

# RETHINKING WALKABILITY THROUGH UNIVERSAL DESIGN: AN ERGONOMICS-BASED FRAMEWORK FOR GREEN INCLUSIVE PATHWAYS IN NATURAL LANDSCAPES

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**KEYWORDS:** *Environmental ergonomics, Human-Centred Design, Human variability, Natural pathways, Universal Design, Walkability*

## ABSTRACT

In recent decades, the concept of walkability has been mainly developed in urban contexts through indicators focused on the physical and infrastructural characteristics of pedestrian spaces. In natural and peri-urban contexts, however, the use of pathways is influenced by greater morphological, environmental, and experiential variability, making it necessary to rethink walkability from an inclusive perspective. This contribution proposes a critical reinterpretation of walkability in natural contexts, understanding it as the dynamic outcome of the interaction between individuals, the environment, and conditions of use, in line with an ergonomic and Environment and Human-Centred Design approach. The methodology is based on the analysis of paradigmatic user profiles and on the identification of physical, sensory-perceptual, and cognitive barriers that affect the use of natural pathways. These profiles are not intended as exhaustive categories, but as representative cases that help to make the complexity of person-environment interaction more explicit. Through a synthesis of recurring functional manifestations, the contribution highlights how difficulties such as physical fatigue, disorientation, reduced environmental legibility, and cognitive overload emerge transversally across different user profiles. Within this framework, Universal Design principles are used as a conceptual support to guide the identification of shared functional requirements, without prescriptive intent. The study is positioned as an exploratory contribution to the debate on inclusive walkability, offering a conceptual framework that may support future methodological developments, evaluation tools, and design processes that are more attentive to human diversity and overall well-being in natural environments.

## INTRODUCTION

Over the last two decades, many studies have examined the effects of the built environment on pedestrian mobility within cities. The need to understand how appropriate urban areas are for walking has led to the development of definitions and metrics for evaluating walkability (Telega et al., 2021). The literature identifies around 80 indices for measuring walkability, referring to objective characteristics of the urban environment, users' perceptions, or a combination of both, at both neighborhood and city scales (Gargiulo et al.,

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2021). More recently, walkability has been linked to health, highlighting the relationship between pedestrian use and an ergonomic approach to spatial design. Urban health does not depend only on physical or infrastructural features, but mainly on the interactions between people and the built environment (Appolloni et al., 2020). In this context, natural elements, although associated with evidence-based health benefits (Hartig et al., 2014; Markevych et al., 2017), are still mostly considered through quantitative and spatial indicators (Francis et al., 2012). Indicators such as green space per capita, proximity to parks and gardens, or distance from ecological corridors and water bodies are useful in urban settings; however, they don't consider the morphological, perceptual, and sensory qualities of natural landscapes. These limitations become more evident when peri-urban areas, regional parks, or large natural environments are considered, where pedestrian use depends on more complex person-environment interactions. According to the WHO's International Classification of Functioning (ICF) (2001), disability results from the interaction between individual characteristics and contextual factors. Anyone may experience temporary or permanent conditions of vulnerability, latent or evident, that can cause discomfort and increase exposure to risk (Magarò, 2019). Therefore, making natural heritage accessible through inclusive interventions does not concern only people with certified disabilities, but a wide and diverse part of the population. From an applied perspective, evidence from national initiatives such as the Progetto Parchi Accessibili confirms a growing interest in inclusive access to natural environments, while also highlighting an uneven adoption of strategies for the design and management of green pathways (Solinas, 2004). Within this framework, this contribution, developed as part of the PNRR research project Cultural Heritage Active Innovation for Sustainable Society (CHANGES), aims to extend urban-centered walkability metrics through a methodological approach based on Ergonomics and Universal Design principles. The approach connects the physical, sensory, and cognitive characteristics of different user profiles with the requirements needed to support broader and more inclusive pedestrian use in natural contexts

## BACKGROUND

Although natural areas are often characterized by morphological and infrastructural conditions that limit accessibility, due to physical, sensory-perceptual, and cognitive barriers, national and international regulations remain fragmented and lack shared and consistent references. For this reason, several public and private institutions, operating in different national contexts, have developed operational documents that pursue similar goals but adopt heterogeneous approaches and levels of detail (Mantuano & Bruno, 2025; Godtman & Ioannides, 2019). A comparative critical review of existing guidelines was conducted (Figure 1), focusing on documents developed in the United Kingdom (1997-2005), Sweden (2005), the United States (2012), Italy (2018), Ireland (2018), and Greece/Bulgaria (2019). These documents were identified through institutional sources and references in the scientific literature. They were selected as representative of different geographical contexts and design approaches, with the aim of highlighting recurring principles, methodological differences, user groups addressed, technical contents, and shared limitations.

