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UNIVERSITÀ DI ROMA

**A COMBINED APPROACH BASED ON ECOSYSTEM
SERVICES AND ENVIRONMENTAL JUSTICE:
THE CASE STUDY OF CIRCEO NATIONAL PARK, ITALY**

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To Gilberto, my family, and all the people who believed in me and supported my work.

"Nature is not a visiting place. It is home."

(Gary Snyder)

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PREFACE

The story of this doctoral thesis started less than three years ago, when I was finishing the exams for my first Ph.D. year. From the last years of my university carrier, I was already detached from the general economic concepts and ideals to embrace a more environmental vision. At the end of the exams, I was unsure of what direction my thesis would take, until I discovered the Ecosystem Services (ES) literature. At the same time, I was attracted and irritated by it. I liked its original idea of connecting the ecosystems to people's well-being and making visible this link. However, I felt opposed to continuous attempts to translate this relation in economic terms. I found that different authors criticized the ES literature for having made the nature an economic subject. Moreover, other authors disapproved of the aggregated and homogenous idea of ES, which failed to consider the heterogeneity of society. One question turned in my mind: where was the relationship between people and nature if the society itself was not considered in the valuation of the ES? In the meantime, I discovered the Environmental Justice (EJ) literature: a concept that emerged out of the social movements in the United States in the early 1980s focused on the fair distribution of environmental benefits and risks. It developed as an interdisciplinary body of social science literature, evolving the idea of justice in three main dimensions: the fair distribution of environmental risks and benefits; the recognition of community differences; and the equitable participation in environmental decision-making.

The two literatures seemed to focus on two distinct aspects of the environment: the original idea of EJ revolved around the negative health impacts of environmental degradation and pollution, while ES highlighted the benefits of ecosystems. And if there was something capable of uniting them? Indeed, EJ was also about environmental benefits and related to the recognition of people differences and inclusion of diverse people's perspectives. So EJ could help ES in considering the social heterogeneity and giving another key of reading for the environmental governance. But in which way and to what extent?

At that point, I started an analysis of both literatures, reviewing them in order to create an analytical approach by integrating aspects of EJ in ES. Sources included books, papers, information from seminars and online courses and conference presentations. The literature review was useful for understanding EJ theories, as applied to ES. In this phase, I discovered that the distributive dimension of EJ was not only about the negative impacts on human health, but it also concerned the distribution of benefits, costs, access, responsibilities or compensations of ES among different individuals or social groups. The recognition dimension could help identify social and cultural differences and minority groups related to ES and procedural justice could support the comprehension of the roles of different stakeholders in decision-making and management procedures related to ES. Moreover, the literature analysis showed the birth of other EJ concepts correlated to ES (commutative, retributive, restorative, intragenerational, intergenerational and interspecies justice) and the interconnections among different dimensions. In the end, the review made clear that all EJ dimensions were essential for the environmental governance of ES.

In October 2018, I participated in the Ecosystem Services Partnership (ESP) Regional Conference 2018. There I met a research group from the Institute of Environmental Science and Technology (ICTA), *Universitat Autònoma de Barcelona* (UAB) in Barcelona, Spain, focused on my same topic, but in an urban context. I decided to spend my visiting period with them and, at the end of April 2019, I went to ICTA as a visiting researcher. There, I started a collaboration with another Ph.D. student and we realised a systematic review about ES and justice, in a more general sense. The systematic review aimed to investigate how the scientific literature about ES and justice has evolved over time, which trends it has followed and how different approaches of ES and justice have been used in real-world applications. We used two search engines and searched for papers that explicitly mentioned the concepts “ecosystem services” and “justice” or “equity” or “fairness”, in their title, abstract, or keywords. We conducted a screening of abstracts in order to classify the potentially relevant papers and to analyse the number and type (conceptual, review, or empirical) of publications, the geographical distribution and scale of case studies analysed, the ES and justice dimensions investigated and the governance contexts explored. The systematic review showed a conspicuous interest of ES and justice combined matters in the last years, but it also identified some gaps in the academic research. From the ES perspective, few studies considered provisioning or cultural and social ES. Moreover, most studies still leaned towards an economic focus, considering compensatory measures of ES. From the justice perspective, still few studies explored recognition issues, confirming the prominence of the distributional and procedural dimensions. Consequently, the systematic review allowed the identification of relevant search roads for the future.

Simultaneously, I decided to apply an ES and EJ approach to a case study. The main goal was to reveal and understand procedural, distributional and recognitional injustices, related with the environmental governance of ES. The case in question is Circeo National Park, a protected area in the centre of Italy. It is the place where I live and this allowed me to reach some specific references for the case study earlier and more easily and reduce the research costs. I used a mixed methodology, composed of a literature review and a qualitative survey I conducted. The literature review included the screening of policy documents, websites, grey literature and scientific literature about the study area. The qualitative survey used online and paper questionnaires. The mixed-methodology was selected to help understand how decisions were made, who participated in making them and in which measure the ES approach was put into practice in the case study (procedural dimension); identifying which social groups bear the costs of conservation policies and ES trade-offs (distributional dimension); assessing the awareness and appreciation of citizens of ES, exploring how the values were differentiated by different citizen groups and defining the different categories of stakeholders taken into consideration in ES and conservation strategies (recognitional dimension). First, the ES and EJ combined approach allowed some environmental governance limitations in terms of procedural justice to be revealed: the lack of real public participation due to a top-down approach in decision-making and management processes and the inefficient citizens involvement in the participatory initiative of the park.

Second, the analysis helped to visualise how benefits and costs of ES were distributed among different social groups and revealed distributive injustices due mainly to the protection regime of protected area and its conservation goals in conflict with interests of some social groups. Third, the ES assessment allowed the recognition of the awareness and appreciation of citizens about ES. In aggregated terms, the investigation showed an unexpected awareness and high importance of the park's benefits among respondents. However, a disaggregated analysis of these values revealed potential losers of conservation policies. Fourth, the approach revealed that only some minority groups were actually identified and involved in the park governance, but others were not explicitly recognised (recognition injustice). However, living in the case study area, I identified a bias of my research: the general sense of discontent, the tendency to complain and a lack of motivation in participation of inhabitants, which incisively emerged from the findings. This may also provide a point of departure for future research.

My thesis concludes by underlining the potentiality of the ES and EJ combined approach in supporting environmental governance. This kind of approach can help inform environmental governance, explore perceptions of the decision-making procedures, distribution of benefits and costs among different stakeholders, recognition of different ES values and social heterogeneity. Moreover, it can support conservation strategies in integrating multiple policy objectives, including diverse social interests in parallel with preserving ecosystem integrity and health. Finally, it can be useful as a starting point to understand some issues, providing opportunities for their alleviation, including multitude of users and beneficiaries and identifying corrective procedures or limiting damages or existent policies.

In the end, this research seeks to demonstrate that there are other relevant ES evaluations in addition to economic ones, which recognise the importance of peoples' diverse perspectives. Moreover, my research findings underline the need to overcome a concept of justice that is focused on distribution, by highlighting the importance of recognition and the active involvement and inclusion of minority groups in environmental governance.

CHAPTER 1. INTRODUCTION

1.1. BACKGROUND

The relations of people to biodiversity and biodiversity conservation have become an important argument of geographic research, as seen through the lens of political ecology approaches (Castree *et al.*, 2009). In this context, a vast literature on Ecosystem Services (ES) has emerged in the last decades, underlying the important contribution to reframing the relationship between humans and natural system (Costanza *et al.*, 2014) and their potential as a tool for analysing intertwined ecological and social change and their economic valuation (Cáceres *et al.*, 2015). One of the most cited definitions of ES is “flows of materials, energy and information from natural capital stocks which combine with manufactured and human capital services to produce human welfare” (Costanza *et al.*, 1997, p. 254). ES are the benefits of nature to households, communities and economies (Boyd and Banzhaf, 2007) and changes in these services affect human well-being in many ways (Millennium Ecosystem Assessment, 2003). ES improve human well-being by either directly or indirectly affecting humans utility and the indirect effects occur as ecosystem goods and services serve as inputs in the production of other goods or services of value to humans (Brown, Bergstrom and Loomis, 2007). ES exist in relation to human values, they are not objectively “out there” waiting to be discovered but are socially constructed (Hirons, Comberti and Dunford, 2016), so they are not merely a natural incidental gift, but the complex outcome of coevolving social, political and economic processes and social and institutional struggles (Depietri *et al.*, 2016). The nature of the ES concept requires an integration of multidisciplinary perspectives (Portman, 2013), which are found among different scholarship debates. This dissertation focuses on debates within political ecology and geography regarding analyses of socio-environment relations, with a particular emphasis on environmental and social justice implications and the environmental governance surrounding the use of natural resources (Castree *et al.*, 2009). For this reason, the thesis embraces a definition of ES proposed by the Millennium Ecosystem Assessment (2003), which describes ES as the benefits people obtain from ecosystems, underlining the relationships between nature and humans.

The following paragraphs aim to give an overview of ES, starting from the most common classifications (1.2), describing the different evaluations (1.3), lingering on the socio-cultural assessment (1.4) and arriving to the use of ES in the governance and decision-making processes (1.5).

1.2. CLASSIFICATIONS OF ECOSYSTEM SERVICES

Services are the production of benefits, which are of value to people (Chan, Satterfield and Goldstein, 2012). Various authors have defined different types of ES, grouping them into broad categories. One such classification was performed by the Millennium Ecosystem Assessment (MEA), established to provide an integrated assessment of the consequences of ecosystem change for human well-being and to analyse

options available to enhance the conservation of ecosystems and their contributions to meeting human needs (MEA, 2003).

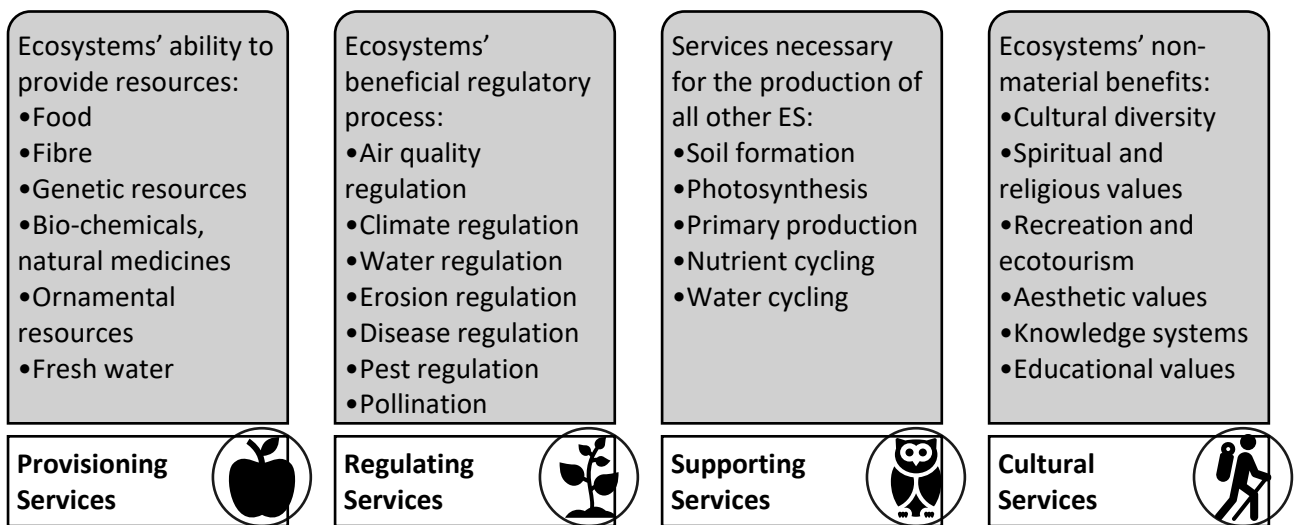


Figure 1.1: Ecosystem services categories of the Millennium Ecosystem Assessment (2003)

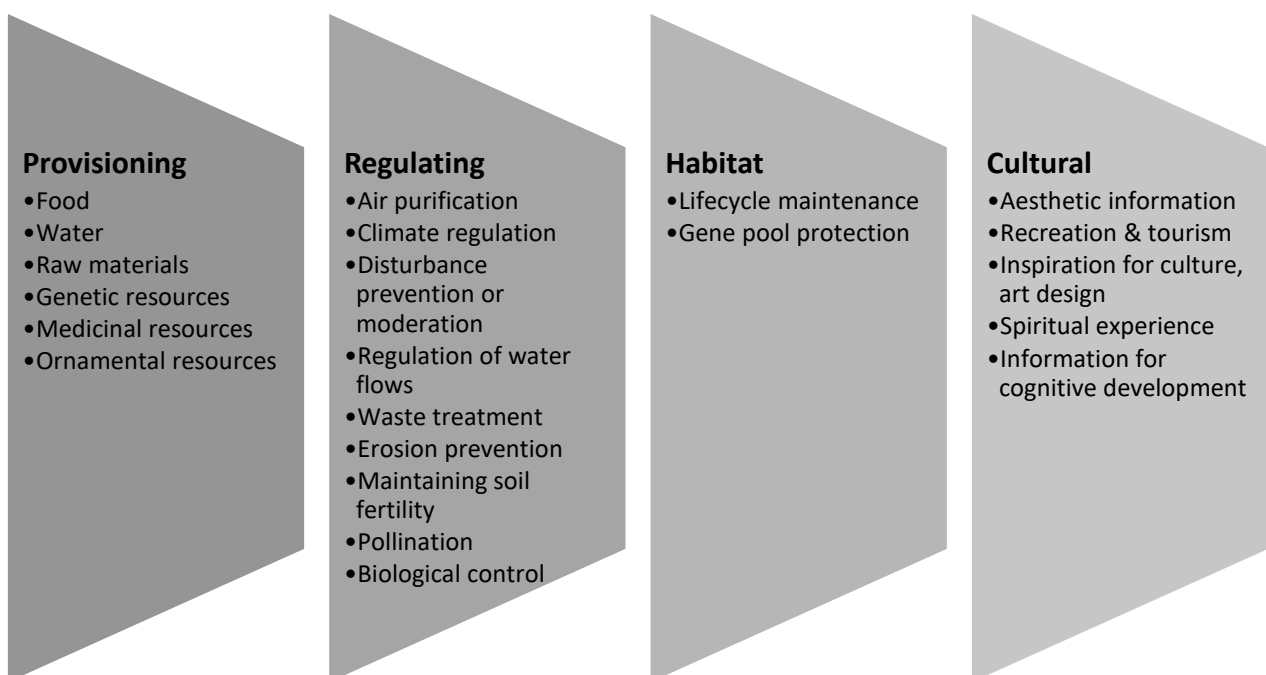


Figure 1.2: Ecosystem services categories of The Economics of Ecosystems and Biodiversity (2010a)

As shown in Figure 1.1, MEA identified four categories of services: provisioning, regulating, supporting and cultural. Provisioning services are the products people obtain directly from ecosystems, such as food, fresh water or timber. Regulating services are the benefits people obtain from the regulation of ecosystem processes, including air quality maintenance, climate regulation and water purification. Because of the indirect benefits of natural regulation functions, they are often not recognised until they are lost or degraded,

but they are nevertheless essential to human existence on earth (de Groot, Wilson and Boumans, 2002). Supporting services are necessary to produce all other ES, such as primary production, production of oxygen and soil formation. Cultural services are the nonmaterial benefits people related to spiritual enrichment, cognitive development, reflection, recreation and aesthetic experiences.

Another classification was completed by The Economics of Ecosystems and Biodiversity (TEEB), a global initiative focused on making nature's values visible (TEEB, 2010a). Following and integrating the previous classification of MEA, also TEEB distinguished the ES in four categories: provisioning, regulating, habitat and cultural (Figure 1.2). Likewise, provisioning services are described as the material outputs from ecosystems, regulating services are the services that ecosystems provide by acting as regulators and cultural services include the non-material benefits people obtain from contact with ecosystems. TEEB defined the habitat or supporting group as the services underpin almost all other services. Indeed, natural ecosystems provide living space for all wild plant and animal species on earth and the maintenance of healthy habitats is a necessary pre-condition for the provision of all ecosystem goods and services, directly or indirectly (de Groot, Wilson and Boumans, 2002). Differently from MEA, distinguished only two ES in the habitat category: habitats for species and maintenance of genetic diversity.

The Common International Classification of Ecosystem Services (CICES) further defined service classes and service groups for each ES categories (Haines-Young and Potschin, 2011), as shown in Table 1.1. Differently from MEA and TEEB, regulating and supporting groups are considerate in one category: regulating and maintenance services. The labels of the classes used in CICES have been selected to be as generic as possible, so that other more specific or detailed categories can progressively be defined, according to the interests of the user. Indeed, inside the three big categories (provisioning, regulating and maintenance and cultural and social), CICES defined nine service classes, twenty-three service group and fifty-nine service type.

Though this dissertation embraces the definition of ES suggested by the MEA, it adopts CICES proposed by Haines-Young and Potschin (2011)¹ in order to describe the different benefits from ecosystems to a heterogeneous audience, in particular in the systematic review and in the case study. Through the systematic review of Chapter 4, I identified the ES considered by different studies and analysed following diverse classifications. The generic categories of CICES were particularly useful because allowed the easy translation of information from different applications under the same standard classification of ES. In the case study of Chapter 6, I converted the conservation goals of a protected area in terms of ES in order to describe these benefits in a questionnaire for local residents. In this case, I integrated some ES categories from the TEEB (2010a) and CICES.

¹ The dissertation didn't adopt the latest version of CICES because, at the beginning of the thesis writing, the latest version had not yet been published.

Table 1.1: Ecosystem services categories, classes and groups of the Common International Classification of Ecosystem Services (2011)

Provisioning Services	
Includes all material and energetic outputs from ecosystems; they are tangible things that can be exchanged or traded, as well as consumed or used directly by people in manufacture. The classification allows the distinction between ecosystem outputs that are used mainly for subsistence or for exchange in markets.	
Service Class	Service Group
Nutrition	Terrestrial plant and animal Freshwater plant and animal Marine plant and animal Potable water
Materials	Biotic materials Abiotic materials
Energy	Renewable biofuels Renewable abiotic energy
Regulating and Maintenance Services	
Includes all the ways in which ecosystems control or modify biotic or abiotic parameters that define the environment of people. Ecosystem outputs that are not consumed but affect the performance of individuals, communities and populations and their activities. The classification distinguishes process and whether the processes operate 'in situ' or 'ex situ'.	
Service Class	Service Group
Regulation of wastes	Bioremediation Dilution and sequestration
Flow regulation	Air flow regulation Water flow regulation Mass flow regulation
Regulation of physical environment	Atmospheric regulation Water quality regulation Pedogenesis and soil quality regulation
Regulation of biotic environment	Lifecycle maintenance & habitat protection Pest and disease control Gene pool protection
Cultural and Social Services	
Includes all non-material ecosystem outputs that have symbolic, cultural or intellectual significance. The classification use criteria such as whether it involves physical or intellectual activity.	
Service Class	Service Group
Symbolic	Aesthetic, Heritage Spiritual
Intellectual and Experiential	Recreation and community activities Information & knowledge

First, TEEB provides the knowledge and guidance to integrate the principles of measuring and valuing ES into policies for the biodiversity conservation and this was useful to translate the policies' objectives in terms of ES. Second, it was straightforward to cross-reference the TEEB categories with the CICES classes, using the tables on CICES documents. I decided to include in the questionnaire the CICES version of ES, instead of TEEB, because it proposed various examples and indicative benefits, which were useful to make ES more clearly understood from an audience of non-experts. For instance, CICES considers regulating and habitat services a

unique category, simplifying the MEA and TEEB categories, and this difference is often not easily understood by non-experts in the field. The habitat services include the regulation and maintenance of biotic conditions in ecosystems (such as pest and disease control, pollination, gene-pool protection, etc.) and CICES regards them as part of a broader regulating and maintenance group, equivalent to other biophysical factors that regulate the ambient conditions, such as climate regulation. This unique category was easier to comprehend for the audience of the questionnaire used in the case study.

Regardless of the type, group or any classifications, all ecosystem goods and services sustain human well-being and human actions. As described by Kandziora, Burkhard and Müller (2013) in Figure 1.3, biophysical structures and processes are ecosystem properties, understood as single ecological subjects, which can be aggregated in the term ecosystem function. The ecosystem function is related to the potential of a system to deliver ES. The use of a good or service provides benefits, such as nutrition, health, or pleasure (de Groot *et al.*, 2010) and benefits can be reflected in the decisions through valuations (Chan, Satterfield and Goldstein, 2012).

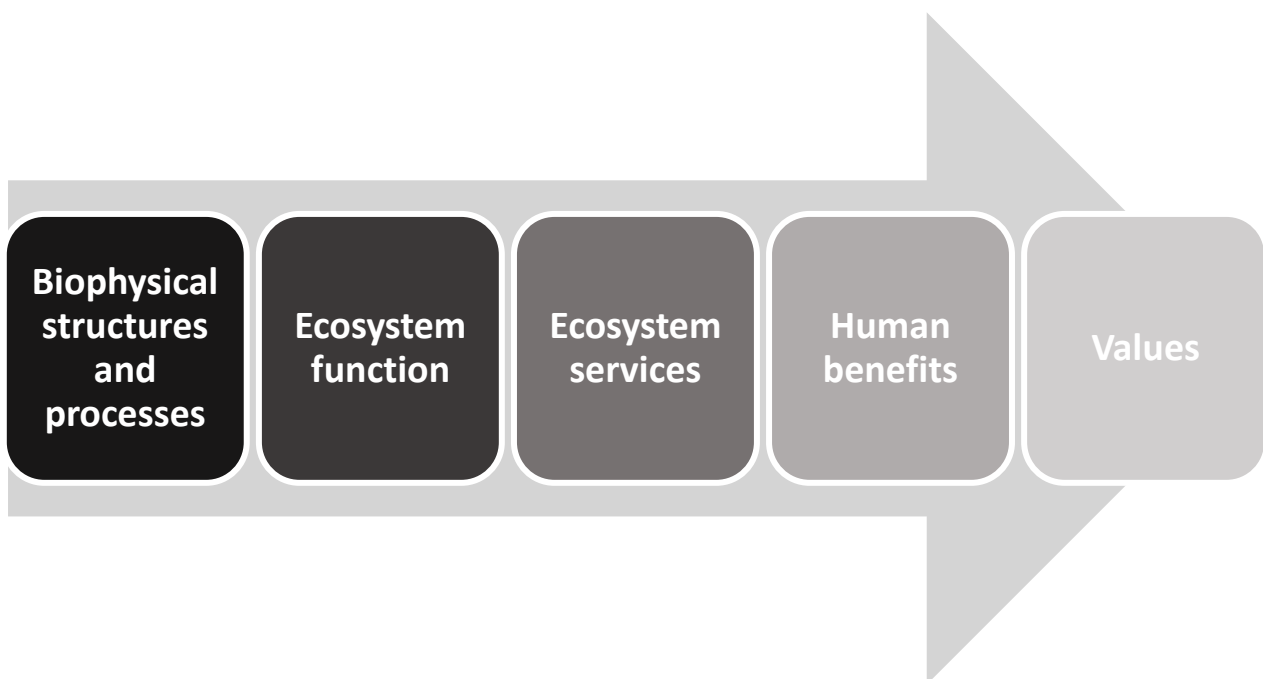


Figure 1.3: The “ecosystem service cascade”, based on Kandziora, Burkhard and Müller (2013)

As described above, the ES framework conceptually describes how ecosystem processes are beneficial to humans, distinguishing among different categories of services, while the production of valuation outputs allows the quantification of these benefits and their communication within approaches to environmental governance. The next section presents the principle types of valuation systems, underlining various multidimensional and multidisciplinary aspects of ES.

1.3. VALUES AND VALUATIONS

Around the world, leaders and academics are recognising ecosystems as natural capital assets that supply life-support services of enormous value (Daily and Matson, 2008). Valuation of ES is one piece of helpful information in the complex task of sustainably managing natural assets (Costanza, 2006). But what are we valuing? What types of values do we refer to when an assessment of ES is carried out? Most ES are valued for many kinds of reasons (Chan *et al.*, 2012) and the nature of their value is multidimensional (Daily *et al.*, 2009). One of the previous categorizations of ES values was given by Costanza (2000), distinguished three types of value that are relevant to the problem of valuing ES (Figure 1.4). The efficiency-based value (E-value) reflects current individual's preferences and represents people's revealed willingness to pay for the good or service in question. The fairness-based value (F-value) relies on consensus over values that would be fair to all members of the current and future community (including nonhuman species). The sustainability-based value (S-value) is connected to ES physical, chemical and biological role in the long-term functioning of the global system.



