Ecosystem’s Health Services and Outdoor Sports

A natural and emerging win-win strategy for sustainable development

Ronaldo Gabriel (rgabriel@utad.pt)
The balance of evidence indicates conclusively that knowing and experiencing nature makes us generally happier, healthier people. More fully characterizing our intangible connections with nature will help shape decisions that benefit people and the ecosystems on which we depend (Russell et al., 2013).
The threat of climate change has generated a global flood of policy documents, suggested technical fixes, and lifestyle recommendations. One widely held view is that their implementation would, almost without exception, prove socially uncomfortable and economically painful. But as a series of new studies shows, in one domain at least—public health—such a view is ill founded. If properly chosen, action to combat climate change can, of itself, lead to improvements in health. The news is not all bad.
PROMOTING HEALTH, PROMOTING SUSTAINABLE DEVELOPMENT

1. END POVERTY
2. END HUNGER
3. GOOD HEALTH AND WELL-BEING
4. QUALITY EDUCATION
5. GOOD HEALTH FOR ALL
6. CLEAN WATER AND SANITATION
7. AFFORDABLE AND QUALITY HEALTHCARE
8. DECENT WORK AND ECONOMIC GROWTH
9. INDUSTRY, INNOVATION AND INFRASTRUCTURE
10. SUSTAINABLE GROWTH AND STRENGTHENED INSTITUTIONS
11. URBAN SUSTAINABILITY AND ACCESS TO UNIVERSAL HEALTH COVERAGE
12. RESPONSIBLE CONSUMPTION AND PRODUCTION
13. LIFE-SAVING ACTIVITY
14. LIFE-SAVING WATER
15. LIFE-SAVING HEALTH
16. LIFE-SAVING SUSTAINABILITY
17. PARTNERSHIPS FOR THE GOALS
Nature and mental health: An ecosystem service perspective

Gregory N. Bratman1,2,4,6, Christopher B. Anderson3,5, Marc G. Berman4,5, Bobby Cochran4, Sjep de Vries3, Jon Flanders6,7, Carl Folk4,5,11,14, Howard Frumkin1,4,11, James J. Gross17, Terry Hartig1,19, Peter H. Kahn Jr.1,30, Ming Kuo21, Joshua J. Lawler2,1, Phillip S. Levin1,3,22, Therese Lindahl24, Andreas Meyer-Lindenberg3, Richard Mitchell12, Zhiyun Ouyang23, Jenny Rowe20, Lynn Scarlett25, Jeffrey R. Smith3,5, Mattilda van den Bosch18,29, Benedict W. Wheeler26, Mathew P. White25, Hua Zheng25, Gretchen C. Daily1,4,5,9,13.

A growing body of morphological evidence is revealing the value of nature experience for mental health. With rapid urbanization and declines in human contact with nature globally, crucial decisions must be made about how to preserve and enhance opportunities for nature experience. Here, we provide points of consensus across the natural, social, and health sciences on the impacts of nature experience on cognitive functioning, emotional well-being, and other dimensions of mental health. We then show how ecosystem service assessments can be expanded to include mental health, and provide a heuristic, conceptual model for doing so.
It is crucial a conceptual framework that supports a model that accesses the spectrum of the Ecosystem’s Health Provision for the spatial evaluation of the ecosystem’s health services at different scales.
(a) knowing, the metaphysical interactions that arise through thinking about an ecosystem, its components, or the concept of an ideal ecosystem, in the absence of immediate sensory inputs (e.g., imagining a polar bear hunting, thinking about a favorite place).

(c) interacting, physical, active, direct multisensory interactions with ecosystem components (e.g., catching a fish, building a sandcastle, touching moss, smelling nearby pine trees, gardening), which may be cursory and may involve other people.

(b) perceiving, remote (i.e., neither proximate nor tangible) interactions with ecosystem components, often associated with visual information alone (e.g., viewing a mountain, watching a nature video).

(d) living within, the everyday, repetitive, pervasive, voluntary, or involuntary interaction with the ecosystem in which one lives (e.g., living in a forested area, near an urban park, or by the seashore).