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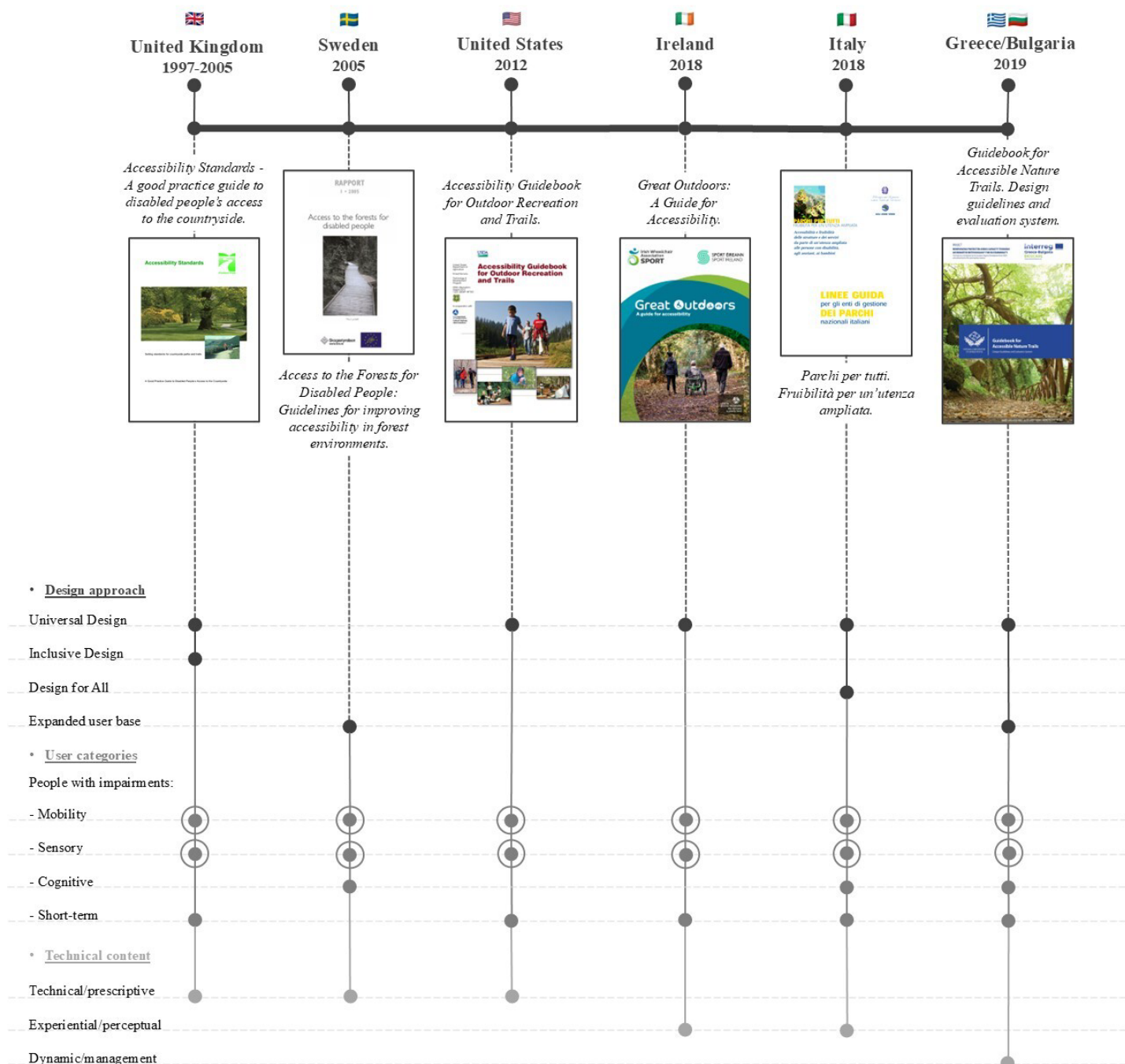


