. A Japanese study (Li, 2009) involved both men and women in a three-day, two-night trip to a forest where participants took short walks each of these days. Blood and urine were sampled on days two, three, seven, and thirty. Adrenaline was measured in the urine and natural killer (NK) cells were measured in the blood. The increase in NK cells lasted more than thirty days suggesting that trips in nature once a month could provide maintenance levels of NK cells which release anticancer proteins into the blood that work to prevent cancer generation and development. Researchers suggest that breathing in wood essential oils with antimicrobial compounds while walking through the forest results in relaxation and improves stress management resulting in significantly increased vigor, decreased anxiety, depression, anger – and may decrease the risk of psychosocial stress related diseases (Li, 2009).

In closing, linking leisure and recreation to health and wellness helps shift our attention to “upstream” efforts to prevent ill health rather than only working “downstream” on rescue and care of people already suffering illness (Maller et al., 2008). Much of the literature reviewed suggests that outdoor nature-based activity deserves a position both upstream as part of disease prevention and downstream as part of rehabilitation and recovery. We frequently hear about the importance of a healthy diet and daily physical activity. Two additional pillars of health worthy of more attention are daily activity that connects us to nature and social interaction with others. Together these four pillars provide a stable foundation for improved physical, psychological, emotional and social health and wellbeing, increased interest in nature, and increased community engagement, resulting in increased community capacity, higher performance at work and school, and lower health care costs (See Figure 1).
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Figure 1. A solid foundation for health and well-being and engaged communities.
Every year, the U.S. Centers for Disease Control and Prevention (CDC) conduct a national survey to assess the health of the country. In 2007, this survey (known as the Behavioral Risk Factor Surveillance System, or BRFSS) revealed a surprising fact: living in a rural area decreased the risk of suffering from psychological disturbance by 17 percent, compared to the risk for urban residents. (Dhingra et al., 2009. See Figure 1). Studies of other mental health conditions such as depression have shown similar results when comparing rural and urban living (Paykel et al., 2000).

BY KURT BEIL

Mental Health Outdoors: The Benefits of Nature
Enviro-Mental Health and Biophilia

The contributing factors for mental health concerns are multiple and varied. Yet despite accounting for genetic, socio-economic and behavioral influences, rural residents still demonstrate greater mental health (on average) than city dwellers. One explanation for this finding that is slowly gaining recognition is the importance of the physical environment itself in shaping mental health (Lundberg, 1998). While the field of “environmental psychology” is broad, this article will focus on one aspect in particular that has relevance to the rural/urban disparity in mental health: the natural environment.

While this awareness of the ability of nature to effect changes in mental health status is not new, it is only recently that science has investigated this phenomenon. The majority of investigation has occurred in response to Harvard biologist and author E.O. Wilson's suggestion that human beings have an evolutionarily inherited affinity for natural places (1984). This affinity, known as “Biophilia,” draws us to places that are similar to the pristine savannahs and forests in which our genetic ancestors lived for millennia. According to the biophilia hypothesis, we are not only psychologically attracted to such places, but are also physiologically programmed to respond favorably to them. These natural places are our environmental “set-point” to which we are conditioned to favorably respond.

The evidence seems to support Wilson's biophilia hypothesis: people are measurably happier after contact with the natural world, particularly when compared to urban settings. In one study, measures of positive affect (i.e. positive emotions such as happiness and joy) improved significantly upon taking a walk in a lightly forested area, while walking in an area of light suburban development had the opposite impact (Hartig et al., 2003; See Figure 2). Inverse responses were noted with regard to sadness, anger, and aggression. This mirrors many other studies that show similar emotional responses and suggests that there is something inherent about a positive emotional response to nature.

Mental Restoration and Health

The ability of nature to positively impact mental health is supported by two complementary theories that utilize biophilia as a guiding principle. One theory, advocated by Stephen and Rachel Kaplan of the University of Michigan, suggests that natural environments decrease our minds’ tendency toward mental fatigue. This “Attention Restoration Theory” (ART) proposes that our minds are evolutionarily adapted to cognitively process the stimuli provided by the natural environment of our ancestors (Kaplan, 1995). In contrast, modern industrialized settings provide environmental stimuli that require more mental effort to process. The moving cars, electronic billboards and construction sounds that are synonymous with urban development decrease our mental capacity for cognitive attention and, ultimately, erode our mental health. These concepts have been demonstrated experimentally in the study by Hartig et al. (2003): Cognitive attention and task performance were affected by exposure to nature and urban environments in a manner similar to emotions.

Figure 1. Prevalence of mild and serious psychological disturbance in urban (grey) and rural (white) populations in the U.S. (Dhingra et al., 2009).

Figure 2. Positive Effect Measures.
Cognitive attention is one of the basic aspects of mental activity, and is a fundamental process in determining mental health status. This is most evident in the mental health condition known as Attention Deficit Hyperactivity Disorder, or ADHD. This condition is very prevalent in today’s population, particularly in children, and evidence supports the idea that environmental stimuli play some role in the lack of cognitive attention in affected individuals. Children diagnosed with ADHD have significant reductions in symptoms when exposed to natural outdoor environments. This is particularly true when compared with children exposed to typical urban or suburban environments, in keeping with the tenets of ART. These reductions have been measured for long-term exposure to nature; such as the finding that changing the amount of nature around a child’s home resulted in corresponding changes in ADHD symptoms (Wells, 2000). Short-term exposures to nature have also proven to be beneficial in reducing ADHD symptoms (Faber-Taylor & Kuo, 2009). Researchers have noted the numerous other benefits that exposure to nature has on children, including improvements in academic performance, social skill development and creative thinking ability. Author and journalist Richard Louv has summarized these benefits in his 2005 book “Last Child in the Woods: Saving Our Children from Nature-Deficit Disorder.”

Stress-Reduction and Mental Health
The other theory of how biophilia and urbanization contribute to mental health and illness is based on an understanding of the set of psychosomatic processes commonly known as “stress.” The stress response is a set of physiological reactions that occur in response to perceived threats to an individual’s well-being. These threats can be real or imagined, and may even be undetectable to a person’s conscious awareness. Through complex processes in the body and brain (known in the medical field as “psychoneuro-endocrino-immunology”, or PNEI) the accumulated effects of stress can have many negative impacts on mental health. The PNEI effects on neurotransmitters and other hormones that affect brain function have been definitively shown to contribute to depression, anxiety, schizophrenia, and other mental health conditions (Goodkin & Visser, 2000).

Stress comes from a variety of sources, and for urban residents in particular environmental stresses are especially problematic. The traffic, lights and noise of the city are constant low-grade stressors that have demonstrable effects on mental health (Freeman & Stansfeld, 1998). In contrast, the stimuli that we encounter in nature are typically relaxing and help us to slow down and “de-stress.” This is exactly why many people chose to live away from busy urban centers and why many urban residents choose to take their vacations in the mountains or on the beach. The calm, vibrant scenery of natural landscapes helps people relax and recover from the stresses of daily life. It feels healthy and natural to be in such places.

The stress-reducing capacity of natural environments can act as a preventive agent to guard against the negative effects of chronic stress on mental health. For example, people that walked regularly in a forest were found to have greatly improved mood, less anxiety and depression, and less production of the “stress hormone” cortisol than people that walked in an area of light suburban development (Morita et al., 2007; Park et al., 2010). A new study from the Netherlands has shown that the presence of nature within close proximity to a person’s home has a buffering effect on how stress impacts mental health status (van den Berg et al., 2010).

Exposure to nature can also aid in mental recovery from acutely stressful situations, as demonstrated by Roger Ulrich and colleagues in a set of now-classic nature and stress studies (1984, 1991). In one study, post-surgery patients were found to recover more quickly and with fewer stress-related complications when their hospital room overlooked a wooded park than when it overlooked another wing of the hospital. The second study measured physical and mental stress after an acutely stressful situation, and found that people that were exposed to natural scenery had vastly superior recovery times. This information has been useful in developing treatment for a number of mental health conditions, including treatment for post-traumatic stress disorder, or PTSD (Ottosson & Grahn, 2008). PTSD is particularly responsive to this type of “ecotherapy” because it reduces a person’s level of stress while providing a stable, non-threatening context that can be returned to multiple times for cumulative benefit. Even when vast expanses of natural landscape are unavailable, small vegetable or flower
garden can provide enough stress-reducing nature exposure to create a therapeutic experience for people in need (Applebome, 2009).

Protection of Nature
The information in this article provides evidence that direct contact with the natural world is beneficial for mental health. While this evidence matches most peoples directly lived experience, the implications of such have not yet been considered in applicable areas such as environmental resource management, land use policy or public health modeling. As urban, suburban, and rural development continue, it will be useful to consider what effects the presence or absence of natural environments have on the long term health and well-being of potentially affected populations. Particularly at a time when environmental degradation and biodiversity loss are increasing at an accelerating pace, an examination of the reciprocal relationship between the health of human beings and the health of the environment seems appropriate. The natural world provides us with more than the physical means to maintain life; it gives us the visual and experiential resources we need to make that life worth living.

ABOUT THE AUTHOR
Kurt Beil is professor of Environmental Medicine at the National College of Natural Medicine in Portland, Oregon, where he sees and treats patients using a combination of naturopathic and Chinese medicine techniques. He is also a public health consultant on the topic of green spaces for sustainable urban development, and advocates for a holistic approach to health for both people and planet.

