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An Emerging Paradigm for the UNESCO Global Geoparks: The Ecosystem's Health Provision

Ronaldo Gabriel [1,*], Helena Moreira [2], Ana Alencoão [3], Aurélio Faria [4], Elizabeth Silva [5] and Artur Sá [6]

1 Department of Sport Sciences, Exercise and Health, Centre for Research and Technology of Agro-Environmental and Biological Sciences, University of Trás-os-Montes & Alto Douro, Quinta de Prados, 5000-801 Vila Real, Portugal

2 Department of Sport Sciences, Exercise and Health, Research Center in Sports Sciences, Health and Human Development, Centre for Research and Technology of Agro-Environmental and Biological Sciences, University of Trás-os-Montes & Alto Douro, Quinta de Prados, 5000-801 Vila Real, Portugal; hmoreira@utad.pt

3 Department of Geology, Centre for Mechanical Engineering, Materials and Processes of the University of Coimbra, University of Trás-os-Montes & Alto Douro, Quinta de Prados, 5000-801 Vila Real, Portugal; alencoao@utad.pt

4 Department of Sport Sciences, Research Center in Sports Sciences, Health and Human Development, University of Beira Interior, Rua Marquês D'Ávila e Bolama, 6201-001 Covilhã, Portugal; afaria@ubi.pt

5 Portuguese National Forum of UNESCO Global Geoparks, Portuguese National Commission for UNESCO, Largo das Necessidades, 1350-215 Lisboa, Portugal; elizabeth.silva@mne.pt

6 Department of Geology, Geosciences Center of the University of Coimbra, University of Trás-os-Montes & Alto Douro, Quinta de Prados, 5000-801 Vila Real, Portugal; asa@utad.pt

* Correspondence: rgabriel@utad.pt; Tel.: +351-918-766-779

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Abstract: During the 38th General Conference of UNESCO, the Member States ratified the creation of the International Geoscience and Geoparks Programme (IGGP) expressing governmental recognition of the importance of managing outstanding geological sites and landscapes in a holistic manner. In this context, the importance of human interactions with the natural environment to promote healthy lifestyles was primarily a response to the need to preserve and enhance the value of the UNESCO Global Geoparks as well as highlighting their usefulness for the sustainable development of local populations. The aim of this paper is to suggest an interdisciplinary approach to be applied to UNESCO Global Geoparks for a standardized survey and grading methodology that can be used to assess the ability to provide and promote healthy lifestyles, which is called the Ecosystem's Health Provision Spectrum (EHPS) on an ecological scale. The suggested EHPS is in line with UNESCO's priorities, in particular with the IGGP and its motto of "Geosciences in the Service of Society". Therefore, the EHPS on an ecological scale will be another important tool for the UNESCO Global Geoparks, facilitating efficient management and promoting economic development, wellbeing and health.

Keywords: geoparks; healthy lifestyles; health services; ecosystem services

1. Introduction

1.1. Nature's Provision of Health

Nature is considered as all living and non-living components of ecosystems described in a widespread but not exhaustive mode, excluding non-living human-built environments [1]. Outdoor natural environments may provide some of the best all-round health benefits by increasing physical activity levels with lower levels of perceived exertion and altering physiological functioning. This includes reducing stress, restoring mental fatigue and improving mood, self-esteem and perceived health [2]. All of these benefits can influence body composition, physiological and biomechanical indicators related to physical ability, fall risk and quality of life, which are markers of health and should be taken into account when fighting the growing incidence of both physical inactivity and noncommunicable diseases (NCDs). NCDs are identified as chronic diseases that usually emerge from an arrangement of genetic, physiological, environmental and unhealthy lifestyle factors [3] Cardiovascular diseases, cancers, chronic respiratory diseases, hypertension, osteoporosis and diabetes are important examples of NCDs. In this context, there is already evidence for how the psychological benefits increase in proportion to the species richness of urban green spaces based on biological complexity and biodiversity conservation [4]. Therefore, more research is needed to discern which characteristics of natural settings (e.g., biodiversity, level of disturbance, proximity and accessibility) are most important for triggering beneficial interactions [5]. Moreover, we need to know how these characteristics vary in importance among cultures, geographic regions, different populations, environments and social contexts in addition to the longer-term impact of repeated exposure on health [6]. In attempting to understand the human–nature relationship, relevant human–nature theories have also been developed. For example, the Biophilia Hypothesis was developed by Edward Wilson [7] to describe the innate human tendency to be drawn to the natural world.