Figure 1.4: Ecosystem services values, based on Costanza (2000)

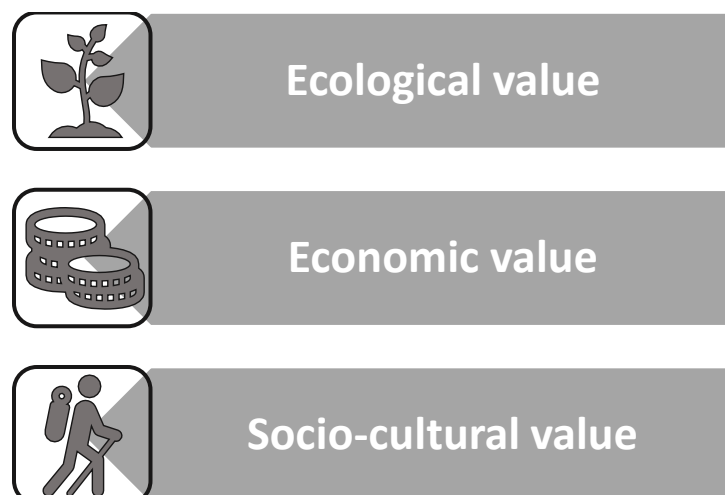


Figure 1.5: Ecosystem services benefits and related values, based on TEEB (2010b)

A different view of ES values was given by TEEB (2010b), who distinguished three other types of ecosystem-based benefits and related values: ecological, economic and socio-cultural values (Figure 1.5). Ecological value comprehends services that contribute to sustaining life on Earth and the provision of ES. It is not particularly man-oriented, but they are concerned with the well-being of other forms of life (Berry, 1976). Ecological value is the degree to which an entity or process contributes to ecological attributes (Arias-Arévalo *et al.*, 2018) and represents the value inherent to biodiversity and ecosystems (TEEB, 2010b). This value is determined both by the integrity of the regulation and habitat functions of the ecosystem and by ecosystem parameters such as complexity, diversity and rarity (de Groot, Wilson and Boumans, 2002).

The economic valuation of the environment conceives of ES, delivered and consumed in the absence of market transactions, as a form of positive externalities. Starting from the evaluation of the world's ES by Costanza *et al.* (1997), much work focused on the monetary values of ES and utility measurements using prices (Arias-Arévalo *et al.*, 2018). Economic value became a measure of ES contribution to human well-being, reflecting preferences and actions of people in a society, who are assumed to behave so as to maximize their well-being given the constraints they face (Brown, Bergstrom and Loomis, 2007). Economic valuation methods fall into four basic types: direct market valuation, indirect market valuation, contingent valuation, group valuation (de Groot, Wilson and Boumans, 2002).

Socio-cultural value consists of material, moral, spiritual, aesthetic, therapeutic and other values towards the environment, all of which can affect people's attitudes and actions toward ecosystems and the services they provide. This category includes, for instance: the value of relaxing, playing, engaging in physical activities, getting away from urban pressures, or seeking solitude (recreational value); the knowledge that a particular area of environmentally relevant open space has been protected from development (contemplative value); or the aesthetic value, associated with an on-site experience or with living in a natural area and the daily experiences that it entails (Berry, 1976).

Therefore, the ES approaches require the connection of natural and human systems through the combination of multidisciplinary perspectives (Portman, 2013): the natural science, social science and practitioner communities jointly need to establish a standard set of measures and approaches for quantifying and monitoring ecosystem service levels and values (Tallis *et al.*, 2008). It makes sense to build the credibility of ES approaches, by combining direct biophysical measurements with economic valuation and non-monetary methods (Daily *et al.*, 2009). In evaluating ES, the consideration of a broader set of goals that include ecological sustainability and social fairness is necessary, along with the traditional economic goal of efficiency (Costanza, 2000). However, past ES research has focused on ecological and economic values, leaving a serious gap about socio-cultural values (Scholte, van Teeffelen and Verburg, 2015). In order to cover this gap, this dissertation considers socio-cultural assessment of ES, in particular for the case study application (Chapter

6). The following section elucidates how the socio-cultural idea of ES has evolved over time, how it has been measured and why this assessment could be useful in terms of environmental governance frameworks.

1.4. SOCIO-CULTURAL EVALUATION OF ECOSYSTEM SERVICES

As anticipated in the previous section, socio-cultural values include emotional, affective and symbolic views attached to nature that, in most cases, cannot be adequately captured by commodity metaphors and monetary metrics (Gómez-Baggethun *et al.*, 2014). For many people, biodiversity and natural ecosystems are a crucial source of non-material well-being through their influence on mental health and their historical, national, ethical, religious and spiritual values (TEEB, 2010a). Sometimes also defined as social values for ES, they represent “the perceived qualities carried by a natural environment that provides benefits (e.g., recreational, aesthetic, spiritual) to support human well-being” (van Riper *et al.*, 2012). The central focus of the socio-cultural perspective is the human being within its social and psychological context, its non-materialistic needs and the rational and emotional components of its attitudes towards the natural environment (Chiesura and De Groot, 2003).

In the last years, the TEEB concept has been extended by other authors. For instance, Scholte, van Teeffelen and Verburg (2015) defined the socio-cultural values of ES as “the importance people, as individuals or as a group, assign to (bundles of) ES” (Scholte, van Teeffelen and Verburg, 2015). While TEEB referred to the non-material well-being connected to ecosystems, they connected socio-cultural values to the full spectrum of ES, reflecting both material and immaterial well-being. The determinants of socio-cultural values are the characteristics of the natural environment (landscape, ecosystem and ES supply), the interaction between beneficiaries and ES (use, perception and information) and the characteristics of beneficiaries (social context and personal characteristics). The socio-cultural assessment of ES elicits people’s preferences towards ES (Zoderer *et al.*, 2016). Social values are the diverse use and non-use values people assign to natural areas (Bryan *et al.*, 2011), representing measurable ecological end-products or endpoints of ES at their interface with human well-being (Boyd and Banzhaf, 2007).

The literature highlights the need to understand the ways society benefits from nature and, hence, the many reasons that societies value ES (Menzel and Teng, 2010). However, it is important to keep in mind the heterogeneity of the socio-cultural value. Indeed, ES are generated at a range of ecological scales and are supplied to stakeholders at a range of scales: stakeholders can have very different perspectives on the values of ES, based on their dependency upon specific services to provide income or sustain their living environment (Hein *et al.*, 2006). Thus, understanding that the social value of ES depends on the ways that services are used by different stakeholders (Carpenter *et al.*, 2009). Socio-cultural assessment should consider how all ES are perceived by people, that is to include the values of all relevant stakeholders (Martín-López *et al.*, 2012), including local and distant beneficiaries and to make explicit who values what (Scholte, van Teeffelen and Verburg, 2015). Different social groups, in a highly heterogeneous society, perceive and value ES in different

ways and they associate them to different ecosystem types. Therefore, it is also important to consider social heterogeneity during the process of ES analysis (Cáceres *et al.*, 2015).

From the methodological point of view, the social value of ES is broad and difficult to measure. The concepts for social values that economists have developed are what society would be willing and able to pay for a service (WTP) or what it would be willing to accept (WTA) to forego that service (Farber, Costanza and Wilson, 2002). Other authors have developed frameworks that conceptually integrate socio-cultural assessment approach with the landscape concept (Zoderer *et al.*, 2016), or land use preferences (Schmidt *et al.*, 2017), analysing and comparing people's perceived importance of the provisioning, regulating and cultural ES categories across different types of landscape. The social valuation of ES through participatory mapping offers another alternative valuation approach to economic assessment of ES (Brown, 2013). Sherrouse, Clement and Semmens (2011) designed an innovative geographic information system (GIS) application to calculate and map the relative social values of ES as perceived by diverse groups of ecosystem stakeholders. Social Values for Ecosystem Services (SoLVES) is a tool that can explicitly quantify and illustrate the connections between social values, the attitudes and preferences that manifest these values and the environmental characteristics, locations and associated ES that elicit such values.

In any case, socio-cultural valuation is a useful approach for management decisions, because it offers a tool to help identify a range of ES; visualize socio-cultural preferences at different perception scales; identify different needs within different times and spaces; elucidate perceived trends as an early warning of ES deterioration; reveal perceived bundles of ES; and explicate the link between ES and traditional management practices (Oteros-Rozas *et al.*, 2014). It can improve efforts to integrate values into the decision-making processes of land and resource managers and facilitate communication between decision makers and various stakeholder groups with diverse interests regarding the trade-offs among various ES and their locations (Schmidt *et al.*, 2017).

As human pressures on ecosystems continue to increase, research involving the effective incorporation of information on social values information within the context of comprehensive ES assessments is becoming more important (Sherrouse, Clement and Semmens, 2011). Moreover, social valuation of ES and public policy alternatives is one of the greatest challenges facing researchers today (Kenter *et al.*, 2015): the social and political challenges are very demanding and associated with incorporating this understanding into effective and enduring institutions, to manage, monitor and provide incentives that accurately reflect the social values of ES to society (Daily and Matson, 2008). Despite socio-cultural assessments offer much in the way of potential for being integrated within environmental governance frameworks, they still remain somewhat marginal, compared to other valuations from natural science and economics disciplines (Milcu *et al.*, 2013; Portman, 2013; Saarikoski *et al.*, 2016). One of the main problems of integrating these values into policymaking or conservation goals is the difficulty to translate them in standard measures or to force them in ordinary trade-off problems (Chiesura and De Groot, 2003). Therefore, a shared path is still missing on how

integrating socio-cultural valuation methods into a decision-making context, together with knowledge on ecological function and monetary aspects of ES. The next section of this chapter provides an overview of how ES approaches, in general, have been considered in environmental governance processes, underlining in which contexts they have been most used.

1.5. ECOSYSTEM SERVICES APPROACH IN ENVIRONMENTAL GOVERNANCE

Here the term environmental governance is intended as intervention actions aiming at changes in environment-related incentives, knowledge, institutions, decision making and behaviours (Lemos and Agrawal, 2006). It represents the establishment, reaffirmation or change of institutions to resolve conflicts over environmental resources, where conflict refers to a conflict of interest between involved parties (Paavola, 2007). Thus, environmental governance also refers to the set of regulatory processes, mechanisms and organizations through which political actors influence environmental actions and outcomes and it can encompass actors such as communities or businesses (Lemos and Agrawal, 2006). The concept is applicable to the governance of all environmental resources, does not limit the type or scale of environmental governance problems and solutions that can be examined and also recognizes justice as an integral part of environmental decisions (Paavola, 2007). In the context of environmental governance, an ES vision has become increasingly relevant over time.

From the beginning, the vision of the Millennium Ecosystem Assessment described a world in which people and institutions appreciate natural systems as vital assets, recognising the central roles these assets play in supporting human well-being and incorporating their values into decision-making (Daily *et al.*, 2009). Over the years, the concept of ES has become an important model for linking the functioning of ecosystems to human welfare and understanding this link is critical for different decision-making contexts (Fisher, Turner and Morling, 2009). The integration of an ES framework in decision-making helps to better understand the society–environment relationship (Santana-Cordero, Ariza and Romagosa, 2016) and relies on access to scientific information showing where ES are provided, how they have been used and how they will be affected by alternative plans and policies (Silvestri *et al.*, 2013). The ES approach and valuation efforts have changed the terms of discussion on nature conservation, natural resource management and other areas of public policy (de Groot *et al.*, 2010). The contexts in which an ES approach has been most used are conservation strategies, landscape and urban planning and policies, including economic compensation.

First of all, the concept of ES has been promoted as a new approach to tackling the problem of biodiversity loss (Hauck *et al.*, 2013) and as a mean for documenting the values humans place on ecosystems and evaluating benefits derived from natural resources (Wallace, 2007). Consequently, policymakers are starting to include the concept of ES in their guidelines and strategies in order to communicate the benefits of ecosystem conservation to diverse stakeholder groups, or to link in its potential to extend biodiversity

conservation beyond protected areas and integrate it within the management of a wider landscape (Hauck *et al.*, 2013).

Additionally, different authors have proposed the usefulness of this approach to calculate declines in ES values associated with the intrusion of natural resources by urban expansion (Su *et al.*, 2012). The continuous increase in the number and size of cities, the climate changing and the ensuing transformation of landscapes have posed significant challenges to reducing the rate of biodiversity loss and related ecosystem functionality, as well as ensuring human welfare (Haase *et al.*, 2014; Luederitz *et al.*, 2015). At the same time, the ES approach has helped garner policy attention on the benefits from urban green spaces (Gómez-Baggethun and Barton, 2013; Langemeyer *et al.*, 2015). Several instruments have been proposed to analyse implications of land use and management changes, such as spatially explicit analysis that involves mapping and valuing together with visualizing ES (Silvestri *et al.*, 2013; Cortinovis and Geneletti, 2018). Thus, the internalization of ES concerns into spatial planning is considered a support to plan making (Geneletti, 2011). Lastly, compensatory policies become effective regulatory mechanisms for monetary compensation for land use changes (Schomers and Matzdorf, 2013). In particular, Payment for Ecosystem (or Environmental) Services (PES) are “voluntary transactions where a well-defined environmental service is being bought by a service buyer from a service provider if and only if the service provider secures service provision” (Engel, Pagiola and Wunder, 2008). Through this approach, also defined as a commodification of ES (Gómez-Baggethun and Ruiz-Pérez, 2011), ecosystem functions are characterized as services, valued in monetary terms and incorporated into markets and payment mechanisms (Gómez-Baggethun *et al.*, 2010). PES programs are used as a tool to promote the conservation of biodiversity, rural development, water and soil quality and other goals (Clements *et al.*, 2010; Schomers and Matzdorf, 2013; Calvet-Mir *et al.*, 2015).

Recent literature underlines the necessity to explicitly and systematically integrate ES into decision-making by individuals, corporations and governments (Daily *et al.*, 2009). Clearly, there is no simple or established way of integrating the ES concept into policies and decision-making processes (Hauck *et al.*, 2013), but the ES approach may allow setting up ecosystem-based management, where natural processes are better preserved and ecosystem functions considered when planning economic activities (Santana-Cordero, Ariza and Romagosa, 2016). The ES approach has the potential to provide precise information on the trade-offs of the different existing economic development alternatives (Santana-Cordero, Ariza and Romagosa, 2016). The classification system explicitly links values with ES, ecosystem processes and natural and socio-cultural assets: values describe important aspects of human well-being and thus can assist those charged with communicating the importance of natural resources (Wallace, 2007).

In the light of the above, this dissertation is focused on exploring how ES can be integrated within environmental governance approaches, in particular, by reflecting on social heterogeneity and the potential for integrating socio-cultural assessments, in light of the specific context of the governance of and context of

protected areas in Italy. The following paragraphs explain in detail the aim (1.6), approach (1.7) and overall structure (1.8) of the thesis.

1.6. REASERCH AIM

The focus on ES socializes ecosystems, because the services produced by ecosystems for people, move to the centre of attention (Sikor, 2013). However, as also anticipated in the previous paragraphs, biophysical and economic values are often included in spatial planning, conservation strategies and environmental management, but social values are rarely considered (Bryan *et al.*, 2010). Moreover, the ES approach has been criticized for adopting a homogenous approach to communities and failing to consider the social heterogeneity and power structures influencing access to benefits and participation in the governance of ES (Iniesta-Arandia *et al.*, 2014; Chaudhary *et al.*, 2018; Díaz *et al.*, 2018). The socialization of ecosystems cannot stop at the level of aggregate human well-being but needs to consider differences among people (Sikor, 2013), which also implies the need to explore an ES approach under a justice framework, a relevant and integral component for environmental governance (Paavola, 2007). Interventions of environmental management, indeed, can affect the distribution of benefits and responsibilities, different people's participation in decision-making or the recognition of their particular identities, interests, or needs (Sikor, 2013).

In order to consider social heterogeneity, the present work proposes to extend the ES approaches by adding an Environmental Justice (EJ) framework, rarely applied in these contexts. Born as a social movement that promoted the fair treatment for all people in environmental matters, EJ has developed into an interdisciplinary body of literature to support environmental governance in reaching the fair distribution of environmental benefits and risks (distribution dimension, recognise different values and identities (recognition dimension) and ensuring equitable decision-making procedures (procedure dimension) (Schlosberg, 2001; EPA, 2011). The aim of this research is to investigate to what extent a combined approach of ES and EJ could support the environmental governance. By addressing this objective, the dissertation advances the knowledge frontier on ES literature in three aspects. First, a literature review explores how the EJ have been applied to ES till now. The literature review describes how the different dimensions of justice (distribution, recognition, procedure and others) have been applied in the ES approaches and analyses the interconnections among these dimensions. Moreover, the review underlines the implications of this combined approach for the decision-making and management processes. Second, a systematic review gives an overview of the trends of the literature, in terms of number and typology of publications, geographical distribution and scales of the cases analysed, ES and justice dimensions examined and governance contexts explored. Third, in order to understand how the environmental justice lens for the ecosystem services approaches can be useful for the environmental governance in practice, the present research applies the

approach in an Italian protected area: Circeo National Park. A mixed methodology, composed of a literature review and a qualitative survey, translates conservation goals of the protected area in terms of ES and follows the dimensions of EJ in order to understand how decisions were made and who participated; identify which social groups bore the costs of these conservation policies and ecosystem services trade-offs; assess the awareness and appreciation of citizens of ecosystem services, explore how the values were differentiated by different citizen groups and define the different categories of stakeholders taken into consideration in ES and conservation strategies. Moreover, analysing the case study in terms of ES and EJ allows the exploration of some issues in order to recommend possible corrective measures.

1.7. REASERCH APPROACH

The dissertation follows a critical social science approach to ES concepts and assessments and to the EJ framework for the environmental governance. These literatures come from different disciplines. ES lies at the intersection of many matters, including biology, ecology, economics – in particular ecological economics – but also sociology and geography (Gómez-Baggethun *et al.*, 2010; TEEB, 2010a; Portman, 2013; Cáceres *et al.*, 2015; Kull, Arnauld de Sartre and Castro-Larrañaga, 2015). At the same time, EJ has been a central concern in a range of social science disciplines, among which environmental sociology, philosophy, anthropology, law and geography and in different environmentalism movements (Ikeme, 2003; Schlosberg, 2013; Martinez-Alier *et al.*, 2014). Despite the differences in disciplines, ES and EJ literatures meet in the political ecology debates. Political ecology is a heterogeneous and transdisciplinary field, expanding in geography, that analyses of society environment relations, contextualised by history and place (Greenberg and Park, 1994; Adams and Hutton, 2007; Castree *et al.*, 2009; Pincetl, Jonas and Sullivan, 2011). Nature is understood as the outcome of political processes (Adams and Hutton, 2007; Hinchliffe, 2008) and, in this context, ES and EJ become a guiding concept for the environmental governance (Chitewere, 2010; Kull, Arnauld de Sartre and Castro-Larrañaga, 2015). Political ecology pays attention not only to the ecology or science of ES, but also to who wins, who loses, what the impacts are for different parts of society, identifying the competing social, political and economic interests in natural resource management (Chitewere, 2010; Kull, Arnauld de Sartre and Castro-Larrañaga, 2015). Since ES and EJ concepts are also socially constructed, with political implications, I draw upon literature, perspectives and methods to address my research questions, approaching with a critical realist epistemological stance. Nature can be studied through science and other means, but our understanding of ES and EJ is limited by the identification of the context that interacts with the generative mechanism to produce an observed regularity in the social world (Bryman, 2012). Thus, the critical realist epistemological approach to the ES and EJ concepts has the power to shape the progression of policy, with material implications for the environmental governance.

1.8. THESIS STRUCTURE

The thesis takes a hybrid structure, which is part monograph, including an introduction that outlines how the thesis approaches the topic and the theoretical framework, a methodological chapter, a descriptive chapter for the case study, as well as three stand-alone chapters that will be submitted for publication as research/empirical articles in peer-reviewed journals, followed by a concluding chapter. The dissertation is organised in seven chapters (Table 1.2).

Table 1.2: Thesis structure

Chapter	Objective	Study type
<i>1. Introduction</i>	Introduction of the literature about the ecosystem services	Review
<i>2. Methodological framework</i>	Description of the methodologies	Descriptive
<i>3. Ecosystem Services and environmental justice: a literature review</i>	Review of the literature about ecosystem services under an environmental justice framework	Review
<i>4. Ecosystem Services and justice: literature trends</i>	Statistical analysis of the trends of scientific publications about ecosystem services and justice	Empirical
<i>5. Case study: Circeo National Park, Italy</i>	Description of case study	Descriptive
<i>6. Ecosystem services and environmental justice: an empirical application</i>	Application of the ecosystem services and environmental justice analysis in the case study	Empirical
<i>7. Conclusions</i>	Explanation of the main findings and the relevance of the thesis	Descriptive

Chapter 1 has provided an overview of ES literature, describing the most common classifications and different kinds of evaluations, with a particular focus on the socio-cultural assessment. Moreover, it explained how governance and decision-making processes have used the ES approaches. Chapter 2 analyses the methodologies used in the thesis: the literature review for Chapter 3; the systematic review of Chapter 4; and the literature review and the survey used in Chapters 5 and 6. Through a literature review, Chapter 3 focuses on the EJ framework, integrating the ES matter. Chapter 4 analyses the trends of scientific publications about ES and justice. Chapter 5 describes the location, history, geography, demography, regulation and management of the case study. Chapter 6 applies the combined approach of ES and EJ in Circeo National Park. Finally, Chapter 7 resumes the main findings and highlights the relevance of the thesis.

CHAPTER 2. METHODOLOGICAL FRAMEWORK

2.1. LITERATURE REVIEW

A literature review is a comprehensive overview of prior research regarding a specific topic, including all of the main themes and subthemes found within the general topic chosen for the study (Denney and Tewksbury, 2013). A review of prior, relevant literature is an essential feature of any academic project and an effective review creates a firm foundation for advancing knowledge (Webster and Watson, 2002). The objective of the present review is to underline empirical insights and theories, synthesizing what is already known in the literature. Instead, the literature review presented in Chapter 3 is used as a means of gaining an initial impression of the thematic areas (Bryman, 2012), focused on the concepts “ecosystem services” (necessary also for the introduction), “environmental justice”, “ecosystem services” and “environmental justice”, collectively considered. Starting from these generic categories, I coded and selected suitable keywords, synonyms or alternatives (presented in Figure 2.1) in order to identify other ways of describing the areas of focus for this research and to find other suitable references (Bryman, 2012). These concepts determined the organizing framework of the review of Chapter 3, with the aim of creating an analytical approach by integrating aspects of EJ in ES. The literature review was crucial to understand the EJ theory applied to the ES, its different dimensions – distribution, recognition, procedure and others –, how these dimensions influence each other and the implications of this framework for the environmental governance.

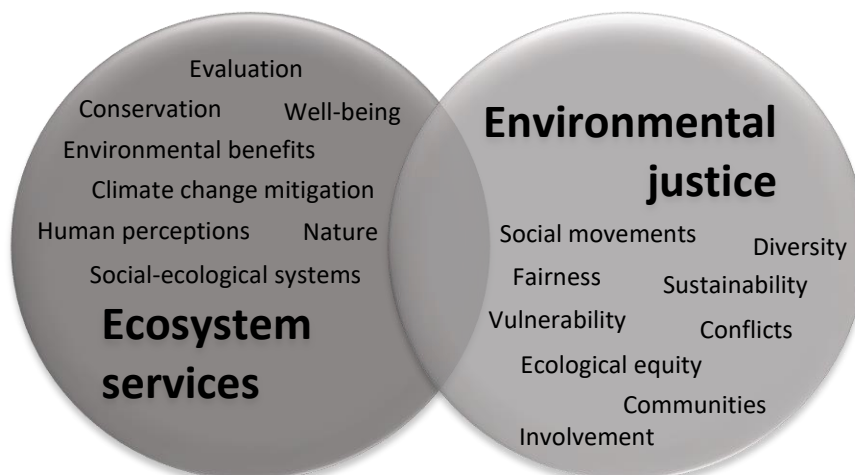


Figure 2.1: Topics included in the literature review

Sources included books, papers, conference presentations and abstracts. Sources was founded in different ways:

- extensive research in the topics area, using Google Scholar as search engine;
- suggested bibliography in brainstorming with supervisors, tutors and experts;
- personal knowledge;

- references from the MOOC – Massive Open Online Courses – “Rights and values in ecosystem services” (University of Leeds) and “Environmental justice” (University of East Anglia);
- backward snowballing technique, that implies finding citations in a paper (Wee and Banister, 2016).

The review process started in April 2016, in the first year of my Ph.D., until the end of 2018. As suggested by Webster and Watson (2002), after reading various references, I synthesized the literature by discussing each identified concept and by recording relevant critical points (Bryman, 2012). In order to identify and explain all of the main points or findings of my specific topics, both classic and the most recent studies were included in the review (Denney and Tewksbury, 2013). The writing process was primarily conducted in 2019.

2.2. SYSTEMATIC REVIEW

In order to integrate the literature review, a systematic review was carried out in 2019 to underline how the scientific literature about ES and justice (in a more general sense) has evolved over time and which trends it has followed. The aim of the systematic review was to investigate how the different approaches of ES and justice were used for real-world applications. The systematic review allowed the exploration, in Chapter 4, of the number and type (conceptual, review, or empirical) of publications, the geographical distribution and scale of case studies analysed, the ES and justice dimensions investigated and the governance contexts in which they have been explored.