ENDNOTES
1 The physical impacts of stress are also numerous and are thought to cost hundreds of billions of dollars annually through worker absenteeism and contribution to healthcare conditions such as heart disease, high blood pressure, obesity, and diabetes.

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Rural Health
AND Rural Landscapes:
An Ecological Approach to the Study of Obesity

BY MICHAEL WIMBERLY, AKIHKO MICHIMI, AND BONNY SPECKER
The increasing prevalence of obesity is now considered to be a global pandemic, and has been linked to a wide range of chronic diseases including Type 2 Diabetes, hypertension, breast cancer, gallbladder disease, asthma, and depression. The causes of obesity are multifaceted, and are related to individual-level factors such as age, gender, and education as well as area-level factors that determine the environments in which people live. In particular, the development of obesogenic environments is hypothesized to increase the risk of obesity by discouraging physical activity, increasing consumption of energy-dense foods, and limiting the availability of healthy foods (Egger & Swinburn, 1997). Obesogenic environments can be further dissected based on the environment type (physical, economic, political, and sociocultural) and spatial scale (micro- and macro-environments) (Swinburn et al., 1999).

Although comparisons of rural and urban populations have frequently found higher rates of overweight and obesity in rural areas, our current knowledge of the environmental determinants of obesity is still largely based on research conducted in urban and suburban environments. In contrast, our understanding of the spatial patterns and determinants of obesity within rural areas is based on far fewer studies. In the 2000 Census, rural areas encompassed more than 97 percent of the total U.S. land area and were home to 59 million people (21 percent of the U.S. population). Given the uniqueness and diversity of rural environments, it is not possible to generalize findings from studies focused on cities and suburbs. Instead, novel perspectives and approaches are needed to elucidate the environmental determinants of obesity in rural areas, and to develop appropriate strategies for reducing the health burden of obesity in these environments.

In this article, we address several topics relevant to the problem of understanding obesity in rural environments. First, we outline a conceptual ecological model for understanding the influences of physical, economic, and sociocultural environments on obesity in rural areas. Next, we examine existing frameworks for classifying rural areas and discuss their limitations and the implications for studying obesity in rural landscapes. Finally, we present an overview of a recent study that mapped and analyzed geographic patterns of obesity and associated risk factors within the contiguous U.S. We discuss how this type of ecologically focused, spatially explicit research can lead to novel insights about the characteristics of rural obesogenic environments, and we address the implications for future research efforts and public health applications.

Conceptual Model

Most research on obesogenic environments has examined populations living in and around cities, and has focused primarily on aspects of the built environment. For example, suburban sprawl may reduce physical activity by necessitating automobile use and discouraging walking and bicycling as means of transportation and recreation (Leal & Chaix, 10). Thus, newer suburban neighborhoods that lack sidewalks and segregate residential and commercial areas should have higher rates of obesity compared to more traditional urban mixed-use neighborhoods.
In addition to the physical structure of communities, socioeconomic characteristics also contribute to the development of obesogenic environments (Leal & Chaix, 2010). Residents of neighborhoods with high levels of material deprivation, as measured by factors such as high unemployment and low income, frequently have higher levels of overweight and obesity than less deprived neighborhoods. Several proximal environmental factors may drive these relationships. If residents have concerns about their safety or negative perceptions of neighborhood aesthetics, then outdoor physical activity may be reduced. Furthermore, residents of low-income and minority neighborhoods often have relatively low access to supermarkets and other stores with a wide selection of healthy foods, particularly fresh fruits and vegetables. Instead, deprived neighborhoods frequently have high concentrations of convenience stores and fast food outlets.

Whereas cities and suburbs are dominated by the built environment, the character of rural communities is molded by aspects of the natural environment including climate, vegetation, terrain, and soils. The idea of the cultural landscape has long been recognized as a framework for understanding the relationships between humans and their environment (Sauer, 1925). The development of the field of landscape ecology, coupled with the emergence of computerized geographic information systems (GIS) technology, has provided a suite of concepts and techniques for measuring, classifying, and modeling landscapes (Forman & Godron, 1986). These approaches are being increasingly applied in the health sciences, mainly in the ecological study of vector-borne and zoonotic diseases. However, similar approaches can also be applied in the context of human ecology for studying the environmental determinants of obesity and other chronic diseases.

In rural areas, elements of the natural environment including climate, physiography, and vegetation, exert a strong influence on the type of land use that is practiced (Figure 1). Land uses can vary widely in rural areas, ranging from agriculture and natural resource extraction to emerging economies linked to recreation and outdoor amenities. These land uses determine the range of human activities that occur in rural landscapes, and also shape the socioeconomic status and demographic structure of the populations that inhabit these landscapes. Regional variability in natural environments and economies also affects the culture of rural populations and influences social norms related to food consumption and physical activity (Hartley, 2004). Rural areas exhibit considerable variability in their spatial patterns of human settlement, ranging from exurban developments at the fringes of...
Definitions—What is Rural?
The word rural evokes a variety of images, including sparsely populated landscapes, mosaics of farms and forests, and small towns. However, the classification and study of specific areas as rural or non-rural requires a more clear-cut definition. The U.S. Census Bureau classifies urban and rural areas at the spatial resolution of the census block group—an area containing a population of 600-3000 people. Urban areas, including large urbanized areas and smaller urban clusters, are identified using a complex algorithm that takes into account population thresholds, population density, and the spatial arrangement of the population. In contrast, rural areas are the remaining block groups that do not meet the urban criteria. Another commonly-used definition of rural areas is based on the metropolitan/nonmetropolitan county classification developed by the U.S. Office of Management and Budget. Metropolitan areas are centered on core counties with dense, urbanized populations, but also incorporate adjacent counties that have a high degree of social and economic integration as measured by commuting ties. All counties that do not fit this definition are considered nonmetropolitan. Although metropolitan and nonmetropolitan classifications are often interpreted as proxies for “urban” versus “rural” counties, both types of counties typically contain a mixture of urban and rural populations (Figure 2a, see next page).

A key point of this comparison is that the definition of rural is both subjective and scale dependent. Furthermore, neither the rural nor the nonmetropolitan classification arises from a specific conceptual model of rurality. Instead, they both encompass areas that are left over following the classification of more urbanized environments. Furthermore, the very act of classification belies the considerable physical and social heterogeneity of rural landscapes. For all these reasons, simple comparisons of obesity in urban versus rural areas are likely to be of limited utility. Instead, obesity research should focus on identifying specific environmental characteristics that are associated with obesity in rural areas. This knowledge can then be applied to develop new approaches for modeling and mapping relevant environmental variability.

Geographic Patterns of Obesity
One way to avoid the subjective nature of the urban-rural dichotomy is through exploratory spatial data analysis. Instead of making comparisons based on an a priori classification, spatial smoothing and clustering techniques can be applied to highlight geographic areas with high and low obesity prevalence. We recently completed a study of the spatial patterns of obesity, physical activity, and fruit and vegetable consumption across the conterminous United States (Michimi & Wimberly, 2010). The analysis was based on seven years of national data from the Behavioral Risk Factors Surveillance System (BRFSS), an annual survey conducted by the Centers for Disease Control and Prevention in collaboration with state health departments. Because of the small sample sizes in most nonmetropolitan counties, a spatial smoothing method (weighted head-banging) was used to reduce local variability and elucidate broader geographic trends in obesity and associated risk factors (Mungiole et al., 1999).

The obesity map generated using these techniques clearly illustrates regional clusters...
of higher and lower obesity prevalence (Figure 2b). Although obesity statistics are frequently summarized and mapped at the state level, these smoothed county-level patterns do not necessarily correspond with state boundaries. For example, multi-state regions such as the Mississippi Delta, the Southern Appalachians, and the Piedmont and Coastal Plains of the southeastern United States emerge as higher-obesity regions. In contrast, much of the interior West along with portions of the upper Midwest and New England have lower obesity prevalence. These geographic patterns of obesity are negatively correlated with physical activity, and also have weaker negative correlations with fruit and vegetable consumption (Michimi & Wimberly, 2010).

New Insights into Obesogenic Environments

In addition to highlighting regions with high and low obesity prevalence, this type of exploratory analysis can provide insights into the underlying obesogenic environments. For example, inspection of the obesity prevalence map suggests correlations with metrics of the social environment. Higher-obesity counties appear to be spatially associated with higher-poverty counties across much of the eastern United States, but not in the West (Figure 2c). Many lower-obesity counties in the West and in New England have a higher proportion of adults with a college degree (Figure 2d). A key insight from this visual assessment is that the associations between obesity and the environment can be spatially heterogeneous. A particular environmental variable may be strongly associated with obesity in some geographic regions (e.g., poverty in the Southeast), but not in others.

Previous research has focused on identifying environmental determinants of obesity at the scale of neighborhoods, or “micro-environments” where people purchase food, exercise, and carry out daily activities (Swinburn et al., 1999). In contrast, the term “macro-environment” has been used to characterize much broader structural influences of industries, governments, and other sectors operating at regional, national, and international levels. Our national-level study suggests that there is an intermediate level of “meso-environmental” influences that reflects regional and sub-regional variability in the natural environment, land use, human settlement patterns, and culture (Michimi & Wimberly, 2010). These factors help to determine characteristics of the micro-environments nested within the broader meso-environments, and can also have direct influences on physical activity, diet, and other risk factors for obesity.

