The Healing Power of Nature:

The need for nature for human health, development, and wellbeing

Denise Mitten, PhD

Ferris State University

Big Rapids, MI 49307, U.S.A.

mittend@ferris.edu

Phone (231) 598-7477

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Introduction

While people who practice friluftsliv know firsthand the benefits of integrating a positive relationship with nature into one's life, for others it is important to show the research supporting a lifestyle with friluftsliv. In many cases community planners, policy makers, school administrators, and others need this information to make decisions and influence people. In many cultures people spend far less time in nature than even 25 or 50 years ago. In fact, many aspects of western culture teach people not to spend time in nature. The aim of this project is to identify, explore, and develop the conceptual and underpinning theories guiding research and practice as well as to show the scope and depth of the research about the positive impacts of the natural environment on human health and development and therefore society.

To that end the research and literature about nature and health from over 30 fields have been identified and reviewed in a comprehensive manner and 14 conceptual and underpinning theories are presented connected with human's need to affiliate with nature, including theories such as indigenous consciousness, psychoevolutionary theory, naturalistic intelligence, biophilia, spiritual connections, and the ethic of care and other concepts that are more manifestations of this mutual dependence such as friluftsliv, traditional ecological knowledge, the land ethic, ecofeminism, ecopsychology, children's development needs, and a socio-ecological approach to human health.

As an example, research has shown that time in natural spaces strengthen neighborhood ties,

reduces crime, stimulates social interactions among children, strengthens family connections and decreases domestic violence, assists new immigrants cope with transition, and is cost effective for health benefits.

Conference Theme: Friluftsliv in the postmodern societal arena: -A distant cry in the wilderness?

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Around the globe in developed nations, but especially in the US, people spend far less time in nature than even 25 or 50 years ago. In 1900 40 percent of US households lived on farms. By 1990 only 1.9 percent of US households lived on farms. This urbanization has changed people's relationship with nature. In fact, many aspects of our culture now teach people not to spend time in nature. Parents have become fearful about their children playing outdoors, and children who grow up in primarily built environments often fear nature, largely because it is unfamiliar. In movies, newspapers, and in aggrandized personal stories nature is often portrayed as the *bad guy* or evil and these stories contribute to a growing biophobic attitude. Even some outdoor programs, hunters, and others talk about conquering nature as if it is the enemy. In a very short period of time, humanity has moved from the industrial revolution to a technical revolution where humans are able to live entire lifetimes rarely having to encounter nature. Exceptions to this isolation often occur only in the midst of natural disasters, floods, hurricanes, tornadoes, droughts, earthquakes, and tidal waves.

Fortunately, there is a backlash now and coalitions such as "Leave No Child Inside" or "Children and Nature Network" have formed in the US and Natural England in the UK. In June 2009 the state of Michigan sponsored a one day summit to initiate working groups that would help prepare an environmental literacy plan for Michigan (about 24 other states currently have or are developing these plans). On the doctor's office TV a health quiz playing asked the question: *spending as little as ____ time in nature can significantly increase your concentration.* The audience chose a. 15 minutes, b. 30 minutes, or c. 45 minutes. However, spending time in nature in the US is not the same cultural phenomena as it is in Norway and other parts of Scandinavia and no term in the US compares with friluftsliv.

Preaching to the choir is an apt expression as I struggled to write this paper. After all, this conference is in Norway, home of friluftsliv. Many of us at this conference have spent most of our lives either outside or figuring out how to get back outside, living as close to the earth as we feel possible for us. Many of us teach outside and we are familiar with the postal carrier's vacation, i.e. many of us vacation doing the very same activities we teach such as canoeing, hiking, kayaking, and mountaineering – all outside. For most of us here it is important that we encourage others to be outdoors often teaching them outdoor traveling and living skills helpful in being more at home outdoors. We probably all believe that being outdoors creates health and wellness benefits. What can I contribute other than talking about the specific benefits yet again?

However, while we may know firsthand the benefits of integrating a positive relationship with nature into our lives, being able to show the theoretical, conceptual and empirical research supporting a lifestyle with friluftsliv helps us better communicate this phenomenon to others. Therefore, the aims of this project are to 1) situate the health benefits of nature in historical and modern contexts, 2) identify the numerous disciplines engaging in research about the health benefits of contact with nature, including the range of activities and settings examined, 3) identify the theoretical concepts and underpinning theories that ground this research, and finally, 4) throughout the paper, as a thread, show the scope and depth of the research about the positive impacts of the natural environment on human development, health, and well-being and therefore society.

The information in this paper is meant to support the work of people who provide opportunities for people to spend time in nature and to help inform others about the benefits of spending time in nature. The author has included information from a number of countries, but the US is represented more than any other country.

In this paper, after reporting on the disciplines that are engaged in this research the author will review a brief history of nature being used for healing or as medicine and how there is a resurgence of a recognition of the positive relationship between being in nature and human wellbeing. Then the author will propose and discuss a number of theoretical concepts and underpinning theories that ground the research about the impact of nature on health, development, and wellbeing. These concepts and theories indicate that humans need healthy connections with a healthy earth to survive. Contextualizing the research is important in part because the research comes from many disciplines. The underlying concepts link the research. Additionally, this examination may help guide future research and help practitioners use research results in their programming or clinics. Showing that time in nature contributes to human wellbeing leads to the question of what kind of time in nature contributes to human wellbeing. What are people *doing* during this time in nature or do people have to be *doing* something? What is known about the affect of the particular activities in nature and the concept of level of immersion will be included in this paper yet many of these areas need further exploration. For example, understanding more about how the level of immersion or intensity of immersion in nature affects humans may benefit practitioners and clinicians. Friluftsliv is a thread throughout this paper as it is both a theoretical concept and practical manifestation of humans' need to be affiliated with the outdoors.

The author's perspective

This paper is written from the perspective of a woman residing in the United States who is involved in promoting health and wellbeing as well as teaching outdoor education and leadership. With background training in forest ecology, complementary and alternative medicine, and outdoor leadership as well as training as a parent educator, the author uses a multidisciplinary lens. The author tends to have a feminist perspective. Specifically, this author believes that the power of the natural environment

has been over looked and undervalued by health practitioners and medical people, city and community planners, school personnel, parents, and even outdoor educators.

For example, some people who work in outdoor fields take the outdoors for granted and don't necessarily highlight, capitalize on or integrate nature into their programming as much as may be beneficial. While I'm not alone, I have proposed that a major contributing factor to the global changes that participants or clients experience after outdoor adventure experiences is the impact of being in the natural environment (Bardwell, 1992; Mitten, 1994). This is especially important as many outdoor programs in the last 30 years have become more about *doing* activities than about *being* outside living and traveling in the outdoors. The activities in environmental education and interpretation, organized camping, adventure education, wilderness therapy programs, and outdoor education events supplement and maybe focus the power of nature, but the fact that programs happen outside is essential for certain benefits. It is also likely that developing programs that use nature at their core and highlighting the value nature contributes could improve program outcomes (Mitten, 2009). The author sees outdoor educators in the US and other countries having opportunities to promote the culture of friluftsliv in their countries. The author welcomes input and would like to continue to broaden this research and perspective. Finally, the author happily acknowledges her Norwegian and Scandinavian ancestry and wonders about the influence of her heritage on her lifestyle choices. The author believes in the necessity of being in free nature and living with the natural rhythms of our earth.

Terms

Understanding and perhaps agreeing on terminology is essential in most endeavors. Throughout this paper the author uses a variety of words when talking about humans' positive contact with nature, including health, healing, medicine, wellbeing, and developmental needs. Phrasing can make a

difference in meaning. Sometimes it seems more accurate to say nature contributes to our wellbeing, other times contributes to our healing, still other times disease is cured using nature. The title of this paper has changed from simply *the healing power of nature* to *the need for nature for human health, development, and wellbeing*. Healing implies that there is a health condition that needs to improve. While nature can heal and improve many physical, mental, spiritual, emotional, and behavioral health conditions, nature also appears to be necessary for healthy maturation and development in humans and our sustained wellbeing. Nature's potential impact on human development is important because developmental gaps can lead to illness and dysfunction. An often overlooked fact is that nature is essential for providing humans with food and materials for living as well as being a buffer for some of the potential disasters that weather patterns can deliver. This paper explores the multi-dimensions of nature in relation to human wellbeing.

Another important distinction is between healing and curing. "Healing" is not synonymous with "curing" and sometimes a person experiences healing though they are not cured of their disease. In this paper both healing properties and curing properties of nature are included.

Curing happens at the level of the body. This usually means that the condition or symptom that the patient came to see the health practitioner about has been eradicated. However, there are a number of diseases for which there is no "cure" and at some time all people will die even if from old age. Rachel Naomi Remen, MD (1999), author of *Kitchen Table Wisdom* and a pioneer in understanding the mind body connection in health says that there may not be a cure for all of us but there is a healing for all of us, "a healing that is rooted in mystery." People working in hospice and palliative care, understanding that their patients have complex diseases and that many are preparing to die, focus on healing. Healing happens to the whole person and often includes spiritual healing. For example in healing spaces, such as nature, stress is reduced which helps the body reach a more balanced state allowing people to summon

up their own inner healing resources and come to terms with an incurable medical condition, feel an increase in general wellbeing, or perhaps experience a cure. When one can be in awe of the mystery and beauty of life there tends to be healing and a wellbeing which includes hope, calmness, and trust in life. This is something which is not objectively measureable; it can only be experienced. This healing benefits people's psychological-emotional, physical, social, and spiritual wellbeing. When people practice friluftsliv, healing often occurs.

Even though medicine is derived from a Latin word meaning the art of healing, Western medicine is seen primarily as a science used to diagnose and treat injury and disease. Astin, Shapiro, Eisenberg, and Forys (2003) conclude that western medicine has failed to move beyond the biomedical model and is rooted in mechanistic thinking. Doctors are trained to treat symptoms using drugs and procedures that have proven mechanisms of performance. They know that "a" makes "b" happen and that "c" makes "d" happen. Usually the mechanism by which something works is proven using a double blind randomized control research study that isolates one mechanistic variable. While there is copious evidence that psychosocial factors can directly influence both physiologic function and health outcomes and therefore using mind-body therapies (including time in nature) may be very useful in treating a number of physical ailments, physicians rarely recommend these therapies, including nature therapy – or time in nature (though in Norway the "green prescription" is becoming more popular). Mechanistic thinking has hindered the acceptance of time in nature or friluftsliv being incorporated as a healing modality into physicians' work and into the lifestyle of people in the US and other countries. At the same time many substances in nature have been used as medicine in both allopathic and homeopathic systems and produce a cure for certain diseases, as will be mentioned as part of the next section.