This systematic review was the result of a collaboration with another Ph.D. student – Amalia Calderón Argelich – and supervised by two researchers – Francesc Baró and Johannes Langemeyer – ICTA, *Universitat Autònoma de Barcelona* (UAB), that began during a period as a visiting researcher from the 29th of April to the 28th of June 2019 and continued until the thesis was finalized. First, we formulated a research protocol to allow formulation of the questions and methods of the review before retrieving the literature (Wright *et al.*, 2007). In May 2019, we searched for papers that mentioned the concepts “ecosystem services” and “justice” in their title, abstract, or keywords. Table 2.1 summarizes the search strings we used for the literature search through Scopus and Web of Science. Based on the numbers of results, we selected the string of the first row, because it focuses on the explicit mention of the topics has a sufficient number of results. The database of results was limited to scientific journal article from all over the world in English language. As shown by Figure 2.2, our initial literature database counted 1098 articles, 443 from Scopus and 655 from Web of Science. Since some papers display a slightly different title depending on the database, we deleted duplicates using the DOI and removing the reprint of the articles, reducing the database to 686 unique records. After this first step of data gathering, we divided the data into two equal groups, 343 papers per reader analyst. For the next step, we conducted a screening of abstracts to classify the potentially relevant papers, determining the study inclusion and exclusion criteria (Harris *et al.*, 2014).

Table 2.1: Search strings and number of results for Scopus and Web of Science (May 2019)

Search strings for Scopus	N	Search strings for Web of Science	N
TITLE-ABS-KEY (("ecosystem servic*") AND ("*equit*" OR "*justic*" OR "*fairness")) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re")) AND (LIMIT-TO (LANGUAGE , "English"))	443	(TS=(("ecosystem servic*") AND ("*equit*" OR "*justic*" OR "*fairness"))) AND LANGUAGE: (English) AND TYPES OF DOCUMENTS: (Article OR Review) Index=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC Period=All years	655
TITLE-ABS-KEY (("ecosystem servic*" OR "ecosystem functio*" OR "ecosystem benefit*") AND ("*equit*" OR "*justic*" OR "*fairness")) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re")) AND (LIMIT-TO (LANGUAGE , "English"))	481	((TS=(("ecosystem servic*" OR "ecosystem functio*" OR "ecosystem benefit*") AND ("*equit*" OR "*justic*" OR "*fairness")))) AND LANGUAGE: (English) AND TYPES OF DOCUMENTS: (Article OR Review) Index=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC Period=All years	688
TITLE-ABS-KEY (("ecosystem servic*" OR "ecosystem functio*" OR "ecosystem benefit*" OR "*environmental benefit*" OR "*environmental servic*" OR "*environmental functio*") AND ("*equit*" OR "*justic*" OR "*fairness")) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re")) AND (LIMIT-TO (LANGUAGE , "English"))	657	(TS=(("ecosystem servic*" OR "ecosystem functio*" OR "ecosystem benefit*" OR "*environmental benefit*" OR "*environmental servic*" OR "*environmental functio*") AND ("*equit*" OR "*justic*" OR "*fairness"))) AND LANGUAGE: (English) AND TYPES OF DOCUMENTS: (Article OR Review) Index=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC Period=All years	855
TITLE-ABS-KEY (("ecosystem servic*" OR "ecosystem functio*" OR "ecosystem benefit*" OR "*environmental benefit*" OR "*environmental servic*" OR "*environmental functio*" OR "green space benefit*" OR "greenspace benefit*" OR "green infrastructure benefit*" OR "green infrastructure servic*") AND ("*equit*" OR "*justic*" OR "*fairness")) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re")) AND (LIMIT-TO (LANGUAGE , "English"))	657	(TS=(("ecosystem servic*" OR "ecosystem functio*" OR "ecosystem benefit*" OR "*environmental benefit*" OR "*environmental servic*" OR "*environmental functio*" OR "green space benefit*" OR "greenspace benefit*" OR "green infrastructure benefit*" OR "green infrastructure servic*") AND ("*equit*" OR "*justic*" OR "*fairness"))) AND LANGUAGE: (English) AND TYPES OF DOCUMENTS: (Article OR Review) Index=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC Period=All years	855
TITLE-ABS-KEY (("ecosystem servic*" OR "ecosystem functio*" OR "ecosystem benefit*" OR "*environmental benefit*" OR "*environmental servic*" OR "*environmental functio*" OR "green spac*" OR "greenspac*" OR "green infrastructure*") AND ("*equit*" OR "*justic*" OR "*fairness")) AND (LIMIT-TO (DOCTYPE , "ar") OR LIMIT-TO (DOCTYPE , "re")) AND (LIMIT-TO (LANGUAGE , "English"))	842	((TS=(("ecosystem servic*" OR "ecosystem functio*" OR "ecosystem benefit*" OR "*environmental benefit*" OR "*environmental servic*" OR "*environmental functio*" OR "green spac*" OR "greenspac*" OR "green infrastructure*") AND ("*equit*" OR "*justic*" OR "*fairness")))) AND LANGUAGE: (English) AND TYPES OF DOCUMENTS: (Article OR Review) Index=SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC Period=All years	1088

Figure 2.2: Dataset definition process

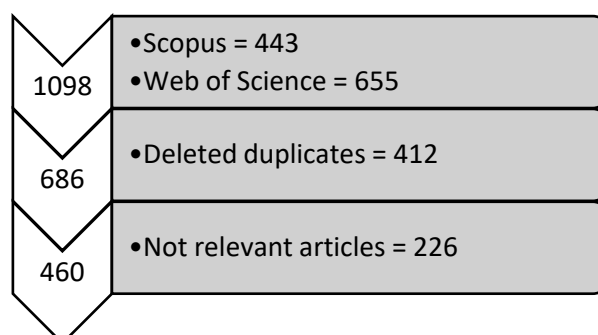


Figure 2.3: Criteria for the paper analysis

Study references	Study and geographical information	Ecosystem services and justice
<ul style="list-style-type: none"> •Title •Authors •Abstract •Keywords •Journal •Year •Times cited 	<ul style="list-style-type: none"> •Category •Country •Protected area •Compensation •Spatial scale •Ecosystem location 	<ul style="list-style-type: none"> •Service-providing unit •Groups of ES •ES examined •Justice dimension

Table 2.2: Criteria for the paper analysis

Criteria	Possible entries (annotations)	References for the coding
Category of article	Case study, Review, Conceptual paper.	-
Country	Name of single country, Multiple, NA.	-
Continent	Africa, Asia, Europe, Latin America, North America, Oceania, NA.	-
Protected area	Yes, No.	-
Compensation	Yes, No.	-
Spatial scale	Local, Sub-national, National, Supra-national, Continental, Global, NA.	(Liquete <i>et al.</i> , 2013; Drakou <i>et al.</i> , 2015)
Ecosystem location	General, Marine, Coastal, Inland Water, Forest, Dryland, Island, Mountain, Polar, Cultivated, And Urban Regions, NA.	(Millennium Ecosystem Assessment, 2003)
Service-providing unit	Coast, Crop field, Fishing area and stocks, Forest, Garden, Green areas, Lake, Landscape vistas, Livestock, Mangrove, Mine, Natural reserve, Park, Plants, Pollinators, Soil, Watershed, Not applicable	(Kontogianni, Luck and Skourtos, 2010; Andersson <i>et al.</i> , 2015)
Groups of ES	General, Provisioning, Regulating and Maintenance, Cultural and Social.	(Haines-Young and Potschin, 2011)
ES examined	General; Terrestrial plant and animal foodstuffs, Freshwater plant and animal foodstuffs, Marine plant and animal foodstuffs, Potable water, Biotic materials, Abiotic materials, Renewable biofuels, Renewable abiotic energy [in Provisioning]; Bioremediation, Dilution and sequestration, Air flow regulation, Water flow regulation, Mass flow regulation, Atmospheric regulation, Water quality regulation, Pedogenesis and soil quality regulation, Lifecycle maintenance & habitat protection, Pest and disease control, Gene pool protection [in Regulating and Maintenance]; Aesthetic, Heritage, Spiritual, Recreation and community activities, Information & knowledge [in Cultural and Social].	(Haines-Young and Potschin, 2011)
Justice dimension	Distributional, procedural/participatory, recognitional/interactional, general, NA	(Schlosberg, 2007, 2013)

We considered a paper relevant if it met the following criteria:

- Studies that explicitly consider and examine ES, or alternatively, equivalent terms (as environmental benefits) in the title, the abstract and all the keywords.
- Studies that explicitly relate the ES framework to environmental justice, social equity or perceptions of fairness in the title, the abstract and all the keywords.

It is important to underline that in both search engines – Scopus and Web of Science – there are different categories of Keywords: “Author Keywords” and other are keywords considered by the databases (ex: “KeyWords Plus”, “GEOBASE Subject Index”). This was the reason why some of the pre-selected papers do not explicitly consider ES and/or justice framework. The final classified dataset of relevant papers was obtained with 460 papers (Figure 2.2). In the period from May to August 2019, papers were analysed using the groups of criteria of Figure 2.3. Data from the “study references” box, such as title, authors, or year of publication, was directly obtained from Scopus and Web of Science databases. From the two other boxes, we screened the abstract and the full text of the papers and we classified each category using the criteria described in Table 2.2.

2.3. CASE STUDY

The aim of the last part of this research is to understand how the EJ lens for the ES approaches can be useful for the environmental governance in practice, considering also the heterogeneity of society. To do this, the present study applied a mixed methods approach to a case study: Circeo National Park (CNP), an Italian protected area. CNP can be considered an instrumental case study, i.e. a case study of a particular situation but, in spite of its uniqueness, it can be potentially applicable to other like-situations (Yin, 2011). Indeed, it represents a particular situation where two cities and some agricultural areas are located in the protected area, highlighting a greater link between nature and human welfare. Nevertheless, the analysis demonstrates that also this conservation approach will confirm the classic exclusionary model of protected areas, in which people are separated from the rest of nature (Martin *et al.*, 2016) and are not completely considered in the environmental governance.

Mixed methods research designs a study which use both quantitative and qualitative methods of analyses, in order to answer the research questions of interest (Yin, 2011). Through continued engagement with cross-disciplinary research, the field of environmental studies is well-positioned to leverage the primary benefit of mixed methods analysis: the capacity to triangulate across various types of data, including quantitative and qualitative (Connolly, et al. 2014). The mixed-methods approach was composed of a literature review and a qualitative survey. Both methods allowed the translation of conservation goals for protected area in terms of ES and an understanding of the different dimensions of EJ. The research aimed to explore how decisions were made and who participated; identify which social groups suffered the costs from conservation policies and ecosystem services trade-offs; assess the awareness and appreciation of citizens of ES, discover how the

values were differentiated by different citizen groups and define the different categories of stakeholders taken into consideration in ES and conservation strategies. Since the values that are attributed to ES depend upon the stakeholders benefiting from these services (Hein *et al.*, 2006), the research need to use mixed-method approaches that comprehend varied stakeholders' perspectives (Favretto *et al.*, 2016) and consider the social heterogeneity. As suggested by Daw *et al.* (2011), the analysis used an exploratory disaggregation approach in order to test the hypothesis of unequal benefits from ES. Groupings were identified, coded and analysed based on personal data (gender, age, Municipality of residence, level of education), geographical location (interviewers' house or work proximity to the park), personal opinion (in terms on park's impact and trust in the park management) and the economic sectors in which the respondents were active.

Figure 2.4: Objectives, methodologies and data analysis of case study

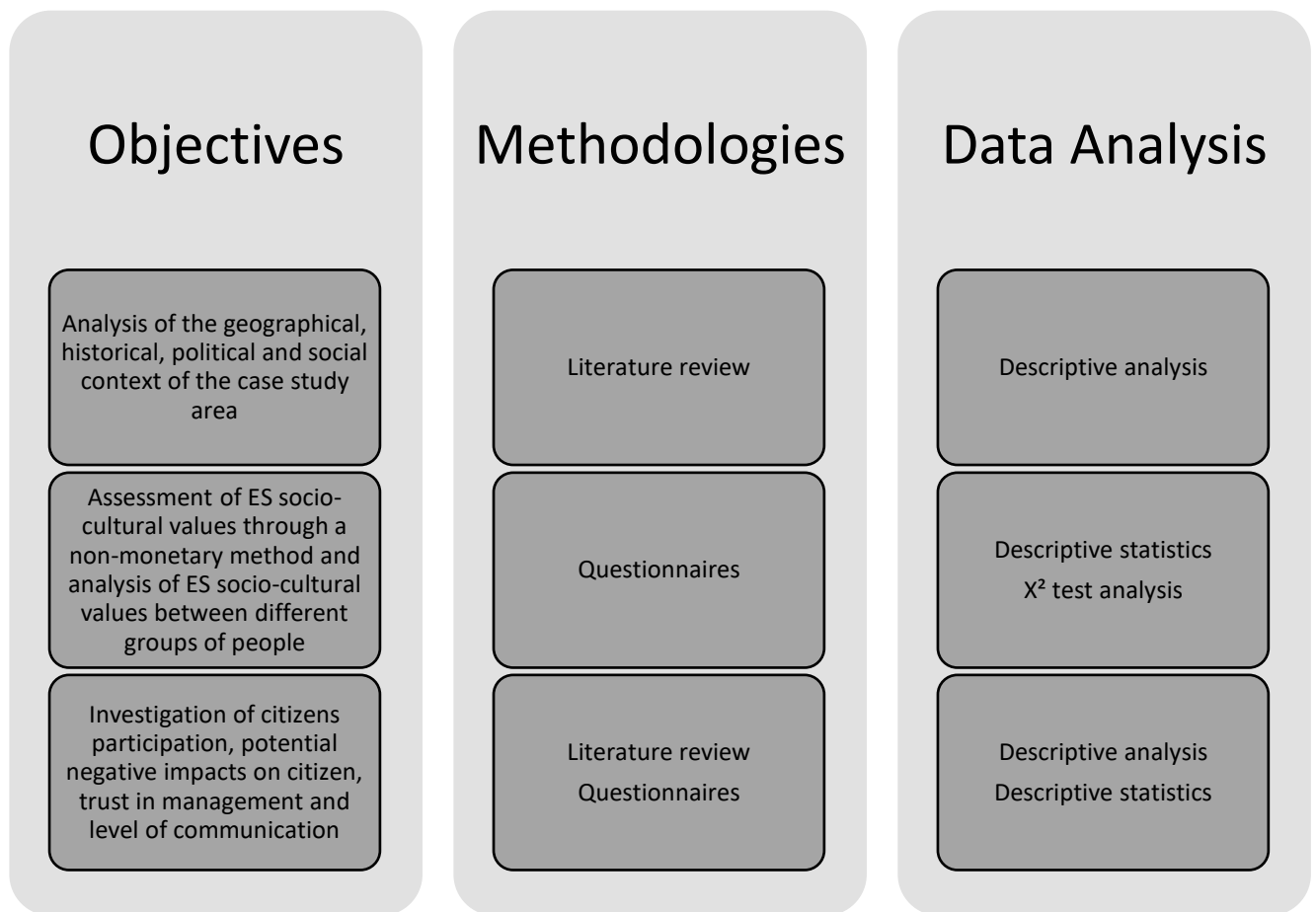


Figure 2.4 shows the methodologies and data analysis used to follow the different objectives of the study for Chapters 5 and 6. The case study relies on quantitative and qualitative primary data. The following sections of this chapter will describe in detail methodologies (literature review in paragraph 2.3.1. and qualitative survey in 2.3.2.) and data analysis, underlying their advantages and limitation and lingering on the researcher's positionality (2.3.3).

2.3.1. Literature review

An initial screening of policy documents, websites and grey literature, including newspaper articles and webpages, was combined with a literature analysis of previous studies from various disciplines in the study area. Between May and August 2018, different information was collected to gain general understanding on territory, history, demography, decision-making and management process, participation and ES supply and trade-offs. Table 2.3 describes in detail the typology of references used for the case study's chapters (5 and 6): official Directives, Regulations and Laws; statistical data; policy documents of CNP; websites; books and scientific literature about CNP. This review provided the groundwork necessary to understand the decision-making and management processes, verifying the practice of the ES approach and identifying the most relevant ES and the trade-offs among them. All documents were analysed using an interpretative analytical approach, in which the documents were reviewed and coded to identify relevant passages. The idea was to analyse the materials using central themes and subthemes (*cf.* Thematic analysis by Bryman, 2012, pages 578-581), of the justice dimensions. The information from different materials was organized based on the core themes of Figure 2.5. For instance, I began by identifying the presence and use of the “ecosystem services” concept in one of the official policy documents of CNP, then I took notes about the different types of information related to ES. This iterative process was repeated for the other materials considered. At the end of the process for the subtheme "ecosystem services", I analysed the set of materials based on the rest of the subthemes.

Figure 2.5 – Themes (vertical) and subthemes (horizontal) used for the interpretative analytical approach of the literature review



In detail, for the procedure dimension of justice, an initial screening of Italian laws of National Parks and all the policy documents of CNP – including the regulation and the Park Plan – was conducted to compile background information on the decision-making. This allowed the identification institutions, regulations and tools provided by the law for the management of protected area and we verified their implementation in CNP. Furthermore, the analysis investigated the presence and the use of the “ecosystem services” concept in all the official policy documents of CNP. The term ES was not often explicitly mentioned in policy objectives, therefore only the documents dealing with park strategies particularly important to the society and economy of the study area were selected.

Table 2.3: Typology and description of references used in the literature review

Typology	Description	References
Official Directives, Regulations and Laws	Natura 2000, Birds Directive, Habitat Directive	European Commission, 2017a-c
	Ramsar Convention	Ramsar Convention, 2014
	CNP sites of Natura 2000	Natura 2000, 2017a-i
	Constitution of the park	Gazzetta Ufficiale della Repubblica Italiana, 2005
	National framework law on protected areas	Gazzetta Ufficiale della Repubblica Italiana, 2018
	Approval of the Statute of Circeo National Park	Ministero dell’Ambiente, 2008
Statistical data	Report on the state of implementation of the law on protected areas	Ministero dell’Ambiente, 2012
	Data about municipal populations, administrative surfaces and touristic flows	ISTAT, 2018a-d
Policy documents of CNP	Data about park population	Personal communication from the Municipalities of Latina, Sabaudia and San Felice Circeo
	Scheme of the Park Plan	Ente <i>Parco Nazionale del Circeo</i> , 2010
	Regulation of the park	Ente <i>Parco Nazionale del Circeo</i> , 2011a
	Park Plan (volume 1-3)	Ente <i>Parco Nazionale del Circeo</i> , 2011b, c, d
	Map of ecosystem services values	European Agricultural Fund for Rural Development, 2013
Websites	Strategic environmental assessment	<i>Parco Nazionale del Circeo</i> , 2016
	Official website of UNESCO	UNESCO, 2017
	Official website of the park	<i>Parco Nazionale del Circeo</i> , 2018a
	Official websites of institutions, associations and organisations related with CNP	Federparchi, 2018 Ministero dell’Ambiente, 2016 Laghi del Lazio, 2017a Proprietà Scalfati, 2017a Zannone, 2018
	Online grey literature of the park in the period January 2016-December 2018 (news and press review)	<i>Parco Nazionale del Circeo</i> , 2018b, c
Books about CNP	Marketing project of Circeo National Park	Caroli, et al. 2012
	Circeo National Park	Salvatori and Rossi, 2006
	Circeo National Park: images of Nature, history and myth	Soldano, 2012
Scientific literature about CNP	Spatial connectivity and boundary patterns in coastal dune vegetation in Circeo National Park, Central Italy	Acosta et al., 2000
	Coastal dynamics vs beach users attitudes and perceptions to enhance environmental conservation and management effectiveness	Aretano et al., 2017
	Local Community Participation in Italian National Parks Management: Theory versus Practice	Buono et al., 2012
	Study of seawater intrusion in the coastal areas of Circeo National Park and Litorale Romano Natural Reserve, for the implementation of numerical modelling methods	Manca, 2014
	Ecotourism and the Charter of Rome on Natural Capital and Cultural Capital in Circeo National Park	Matarrese, 2015
	Environmental effects of over-exploitation of the aquifers of the Pontine Plain (Lazio)	Sappa et al., 2005

These documents – the Environmental Strategic Assessment and the PP – were compared with international ES classifications (CICES; Haines-Young & Potschin, 2011; TEEB, 2010), translating the policies’ objectives in

terms of ES. This phase was necessary, in order to define the ES that would be valued through the questionnaire in the following step. For the distribution dimension, the park policy documentations (Strategic Environmental Assessment and the Park plan), all the grey literature available online from 2016 to 2018 (news and press review on CNP website), as well as relevant scientific publications were examined to identify existent conflicts concerned the delivery and the conservation of different ES and the implications of trade-offs among ES. Finally, for the recognition dimension, the analysis focused on the Park plan (PP), an instrument of the Park Authority to protect natural and environmental values. Draft by the Park Authority, the PP in CNP was set up as an interactive process in order to involve citizens and stakeholders of the territory. The screening of the PP was useful to understand how and in which extent stakeholders were recognised by the Park Authority. The review investigated if the PP took in consideration people depending on the ES and the groups of citizens negatively affected due to the conservation regime of the park.

2.3.2. Questionnaires

Data was collected from questionnaires to capture citizens perceptions regarding: the importance of the ES; the degree of community participation in the Park's initiatives and eventually why people did not participate; potential negative impacts on citizen groups due to the protection regime of the park at an individual level; the trust in the management of the park and in the resolution of problems and tensions with the citizens; and respondents' judgement about the communication media of the park in publicizing the participatory initiatives.

2.3.2.1. Structure

Online questionnaires are designed as web pages and located on a host site (Clifford et al., 2010), in this case using Google Forms. This questionnaire combined semi-structured questions, which generated answers that could be coded and processed quickly and qualitative questions, in order to capture the interviewee's point of view through detailed answers (Bryman, 2012). The questionnaire was organized in seven different part and included both fixed-response questions (multiple choice questions, multiple choice questions with multiple answers and Likert scale questions) and open-ended questions (Clifford et al., 2010), as shown in Table 2.4. Table 2.4 also describes in detail the obtained data, which was for the most part qualitative, for the different questions and how they were used in analysis, according to the relevant sections of the remaining Chapters. The questionnaire asked about people's background knowledge and personal opinions on CNP. In the first three parts, respondents had to indicate which natural environment, inhabited areas and Municipalities make part of CNP; identify the manager body; define their trust level towards CNP Authority (very low, low, high, very high); declare what kind of impact the park has on their activity (positive, negative and null) and why; recognise the activities and the initiatives made or organized by CNP.

Table 2.4: Questionnaire structure articulated in the title of the sections, number of responses and short description of question types, data obtained and use of data

Section	Questions numbers	Description of questions	Types of obtained data and use of data
Knowledge about the CNP	From 1 to 5	Multiple choice questions with multiple answers regarding the awareness and knowledge of the park structure and management system	Qualitative data testing respondents' knowledge about some characteristics the CNP (natural environment, inhabited areas, Municipalities, activities and manager body). These data have not been used in the present study.
	6	Multiple choice question on how the park impacts the respondent or their family	Qualitative data that showed what kind of impact the park has on respondents' activities and life. The frequency distribution of answers has been presented with a pie graphs (as described in section 2.3.2.7). Moreover, these data have been used as variables for the chi-square tests (as described in section 2.3.2.9).
	7	Open-ended question to further explain the previous response	Qualitative answer that described some of the previous answers about the park impacts the respondent or their family. The main motivations for the negative impacts have been described and quantified in a frequency table (as described in section 2.3.2.7).
Trust level and impact of the CNP	8	Likert scale question regarding the level of confidence in the management of the park	Ordinal qualitative data that described the trust level of respondents towards CNP Authority. The frequency distribution of answers has been presented with a pie graph (as described in section 2.3.2.7). Moreover, these data have been used as variables for the chi-square tests (as described in section 2.3.2.9).
	9	Multiple choice with multiple answer question regarding the awareness of the park initiatives	Qualitative data testing respondents' knowledge about some themes the CNP initiatives (agriculture, cultural heritage, biodiversity, deterioration and environmental pollution, park presentation, promotion of the territory, tourism, none). These data have not been used in the present study.
	10	Likert scale question regarding the level communication of the park's initiatives	Ordinal qualitative data that described respondents' opinion about the level of communication of the park's initiatives via different media (local press, social networks, newsletter, word of mouth and posters). The frequency distribution of answers has been presented with a bar graph (as described in section 2.3.2.7).

Section	Questions numbers	Description of questions	Types of obtained data and use of data
Perception of the CNP initiatives	11 and 13	Multiple choice with multiple answer question regarding the participation in the park initiatives and events	Qualitative data showing respondents' participation in different park initiatives (training activities, Park Plan meetings, meetings with farmers, meetings with touristic operators, promotional meetings, cultural heritage meetings, biodiversity meetings, deterioration and environmental pollution meetings, none) and events (environmental education, food and wine, cultural conferences, summer initiatives, sport initiatives, guided tours, none). For this study I used only data related with the Park Plan meetings. The frequency distribution of answers has been presented with a bar pie (as described in section 2.3.2.7).
	12 and 14	Multiple choice question on the reason of the non-participation	Qualitative data showing respondents' reason of the non-participation in park initiatives and events of the previous questions, For this study I used only data related with the non-participation in Park Plan meetings. The frequency distribution of answers has been presented with a bar graph (as described in section 2.3.2.7).
Actual and future participation in the CNP initiatives	15 and 16	Likert scale question regarding the future availability to participate in the park lifetime	Ordinal qualitative data related with the respondents' availability to participate in some park initiatives (meetings with inhabitants of CNP, meetings with workers, training meetings, focus groups to solve conflicts, administrative meetings) and use some park services (information desk at the visitor centre, discussion forum on the website parcocirceo.it, online survey of citizens' satisfaction, social networks as information moment). These data have not been used in the present study.
	17	Open-ended question to suggest other options	Qualitative answer that proposed respondents' suggestions in order to participate in the park lifetime. These data have not been used in the present study.
Recognition of ES of the CNP	18	Multiple choice question on the awareness of the park's benefits	Qualitative data testing respondents' knowledge of single ES (food from agriculture, food from aquaculture, food from mushrooms picking, habitat for species, soil erosion control, air purification, water purification, nature recreation activities, aesthetic value and tranquillity of nature, environmental education and science). The frequency distribution of answers has been presented with a frequency table (as described in section 2.3.2.7).

