



## Accessibility indicator for a trails network in a Nature Park as part of the environmental assessment framework



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### ABSTRACT

The natural heritage of parks is an important resource within the framework of sustainable development. Plans, projects and activities concerning park management form the basis for evaluations that rely on indicator systems to keep the evolution of pressure factors and the conditions of habitats and protected species under control. The aim of this study is to contribute to the provision of tools to analyse and evaluate the social impact of a Nature Park in terms of the accessibility and usability for all of the network of pedestrian paths within it.

The study proposes an analysis methodology and an indicator of the “environmental accessibility of the pedestrian network” which enables us to measure some aspects of accessibility such as: the ease of getting around, comfort and security for all types of users, with the maximum degree of autonomy improving the quality of the visitor's experience of the park.

A spaces configuration and performance based analysis methodology was used, and the ‘accessibility for all’ indicator was developed in relation to the conduct of users, based on expert knowledge and the involvement of stakeholders. The results are highlighted using maps.

There is still a long way to go before methodologies and operational procedures for this type of accessibility analysis can be set out, and the case studies research can provide an important contribution. The article reports on the application of the proposed methodology to the case study of the natural park of Migliarino, San Rossore and Massaciuccoli in Tuscany (Italy).

## 1. Introduction

### 1.1. Environmental and social sustainability of natural parks

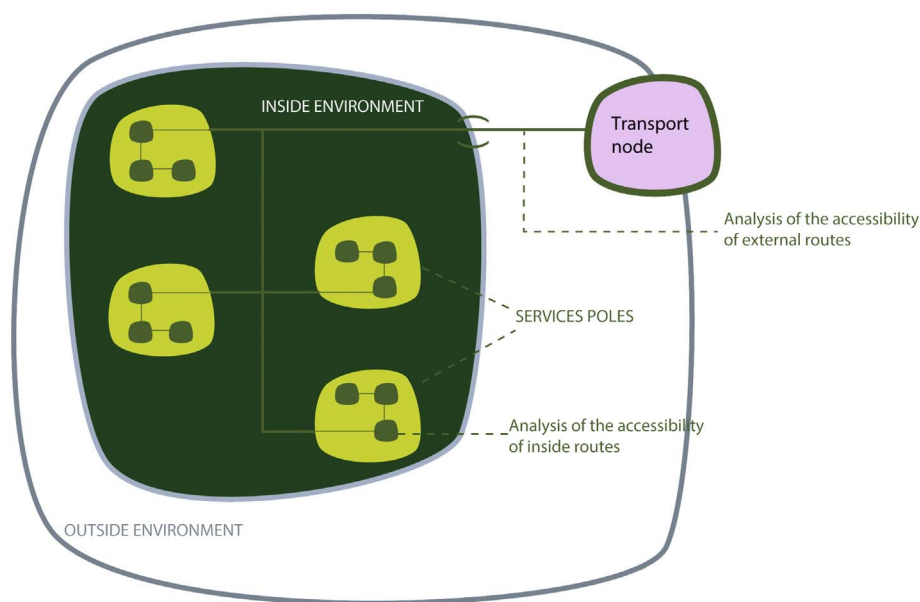
The natural heritage of parks is an important resource within the framework of sustainable development at both global and local level. The environmental approach to sustainable development has had the virtue of highlighting the naturally available resources representing the natural capital, in an economy that assigns nature the capacity to provide ecosystem services for development (Costanza et al., 1997; Millennium Ecosystem Assessment, 2005; Kareiva et al., 2011) and from this perspective it should be both protected and enhanced. Since the 1960–70s the environmental culture has promoted a vision aimed at protecting the eco-compatibility of economic growth (Carson, 1962) and promoting the enhancement of environmental systems that produce biodiversity and biocapacity (IUCN UNEP WWF, 1980). However, from the end of the twentieth century and with the start of the twenty-first the issue of sustainable development saw social aspects resurface,

United Nations in 2000 adopted the Millennium Development Goals (A/RES/55/2, 2000) already detailed in the Brundtland report (WCED, 1987), to be understood not only as a social consequence of environmental transformations. The social issue has placed increasing attention not only on the global but also the local dimension of the natural capital (landscape, territory) and ecosystem services (ground, air, water, food) causing the environmentalist culture and the regional planning culture to converge (Magnaghi, 1998) into the concept of nature as capital, as an asset to be enhanced, capable of producing ecosystem services, and as a heritage, an asset available to society (Dale et al., 2001). The ecosystem services also include cultural, aesthetic, spiritual, educational and recreational ones (Millennium Ecosystem Assessment, 2005)<sup>1</sup> and, as argued by Burkhard et al. (2012) as concerns the Salza Message (2010) on “Sustaining natural capital and ecosystem services,” the ecosystem services must also be assessed from a social and economic point of view. The social aspect and its dimension, even local, require us to consider the “system of players” present in the region (Moine, 2006).