Nature and health benefits: A look at the history

A thread of understanding about our deep connection with nature and the healing power of nature can be traced from shamans in the Reindeer Age, beginning 40,000 years ago. Symbolized by the medicine wheel, *medicine* was about coming back into balance and harmony with natural cycles and rhythms. Ayurvedic Medicine (the Indigenous Indian medical system), Tibetan Medicine, Native American Medicine, and Traditional Chinese Medicine, all at least 5000 years old, are examples of medical systems that see being in nature as integral to healing, health, and wellbeing and in which people maintain a physical and spiritual connection with nature. Amchis, the name of Tibetan Medicine healers in Nepal, even today, use up to 1800 plants in their work (Adhikari, 2009).

Over two thousand years ago spiritual teachers recognized the interface between spiritual, physical, mental, and behavioral health and nature exemplified in Christianity by Jesus' suggestion to "contemplate the flower and learn how to live" (Tolle,2005, p. 2) and the use of a white bird, the dove, as a symbol of peace or the Holy Spirit. Buddha also used form in nature as a bridge between the physical form and spirit form. In some Eastern religions, the lotus flower is considered a window to the spirit and the beauty of the flower is symbolic of the beauty of a person's essence. The origin of Zen, in the fourteenth century is contemplation, supposedly originating with contemplation of a flower.

In many cultures women have traditionally been healers and used nature in their healing most significantly through the use of herbs, many of which are still used today. These women, called wise women, used centuries of empirical evidence gained though practice-based research in prescribing their medicinal cures and healing tonics. This history continues to be uncovered: "It was witches who developed an extensive understanding of bones and muscles, herbs and drugs, while physicians were still deriving their prognoses from astrology and alchemists were trying to turn lead into gold. So great

was the witches' knowledge that in 1527, Paracelsus, considered the father of modern medicine, burned his text on pharmaceuticals, confessing that he had learned from the Sorceress all he knew" (Ehrenreich & English, circa 1971). We know that by the 14th century, though, many women, possibly in the millions, were persecuted and put to death for practicing their healing arts (Murray, 1921). A sample case follows:

> The establishment of medicine as a profession, requiring university training, made it easy to bar women legally from practice. With few exceptions, the universities were closed to women (even to upper class women who could afford them), and licensing laws were established to prohibit all but university-trained doctors from practice. It was impossible to enforce the licensing laws consistently since there was only a handful of university-trained doctors compared to the great mass of lay healers. But the laws could be used selectively. Their first target was not the peasant healer, but the better off, literate woman healer who competed for the same urban clientele as that of the university-trained doctors. Take, for example, the case of Jacoba Felicie, brought to trial in 1322 by the Faculty of Medicine at the University of Paris, on charges of illegal practice. Jacoba was literate and had received some unspecified "special training" in medicine. That her patients were well off is evident from the fact that (as they testified in court) they had consulted well-known university-trained physicians before turning to her. The primary accusations brought against her were that . . .she would cure her patient of internal illness and wounds or of external abscesses. She would visit the sick assiduously and continue to examine the urine in the manner of physicians, feel the pulse, and touch the body and limbs. Six witnesses affirmed that Jacoba had cured them, even after numerous doctors had given up, and one patient declared that she was

> wiser in the art of surgery and medicine than any master physician or surgeon in Paris. But these testimonials were used against her, for the charge was not that she was incompetent, but that—as a woman—she dared to cure at all (Ehrenreich & English, circa 1971).

Indicators can be found that more than one thousand years ago at least some people in both Asian and Western cultures believed that plants and gardens are beneficial for patients in healthcare environments (Ulrich and Parsons, 1992). Throughout the struggle for the control of medicine, gardens remained popular through the evolving history of hospitals. Hospital comes from a Latin root meaning host (also the root for hostel, hotel, and hospitality). Through the middle ages hospitals also were often almshouses and resting places for pilgrims. Guests and patients could walk in the gardens growing medicinal and culinary herbs and sit in the outdoor courtyards of the monasteries. Some hospitals were attached to the church as part of their charity mission as they embraced a charity doctrine. A binding force during the feudal period, a medieval monastery by the 12th century was a farm, an inn, a school, a library and a *hospital.* Some historians note that monasteries created elaborate gardens to bring pleasant, soothing distraction to the more well-to-do ill (Gierlach-Spriggs, Kaufman, & Warner, 1998). The church allowed certain women to be midwives, though that was their only legal access to healing.

Transitioning to the 15th century the cure of the body and care of the soul were separated and hospitals were as often separate structures established by individual merchants or guilds (Elmer, 2004). Still European and American hospitals in the 1800s commonly contained gardens and plants as prominent features (Nightingale, 1860).

In 1796 another medical system relying on nature was developed. Using theory from the sixteenth century, Samuel Hanhnemann developed principles for a medical system in which remedies from plants,

animals, and minerals in non material doses cured the symptoms in ill people while these same substances often would cause ill symptoms in healthy people. Hanhnemann, followed by others, developed over 3500 remedies. While homeopathy has struggled with the American Medical Association (AMA) in the US, it has been practiced beside allopathic medicine in many countries and is seeing a revival since the late twentieth century in the US.

Dating back to the 1800s romantic notions about nature often fueled getting outside in the US, when it was not for work. Frequently these romantic notions were about being refreshed by spending time in nature, akin to the current restoration theories. John Muir's writings speak to this concept: "Climb the mountains and get their good tidings, nature's peace will flow into you as the sunshine into the trees. The winds will blow their freshness into you, and the storms their energy, while cares will drop off like autumn leaves." This time period saw Henrik Ibsen's writing about friluftsliv which of course has become a unifying concept for outdoor enthusiasts and educators in the Scandinavian countries.

The concept of a vacation (a time away for rest) in Europe was most likely a result of the influences of industrialization and urbanization combined with a wish for the romantic. In the early 1800s the concept of going to the mountains for health was becoming in vogue. For example an English woman, Isabella Bird Bishop (1831 – 1904) travelled at the advice of her physician. When she was at home in Britain she often was ill with the vapors and other nondescript ailments. When she travelled in Canada, Scotland, and the Rocky Mountains in the US while pursing her natural history interests in nature she was not ill. By the 1820s mountaineering and adventure pursuits were ensconced in Europe and by the 1930s the British Mountaineering Leadership Scheme was developed. This beginning of exploration and adventure excursions formed the basis for adventure travel, and challenge courses programs in Australia, Canada, Great Britain, New Zealand and the US (Priest, 1986). The concept of vacationing for health and renewal has been maintained better in Europe, New Zealand, and Australia where six weeks

of vacation a year are the norm with no less show in work productivity.

In the late 1800s the Quakers' Friends Hospital used nature in the treatment of mental illness and tuberculosis through people living in outdoor sanitariums to recover. It is debated today if the state-of-the-art "heliotrope" treatment of fresh air, sunshine, good food offered by groups using tent camps in Colorado, such as the Jewish Consumptives' Relief Society, was a successful treatment for tuberculosis. Nevertheless, Colorado and other western states advertised heavily for ill people to recover in the dry air and sun so successfully that by 1920 it is estimated that 60% of Colorado's population was ill people and their families who migrated there from the east coast (Harvard Magazine, 2009).

Following an earlier transition from rural to urban environments that had happened in the UK, less people in the US live in rural areas, therefore less people have nature as a large part of their lives. By 1900 only 40% of US households lived on farms. With the greater urbanization in the US the recreation movement began to help children have safe outdoor play environments.

By the mid1900s Western medicine and nature were not connected, though in areas with no Western trained doctors available people continued to use nature-based home remedies. Many people practicing allopathic or Western medicine commonly from Western European descent have lost their understanding of the value of connection to the natural world to healing. In fact since the mid 1900s hospitals have become sterile, often large complexes more concerned with efficiency and cost rather than patient satisfaction. Outdoor terraces and balconies disappeared and parking lots replaced natural areas (Ulrich, 1992; Malkin, 1992; Horsborough, 1995). However, in 1955 the University of Michigan developed a combination horticultural and occupational therapy degree and others followed. By the 1960s there was a start to a back-to-nature ideal and the 1964 Wilderness Act presumed the need for people to have time in spaced untrimmed by man [sic]. Still, people in the US, especially children, have

continued as a whole to be more removed from nature.

The rediscovery of the impact of nature on human wellbeing

The author would be remiss not to acknowledge that many indigenous people have kept the knowledge of this mutual dependency between nature and humans at the forefront of their culture. Many indigenous people continue to live in harmony with natural landforms. A number of aboriginal populations continue to use initiation or rite-of-passage ceremonies to aid in healthy development and maturation that have been used for thousands of years. A study on health promotion and illness prevention in Chinese elders revealed that the elders today believed 'conformity with nature' was considered the key to health and wellness (Yeou-Lan, 1996). In Scandinavian history the importance of nature, popularized by Ibsen and others, never really waned. More recently, from the mid twentieth century on many practitioners of outdoor and environmental education, worldwide, have understood the value of being outdoors and have educated people about the natural environment and environmental ethics.

The renewed realization by mainstream Western European cultures in modern day about the importance of nature for humans and how intertwined human existence and nature are has co-evolved from a multiplicity of disciplines. This rediscovery of the importance of nature for health, human development, and healing currently is building in momentum world-wide. For example, Fitzpatrick (2006) reported in *The British journal of general practice: The journal of the Royal College of General Practitioners* that Natural England, endorsed by the Deputy Chief Medical Officer and the BBC and supported by a budget of £500m of taxpayers' money, has launched a campaign to educate general practitioners about the health benefits through contact with nature. While Fitzpatrick does not necessarily support nature therapy, he does say that Natural England's health campaign focuses on

children and the obesity epidemic, bullying prevention, ADHD reduction and improved concentration, self-discipline and self-esteem.

Similarly, in the US the current movement focuses heavily on children, with organizations such as the Children and Nature Network. Some local and national legislation is now moving forward regulating curriculum on environmental education and school children's time outdoors. *Last Child in the Woods* by Richard Louv (2005, updated in 2008) seemed to ignite this movement to new heights. Even the Forest Service and the Bureau of Land Management are reinforcing this momentum with their current slogans such as ***take it outside***. During the summer 2009, the state park system in Michigan offered a free day in a state park for each library book checked out.