Figure 1. Comparative timeline of national guidelines and good practices for accessibility in natural and peri-urban environments

The analysis reveals significant cultural differences in the way accessibility is framed, starting from the titles of the documents themselves. In the United Kingdom and Swedish guidelines, explicit references to people with disabilities indicate a clear focus on specific user groups. This reflects a sector-based and compensatory approach, where accessibility is still mainly conceived as a response to particular needs. In contrast, more recent documents, such as those from Ireland and Italy, avoid explicit references to disability in their titles, shifting the focus from individual deficits to the diversity of user experiences and the possibility for everyone to engage with natural environments. In this perspective, accessibility is no longer treated as a special provision, but as an ordinary and expected quality of natural spaces. An intermediate position is represented by the Greece/Bulgaria guide, where the term “accessible” is

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retained but framed in operational and evaluative terms rather than identity-based ones. Overall, this shift from disability-focused terminology to more universal formulations reflect the consolidation of an approach in which accessibility is increasingly understood as an environmental, social, and landscape quality, capable of ensuring equal opportunities for interaction with nature. Another relevant aspect concerns the design approaches adopted in the reviewed documents. Most guidelines explicitly refer, to different extents, to Universal Design (UD), Design for All (DfA) or Inclusive Design (ID). However, these concepts are sometimes reduced to terminological frameworks rather than applied as concrete operational tools. This limitation also affects the way user profiles are represented. There is a widespread tendency to focus primarily on motor and sensory impairments (visual and auditory), while cognitive diversity and neurodivergence receive limited attention. Although occasionally mentioned, these conditions are rarely explored in depth or translated into specific design or communication strategies. From a technical perspective, the guidelines from the United Kingdom, Sweden, and the United States adopt a predominantly prescriptive approach, characterized by regulatory language and a strong focus on measurable parameters. These include walking surface characteristics, path widths and narrowing points, longitudinal and transversal slopes, distances between resting areas, maximum level changes, steps and thresholds, surface interruptions, path edges, bridge and boardwalk dimensions, mesh sizes of perforated surfaces, and the characteristics of barriers and gates. The main objective is to define measurable standards that ensure consistency and replicability. However, this approach tends to prioritize technical compliance over experiential quality. In particular, perceptual and cognitive dimensions are rarely addressed, reducing accessibility to a set of physical requirements rather than an integrated concept of usability. In contrast, the Irish and Italian guidelines introduce a more experiential and perceptual perspective, where technical aspects are combined with attention to human experience and interaction with the natural environment. In the Italian case, multisensory experience, environmental legibility, perceived safety, and comfort play a central role. Accessibility is no longer limited to the removal of physical barriers but is understood as an environmental quality that supports well-being, autonomy, and inclusive use of natural areas. Nevertheless, even in these cases, the operational translation of such principles remains partial, with a limited number of tools or indicators available to systematically assess perceptual and cognitive aspects. The Greece/Bulgaria document, while maintaining a functional approach, promotes a more dynamic and management-oriented perspective, focused on maintenance, monitoring, and continuous improvement. It introduces an evaluation system based on quantitative and qualitative indicators organized into seven categories covering the entire user experience: access and connections, route layout, surfaces, safety and barriers, resting areas and facilities, signage and information, and cognitive and perceptual comfort. The overall score allows paths to be classified into three levels of accessibility. Overall, the review highlights the need to overcome the traditional separation between technical prescriptions and experiential dimensions, recognizing human diversity as a design resource rather than a condition to be compensated for. Accessibility is still often interpreted mainly in terms of removing physical or sensory barriers, while perceptual, cognitive, and relational dimensions, crucial for inclusive enjoyment of natural environments, remain underexplored.