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<sup>1</sup> Millennium Ecosystem Assessment Reports 2005 Global Assessment, Chapter 1 MA Conceptual Framework p.29: “Cultural services are the non-material benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experiences.”



**Fig. 1.** The boundaries of the system. The boundaries of the system observed are defined by: external transport and external access hubs, internal points of interest, internal paths network, and the external paths complementing the circuits or for pedestrian access.

**Table 1**

Distance and travel time along a path for different types of users based on the type and degree of ability and the aids they use. The bibliographic sources consulted are: (1) Aragall and Sagramola, 2003; (2) Gates et al., 2006; (3) Knoblauch et al., 1996.

Type	m/s	Source	km/half day	km/day
Excursionist walker	1.05	Bibliographic <sup>(2)</sup> <sup>(3)</sup>	11.3	22.6
Excursionist on electric wheelchair	1.15	Bibliographic <sup>(1)</sup>	12.4	24.8
Excursionist on wheelchair	0.75	Bibliographic <sup>(1)</sup>	8.1	16.2
Excursionist expert walker	1.30	Bibliographic <sup>(2)</sup> <sup>(3)</sup>	14.0	28.0
Blind with guide dog	0.82	Test measurement	8.85	17.7
Blind with assistant	0.70	Test measurement	7.5	15
Blind with stick	0.49	Test measurement	5.3	10.6
Person on electric wheelchair	1.01	Test measurement	10.92	21.84
Person on wheelchair	0.81	Test measurement	8.8	17.6

In the context of natural capital and ecosystem services, heritage represented by a protected area, according to the IUCN (International Union for Conservation of Nature) definition, is represented by “a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.” (Dudley, 2008:8).

Protected areas are internationally classified by IUCN to take account of biodiversity values alongside social and economic values, in particular for the most directly affected communities (IUCN, 2017). According to both the IUCN classification and other classifications, for example that of MAB UNESCO (UNESCO, 2017), a fundamental distinction is made between a nature reserve and wilderness area on the one hand and, on the other, areas where sustainable use and management of the resources is possible. In the latter, the organization that manages the Park has the task of protecting the natural heritage and at the same time also providing services to enhance the park for its users and the local community. An important prerequisite of this aspect is the accessibility and usability of some parts of the park itself, without coming into conflict with habitat and species conservation, ensuring that individuals and the local community are able to make use of it as local property and as a common good for the benefit of humans and personal health, personal well-being, and social well-being.

### 1.2. Background and research questions

Plans, projects and activities concerning park management already form the basis for evaluations, for instance the assessment of the impact they could have on the integrity of habitats and species (in the EU see Habitats Directive 92/43/EEC and Directive 2009/147/EC) or those conducted within the environmental management systems of the parks themselves (Ielasi et al., 2003; ENEA, 2001). These evaluations use indicator systems to keep the evolution of pressure factors and the conditions of habitats and protected species under control, in order to define conservative, improvement, compensatory or recovery-oriented management strategies, but also for the environmental evaluation of the service and production activities going on within the park (Gondran, 2012). Some of these indicators concern actions aimed at using the protected area, as proposed by tools and indicators known as the “internal road network” or “trial accessibility” (Ielasi et al., 2003; Clius et al., 2012; Torricelli, 2015), going on to contemplate specific aspects of the social management of a park.

Within this framework of environmental and social evaluation, the research outlined below proposes the development of a methodology to analyse the pedestrian trail network inside a park capable of developing an “environmental accessibility of the network” indicator. The European Disability Strategy 2010–2020 defines Accessibility “as meaning that people with disabilities have access, on an equal basis with others, to the physical environment, transportation, information and communications technologies and systems (ICT), and other facilities and services.” So the environment, hence the use of the term ‘environmental accessibility,’ plays an important role in enabling everyone to identify, reach, understand and use the places and services in comfort and security (EC, 2010; Lauria, 2017; Aragall, 2003). The accessibility of public spaces intended for recreational activities, and in particular of natural parks in areas where use is admitted, is an important component in the context of equal opportunities, human rights, and the security and well-being of people (Rapley, 2013; Farrington, 2007). “Accessibility within a park” (Levi Sacerdotti et al., 2010) has to do with performances such as: the ease of getting around, comfort and security for all types of users, with the maximum degree of autonomy possible for everyone, improving the quality of the visitor's experience of the park. The aim is to overcome a vision of standard accessibility, or vice versa comprised of special measures for specific users (AA.VV., 1988; MATTM, 2003), and to provide tools to analyse and assess the social impact of parks in terms of accessibility and usability for all

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