Some hospitals are renewing their belief in the efficacy of nature in healing and are embracing therapeutic landscapes again (Therapeutic Landscapes Database, 2000). As hospitals, nursing homes, primary care clinics and rehabilitation facilities face high construction and renovation costs the economic benefits in terms of the healing impact of nature are being figured in to the mix. The United Kingdom has spent at least $4 billion on new hospital construction since 2002, the Texas Medical Center in Houston about $1.8 billion. The US has averaged about $15 billion annually during the last decade for new hospitals (Urlich, 2002). If incorporating gardens, such as the play-garden at the Rusk Institute of Rehabilitative Medicine in New York City help the children with brain injuries recover mobility faster than only exercising in a rehabilitation room, then costs are cut and healing enhanced. When burn patients are wheeled outside on paths designed wide enough for beds, the patients practice walking on different grades and experience different textures healing more quickly. The benefits are multiplied when their families can be part of their time outdoors, there is a relaxed setting for patient-visitor interaction away from the hospital interior, and staff are provided with needed retreat from the stress

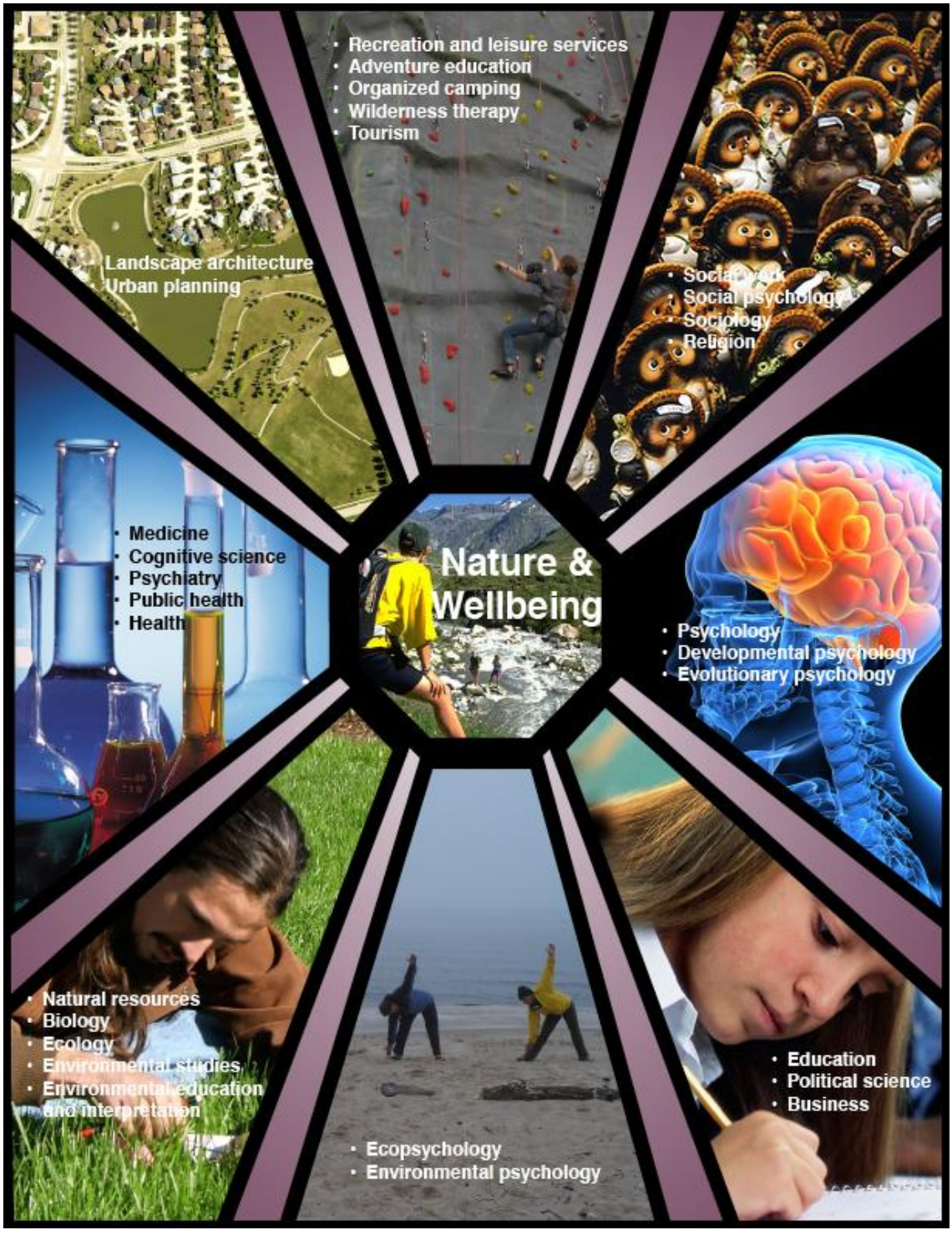
of work clinical. Both economic and satisfaction benefits are achieved.

People in more urbanized and built communities are beginning to realize the impact of natural landforms and how they influence human health and wellbeing. As some humans become more separate from nature they don't reliably consider the potential power of nature in relationship to the built environment. However, a number of recent disasters have provoked more research in the area of land forms and disaster prevention, warning, mitigation, and recovery. All natural disasters and hazards cannot be avoided, but appropriate use of nature and natural landforms can lessen human vulnerability. Two brief examples: Two hotels on a beach in Sri Lanka were in the path of the 2004 Tsunami. One hotel had removed the natural sand barrier in order to have a better view and access to the water and over 100 people died in this hotel. A second hotel was behind a natural sand barrier and lost only a few people. As a result of a 2004 hurricane that hit neighboring countries, Haiti and the Dominican Republic, massive amounts of water was released on the land at one time. In Haiti, deforested by mining, this excessive water caused massive landslides and over 6,000 deaths. Neighboring Dominican Republic, still largely forested benefited from the ability of the vegetation to stabilize the land and limit their flash flood problem resulting in relatively few deaths during the aftermath of the storm (Ingram, 2009). Trees not only add in soil stabilization during storms they also help store water. Because of deforestation on Bali water runs off into the ocean instead of being stored in large underground basins and used year round by residents. There a water shortage is expected within ten years. Allowing mangrove to remain in the saline coastal areas creates protection from storm damage and provides vital habitat for fish used in human consumption. Understanding how mutually dependent humans are with nature for our wellbeing might lessen risks of drought, food shortages, and direct human injury.

Research background

In recent years, people in many different disciplines have engaged in research about the human nature connection. In addition to the outdoor related fields (natural resources, recreation and leisure, environmental studies, environmental education and interpretation, organized camping, adventure education, and wilderness therapy), other fields that have been examined as part of the author's research include biology, business, cognitive science, developmental psychology, ecology, ecopsychology, education, environmental psychology, evolutionary psychology, health, landscape architecture, medical, nursing, political science, psychiatry, psychology, public health, recreation, religion, social psychology, social work, sociology, therapy, tourism, and urban planning (see Figure 1).

Figure 1. Disciplines researching connections between health, development, wellbeing, and nature



While excited about the growing body of research showing the positive impacts of nature, the research quality must be measured and methods and protocols must continually be examined to be sure the research is sound, reliable and valid. In our desire to embrace research showing health benefits from being in nature we may not dig as deeply into the authentication of the research as is needed. Research papers need to be scrutinized for the logic of their conclusions. We also need to identify research gaps and replicate research with larger populations, different populations, and using a variety of methods. As feasible, meta-analyses on outcomes need to be completed. While research, especially empirical research is useful in proving the efficacy of the healing power of nature, we should not become too wedded to empirical research only.

For example, wilderness therapy providers believe that participants leave their programs "better" somehow, and they acknowledge that they haven't a clear idea of what specifically works to benefit the participants. In trying to gain legitimacy, practitioners and researchers have tried to isolate what about these endeavors make them work and have mostly used a reductionist and mechanistic mindset in trying to determine the efficacy. In the US this mechanistic mindset has, in part, been driven by the medical research model and the need to *prove* mechanistically how programs *work*. There are pitfalls of only using mechanistic thinking and research in assessing outcomes. Sometimes it is the holistic system that creates the healing or change (Mitten, 2004). In these cases process research may be an appropriate option.

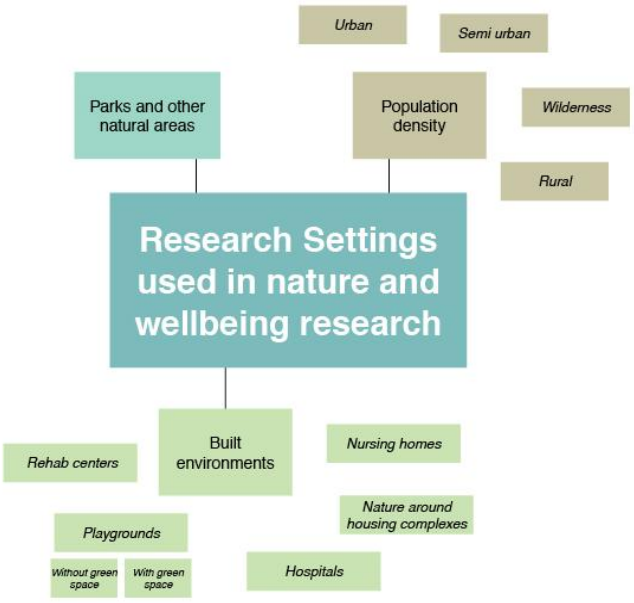
A combination of theoretical (testing actual theories), conceptual (looking at the underlying theories and concepts guiding research or practice) and empirical research (quantifying direct or indirect observation of interactions, usually through experimentation) as well as practice-based and anecdotal

evidence is being reported in the literature. For example, outdoor related fields often are reporting conceptual beliefs supported by anecdotal evidence. While there is a need for other kinds of research evidence this anecdotal evidence is crucial in helping to form the basis for evolving research agendas.

The volume of research has grown considerably in recent years. Because of the diverse fields, a wide array of research methodologies have been used as well as many different contexts, including clinical, general living (nature around living space), sitting or walking in nature at parks or other natural areas, playing, gardening, specific nature activities, outdoor pursuits, and wilderness trips (see Figure 2) and different settings have been researched including built environments such as hospitals, nursing homes, playgrounds (both with and without green space), and housing complexes (see Figure 3). Different population density settings have also been researched including urban, semi urban, rural, and wilderness environments (see Figure 3).