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## METHODS

The methodology adopts an Environment and Human-Centred Design approach, aiming to manage the complexity of the relationships between individuals, systems, and activities (Attaianese, 2016). It integrates users' characteristics and use-related needs with the expected performance of technological, spatial, and environmental systems. In a first phase, three paradigmatic user profiles were identified. These profiles are considered representative because they interact with the environment in different ways. Through these models, it is possible to interpret the complexity of use conditions and to analyse how different types of environmental barriers affect the walking experience in natural contexts. In a second step, each profile is associated with specific characteristics and use-related needs emerging from an ergonomic analysis of person–environment interaction. This approach allows moving beyond an interpretation based solely on individual limitations, shifting the focus toward environmental conditions that facilitate or hinder action, orientation, and spatial understanding. To translate these needs into design-oriented guidance, the methodological framework integrates the principles of Universal Design, which are adopted as a conceptual reference. Universal Design is used to relate the identified interaction patterns to design criteria capable of addressing, in a transversal way, the variability of human conditions. Finally, to make overlaps between different vulnerability conditions explicit, the method introduces a matrix of recurring manifestations and behaviours. This matrix highlights shared person–environment interaction patterns and provides the basis for identifying a set of requirements for the design and evaluation of natural pathways.

## RESULTS

Since defining user profiles in a comprehensive way is particularly complex, an interpretative framework is proposed [Table 1] to highlight the relationship between three paradigmatic need-based profiles, corresponding to three types of environmental barriers, and the seven principles of Universal Design.

Barrier category	Paradigmatic user profiles	Use-related needs	UD principles
Physical	People with: – mobility impairments using manual or powered wheelchairs.	Route continuity; propulsion effort; surface stability.	(UD1) Equitable Use (UD6) Low Physical Effort (UD7) Size and Space for Approach and Use
Sensory, perceptual and communicative	– total visual impairments using a long cane or guide dog; – partial visual impairments; – hearing impairments.	Environmental legibility; orientation; perceptual continuity; multisensory information.	(UD1) Equitable Use (UD2) Flexibility in Use (UD4) Perceptible Information (UD5) Tolerance for Error
Cognitive	– age-related cognitive impairments; – neurodiversity.	Predictability; coherence; cognitive load reduction; stimulus management.	(UD1) Equitable Use (UD3) Simple and Intuitive Use (UD4) Perceptible Information (UD5) Tolerance for Error

Table 1. Relationship between barrier categories, paradigmatic user profiles, use-related needs, and Universal Design (UD) principles

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## PHYSICAL BARRIERS

Physical barriers refer to environmental characteristics and elements that may

cause discomfort for pedestrian mobility in general, and in particular for individuals with reduced or impaired motor abilities, whether permanent or temporary. The analysis of these profiles allows the assessment of walkability conditions in natural paths in relation to route characteristics and the physical effort required for propulsion. In this sense, physical barriers include obstacles that affect not only physical well-being but also the safety of the walking experience, as they may induce potentially unsafe behaviours aimed at overcoming them. Typical examples include uneven walking surfaces and materials, excessive slopes, the presence of obstacles along paths, unfavourable microclimatic conditions, level changes (steps, edges, height differences, stairs), as well as the absence of connecting ramps and narrow passage spaces. The use-related needs associated with physical barriers mainly concern route continuity, surface stability, and the reduction of physical effort during walking. In relation to these needs, several Universal Design principles are particularly relevant, namely Equitable Use, considered a transversal principle across different barrier categories; Low Physical Effort, referring to the minimization of required effort; and Size and Space for Approach and Use, related to access and manoeuvrability conditions along the path.

## **SENSORY-PERCEPTUAL AND COMMUNICATIVE BARRIERS**

Sensory-perceptual and communicative barriers refer to the absence or inadequacy of measures, signage, and support elements that enable users to perceive relevant environmental information for safe and effective use, such as the presence of essential or hazardous objects, level changes, and route variations (Roveredo, 2024). These barriers primarily affect individuals for whom the use of one or more sensory channels is difficult or impossible, with particular reference to visual and auditory impairments. By contrast, limited attention has been paid to alterations involving other sensory channels, such as taste, smell, and touch. Beyond requirements related to orientation, safety, and comfortable usability, inclusive use of natural paths also depends on environmental communicability, understood as the ability of spatial elements and facilities to be perceivable and understandable by all users, and especially by people with sensory or cognitive difficulties (Lauria, 2002). The degree of communicability is influenced by the presence of intentional environmental cues, arising from spatial layout, typological systems, or dedicated informational aids, as well as by unintentional environmental cues, such as natural or built landmarks and reference lines. However, in natural contexts, the reliability of such cues may change over time, making orientation more complex and uncertain.