Connecting these ideas with the ecological conceptual model outlined previously (Figure 1) offers the potential for new perspectives and insights into the complex web of factors that affect obesity and other rural health problems. For example, over the past several decades the “recreation county” has emerged as a unique type of non-metropolitan area (Johnson & Beale, 2002). These are defined as counties that have high concentrations of outdoor recreational amenities such as mountains, water, and forest. As a result of these amenities, they also have large proportions of employment or income that are derived from recreation-related industries, including hotels and restaurants, outdoor recreation, real estate, and other service industries.

Natural amenities are known to be a major force of migration that attracts workers and retirees to move from elsewhere. Thus, high-rates of population growth in recreation counties are driven by this combination of desirable outdoor recreational amenities and economic opportunities. The natural environment determines whether counties will develop a recreation base, and the existence

![Figure 2. Spatial patterns of obesity and socioeconomic characteristics in the conterminous United States. (a) percent of population living in rural areas; (b) smoothed prevalence of obese adults (aged +18 years) with body mass index of over 30kg/m2; (c) percent of population with income below the poverty level.](image-url)
of desirable amenities and recreational opportunities influences the demographic makeup and socioeconomic status of the population. This combination of natural environments that encourages outdoor activity, local culture focused on outdoor recreation, higher socioeconomic status, and selection by residents who are predisposed to engage in physical activity may help to explain the relatively low prevalence of obesity across many non-metropolitan counties in the West (Figure 2b).

Conclusions
An ecological approach to the study of obesity addresses questions about spatial patterns of obesity and their relationships with obesogenic environments and other risk factors. The spatially explicit nature of this type of research makes it particularly relevant to the development and implementation of public health efforts to reduce the burden of obesity. For example, mapping the geographic distribution of obesity and its environmental correlates can help ensure that community health efforts are directed toward the areas where they are most needed. Furthermore, research that improves our understanding of obesogenic environments can aid in the design of appropriate health interventions and inform the development of public policies that encourage healthier communities. Our future research will aid in these efforts by testing a set of hypotheses about the influences of supermarket accessibility, outdoor recreational amenities, and other environmental variables on the prevalence of obesity in rural areas. We are also working to develop more refined classification schemes for rural landscapes that emphasize the environmental factors most relevant to obesity, integrate elements of the natural and built environments, and effectively capture the broad variability in rural landscapes.

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REFERENCES


The Obesity Research Prevention and Evaluation of Intervention Effectiveness in Native North Americans (OPREVENT)

BY JOEL GITTELSOHN, MARLA PARDILLA, PREETY GADHOKE, MEGAN ROWAN, KARINA CHRISTIANSEN, AND SARA NEWMAN.
American Indians have the highest burden of chronic diseases among all ethnic groups in the United States. Cardiovascular disease is twice that of the general US population and diabetes is diagnosed 2.2 times greater among American Indians than the general US population. The adjusted prevalence of obesity has increased more than 25 percent within a ten-year period across all U.S. regions from 1995-1996 to 2005-06. Health and economic consequences of chronic conditions that limit American Indians are serious, including higher prevalence of end-stage kidney disease and lower life expectancy than the U.S. average.

Interventions designed to address chronic conditions to date tend to focus upon individual behavior change with little impact upon reversing and stopping these trends. Novel interventions are needed at multiple levels of influence to address the rising obesity trend. In this newsletter article, we provide a synopsis of our most recent community-based obesity prevention intervention that is currently being implemented to tackle adult obesity. This effort is funded by the U.S. Department of Agriculture.

The Obesity Research Prevention and Evaluation of Intervention Effectiveness in Native North Americans (OPREVENT) is an intervention trial that is designed to address the following two research questions:

1. What is the impact of a multi-site, multi-institutional trial on the intake of (a) fruits and vegetables, total energy intake, and total fat intake; (b) total energy counts and percent of time spent in sedentary activity?; (c) body-weight index (BMI), waist circumference, and percent body fat?
2. Is exposure to the intervention associated with improvements in knowledge, self-efficacy, risk perception, outcome expectations, behavioral intentions, and social support?

Additional research questions are:

1. What are the feasible and sustainable intervention strategies that would permit children to serve as change agents in their homes to improve diet and increase physical activity of adult household members?
2. What are the feasible and sustainable intervention strategies that would occur in local worksites that would lead to increased physical activity and improved diet among American Indian (AI) community members?

Indigenous peoples globally suffer very high rates of obesity and related conditions, as a result of the role of multifactorial determinants. AI adult BMI in both urban and rural reservation settings have been on a steady rise, with women having higher burden of overweight and obesity than men. Obesity is a primary risk factor for diabetes mellitus, cardiovascular disease, and other chronic conditions. Research indicates a direct association between dietary fat and energy intake and obesity. On average, AI diets are high in fat and caloric content, and physical activity is low. Environmental factors such as the presence of food stores are associated with diet patterns. Limited worksite wellness programs in AIs have achieved diet and physical activity goals, increased energy expenditure, and led to a reduction in body fat. Body image perceptions also influence AI communities' motivation for action. Family environment and social support, particularly
Table 1. Study Phases.

<table>
<thead>
<tr>
<th>Phase &amp; Description</th>
<th>Timeline</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1:</td>
<td>Months 1-9</td>
<td>N=60</td>
</tr>
<tr>
<td>Tribal approvals/CACs, Formative Research, Measurement protocol preparation</td>
<td></td>
<td>N=90</td>
</tr>
<tr>
<td>Phase 2: Baseline data collection, Intervention development, Process evaluation</td>
<td>Months 10-27</td>
<td>N=504 (84/community)</td>
</tr>
<tr>
<td>Phase 3: Intervention implementation (Round 2), maintenance data collection</td>
<td>Months 28-45</td>
<td>N=504 (84/community)</td>
</tr>
<tr>
<td>Phase 4: Data analysis and dissemination</td>
<td>Months 31-45</td>
<td>N=504 (84/community)</td>
</tr>
</tbody>
</table>

through the extended family network, is vital to adult dietary and physical activity habits among AIs. Children can impact adult diets, such as increasing adult fruit and vegetable (FV) intake per day, and decreasing fat consumption. Overall, modest improvements in diet and physical activity can reduce the risk of obesity and heart disease among adults, such as walking 15 minutes per day and eating 100 kilocalories less at each meal or substituting high calorie drinks with diet drinks.

OPREVENT is being led by a multidisciplinary team that has years of experience designing, implementing, and evaluating community-based AI interventions. Our school-based, food store and multi-disciplinary projects have reported significant improvements in diet and physical activity related knowledge, self-efficacy, and intentions, reduced fat intake, increased healthy food purchasing habits, and positive policy changes. Our most recent project, Zhiwaapenewin Akinomamagewin (ZAFT) was implemented between 2003 and 2006 as a multi-level multi-institutional program to improve diet and physical activity in seven First Nations communities. Our intervention improved overall knowledge and healthy food acquisition frequency.

Our project, OPREVENT, is theoretically informed by the Social Cognitive Theory and the Diffusion of Innovations Theory. The Social Cognitive Theory (SCT) suggests that individuals are both products and producers of their social environment, and that there is a dynamic, reciprocal relationship between personal factors, the environment, and health behaviors. The Diffusion of Innovations Theory provides a systematic framework for how an innovation gets adopted by the target population. Diffusion is the process by which an innovation is communicated (planned and spontaneous) through certain channels over time within social systems that involve interpersonal social networks. Antecedent variables that affect the process of innovation diffusion include the characteristics of the innovation, nature of the adopter, the social context, communication channels, and the nature of the change agent.

The conceptual framework of OPREVENT depicts a visual graphic of how we envision the role of the media, food stores, schools, households, and worksites in the prevention of adult obesity among AI communities (Figure 1).

The OPREVENT study design is a randomized, controlled community trial in six American Indian communities in Michigan and New Mexico (Table 1). The four phases to OPREVENT are outlined in Table 1.

There are three intervention and three comparison (delayed intervention) communities. Delayed intervention communities will receive all the benefits of the study including our training materials and intervention materials. The study consists of formative research and pre-post intervention surveys. OPREVENT involves community engagement, including Community Advisory Councils (CACs) and workshops and stakeholder participation, partnerships with health agencies and...
### Table 2. Intervention Components.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Theme</th>
<th>School Program</th>
<th>Food Store Program</th>
<th>Work Program</th>
<th>Health Services Program (incl. media)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Curriculum</td>
<td>Child Change Agent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Start Your Day Moving</td>
<td>3rd: What is Healthy? 4th: Body Clues</td>
<td>Training basic principles</td>
<td>Breakfast demo</td>
<td>Group for PA challenge</td>
</tr>
<tr>
<td>2</td>
<td>Living Longer Fat</td>
<td>3rd: Everyday Foods 4th: Activity Pyramid, Fat</td>
<td>Family goals: healthy cooking</td>
<td>Drain &amp; rinse demo</td>
<td>Pedometer challenge</td>
</tr>
<tr>
<td>3</td>
<td>Healthy Drinks</td>
<td>3rd: Sometimes Foods 4th: Sugar Facts</td>
<td>Family goals: food buying 1</td>
<td>Drinks taste test</td>
<td>Healthy Office Snacks</td>
</tr>
<tr>
<td>4</td>
<td>Healthy Breaks</td>
<td>3rd: Being Active, Everyday Snack Attack 4th: Fiber Facts</td>
<td>Family goals: snacks</td>
<td>Snacks taste test</td>
<td>Smart Lunch Choices</td>
</tr>
<tr>
<td>5</td>
<td>5 a Day/Shop wisely</td>
<td>3rd: Next Year 4th: Label Reading</td>
<td>Family goals: food buying 2</td>
<td>FV taste test</td>
<td>Cross-worksite challenge</td>
</tr>
<tr>
<td>6</td>
<td>Reinforcement</td>
<td>Additional teacher training</td>
<td>Summer family goal setting</td>
<td>Summer Materials</td>
<td>Team Walk-a-Thon</td>
</tr>
</tbody>
</table>

Pictured: OPREVENT’s two Michigan American Indian tribal communities.
University extension personnel. There are four OPREVENT components: a community media campaign, school to home, worksite, and food stores (Table 2). For the school-to-home component, OPREVENT will modify existing school-based curriculum that was developed for grades three through five and that have been administered and evaluated in previous American Indian interventions by Dr. Gittelsohn and colleagues. OPREVENT will expand upon previous interventions by developing a curriculum for grades two and six. The study’s program evaluation methods are outlined in Table 3.