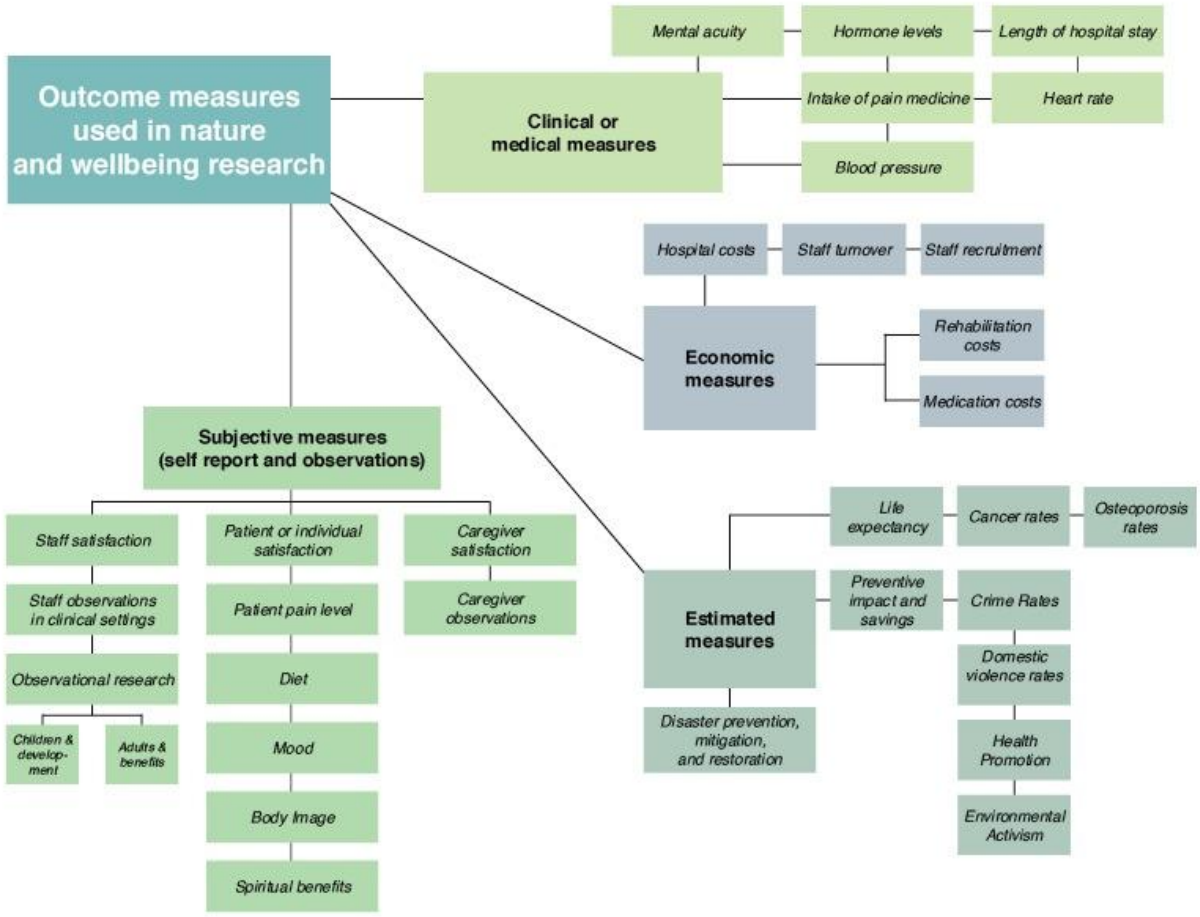
Figure 2. Activities in nature researched in relation to human wellbeing.

Figure 3. Many different settings have been researched in relation to nature and human wellbeing.



There have been many different outcome measures used for research about nature and wellbeing. Data can be in the form of 1) observable clinical signs or medical measures, hormones, blood pressure, and intake of pain drugs 2) subjective measures such as reported satisfaction, mood, or pain level and developmental observations, 3) estimated measures which may include crime rate changes in part due to natural areas, preventive and general wellness benefits by being in nature and 4) economic measures such as rehabilitation or staff costs due to turnover (see Figure 4). Of course the lines between these outcome measures are not exact. For example, a clinical outcome often leads to an economic outcome. As an overall example, Ulrich (2002) has shown that providing a hospital garden or plants improves clinical indicators, economic outcomes, and patient and staff satisfaction reports.

Figure 4. Outcome measures used in nature and wellbeing research.



Of all of the research, evidence from clinical research seems to be the most persuasive for physicians and other healthcare administrators as well as for federal funding requirements. Kreitzer, Mitten, Shandeling, & Harris (2002) found that medical, nursing, and pharmacy faculty were most comfortable when presented with an evidence-based approach for understanding complementary and alternative medical treatments; this includes nature healing. Therefore measuring health outcomes, indicators of healthcare quality, due to interaction with nature using clinical measures perhaps

combined with other measures seems to be the most promising for professional acceptance. Though clinical and economic outcome data have historically been more influential in decision making, patient satisfaction measures along with staff and caregiver benefits are becoming better recognized as valid outcomes.

For many of the fields or disciplines mentioned above, research about the impact of nature on health and wellbeing is a small part of that discipline. The magic happens when one looks at the research from all of these disciplines and realizes that the combined body of research is significant. For example, using this body of knowledge Mitten (2004) proposed that intentional health care work by clinically trained outdoor leaders could help to such a medical significance that wilderness therapy and adventure therapy ought to be classified as a complementary modality in the US National Institute for Health (NIH), National Center for Complementary and Alternative Medicine (NCCAM) classification in the mind-body interventions, biologically-based therapies, and the energy therapies domains.

Theoretical concepts and underpinning theories

Theoretical concepts and underpinning theories are the set of ideas that guide research as well as the work of practitioners and clinicians. In this section the author looks at the role of a number of theories and concepts in both research design and practitioners' work. The concepts and theories described in this section help us look at the fundamental relationship of human beings and the natural environment.

Theories and concepts are used to construct knowledge. Clarifying these relevant concepts and theories will help advance the understanding and contextualization of the research being published about nature and health. Through outlining these concepts, conceptual bridges can be built among neighboring and maybe even more distant fields or professions, thus adding to the construction of

knowledge and advancement of our understanding of human and nature relationships.

Conceptual research, like theoretical research identifies and makes connections using induction, logic, or argument, that helps tie concepts together, some well-known, some agreed upon, and some not, to help solve a research puzzle or describe or explain a phenomena. Conceptual research also examines the role of specific concepts in both research agendas and the practitioner's or clinician's conceptual field. Empirical research is grounded in concepts and theoretical underpinnings – they define our questions. Therefore conceptual research or uncovering the grounding concepts is not only helpful but instrumental in guiding and interpreting research. Additionally, erroneous concepts may be exposed that are underlying the research that in fact may be hindering research.

Readers will notice overlap among the concepts and theories presented in this section. That is evidence of some of the bridging. We can see how and where various concepts and theories validating humans' need to be in and around natural spaces interrelate. When these concepts are examined and tied together the resulting overarching theory, which some people believe as fact, is that time in nature as well as appropriate use of natural landscapes is essential for healthy growth, development, and maintenance of human beings. The author expects this section to grow and evolve as more research is published and more connections are made.

The following theories and concepts, inferring genetic, cultural, and social inheritance origins, form the basis for research about nature and healing or the benefits of spending time in nature. Putting forth these concepts can and should lead to discussion and perhaps debate; after all it is our underlying beliefs that guide our research and our practice. This section is intentionally broad and some categories also may be fields of study. For example friluftsliv is considered a concept and a field of study. The same may be true of ecopsychology, traditional ecological knowledge, and others.

Friluftsliv

That there is a cultural phenomenon of friluftsliv and that so many people feel that immense draw to be free in nature is both evidence of a connection and a cause to research this connection. While friluftsliv is tangible in that people live it; it is also intangible as it is hard to define. Friluftsliv is described as a way of life, especially for people living in more rural areas. For people from the city coming to natural areas for adventure and pleasure friluftsliv has perhaps become a term for this certain kind of outdoor recreation.

In Norway, friluftsliv is taught, as in students doing a year of friluftsliv study before entering the workforce or before college, or as a college major. Friluftsliv also enters educational pedagogy as in friluftsliv kindergartens where the philosophy is that the children will learn better through having all of this phase of their educational experience primarily outdoors.

Friluftsliv may be genetic, learned as a cultural practice, or both, or some other origin altogether. The concept of friluftsliv is a thread seen in many of the other concepts reported on here.

Traditional ecological knowledge

Traditional ecological knowledge (TEK), sometimes known as traditional environmental knowledge is defined by the Convention on Biological Diversity, Article 8 (j):

> Traditional knowledge refers to the knowledge, innovations and practices of indigenous and local communities around the world. Developed from experience gained over the centuries and adapted to the local culture and environment, traditional knowledge is transmitted orally from generation to generation. It tends to be collectively owned and takes the form of stories, songs, folklore, proverbs, cultural

> values, beliefs, rituals, community laws, local language, and agricultural practices, including the development of plant species and animal breeds. Traditional knowledge is mainly of a practical nature, particularly in such fields as agriculture, fisheries, health, horticulture, and forestry.

An important feature of TEK is that it recognizes that adaptation to our natural environment is key to human survival and uses observation and practice to understand the natural environment's response to human practices. Beginning with the agricultural revolution about 10,000 years ago humans began to disconnect from TEK. An important question might be what lead to this disconnect and how might reconnection be facilitated. Cultural imperialism and the industrial revolution have furthered the distance between most of the human race and TEK. Natural resource managers and many commercial concerns now understand biodiversity's importance not just for sustainable development, but also human survival. Therefore academics have begun to appreciate and study TEK. The largest academic-based ecology conference in the US, Ecological Society of America (ESA), has a presentation track dedicated to TEK. Using research methods from anthropology and general biology, anthropology, ethnobiology, ethobotany, and human ecology are some of the areas that study and inform research about TEK.

There are, of course, connections between TEK and friluftsliv as aspects of TEK are integral to friluftsliv. Like friluftsliv, there may be genetic, learned as a cultural practice, or both of these aspects to the origin of TEK.

Indigenous Consciousness

Indigenous Consciousness, or Intra-Indigenous Consciousness (IIC), seemingly closely related to TEK, is a knowledge system that is taught through beliefs, rites, and ceremonies. This consciousness includes spirituality, responsibility, reciprocity, the earth, animals and many other facets (Martinez, 2008). Many early medical systems such as Tibetan Medicine and Native American Medicine encompassed and have been sustained through indigenous consciousness. Today Martinez's research with seven nations has shown that medicine and health and healing paradigms are a central manner in which indigenous consciousness is both used and maintained, including helping to temper colonizer affects.