## **COGNITIVE BARRIERS**

Cognitive barriers include typological, technological, or organizational elements of a spatial system that hinder use or represent a source of risk because they lead to an inadequate understanding of information related to comfortable usability. They constitute an obstacle to the process of knowing and interpreting the environment, as they fail to adequately meet users' needs for orientation, safety, and information, interfering with processes of memory, reasoning, and interpretation (AA.VV., 2014). From this perspective, cognitive barriers also include spatial conditions that alter proxemics and multisensory aspects of perception, proprioception, and kinaesthesia, affecting users' ability to understand and anticipate spatial organization. These barriers take different forms depending on the variability of individual conditions, which may be related to mental and experiential factors, also in connection with physical and

sensory limitations, as well as to forms of neurodiversity, whether typical or atypical. Recurring examples include inadequate physical, technical, or environmental control, such as inconsistent acoustic or lighting solutions, as well as the absence of appropriate informational strategies resulting from morphological or material choices that make spatial understanding difficult. Such conditions influence environmental perception in terms of light and sound reflection or absorption, color schemes, textures, and spatial configuration, producing effects of spatial compression or expansion and generating difficulties in spatial and social interaction (Conti, 2019). The use-related needs associated with cognitive barriers mainly concern environmental predictability, information coherence, simplification of informational content, management of sensory stimuli, and reduction of cognitive load. In relation to these needs, several Universal Design principles are particularly relevant, including Equitable Use, as a transversal principle ensuring equal conditions of understanding and use; Simple and Intuitive Use, referring to ease of environmental interpretation; Perceptible Information, supporting clarity and legibility of information; and Tolerance for Error, aimed at reducing the negative consequences of misunderstandings or unintended actions. In this sense, attention to cognitive barriers allows moving beyond the traditional focus, widely found in the literature and international guidelines, on mobility and sensory impairments, extending the analysis toward a more articulated understanding of person-environment interaction. Within this framework, the association between environmental barriers, use-related needs, and Universal Design principles does not aim to define specific design solutions, but rather to guide the identification of functional requirements for the inclusive use of natural pathways. Since these needs cannot be uniquely attributed to single user profiles but may emerge across different conditions, the profiles considered assume a paradigmatic value. Accordingly, Table 2 summarizes recurring functional manifestations in the use of natural paths, highlighting overlaps and shared patterns of person-environment interaction that provide the basis for identifying transversal functional requirements.

Relevant manifestations for use	Mobility impairment	Visual impairment	Hearing impairment	Cognitive decline	Neurodiversity
Physical fatigue during walking	✓			✓	
Spatial orientation difficulties		✓		✓	✓
Reduced environmental legibility		✓	✓	✓	✓
Difficulties in information processing				✓	✓
Need for high route predictability	✓			✓	✓
Sensitivity to sensory stimuli					✓
Difficulties in information communication			✓	✓	✓
Reduced perception of environmental risks		✓		✓	
Cognitive overload in complex environments				✓	✓

Table 2. Recurring functional manifestations in natural pathway use across the considered paradigmatic profiles.

## CONCLUSIONS

This contribution has proposed a critical reinterpretation of the concept of walkability in natural and peri-urban contexts, shifting the focus from the mere