Currently, our researchers are in the first phase of the study in both Michigan and New Mexico.

Overall, the goals of our study include the following:

1. To develop sustainable community obesity prevention program through collaborative partnerships with tribal leadership, health agencies, schools, worksites, local USDA extension programs.

2. To advance knowledge of the relationship between behavioral and environmental factors and obesity among American Indian populations.

3. To reduce obesity in American Indians communities. This is the first study of its kind to address the multifactorial nature of adult obesity in these six communities.

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Marla Pardilla is a behavioral health researcher, mainly focused on obesity and diabetes prevention in Native American communities.

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For references, see next page.

Table 3. Program Evaluation Methods.

<table>
<thead>
<tr>
<th>Evaluation Method</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quantitative Food Frequency Questionnaire</td>
<td>Developed for American Indian/Alaska Native populations</td>
</tr>
<tr>
<td>Anthropometry, body composition, accelerometry</td>
<td>Pre- and post-intervention assessment</td>
</tr>
<tr>
<td>Impact Questionnaires</td>
<td>Pre- and post-intervention (Household adult, food stores, worksite, school)</td>
</tr>
<tr>
<td>Environmental observation checklists</td>
<td>Pre- and post-intervention (Worksites, food stores)</td>
</tr>
<tr>
<td>Process Evaluation forms</td>
<td>During intervention (Worksites, schools, food stores, family/household)</td>
</tr>
</tbody>
</table>
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Health and economic consequences of chronic conditions that limit American Indians are serious, including higher prevalence of end-stage kidney disease and lower life expectancy than the U.S. average.
Poverty Reduction Project Increases Social and Natural Capital

It’s hard to care for the environment when you can’t see beyond the garbage in your yard.

BY DEBRA KOLLOCK
Members of a small rural community just seven miles south of the Canadian border have mobilized their town to remove over 53 tons of garbage, win a grant to upgrade the town’s boat launch, and start a community garden. For these citizens of Northport, Washington, simple conversations about reducing poverty have become a community-wide demonstration of the power of dialogue over disagreement and a spirit of service over blame.

While this town of 301 residents is surrounded by mountains, a river, and breathtaking scenery, 27 percent of its families live below the poverty level. With this level of poverty, the community has been eligible, since 2006, to participate in Horizons, a grant-funded poverty-abatement and leadership development program. In the early stages of the program, 78 of Northport’s youth and adults participated in facilitated discussions about poverty issues in their community. Thriving Communities: Working together to move from poverty to prosperity for all is a public dialogue and problem solving process. Using the study guides, in their Community Conversation Groups, the Northport participants worked through topics that ultimately led them to an action plan (see inset.)

**Community Clean-up**

As they discussed the topic “What Does Poverty Look Like Here?” community members acknowledged that mounds of trash and run-down houses gave their town the appearance of being poor. Inadequate transportation, lack of money for fee payments, and limited time conspire against these and other remote community residents’ efforts to dispose of trash. The Horizons group determined that, in their town, this situation could best be addressed together and a Community Clean-up was scheduled as the first action item.

The first clean-up was held on “Earth Day” weekend in 2007 and has happened every third week of April since. Volunteers meet at Northport’s old gas station and bring gloves, tools, and heavy equipment. The clean-up is community-funded and volunteers are reimbursed for gas and dump fees. In the past four years, the community has raised enough money to cover these costs through recycling aluminum cans (2,985 pounds) and vehicle batteries (27,768 pounds).

In addition to the 53 tons of garbage and appliances, volunteers have removed 178 tons of scrap metal. With their town’s designation as a permanent location for scrap metal collection, disposing of scrap is easy for Northport residents as is pick up for a private recycling contractor. A designated compost area for green waste also decreases the amount of trash taken to the nearby landfill. In 2010, the town council assigned two employees to the trash removal project and allowed them to use the city’s heavy equipment to clean up Northport’s alleys and sidewalks and remove debris from a fire-damaged home.

The group’s unwavering “how can we serve” attitude has won over some of the community’s most vocal skeptics. The team distributes flyers door-to-door and asks residents what they need. In one instance, group members partnered with a local church to repair a resident’s fence while the resident participated as she could by rolling her wheelchair across the yard, and delivering small tools to the volunteers.

While 158 homes and families have been helped through the Community Clean-up, removing trash is not the only benefit. Residents of all ages, physical ability and income levels participate—including many youth. At the end of each clean-up day, community members hold a potluck barbeque and reports abound that community and personal pride have been enhanced by the simple collective act of removing trash.

Restored Marina

The leadership development phase of the Horizons program provided an opportunity for members of two typically disengaged groups to see themselves as potential leaders—youth and people in poverty. Through Horizons, Wheatley’s (2008) definition of a leader emerged. This author suggests that, “A leader is anyone willing to help, anyone willing to step forward to change things. Communities everywhere are filled

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**Thriving Communities Discussion Sessions:**

- How Are We Connected to Our Community and to Poverty?
- A Vision for Our Community: What Does Poverty Look Like Here?
- Why is There Poverty in Our Community?
- Reaching Our Vision and Reducing Poverty
- Moving to Action

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with these leaders; they reveal themselves when the issues appear.” As a result of their participation in Horizon’s-sponsored leadership education, community members created Northport Community Preservation & Restoration (NCPR), a non-profit corporation dedicated to community improvement.

Since its inception, a representative of NCPR has attended every monthly city council meeting to listen, learn, and offer support for community improvement projects and tasks identified by the council. With trust earned through this regular level of positive engagement, NCPR was asked by the council to assume responsibility for applying for a grant to improve the boat marina on Lake Roosevelt, one of the area’s most important natural assets. The group subsequently wrote and received a $400,000 grant from the Washington State Recreation and Conservation Office to upgrade the marina and boat launch. When complete, the project will provide a safe place for local residents to launch their boats, a new park for families to enjoy, and is very likely to improve the local economy by attracting water recreation enthusiasts to the area and bringing outside tourism dollars to local businesses. The project has already increased community involvement, demonstrated by the successful collection of a cash match for the grant. NCPR has been busy with other projects as well. In 2010, Washington State Fish and Wildlife announced its intention to close 12-15 miles of the river adjacent to Northport. With a new sense of empowerment and newly acquired leadership skills, NCPR rallied 15 people to drive 40 miles to testify at the public hearing. Two members of the committee also spoke at a regional meeting, and convinced Fish and Wildlife that the local economy relies on the tourism dollars from river visitors. NCPR members report that engaging in environmental issues has created a better understanding of and passion for their surroundings.

**Growing a Community Garden**

Following more community conversations, the Horizon’s group selected a Community Garden as its next priority project. NCPR received a donation of land in the middle of town and organized volunteers to establish the garden, erect a fence, and obtain a grant to build a greenhouse.

The project has further strengthened group members’ leadership abilities and increased their understanding of food systems and the environment. The intent is now to ignite this same level of understanding among other members of the community, as noted by Nina Grobben, NCPR community garden committee chair, “If we could help show a garden friend how to steward the land, perhaps it would lead them to becoming a better steward of themselves, their loved ones, their homes, and their communities.”

In addition to the donation of land, the group has received four truckloads of bark, wood for 35 raised beds, and carpet for weed control on the paths. They have been awarded five grants totaling $25,500 for initial construction of the garden, greenhouse, and educational programs. Youth have learned construction skills by working with the contractor to build the greenhouse. The group has now hired a VISTA Volunteer who will become the “Garden Keeper.” When this person begins work in fall of 2010, his primary responsibility will be to work with the elementary school to develop a curriculum that teaches K-8th graders about healthy food systems—from planting seeds, to growing, to harvesting, to preparing, and finally to eating. Fifty-two percent of the students in Northport qualify for free and reduced lunches—another indicator of the extreme level of poverty. In addition to learning about the environment, the goal is to teach the youth skills and knowledge that will break the cycle of childhood obesity and diabetes.

The Community Garden has sold 16 beds, and has the remaining 19 planted for community use and provides nutritious food for the twice-weekly Senior Meals and Food Bank. Plans also include building wheelchair accessible and walker-friendly raised beds where seniors and individuals with disabilities can work in the garden alongside youth. The drip-water irrigation system was designed by a Master Gardener and funded through one of the grants and the water for the garden is donated by a neighbor. Home-schooled youth are also planting three seasonal items in the greenhouse for year-round fundraising activities.