James Neill (2004) theorizes that everybody is indigenous and that indigenous consciousness can be unlocked through reconnection with nature perhaps using experiences which were significant to one's ancestors, such as being outdoors. Neill proposes that intra-indigenous consciousness is genetically stored. Once again there are connections and overlap among friluftsliv, TEK, and indigenous consciousness. A question remains as to what may be genetic and what may be learned.

Psychoevolutionary theory (PET)

Evolutionary psychologists see certain behaviors (memory, perception, language) as adaptations that have been selected for in a population in a similar manner as we think of natural selection selecting for a physically well adapted individual. A well-used example is that humans may have inherited certain mental capacities for acquiring language making language acquisition seem almost automatic. Neil, et al. (2004) proposed that humans have a mental link that *knows* that we, as humans, need time outdoors. Therefore outdoor education occurs in industrialized societies and is a form of ritualistic or compensatory cultural adaptation to deal with the disconnection of nature from daily life.

Evolutionary psychologists are more likely to see the fairly universal fear of snakes, spiders, heights, and blood as a positive adaptation to our environment that over time may have a genetic component. New research showing the possibility of genetic changes during one's lifetime may continue to blur the lines between nature and nurture. Now we may wonder if PET is responsible for friluftsliv, TEK, and Indigenous Consciousness as well as naturalistic intelligence discussed next.

Naturalistic intelligence

In 1983 Howard Gardner published his groundbreaking book conceptualizing human intelligence as more than a person's cognitive ability. Now his Multiple Intelligence Theory (MI) identifies nine intelligences, including naturalist intelligence (Gardner, 1999). It makes sense that humans would have naturalist intelligence through genetics, innate brain development, or other avenue because being in tune with nature would help survival. Naturalist intelligence is signaled by an affinity to be outdoors and connect with nature, sensing patterns in nature, and being aware of subtle changes in the outdoor environment. Naturalistic intelligence is the ability to focus on the large picture– including seeing how natural systems are connected. These individuals might have a highly-developed level of sensory perception, may be able to categorize or catalogue things easily, and may benefit from moving around while learning. Naturalistic intelligence helps people be sensitive to their role in nature and be drawn to nurturing. Gardner suggests that people living close to the land, such as Aboriginal peoples may both possess and value naturalistic intelligence. Perhaps naturalistic intelligence is very similar or the same thing as indigenous consciousness. Perhaps naturalistic intelligence or indigenous consciousness cause friluftsliv and TEK to continue to be practiced. Part of the MI theory is that all individuals possess nine intelligences, however individuals vary in how innately strong or how well developed these intelligences are. If this theory holds then people such as Charles Darwin, Rachael Carson, and Jane Goodall would have high naturalistic intelligence. This theory that humans have naturalist intelligence is supported by

research showing our affinity to nature. Recently the author listened to *The Second Journey: The road back to yourself*, by Joan Anderson (2008), author two nonfiction *New York Times* bestsellers. When talking about her personal growth a number of times she referenced the importance of being in nature to her well being. This theme of being in nature to feel better or to gain psychological health is common. People seem to *know* they need to be in nature or notice that they feel better in nature. The anecdotal evidence seen in a number of books is supported by a study asking a sample of university students in San Francisco area what settings they sought when they were feeling stressed or depressed. Seventy five percent of the sampled population cited outdoor places such as wooded urban parks, places offering scenic views of natural landscape, and locations at the edge of water such as lakes or the ocean (Francis & Cooper-Marcus, 1991). Dr. Dawn Yankou (2002), School of Nursing, University of Western Ontario found that walking outside helps alleviate depression and generally improves mood states and wellbeing. Naturalistic intelligence helps us know to be outdoors. Of course this same research also supports other concepts and theories including indigenous consciousness, ecopsychology, and biophilia.

Rachel Carson's (1907 – 1964) life exemplified naturalist intelligence. She understood the human nature connection and was a pioneer in calling for a change in the path of industrialization. A biologist, trained at John Hopkins and Woods Hole, Carson understood the healing power of nature from both biological and developmental aspects. In 1952 she retired from the Fish and Wildlife service to focus on her writing. While she is best known for her 1962 book, *The Silent Spring*, in a 1954 article, "The real world around us" Carson wrote "the more clearly we can focus our attention on the wonders and realities of the universe about us, the less taste we shall have for destruction" (Rachelcarson.org). In "Help your child to wonder" Carson (1956) encouraged parents to take children outside and help them enjoy nature (Lear, 1998). Her gift was her ability to understand the interconnectedness of all parts of the ecosystem, including humans and to be able to write about these connections in an accessible

manner to the general public. She asked people to tend to the earth so the earth could continue to nourish us. She made connections between human industrial practices and environmental damage that would lead to human damage. Her work and collaboration with Dr. George Wallace from Michigan State University showed the connection between pesticides and environmental damage. Once a breeding ground for mosquitoes and malaria, after World War II the Michigan's campus was regularly dosed with DDT in high doses. Wallace, another person showing high naturalist intelligence, concerned with the multitude of dying robins worked to find the cause of their deaths. He found that the robins were dying because the DDT had accumulated in the worms they were eating. His research set the ground work for the ecological concept of bioaccumulation, introduced in *Silent Spring* and now an elementary concept in ecology. Both Carson and Wallace underwent heavy criticism for their work. Industry lobbied to have Wallace fired and Carson received life threats.

People like Carson seem compelled to study nature and to help others understand the importance of our connections to natural systems. Carson's drive was so strong that she continued her work even when faced with an early death due to cancer. Carson made accurate connections among human mental health, human development, biology, ecology, and other areas.

The land ethic

In 1909 Aldo Leopold (1887 – 1948), another person with high naturalistic intelligence, was fresh out of graduate school at the Yale School of Forestry and assigned to work at a national forest in the southwest. During his tenure in the southwest several experiences lead him to understand in his bones that the natural world is a community to which humans belong and that we have a duty in our land management agencies to honor all life. Being in the outdoors and feeling connected to nature helped promote this larger sense of community for Leopold and outdoor and environmental educators rely on

this belief for their work. In other words, being in nature imparts an understanding of community that reaches beyond the group members in the program or human communities; it promotes the land ethic which is the understanding that community consists of interdependent parts including soils, waters, plants, animals, and humans (Leopold, 1949) or as Leopold said, "*The land*." This belief in the interconnectedness is illustrated by a passage from Susan Griffin (1980), "We give the grass a name, and earth a name. We say earth and grass are separate. We know this because we can pull grass free of the earth and see its separate roots - but when the grass is free, it dies."

Published posthumously, *Sand County Almanac* (Leopold, 1949) contains his now famous land ethic: "A thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise." The land ethic helps take land from an economic realm where humans reaped goods but did not have obligation to a place where humans ought to care for the land or the natural community. Leopold was a founder of the Wilderness Society in 1935. Friluftsliv, and TEK, both originating before Leopold's writings, reflect this land ethic, lending support to the strong connections among these concepts.

Ecofeminism and Ecopsychology

Ecofeminism and ecopsychology both focus on undoing the consequences of a shared and reciprocal relationship with nature being extinguished. Ecofeminism tries to unravel the history of a mutualistic time with nature becoming one of fear and mistrust of humans towards nature. Through ecofeminism the interconnectedness of all domination can be seen and begun to be dismantled. The power-over or domination of one person or species over another is a philosophical stance which has lead to massive human caused species extinctions and a huge amount of environmental destruction in the world. Ecofeminism tells us to learn to live with and embrace our differences both within our species and with

other species. Ecopsychology, a bit less radical than ecofeminism, works to heal the wounds caused by domination.

Robert Greenway coined the term ecopsychology in his 1963 essay (Greenway, 1999). Greenway, working at Sonoma State University in California, kept data for over 30 years as he took students on outdoor trips as part of his university classes. He found that 90 percent of the students described an increased sense of aliveness, well-being and energy coming from their time in nature and that 90 percent said experience allowed them to break an addiction (defined broadly)-nicotine, chocolate (Greenway, 1996).

Ecofeminism and ecopsychology have long histories as described in women's outdoor travel literature for over 100 years and have been largely practiced by women's outdoor programs in the US and other countries. The dominant culture's attitude towards nature as something to be used or conquered was destructive and belittling to both women and the land. In her introduction to *Wilderness Therapy for Women*, Cole (1995) noted the process by which individuals are encouraged to spend healing time in nature and as nature heals the individual, the individual also nurtures and heals the planet" (p. 3). Women have found nature to be healing, were prone to find a sense of place, and felt spiritually connected to the land. As a result women tended to have a mutual healing relationship with nature, notably exemplified by Julia Butterfly Hill who spent over 700 days living in a California Redwood tree to prevent loggers from the Pacific Lumber Company from cutting it down. Hill later was inducted in to the Ecology Hall of Fame for those efforts and her continuing work to heal the rift between humans and nature (Weiss, 2003).

Ecopsychology is a blending of environmental philosophy, ecology, and psychology that has evolved into a growing body of knowledge that explores how our psychological health is related to the ecological

health of the planet earth. It is believed that the mind can be comforted and healed through time in natural environments. Therefore the destruction of the natural environment negatively affects the physical and mental health of humans. The paradigm of ecopsychology supports the healing value that occurs when people are in nature, including the work of outdoor professionals in environmental education, organized camping, adventure education, and wilderness and adventure therapy.

Edith Cobb's (1895 – 1977) work is an example of early research supporting ecopsychology and demonstrating this connection between healthy human development and nature. Cobb trained in social work in the 1950s with an interest in the natural world, child development, and adult psychology undertook a massive research project wherein she collected and analyzed more than 250 autobiographies. In *The Ecology of Imagination in Children* Cobb (1977) establishes the importance of children's deep experience of the natural world to their adult cognition and psychological well-being.

She suggests that a sense of place (a tree, a stream, a knoll) is vital to a child's evolving personality and makes a connection between happy childhood experiences and time in nature and adult creativity (Cobb, 1977). Chawla (2002) expanded on Cobb's work and reinforces the importance of children spending time in the natural world in an unthreatening way that encourages a bond based on connection rather than on fear. An overwhelming majority of the environmentalists whom Chawla interviewed experienced "positive experiences of natural environments in childhood and adolescence, and family role models who demonstrated an attentive respect for the natural world" (Chawla, 2002, p. 212).