Considering the restorative importance of natural environments for effective human functioning and wellbeing, the Kaplans' Attention Restoration Theory (ART) was developed [8]. The Stress Reduction Theory (SRT) [9] is very similar to ART and is based on human responses to the natural environment (reducing stress and providing a calming effect) when there is biodiversity and landscapes with features, such as views of the sky and of water bodies (oceans, seas, lakes, ponds, wetlands). These include other geographical features where water moves from one place to another (rivers, streams, canals, etc.).

Complementary to the theories established by others, the opportunity to develop strong connections with natural places based on the spiritual benefits that natural environments can provide has provided support for the development of several place-based theories [10,11].

According to these human–nature theories, the physical and emotional health benefits of a connection to nature have been well documented [12,13]. An ecosystem approach to human health has also been suggested to enhance the health of communities by instituting ecosystem–management methods, which will foster the sustainability of the ecosystem itself and the health of the human beings, who are part of it [14]. However, this approach must take into account that the change from a very physically demanding lifestyle in natural outdoor settings, where our current genome was forged via natural selection, to an inactive indoor lifestyle is at the origin of many widespread NCDs that are endemic in our modern society [15].

There is already some scientific evidence about added beneficial effects on mental and physical wellbeing, health-related quality of life and long-term adherence to physical activity as a result of participation in physical activity in natural environments in comparison with indoor physical activity [16]. Specifically, that review exposed some encouraging effects on self-reported overall wellbeing immediately following exercise in natural environments compared to indoor physical activity where it does not happen. From this perspective, the UNESCO Global Geoparks has become even more important for our survival by offering recreation and health services for many citizens, which will make them happier and their bodies healthier. By complementing outdoor recreational sports activity, considering the sustainability of our natural resources and environment as well as looking at the improvement of health and wellbeing, UNESCO Global Geoparks projects can be developed to give the opportunity to tackle demanding physical working tasks that improve both health and the environment at the same time. For instance, the Rokua UNESCO Global Geopark, the Basque Coast UNESCO Global Geopark and the Açores UNESCO Global Geopark with water bodies features, such as ocean, lakes, ponds and rivers, propose successful programs and activities to know and experiencing nature, offering exciting ways to enjoy active outdoor adventures. This is based on a network of hiking, biking and paddling trails and is deeply connected with local companies offering guides and equipment for discovering the Geoparks territories all year round.

There has been an epidemiologic transition to NCDs as the major causes of mortality, apart from the heuristic value of the World Health Organization (WHO) definition of health [17], which is firmly linked to an alternative, holistic paradigm of health based on sustainable healthy lifestyle choices. This is the basis for action and the expansion of the research field on the positive health effects of human interactions with ecosystems [18]. Conceptual advances (experimental testing of the effects of contact with nature on health), methodological advances (resources and techniques that have recently become available) and the improvement of interdisciplinary research paradigms that shape the way in which researchers work by enabling and optimizing the integration of research disciplines have also been crucial for the expansion of the field [19].

However, even after the German psychologist Ulrich Gebhard showed to the scientific community that children need to develop personal relationships with nature before puberty [20], there is a lack of understanding of the benefits of interaction with nature (knowing and experiencing nature), the effects of such interactions on the health and well-being of individuals and communities (prevention of NCDs) and the value of ecosystem services. The ability to overcome that gap in understanding and to engage with those different but important stakeholder communities will determine the future health of both humans and the environment [21].