Channels of Human Experience

Senses

Vision
Hearing
Smell
Taste
Touch

Balance

Temperature

Proprioception

Pain

Nature

Components of the Ecosystem

i) Abiotic components
non-living or physico-chemical factors like air, soil, water and the basic compounds and elements of the environment

ii) Biotic components
living parts of the environment, including the association of a lot of interrelated populations
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non-living or physico-chemical factors like air, soil, water and the basic compounds and elements of the environment

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living parts of the environment, including the association of a lot of interrelated populations

ASSESSING NATURE EXPOSURE

http://www.huffingtonpost.com/erica-simone/fine-art-photography-huma_b_7868892.html
A CONCEPTUAL RESEARCH FRAMEWORK TO ECOSYSTEMS’ HEALTH PROVISION SPECTRUM FOR GEOPARKS

Stress Reduction Theory

**Ecopsychology**

Valerie L. Lohrke, Ph.D., R.N.C., H.N.C.

The Utility of Ecopsychology for Environmental Psychology

Ecopsychology is a field that explores the relationship between humans and their environment. It examines how the natural world can promote mental health and well-being. Ecopsychology emphasizes the importance of human-nature interactions and highlights the ways in which our natural surroundings can be used to support mental health.

**Neighborhood Responses to Disorder and Local Attachments: The Systemic Model of Attachment, Social Disorganization, and Neighborhood Use Value**

Patrick A. Dye

The paper investigates neighborhood attachment between ecological data and neighborhood characteristics. It presents a theoretical model that links neighborhood disorder and local attachments to individual well-being and social disorganization. The model suggests that neighborhood disorder negatively impacts individual well-being, while local attachments positively affect it. The study contributes to our understanding of how neighborhood characteristics influence individual well-being and social disorganization.

**Stress Recovery During Exposure to Natural and Urban Environments**

Rogier S. Usui, Robert F. Kranzler, Barbara A. D. Longton, Evelyn P. Hoffman, Marla A. Mooney, and Michael J. Zelenson

This study examines the effects of natural and urban environments on stress recovery. The researchers measured stress levels and mood changes in participants exposed to natural and urban environments. The results suggest that natural environments may be more effective in reducing stress and improving mood compared to urban environments.

**Biophilia Hypothesis** (Wilson, 1984)

Edward O. Wilson

The Biophilia Hypothesis is a theory that suggests humans have an innate tendency to seek connection with other life forms. This theory is based on the idea that humans have a deep-seated need for connection with nature, which is essential for their well-being. The Biophilia Hypothesis has been influential in shaping environmental policies and practices.

**The Kaplans’ Attention Restoration Theory (ART)**

Steven G. Kellert

Attention restoration theory (ART) is a theory that suggests that exposure to natural environments can help restore attention and focus. This theory is based on the idea that natural environments are more restorative for attention than urban environments. ART has been influential in the design of green spaces and park planning.

**Place-based theories**

The theories of landscape planning and stress, eco-psychotherapy, and stress recovery during exposure to natural and urban environments all emphasize the importance of place-based theories. These theories suggest that the physical environment can have a significant impact on human well-being and behavior.
RESEARCH PAPER

An estimation of the number of cells in the human body

Eva Bianconi, Allison Povesan, Federica Facchin, Alina Beraudi, Raffaella Casadei, Flavia Frabetti, Lorena Viola, Maria Chiara Pelleri, Simone Tassani, Francesco Piva, Soledad Perez-Amor, Pierluigi Strippoli, and Silvia Caniader

Department of Experimental, Diagnostic and Specialty Medicine, University of Bologna, Bologna, Italy; 1Department of Life Quality Studies, University of Bologna, Bologna, Italy; 1Department of Communication and Computer Systems, Athens, Greece; 1Department of Biomedical, Biotechnology, and Nanomedicine, School of Medicine, Polytechnic University of Marche, Ancona, Italy; and 1Biomaterials for Regenerative Therapies Group, Institute for Bioengineering of Catalonia (BEC), Barcelona, Spain

Abstract

Background: All living organisms are made of individual and identifiable cells, whose number, together with their size and type, ultimately defines the structure and functions of an organism. While the total cell number of lower organisms is often known, it has not yet been defined in higher organisms. In particular, the reported total cell number of a human being ranges between 10^{14} and 10^{17} and it is widely mentioned without a proper reference. Aim: To study and discuss the theoretical issue of the total number of cells that compose the standard human adult organism.

Subjects and methods: A systematic calculation of the total cell number of the whole human body and of the single organs was carried out using bibliographical and/or mathematical approaches.