**Conclusion**

The lesson of Northport, Washington is that community change can start with simple conversations. In this remote, rural community, the investment in talking to each other has created conditions to foster change. Projects launched in Northport were initially intended to solve one problem – clean up a dumpy looking town. From a community development perspective, it has morphed into so much more. The projects improved their natural capital, the marina, the streets of Northport, and individual homes. These actions then resulted in increased social capital because people who needed assistance felt supported and understood by those who could help. And it was possible because of the increased human capital encouraged through the Horizon’s program (Emery & Flora, 2006). Through this process, community members learned about their community needs and developed leadership skills that enabled them to act in productive ways.
Real change begins with the simple act of people talking about what they care about,” states Wheatley (2002). The success of the Community Clean-up project started with discussions between neighbors and it has resulted in physical and social change.

Working together to do something as simple as picking up trash has created the momentum of change. The key to their success has been a consistent, long-term attitude of service in place of judgment or blame. Before the clean-up people felt overwhelmed by the garbage in their yard, but with simple conversations they are moving toward NCPR’s vision: “to have a sense of community; a sense of pride; and a sense of place for our young, endeavoring to show and amaze our visitors this beautiful place.”

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Debra Kollock is the Stevens County Director for Washington State University Extension.

ADDITIONAL RESOURCES


The contributions of regular physical activity (PA) to health are well-documented. The role that parks and recreation settings play in helping people become physically active, and thus healthier, has been evident since the recreation movement began over a century ago. Although a logical connection exists between PA promotion and parks and recreation, these settings have only begun to be acknowledged. For example, Healthy People 2010 (U.S. Department of Health and Human Services, 2000) emphasized that the design of communities and the presence of parks, trails, and other public recreational facilities affected people’s abilities to reach the recommended level of PA. Parks and recreation agencies in both urban and rural areas have great potential for promoting PA by virtue of the resources they manage and the services they provide.

Because of the lack of data about how public parks and recreation agencies address physical activity promotion, faculty at North Carolina State University in the Department of Parks, Recreation, and Tourism Management undertook an ongoing initiative to explore and measure the ways that communities promote PA. The initiative, IPARC-Investigating Places for Active Recreation in Communities, aims to advance the science of how park, recreation, sport, and tourism environments support active recreation and to provide empirical evidence to facilitate practices and policies to promote PA. The purpose of this article is to describe the work IPARC faculty undertook to examine issues confronting park and recreation directors in urban and rural communities, and to discuss briefly the role that an initiative like IPARC can have in documenting and promoting PA in communities of all types.

The framing of IPARC’s work is the social ecological model of health promotion. This model proposes that health is based on intrapersonal/individual, interpersonal/social, institutional/organizational, community and policy contexts, and provides a conceptualization of how these contexts in rural as well as urban areas can enhance behaviors by promoting certain actions and discouraging or prohibiting other behaviors. McLeroy et al. (1988) described how intrapersonal factors include psychological and biological variables as well as the developmental history of individuals. Interpersonal factors refer to relationships with others such as family, friends, and coworkers. Institutional aspects of social ecology include the role of organizations such as schools, health organizations, and parks and recreation departments. Community factors address the social environments and the relationships among groups in a geographic area. Public policy
encompasses the laws and policies as well as the views of policy makers at local, state, and national levels. Although intrapersonal and interpersonal issues are important, institutional, community, and policy aspects must also be explored regarding how PA access can be further promoted. Research has shown that programs that target multiple levels will be more likely to affect longer-term change (e.g., Sallis et al., 2006).

Assessing Issues in Rural and Urban Communities

A first task of IPARC was to survey county and municipal parks and recreation directors in North Carolina to collect baseline data about institutional, community, and policy issues faced in facilitating PA opportunities for NC citizens. One goal of this study was to examine differences in community settings.

Because rural areas are vitally interconnected with urban areas (e.g., source of food and raw materials), maintaining the vitality and sustainability of rural areas is important to the country. Significant gaps in health outcomes between rural and urban areas mean negative quality of life for rural populations and a strain on rural economic resources. Attention to increasing rates of leisure-time PA for rural residents has been a response to significant changes to rural structures. Shifts in economic activities away from agriculture have led to less occupational PA and longer commute times (Lobao, 2004). Furthermore, population migration from urban and suburban to urban-proximate rural areas since the 1970s increased strains on community capacity to provide essential services for many residents (Johnson, 2003) including PA opportunities.

For the IPARC study, all county and municipal park and recreation (P&R) directors in NC were surveyed to ascertain: (a) how rural and urban P&R directors perceived their citizen and political support surrounding PA, (b) barriers effectiveness in providing PA opportunities, and (c) priorities for the future. More details about the study can be found in the article by Bocarro et al. (2009).

The survey was developed with input from a focus group comprised of P&R directors as well as a literature review. It included 67 questions about PA in communities (i.e., 20 on opinions about the role of P&R, 18 about extent and adequacy of existing programs and partnerships, 12 about barriers, 11 about priorities, and seven about general demographic data).

A coding process categorized whether a community or county was considered rural or urban. The jurisdiction name was identified on the survey. To determine this rural/urban designation, we used the 2006 U.S. Census estimates of population to designate a county as urban (including suburban) or rural. Municipalities located within a designated Metropolitan Statistical Area (MSA) were considered urban, while communities located outside an MSA were coded as rural. Although differences between rural and urban populations are widely discussed, there is little agreement about their definitions. Therefore, although county-level measures may be less than ideal, the use of rural and non-rural ideal types was needed to compare places.

A total of 134 usable questionnaires were returned for a 64% response rate. Returns included 92 from urban areas and 42 from rural areas. Results showed that rural P&R departments were only statistically significantly higher on one item: P&R departments must form partnerships. Rural directors reported significantly higher need to form partnerships compared to urban departments. Directors in urban areas were significantly more likely to say they:

- Had enough parks and open spaces.
- Were taking a lead in promoting PA.
- Had elected officials who saw the importance of PA.
- Believed residents were willing to pay for PA opportunities.
- Thought that all income groups had access to equal quality of facilities.
- Believed that PA opportunities were generally adequately funded.

Although the urban agreement scores were higher, both rural and urban averaged on the agree side of the scale except that rural P&R directors did not believe they had “enough parks and open spaces.”

Although the P&R directors in North Carolina generally believed that PA was important in their municipalities and counties, they also indicated that such programs needed additional funding. Interestingly, not having enough staff was the most important barrier followed by funding and then, quality and amount of facilities and equipment. A comparison of barriers based on rural or urban designation found four statistically
significant differences: staff knowledge about promoting PA, no clear standards about what should be provided, lack of support from government authority (i.e., commissions, board, or councils), and the number of low income residents. For each item, directors from rural counties perceived the barriers as more important than their urban counterparts. As noted however, none of these barriers were perceived as a major detriment.

This study provided a useful baseline for determining future directions that might be taken to facilitate the promotion of PA in community settings. An understanding of the role of public P&R services in rural areas has not been fully developed. One assumption that has inhibited exploration of this topic is a perception that proximity to natural resources and open space encourages higher levels of participation in outdoor recreation (Hendee, 1969). Therefore, rural residents are expected to participate in unstructured outdoor recreational activities (Cordell et al., 2002), and may have less need for local P&R programs to facilitate PA.

Generalizations that rural communities are amenity-rich fail to recognize the complex and contextual conditions of rural areas. Many remote rural areas do not possess the level of natural amenities (e.g., mountains, water areas, scenic vistas, public lands) necessary to be available for recreation use (Kranich & Petzelka, 2003). Additionally, rural residents often describe constraints to participating in outdoor recreation including a lack of accessible resources, fear of hunters and criminal activity in isolated stretches of land, and lower levels of social support for spontaneous activity (Moore et al., 2010; Yousefian et al., 2009). A reliance on limited local tax dollars and insufficient volunteer support has led to many rural communities lacking the capacity to develop, maintain, and sustain facilities and programs (Paluck et al., 2006). Because of fewer resources, rural directors saw the critical need to form partnerships to improve levels of PA. Although rural P&R directors in our study perceived a higher need to form partnerships, Mowen et al. (2009) found that rural P&R agencies nationwide may be less likely than their urban counterparts to actually engage in these types of partnerships. More research is needed in this area.

**IPARC Responds to the Challenge of Promoting Physical Activity in Communities**

The mission of IPARC is to advance the science of park, recreation, and sport environments to promote active living. IPARC faculty and staff members seek to facilitate the application of evidence-based policies and practices to enhance opportunities for PA to enhance quality of life. To these ends we are conducting research about opportunities for PA for community residents in parks, recreation, schools, and other community settings (e.g., the study described previously). A study of rural and urban community partnerships is planned to begin in fall 2010.

We also seek to facilitate collaborative research opportunities among NC State faculty and other colleagues. Over the past two years, we have invited a number of local, as well as nationally respected researchers, to share their work with us and to explore opportunities for partnerships. We have established ongoing relationships with other units including NC Division of State Parks, NCSU College of Design, East Carolina, Appalachian State University, NCSU Cooperative Extension, and UNC-Chapel Hill School of Public Health and Department of Urban and Regional Planning, to mention only a few.

A third goal is to advance the state of knowledge about evidence-based research regarding active recreation in communities through projects, publications, and training workshops and seminars. We sponsored an Active Recreation Counts Summit to bring together researchers and practitioners from throughout the state who were interested in measuring the impact of community programs on PA involvement. We have also presented research at national and state conferences and published almost three-dozen papers pertaining to issues of active recreation.