By the 1990s, the concept of ecopsychology and our need to heal and be healed by the planet had become more widespread. Today ecopsychology has developed into a discipline with college textbooks, such as Deborah Du Nann Winter's (1996) *Ecological Psychology: Healing the Split between Planet and*

Self, and degrees offered at universities such as in Colorado. From Naropa University's webpage ecopsychology is based on the belief that "human health, identity and sanity are intimately linked to the health of the earth and must include sustainable and mutually enhancing relationships between humans and the nonhuman world" (Naropa University, 2009).

Children and development

A number of authorities have shown that positive exposure to nature is necessary for healthy human development and helpful in mitigating harmful results from urbanization. Certainly moms from the 1950s and 1960s were on to something positive when they would tell their children to play outdoors until dinner. Carson (1962), Cobb (1977), and Chawla (2002) discussed previously in this paper all agreed that children developed into healthier adults when their childhoods included regular time outdoors in natural environments. Psychologist Harold Searles (1960) studied and wrote about transference. He said that we both long to merge with nature and fear being swallowed up by nature. He cites numerous examples where transference feelings, projections and identifications with the natural world, especially with animals occur.

In his first book he says:

> The thesis of this volume is that the nonhuman environment, far from being of little or no account to human personality development, constitutes one of the most basically important ingredients of human psychological existence. It is my conviction that there is within the human individual a sense, whether at a conscious or unconscious level, of relatedness to his nonhuman environment, that relatedness is one of the transcendentally important facts of human living, that –- as with other very important circumstances in human existence -– it is a source of ambivalent feelings to him, and

> that, finally, if he tries to ignore its importance to himself, he does so at peril of his psychological well-being (Searles, 1960, p. 6).

As mentioned earlier, children and nature is a current topic in a number of developed countries. An interesting historical perspective is that in the US in the 1960s and 1970s there also was a revival of the understanding of our need of nature and would probably be labeled as the first modern day green movement. In response Elwood Shafer of the Forest Service's Pinchot Institute of Environmental Forestry Research, worried about the impact on youth and children spending less time in nature, gathered professionals from many different disciplines working with children. Representatives from local, state, and federal health, recreation, and park officials; and individuals working in the fields of child development and environmental studies constituted most of the presenters along with some academics. The resulting 1975 proceedings of the *Children, Nature, and the Urban Environment Symposium* concluded that children need opportunities to explore wild places and to learn about nature for healthy maturation and are not having these opportunities. Along with ground breaking environmental protection legislation many school systems adopted environmental education programs and several curricula were developed including Project WILD, Project WET, and Project Learning Tree supported in part by federal agencies.

Twenty-five years later the question about children needing and having opportunities to explore wild places and to learn about nature for healthy maturation was addressed again by Kahn and Kellert (2002) in their book *Children and Nature*. They gathered ecologists, biologists, and psychologists academics and the findings were consistent with the practitioners of the 1975. Children were being denied the opportunity to explore wild places and to learn about nature (Kahn & Kellert, 2002). Kellert (2002) said that a child's direct and ongoing experience of accessible nature is an essential, critical, and

irreplaceable dimension of healthy maturation and development.

Ruth Wilson (2008) in her book, *Nature and Young Children: Encouraging Creative Play and Learning in Natural Environments* explains why we need to create many opportunities for children to feel nature and not just think about it. Even campaigns to save the rainforest and other natural areas need to start with people having opportunities to feel nature and have nature in their bones, as in friluftsliv, in order to truly understand the need for protection of biodiversity.

Biophilia

The synergistic relationship between personal wellbeing and planetary wellbeing may have an evolutionary history as described in the biophilia hypothesis. Supporting the work of ecofeminists, the practice of TEK, and the theories of indigenous consciousness and PET, and building on the work of early ecology pioneers such as Rachael Carson, E. O. Wilson (1984) asserted that there is the existence of a biologically based, inherent human need to affiliate with life and lifelike processes. He went on to say that human identity and personal fulfillment depend on our relationship to nature as does human's positive emotional, cognitive, aesthetic and spiritual development. Therefore, people's success in their search for a coherent and fulfilling existence depends on their relationship to nature. This biologically ingrained attraction to the natural world according to Wilson is probably genetic. A part of this theory is that a measured or healthy fear of some parts of the natural world is essential for humans' survival. Called biophobic, considerable evidence from clinical psychology and psychiatry, including evolutionary psychology, supports that the majority of phobic occurrences involve strong fears about things or situations that have threaten humans throughout evolution, such as snakes, spiders, heights, closed spaces, and blood. Therefore there is a balance of respect or healthy fear of some aspects of nature and the human capacity to experience a sense of nature's magnificence and wonder. Naturalistic

intelligence, ecopsycology, and much of the research about the healing power of nature support the biophilia hypothesis. E.O. Wilson has been highly criticized for his earlier theory of sociobiology, wherein he claimed that biology was destiny even to the point that the males of species, including Homo sapiens were acting out of biology when they raped females. Wilson's maturity and development as an ecologist is significant and today he is a leading proponent of biodiversity preservation. Additionally, Wilson (2001) has endorsed a socio-ecological approach to human health and the collaboration among scientists and policy makers.

Socio-ecological approach to human health

As early as 1986 the World Health Organization proclaimed that health care is not separate from caring for the environment. The Ottawa Charter for Public Health Promotion, created at an international conference on health promotion in Ontario, Canada, calls for a socio-ecological approach to health management, including environmental protection in the name of health reform (Public Health Agency of Canada, 2008). The theory behind the socio-ecological approach to health management is that human behavior is a consequence of transactions among multiple levels and ensuring health and well being requires political commitment and a multidisciplinary approach. As disciplines begin to overlap and policy makers from environmental, public health, psychology, landscape architecture, medical, and urban planning backgrounds collaborate, a truer understanding of the need, potential, and practice of socio-ecological approach to health management and promotion will result.

In a socio-ecological approach to human health it is believed health results from an interwoven relationship between people and their environment. Human health is influenced by intrapersonal, interpersonal, organizational, community and environmental factors, including the natural environment and then policy influences and creates further interdependencies that impact health (McLeroy, Bibeau,

Steckler, & Glanz, 1988). Improvements in health may require interventions and changes, such as changes in policies at each or some levels or changes in personal health management. While similar to ecopsychology, a socio-ecological approach works to connect public policy (and public policy makers), community structures, organizations, individuals, and nature. Since environmental factors, including the natural environment are components in the socio-ecological approach, this model necessarily looks at the relationship between people and the natural environment. Natural spaces, including public-owned parks, play a key role in a socio-ecological approach to health because these environments encourage and enable people to relate to each other and the natural world (Maller, Townsend, Pryor, Brown, & St Leger, 2006). Especially people in urban environments need natural areas maintained in close proximity to their living spaces in order to reap the benefits of being in nature. In the past developers and community planners have not realized that the research shows that green space around housing units can increase social bonds, decrease family violence, and help immigrants transition to a new area (Kuo, Bacaicoa, & Sullivan, 1998; Wong, in Rohde and Kendle, 1997). A socio-ecological approach to human health, an attempt at a true integration of science, society, and ideology, is another major underpinning to the concept of nature and well being.

Spirituality: Connecting directly with all that is

This section was especially challenging to write. Even though connecting with the whole is a spiritual concept, it contains pieces from disciplines that deal with development, psychology, emotional aspects, and others. This view that spirituality and nature are connected is evident in the writing of Scandinavian American, Sigurd F. Olson, an environmental educator, whose view of wilderness is antithetical to the historically typical US masculine view. His writings echo the essence of friluftsliv in his recognition of wilderness not only as a place to recreate but as a spiritual space. In the wake of World War II, Sigurd F. Olsen said that wilderness is "a spiritual backlog in the high speed mechanical world in which we live"

(Olson, 1946). For Olsen the primary draw of the wilderness was perspective, he writes, "They go to the wilderness for the good of their souls. These people know that wilderness to them is a necessity if they are to keep their balance" (Olson, 1946 pp 62-63). People certainly experience the outdoors in different ways however in the literature and reported by outdoor leaders anecdotally, there is a prevalent thread that people feel at home and at one with the world or universe in the outdoors. People feel spiritual and spiritually alive. The soul is nourished.

Nature acts as a natural stimulus for spiritual development

Both the whys and how of spirituality and consciousness continue to be mysteries. However, a number of references can be found that indicate that the natural world may act as a bridge between the physical world and the spiritual world. The natural world helps humans develop consciousness and spiritual awakening. The forms, sounds, and smells of nature provide for many a window to understand the spirit. Tolle (2005) speculates that flowers may have been one of the first non-utilitarian things humans were attracted to. Flowers, as well as gems, crystals, some birds, and precious stones, have an ethereal quality, according to Tolle that extends beyond form, thus aiding in transforming human behavior and conscious development. The white dove is an important symbol in Christianity. The lotus flower is sacred in some Eastern spiritual traditions. In the gospel of Mary, discovered about 1945 in Egypt, it is written “Be of good courage and if you are discouraged be encouraged in the presence of the different forms of nature” (Lee, 2009). This intrinsic value of natural spaces for spiritual development and attentiveness helps people be able to implement some of the great wisdom teachings that ask humans to rise above identification with form and be able to be aware of the formless. Being in nature can help people see the divine life force and recognize it as their own essence. Seeing beauty in flowers can awaken in humans their inner beauty. The evolution of consciousness is connected to nature and evidenced in the wide embracement of the land ethic, ecopsychology, friluftsliv, and, at least in Canada

and Australia, the socio-ecological approach to human health.

The universe is a process

Human bodies are process, part of the larger earth-wide ecosystem as well as the universe. Our bodies, like all objects we see as solids, are more space than matter. This leads some to say that a body is not a structure; it is a process. Furthermore, human bodies, the ecosystem, and the universe are all ***one*** process (Chopera, 2001). Most of us would agree that we are part of the ecosystem or, as I learned in school 40 years ago, part of the web of life. No process or being is separate from any other process. With good intent Western medicine has taken a mechanistic mindset and tried to break down life functions in to discrete structures with their own processes. Then finding the process that appears to be broken, fix it. While this has seemingly worked in many cases, now we find that we actually spend more on health care each year, our life expectancy has not risen appreciably for 30 or more years, and younger generations may even have a shorter lifespan than baby boomers. The belief system behind that healthcare model does not understand the magnitude of entanglement or connection that all life and what we see as inanimate objects have.