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measurement of the physical performance of paths toward a broader and more systemic understanding of inclusive use. From this perspective, walkability is not considered only as a geometric or infrastructural property of a route, but as the dynamic outcome of the interaction between individuals, the environment, and conditions of use, in line with an ergonomic and human-centred approach. The analysis of physical, sensory-perceptual, and cognitive barriers has highlighted that difficulties in use cannot be attributed to single user categories, but rather emerge transversally across the life course, in the presence of permanent, temporary, or situational impairments, as well as under conditions of fatigue, cognitive decline, or neurodiversity. In this sense, the identified profiles assume a paradigmatic rather than categorical value, allowing vulnerabilities to be interpreted as recurring functional conditions rather than as static individual attributes. The synthesis presented in Table 2 shows that manifestations such as physical fatigue, orientation difficulties, reduced environmental legibility, and cognitive overload are distributed across different user profiles. This evidence suggests the need to define shared functional requirements rather than sector-specific design solutions. Within this framework, the association between barrier categories, use-related needs, and Universal Design principles is not intended to provide prescriptive answers, but to guide decision-making processes toward performance-oriented criteria capable of supporting equitable, continuous, and safe use of natural pathways. These considerations are consistent with findings from recent international literature. In particular, the systematic literature review by Gupta et al. (2025) highlights that the application of Universal Design in public open spaces is often fragmented, mainly focused on physical accessibility, and only partially extended to the cognitive, perceptual, and communicative dimensions of use. Similarly, the review emphasizes that the effectiveness of Universal Design principles depends on their integration from the early stages of the design process and on their adaptation to specific territorial, cultural, and environmental contexts, rather than on their application as mere normative standards. Within this perspective, the present work contributes to the ongoing debate by proposing a conceptual shift from accessibility assessment as a compliance requirement toward the definition of inclusive use as an intrinsic dimension of environmental quality. This implies recognizing route continuity, multisensory legibility, spatial predictability, and cognitive load management as relevant components of walkability, especially in natural contexts characterized by greater morphological and environmental variability. Finally, this contribution suggests that the design of accessible natural pathways can hardly be addressed through isolated technical checklists alone but instead requires an integrated approach capable of combining Universal Design, Design for All, and ergonomic knowledge within a performance-based and use-oriented framework. In this direction, the identified functional requirements represent a possible reference base for the development of evaluation tools and design-support processes aimed at promoting more inclusive natural environments and enhancing overall user well-being.

## ACKNOWLEDGEMENTS

This article is part of a research activity conducted within the CHANGES project “Cultural Heritage Active Innovation for Sustainable Society”, PE5 “Humanities and cultural heritage as laboratories of innovation and creativity”, Spoke 1 - Historical Landscapes, Traditions and Cultural Identities. MUR project code: PE00000020 - CUP: E53C22001650006.