IPARC fits at NCSU since the Department of Parks, Recreation and Tourism Management is one of the oldest, largest, and most respected programs in the nation. In addition, the location in a College of Natural Resources provides a unique perspective on PA as a public health issue. Faculty have related and concurrent interests and expertise in topics such as the human dimensions of natural resources, urban forestry, participatory natural resource planning, urban wildlife, and youth development. We also work closely with the NCSU Recreation Resources Service (RRS), a state supported unit that provides technical assistance to communities in NC. Further, NCSU has a nationally recognized Geographic Information Systems Technology program.

Future proposed projects include webinars to address issues regarding promotion of PA, further opportunities to use GIS, making connections between PA and food environments, and determining means to influence policy gathered from evidence-based research. The IPARC faculty is committed to addressing PA through research about parks, open spaces, urban forests, schools,
and community non-profit organizations. For additional information about projects and publications please visit the project’s website at http://cnr.ncsu.edu/iparc/

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ADDITIONAL RESOURCES
Investigating Places for Active Recreation in Communities
http://cnr.ncsu.edu/iparc/

REFERENCES


Introduction

“Everybody needs beauty as well as bread, places to play in and pray in, where nature may heal and cheer and give strength to the body and soul alike.” John Muir

Nature-based recreation is believed to be the fastest growing sector of the recreation and tourism industry globally, generating an estimated 10-12 percent growth in international travel per year (World Tourism Organization, 2001). The United Nations Environmental Programme (UNEP) and Conservation International (CI) have indicated that most of the growth in leisure travel is occurring in and around the world’s remaining natural areas (Christ, 2005). Within the United States, demonstrating the highest increases (double digits from 2008), were backpacking, mountain biking, and trail running; with hiking and camping increasing slightly (7 and 9 percent respectively). Participation in nature-based activities has been measured by Cordell et al. (2008) since 2000. Prominent among the top seventeen activities, viewing or photographing flowers and trees and natural scenery ranked the highest, with growth rates of nearly 26 percent and 14 percent respectively. Cordell et al. (2008) suggest that “Americans’ interest in nature and nature-based recreation, though changing is not declining; rather, is strong and growing” (p. 10).

Increased use comes with concerns. Major initiatives and forums in the 1980’s such as the creation of the World Commission on Environment and Development (WCED) and its subsequent 1987 report, Our Common Future (United Nations, 1987); and the 1992 Earth Summit, resulting in the Rio Declaration on Environment and Development, and Agenda 21 (Hall & Lew, 1998) brought to the forefront that “current generations were imposing too great a demand upon the natural environment to allow it to...
continue to reproduce and maintain itself at its previous level of stability” (Butler, 1998, p. 26). Evolving as Agenda 21 for the Travel and Tourism Industry (WTTC, WTO, Earth Council, 1995), Agenda 21 laid the groundwork and guidance for sustainable recreation and tourism in a broad sense. It also prompted an expanded discourse on recreation in protected areas, which included the notion of “operating in harmony with the local environment, community, and cultures, so that these become the permanent beneficiaries not the victims of [recreation] development” (WTTC, WTO, Earth Council, 1995, p. 30).

When placed in the context of human development, protected areas serve as storehouses for biodiversity, and contribute to human health and well-being, through direct and indirect benefits. The benefits that healthy environments support as “ecosystem services” are often used to understand this relationship. These benefits include: 1) provisioning such as food and freshwater; 2) regulating services, such as climate regulation and water purification; 3) supporting services, such as soil formation and nutrient cycling; and 4) cultural services, such as recreational, spiritual, religious, and other non-material benefits (Millennium Ecosystem Assessment, 2005). Sustainability becomes synonymous with a conscious strategy to prevent ecological degradation, and hence enhance ecosystem services vital to healthy species existence (Chivian, 2004). Public lands in the United States provide large corridors to protect and conserve biodiversity, as well as provide areas for healthy recreational pursuits, economic benefits to local communities by way of recreation and tourism development, and increase quality of life for surrounding communities. These ideas are also supported by the USDA Forest Service’s mission: “To sustain the health, diversity, and productivity of the Nation’s forests and grasslands to meet the needs of present and future generations.” (United States Department of Agriculture Forest Service (USDAFS), 2009).

Sustainable recreation, conceptualized by global initiatives and supported through our public land managing agencies missions, is a multi-faceted complex idea, which has not been explored through public land manager’s perspective. This paper explores how public land managers perceive sustainability within the context of managing for sustainable recreation on USDA FS managed lands. The objectives of this study were to examine USDA FS personnel perceptions of sustainable recreation and:

1. Improved health for the recreating public;
2. Increased appreciation for surrounding communities;
3. Cooperation with surrounding communities in policy and decision-making processes;
4. Improved quality of life for surrounding communities; and,
5. The economic benefits of sustainable recreation.

Methods
The study population was USDA FS managers in decision-making roles regarding recreation. The levels of responsibility were regional, forest, district, and location. A total of 872 employee’s names and email addresses were gathered and 433 individuals participated. Our final response rate was 50.5 percent, after eliminating non-functioning email addresses.

Survey Instrument
Development of our questionnaire was a multi-phased process. In our first phase we gathered impressions from the field. Suggestions were sought from USDA FS regional recreation managers to discuss the study concept and proposed objectives, which in turn provided insights on critical issues in sustainable recreation and tourism concerns. Survey items were derived from a sustainable operations survey (Winter, 2008), sustainable management concepts explored by Cottrell and others (see Cottrell & Vaske, 2006; Cottrell et al., 2007), and unique items of

Figure 1. Importance of Sustainable Recreation.
interest to this study such as responses to global climate change which were based on previous work for the California State Parks Public Opinions and Attitudes Survey on outdoor recreation in California (Hendricks et al., 2007). The survey draft was then provided to research colleagues and agency personnel interested in sustainability and/or recreation and tourism for their review and comment, which resulted in a reduction of the number of survey items and rewording several of the items. Review by a union representative and a pretest with a random segment of our sample rounded out our survey development preparatory steps.

Survey Questionnaire
The final survey was specifically designed for online administration through a program called Zoomerang. Our survey included selected respondent characteristics (e.g., length of time in area, and highest level of education completed); and respondent position in the USDA FS (e.g., job title and time in assignment). To explore Forest Service managers' understanding of the relationship between sustainable recreation and tourism and surrounding communities, sections of the survey included questions surrounding economic benefits, quality of life, and community involvement in decision-making processes. Two items also explored the importance of sustainable recreation in the employee’s management area (e.g., importance within the management area and sustainable recreation as a FS priority), and these were evaluated based on a five-point scale where 1=very unimportant and 5=very important.

Findings represent responses from 433 participants, the vast majority (97.9 percent) who worked full-time, primarily at the district-level (57.0 percent). Most served as recreation managers (47.8 percent) or recreation staff officers (28.9 percent), and averaged 7.4 years in their current assignment. More than half (59.1 percent) held Bachelor’s Degrees, and almost one-third had completed graduate degrees (21.7 percent Master’s, 8.5 percent Ph.D.).

Sustainable Recreation and Community
When considering SR and communities, Forest Service managers generally agreed that several aspects of community life were important to sustainable recreation (see Figure 2). The majority (80 percent) agreed to strongly agree that recreation created new job opportunities and diversified the local economy; and, almost 90 percent felt recreation brings new income to surrounding communities. And, 92 percent felt economic impacts of recreation on surrounding communities was an important to very important aspect of sustainable recreation.

Respondents were also asked about aspects of quality of life and sustainable recreation (see Figure 2). A vast majority (87 percent) felt that improved health for the recreating public was important to very important when considering sustainable recreation. Quality of life for surrounding communities, with 90 percent agreeing that FS managed lands...
increased the quality of life for residents in surrounding communities.

Lastly, while most respondents agreed that residents should be involved in decision-making (85 percent), only half (50 percent) actually felt there was good communication among parties involved in the policy and decision-making processes surrounding recreation.

Discussion
This study demonstrated that our respondents agreed there is a connection between healthy communities and sustainable recreation on FS managed lands. While many managers surveyed in this study understood the linkages to community, further assurance that this is a Forest Service priority may provide an incentive for managers to increase their emphasis on conservation and sustainable management of public lands as portals to enhancing ecosystem services (i.e., provisioning, regulating, supporting, and cultural).

This study focused on recreation managers and aspects of communities with respect to sustainable recreation development. Yet we know that protected areas not only provide direct economic benefits, but also create venues for a range of environmental services such as climate regulation, watershed protection, water purification, and pollination (Dudley et al., 2008). The importance of ecosystem services to livelihoods and economic well-being suggests the need for a broader understanding of managers’ perspectives from all resource areas (i.e., water, botanical, wildlife) within our public lands system. The role of sustainable recreation in the broader sphere of public land management responsibilities might also be important to know. It is at the broader sphere that decisions about resource allocation and agency priorities are made.

The consequences of nearly 700 million visitors (WTO, 2001) roaming the globe at the start of the new millennium has increased awareness of the importance of creating and sustaining the biologically-diverse environments and healthy communities upon which nature-based recreation survival depends. Governments, non-governmental organizations, and communities have a critical need for research to address these public policy issues. The nature-based recreation industry, with the aid of research, has an opportunity to play a leadership role in shaping a more sustainable society, one that brings real benefit to biodiversity conservation and protection of ecosystems at all levels.