The concept that the universe is a process and humans are part of that process implies, as shaman, medical systems such as Tibetan, Ayurvedic, Native American, and Traditional Chinese say, that we must stay in balance or return to balance with the other processes, including the natural world. Therefore instead of relying on a drug or belief that the allopathic medical system can provide a pill to *cure* life style related diseases, including obesity, diabetes, and heart disease, individual responsibility ought to be encouraged to maintain a healthy life, including spending time in natural areas and being in harmony with nature. This can be explained in terms of process and connection to the whole and a need to stay in balance or in harmony.

Connection to the whole: Ethic of care

Humans are social creatures and need spiritual, emotional, and social connections. Human beings are hardwired to make connections to each other, animals and nature. We are hardwired to learn and we learn through social and emotional channels. Basically, everything is connected. Nature helps people find the goodness within them and allows that goodness to emerge. In this way nature helps people connect to their essence and feel the joy of being and the bliss of simple things. This wholeness or universal connection is reflected in friluftsliv. This sense of connectedness for many people is comforting. Our Western mind teaches us to be separate both from nature and each other. Animals, plants, and rocks may not have the same struggle between wanting and needing to be connected and believing they should be separate. This connectedness that is the essence of nature does not mean that nature is always safe or easy; it means that it just is. Like all plants and animals, humans have to know how to and develop ways to work with nature to ensure survival, perhaps using indigenous consciousness, naturalistic intelligence and TEK. However, at this point western humans have gotten into a competition with nature (and each other). This is a very real game of life in which like monopoly, eventually everyone else may lose. Like monopoly when everyone else looses the game is over. To survive as a species we need to imagine a game of life that never ends. This means that competition to the extent that humans practice it needs to be rethought. This rethinking process can be significantly helped with time in nature. Time in nature can heal erroneous thinking that having material acquisitions will make one happy; that bigger built environments are best; that wilderness is evil and something to be conquered, defeated, and obliterated. Extending the ethic of care to the land includes a sense of this larger community as well as using state of the art low trace traveling and camping techniques in outdoor areas. As pollution and destruction do not know political boundaries, the larger community needs to be global. For example Los Angles has a reputation for high pollution and many people have worked hard to

lessen pollution there, but now about 25 per cent of Los Angeles' pollution on any given day is from China, making positive global connections essential (Friedman, 2008). Northern Norway and Sweden had increased radioactive contamination after the Chernobyl nuclear reactor explosion.

Perhaps just as problematic, as is bared out in research about children, is ignoring nature (Kals, Schumacher, & Montada, 1999; Kals & Ittner, 2003). This is done through thoughtless air and water pollution by individuals and corporations who use these free resources, externalizing the costs or pollution for future generations to deal with. As Tolle (2005) points out when we think of me as separate from nature, we take liberties such as pollution, but also we miss feeling of the connectedness that we need to survive individually and as a species.

When people can be in the space and take the time to listen to birds, watch leaves blow in the breeze, or look at the floating and ever changing clouds, in these simple things one feels something greater than humans and this something is peaceful. When one sees a multicolored sunset, northern lights or a dramatic nature seen, awe also is inspired and we feel better knowing that we can't control the world so we relax. However, without regular contact with nature we can lose the ability to care. While we are born with the innate ability to care and be empathetic, Nel Noddings (1984) points out that care needs to be practiced.

The researchers

There are a few current key researchers in the US that may be useful to mention here.

Frances Kuo, Director, Landscape and Human Health Laboratory, University of Illinois at Urbana-Champaign http://www.lhhl.uiuc.edu/ has published extensively documenting the relationship between natural environments and healthy development and healthy communities. Since 1996 Kuo and his

colleagues have made great strides in showing the contribution of natural space and horticultural in the socioecological approach to health and wellbeing. Primarily an environmental psychologist, Kuo has studied the areas of crime, aggression, and nature; children and nature; inner city and nature; sense of community and nature and has published mostly in the *Journal of Environmental Psychology* and *Environment & Behavior*. His numerous publications can be found on University of Illinois' the website.

Since the early 1970s and starting with a US Forest Service grant, Rachel & Stephen Kaplan, have been researching and writing about attention restoration theory (ART). As environmental psychologists, at the University of Michigan, Stephan is in the Department of Psychology while Rachel is in the School of Natural Resources and the Environment. They have hundreds of publications about their ART or restoration theory. Numerous other researchers have also looked at restoration theory. The Kaplan's work has been combined with many other disciplines including landscape architecture and urban planning.

In the medical field, Howard Frumkin, Ph.D., M.D., M.P.H, is one of the first people to research and speak out about the health benefits from contact with nature. As the Director of the National Center for Environmental Health and Agency for Toxic Substances and Disease Registry (NCEH/ATSDR) at the U.S. Centers for Disease Control and Prevention, he specifically works in the area of promoting healthy environments free of toxic substances and other environmental hazards. Frumkin's public health background seems evident in his work. Recently he teamed with Richard Louv, author of the popular and informative *Last Child in the Woods*. Both key note speakers at the Healthy Parks Healthy People Congress April 2010 in Melbourne.

Many of the benefits from spending time in nature are categorized below:

Physical Benefits

Sunlight
- Vitamin D (lowers blood pressure, decreases risk of colon, prostrate, and pancreatic cancers)
- Increases calcium uptake

Better diet (kids who garden eat more vegetables)

Immune system strengthening (kids who play outside have stronger immune systems)

Promotes healing

Reduces pain

Decreases the effects of jet lag

Increases life expectancy

Provides opportunities for exercise
- Decreases BMI
- Lowers systolic blood pressure
- Reduces avoidable disease risk factors
- Reduces cancer risk
- Reduces osteoporosis risk

Psychological-emotional

Restorative
- Stress reduction
- Attention restoration

Improves mood states

Reduces depression

Reduces anger and anxiety

Enhances feelings of pleasure

Increases mental acuity (kids who grow plants scored 12% higher on academic tests)

Reduces mental fatigue

Improve problem solving ability and concentration

Improves body image for women

Reduces the impact of stress

Increases feelings of empowerment

Encourages nurturing characteristics

Decreases risk of seasonal affective disorder (SAD)

Mitigate impact of dementia, including Alzheimer's

Spiritual Benefits

Gives children a sense of peace and oneness with the world

Sparks creativity and imagination

Inspires connections with the wider world

Increases a sense of wonder

Encourages reflection

Quiets the mind

Society's benefits

Cuts crime

Strengthens family relations

Decrease domestic violence

Strengthens neighborhood ties

Assists new immigrants cope with transition

Cost effective health promotion

Environmental economics – increases preference for environmental quality over other goods

Increases environmental activism

Increases park planning

Preserves biodiversity

Stimulates social interactions among children

Summary/conclusions

Nature is essential for human existence, health, development and well being. Yet in recent years humans in developed countries have had much less contact with nature than in previous times. This, not surprisingly, for many leads to a reaction of pervasive fear and mistrust of the natural world. Unfortunately this results in a viscous cycle of building structures and societies that remove humans further from the natural world causing a higher degree of alienation from nature which leads to more destruction and inappropriate and unsustainable use of the natural world. This alienation also leads to more dysfunction and disease in the human population.

A recent study called "The Preventable Causes of Death in the United States", estimates the mortality effects of 12 modifiable dietary, lifestyle, and metabolic risk factors as 2,000,000 per year. These risk factors, high blood glucose, high low-density lipoprotein (LDL) cholesterol, high blood pressure, overweight–obesity, high dietary trans fatty acids, high dietary salt, low dietary polyunsaturated fatty acids, low omega-3 fatty acids (seafood), low dietary fruits and vegetables, physical inactivity, alcohol use, and tobacco smoking, can be mitigated with life style choices, including spending time in nature. Therefore in the US alone time in nature on an on-going basis from childhood through adulthood has the potential to impact two million deaths annually. Certainly this is a bold claim, but this paper has presented the wide reaching research supporting that a friluftsliv lifestyle or a lifestyle that embraced significant time in nature, including green spaces around homes and workplaces, significantly impacts health and development. Also reported were a number of medical systems that essentially prescribe time in nature. Time in nature has been shown to lessen the impact of these risk factors, lessen the effects of stress (often at least a partial cause of these risk factors), and help people

not abuse tobacco and alcohol.

Many disciplines have contributed research that supports humans need to reconnect with the natural world. The history and interaction of these professions with each other and with the understanding about the positive impacts of time in natural environments is complex. On a basic level this paper shows how the rich and building literature in this area supports the conceptual and theoretical bases of many practices including adventure therapy, ecopsychology, friluftsliv, nature therapy, outdoor education, physical rehabilitation in the outdoors, and others.

Additionally, this paper begins to identify the underlying theoretical concepts that are or maybe ought to drive research in the area of health and the outdoors. These theories and concepts support one another. Several theories including indigenous consciousness, multiple intelligences (naturalistic intelligence), psychoevolutionary theory, and biolphillia seem to point to a combination of genetic and cultural systems that help humans realize their need to connect and work with nature. Research shows that early connections with nature can have very positive affects in helping people develop an environmental literacy. Perhaps humans are born with neurons in the brain that give us naturalistic intelligence or indigenous consciousness, but like language neurons, if they are not used in time they are pruned and much harder to develop later in life. As these concepts are tied together a clearer picture of the importance of nature to human existence and how positive human nature connections can be made. The concepts and theories the author has presented support human's need for engagement with nature for continued wellbeing and friluftsliv is seen as a thread throughout. Hopefully, understanding these underlying concepts or key ideas can advance our understanding of human-nature relations.

While western people have been slow to embrace a positive mutualistic relationship with nature,

the author is hopeful that as more people learn the research from the many fields and use the research in their fields, then major changes in health and communities can take place.

References

1. Adhikari, S. (2009). *Commonly used ethno-medicinal plants by the indigenous people of Nepalese Himalayas*. Ecological Society of America 94th Annual Meeting, Albuquerque, NM.

2. Anderson, J. (2008). *The second journey: The road back to yourself*, Ashland, OR: Blackstone Audio, Inc.

3. Astin, J. A., Shapiro, S. L., Eisenberg, D. M., Forys, K. L. (2003). Mind-body medicine: State of the science, implications for practice. *J Am Board Fam Pract* 16(2):131-147.

4. Bardwell, L. (1992). A bigger piece of the puzzle: The restorative experience and outdoor education. In Henderson (Ed.) *Coalition for education in the outdoors: Research symposium proceeding* (pp. 15-20). Bradford Woods, IN: Coalition for education in the outdoors.