Section	Questions numbers	Description of questions	Types of obtained data and use of data
Evaluation of ES for social and personal well-being	19 and 20	Multiple choice question on the benefits' assessment	Ordinal qualitative data related with the respondents' appreciation of ES groups (provisioning, regulating and cultural) for the social well-being. These data have not been used in the present study.
	From 21 to 23	Likert scale question regarding the benefits' assessment	Ordinal qualitative data related with the respondents' appreciation of single ES (food from agriculture, food from aquaculture, food from mushrooms picking, habitat for species, soil erosion control, air purification, water purification, nature recreation activities, aesthetic value and tranquillity of nature, environmental education and science) for the personal well-being. I translated these data in discrete quantitative variables (as described in section 2.3.2.5) and I calculated their mean value (as described in section 2.3.2.8). They have been used in aggregated terms, showing their mean values in a frequency table (as described in section 2.3.2.7) and in disaggregated terms, as variables for the chi-square tests (as described in section 2.3.2.9).
Socio-demographic data	From 24 to 28	Multiple choice question on social characteristics	Qualitative data related with gender, nationality, qualification, occupation and quantitative data related with age of respondents. In this section I selected data that indicated gender and age and they have been used as variables for the chi-square tests (as described in section 2.3.2.9). Moreover, gender and age have been used as variables for the post-stratification (as described in section 2.3.2.4).
	29	Multiple choice with multiple answer question regarding the business sector	Qualitative data related with the business sectors of respondents. From this section I used all data. These data have been translated in new dichotomic variables (as described in section 2.3.2.6) and used as variables for the chi-square tests (as described in section 2.3.2.9).
	From 30 to 33	Multiple choice question on demographic characteristics	Qualitative data related with the Municipality of residence, residence time, specific area of residence and work of respondents. In this section I selected data that indicated the house and work proximity to CNP. These data were translated in new dichotomic variables (as described in section 2.3.2.6) and used as variables for the chi-square tests (as described in section 2.3.2.9). Moreover, Municipality of residence have been used as variables for the post-stratification (as described in section 2.3.2.4).

Figure 2.6: Housing and working area



The fourth part asked people to declare if they participated in some park events and if they are available to participate in future initiatives. Parts five and six focused on the ES perception and were realized based on Martín-López et al. (2012) and Oteros-Rozas et al. (2014) papers. Since many people may not be familiar with the term “ecosystem services” (Plieninger *et al.*, 2013), before the section of ES evaluation, respondents received the following brief description: “The objective of this section is to evaluate which benefits of Circeo National Park are important for the well-being of society and citizens. Therefore, questionnaire will ask you to evaluate the importance of some benefits for social well-being and, then, for personal well-being”. Pre-testing (N=20) had shown this explanation to be sufficient to introduce the concept, the actual questionnaire thus did not refer explicitly to the term “ecosystem services”. Pre-testing had also shown the need to simplify the technical language about the ES description. For this reason, the questionnaire presented four tables, using simple description and presenting examples and pictures of the groups and single of ES identified through the literature review. Respondents had to recognise the presence of the ES (yes, no, I don’t know), rank the three categories of ES (provisioning, regulating and cultural) for their importance in the social well-

being (1st and 2nd) and value each ES for the personal well-being (not important, not very important, enough important, very important). The last part asked about the socio-demographic characteristics of respondents: gender, age, nationality, qualification, occupation, working sector, municipality of residence, residence time, housing and working area (see figure 2.6). The full questionnaire is available in Annex I (and references in Annex II), but only some data from the questionnaire were used for the chapter 6, as also described in Table 2.4. For this reason, the following sections will refer to the data actually used.

2.3.2.2. Distribution

During the period from the 18th of December 2018 to the 18th February 2019, the post survey URL link was distributed online. In detail it was:

- published on the CNP website (Figure 2.7);
- published on my personal Facebook profile;
- published on Istituto Pangea Onlus Facebook page;
- published on 11 Facebook community bulletin boards of Sabaudia citizens;
- published on 8 Facebook community bulletin boards of San Felice Circeo citizens;
- published on 2 Facebook community bulletin boards of Park's Municipalities;
- sending by private messages to 489 Facebook contacts;
- sending by private messages to 436 Facebook pages of all typology of associations, commercial and touristic activities.

To reach people who do not use the internet for age reasons, I distributed the paper version in three elderly centers: Sabaudia, San Felice Circeo and Borgo Montenero (in San Felice Circeo). After 2 months, I collected 375 anonymous questionnaires, of which 52 from the elderly centres and 323 completed online.

Figure 2.7: Online distribution through Circeo National Park website



La percezione del Parco Nazionale del Circeo: un questionario per i cittadini di Sabaudia e San Felice

L'analisi sostenuta dall'Ente Parco nell'ambito di un dottorato di ricerca dell'Università "La Sapienza" di Roma

(Sabaudia, 18 Dicembre 18)

Valutare la percezione e l'importanza del Parco Nazionale del Circeo per i cittadini di Sabaudia e San Felice Circeo: è questo l'obiettivo dell'indagine accolta e sostenuta dall'Ente Parco del Circeo, e svolta nell'ambito del dottorato di ricerca della dottoressa Stefania Benetti dell'Università "La Sapienza" di Roma.

Nell'ambito di questa analisi è fondamentale conoscere il punto di vista dei cittadini sul ruolo che occupa il Parco nelle loro vite e nelle loro attività giornaliere ed economiche.

Il questionario da compilare è anonimo e i dati raccolti saranno trattati in modo aggregato, nel rispetto della legge sulla privacy.

Vi invitiamo a partecipare dedicando pochi minuti della vostra giornata alla compilazione del questionario perché i risultati saranno utilizzati dal Parco al fine di migliorare i propri servizi.

Troverete il questionario al seguente link: <https://goo.gl/forms/UmAbhkH2qUg3DeIL2>



La percezione del Parco Nazionale del Circeo: un questionario per i cittadini di Sabaudia e San Felice

2.3.2.3. Advantages and limitations

The empirical data for this research was mainly derived from the online questionnaires for the reasons and the advantages summarized in Table 2.5. Survey research is particularly useful for eliciting people's attitudes and opinions about social, political and environmental issues and is a tool for gathering information about people's lives that is not available from published sources (Clifford et al., 2010). Questionnaires were distributed using Facebook because the following reasons:

- Facebook can reduce the time space constraints using social networks contacts and can minimise the cost of updating the sample framework.
- Facebook can be an efficient source of information that can extend the sample size of studies that use ascending methodologies, increasing the validation and representativeness of the results.
- The combination of Facebook recruitment with an online survey reduces time and monetary costs and minimises response bias (Baltar and Brunet, 2012).

Combined with online questionnaires, as mentioned above, hard copy versions were also distributed in three elderly centres to reach people who do not use the internet for age reasons. In geography, questionnaire surveys have been used to explore people's perceptions, attitudes, experiences, behaviours and spatial interactions in diverse geographical contexts (Clifford et al., 2010). However, this methodology entails limitations in research, as highlighted in table 2.6.

The objective of online distribution was to access potential participants by posting invitations to participate in the survey on community bulletin boards or discussion groups of citizens and by sending private messages. Nevertheless, members of online communities or people received the messages can find this behaviour rude or consider this type of posting to be spam (Baltar & Brunet, 2012; Wright, 2006). To avoid this, I apologized in advance for the potentially unwanted posting and message, with an explanation of the importance of conducting the research and possible benefits to members.

The greatest limitation is that achieving a random sample of Internet users is problematic, if not impossible (Van Selm and Jankowski, 2006). As defined in Van Selm & Jankowski (2006), this sample can be considered as a unrestricted sample, generated by communicating the availability of a questionnaire widely and allowing anyone to visit the Web site and to complete the questionnaire. In order to overlap these limitations, I applied a post-stratification, described in the following paragraph.

Table 2.5: Advantages of online questionnaires

Advantages	Description	References
Cheaper	Costs are lower and surveys are self-administered, so they do not require personal interviews.	Baltar and Brunet, 2012 Clifford et al., 2010 Fricker and Schonlau, 2002 Ho, 2014 Van Selm and Jankowski, 2006 Wright, 2006
Faster	Online surveys can be administered in a time-efficient manner, minimising the period to collect and process data.	Baltar and Brunet, 2012 Clifford et al., 2010 Fricker and Schonlau, 2002 Ho, 2014 Van Selm and Jankowski, 2006 Wright, 2006
More types of questions and more visually attractive	Online surveys can include all kinds of questions (e.g. dichotomous, multiple-choice, scales, open-ended questions). And they can contain detailed colour graphics, such as maps, photographs, video clips and animations.	Baltar and Brunet, 2012 Clifford et al., 2010
Higher distribution and access	Internet surveys provide access to geographically dispersed populations and they can be used to reach physically immobile groups. The Internet enables communication among people who may be hesitant to meet face-to-face and express their opinion. Moreover, online survey takes advantage of the ability of the Internet to provide access to groups and individuals who would be difficult, if not impossible, to reach through other channels. And then, technology innovations that make questionnaires more attractive and easier to use, also to respondents without computational skills.	Baltar and Brunet, 2012 Clifford et al., 2010 Wright, 2006
Higher response rate	Online surveys increase the response rate because it is easier to follow-up non-respondents. Furthermore, combined with other survey modes, yield higher response rates than the other survey modes by themselves.	Baltar and Brunet, 2012 Clifford et al., 2010 Fricker and Schonlau, 2002
More immediate data collection	Data often can be used more or less directly for analysis because, once the last questionnaire is submitted, the researcher instantaneously has all the data stored in a database.	Baltar and Brunet, 2012 Clifford et al., 2010 Ho, 2014 Van Selm and Jankowski, 2006
Quick and convenience for the respondent	Respondents can answer at a convenient time for themselves.	Baltar and Brunet, 2012 Ho, 2014 Van Selm and Jankowski, 2006
Anonymity of the respondent	Web based surveys do allow for anonymity in as much as respondents are free to withhold their names. And this implies an absence of interviewer bias.	Van Selm and Jankowski, 2006

Table 2.6: Disadvantages of online questionnaire

Disadvantages	Description	References
Need of Internet access	Respondents need to regularly access and have access to the Internet.	Ho, 2014
Difficulty of participation for some categories	People with disabilities (e.g. visual impairment) have difficulty to participate in the survey. Moreover, some respondents could lack of online experience.	Baltar and Brunet, 2012 Ho, 2014
Impersonal	There is usually no human contact in online surveys.	Baltar and Brunet, 2012
Possibility of multiple responses	Multiple responses are also possible in this form of online survey from a single person.	Van Selm and Jankowski, 2006
Spam perception	Sometimes possible respondents can have the perception that the message for the questionnaire compilation is a spam. Or someone may delete the message, considered as an unwanted post. This can increase the non-response rate.	Baltar and Brunet, 2012 Wright, 2006
Impossibility of calculating the response rate	There is no way in which to know how many individuals might have seen the survey or its links but declined to participate. Only the number of completed surveys is known and not the number of refusals. In addition, some studies reflect that there is a low response rate of many online surveys.	Baltar and Brunet, 2012 Van Selm and Jankowski, 2006
Self-selection bias	Selection bias related with the Internet population (gender, age, education level, socioeconomic level, etc) and is one of the major limitations of online survey research. In any given Internet community, there are undoubtedly some individuals who are more likely than others to complete an online survey. There is a tendency of some individuals to respond to an invitation to participate in an online survey, while others ignore it, leading to a systematic bias. These sampling issues inhibit researchers' ability to generalize about study findings.	Baltar and Brunet, 2012 Wright, 2006
Volunteer sample	The sample selection methods for the online surveys are volunteer samples. In the case of in online communities (such as Facebook groups), participation may be sporadic depending on the nature of the group and the individuals involved in discussions. Some people are regulars, while others only participate intermittently. Furthermore, there are some individuals who read posts but do not send messages, who may complete an online survey even though they are not visible to the rest of the community.	Baltar and Brunet, 2012 Wright, 2006

2.3.2.4. Post-stratification

Following Little (1993), I stratified the universe population and the sample population based on gender, age and Municipality of residence. The distribution of the two populations are not very different, but, because the sample respects the characteristics of the universe, this is not enough. In order to correct the starting

distribution, I calculated weights based on these stratifications for the universe and the sample population. Then, I calculated the final weights as the ration between the weight of universe population and the weight of sample population, obtaining the Table 2.7. I applied these weights to each rows of the database. The number of individuals taken into account with the weights of Table 2.7 are 365, because 10 individuals didn't declare their gender. For this reason, I applied a weight equal to 0 to the questionnaires corresponding to these individuals. This procedure allowed the sample to be more representative of the population.

Table 2.7: Weights of the universe population compared to the sample population

WEIGHTS APPLIED TO THE QUESTIONNAIRES			
Gender	Age	SABAUDIA	SAN FELICE CIRCEO
M	18-24	2,504312162	2,539288589
	25-34	0,945529406	0,544855005
	35-44	1,718974791	0,582940447
	45-54	2,700180153	0,926606262
	55-64	1,633081166	1,283135202
	65-74	1,551554295	0,688081706
	>75	11,48625858	0,811453103
F	18-24	1,070278662	0,384740695
	25-34	0,32847427	0,353579879
	35-44	0,686502833	0,457491663
	45-54	1,622906206	0,53094216
	55-64	2,94501514	1,077273947
	65-74	2,342421272	1,434033501
	>75	3,801937598	1,122743302

2.3.2.5. Changing

At the end of questionnaires distribution, I collected 376 responses. However, rows 168 and 169 were perfectly identical and recorded unlike a few seconds. Most likely they were recorded two times for error by the same person. For this reason, I eliminated one of this two rows, obtaining a sample of 375 anonymous questionnaires. Moreover, I modified some answers, transforming them from ordinal qualitative variables in discrete quantitative variables, as follows: evaluation of single ES (Food from agriculture, Food from aquaculture, Food from mushrooms picking, Habitat for species, Soil erosion control, Air purification, Water purification, Nature recreation activities, Aesthetic value and tranquillity of nature, Environmental education and science) for personal well-being: no importance = 1; little importance = 2; some importance = 3; much importance = 4.

2.3.2.6. New variables

In order to simplify some qualitative variables, I created the following new variables.

- “ProxHouse” indicates the house proximity to CNP for each respondent. It’s a dichotomic variable and takes value equal to 1 if the respondent lives in the area “A”, “C”, “E”, or “G”, which are the areas of CNP. It takes values equal to 0 if the respondent lives in the area “B”, “D”, or “F” (see figure 3.6).
- “ProxWork” indicates the work proximity to CNP for each respondent. It’s a dichotomic variable and takes value equal to 1 if the respondent works in the area “A”, “C”, “E”, or “G”, which are the areas of CNP. It takes values equal to 0 if the respondent lives in the area “B”, “D”, “F”, “Other areas” or “No work” (see figure 3.6).
- “ProxHW” indicates the house and work proximity to CNP for each respondent. It’s a dichotomic variable, based on the previous two. It takes value equal to 1 only if “ProxHouse” and “ProxWork” are equal to 1, so when the respondent lives and works in the areas of CNP.
- In the questionnaires, respondents can indicate one or more business sectors. To simplify the lecture of these data I create 13 dichotomic variables, for each business sector. They take value equal to 1 if the respondent works in that sector and 0 if they don’t. These variables are: “AgricultureSector”, “HotelCateringSector”, “IndustryCraftSector”, “Education”, “ProfessionalSector”, “PublicSector”, “BuildingSector”, “TradeSector”, “RentalTravelSector”, “RealestateInsuranceSector”, “FishingSector”, “TransportSector” and “OtherSectors”.

2.3.2.7. Table of frequencies and graphs

In order to showing the distribution of values in the set of data (Ebdon, 1985), I used the tables of frequencies, accompanied by bar or pie graphs. With these tools, I gave a visual representation of the frequency distribution (Ebdon, 1985) for the following survey results:

- the level of communication of park initiatives;
- the level of participation in park initiatives;
- the impact of the park on people activities;
- the trust level in the park management;
- the recognition of ES;
- the importance of single es for the personal well-being.

2.3.2.8. Mean value

For some questionnaires’ results, I considered their arithmetic mean value. It is the average value of discrete variables, a one-number summary of the distribution (Wasserman, 2004). It is calculated by adding together all the values in the data set and dividing by the number of values (Ebdon, 1985). The equation is:

$$\bar{x} = \frac{\sum x}{n}$$

I calculated the mean value for the importance of single ES for the personal well-being, based on Oteros-Rozas et al. (2014), who calculated the mean considering respondents' answers as: no importance = 1, little importance = 2, some importance = 3 and much importance = 4. Moreover, in order to be able to better compare ES, I used a minimum-maximum normalization to standardize data on a 0 to 1 scale (Castro et al., 2015; Willemen et al., 2010), following the formula:

$$\bar{y} = \frac{\bar{x} - \min}{\max - \min}$$

where *min* and *max* are the minimum and maximum values of respondents' answers (no importance = 1 and much importance = 4).

2.3.2.9. Pearson Chi-square test

Pearson Chi-square test is a non-parametric statistic, also called a distribution free test, applied to contingency tables with various dimensions (Bewick, et al., 2004; Mchugh, 2013). Contingency table is a type of table in a matrix format that displays the frequency distribution of the variables and provides a basic picture of the interrelation between two variables (Ebdon, 1985). The χ^2 assume the data were obtained through random selection, however, it is not uncommon to find inferential statistics used when data are from convenience samples rather than random samples (Mchugh, 2013). The assumptions of the test include:

1. the data in the cells should be frequencies or counts of cases rather than percentages or some other transformation of the data;
2. the levels (or categories) of the variables are mutually exclusive, i.e. a particular subject fit into one and only one level of each of the variables;
3. each subject may contribute data to one and only one cell in the χ^2 ;
4. the study groups must be independent;
5. there are 2 variables and both are measured as categories, usually at the nominal level or data may be ordinal data;
6. the value of the cell expected should be 5 or more in at least 80% of the cells and no cell should have an expected of less than one (this assumption specifies the number of cases needed to use the χ^2 for any number of cells in that χ^2) (Mchugh, 2013).

The test is applied when there are two categorical variables from a single population and it is used to determine whether there is a significant association between these two variables (Bewick, et al., 2004). It has no rule about limiting the number of cells (Mchugh, 2013). The null hypothesis is that there is no association between the two variables of analysis. The test involves calculating the differences between the observed and expected frequencies and, as represented in Bewick et al. (2004) and Wasserman (2004), the calculated test statistic for a table with *r* rows and *c* columns is given by:

$$X^2 = \sum_{i=1}^r \sum_{j=1}^c \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

where O_{ij} is the observed frequency and E_{ij} is the expected frequency in the cell in row i and column j . If the null hypothesis is true, the calculated test statistic approximately follows a χ^2 distribution with $(r - 1) \times (c - 1)$ degrees of freedom. A large value of X^2 indicates that there is a large amount of difference between the observed and the expected frequencies and would suggest that the null hypothesis can be rejected. However, it is necessary to check whether the calculated value of X^2 is indeed greater than the critical value given in the appropriate table.

Using categorical variables in this study, data were summarized in the form of frequencies. In order to investigate the association between variables, these frequencies were presented in contingency tables. Variables taken into account in contingency tables were personal data (gender, age, residence, level of education), proximity to the park (house proximity, work proximity), personal opinion (park impact and level of trust), participation (general level of citizens participation) and business sectors (agriculture, livestock and forestry; fishing and aquaculture; industry and crafts; buildings; wholesale and retail trade; hotel and catering sector; rental, travel agencies, business support services; transport and storage; financial, insurance and real estate activities; professional, scientific and technical activities; education; public administration and defence; other activities). Variables taken into account in contingency tables were recognition of ES (for food from agriculture; food from aquaculture; food from mushrooms picking; habitat for species; soil erosion control; air purification; water purification; nature recreation activities; aesthetic value and tranquillity of nature; environmental education and science) and evaluation of ES for personal well-being (for food from agriculture; food from aquaculture; food from mushrooms picking; habitat for species; soil erosion control; air purification; water purification; nature recreation activities; aesthetic value and tranquillity of nature; environmental education and science). For all the tests, the significance level was equal to 0,05. All statistically significant tests are listed in Annex III, but only some of them have been used in Chapter 6. This examination was the basis of the disaggregated analysis (Daw *et al.*, 2011) used to consider variables of social heterogeneity.

2.3.3. Positionality

A research practice should recognise and take account of the researcher's own position (McDowell, 1992). The need to situate a knowledge of a research is based on the fact that the sort of knowledge made depends on who its makers are (Rose, 1997). For this reason, I want to recognise my positionality in my research thesis. I live in San Felice Circeo, one of the municipalities of the case study. Since 2016, I have worked as a tour guide in Circeo National Park, so I know the protected area well. Thus, describing the case study was easier for me with respect to another researcher who unfamiliar with the area. Moreover, my local knowledge network allowed me to reach earlier and more easily some specific references for the case study and reduce

the research costs. At the same time, living in the case study area may have biased my perspective in the onset of carrying out this research, as I already had some experience reflecting on justice/injustice in the area. First, I often perceived a general sense of discontent of inhabitants. Residents identify Circeo National Park as a limitation or a prohibition, especially for their economic activities. This emerged in part from results (Figure 6.7 and Table 6.3). Second, despite this sense of discontent, I noticed a tendency to complain rather than doing something to change this situation. This also emerged in part from results (Figure 6.2), but not so incisively. What I did not expect, on the contrary, was the high resident's awareness and appreciation of benefits from Circeo National Park (Table 6.4). As underlined by Rose (1997), a researcher cannot know everything, nor survey knowledge as if we can fully understand, control or redistribute it. But the researcher may be able to "inscribe into own research practices some absences and fallibilities while recognising that the significance of this does not rest entirely in our own hands" (Rose, 1997).

CHAPTER 3. ECOSYSTEM SERVICES AND ENVIRONMENTAL JUSTICE: A LITERATURE REVIEW²

3.1. BACKGROUND

Ecosystem Services (ES) have been defined as a contested concept (Schröter *et al.*, 2014) and criticised for the risk of “selling out on nature” (McCauley, 2006). ES are found in open access, public or communal properties, but the commodification process, i.e. the inclusion of new ecosystem functions into pricing systems and market relations, turned ES into commodities that can be accessed only by those having purchasing power (Gómez-Baggethun and Ruiz-Pérez, 2011). This chapter focuses on the idea that biodiversity, ecosystems and all types of ES are matters of concern within a human right or a justice context (Arias-Arévalo *et al.*, 2018) and avoids discussions, while recognizing them, on the principal criticisms about the justice of nature commodification. The chapter analyses equity and justice issues involved in ES approaches.

Assessments of ES typically explore the complexity of ecological functioning and its values in variable socio-political contexts, as well as the impact they have on wider social-ecological systems (Aragão, Jacobs and Cliquet, 2016). Economic valuation was and often is a strategic calculation, rarely considering its social and environmental justice implications (Matulis, 2014). In some cases, ES solutions can be seen as reinforcing unequal power relationships or leading to social injustice (Kull, Arnauld de Sartre and Castro-Larrañaga, 2015), or being criticized for not tailoring to or specifically addressing human health concerns of communities (Marshall and Gonzalez-Meler, 2016). In addition, the ES approach has been criticized for adopting a homogenous approach to communities and failing to consider social diversity and power structures influencing access to benefits and participation in the governance of ES (Iniesta-Arandia *et al.*, 2014; Chaudhary *et al.*, 2018; Díaz *et al.*, 2018). In order to bridge this gap, ES approaches require a steady ethical compass (Aragão, Jacobs and Cliquet, 2016) and a justice analysis (Sikor *et al.*, 2014).

However, Environmental Justice (EJ) frameworks have rarely been applied to ES discourse, although they can make an important contribution (Chaudhary *et al.*, 2018). Through a literature review, this article integrates aspects of EJ in ES, considering EJ as an analytical approach to thinking about ES issues. The review develops an analytical framework applied to ES, based on a lens of environmental justice (3.2) and its different dimensions – distribution (3.3), recognition (3.4), procedure (3.5) and others (3.6) – as well as how these dimensions influence each other (3.7). Moreover, the research focuses on the implications of this framework with a consideration of environmental management (3.8).

² Note to reader: This chapter has been prepared for submission to an international peer-reviewed journal for publication. For a more detailed explanation of the methodological approach underpinning this article, please refer to Chapter 2. A further application of the theoretical framework developed in this article can also be found in Chapters 4 and 6.