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## REFERENCES

- AA.VV. (2014). *DSM 5. Manuale diagnostico e statistico dei disturbi mentali*, American Psychiatric Association. Milano: Raffaello Cortina.
- Appolloni, L., Giretti, A., Corazza, M. V. et al. (2020). Walkable Urban Environments: An Ergonomic Approach of Evaluation. *Sustainability*, Vol. 12(20), 8347. DOI: 10.3390/su12208347.
- Attaianese, E. (2016). Increasing Sustainability by Improving Full Use of Public Space: Human Centred Design for Easy-to-Walk Built Environment. In: Rebelo, F., Soares, M. (eds) *Advances in Ergonomics in Design. Advances in Intelligent Systems and Computing*, vol 485. Springer, Cham.
- Attaianese, E., Tosi, F., & Steffan, I. T. (2021, May). From accessibility to inclusion in people centered design. In *Congress of the International Ergonomics Association* (pp. 357-366). Cham: Springer International Publishing.
- Conti, C. (2019). "Architettura per l'autismo. La funzione abilitante delle superfici negli ambienti domestici" in Baratta, A.; Conti, C.; Tatano, V. (a cura di), *Abitare Inclusivo. Il progetto per una vita autonoma e indipendente*. Conegliano: Anteferma, pp. 14-17.
- Francis, J., Wood, L. J., Knuiman, M., & Giles-Corti, B. (2012). Quality or quantity? Exploring the relationship between Public Open Space attributes and mental health in Perth, Western Australia. *Social science & medicine*, 74(10), 1570-1577.
- Gargiulo, C., Gaglione, F., Zucaro, F. (2021). Urban Accessibility and Social Equity in Covid-19 Era: A Spatial Analysis in Two Neighbourhoods of the City of Naples. *Computational Science and Its Applications - ICCSA*, pp 509-524. DOI: 10.1007/978-3-030-87016-4\_37.
- Godtman Kling, K., & Ioannides, D. (2019). Enhancing accessibility in tourism & outdoor recreation: A review of major research themes and a glance at best practice.
- Gupta, A., Yadav, M., & Nayak, B. K. (2025). A Systematic Literature Review on Inclusive Public Open Spaces: Accessibility Standards and Universal Design Principles. *Urban Science*, 9(6), 181. <https://doi.org/10.3390/urbansci9060181>.
- Hartig, T., Mitchell, R., De Vries, S., & Frumkin, H. (2014). Nature and health. *Annual review of public health*, 35(1), 207-228.
- Irish Wheelchair Association Sport (IWA-Sport). (2018). *Great outdoors: A guide for accessibility*. Dublin, Ireland: National Disability Authority. <https://www.sportireland.ie/sites/default/files/2019-10/great-outdoors-a-guide-for-accessibility.pdf>
- Lauria, A. (2002). "La comunicatività ambientale", *Paesaggio Urbano*, 1, pp. 33-38.
- Lundell, Y. (2005). Access to the forests for disabled people. *Rapport/Skogsstyrelsen*, (1). Sweden. [https://pub.epsilon.slu.se/4608/1/Rapport\\_2005\\_1.pdf](https://pub.epsilon.slu.se/4608/1/Rapport_2005_1.pdf)
- Magarò, A., Baratta, A., & Finucci, F. (2020). Intelligent Domestic Ecosystems: innovative housing models for fragile elderly. *European Journal of Creative Practices in Cities and Landscapes*, 3(2), 73-91.
- Mantuano, A., & Bruno, F. (2025). Classification of Hiking Difficulty Levels of Accessible Natural Trails. *Sustainability*, 17(13), 5699.
- Markevych, I., Schoierer, J., Hartig, T., Chudnovsky, A., Hystad, P., Dzhambov, A. M., ... & Fuertes, E. (2017). Exploring pathways linking greenspace to health: Theoretical and methodological guidance. *Environmental research*, 158, 301-317.
- Ministero dell'Ambiente e della Tutela del Territorio - Direzione per la Conservazione della Natura, & ACLI Anni Verdi. (2003). *Parchi per tutti. Fruibilità per un'utenza ampliata. Linee guida per gli enti di gestione dei parchi nazionali italiani*. Editoriale AESSE. Italia. [https://www.mase.gov.it/portale/documents/d/guest/dpn\\_linee\\_guida\\_parchi-pdf](https://www.mase.gov.it/portale/documents/d/guest/dpn_linee_guida_parchi-pdf)
- National Confederation of Disabled People. (2019). *Guidebook for accessible nature trails: Design guidelines and evaluation system*. Interreg Greece/Bulgaria Programme. [https://old-2014-2020.greece-bulgaria.eu/gallery/Files/PROJECT%20DELIVERABLES/BIO2CARE/D\\_4\\_5\\_2\\_Pathways-for-recreational-purposes-and-bird-watching-for-handicapped-and-disabled-\(GUIDEBOOK\)\\_EN.pdf](https://old-2014-2020.greece-bulgaria.eu/gallery/Files/PROJECT%20DELIVERABLES/BIO2CARE/D_4_5_2_Pathways-for-recreational-purposes-and-bird-watching-for-handicapped-and-disabled-(GUIDEBOOK)_EN.pdf)
- Roveredo, L. (2023). *Barriera senso-percettiva*. In A. F. L. Baratta, C. Conti, & V. Tatano (Eds.), *Manifesto lessicale per l'accessibilità ambientale. 50 parole per progettare l'inclusione* (pp. 108-113). Anteferma Edizioni.
- Solinas, M. (2004). *Accessibilità e fruibilità delle aree naturali protette*. Roma: Gangemi Editore.
- Telega, A., Telega, I., Bieda, A. (2021). Measuring walkability with GIS-methods overview and new approach proposal. *Sustainability*, 13(4), 1883.
- The Fieldfare Trust. (1997). *Accessibility standards - Setting Standards for Countryside Paths and Trails. A good practice guide to disabled people's access to the countryside* (BT Countryside for All Standards). The Fieldfare Trust Ltd. United Kingdom. [http://www.eau.ee/~bell/Recreation\\_course%2020089/Countryside%20for%20All/Accessibility%20Standards.pdf](http://www.eau.ee/~bell/Recreation_course%2020089/Countryside%20for%20All/Accessibility%20Standards.pdf)

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- WHO (2001). "ICF Introduction. Ginevra (CH): World Health Organization". [www.who.int/standards/classifications/international-classification-of-functioning-disability-and-health](http://www.who.int/standards/classifications/international-classification-of-functioning-disability-and-health).
- Zeller, J., Doyle, R., & Snodgrass, K. (2012). Accessibility guidebook for outdoor recreation and trails. United States. Available to: <https://www.americantrails.org/resources/accessibility-guidebook-for-outdoor-recreation-and-trails>

## SHORT BIO

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