Even if the attempts to quantify and appreciate the ecosystem's health provision have grown rapidly, our dependence upon cultural connections (nonmaterial/intangible interactions) with nature deserves increased attention, particularly on the basis of multidisciplinary research related to the contributions of nature or ecosystems to human health mediated through intangible connections [1]. The empirically supported Theory of Embodied Cognition [22,23] has been the starting point for growing insights into the full range of intangible interactions with ecosystems, which can provide health benefits. In contrast to the mind theory suggested by Rene Descartes in the seventeenth century (the mind is entirely different from the body), embodied cognition is the idea that the mind is not only linked to the body, but that the body influences the mind. In other words, embodied cognition means that our ability to attend to external stimuli or internal motivation, to identify the significance of such stimuli and to plan meaningful responses to them is not limited to our cortices. This is, instead, possibly determined by our creative combinations of experiences in the physical world. This implies that the way in which humans interact with our environment helps guide how humans think and who humans are. Consequently, this impacts the core of the health of humans [1]. These authors [1] propose that benefits derived from non-material interactions with ecosystems may be obtained through four different channels of human experience (not truly separable or mutually exclusive) that incorporate all of the ways in which people experience nature, consciously or subconsciously. The four channels proposed by those authors include the following: (a) knowing, which involves the metaphysical interactions that arise through thinking about an ecosystem and its components or the concept of an ideal ecosystem in the absence of immediate sensory inputs; (b) perceiving, which involves the remote interactions with ecosystem components and is often associated with visual information alone; (c) interacting, which involves physical, active, direct multisensory interactions with ecosystem components, which may be cursory and may involve other people; and (d) living within the everyday, which includes repetitive, pervasive, voluntary or involuntary interactions with the ecosystem in which one lives.

The importance of human interactions with the natural environment to promote healthy lifestyles through these different channels of human experience was primarily a response to the need to preserve and enhance the value of the UNESCO Global Geoparks, while highlighting their usefulness for sustainable development of local populations. More specifically, geodiversity can be used as an effective strategy in Geoparks to foster economic sustainable development of local communities based on the promotion of geotourism and education. Furthermore, this allows exploration of the interactions between social and natural systems with a particular emphasis on sustainability in the context of our planet's resilience and climate change [24,25]. Consequently, there arises the concept of the ecosystem's health provision and the need to take into account multiple initiatives at the national and global levels for the development and implementation of international nature conservation policies. This enhances and reaffirms the importance of the UNESCO Global Geoparks as one-of-a-kind, unified geographical areas with a "bottom-up" development strategy within a holistic approach, designed with people and for the people, protecting and promoting all of their natural and cultural (tangible and intangible) heritage, used for education and science and as a sustainable economic asset associated with the implementation of responsible tourism. Therefore, it is crucial to develop a conceptual framework that supports a model to access the spectrum of the ecosystem's health provision as part of an effort to set up tools and methods for the spatial evaluation of the ecosystem's health services at the level of UNESCO Global Geoparks.

1.2. The Concept of the Ecosystem's Health Provision Spectrum (EHPS) at the Scale of UNESCO Global Geoparks

The development of an ecosystem's health provision spectrum (EHPS) must be intrinsically supported by interdisciplinary methodological approaches between geosciences, environmental sciences, humanities, social sciences as well as life and health sciences to identify and evaluate natural settings that can provide demonstrable health benefits in the context of NCDs. These are called Health Resources (HRs) [26]. More specifically, any EHPS should be able to establish or indicate what and where the ecosystem's HRs are and the magnitude of the HRs available in addition to providing the opportunity to benefit from them.

EHPS development should be based on previous approaches [27,28] focused on adaptations to the Recreational Opportunity Spectrum (ROS) model [29] that take into account the Recreational Potential (RP) and the Recreational Opportunity (RO). The ROS model [30] was developed in the United States to provide a framework that helped to elucidate relationships between recreational settings, activities and experiences, where biophysical, social and management attributes are used to describe places of recreation. An adaptation of the ROS approach for continental studies was used as a tool for assessing the potential recreational provision in Europe [28], where the analysis was focused on a whole range of possibilities for recreation provided by ecosystems. This took into account the identification of three main delineation factors of the ROS zones: remoteness, naturalness and expected social experience. This ROS adaptation in the context of the ecosystem services was associated on one hand with the potential provision of the service, which is known as the Recreational Potential Indicator (RPI). On the other hand, this was associated with knowing how recreation can be delivered to the people, which was called Remoteness and Accessibility (RA) [28]. RA divided the RPI into three components: (a) the degree of naturalness; (b) protected areas as public recreation areas; and (c) water attractiveness. The degree of naturalness was modelled through the Hemeroby index, which is an index that measures the magnitude of the deviation from the potential natural vegetation caused by human activities [31]. Databases that hold information about protected sites and the national legislative instruments that directly or indirectly create protected areas were considered in mapping protected areas as public recreation areas. Nevertheless, sites classified as Strict Nature Reserves were not considered very high in natural value. As there are many driving factors for water attractiveness and for the RPI, only three of them were considered: (a) data on bathing water quality, (b) distance from the coast and (c) coastline included in protected areas. These three RPI components (degree of naturalness, protected areas as public recreation areas and water attractiveness) were aggregated following the procedure for building composite indicators [32]. A previous study obtained the final result that they called the RPI after treatment adaptation of other data [28].