3.2. ENVIRONMENTAL JUSTICE FRAMEWORK

EJ can be considered fair treatment for people of all races, cultures and incomes, regarding the development of environmental laws, regulations and policies (EPA, 2011). It emerged as a concept in the United States in the early 1980s and the term has two distinct uses:

- 1) A social movement that focuses on the fair distribution of environmental benefits and risks;
- 2) An interdisciplinary body of social science literature that includes theories of the environment and justice, environmental laws and their implementations, environmental policy and planning and governance for development and sustainability and political ecology (Schlosberg, 2001).

The EJ movement included the incorporation of the principle of the right of all individuals to be protected from environmental degradation; the adaptation of a public health model of prevention; the burden of proof to polluters and dischargers; and the redresses disproportionate risk burdens through targeted action and resources (Brulle and Pellow, 2006). The original idea of EJ revolved around the negative health impacts of environmental degradation and pollution, while ES highlights benefits of greenspaces beyond health (Marshall and Gonzalez-Meler, 2016). This could be considered an impediment for taking an ES approach to EJ because the two fields seem focus on two distinct aspects of the environment, but EJ is not limited to concerns over environmental degradation and pollution.

EJ is strictly related to politics, intended in terms of policies (e.g., certain environmental measures), the very structures of polity (i.e., institutionalised forms of policies) and of politics (i.e., actors and conflicts about structures and political strategies) (Görg *et al.*, 2017). Therefore, EJ concerns questions of environmental power relationships, which include, on the one hand, questions of forces from above and their impacts locally and, on the other, one of the struggles across scales involving a host of individual moments, actors and enactments (Castree *et al.*, 2009). The EJ perspective can give a more detailed understanding of this politicized environment, in particular, in the analysis of how unequal power relations are often linked to conflicts over access to and the use of, diverse environmental resources (Bryant, 1998). Here environmental governance becomes a way to address the inequitable distribution of social goods, conditions undermining social recognition, democratic and participatory decision-making procedures (Schlosberg, 2004).

In recent years, political theory literature has generally seen justice exclusively as a question of equity in the distribution of social goods (Schlosberg, 2001). Additionally, general notions of ES and EJ were commonly focused on theoretical discussions of how to define distributive justice of ES (Matulis, 2014). The distributive dimensions of analysis focused on different aspects of ES: benefits, costs, access, responsibilities or compensation for ES. Over the years, EJ moved beyond distributional issues and began considering issues of recognition and participation (Chaudhary *et al.*, 2018), recognising different values and identities and exploring various perceptions of decision-making procedures.

This chapter builds on recent scholarly work on distributional, recognitional and procedural dimensions of EJ and it is specifically relevant considering the contributions of definitions and theoretical frameworks from Schlosberg (2001), Sikor (2013) and Chaudhary et al.'s (2018). The following sections extend these works by describing in detail the dimensions of EJ analysed by the ES literature (3.3, 3.4, 3.5, 3.6 and 3.7) and developing an ES and EJ combined framework in order to sustain the environmental governance (3.8).

3.3. DISTRIBUTION

Environmental injustices can impact human beings unequally along lines of race, gender, class, nation (Brulle and Pellow, 2006) and other human and community-centred characteristics. Distribution can be broadly be defined as the equal distribution of benefits and burdens among individuals or groups (Schlosberg, 2004; Boone *et al.*, 2009). Distributive justice is about the distribution of goods and bad between different people, such as access to clean water or exposure to air pollution, with implications for human well-being (Sikor, 2013). Distribution is also about the assignment of rights and responsibilities among stakeholders (Sikor *et al.*, 2014). Thus, excluding vulnerable populations entirely from access to fundamental ES is a distributive injustice (Aragão, Jacobs and Cliquet, 2016).

In the literature, there are different applications of distributive justice within the context of ES. For instance, Chaudhary *et al.* (2018) analysed how ES were accessed within a community forestry case study in Nepal, differentiating by income, caste and gender. Boone *et al.* (2009) measured parks distribution and access in Baltimore, considering park as an set of ES. Indeed, in the urban context, green spaces, parks and gardens provide a wide range of ES that can help combat many urban issues and improve the quality of life and health for city dwellers (Wolch, Byrne and Newell, 2014). As previously underlined by Wolch, Byrne and Newell (2014), access to green spaces is often highly stratified by income, ethno-racial characteristics, age, gender, (dis)ability and other socio-economic axes of difference.

The benefits from ES are rarely, if ever, distributed equally within communities (Lau *et al.*, 2018) and, in some cases, different access and control over natural resources or ES can cause environmental conflicts (Hanaček and Rodríguez-Labajos, 2018). Hanaček and Rodríguez-Labajos (2016), for example, identified different levels of access to benefits from cultural ES among the causes of environmental conflicts in agroecosystems. Moreover, the distribution of benefits can differ between poor and rich areas of a place (Ernstson, 2013).

Research on distributive issues has been centred around compensatory measures for poverty alleviation and climate change mitigation. In the case of payments for ES (PES), for instance, the inhabitants of rural areas receive compensations in return for supplying ES by renouncing intensive farming and implementing habitat-protective techniques (Fleischer, Felsenstein and Lichter, 2018). Since most of the global poor live in rural areas, PES have an effect on equity: the poor are paid for reducing environmental damage, meaning their conservation or avoided practices and activities are compensated (Fleischer, Felsenstein and Lichter, 2018).

The evaluation of ES flows also creates implications for justice: measurement can have distributive implications since the employed methodologies tend to capture some changes in ES flows and fail to do so for others (Sikor *et al.*, 2014). For instance, economic evaluations of ES are often carried out using aggregate figures, without concern for or techniques to account for the issue of unequal distribution among those who benefit and those who incur in costs in the wake of change in ES provision (Fleischer, Felsenstein and Lichter, 2018). In legal terms, distributive fairness depends on the proportionality of costs and benefits, an essential consideration in developing legal instruments to balance the conservation and exploitation of ES (Aragão, Jacobs and Cliquet, 2016).

Moreover, the human use of ecosystems and its services raises fundamental questions of intragenerational and intergenerational justice: theories of distributive justice should consider the distribution of access rights to ES, both among persons of the present generation and between persons of the present and future generations (Glotzbach, 2013). Distribution should be viewed herein as the temporal and spatial scales at which it is possible for humans to benefit from, or access to, ES (Ernstson, 2013): the distribution of benefits and costs associated with the ES should be calculated across both spatial and temporal scales (Jax *et al.*, 2013).

ES approaches to EJ should also be spatially explicit, using specific local knowledge in targeting alleviation of disparities (Marshall and Gonzalez-Meler, 2016). ES-based research needs to interrogate pre-defined stakeholder groups to move towards environmental and social justice (Lau *et al.*, 2018). Disregarding the distributional patterns means ignoring questions of justice and raise the troubling prospect that ES approaches may make societies more uneven, thereby risking development outcomes and associated conservation capacities (Chaudhary *et al.*, 2018).

3.4. RECOGNITION

Recognition refers to who or what is recognised in decision-making processes, without necessarily actively participating, in terms of respect for differences and avoiding domination (Bohman, 2007). Recognition is about acknowledging people's distinct identities and histories and eliminating forms of cultural domination of some groups over others (Sikor, 2013; Sikor *et al.*, 2014). It means respecting social and cultural difference and resisting any pressure on minority groups to assimilate to dominant norms (Sikor, 2013). Injustices can occur as a result from a lack of recognition or misrecognition of issues related to social categories like caste, class, gender and culture (Fraser, 2000). When misrecognition is embedded in the cultural norms of society and sometimes in the structures of language, injustices are much more likely (Martin *et al.*, 2016).

Moreover, issues of recognition can arise when stakeholders hold different visions of the ecosystem, have different histories in their engagement with the ecosystem and apply different types of knowledge and practices to management (Sikor *et al.*, 2014). Social actor groups can have very different perceptions of and interests placed on, the benefits provided by local ecosystems (Cáceres *et al.*, 2015). Socio-cultural or

ecological conflicting values, interests and preferences can often be a cause of a conflict (Hanaček and Rodríguez-Labajos, 2018). The diversity of values and perspectives exists among stakeholders, including the poorest and most marginal local people (Dawson *et al.*, 2017).

EJ conflicts arise whenever different stakeholder groups have different preferences regarding which use to make of ecosystem functions identified as potentially useful to human purposes (Spangenberg, 2015). Different societal groups will express different, culture and value based individual and collective preferences in this process of use value attribution (Spangenberg, 2015). Identifying how different people value and prioritize ES is a crucial step for equitable and successful ES-based approaches (Sikor *et al.*, 2014). Exploring trade-offs between ES and linking them with stakeholders can help reveal the potential losers and winners of land use changes and conflicts (Kovács *et al.*, 2015). Improving recognition is about acknowledging that conservation can produce these kinds of harms as well as providing opportunities for their alleviation (Martin *et al.*, 2016).

3.5. PROCEDURE

Procedural justice refers to the legitimation of decision-making procedures and considers transparency, citizen involvement, access to environmental information and public participation (Aragão, Jacobs and Cliquet, 2016). Just processes refer to forms of participation, analysing who participates in decision-making, on what terms and how decisions are made for equitable outcomes (Gustavsson *et al.*, 2014). Participation is often referred to as “procedural justice”, directing attention to the roles of different stakeholders in decision-making (Sikor, 2013; Sikor *et al.*, 2014). The omission of public participation in decision-making processes in respect of ES, is procedural injustice (Aragão, Jacobs and Cliquet, 2016). Different forms of exclusion are related to either vulnerable groups from decision-making, environmental management, policy making and also from participation in scientific research (Hanaček and Rodríguez-Labajos, 2018).

Effects on procedural justice arise from the decision-making procedures employed to identify the trade-off and the desirable level of ES provision (Sikor *et al.*, 2014). From a valuation perspective, environmental problems and conflicts are the consequence of trade-offs between values held by different groups of stakeholders, which in many cases are not well represented in the decision-making process (Jacobs *et al.*, 2016).

Decisions concerning ES are reflected in ecosystem governance, urban planning and other management tools. Environmental management inevitably involves trade-offs among different objectives, values and stakeholders (Daw *et al.*, 2015). At the same time, urban management involves collaborations between local government, urban planners, designers, ecologists and disparate community groups to articulate strategies for urban green space that explicitly advance public health, environmental equity and social justice in urban communities. (Wolch, Byrne and Newell, 2014).

Different authors have underlined the importance of including ES and groups of citizens related to them in decision-making processes. Chan et al. (2012) identified the necessity of participatory methods of cataloguing or identifying priority ES based on stakeholders' input. Daw *et al.* (2015) also undelined that participatory models and scenarios approaches can increase awareness of trade-offs, promote discussion of what is socially acceptable and potentially identify and reduce obstacles to compliance. According to Martín-López *et al.* (2012), visualizing ES trade-offs based on socio-cultural preferences can serve as a tool to identify the impact of different management options on an ecosystem's capacity to deliver services and as a basis for decision-making processes. Raum (2018) argues that a stakeholder analysis enables the systematic identification of stakeholders, the assessment and comparison of their particular sets of interests, roles and powers and the consideration and investigation of the relationships between them, including alliances, collaborations and inherent conflicts.

There is no one governance approach that can definitively deliver on improved ecosystem health and human wellbeing (Nunan *et al.*, 2018), but an explicit consideration of the diversity of values and possible taboos help explain the deeply felt conflicts that can result from ES trade-offs, acknowledge the social complexity and support decision-making processes (Daw *et al.*, 2015). Involvement, or participation, must be meaningful, i.e. it must be sustained and have influence over decision-making (Nunan *et al.*, 2018). Moreover, ES assessments should incorporate non-monetary methods to assess social preferences in order to identify relevant services for people, potential social conflicts due to different needs and perceptions, trade-offs among ES and ES bundles (Martín-López *et al.*, 2012). Linking ES to stakeholders and systematically mapping their potential stakes in these will be essential for equitable and sustainable governance and management (Raum, 2018).

3.6. OTHER DIMENSIONS

Next to the classic dimension of EJ (distributive, recognition and procedural), the following additional dimensions can be identified within the literature.

1. Commutative justice refers to correct valuation for environmental goods employed for economic purposes (Aragão, Jacobs and Cliquet, 2016) and to fair compensation and focuses on the equivalence of a transaction between two parties (Jonge, 2011). Commutative justice requires an appropriate valuation, a correct pricing and a fair payment/compensation for natural capital employed in productive uses, taking into account ES appropriation (Aragão, Jacobs and Cliquet, 2016). The idea of commutative justice is related to the design and the implementation of the ES compensatory measures (taxes or payment schemes as PES, REDD+, or IPEBES). Unjust enrichment or activities which impose disproportional advantages for one of the contracting parties in the exploitation and appropriation of ES for private use are considered commutative injustice (Aragão, Jacobs and Cliquet, 2016).

2. Retributive justice stipulates that any relevant human influence on ES should trigger a legal consequence: for negative influences on ES, incentives or regulatory measures should be applied when causing negative consequences (e.g. taxation, imposing bureaucratic burdens, or direct sanctioning), as well for positive human influences on ES can be positively rewarded as well (e.g. direct economic retribution, subventions, tax deductions, economic incentives and removal of bureaucratic burdens) (Aragão, Jacobs and Cliquet, 2016).
3. Restorative justice requires corrective actions be taken in case of ES degradation or loss. For instance, the irreversible loss of ES due to anthropogenic activities is considered a form of restorative injustice (Aragão, Jacobs and Cliquet, 2016).
4. Within the distributive dimension, the EJ literature distinguishes issues of intragenerational, intergenerational justice and interspecies justice. The first two dimensions refers to the distribution of access rights to ES among persons of the present generation (intragenerational), as individuals, social groups and communities and between persons of the present and future generations (intergenerational) (Baumgartner and Glotzbach, 2012; Glotzbach, 2013; Sikor, 2013). Intergenerational justice is a prominent feature in EJ, in contrast to social justice in general (Sikor, 2013). The interspecies justice is justice among and with other species (Lele *et al.*, 2013).

3.7. INFLUENCES BETWEEN DIMENSIONS

These dimensions are often connected to each other (Sikor, 2013). For instance, distribution is important but incomplete without consideration of institutional contexts, rules and languages that mediate social relations and are the foundation of unjust distributions of environmental benefits: fair and appropriate distributive outcomes are achieved only through just process (Chaudhary *et al.*, 2018). Analyses of distributive justice can be appropriate starting points for comprehending who gets what and why (Boone *et al.*, 2009). At the same time, a distributive analytical approach is important and can provide real insights into failures of recognition (Martin *et al.*, 2016), while the recognition of social difference can facilitate the inclusion of particular individuals or groups in decision-making (Sikor, 2013). Additionally, assessments of procedural justice can be fundamental for understanding the social and institutional dynamics (Boone *et al.*, 2009); and, finally, redistributive measures can encourage marginalized people to participate in public decision-making or to establish recognition (Sikor, 2013).

Even if they are linked to each other, these dimensions cannot be collapsed into a single one (Sikor, 2013), as all of them are essential for environmental management. Governance can affect the distribution of benefits and duties among stakeholders and this is important from two perspectives: a social perspective, as governance should be effective, efficient, but also just; an ecological perspective, because the environmental behaviour of stakeholders is likely to depend on how they perceive the legitimacy and fairness of ecosystem

governance (Sikor *et al.*, 2014). Before discussing implications for the governance (paragraph 3.8), the following section will describe the different directions identified in the literature on justice and ES.

3.8 IMPLICATIONS FOR THE ENVIRONMENTAL GOVERNANCE

The ES framework has direct implications for the justices and injustices of environmental management because of how it analyses and includes the ways of knowing, conceptions of values and notions of governance (Sikor, 2013). Indeed, as anticipated in the previous paragraphs, decisions concerning ES are reflected in governance and management tools and at the same time, governance can affect all justice dimension: augmenting ES research with EJ approaches can more effectively capture important responses to ecosystem governance (Dawson *et al.*, 2017). EJ is an integral dimension of environmental management (Sikor, 2013), it can allow for ES valuations to be performed while systematically balancing fairness (Sikor, 2013). Simultaneously, valuation of ES can help fulfil social justice and other socially relevant objectives (Aragão, Jacobs and Cliquet, 2016). Integrating ES evaluation with the inclusion of EJ in the disciplinary mix could be useful for the different contexts and support social struggles in environmental conflicts or strategic impact assessments (Jacobs *et al.*, 2016). Moreover, identifying how different people value and prioritize ES is a crucial step for equitable and successful ES-based approaches (Sikor *et al.*, 2014). Since the concept of ES is influencing how environmental stakeholders pursue dual conservation and community development goals (Chaudhary *et al.*, 2018), EJ research can help reveal local perceptions and social feedbacks critical to ES trade-offs and highlight pathways to reconcile them by satisfying stakeholders' diverse, dynamic objectives (Dawson *et al.*, 2017). The identification of trade-offs and affected stakeholders can directly influence the justice of ecosystem governance in all its dimensions (Sikor *et al.*, 2014). If justice were embedded in the policies and practices of ES, recommendations for fairer and more sustainable socioecological systems could be developed (Chaudhary *et al.*, 2018).

3.9. CONCLUSIONS

Starting from the previous works by Schlosberg (2001), Sikor (2013) and Chaudhary *et al.* (2018), this Chapter aims to theoretically contribute to the debate on ES by exploring the classic dimensions of justice – distribution (3.3), recognition (3.4), procedure (3.5) – and identifying other new dimensions analysed by the ES literature. First, the distributive dimension can facilitate the visualization of how benefits, costs, accesses, responsibilities or compensations of ES are distributed among different individuals or social groups. Second, the recognition dimension can help to recognise social and cultural differences and minority groups in decision-making and management processes. Third, procedural justice can support the comprehension of the roles of different stakeholders in decision-making and management procedures. Since there is often no clear division between dimensions, an ES and EJ approach cannot be focused on a singular dimension,

because each dimension can have effects on the others (3.7) and all the justice dimensions are essential for the governance of ES (3.8). Thus, this article emphasises how a combined approach based on ES and EJ can contribute to a more just environmental governance. A practical implementation of this combined approach is applied to the case study (Chapters 5 and 6). However, before proceeding with its practical application, Chapter 4 highlights how the scientific literature about ES and justice has evolved over time and which trends it has followed in order to sustain environmental governance.

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CHAPTER 4. ECOSYSTEM SERVICES AND JUSTICE: LITERATURE TRENDS³

4.1. BACKGROUND

The previous literature review in Chapter 3 integrated the aspects of EJ in ES, creating an analytical approach to thinking about ES issues in terms of EJ and highlighting that this kind of approach can more effectively capture important responses to ecosystem governance (Dawson *et al.*, 2017). Since the EJ framework has rarely been applied to ES discourse (Chaudhary *et al.*, 2018), the present systematic review explores the concepts of “ecosystem services” and “justice” in a more general sense, also including the synonyms “equity” and “fairness”. This chapter analyses how the scientific literature about ES and justice combined approaches has evolved over time, which trends it has followed and how they have been used in real-world applications. The systematic review shows the trends in academic literature in terms of the number and type (conceptual, review, or empirical) of publications (4.2), geographical distribution and scale (4.3), the ES and justice dimensions (4.4) and the governance contexts (4.5).

4.2. GENERAL TRENDS

The number of publications which explicitly combine ES and justice, equity or fairness started at the end of 90s, with the definition of ES concept and has grown conspicuously since 2010 (Figure 4.1), after the publication of the Economics of Ecosystems and Biodiversity reports (TEEB, 2010a, 2010b) and the Common International Classification of Ecosystem Services (Haines-Young and Potschin, 2011). The analysed papers (N=460) were conceptual works (22%), reviews (9%) and 69% of them were empirical case studies (Figure 4.2).

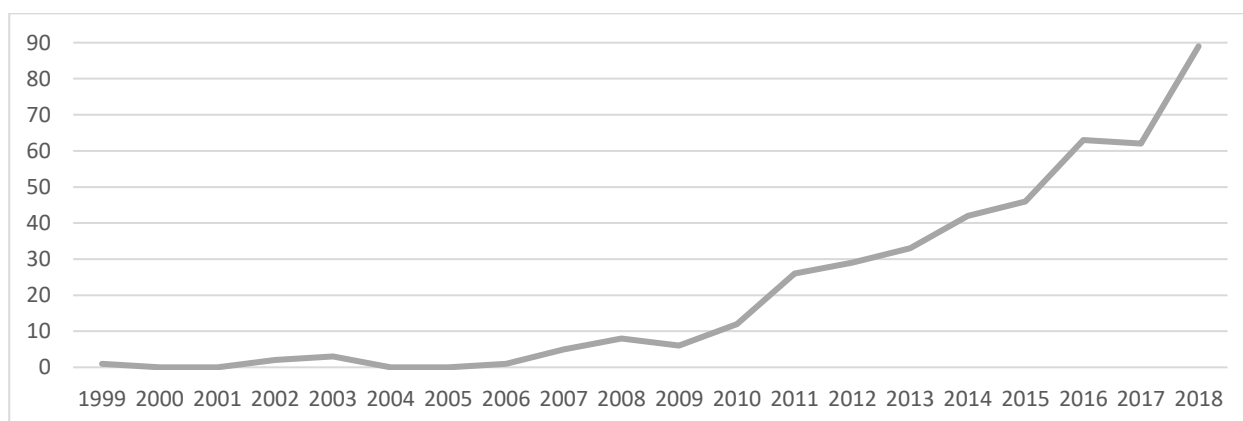


Figure 4.1: Number of publications per year

³ Note to reader: This chapter has been prepared as a stand-alone article for submission to an international peer-reviewed journal for publication. For a more detailed explanation of the methodological approach and the explanation of theory underpinning this article, please refer to Chapters 2 and 3. A further application of the theoretical framework developed in this article can also be found in Chapter 6. This chapter is based on the results of a systematic review made in collaboration with Amalia Calderón-Argelich, Francesc Baró and Johannes Langemeyer at the Institute of Environmental Science and Technology (ICTA), Universitat Autònoma de Barcelona (UAB), Barcelona, Spain.

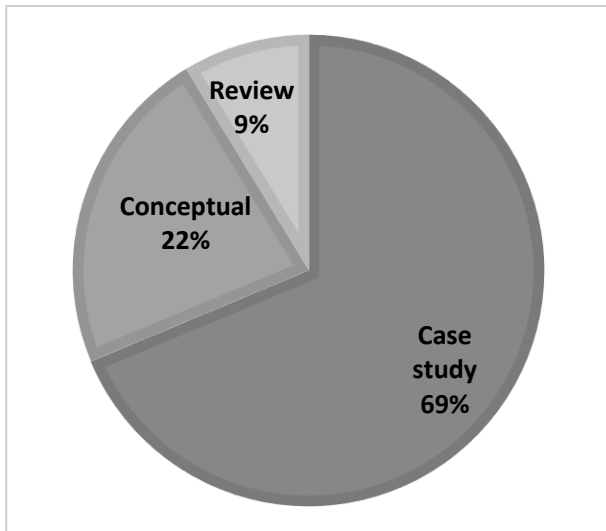


Figure 4.2: Percentages of papers typology

Table 4.1: Continents of the studies

Continent	Count	%
Latin America	95	21
Asia	85	18
Africa	67	15
North America	63	14
Europe	60	13
Oceania	9	2
Not applicable	128	28

4.3. GEOGRAPHICAL DISTRIBUTION AND SCALES

As showed by Table 4.1, most papers focused on Latin America (21%), followed by Asia (18%) and Africa (15%), continents where PES or similar compensatory measures are widespread. Other articles investigated cases from North America (14%), Europe (13%) and Oceania (2%). Analysing single countries (Figure 4.3), the situation is different: most of the case studies was in the USA (N=52), were the concept and the movements of EJ started in the early 1980s (Schlosberg, 2001), in particular in the urban contexts. The second highest number of case studies was located in Mexico (N=26), followed by Brazil (N=16), China (N=16), Vietnam(N=15) and India (N=15), countries where compensation measures are very common. The spatial scale of the studies ranged from local to global (Figure 4.4), with great concentration in local (32%), such as cities, villages, towns, or municipalities and sub-national (24%) scales, regional areas within nations. As shown in Table 4.2, urban and cultivated (respectively 26% and 25% of the studies) regions comprised the largest numbers of study systems, with the third most prominent being forest (23%) regions. Few studies (under 7%) took place in coastal, inland water, marine, mountain and peri-urban regions. Little different discourse for the service-providing unit (Table 4.3), defined as the collection of individuals from a given species and their characteristics necessary to deliver an ES at the level desired by service beneficiaries (Kontogianni, Luck and Skourtos, 2010; Andersson *et al.*, 2015). In lots of studies, ES were distributed by forests (29%). Other frequent service-providing units were watersheds (13%), crop fields (10%) and green areas (10%). The other service-providing units (natural reserves, coasts, fishing area and stocks, livestock, parks, mangroves, landscape vistas, gardens and lakes) didn't overcome 10% of the analysed papers.