We generally accept that sustainable recreation development must be inclusive of not only environmental considerations, but also needs social and economic pillars. By exploring nature-based recreation’s relationship to protection of natural areas, including biodiversity and protected areas such as public lands, we can begin to understand ways in which sustainability can be incorporated into all aspects of this complex industry. As Butler (2000) suggests, the relationship between [recreation] and [protected areas] will never be an easy one, but for the mutual well-being of both partners, the relationship must not only continue, but become more symbiotic if these areas are to continue to perform their multiple functions into the third millennium (p. 335). And, while we understand that sustainable recreation must safeguard the natural environment in order to meet the needs of the host population and satisfy its visitors, we have yet to determine whether or not this is actually taking place in practice (Cater, 1993). The USDA Forest Service embraces as its motto: “Caring for the land and serving the people.” Inherent in its mission and motto is guidance that culminates in sustainable recreation (USDA FS, 2010). For example:

- Advocating a conservation ethic in promoting the health, productivity, diversity, and beauty of forests and associated lands.
- Listening to people and responding to their diverse needs in making decisions.
- Protecting and managing the National Forests and Grasslands so they best demonstrate the sustainable multiple-use management concept.
- Providing technical and financial assistance to State and private forest landowners, encouraging them to practice good stewardship and quality land management in meeting their specific objectives.
- Providing technical and financial assistance to cities and communities to improve their natural environment by planting trees and caring for their forests.
- Providing international technical
assistance and scientific exchanges to sustain and enhance global resources and to encourage quality land management.

- Helping States and communities to wisely use the forests to promote rural economic development and a quality rural environment.
- Developing and providing scientific and technical knowledge aimed at improving our capability to protect, manage, and use forests and rangelands.
- Providing work, training, and education to the unemployed, underemployed, elderly, youth, and disadvantaged in pursuit of our mission.

This study shed some light on support for sustainability in nature-based recreation by land managers that address these issues in their daily work. Further research is needed to address the relationships between sustainable nature-based recreation and the health and viability of adjacent communities. Whether, rural, urban, or somewhere in between, the pillars of sustainable recreation offer guides to beneficial delivery of services across scales and ecosystem types.

**ENDNOTES**

1. Biological diversity is the “variability among living organisms from all sources, including terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems” (IUCN, 2001, p. VIII). Conservation of biological diversity means that we use various management practices to “maintain the populations of genes, species and areas of ecosystems” (IUCN, 2001, p. 1).

2. Sustainable recreation is envisioned as an all encompassing term to include both local recreationists (visitors) and those who travel to public lands (tourists), which potentially creates a recreation/tourism industry in local communities.

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

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My happy childhood memories of growing up in Massachusetts and playing outside for hours upon hours, make me concerned about the lack of exposure to outdoor recreation and nature for today’s children, no matter where they live. While some may assume that rural children and adults spend more time outside recreating in nature, recent studies have shown that this just isn’t the case. In his book, “Last Child in the Woods,” Richard Louv draws our attention to the work of Rhonda Clements, of Manhattanville College in New York, who surveyed 1,800 urban and rural mothers and compared their answers to those of mother’s a generation ago. She found that while over 70 percent of today’s mothers recalled playing outdoors every day as children, only 26 percent said that their own children played outside everyday.

“Surprisingly, the responses did not vary a great deal between mothers living in rural and urban areas.” Rhonda L. Clements, as quoted in “Last Child in the Woods,” by Richard Louv (2005).

The assumption that people in rural communities have healthier lifestyles has been challenged by recent research as well, revealing many of the long-standing challenges rural communities face. The aging rural population, lack of transportation, fewer municipal funding resources and lack of access to commercial fitness facilities in rural areas, limit the health and fitness opportunities available to rural residents. Deborah John of Plymouth State University states that,

“While rural living is associated with quality of life, access to outdoor recreation, ... inherently more active, the reality is that people living in rural areas have limited access to health care, commercial exercise facilities, and community or corporate physical activity programs. In addition, rural municipalities have fewer resources to
While almost anyone can appreciate nature’s beauty and most understand the importance of having active lifestyles to sustain good health, not everyone views access to the natural world in the same way.

support healthy active living. Consequently, people living in rural areas are more prone to develop conditions associated with inactivity, such as heart disease, diabetes, and obesity, than their urban and suburban neighbors.”

**Access, Safety and Proximity Matter**

Rural children, often living great distances from their schools and village centers, may actually have less opportunity to ride their bikes or walk to school than urban children and often have to arrange extra transportation if they wish to stay after school to participate in sports programs or use the school’s gymnasium or other community facilities. Even if a rural child lives near their school, parents may have safety concerns about the safety of bicycling on rural roads. Rural roads can be very dangerous. In a study of traffic accidents in 2002, by the Washington State Department of Transportation, it was found that the number of fatal accidents on rural roadways was more than double that of urban roadways. Parents may not want their children walking or riding alone on rural roads and trails.

Proximity matters in access to recreation, nature and increased physical activity. Living in rural areas often means great distances between important locations. In urban settings, providing appropriate access to recreation takes proximity into account. An urban park or recreation facility’s “Neighborhood Service Area” is considered to be a half-mile from its perimeter or, as some have determined, within walking distance for a healthy person. It’s fairly rare to find this convenience in a rural setting.

**Electronic Media, Isolation and Nature Deficit Disorder in Rural Living**

Do rural children suffer “Nature Deficit Disorder?” Do they experience a lack of outdoor physical activity? It would be a mistake to think that rural children are any less susceptible to the draw of electronic media (video games, the Internet or television) than urban children. Are they more or less isolated given today’s access to the virtual social networks online?

When blogger Mick Ly asked the question, “Does Internet make us isolated?” he got some interesting responses:

“I think sometimes the Internet really makes us isolated. We don’t often go to have the outdoor activities. We just stay at home and get online. We contact our friends and family by emails and chatting software. But we don’t often visit them in person. Even we go shopping via the net today. This is the disadvantage of Internet to take people apart.” Youless

“... I hear parents complain about their kids spending more time on the computer and have stopped playing outdoor games, and have very limited time socializing with family members and friends. So in my opinion, while Internet gives us a wider reach to the people around the world, it also isolates us from the people who matter more to us—our family and personal friends.” Dory Vien

Others felt that Internet access can also allow interaction with distant others, broader perspectives, and online networks of virtual friends, essentially reducing our self-perception of isolation. While reducing a sense of isolation and providing greater access to information is a good thing, finding a balance is critically important. The question is, where does the time allocated for electronic media time come from? In other words, what activities are displaced by the use or over use of electronic media? Recent research on this issue at the University of Waterloo, using random sampling and multivariate analyses, found that electronic media use displaced both social and physical activities at significant levels (-.37 and -.23 respectively). The same study found that use of electronic media did not interfere with activities at school, so it follows that the most likely source of time displaced is a family’s 1:1 time before and after school, weekends and holidays.

One balanced approach is more effective time management allocating limited time for sedentary activities without denying access to electronic media altogether combined with frequent, regularly planned family, community and age group nature-based activities and outdoor recreation.

**Nature and Rural Values: Finding our Common Ground**

Many rural families have lived in their community for generations and may have differing views and beliefs about nature than newer residents who have moved to a rural setting from an urban area specifically to live closer to nature. This doesn’t mean that these values are in any way in conflict with each other, just that a respectful and sensitive acknowledgement of these differences in perspective exist and employing the “assumption of good intent” are important for a cohesive, inclusive,
positive and community-based approach. Finding common ground and sharing specific goals is a good place to start. While almost anyone can appreciate nature’s beauty and most understand the importance of having active lifestyles to sustain good health, not everyone views access to the natural world in the same way. Barbara McCahan, director of the Center for Active Living and Healthy Communities at Plymouth State University, highlights these different perspectives, “…the woods can be as much of a deterrent to being physically active as a freeway, depending on how you look at it.”

Individual and Community-Based Solutions and Resources
Rural children are likely to be dependent on their families for their recreation experiences and exposure to nature. With rural families working harder than ever to make ends meet and most parents working more hours per day than ever before, what is a rural family to do to provide exposure to nature and recreational activities for their family members? Knowing the problem is good, knowing effective solutions is even better. Canada has a long history of proactively developing rural communities over vast and sometimes isolating distances and in many instances doing so with few financial resources. In “The Recreation Road – A Rural Route to Planning,” the Leisure Information Network provides a step-by-step workbook for rural communities attempting to provide recreation activities for their community members. Written for volunteers, one of the great things about this workbook is that they have built in methods for planning community recreation that any lay person can understand and use. Conclusions and recommendations are based on research combined with interviews with community leaders in rural settings. The conclusions, or “impressions” as they are referred to in the workbook, suggest culturally-sensitive and useful methods to identify community strengths, challenges, needs, and goals for local recreation. One of the interesting insights provided by the Leisure Information Network of Canada is that many well-meaning efforts at developing rural recreation programs do not actually ask rural residents what they want. The workbook provides ways of identifying what local people want in recreation programs and this provides a greater chance for a successful rural recreation effort.