Furthermore, with the aim of quantifying the RP, some authors [27] suggested the aggregation of the so-called RP, which is an adaptation of the concept of RPI used by Paracchini et al. [28], with another component designated as the RO. The RO took into account the infrastructure that was in place to host or guide the visitors and included information regarding the density of mountain summits and the locations of recreational areas, climbing sites, cycling paths and routes of geological interest.

On a similar scale (continental/regional scale), Wheeler et al. [33] reinforced the rationale behind the approach followed by Paracchini et al. [28] and Casado-Arzuaga et al. [27] that takes into account the current state of the art, where it is suggested that exposure to natural environments enhances human health and wellbeing. This previous study [33] indicated that natural environments cannot be treated as a homogenous environment type with different types and qualities of natural environments instead needing to be considered in the study of these types of influences. They concluded that the type, quality and context of natural environments should be considered in the assessment of relationships between natural environments, human health and wellbeing.

However, it is not possible to include many important aspects of the natural environments that must be incorporated in the EHPS on a continental/regional scale even when considering the infrastructures that are in place to host or guide visitors and that include information regarding the density of mountain summits and the locations of recreational areas, climbing sites, cycling paths, and routes of geological interest. This is namely relevant to those used in the UNESCO Global Geoparks with regards to the differences resulting from outdoor initiatives and field trips, as they take into account their geological heritage in connection with all other settings of the natural areas and cultural heritage. This is consistent with the concept of ecosystem services as flows of materials, energy and information from natural capital stocks, which combine with manufactured and human capital services to produce human welfare [34,35]. Specially, this is linked with the main divisions of cultural ecosystem services identified by CiCES [36], where the environmental settings were found to support non-consumptive physical and intellectual interactions with ecosystems and land or seascapes, which affect physical and mental states of people on an ecological scale (the scale where the relationship between humans and their environments is defined) [37]. Nevertheless, the concept of ecosystem services only includes services that involve ecosystem processes between the biotic and abiotic worlds and exclude services that are purely abiotic, which could be termed as 'geosystem services' [38]. In this context, a more holistic approach is needed for valuing, conserving and managing nature, which includes both geodiversity and biodiversity. This is especially the case when the threats to nature and human health and wellbeing are increasing from human actions and climate change [39]. This thinking can be extended to all of the environmental settings that can provide demonstrable health benefits when used by human beings, which is essential in the perspective of the UNESCO Global Geoparks. Consequently, when we are looking for the ecosystem's health provision in any UNESCO Global Geopark, it is crucial to have an EHPS available on an ecological scale.

To develop an EHPS on an ecological scale (the scale that is adequate for the UNESCO Global Geoparks), it is crucial to create a systematic approach for identifying and evaluating environmental settings that serve as HRs as well as the provide opportunities to take advantage of them through the four different channels of human experience (knowing; perceiving; interacting in physical and multi-sensory manners; living within) as proposed by Russell et al. [1]. Therefore, these types of HRs are found more specifically in the context of all the environmental settings that can provide demonstrable health benefits when used by populations and tourists [26]. For example, knowing and experiencing natural territories through hiking provides physical activity, promotes mental health and wellbeing through contact with nature and stimulates social wellbeing by providing educational opportunities and social interactions with other people. In the same way, a prospective EHPS related to hiking trails network (on an ecological scale) should include the identification of where the HRs are most conducive to improving physical and mental health and should evaluate the HRs in order to indicate where we can find the maximum health benefits. For that reason and based on a well-defined conceptual framework (Figure 1), a set of specific methodologies and metrics for identifying and evaluating environmental HR potential and the opportunity for the sustainable use of such HRs must be developed and made available.

Hence, from this perspective, the aim of this paper is to suggest an interdisciplinary approach between geosciences, environmental sciences, humanities, social sciences as well as life and health sciences to be applied to UNESCO Global Geoparks. This includes relevant information and proposes a standardized survey and grading methodology that can be used to assess the ability to provide and promote healthy lifestyles, which is namely the EHPS on an ecological scale.