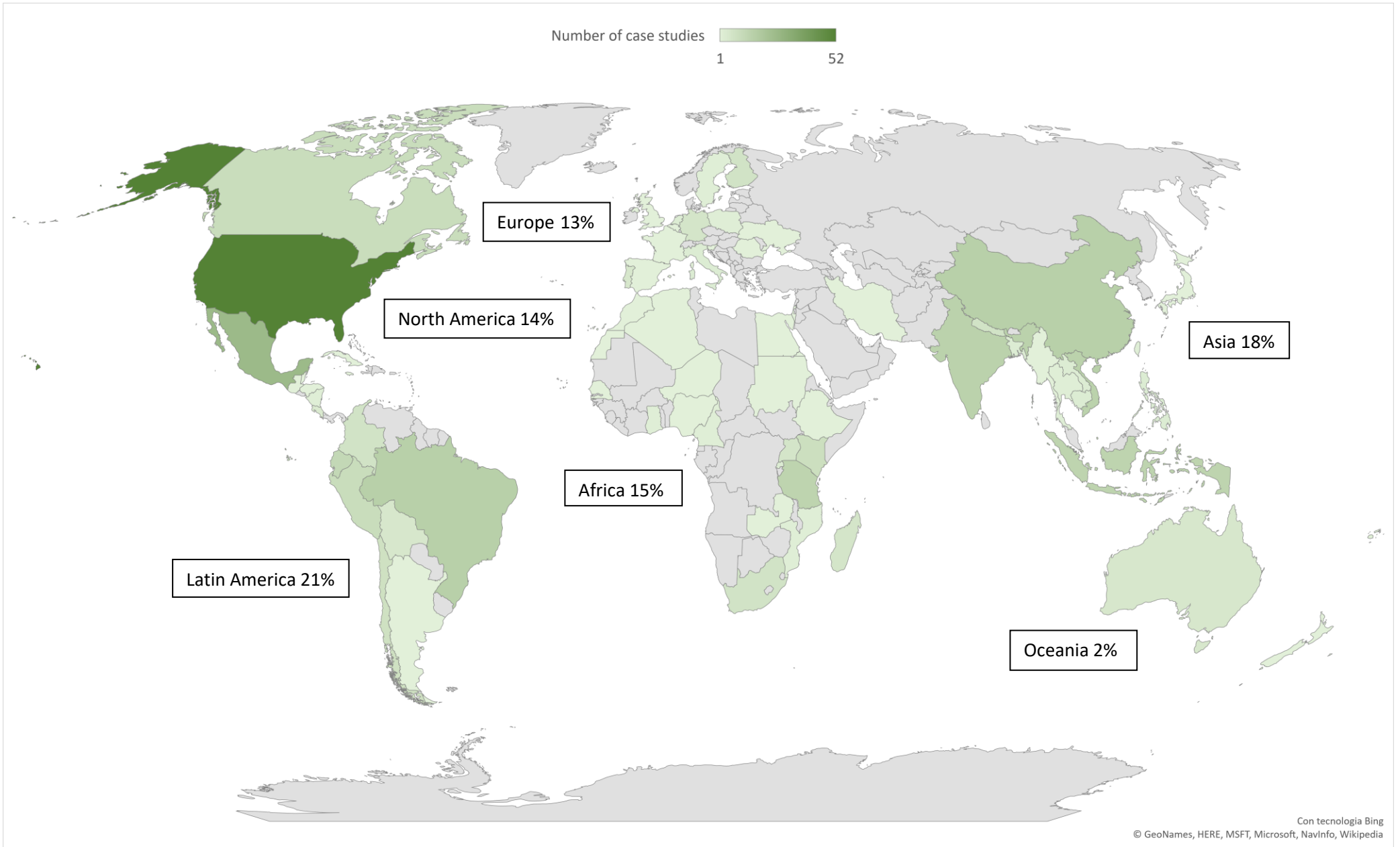


Figure 4.3: Geographical distribution of the case studies

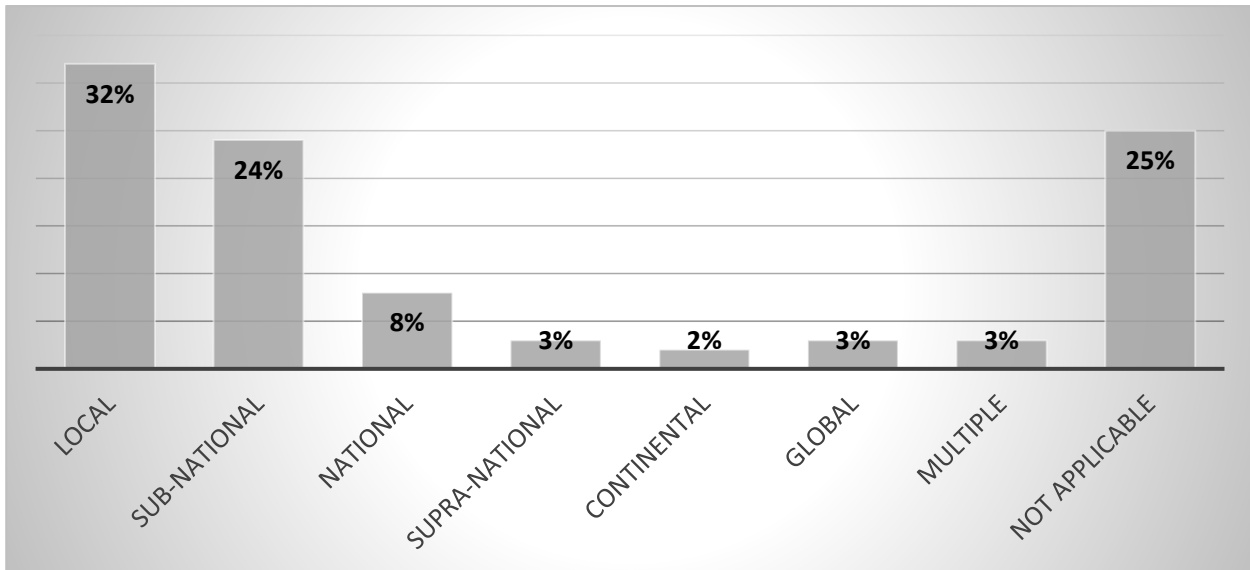


Figure 4.4: Percentages of spatial scales (Liquete et al., 2013; Drakou et al., 2015) analysed in the studies

Table 4.2: Number of type of region (Millennium Ecosystem Assessment, 2003) analysed in the studies

Type of region	Count	%
Urban	118	26
Cultivated	116	25
Forest	106	23
Coastal	31	7
Inland Water	21	5
Marine	17	4
Mountain	13	3
Peri-urban	12	3
Not specified	102	22

Table 4.3: Number of service-providing unit (Kontogianni, Luck and Skourtos, 2010; Andersson et al., 2015) analysed in the studies

Service-providing unit	Count	%
Forest	135	29
Watershed	59	13
Crop field	48	10
Green area	48	10
Natural reserve	27	6
Coast	24	5
Fishing area and stocks	21	5
Livestock	16	3
Park	13	3
Mangrove	9	2
Landscape vista	7	2
Garden	6	1
Lake	5	1
Not specified	110	24

4.4. ECOSYSTEM SERVICES AND JUSTICE

Following the Common International Classification of Ecosystem Services – CICES – (Haines-Young and Potschin, 2011), 45% of the studies considered ES in general, while 41% considered regulating and maintenance, 27% provisioning and 21% cultural and social group (Figure 4.5). In the regulating and maintenance group (Figure 4.6), most studies were focused on atmospheric regulation (61%) and dilution and sequestration ES (57%); in particular, these latter studies were related to climate change and emission reductions in urban contexts and with compensation programs, such as Reducing Emissions from

Deforestation and Forest Degradation – REDD – in forest regions. Numerous studies concerned lifecycle maintenance and habitat protection (36%) and gene pool protection ES (26%), mostly in the analysis of protected areas. Water flow regulation (30%) and water quality regulation ES (23%), such as potable water (43% of the provisioning ES), were strictly related to Payment for Ecosystem Services – PES – in water resource management. In the provisioning group, the most frequent ES was terrestrial plant and animal foodstuffs (52%), very common in cultivated regions, while in the cultural and social group, recreation and community activities (85%) were often related with green spaces benefits in urban contexts. From the justice perspective (Figure 4.7), 27% of papers analysed general aspects of justice, while most of the studies were focused on distributional (50%) and procedural (38%) dimensions. Only 14% of the studies explored recognition issues. In order to give a more complete vision of the literature trends, justice dimensions results were combined with ES groups (Figure 4.8). As described in section 3.3, the distributive dimension is related to the equal distribution of benefits, costs and responsibilities among people (Schlosberg, 2004; Brulle and Pellow, 2006; Boone *et al.*, 2009; Sikor, 2013; Sikor *et al.*, 2014; Aragão, Jacobs and Cliquet, 2016). In terms of ES, when the distributive dimension was focused on the regulating and maintenance group (22%), papers analysed the distribution of benefits of compensatory measures, or costs of climate change or conservation procedures. Distributional justice in the provisioning group (14%) was often related to benefits, costs, or access to agricultural areas and potable water. Injustices in the cultural and social group (12%) concerned the distribution of benefits or access to green spaces in urban contexts. Studying the recognitional dimension, that comprehends the acknowledgement of people’s identities, histories and interests (Sikor, 2013; Sikor *et al.*, 2014), some articles embraced the cultural and social sphere of ES (3%). This result was often related to the recognition of the spiritual importance of forests for indigenous people. Justice in decision-making and participatory procedures (Sikor, 2013; Gustavsson *et al.*, 2014; Sikor *et al.*, 2014; Aragão, Jacobs and Cliquet, 2016) were especially concerned with cultural and social ES (7%), again in the case of indigenous people, but also in the management of recreational activities.

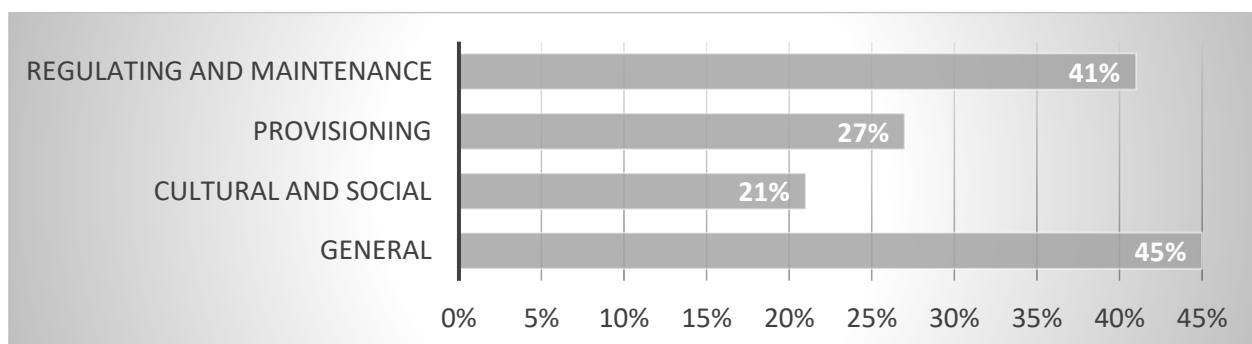
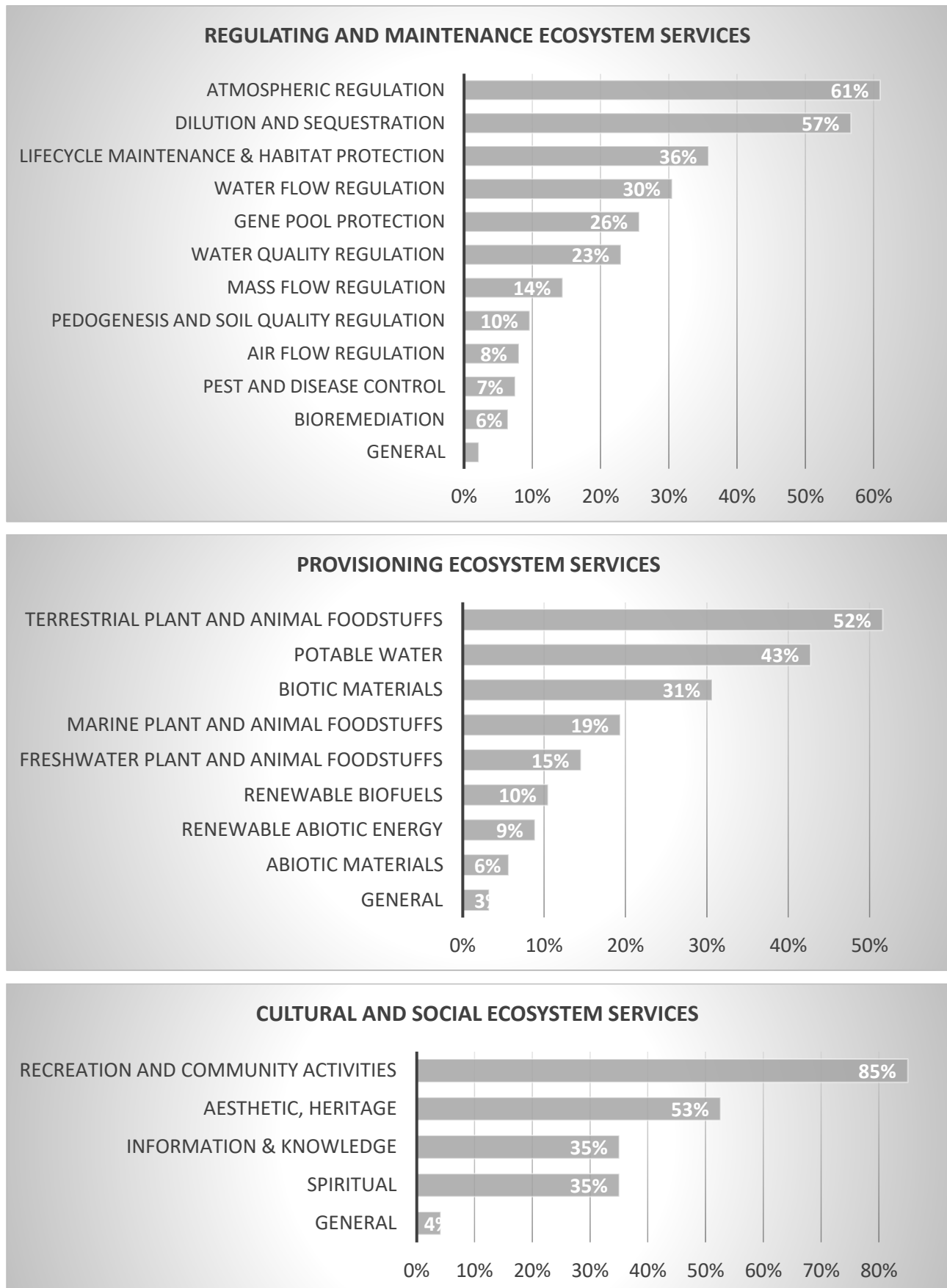


Figure 4.5: Percentages of groups of ecosystem services (Haines-Young and Potschin, 2011) analysed in the studies

Figure 4.6: Percentages of single ecosystem services (Haines-Young and Potschin, 2011) analysed in the studies, calculated on the total of ecosystem services groups



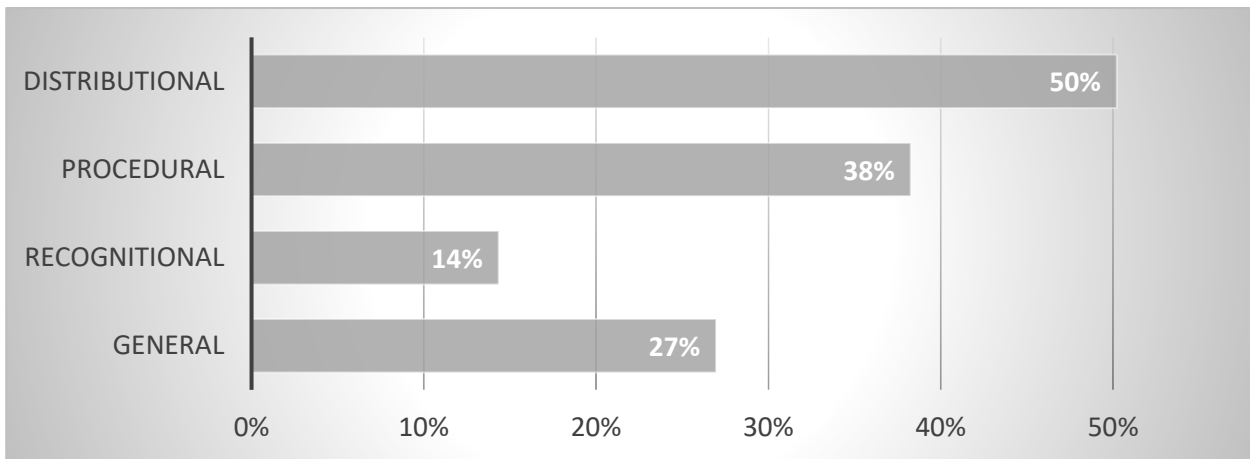


Figure 4.7: Number of justice dimensions (Schlosberg, 2007, 2013) analysed in the studies

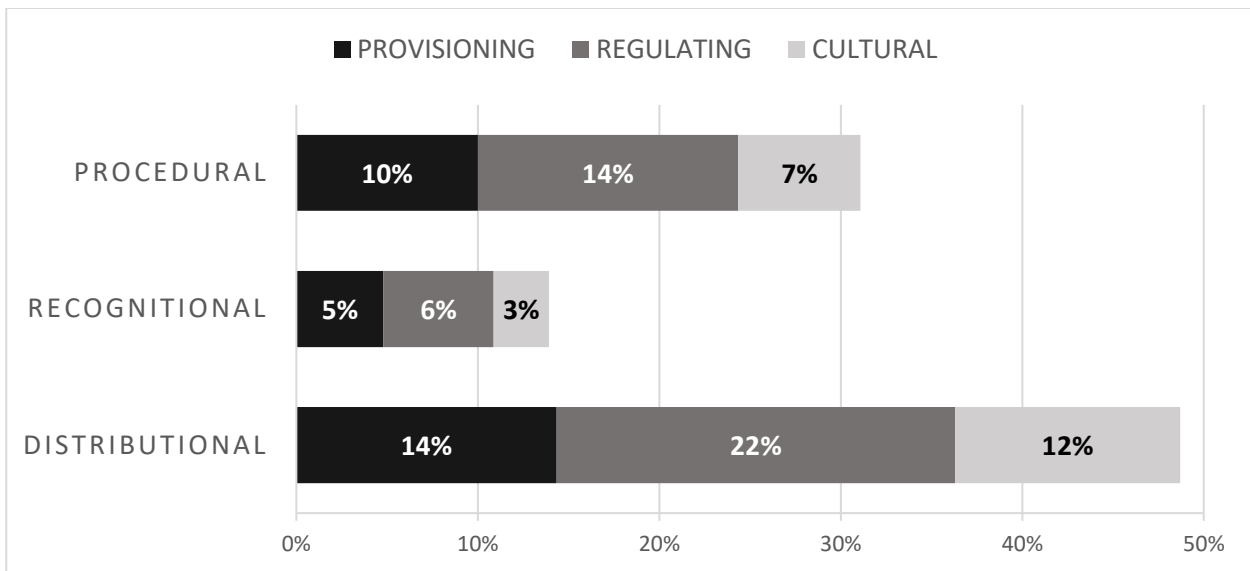


Figure 4.8: Proportional representation of dimensions of justice and the groups of ecosystem services examined in the studies reviewed

4.5. GOVERNANCE CONTEXTS

In exploring author keywords (Figure 4.9), papers were found to be focused on three big themes: urban contexts (planning, green areas, climate change, etc.), compensation procedures (PES, REDD, valuation, poverty alleviation, etc.) and the conservation dimension (forest, biodiversity, ecosystem governance, etc.), as already anticipated in Chapter 1. To confirm this, Figure 4.10 reveals that 26% of the articles was focused on urban contexts, while 30% took care of protected areas and 44% of compensatory programs. The last data underlines the strong tendency of translating the ES values in economic terms, in order to define the payment for natural capital employed in productive uses.



Figure 4.9: Word cloud of keywords, repeated more than four times

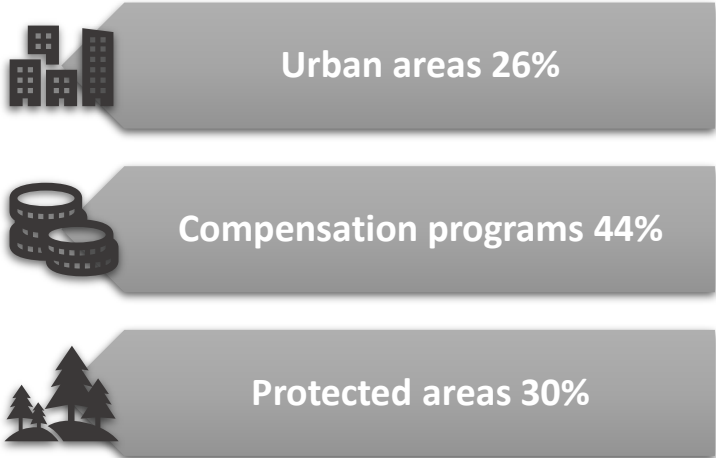


Figure 4.10: Percentages of urban areas, compensation programs and protected areas analysed in the studies

4.6. CONCLUSIONS

The systematic review used in this chapter explored the literature about ES and justice, which has gained a conspicuous interest from academic circles using this combined approach. This was demonstrated by the increase of the academic publications number in the last years (Figure 4.1). Furthermore, this interest is reinforced by the fact that this approach can more effectively capture important responses to environmental management and decision-making. This is confirmed by the empirical nature of the analysed papers: 69% of them were case studies (Figure 4.2). Indeed, integrating the ES evaluation with the inclusion of justice in the disciplinary mix could be useful for the different contexts, such as landscape planning, urban planning, forest management, environmental conflict resolution, ecosystem governance, poverty alleviation procedures, sustainable policies, etc. (Figure 4.9 and 4.10). Most of studies still followed the economic tendency, focusing on the compensatory measures of ES (44% in Figure 4.10). Most articles investigated the regulating and maintenance ES (41% in Figure 4.5), often related with the regulation of compensation programs, the conservation of biodiversity in protected areas, or climate change and emissions reductions in an urban context. Still, few studies took care of provisioning and cultural and social ES (respectively 27% and 21% in Figure 4.5). Moreover, focusing on the justice perspective, still fewer studies explored recognition issues (14% in Figure 4.7), confirming the prominence of distributional (50%) and procedural (38%) dimensions in the literature.

In order to underline the importance of all justice dimensions and the exploration of not only regulating and maintenance ES, Chapter 6 applies an ES and EJ combined approach to the case study of an Italian protected area: Circeo National Park, described in Chapter 5. The main goal is to understand how the EJ lens for the ES approach can be useful for the environmental governance in practice.

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CHAPTER 5. CASE STUDY: CIRCEO NATIONAL PARK, ITALY

5.1. LOCATION

Circeo National Park is a small area of 8,917 ha, located in the Pontine Plain, enclosing a rich mosaic of environments: forest, the Circeo promontory, Fogliano, Monaci, Caprolace and Paola or Sabaudia Lakes, sand dunes, the island of Zannone and the towns of Sabaudia and San Felice Circeo. It is situated along the Tyrrhenian coast in the South of Rome, between Anzio and Terracina and it extends in the Province of Latina, in particular in the Municipalities of Latina, Sabaudia, San Felice Circeo and, for the insular part of the Island of Zannone, Ponza (Federparchi, 2018; *Parco Nazionale del Circeo*, 2018d; Salvatori and Rossi, 2006; Soldano, 2012).

5.2. HISTORY

In the past, the Pontine Plain was characterized by a thick forest grew over the sandy soil and the presence of areas of marshland and coastal lakes. This wild landscape, called the ancient *Selva di Terracina*, remained unchanged until 1928 when the drainage and clearing of the area, ordered by Mussolini, started. In 1934, a small area of this Plain Forest, saved from the cutting and clearing, became Circeo National Park. The portion of the forest that was not clear-cut, together with the Lake of Sabaudia, the coastal dune and the Circeo Promontory, constituted the Park's original nucleus. Circeo National Park was established with National Law L. 285/1934 in order to protect and improve the flora and fauna, preserve the special geological formations and the beauty of the landscape and develop tourism. Compared to the initial perimeter, Circeo National Park underwent substantial changes in the '70s when, due to heavy construction work abusive, a stretch of the *Lido di Latina* (beach of Latina) was compromised, so as to justify its exclusion from the area protected. In 1975, the coastal lakes of Fogliano, Monaci and Caprolace were annexed to the Park with an extension decree, thus avoiding that building speculation also occurred in those places, while the island of Zannone became part of the Park in 1979. Circeo National Park is one of the places where the concept of UNESCO's Man and Biosphere Programme (MAB), described in Table 5.1, was created and developed, as the Biosphere Reserve "Circeo State Forest" (*Selva di Circe*) was established in 1977. In 2013, following the regular revisions that UNESCO carries out on MAB reserves, the Circeo Reserve was enlarged to its current perimeter. Moreover, Circeo National Park was classified as a Special Protection Area (SPA) in 1988 (Federparchi, 2018; Matarrese, 2015; Natura 2000, 2017d; *Parco Nazionale del Circeo*, 2018e; Soldano, 2012; UNESCO, 2017).

5.3. PARK ENVIRONMENTS

The territory of CNP is characterized by the cohabitation of five varied ecosystems: forest, dunes, promontory, wetlands and the island of Zannone. The next sessions describe the characteristics of these environments, which, together, represent the great biodiversity of CNP.