Some good ideas include:

- Partnership efforts with community service non-profits like the Kiwanis Club to organize and support team sports, fishing derbies, hiking and walking clubs, nature workshops, sports challenges and village fairs.
- Tapping into cultural traditions of rural indigenous communities can expose the community at large to a more meaningful experience with nature that is based in diverse perspectives and historical values. Enriched experience and breadth of exposure enhances a child’s understanding and respect for nature.
- Provide easier access to local trails and walking paths. In rural areas, trails and pathways often pass through private land and require permission to cross and this can complicate access. One shared goal might be establishing a positive relationship with these land owners. Having established standards
for hikers that respect the land owners needs while gaining permission to walk freely on private hiking trails can increase access to nature while building positive relationships within the community. A local trail map could be produced with efforts to increase eco-tourism.

- Provide positive nature-based experiences can help children develop mentally and physically. Two excellent books, filled with activities, are “Sharing Nature with Children II” by Joseph Cornell and “Nature’s Playground,” by Fiona Danks and Jo Schofield. Both books are suitable for use by families or with larger community groups (and frankly, adults would enjoy them too).

- Invite county recreation organizations to participate with mobile recreation programs that bring new experiences into rural communities periodically throughout the year.

- Find out what local seniors feel would reduce isolation and increase activity.

- Form a Community Action Council.

In conclusion, it’s clear that many of the myths about rural living are being dispelled and many of the challenges of rural living are coming to light. Far from the “rose colored glasses” view of the idyllic nature of rural living held in the past, a more balanced view taking in the significant challenges along with the positive benefits of rural living is helping communities advocate for themselves and create positive change for their community members. Actively developing a positive relationship with nature and increasing outdoor physical activity is equally important for rural and urban kids.

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Thermus aquaticus and You: Biodiversity, Human Health, and the Interpretive Challenge

By Daniel L. Dustin, Keri A. Schwab, and Kelly S. Bricker
Imagine being imprisoned for a crime you didn’t commit. How would it affect your physical, mental, and emotional health? How would it affect the health of your family and friends? Imagine your sense of helplessness when everyone who should have helped set you free—eyewitnesses, investigators, police, and attorneys—all conspired instead to build a strong case against you. After your trial and sentencing, imagine how you would feel after more than a decade behind bars for something you didn’t do.

Such was the case of Christopher Ochoa, who, in 1988, was coerced into confessing to a murder he didn’t commit, and whose grandfather died while Ochoa served 12 years in prison. Such was the case of Neil Miller who was incarcerated for nine years after a wrongful rape conviction. Such was the case of Earl Washington who was wrongly imprisoned for 17 years after discrimination, manipulation, and poor legal representation led to his conviction for rape and murder. And such was the case of Gary Dotson who spent eight years in prison on aggravated kidnapping and rape charges, after a victim misidentified him as the perpetrator.

Fortunately, thanks to deoxyribonucleic acid (DNA), these stories have an unexpected happy ending. Since Gary Dotson was first set free by a DNA matching technique in 1989, more than 250 convictions have been reversed in the United States, leading to innocent people being set free. DNA is a spiral molecule found in all organisms. It contains specific genetic information unique to each one of us. For an individual accused of a crime, DNA testing can often help determine beyond a reasonable doubt if that person committed the crime. It is a powerful diagnostic tool for both the prosecution and the defense. But how did DNA testing come to be?
Polymerase Chain Reaction
On a hot dry evening in May of 1983, Kary Mullis, a researcher with the Cetus Corporation, was driving north from Berkeley, California through Mendocino County. He was enjoying the smell of blossoming California buckeyes and thinking about a way to read the sequence of, as he put it, the “King” of molecules, DNA. If he could do that, he felt he could change the world. As he drove on, Dr. Mullis understood that he had to arrange a series of chemical reactions that would represent and display the sequence of a stretch of DNA. He could do this, he thought, by attaching a short synthetic piece of DNA to a long strand of DNA if the sequences matched up somewhere on the longer strand. He then focused on how to do it. Later on that evening and farther down Highway 128, Dr. Mullis worked out in his mind the rudimentary chemistry for what would come to be known as the polymerase chain reaction (PCR), the key to the DNA matching technique. Ten years later, in 1993, he won the Nobel Prize in Chemistry for that night’s conceptual work.

Integral to PCR’s utility as an amplification technique for reading DNA is Taq polymerase, a heat resistant enzyme that makes it easier to duplicate specific pieces of DNA. Taq polymerase, in turn, is found in bacteria that thrive at extremely high temperatures. These thermophilic bacteria are considered unusual because they defy what were thought to be the upper temperature limits of life (> 55 degrees Celsius or >131 degrees Fahrenheit). Indeed, the bacterium from which Taq polymerase was isolated thrives in scalding water. And where on earth was that bacterium, that source of Taq polymerase, found?

Thermus aquaticus
In the summer of 1966, Thomas Brock, a microbiologist from Indiana University, was driving cross-country to a summer job in Seattle. He did some climbing in the Grand Teton and then, against his better judgment, made a detour north to Yellowstone National Park. (Dr. Brock had avoided visiting Yellowstone on several previous occasions, because of his aversion to tourists and crowds.) He stopped briefly at the West Thumb Geyser Basin on the western shore of Yellowstone Lake, and, to his amazement, saw what he described as “algae mats, bright orange, red, and green, spread out along the silica channels under sheets of hot, steaming water” (Brock, 1978, p. 441). Fascinated by what he observed, Dr. Brock spent the next ten years studying microorganisms thriving in Yellowstone’s geyser basins. The hot springs proved to be wonderful natural laboratories. The crowning achievement of Dr. Brock’s decade of research was the discovery of a new bacterium, Thermus aquaticus, in October of 1966, the bacterium from which the heat resistant enzyme, Taq polymerase, was eventually isolated and adopted for use in the DNA matching process.

Thermus aquaticus and You
The story of Thermus aquaticus’s discovery in Yellowstone National Park, and its subsequent role in creating a 1993 Nobel Prize-winning technology that makes it possible to read DNA, is a clear illustration of human health’s interdependencies to everyday people.

The Thermus aquaticus story demonstrates the connection between biodiversity and human health vividly. But this kind of connection must be communicated to the general public in a way that resonates with their personal experience if the implications of the connection are to be clearly understood. Because our scientific understanding of the working of things typically outpaces our common understanding, we believe the real challenge is an interpretive one. We must design effective ways to communicate complex ecological interrelationships and interdependencies to everyday people in everyday language if we are to gain widespread public support for biodiversity conservation.

We often think of Yellowstone as a tourist attraction to be enjoyed for its recreational amenities. Indeed, inscribed on the Roosevelt Arch at the Gardiner entrance to Yellowstone is “For the benefit and enjoyment of the people.” While we think of these benefits as being largely recreational, they represent but a fraction of the overall benefits Yellowstone has to offer. Benefits come in many forms, and as the Thermus aquaticus story illustrates, the health benefits have turned out to be enormous. Clearly, the National Park Service’s (NPS) custodial responsibility is much larger than we typically give it credit for. By preserving Yellowstone’s biodiversity, the NPS has contributed immensely to the health of people everywhere. This is a benefit well beyond the context of recreation. One can only wonder what other potential health benefits lay hidden in the Yellowstone ecosystem awaiting future Dr. Brocks of the world?

The Interpretive Challenge
The Thermus aquaticus story demonstrates the connection between biodiversity and human health vividly. But this kind of connection must be communicated to the general public in a way that resonates with their personal experience if the implications of the connection are to be clearly understood. Because our scientific understanding of the working of things typically outpaces our common understanding, we believe the real challenge is an interpretive one. We must design effective ways to communicate complex ecological interrelationships and interdependencies to everyday people in everyday language if we are to gain widespread public support for biodiversity conservation.

We have told the story of Thermus aquaticus in a way that reflects Freeman Tilden’s (1967) principles of interpretation by allowing the story itself to reveal its relevance to you,
thereby provoking you to reconsider the meaning of the story to your own life. Who among us cannot relate to the horror of an innocent person being wrongly imprisoned? Who among us would not welcome a scientific breakthrough that could exonerate us from a false accusation? Who among us would not want to protect the origin of that scientific breakthrough? Who among us, then, does not now feel a little more committed to protecting Yellowstone National Park and the biodiversity it represents?

**Reconnecting with Nature**

This interpretive challenge is heightened by our society’s increasing disengagement from the natural world. The United States of America is now more than 85% urbanized. We are, by and large, city dwellers far removed from the sources of biodiversity that sustain us. The danger in this separation rests in the possibility that we may lose sight of our dependency on nature for our sustenance. We may not miss what we do not know and do not see. And in distancing ourselves from nature, we may behave increasingly in ways that are detrimental to the health of us all.

Getting people back to nature means more than enhancing physical, mental, and emotional health, important as they are. It means reestablishing a basic understanding of humankind’s dependence on the natural world. This will be harder and harder to do if the context for most people’s life experiences is confined to the city. Helping people really, truly understand that human health is dependent on the health of ecosystems far removed from human populations, and that humans must modify livelihoods and lifestyles to ensure the continued good health of those distant reservoirs of biodiversity, is a daunting educational task. To accomplish it, we must employ creative approaches to interpretation that employ vivid examples that illustrate complex ecological interrelationships and interdependencies, make environment-health connections explicit, and motivate us to get back to nature, learn from nature, and live our lives in harmony with nature. Therein resides the connection between Thermus aquaticus and you.

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**RECOMMENDED READING**


Engaging the Future

Hosted by Utah State University with generous support from USU’s Cooperative Extension and Agricultural Experiment Station.

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