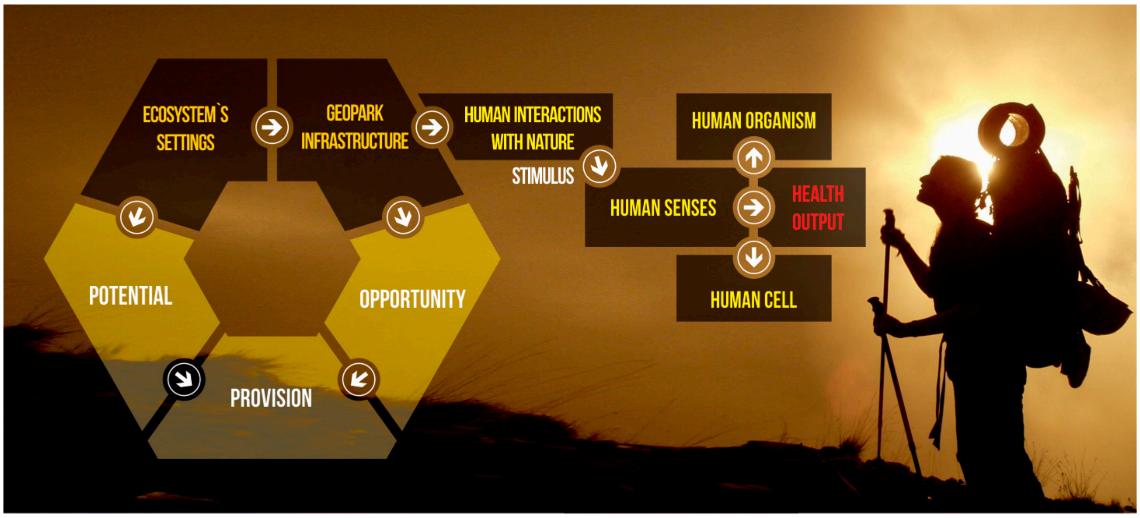

Figure 1. A conceptual research framework to ecosystems' health provision spectrum for geoparks.

2. An Approach to Model the Ecosystem's Health Provision Spectrum (EHPS) at UNESCO Global Geoparks Scale

2.1. Ecosystem's Health Potential (EHP)

According to findings from literature, we suggest that the Ecosystem's Health Potential (EHP) should be developed on an ecological scale and supported through components that have a potential specific link through any of the four different channels of human experience (knowing; perceiving; interacting in a physical and multi-sensory manner; living within). This was proposed by a previous study [1], which stated that people's behavior can provide demonstrable health benefits in the context of NCDs. Therefore, the EHP should include the identification of where the HR is most conducive to physical and mental health benefits. In other words, the EHP should identify where some types of potential environmental exposures with positive health effects are located and determine their potential magnitude. This implies the potential to perform certain types of interactions with nature that may benefit health and wellbeing.

For instance, from that standpoint, health and wellbeing may benefit from certain sounds of the natural world [40–44], such as those from flowing water [41], birds [40,42,44] and wind [41].

Potentially healthful views should also be considered, such as those with the presence of flowers in different colors [40,41,44], aesthetically beautiful landscapes [44,45], places where the sea waves can be admired [40,43,46], streets with trees [47,48], the degree of naturalness of the landscape [12,45,49,50], views of agricultural landscape [45,51] and green spaces [13,45,49,50,52,53].

The potential health and wellbeing benefits provided by sensory experiences from the smells of nature must be taken into account, especially the smell of fresh air [44,49], wet earth [41,45], trees [54,55] and wild fruits [44]. There are potentially healthful flora settings that should be identified, considering the presence of native flowers [56,57], the degree of plant biodiversity [49,58,59] and the presence of grassland [60] and trees [44,45,49,61].

Water is one of the most important physical and aesthetic landscape elements where salutogenic health benefits can be identified, such as through the presence of lakes and rivers [43,44,49,62].

Nevertheless, natural white spaces, such as snow-capped mountains, can both promote and reduce physical, mental and social well-being, depending on experiences and personal understanding of severe winter weather conditions [63]. Similar to the presence of a certain degree of plant biodiversity, the degree of animal biodiversity can influence health benefits [40,44,45,49,59] and must be identified in the ecosystem.