Table 5.1: Description of UNESCO's Man and Biosphere Programme, Natura 2000 and Ramsar Convention

<p>UNESCO's Man and the Biosphere Programme, launched in 1971, is an intergovernmental scientific program that aims to establish a scientific basis for the improvement of relationships between man and environment and to reduce the loss of biodiversity through research and capacity-building programs. MAB recognizes Biosphere Reserves: marine and terrestrial areas that Member States undertake to manage in a perspective of resource conservation and sustainable development, with the full participation of local communities. Each Biosphere Reserve is composed of three zones: a core area where animal and vegetal biodiversity is strictly protected and where research is carried out; a buffer zone that is used for low-impact forestry, agricultural and tourism activities; a transition area for the sustainable development of handcraft, services and activities in the field of forestry, agriculture and breeding. Currently, World Network of Biosphere Reserves counts 669 sites in 120 countries all over the world, including 20 transboundary sites (Soldano, 2012; UNESCO, 2017).</p>
<p>Natura 2000 is the largest coordinated network of protected areas in the world, stretching over 18% of the EU's land area and almost 6% of its marine territory. Its aim is to ensure the long-term survival of Europe's most valuable and threatened species and habitats, listed under both the Birds Directive and the Habitats Directive. The Birds Directive 79/409/EEC, amended in 2009, became Directive 2009/147/EC, with the aim to protect all of the 500 wild bird species naturally occurring in the European Union. Under the Directive, Member States of the European Union (EU) have a duty to safeguard the habitats of and for endangered and migratory species. To reach this aim, the Directive establishes a network of Special Protection Areas (SPA) including all the most suitable territories for these species. The Habitats Directive 92/43/EEC ensures the conservation of a wide range of rare, threatened or endemic animal and plant species, taking account of economic, social, cultural and regional requirements. The Directive defines the Special Areas of Conservation (SAC) to protect approximately 200 habitats and 1000 species, considered to be of European interest. It also defines Sites of Community Importance (SCI) that contribute significantly to the maintenance or restoration at a favourable conservation status of a natural habitat type or of a species and may also contribute significantly to the coherence of Natura 2000 and/or contributes significantly to the maintenance of biological diversity within the biogeographic region or regions concerned. SCI are proposed to the Commission by EU Member States and once approved, they can be designated a SAC by Member State (European Commission, 2017a-c).</p>
<p>The Ramsar Convention on Wetlands of International Importance especially as Waterfowl Habitat is an international treaty adopted in the Iranian city of Ramsar in 1971, which came into force in 1975. The principal mission is "the conservation and wise use of all wetlands through local and national actions and international cooperation, as a contribution towards achieving sustainable development throughout the world". The Contracting Parties commit to work towards the wise use of all their wetlands; they designate suitable wetlands for the list of Wetlands of International Importance (the "Ramsar List") and ensure their effective management; cooperate internationally on transboundary wetlands, shared wetland systems and shared species. There are currently over 2,200 Ramsar Sites around the world and they cover over 2.1 million square kilometres (Ramsar Convention, 2014).</p>

5.3.1. Forest

The forest in Circeo covers an area of about 3,300 ha; it is a rare example of a large and well-preserved flatland forest in Italy. The forest can be visited all-year round on a network of cycling and hiking trails. Today it is known as *Selva di Circe* and it keeps many of the characteristics of *Selva di Terracina*, the ancient coastal forest which, before the draining works carried out in the 1930s, covered around 11,000 ha. The forest is an extremely rich and diverse ecosystem and, for this reason, it was declared a Biosphere Reserve in the framework of the UNESCO MAB Programme in 1977. Despite its definition as a flatland forest, the *Selva di Circe* is shaped by gradients: in the lowest areas the rainwater accumulation and aquifer outcrop form swampy areas, called *Piscine* (pools); in the highest areas, called *Lestre*, seasonal dwellers once used to build their villages, of which only few ruins remain today. In the 1970s some of these areas became strict nature reserves: *Piscina delle Bagnature*, *Piscina della Gattuccia* and *Lestra della Coscia* (*Parco Nazionale del Circeo*, 2018f, UNESCO, 2017). The forest was proposed as a SCI, in 1995 and designated a SAC in 2017 (Natura 2000, 2017c). Within the forest of Circeo National Park, several types of vegetation can be found, according to micro-environmental conditions: different oaks characterize vegetation in dry areas; pedunculate oaks, ashes, alders and aspens grow around the *Piscine*; butcher's-broom, bracken and wild asparagus form the thick and tangled undergrowth. As regards fauna, the biggest mammals are wild boars and allochthonous deers, although many more species live there, as badgers, foxes, hares and hedgehogs. Among reptiles, there are different snakes, Hermann's tortoises and green lizards. Amphibians include tree frogs, frogs, toads and newts. The forest is also home to several species of woodpeckers, passerines and birds of prey both diurnal and nocturnal (*Parco Nazionale del Circeo*, 2018g).

5.3.2. Dunes

The crescent-shaped coastal dune of Circeo National Park runs for 25 km, from the Promontory to *Capo Portiere*. The beach is made of fine sand and, behind it, the dune range can be as high as 27 meters. This environment is characterized by high temperatures, long droughts, scarcely fertile land and strong winds. A road runs on the dune summit, but by the Monaci Lake it is only possible to walk or cycle because of the collapse of the road in the 1980s. In the summer, thousands of tourists visit the coast to enjoy its wide beaches and sea. This sandy area is a very fragile environment: not violating its spaces and keeping to the wooden boardwalks is the first rule to respect and preserve this environment (*Parco Nazionale del Circeo*, 2018h). The dune of Circeo National Park consists of three main areas, with different morphology and vegetation:

- The water edge is the dune portion immediately facing the sea, where waves break on the beach until a sort of terrace called berm.

- The dune front is the portion of dune which waves normally do not reach, but which is however directly exposed to salty wind. Halophyte plants grow here and thanks to their strong, long roots, fixed to the ground, they mitigate the effect of wind, thus opposing erosion and allowing the Mediterranean scrub to progressively settle.
- The dune back is the portion of dune that is protected from sea winds, where a Mediterranean scrub grows and is replaced by a sclerophyll forest down by the lakes. Going on towards the inland, it's possible to find juniper, mastic, myrtle, Italian buckthorn, Erica multiflora and climbing shrubs. The scrub is largest on the dune slope overlooking the lakes, where evergreen oaks, Phoenician junipers, honeysuckles and strawberry trees also grow.

The dune is inhabited by seagulls, lizards, several types of beetles, wild rabbits, foxes. Badgers and crested porcupines live in the thickest wood areas. As far as birds are concerned, the dune is particularly important for the breeding of Kentish plovers and little ringed plovers (*Parco Nazionale del Circeo, 2018i*). The dune of Circeo National Park was proposed as a SCI in 1995 and designated a SAC in 2017 (Natura 2000, 2017g).

5.3.3. Promontory

The Circeo Promontory, the Park's very symbol, is a 541-meter high calcareous elevation. The widespread presence of caves on the sea-facing slope makes this area particularly attractive from a geo-speleological point of view and for numerous prehistorical findings. The best-known cave is *Grotta Guattari*, where a Neanderthal-type skull was found in 1939 (*Parco Nazionale del Circeo, 2018j*). The promontory's main slopes are called *Quarto Caldo*, south-facing and *Quarto Freddo*, north-facing. In the *Quarto Caldo*, sun exposure is high and rainfall scarce, especially in the summer. Plants that have adapted to arid climate grow here, forming a less lush Mediterranean scrub. The typical, evergreen Mediterranean forest grows in the *Quarto Freddo*, with evergreen oaks, hop-hornbeams, manna ashes, green olive tree, strawberry tree, etc. At the foot of this slope, in a place called *Selva Piana*, a cork oak wood thrives thanks to the protection offered by the promontory and to the high air humidity. As regards animals on the promontory, wild boars, badgers, weasels and hazel dormice live on the *Quarto Freddo*, some bat species find shelter by the caves, the rare peregrine falcon nests on the cliffs and various species of reptiles and amphibians inhabit the *Quarto Caldo* (*Parco Nazionale del Circeo, 2018k*). Both areas of *Quarto Caldo* and *Quarto Freddo* were proposed as SCI in 1995 and designated as SAC in 2017 (Natura 2000, 2017e, f). Recreation activities are different: in addition to classic foot or bicycle paths, it is possible to reach the highest point of the promontory (*Picco di Circe*, 541 meters) with a trekking trail or reach the caves accessible only from the sea with canoes (*Parco Nazionale del Circeo, 2018j*).

5.3.4. Wetlands and lakes

The lagoon wetland, consisting of four coastal and brackish lakes (Lake Sabaudia or Paola, Lake Caprolace, Lake Monaci and Lake Fogliano) and of seasonally flooded wetlands, extends behind and parallel to the Coastal Dune. The lakes and the surrounding wetlands together were declared a Wetland of International Importance according to the Ramsar Convention. These environments offer a particularly suitable environment for the rest, wintering and nesting needs of numerous migratory bird species, indeed over 260 water bird species crowd the Park's lakes and ponds in spring and autumn (*Parco Nazionale del Circeo*, 2018l). In particular, the Park represents a rest stop both for birds migrating across Italy in a NE-SW direction and for those migrating along the peninsula's coastline. Among the birds there are, for example, mallard, widgeon, northern shoveler, coot, great cormorant, little grebe, mallard and moorhen. Lake and canal shores are covered with vegetation typically found in swamps, mostly consisting of reeds and rushes, while the marshy ground by the shore is characterised by a plant community of salt-tolerant pioneer species (*Parco Nazionale del Circeo*, 2018m). The four lakes became part of Wetlands of International Importance, under the Ramsar Convention in 1976, moreover, they were proposed with *Pantani d'Inferno* – an adjacent area to Caprolace Lake – as SCI in 1995 and designated as SAC in 2017 (Natura 2000, 2017a, b; RSIS, 2018). Together with the birdwatching, other recreational activities are the cycling tour of the four coastal lakes, walks in the Fogliano lake path, kayak and canoe excursions in the Paola Lake (Proprietà Scalfati, 2017d). The following sections describe the characteristics of each lake.

5.3.4.1. Paola or Sabaudia Lake

Paola Lake is the southernmost of the four Pontine lakes, 6.7 km long, with an area of 400 ha, a perimeter of 20 km and an average depth of 4.5 m. It is separated from the Tyrrhenian Sea by a sand dune, about 200 meters wide. Paola Lake has irregularly shaped, with numerous inlets, residues of the beds of ancient rivers that flowed in the area: *Bagnara*, *Molella*, *Carnarola*, *Arciglioni*, *Caprara* and *Annunziata*. The water exchange with the coastal marine environment is accomplished through two canals: the *Canale Romano* at the southern mouth of the *Torre Paola*, primary liaison with the sea; and the *Canale Caterattino* at the northern mouth, excavated during the recent reclamation of the Pontine Marshes (1925-1935) (Proprietà Scalfati, 2017b; Laghi del Lazio, 2017b).

Despite being part of CNP, the Sabaudia lake is privately owned by the Scalfati family. For more than 100 years, Scalfati family has been the caretaker of certain goods and real estate of historic, archaeological and environmental importance, among which is Paola Lake. From 1854 to 1888, the Scalfati family was the only tenant and then became owner of the lake in 1888, continuing to the present (Proprietà Scalfati, 2017 c). Starting from 2007, the Scalfati family have reconstituted the *Azienda Vallicola* of Paola Lake and

implemented a project of environmental and productive requalification of the area, which provides measures to restore activities (aquaculture and mussels cultivation) and develop sustainable tourism activities. The Scalfati family developed fishing activities, including mullet fish, sea bass, sea bream, eel, sole and the cultivation of sea mussels, all addressed for sale (Proprietà Scalfati, 2017b, c). Inside the property, it is possible to walk among ancient Roman ruins and eighteenth-century structures built when the fishing valley was ruled by the Vatican and it is also possible to organize naturalist tours of Paola Lake with the family's boat (Proprietà Scalfati, 2017d).

5.3.4.2. Caprolace Lake

Included in CNP in 1975, Caprolace Lake has a perimeter of about 8 km, an area of 2.3 square km and it is not very deep, as it gets to a maximum of 3 m. Elongated parallel to the sea, separated from this by the coastline and the coastal path that takes after the parenthesis of the Monaci lake, it is connected to Sabaudia Lake with *Canale Fossa Augusta*. The Lake has brackish waters and flat banks, arranged artificially. More than the other lakes, Caprolace guarantees, especially to animal species living in these environments, a sufficient guarantee of open space and tranquility (Laghi del Lazio, 2017c).

5.3.4.3. Monaci Lake

Monaci Lake owes its name to the fact that it belonged to the monks of the Abbey of Grottaferrata. It is the smallest of the coastal lakes of CNP and the least known. It is located immediately below that of Fogliano, from which is divided by the *Rio Marino* estuary. Monaci Lake has a pentagonal shape and it is separated from the sea by the narrow coastal dune that engulfed the road completely closed to traffic. The Lake has an area of 0.9 square km, a length of about 1.5 km, a maximum width of 1 km, but a great depth. Along the perimeter measuring about 3.8 km, it is possible to see buffalo grazing herds (Laghi del Lazio, 2017d).

5.3.4.4. Fogliano Lake

Fogliano Lake is northern and the largest of the four coastal lakes of the Pontine region. On the southeast side, there is the village of Fogliano, which gives its name to the Lake. It stretches for 5 km on the sea front, with a perimeter of about 11 km, a width that reaches almost 1.5 km and an extension of 4 square km. It is the second in the province of Latina and the first one for the pontines in terms of the area it extends, but, one of the lowest in absolute terms, reaching a depth maximum of 2 m. It includes the ditch tributary of *Cicerchia*, but in the summer months, it also receives water from the Astura River (Laghi del Lazio, 2017e).

5.3.5. Island of Zannone

The island of Zannone is the northernmost island of the Pontine Islands archipelago, composed by Ventotene, Ponza, Palmarola, Santo Stefano and Gavi. It extends 103 ha and is composed of volcanic, metamorphic, and sedimentary rocks., dating back to over 200 million years ago. Thanks to its naturalistic importance, it was incorporated into CNP in 1979 (*Parco Nazionale del Circeo*, 2018n). Zannone is an island evenly shaped, compact and has a lush and well-preserved Mediterranean vegetation, thanks to scarce human presence throughout the centuries. On the island of Zannone, vegetation has diverse shapes and colours, according to elevation and exposition. In general, the island presents a typical Mediterranean flora, with brooms, myrtle, tree heath and wild olive; but there is also helichrysum, hanging on the cliff and strawberry trees and bushes of evergreen oak in the highest part of the coast. Completely different plants grow on the north-facing slope: there is a proper evergreen oak wood, with heath and laurel underwood. Life underwater is just as rich as on the land: a thick forest of Gorgoniidae fluctuates on the seabed. This variegated vegetation makes Zannone an ideal intermediate destination for many migratory birds: peregrine falcons, western marsh harriers, yellow-legged gulls, shearwaters, turtle dove and many others. Reptiles of the island are lizards, lepidopterans, orthopterans. A small colony of mouflons, originally brought from Sardinia in the 1920s, lives on the island and is now protected (*Parco Nazionale del Circeo*, 2018o). The island of Zannone, with the island of Palmarola, was proposed as a SCI in 1995 and designated a SAC in 2017. In 1996, with the other islands of the Pontine Islands archipelago, it was classified a SPA (Natura 2000, 2017h, i). There are not many recreational activities in Zannone, but it is possible to go hiking until to the highest point of the island (*Monte Pallegirino*, 192 meters) and to snorkel along the coast (Soldano, 2012; Zannone, 2018).

5.4. ZONING

The zoning of CNP (*Ente Parco Nazionale del Circeo*, 2010; *Gazzetta Ufficiale*, 2018: art. 12) is divided into the following areas and as shown below in Figure 5.1:

- A. Integral reserves, in which the natural environment is preserved in its entirety.
- B. General oriented reserves, in which it is forbidden to construct new building works, to enlarge existing buildings, to carry out territorial transformation works. However, traditional production utilizations, the construction of the strictly necessary infrastructures and natural resource management interventions by the Park Authority may be allowed.
- C. After verifying the compatibility, according to the traditional uses or according to methods of organic farming, in harmony with the institutional aims and in compliance with the general criteria established by the Park Authority, areas under protection can continue agricultural and pastoral

activities, as well as fishing and harvesting of natural products and quality craft production, which is also encouraged.

- D. Areas of economic and social promotion that are part of the same ecosystem, more extensively modified by anthropization processes, in which activities compatible with the purpose of establishing the park are allowed and aimed at improving the socio-cultural life of local communities and the highest enjoyment of the park by visitors.

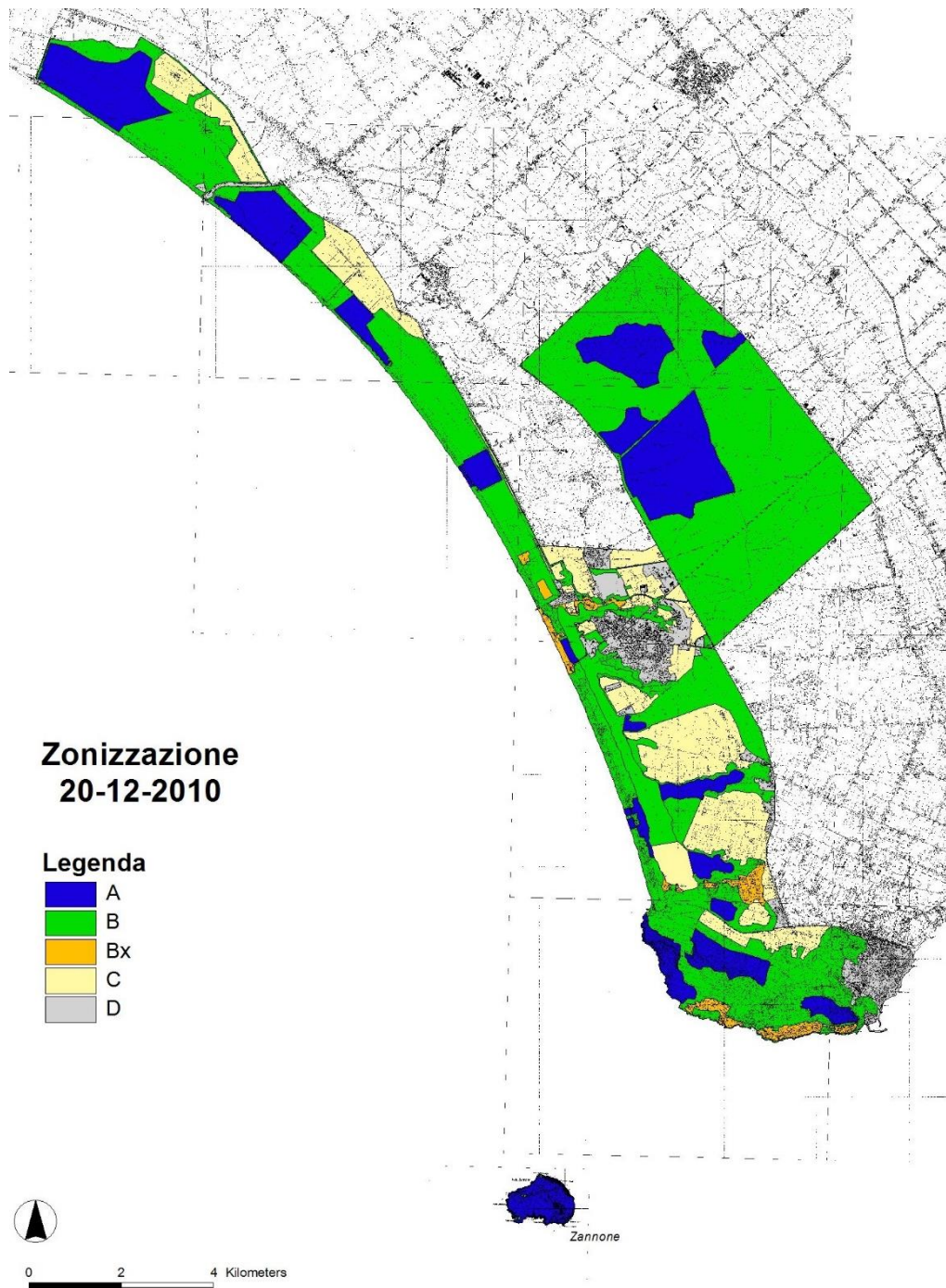


Figure 5.1: Areas of Circeo National Park (Ente Parco Nazionale del Circeo, 2010)

5.5. TERRITORY AND MUNICIPALITIES

Circeo National Park extends over a total area of 8,917 ha in the Municipalities of Latina, Ponza, Sabaudia and San Felice Circeo (*Parco Nazionale del Circeo*, 2018d). Figure 5.2 shows the distribution of Circeo National Park's Municipalities. In the current perimeter, the Municipality of Latina is present in the Park with the stretch of dunes that goes from Capo Portiere to Rio Martino and with the lake of Fogliano. The Island of Zannone is part of the Archipelago of the Ponziane Islands and returns to the jurisdiction of the Municipality of Ponza. The largest territorial extension of the Park is part of the Municipality of Sabaudia, which includes the city of Sabaudia, the Circeo State Forest, the stretch of dunes that goes from Rio Martino to Torre Paola and the lakes of Monaci, Caprolace and Paola. Finally, all the Circeo Promontory, the historical center of San Felice and half of the inhabited area of La Cona are part of the Municipality of San Felice Circeo (Ministero dell'Ambiente, 2016; *Parco Nazionale del Circeo*, 2018p-s; Soldano, 2012).

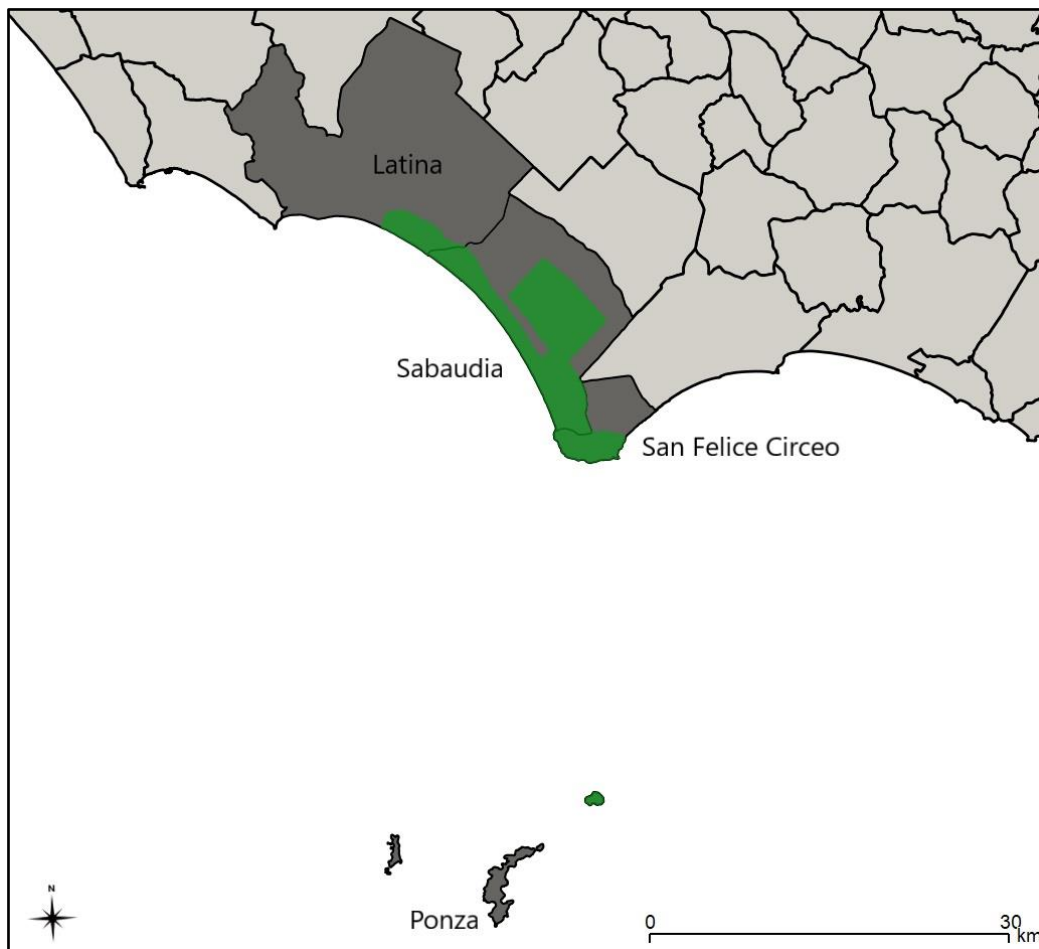


Figure 5.2: Circeo National Park's Municipalities

The population of each Municipality in the CNP area is described in Table 5.2. The total CNP population is 9,64% of the entire municipal population. This value is more concentrated in the Municipality of Sabaudia (80,45%) and with lower values in San Felice Circeo (13,16%) and Latina (6,38%). Latina is the most populated among these, but only 0,78% of inhabitants live in the CNP area. The Island of Zannone is uninhabited; consequently, the percentage of CNP residents compared to the Municipality of Ponza is equal to 0. More than half of Sabaudia inhabitants fall within the jurisdiction of the Park (20,24%), while 20,27% of San Felice Circeo's population lives on the Promontory. Considering the data and percentages shown in Table 5.2, the study will focus on the Municipalities of Sabaudia and San Felice Circeo. In order to give an overall idea of these two Municipalities, Table 5.3 summarizes the data of local populations. Sabaudia is more populated than San Felice Circeo (respectively 66,67% and 33,33%), but the partial percentages for each Municipality, differentiated by gender and age, are very similar.