Results: A current estimation of human total cell number calculated for a variety of organs and cell types is presented. These partial data correspond to a total number of 3.72 x 10^{17}. Conclusions: Knowing the total cell number of the human body as well as of individual organs is important from a cultural, biological, medical, and comparative modelling point of view. The presented cell count could be a starting point for a common effort to complete the total calculation.

Keywords

Cell size, human cell number, organ, total cell count, theoretical issue

History

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A TISSUE ADAPTS TO THE LEVEL OF LOAD/STIMULUS IMPOSED ON IT

Julius Wolff

The Law of Bone Remodelling

Translated by
P. Maquet and R. Furlong

With 55 Figures

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London · Paris · Tokyo
The best available such reconstruction suggests that the World Health Organization’s recommendation, a physical activity level of 1.75 (\(2.1 \text{ MJ (490 kcal)} \text{ yd}\)), most closely approximates the Paleolithic standard, that for which our genetic makeup was originally selected.

**CHANGE FROM A VERY PHYSICALLY DEMANDING LIFESTYLE IN NATURAL OUTDOOR SETTINGS, TO AN INACTIVE INDOOR LIFESTYLE: THE ORIGIN OF MANY OF THE WIDESPREAD CHRONIC DISEASES (O'Keefe et al., 2011)**

Furthermore, because humans evolved to be active for play or necessity, efforts to promote exercise will require altering environments in ways that nudge or even compel people to be active and to make exercise fun.
DIVERSITY AND VARIABILITY OF STIMULUS, for the real world and FUN
A METHODOLOGICAL FRAMEWORK TO ECOSYSTEMS’ HEALTH PROVISION SPECTRUM FOR GEOPARKS

What about Outdoor Sports?
"Sport" means all forms of physical activity which, through casual or organised participation, aim at expressing or improving physical fitness and mental well-being, forming social relationships or obtaining results in competition at all levels.
The United Nations Inter-Agency Taskforce on Sport for Development and Peace (2003) defined Sport as:

all forms of physical activity that contribute to physical fitness, mental wellbeing, and social interaction. These include play, recreation, organised, causal or competitive sport and indigenous sports or games.
“More broadly, outdoor recreation refers to activities that people undertake outdoors in places where they can access nature or green areas, both in urban or rural environments, mainly as part of their daily or weekend routines.”
Outdoor Sports refers to all forms of physical activity that contribute to physical fitness, mental wellbeing, and social interaction, in places where people can access nature or green areas, both in urban or rural environments, mainly as part of their daily, weekend or holidays routines.
The mediating role of outdoor sports
A CONCEPTUAL RESEARCH FRAMEWORK TO ECOSYSTEMS’ HEALTH PROVISION SPECTRUM FOR GEOPARKS

Outdoor Sports

Diversity and Variability of Stimulus

Recreation and mental and physical health
Nature-based opportunities for recreation play an important role in maintaining mental and physical health, e.g. walking and playing sports in parks and urban green spaces.

Tourism
Enjoyment of nature attracts millions of travelers worldwide. This cultural ecosystem service includes both benefits to visitors and income opportunities for nature tourism service providers.

Aesthetic appreciation and inspiration for culture, art and design
Animals, plants and ecosystems have been the source of inspiration for much of our arts, culture, and design; they increasingly inspire science as well.

Spiritual experience and sense of place
Nature is a common element in most major religions. Natural heritage, spiritual sense of belonging, traditional knowledge, and associated customs are important for creating a sense of belonging.

Cultural Services are non-material benefits people gain from ecosystems, for e.g. aesthetic and engineering inspiration, cultural identity and spiritual well-being.

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Levels of Arrangement with Nature

Environmental Naturalness

Engagement with Nature

Physical Activity
Levels of Arrangement with Nature

Environmental Naturalness

Engagement with Nature

Physical Activity

OUTDOOR SPORTS

Channels of Human Experience

Environmental Naturalness

The naturalness of environments may be objectively quantified using existing methods; for example, the green cover ratio; the visible greenness ratio; and ecological diversity.

Engagement with Nature

The degree of engagement with nature (or interaction with nature) should encompass physical, psychological, and spiritual aspects in addition to all five sensory functions.