Therefore, in general terms, the EHP should include the identification of where the ecosystem settings are, which will focus on the structural and functional complexity of the abiotic and biotic components of the ecosystems that are most conducive to physical and mental health benefits.

Besides the relevant human–nature interactions, theories from the environmental psychology perspective, such as somatic interactions with nature, should also be taken into account in order to help to meet the physiological and biomechanical needs of more than 37 trillion individual and identifiable cells that ultimately define the structure and functions of an adult human body [64]. These types of interactions imply physical activity levels that most closely approximate the Paleolithic standard, for which our genetic makeup was originally selected [65]. Our genes were selected in a strenuous, demanding and diverse natural environment in order to enable our ancestors to survive and prosper. This was the result of a very vigorous lifestyle and the change from a very physically demanding lifestyle in a natural outdoor setting to an inactive indoor lifestyle forms the origin of many widespread non-communicable diseases that are endemic in our contemporary society [15]. Furthermore, because humans evolved to be active for the purpose of play or through necessity, efforts to promote physical activity will require diverse natural environments to nudge or even compel people to be active and that make physical activity fun [66].

Taking into account that the diversity of stimuli from the ecosystem settings depends on the structural and functional complexity of the abiotic and biotic components of the ecosystems, a prospective Health Potential Indicator (HPI) should be developed and supported through components based on the findings from surveys and from literature to connect the diversity of ecosystem settings with human senses. These settings can be divided into five components (Figure 2): geodiversity; biodiversity; weather and climate diversity; waterscape diversity; and biomechanical exposure diversity.

Figure 2. A methodological framework to ecosystems' health provision spectrum for geoparks.

Geodiversity can be defined as the natural range (diversity) of geological (rocks, minerals, fossils), geomorphological (landform, processes) and soil features [38,39]. It includes their assemblages, relationships, properties, interpretations and systems [67]. Even if the quantitative evaluation of geodiversity is a scientific topic in development, predictive models should be supported by means of quantitative analysis of geological and geomorphological components in order to contribute to a geodiversity index that is inferable by GIS analysis. Sites of Geological Interest and Areas of Special Landscape Interest should also be considered in the geological component. For instance, these models should take into account the theoretical contribution to the aesthetics literature and the practical implications for destination planning, branding and management created by Kirillova et al. [68]. Furthermore, they should consider the aesthetics-based classification of geological structures in outcrops developed by Mikhailenko et al. [69] that could augment restorative properties of recreational activities and thus, improve quality of life and health.

According to Hill et al. [70], biodiversity evaluation is the process of measuring the value of biodiversity components, such as the number of species present, the population of a species, a habitat or the sum of all such components within a given area or site. Quantitatively, biodiversity can be measured by a biodiversity index (such as the Shannon index and/or the Simpson index), which is a mathematical measure of species diversity in a given community based on the species richness (the number of species present) and species abundance (the number of individuals per species).

Considering that the weather and climate indicates the behavior of the atmosphere over different temporal and spatial scales with respect to its effects upon life and human activities, it appears to be reasonable to take into account climate characterization and a weather diversity index. This could possibly incorporate temperature, humidity, precipitation, cloudiness, brightness, visibility, wind, atmospheric pressure and so on.

A landscape in which a view of water bodies is a dominant feature (waterscape) has an added attractiveness conferred by those water bodies on the surrounding areas. However, there are several factors, such as coastal morphology and water quality, that can reduce attractiveness and therefore, the waterscape diversity [28]. Therefore, apart from the bathing water quality, a waterscape diversity index should take into account the multifunctional emerged and submerged structures (artificial and natural) that could provide coastal protection as well as the enhancement of water recreation features.

Biomechanical exposure diversity can be defined as the extent to which mechanical exposure entities differ [71]. Therefore, the biomechanical exposure diversity in an ecosystem can be defined as the extent to which the prospective ways of interacting physically or mechanically with the natural outdoor setting differ. As human bipedal locomotion is the natural way to access the natural environment, a biomechanical exposure diversity index should consider the gradient, tread texture (hard-packed dirt trails, soft dirt trails, loose surfaces, sandy trails, muddy trails, rocky trails, snow trails, etc.) and shape (presence of trees, stream, stones, and other obstacles) of the prospective natural surface trails.