5. Carson, R. (1962 reprinted 2002). *Silent Spring.* Boston, MA: Houghton Mifflin Company.

6. Carson, R. (1956 reprinted 1965). *The sense of wonder (Help your child to wonder),* New York: Harper & Row.

7. Chawla, L. (2002). Spots of time: Manifold ways of being in nature in childhood. In Kahn, P. & Kellert, S.R. (Eds.), *Children and nature*, (pp. 199-225). Cambridge: MIT Press.

8. Chopra, D. (2001). *How to know God: The soul's journey into the mystery of mysteries*. New York: Random House.

9. Cobb, E. (1977). *The ecology of imagination in childhood*. New York: Columbia University Press, Reprinted 1993; Spring Publications.

10. Cole, E., Erdman, E. & Rothblum, E. (Eds). (1994). *Wilderness therapy for women: The power of adventure*. New York: Harrington Press

11. Du Nann Winter, D. (1996). *Ecological psychology: Healing the split between planet and self*. New York: HarperCollins College Publishers.

12. Ehrenreich, B, and English, D. (circa 1971). *Anarchism and feminism: The earliest practitioners, witches, midwives, and nurses: A history of women healers*. originally published by The Feminist Press at CUNY. http://tmh.floonet.net/articles/witches.html .

13. Elmer, P. (Ed.) (2004) *The healing arts*, Manchester University Press The Open University.

14. Fitzpatrick. M. (2006). Letter. *The British Journal of General Practice: The Journal of the Royal College of General Practitioners* 332(7535): 236.

15. Francis, C. & C. Cooper-Marcus. (1991). Places people take their problems. In J. Urbina-Sotia, P. Ortega-Andeane, & R. Bechtel (Eds.), *Proceedings of the 22nd Annual Conference of the Environmental Design Research Association*. Oklahoma City: Environmental Design Research Association, pp. 178-184.

16. Friedman, T. (2008). *Hot, flat, and crowded: Why we need a green revolution--And how it can renew America*. New York: Macmillan Audio.

17. Gardner, H. (1999). *Intelligence reframed: Multiple intelligences for the 21st century*. New York: Basic Books.

18. Gardner, H. (1983). *Frames of mind: The theory of multiple intelligences*. New York: Basic Books.

19. Gierlach-Spriggs, N., Kaufman, R. E., and Warner, Jr. S. B. (1998). *Restorative garden: The healing landscape*. New Haven: Yale University Press.

20. Greenway, R. (1999). Ecopsychology: A personal history. *Gatherings*, 1, Winter.

21. Greenway, R. (1996). Wilderness experience and ecopsychology. *International Journal of Wilderness*. *2*(1), 26-30.

22. Griffin, S. (1980). *Women and nature*. New York: Harper Colophon.

23. Harvard Magazine. (2009, February 18). Video: Sanatorium scenes. Retrieved April 15, 2009, from Harvard Magazine: http://harvardmagazine.com/extras/video-sanatorium-scenes.

24. Horsburgh, C. R. (1995). Healing by design. *The New England Journal of Medicine*, Vol. 11, No. 333, pp. 735-740.

25. Ingram, J. (2009). *The role of ecological systems and natural resource management in reducing vulnerability to hazards*. Wildlife Conservation Society. Ecological Society of America 94th Annual Meeting, Albuquerque, NM.

26. Kahn, P. & Kellert, S. R. (Eds.). (2002). *Children and nature*. Cambridge: MIT Press.

27. Kals, E. & Ittner, H. (2003). Children's environmental identity, indicators and behavioral impacts. In Clayton, S. & Opotow, S. (Eds.), *Identity and the natural environment: The psychological significance of nature*. Cambridge, MA: MIT Press.

28. Kals, E., Schumacher, D., and Montada, L. (1999). Emotional affinity towards nature as a motivational basis to protect nature. *Environment & Behavior*, 31(2), 178-202.

29. Kellert, S. R. (2002). Experiencing nature: Affective, cognitive, and evaluative development. In Kahn, P. & Kellert, S.R. (Eds.), *Children and nature*, (pp. 199-225). Cambridge: MIT Press.

30. Kreitzer, M. J., Mitten, D. S., Shandeling, J., & Harris, I. (2002). Attitudes towards CAM among medical, nursing, and pharmacy faculty and students: A comparative analysis. *Alternative Therapies 8*(6): 44-47.

31. Kuo, F.E., Bacaicoa, M., & Sullivan, W.C. (1998). Transforming inner-city neighborhoods: Trees, sense of safety, and preference. *Environment & Behavior,* 30(1), 28-59.

32. Lear, L. (Ed.). (1998). *Lost woods: The discovered writing of Rachel Carson*, Boston, MA: Beacon Press.

33. Lee, J. (2009). *The secret place of Thunder*. The Nag Hammadi Library. Retrieved July 31, 2009 from: http://vodpod.com/watch/744577-the-secret-place-of-thunder.

34. Leopold, A. (1949) *Sand County almanac*. New York: Oxford University Press.

35. Louv, R. (2005, updated 2008). *Last child in the woods*, Chapel Hill, NC: Algonquin Books.

36. Malkin, J. (1992). *Hospital interior architecture.* New York: Van Nostrand Reinhold.

37. Maller, C., Townsend, M., Pryor, A., Brown, P., & St Leger, L. (2006). Healthy nature, healthy people: 'Contact with nature' as an upstream health promotion intervention for populations. *Health Promotion International, 21*(1), 45-54.

38. Martinez, D. E., (2008-07-31). *Indigenous consciousness and the production of knowingness*. Paper presented at the American Sociological Association Annual Meeting, Sheraton Boston and the Boston Marriott Copley Place, Boston, MA Online <PDF>. 2010-01-23 from

http://www.allacademic.com/meta/p242173_index.html.

39. McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (1988). An ecological perspective on health promotion programs. *Health Education Quarterly*, 15(4), 351-377.

40. Mitten, D. (2009). Under our noses: The Healing power of nature, *Taproot Journal* 19(1) 20-26.

41. Mitten, D. (2004). Adventure therapy as complementary and alternative therapy. In S. Bandoroff & S. Newes (Eds.), *Coming of age: The evolving field of adventure therapy* (pp. 240 – 257). Boulder, CO: Association of Experiential Education.

42. Mitten, D. (1994). Ethical considerations in adventure therapy: A feminist critique. In E. Cole, E. Erdman, E. Rothblum (Eds.), *Wilderness therapy for women: The power of adventure* (pp. 55-84). New York: Harrington Press.

43. Murray, M. A. (1921). *The witch-cult in western Europe*, by Margaret Alice. Oxford University Press.

44. Naropa University. (2009). *What is ecopsychology?* Retrieved March 21, 2009, from Naropa University: http://www.naropa.edu/academics/graduate/psychology/tcp/ecoc/what.cfm.

45. Neill, J. (2004, November 1). *A psycho-evolutionary theory of outdoor education*. Retrieved January 4, 2010, from Wilderdom: http://wilderdom.com/psycho-evolutionary/.

46. Nightingale, F. (1860) (1996). *Notes on nursing* (Revised with additions). London: Ballière Tindall.

47. Noddings, N. (1984). *Caring: A feminine approach to ethics and moral education*. Berkeley, CA: University of California Press.

48. Northeastern Forest Experiment Station (1977). *Children, nature, and the urban environment: Proceedings of a symposium-fair.* Gen. Tech. Rep. NE-30. Upper Darby, PA: U.S. Department of Agriculture, Forest Service, Northeastern Forest Experiment Station.

49. Olson, S. (1946). We need wilderness. *National Parks Magazine*. January-March. Reprinted in condensed form in *Plants and Gardens*, Winter 1946.

50. Priest, S. (1986). *Outdoor leadership preparation in five nations*, Dissertation, University of Oregon.

51. Public Health Agency of Canada. (2008, December 8). *Ottawa Charter for Health Promotion: An International Conference on Health Promotion*. Retrieved March 2, 2009, from Public Health Agency of Canada: http://www.phac-aspc.gc.ca/ph-sp/docs/charter-chartre/index-eng.php. Remen, R. N. (1997). *Kitchen table wisdom*, New York: Riverhead Books / Penguin Putnam, Inc.

52. Searles, H. (1960). *The nonhuman environment in normal development and in schizophrenia*. Madison, CT: International Universities Press.

53. The Life and Legacy of Rachel Carson. (1996 – 2009). Retrieved February 2008 from The life and legacy of Rachel Carson: http://www.rachelcarson.org/ .

54. Therapeutic Landscapes Database. (2000). Retrieved May 1, 2009 from Therapeutic Landscapes Resource Center, Inc.: http://www.healinglandscapes.org/sites.html .

55. Tolle, E. (2005). *A new Earth: Awakening to your life's purpose*, New York: Penguin Books.

56. Ulrich, R. (2002). Health benefits of gardens in hospitals, *Plants for People,* International Exhibition Floriade.

57. Ulrich, R. S. (1999). Effects of gardens on health outcomes: Theory and research. In C. Cooper-Marcus, & M. Barnes. *Healing gardens: Therapeutic benefits and design recommendations*. New York: John Wiley & Sons, pp. 27-86.

58. Ulrich, R. S. (1992). Effects of interior design on wellness: Theory and recent scientific research.

Journal of Healthcare Design, Vol. 3, pp. 97-109.

59. Ulrich, R. S. and R. Parsons (1992). Influences of passive experiences with plants on individual well-being and health. In D. Relf (Ed.), *The role of horticulture in human well-being and social development.* Portland, OR: Timber Press, pp. 93-105.

60. Weiss, D. (2003, May 3). *Ecology Hall of Fame*. Retrieved April 15, 2009, from Ecotopia.org: http://www.ecotopia.org/ehof/index.html.

61. Wilson, R. (2008). *Nature and young children: Encouraging creative play and learning in natural environments*. London: Routledge.

62. Wilson, E. (2001). Nature matters. *American Journal of Preventive Medicine*, (20)3, 241-242.

63. Wilson, E. O. (1984). *Biophilia.* Cambridge, MA: Harvard University Press.

64. Wong, in Rohde, C. L. E. & Kendle, A. D. (1997). Nature for people. In Kendle, A.D. & Forbes, S. (Eds.), *Urban nature conservation - Landscape management in the urban countryside*. pp. 319-335. London: E & FN Spon.

65. Yankou, D. (2002). MorningStar: A place of restoration; *MorningStar Adventures*, LeRoy, MI. *18*(2): 3.

66. Yeou-Lan, D.C. (1996). Conformity with nature: A theory of Chinese American elders' health promotion and illness prevention processes. *Advanced Nursing Science* (19) 17-26.