Physical Activity

Physical Activity (PA) is any bodily movement by skeletal muscles that results in more energy expenditure than does resting. Related research has indicated that PA encompasses four characteristics: (1) bodily movement through skeletal muscles, (2) energy expenditure, (3) continuous variation of energy expenditure from low to high, and (4) positive correlation with physical fitness.
LEVELS OF ARRANGEMENT WITH NATURE

DENOMINATIONS for Ecosystem’s Services based on Outdoor Sports

Family
Science
Adventure
A trail where one wants a **family side**, having several points of interest related to nature and science and having infrastructures/facilities (health, accommodation, restaurant activity, among others).

**LEVELS OF ARRANGEMENT WITH NATURE**

- **Environmental Naturalness**: 3 stars
- **Engagement with Nature**: 2 stars
- **Physical Activity**: 1 star
DENOMINATIONS for Ecosystem’s Services based on Outdoor Sports

A trail where a scientific strand is sought, gathering points of interest in geology, fauna, flora, ecology, etc.

LEVELS OF ARRANGEMENT WITH NATURE

Environmental Naturalness  Engagement with Nature  Physical Activity

⭐⭐⭐⭐⭐  ⭐⭐⭐⭐⭐  ⭐⭐⭐⭐⭐
Given to a trail and where there are points of interest related to outdoor activities or nature, involving challenges and assessed risks. Activities can involve canoeing, rafting, mountain biking, hiking, climbing, etc.

DENOMINATIONS for Ecosystem’s Services based on Outdoor Sports

LEVELS OF ARRANGEMENT WITH NATURE

Environmental Naturalness  Engagement with Nature  Physical Activity

⭐⭐⭐⭐⭐  ⭐⭐⭐⭐⭐  ⭐⭐⭐⭐⭐
The denominations are outlined, according to a list of **THEMATIC INDICATORS**
THEMATIC INDICATORS

PHYSICAL ACTIVITY AND SAFETY

BIOLOGY

GEOLOGY
PARAMETERS OF THE "PHYSICAL ACTIVITY AND SAFETY" INDICATOR

<table>
<thead>
<tr>
<th>Hiking trail length</th>
<th>Up to 15 km</th>
<th>Between 15 and 25 km</th>
<th>More than 25 km</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficulty</td>
<td>Very easy to enjoyable</td>
<td>Easy to difficult</td>
<td>Severe or extreme</td>
</tr>
<tr>
<td>Duration</td>
<td>Up to 5 hours</td>
<td>Between 5 and 8 hours</td>
<td>More than 8 hours. May require more than one day.</td>
</tr>
<tr>
<td>Slope</td>
<td>between [-10%, +10%]</td>
<td>between [-20%, -10% [ and/or between ] +10%, +20%]</td>
<td>] -∞, -20% [ and/or ] +20%, +∞ [</td>
</tr>
</tbody>
</table>
### Parameters of the "Physical Activity and Safety" Indicator

<table>
<thead>
<tr>
<th>Obstacles</th>
<th>Use by families and persons with reduced mobility</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presence of obstacles that do not require the use of specific orienteering / navigation equipment, climbing techniques, among others;</td>
<td></td>
</tr>
<tr>
<td>The presence of obstacles requiring survival techniques and / or some degree of skill specialization, including the use of specific guidance / navigation equipment, climbing</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Crossing Rivers and Streams</th>
<th>Carried out by bridges and there must be walking surfaces in wood or other material in places where, for safety reasons, their implementation is justified.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carried out without bridges but in low depth places</td>
<td></td>
</tr>
<tr>
<td>Made without using bridges but with the use of specific equipment.</td>
<td></td>
</tr>
</tbody>
</table>

| Encounters with Other Users                                                                 | Regular encounters with other users                                                                                                           |
|                                                                                           | Sporadic encounters with other visitors                                                                                                       |
|                                                                                           | Little or no likelihood of finding other visitors                                                                                           |

| Width of the Hiking Trail                                                                 | Between 1.8 and 3 meters                                                                                                                      |
|                                                                                           | Between 0.6 m and 1.2 m on most sections                                                                                                      |
|                                                                                           | 0.5 to 1 m wide                                                                                                                               |
**PARAMETERS OF THE "PHYSICAL ACTIVITY AND SAFETY" INDICATOR**