To calculate the final result of the EHP, the approach suggested by some authors [72] for calculating the final result of the RPI can be adapted in order to consider the five components suggested by us. These components (geodiversity, biodiversity, weather and climate diversity, waterscape diversity and biomechanical exposure diversity) should be considered to have the same importance and could be aggregated using the procedure for building composite indicators [32].

2.2. Ecosystem's Health Opportunity (EHO)

On a continental or regional scale, RO takes into account the infrastructure that is in place to host or guide the visitors [27] (e.g., trails for hikers, cyclists, horse-riders, skiers, snowshoers, climbers and paddlers, visitor centers, resting places, parking's, camp grounds, watching platforms, etc.), and a similar approach could be taken with regard to the Ecosystem's Health Opportunity (EHO). However, on an ecological scale, we have to take into account the difficulty (or lower facility) experienced by people (with and without disabilities) when using these kinds of infrastructures. Because walking, hiking, and running constitute ideal physical activities to initiate a change in behavior, which is often needed to obtain health benefits, as they are accessible to all segments of the community and can be incorporated into daily routines. The use of trails for walking, hiking and running, which are also known as nature trails (NTs), has become very popular for a wide variety of users and purposes (professionals, recreational, health or educational purposes) and they are a crucial infrastructure to hold the ecosystem's HRs.

Therefore, we suggest that the EHO should be developed on an ecological scale and supported through components that go beyond the classification of the NT based on type, course conditions, slopes, marking, infrastructure support, and weather conditions among other aspects. Those components should provide information about the difficulty of motor execution and about the total biomechanical and physiological load on the participant during the completion of the course. At the end, the levels of difficulty should be directly indicated as a multiple of the difficulty of executing a certain horizontal nature trail, such as a trail of 5000 m, by following methodologies already published and applied using the energy equivalent and biomechanical load equivalent [73–75].

2.3. Obtaining the Ecosystem's Health Provision Spectrum (EHPS)

The final EHPS value should be obtained by merging the EHP and EHO and presenting the final result grouped into different classes. This should also consider previous data arrangements for representing continuous data from the EHP and EHO in logically defined classes. For that reason, three well-known statistical methods of data classification could be used: Equal Intervals, Quantiles and Natural Breaks. The Equal Intervals method considers the range of data values divided into intervals that are the same size. The Quantiles method can consider an equal quartile or an equal quintile distribution where data classification places 25% of the sample into each of four classes or 20% into each of five classes. The Natural Breaks method is developed to provide natural groups based on the data characteristics. This method has been previously suggested for mapping the recreational and aesthetic value of ecosystems [27].

3. Final Remarks

In any case, the conceptual and methodological frameworks suggested for accessing the EHPS naturally have several limitations that need to be solved in future works. Namely, future developments of the knowledge about the association between the five components of ecosystems settings diversity (geodiversity, biodiversity, weather and climate diversity, waterscape diversity and biomechanical exposure diversity) that have a specific link with human senses and could bring health benefits are needed. Those developments will help to redefine the methods to assess all five components of ecosystem settings diversity considered in the EHPS. On the other hand, the conceptual and methodological frameworks related to the EHO need future improvements. Future research is needed to improve the use of the energy equivalent and the biomechanical load equivalent in conjunction with recreational ecology. Furthermore, this needs to focus on developing new survey methods for assessing formal and informal trails or unsurfaced roads in the wilderness and backcountry settings [76] to promote healthy lifestyles.

4. Conclusions

During the 38th General Conference of UNESCO, the Member States ratified the creation of the International Geoscience and Geoparks Programme (IGGP) expressing the governmental recognition of the importance of managing outstanding geological sites and landscapes in a holistic manner. In this context, the suggested EHPS is consistent with UNESCO's priorities, especially with the IGCP and its motto "Geosciences in the Service of Society". Moreover, the holistic approach, whose current implementation is a requirement of the management entities of the territories classified as UNESCO Global Geoparks, implies that approaches should be able to address the social, environmental and economic dimensions of sustainable development. Thus, this reaffirms the founding principles of UNESCO. Therefore, the ecosystem's health provision on an ecological scale will be another important tool for the UNESCO Global Geoparks to assist with efficient management and to promote economic development, wellbeing and health.

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