<table>
<thead>
<tr>
<th>Signaling</th>
<th>Facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Well defined and marked route, containing clear indications of the crossings and not requiring effort in the identification of the route.</td>
<td>WC</td>
</tr>
<tr>
<td>Presence of interpretive signs of landscape, fauna and flora.</td>
<td>Playground</td>
</tr>
<tr>
<td>Frequent use of signals for interpretation and management of routes.</td>
<td>Car parking</td>
</tr>
<tr>
<td>Abundant signage providing visitors with opportunities to observe and interpret the natural environment</td>
<td>Coffee Shop</td>
</tr>
<tr>
<td>Markings are limited and commonly displayed on logs and stones.</td>
<td>Reception / shop area, where publications can be purchased and user support resources available (binoculars, bicycles, kayaks, etc.).</td>
</tr>
<tr>
<td>The recognition of the route depends on the understanding of the terrain and the route of the route, imposing the identification of geographical accidents and the cardinal points</td>
<td>Only minimum safety services, and road users should be self-sufficient in case of emergency or abrupt climate change.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Physical condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acceptable physical fitness</td>
</tr>
<tr>
<td>Acceptable physical fitness and some hiking experience</td>
</tr>
<tr>
<td>Physical fitness above average, experienced pedestrianists and mastery of survival techniques and guidance / navigation</td>
</tr>
</tbody>
</table>
### PARAMETERS OF THE “BIOLOGY” INDICATOR

<table>
<thead>
<tr>
<th>Description</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification of the most emblematic species (fauna and flora)</td>
<td></td>
</tr>
<tr>
<td>Detailed identification of the most emblematic species (fauna and flora)</td>
<td></td>
</tr>
<tr>
<td>Brief identification of the Conservation Statute</td>
<td></td>
</tr>
<tr>
<td>Detailed identification of the Conservation Statute</td>
<td></td>
</tr>
<tr>
<td>Brief explanation of phenology</td>
<td></td>
</tr>
<tr>
<td>Detailed explanation of phenology</td>
<td></td>
</tr>
<tr>
<td>Distribution and population trends</td>
<td></td>
</tr>
<tr>
<td>Detailed explanation of distribution and population trends</td>
<td></td>
</tr>
<tr>
<td>Brief reference to the main aspects of species biology and ecology</td>
<td></td>
</tr>
<tr>
<td>Detailed reference of the main aspects of species biology and ecology</td>
<td></td>
</tr>
<tr>
<td>Brief reference to Ecological requirements (habitat, feeding, breeding)</td>
<td></td>
</tr>
<tr>
<td>Detailed reference of Ecological requirements (habitat, feeding, breeding)</td>
<td></td>
</tr>
<tr>
<td>Identification of the main threats (habitat, feeding, breeding)</td>
<td></td>
</tr>
<tr>
<td>Detailed identification of major threats (habitat, feeding, breeding)</td>
<td></td>
</tr>
</tbody>
</table>
PARAMETERS OF THE "GEOLOGY" INDICATOR

<table>
<thead>
<tr>
<th>General geological map</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Detailed geological map</td>
<td></td>
</tr>
<tr>
<td>General characterization of the main types of rocks</td>
<td></td>
</tr>
<tr>
<td>Detailed characterization of rocks and minerals</td>
<td></td>
</tr>
<tr>
<td>General geological history of the region</td>
<td></td>
</tr>
<tr>
<td>Detailed geological history of the region</td>
<td></td>
</tr>
<tr>
<td>General characterization of structural aspects</td>
<td></td>
</tr>
<tr>
<td>Detailed characterization of the structural aspects</td>
<td></td>
</tr>
<tr>
<td>General characterization of weathering forms</td>
<td></td>
</tr>
<tr>
<td>Detailed characterization of weathering forms</td>
<td></td>
</tr>
<tr>
<td>General characterization of the geological landscape (reading / interpretation)</td>
<td></td>
</tr>
<tr>
<td>Detailed characterization of the geological landscape (reading / interpretation)</td>
<td></td>
</tr>
<tr>
<td>General characterization of exploited or exploited geological resources</td>
<td></td>
</tr>
<tr>
<td>Detailed characterization of exploited or exploited geological resources</td>
<td></td>
</tr>
</tbody>
</table>
IUCN recognises that sport can negatively impact biodiversity...

However, at the same time, sport, through its global reach, can be an important catalyst for raising awareness about the need for biodiversity conservation, and promoting and supporting efforts to enhance biodiversity.

A NATURAL AND EMERGING WIN-WIN STRATEGY FOR SUSTAINABLE DEVELOPMENT

THE MEDIATING ROLE OF OUTDOOR SPORTS