Table 5.2: Population of Circeo National Park's Municipalities (ISTAT, 2018a; personal communication from the Municipalities of Latina, Sabaudia and San Felice Circeo)

Municipality	Municipal population	CNP population	% CNP population compared to municipal population	% CNP population compared to the total population of CNP
Latina	126.151	985	0,78	6,38
Ponza	3.348	0	0,00	0,00
Sabaudia	20.613	12.418	60,24	80,45
San Felice Circeo	10.025	2.032	20,27	13,16
Total	160.137	15.435	9,64	100,00

Table 5.3: Population of Sabaudia and San Felice Circeo Municipalities, distinguished by gender and age (ISTAT, 2018a)

Gender	Age	San Felice		Total	% Sabaudia	% San Felice Circeo
		Sabaudia	Circeo			
M	18-24	716	363	1079	7,84	8,16
	25-34	1622	701	2323	17,76	15,76
	35-44	1843	875	2718	20,18	19,68
	45-54	1737	861	2598	19,02	19,36
	55-64	1284	642	1926	14,06	14,44
	65-74	1109	541	1650	12,14	12,17
	75	821	464	1285	8,99	10,43
F	18-24	612	330	942	7,41	7,77
	25-34	1080	556	1636	13,07	13,09
	35-44	1423	654	2077	17,23	15,39
	45-54	1624	759	2383	19,66	17,86
	55-64	1263	693	1956	15,29	16,31
	65-74	1172	615	1787	14,19	14,47
	75	1087	642	1729	13,16	15,11
Total		17393	8696	26089	66,67	33,33

5.6. TOURISTIC FLOWS

Unfortunately, there are no precise estimates of tourist flows in the areas of Circeo National Park; in any case, it is still possible to examine generic tourist trends in the Municipalities of Latina, Ponza, Sabaudia and San Felice Circeo. Table 5.4 analyses the arrivals and presences of tourists in the Municipalities, while Table 5.5 observes the capacity of tourist accommodations for each Municipality. However, the data of tourist flows do not include the phenomenon of second homes, as they cannot be classified accommodation facilities. Consequently, studying the real phenomenon became difficult, because most tourists, especially from Rome and Naples, have their own homes where they spend summer holidays (Caroli et al., 2012).

Table 5.4: Tourist Arrivals and Presences 2016 (ISTAT, 2018c)

Municipality	Tourist arrivals	% Tourist arrivals compared to the total arrivals of Municipalities	Tourist presences	% Tourist presences compared to the total presences of Municipalities
Latina	65.033	36,49%	180.123	39,90%
Ponza	19.452	10,91%	51.921	11,50%
Sabaudia	71.767	40,27%	160.305	35,52%
San Felice Circeo	21.968	12,33%	59.035	13,08%
Total	178.220	100,00%	451.384	100,00%

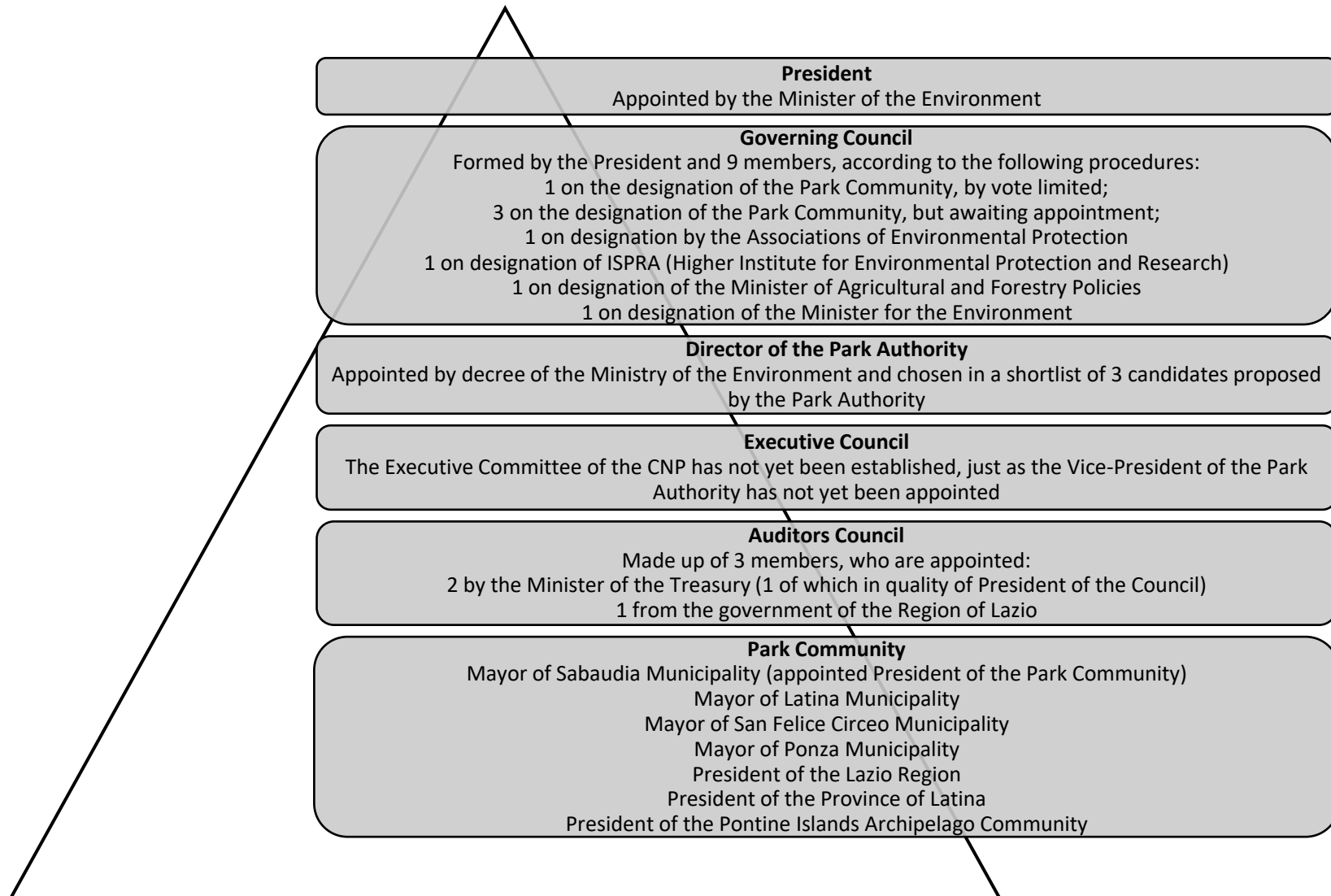
Table 5.5: Capacity of Tourist Accommodations 2016 (ISTAT, 2018c)

Municipality	Hotel structures	% Hotel exercises compared to the total of municipal hotel exercises	Extra-hotel Exercises	% Extra-hotel exercises compared to the total of municipal extra-hotel exercises
Latina	18	29,51%	23	20,72%
Ponza	18	29,51%	39	35,14%
Sabaudia	12	19,67%	22	19,82%
San Felice Circeo	13	21,31%	27	24,32%
Total	61	100,00%	111	100,00%

5.7. MANAGEMENT

The most recent legislative framework of reference for Italian National Parks is Italian Law 394/1991, also referred to as “*Legge Quadro sulle Aree Protette*” – the Framework Law on Protected Areas – which defines the fundamental principles for the establishment and management of Italian Protected Areas (Gazzetta Ufficiale, 2018). Art. 9 of this Law establishes, for the first time, the figure of the Park Authority, an institution with representatives of public law, legal and administrative headquarters in the territory of the Park and which is supervised by the Minister of the Environment.

Figure 5.3: : Park Authority of Circeo National Park (Gazzetta Ufficiale, 2018; Ministero dell’Ambiente, 2008; Parco Nazionale del Circeo, 2018t)



The Park Authority is composed of the President, the Governing Council, the Director, the Executive Council, the Auditors Council and the Park Community. Every Park Authority uses a Statute, drawn up by the Governing Council and adopted by the Minister for the Environment, to define the internal organization, modalities of popular participation and forms of publicity of the documents. All bodies of the Park Authority remain in office for five years and members can only be confirmed once. Except for the Park Community, other bodies are defined by a top-down approach. On the other hand, Art. 10 defines the Park Community as an advisory and proposing body, constituted of presidents of the Regions, presidents of the Provinces and mayors of the Municipalities of Park territories. These administrative figures are elected by local communities. Since its establishment in 1933, Circeo National Park has been managed by the State Forestry Corps. Despite the entry into force of Italian Law 394/1991, a specific regulatory provision established for the Park Authority according to the criteria indicated by the law in 2005 (Gazzetta Ufficiale della Repubblica Italiana, 2005; Ministero dell’Ambiente, 2012; *Parco Nazionale del Circeo*, 2018e). Moreover, the President and the Governing Council were elected even later, in 2007 and the Director in 2008 (*Parco Nazionale del Circeo*, 2018e). The actual Park Authority is shown in Figure 5.3.

5.8. REGULATION AND AUTHORIZATIONS

Art. 11 of Italian Law 394/1991 (Gazzetta Ufficiale, 2018) describes the objectives of the Regulation of the Park, adopted by the Park Authority. This document regulates the exercise of the activities allowed within the territory of the Park, including agricultural and commercial activities, transport circulation, recreational and research activities, accessibility in the Park territory, prohibited activities, etc. The Park Regulation is approved by the Minister for the Environment, after consultation with the Council and after consulting the local authorities concerned. After its publication in the Official Gazette of the Italian Republic, Municipalities are required to adapt their regulations to the Park Regulation.

Circeo National Park regulation was already adopted by the board of the park authority in 2012 but will be approved by the Minister of the Environment only after the approval of the Park Plan (*Parco Nazionale del Circeo*, 2018u).

The regulation (Ente *Parco Nazionale del Circeo*, 2011a) establishes that in Circeo National Park territory some activities are forbidden, including:

- the capture, killing, damage, disturbance of animal species;
- the collection and damage of plant species (except as provided for agricultural-forestry-pastoral activities in areas where they are allowed);
- the transformation of wooded areas, detrimental to the needs of hydrogeological protection and environmental conservation;
- the opening and operation of quarries, mines and landfills;

- earth movements capable of altering the natural profile of the land;
- modification of the water regime;
- the introduction and use of any means of destruction or alteration of the bio-geochemical cycles;
- the use of outdoor fires;
- collecting and tampering with items of historical and cultural value.

The regulation defines rules for the picking of mushroom and undergrowth products, sport fishing and the navigation of the lakes. Moreover, it regulates interventions and work on buildings in the park area. For example, in the integral and general oriented reservations, the creation of any new work or artefact is prohibited. Furthermore, constructing plants, artefacts and works aimed at storing, transporting, processing, producing and treating materials, resources, energy, substances, waste, wastewater that produce environmental, landscape, acoustic and luminous impacts, polluting loads, is forbidden. According to Circeo National Park regulation (Ente *Parco Nazionale del Circeo*, 2011a) and Art. 13 of the Italian Law 394/1991 (Gazzetta Ufficiale, 2018), the granting of concessions or authorizations relating to plant interventions and works within the park territory, but outside of the integral reserves, is subject to the preventive authorization of the Park Authority.

The regulation controls agricultural and pastoral activities in the park area. For instance, in the general oriented reserves, only pesticides using biological and integrated control techniques are permitted, except with a specific authorization issued by the Park Authority that is reserved for serious and demonstrable reasons. In the areas of protection, the use of pesticides and chemical fertilizers allowed under current regulations is permitted. The use of permanent greenhouses is allowed only if the farm surface and structures concerned comply with certain parameters relating to dimensions, boundaries, roofing material, irrigation systems, etc. The creation of new structures is only allowed for organic production.

5.9. PARK PLAN AND ECONOMIC AND SOCIAL PLAN

Art. 12 of Italian Law 394/1991 (Gazzetta Ufficiale, 2018) defines that the Park Authority have an important instrument to protect natural and environmental values: Park Plan. The Park Plan regulates:

- a) general organization of the territory and its articulation in areas characterized by different forms of use, enjoyment and protection;
- b) restrictions, rules, destinations for public and private use;
- c) systems of vehicular and pedestrian accessibility with particular regard to disabled people;
- d) systems of equipment and services for the management and social function of the park, museums, visitor centres, information offices, camping areas, agritourism activities;
- e) criteria for interventions on flora and fauna.

The Park Plan is drafted by the Park Authority, adopted by the Region of competence, after having heard from local authorities and taking into consideration the observations to the Plan that can be presented by anyone (including individuals) in written form. The Plan is published in the Official Gazette of the Italian Republic and in the Official Bulletin of the Region and is immediately binding for administrations and private individuals. Art. 14 (Gazzetta Ufficiale, 2018) establishes that the Park Community can promote, through the long-term Economic and Social Plan (E&S Plan), initiatives aimed at favouring the economic and social development of collectives residing within the park and adjacent territories. The E&S Plan is submitted to the binding opinion of the Governing Council and is approved by the Region.

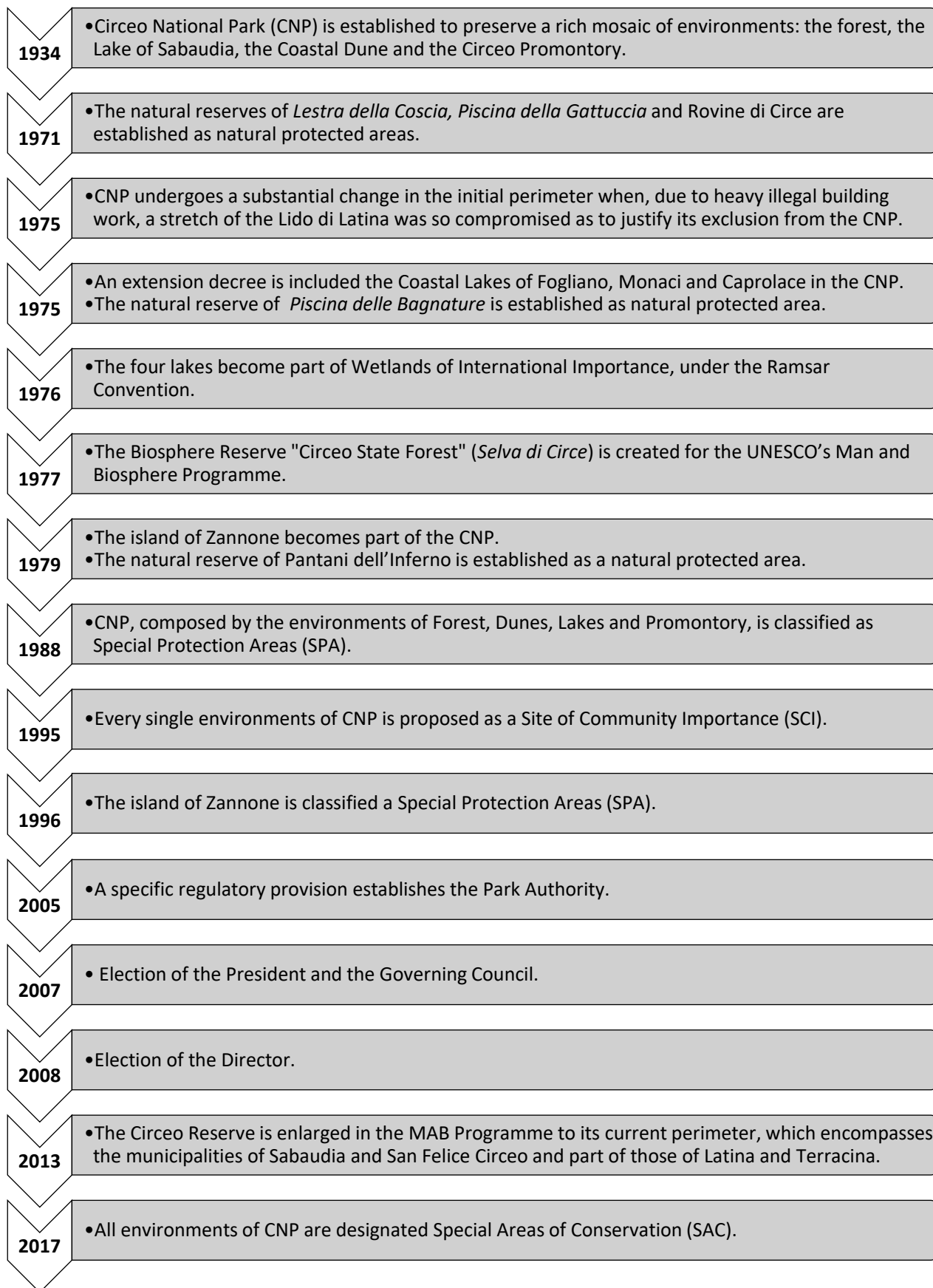
However, Circeo National Park Plan, has remained in preparation and discussion for years (*Parco Nazionale del Circeo*, 2018u). In 2011, it was approved by the Governing Council but waited for the opinion of the Park Community (Ministero dell'Ambiente, 2012). Finally, on July 25th, 2017, the Regional Council of Lazio adopted the Park Plan, the Environmental Report and the Non-technical Summary (V.A.S.) (*Parco Nazionale del Circeo*, 2018w). On November 2017, CNP presented to the Region 366 observations for the Park Plan and 150 for the V.A.S. (*Parco Nazionale del Circeo*, 2018x). In actuality, the process for final acceptance has stopped with the Region (*Parco Nazionale del Circeo*, 2018y).

Once approved, the Park Plan (*Ente Parco Nazionale del Circeo*, 2012) will be immediately binding for administrations and private individuals and updated every ten years. Moreover, the Plan will have the value of an urban plan and it will immediately replace the territorial or urban plans of any level. The general or special planning instruments, implementation and their variations of the municipalities included in the protected natural area, as well as the new building regulations and/or variants of the existing ones, not yet definitively approved at the date of entry into force of the Plan will be subjected to clearance from the Park Authority. Until the date of approval of the variant to adapt the municipal planning instruments to the Plan, Municipalities cannot authorize building interventions and/or the transformation of the territory or adopt variants of the urban planning instrument in contrast to the rules of the Plan and zoning. At the regional level, the provisions of the Regional Landscape Territorial Plan ("*Piano Territoriale Paesistico Regionale*" – PTRP) and those of the Park Plan will be compatible with each other, with prevailing provisions of the Park Plan, in accordance with the Region of Lazio. In implementing the Park Plan, the more restrictive provisions of those in the Plan or those in the current PTRP will apply.

5.10. ADMINISTRATIVE, REGULATORY AND MANAGEMENT EVENTS

Figure 5.4 summarizes the important events of Circeo National Park described in the previous paragraphs, in chronological order.

Figure 5.4: Chronological events of Circeo National Park



CHAPTER 6. ECOSYSTEM SERVICES AND ENVIRONMENTAL JUSTICE: AN EMPIRICAL APPLICATION⁴

6.1. BACKGROUND

Protected areas are essential to people's well-being. They are key instruments for conserving biodiversity and maintaining livelihoods for communities (UNEP-WCMC and IUCN, 2016; García-Llorente *et al.*, 2018) and people depend on a multitude of ecosystem goods and services from these natural areas (Trzyna, 2007). They promote human health, help give people a sense of place, offer opportunities to learn about nature, help mitigate climate change, protect threatened species and habitats not protected elsewhere and support the local economy (Trzyna, 2014). Protected areas' objectives are complex and multi-targeted, integrating ecological, research, cultural and socio-economic priorities related to different ecosystem services, as well as users at different scales (García-Llorente *et al.*, 2018). Their designation is one of the most important conservation strategies available to societies (Palomo *et al.*, 2013) and, for decades, these conservation efforts presumed to safe biodiversity from human threats (McDonald *et al.*, 2008). However, a crucial aspect for protected areas is the predominant idea focused on individual and static ecosystems almost in isolation (García-Llorente *et al.*, 2018; Palomo *et al.*, 2013; Petrosillo *et al.*, 2009). Conservation approaches have been driven by the assumed superiority of exclusionary models of protected areas in which people are separated from the rest of nature (Martin *et al.*, 2016). One of the main risks derives from a system of territorial planning where natural areas are often embedded in an ecologically degraded territory dedicated to economic development (García-Llorente *et al.*, 2018). This idea of protection generated the classic vision of conservation vs. development conflict, also reflected in people's perceptions (Palomo *et al.*, 2011). Moreover, this conservation model has other limitations, including lack of support by local communities and inability to prevent land use change beyond the administrative boundaries of the protected area (García-Llorente *et al.*, 2018). However, long-term conservation strategies cannot be achieved if the relationships between protected areas and the areas that surround them are not considered (Hockings *et al.*, 2006; Palomo *et al.*, 2013). In this context, the spread of ecosystem services-based governance can enable effective and lasting conservation (Sikor *et al.*, 2014).

Ecosystem services (ES) are defined as the benefits people obtain from ecosystems and their changes can affect human well-being in many ways (MA, 2003). Because benefits from ES interest multiple scales, this kind of approach allows managers and scientists to better understand protected areas overcoming the

⁴ Note to reader: This chapter is being prepared as a stand-alone article, written in collaboration with Johannes Langemeyer, from the Institute of Environmental Science and Technology (ICTA), Universitat Autònoma de Barcelona (UAB), Barcelona, Spain. The paper has been in an approved pre-submission by the editors of the journal "Ecosystems and People" and is actually under review. For a more detailed explanation of the methodological approach and explanation of the theories underpinning this article, please refer to Chapters 2 and 3. A further application of the theoretical framework developed in this article can also be found in Chapter 4.

classical conservation vs. development model (García-Llorente *et al.*, 2018). ES research provides an essential foundation to understand diverse attachments to natural resources (Dawson *et al.*, 2017) and offers a way of reading and framing the link between nature and human welfare. Indeed, ES provide an anthropocentric approach for pursuing conservation goals (Chaudhary *et al.*, 2018) and they can be useful to solve trade-offs (Sikor *et al.*, 2014), consider broader ecological processes both within and outside the protected area and avoid the risk of isolation (Palomo *et al.*, 2013). Furthermore, they extend conservation objectives, including social, economic and cultural values of nature (Cowling *et al.*, 2008; García-Llorente *et al.*, 2018). However, one of the critiques of ES approaches is their focus on aggregated wellbeing that neglecting the heterogeneity of societies (Chaudhary *et al.*, 2018). Communities are socially diverse, made up of different groups and this diversity impacts who benefits from ES and influences what is considered fair in ES distribution and governance (Lau *et al.*, 2018). Thus, aggregated ES approaches can be inadequate for determining which groups in society benefit or bear the costs from conservation policies or ES trade-offs and why. The ES approach can overlap the critical of adopting a homogenous approach to communities and failing to consider social diversity and power structures influencing access to benefits and participation in the management of ES (Chaudhary *et al.*, 2018; Díaz *et al.*, 2018; Iniesta-Arandia *et al.*, 2014), applying a justice analysis (Sikor *et al.*, 2014).

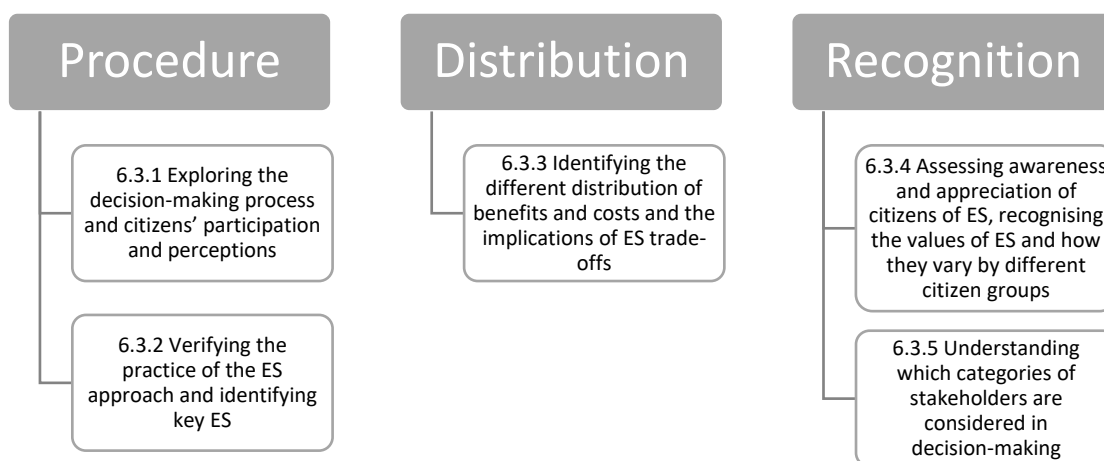
Environmental justice (EJ) provides a well-developed lens to focus on fair treatment of all with respect to the development, implementation and enforcement of environmental laws, regulations and policies (Schlosberg, 2001; Chaudhary *et al.*, 2018). The addition of an EJ lens in combination with the ES approach can reveal local perceptions critical to ES trade-offs, understand different stakeholders' objectives and highlight pathways of resolution (Dawson *et al.*, 2017). EJ can uncover existing and potential social conflicts between management and use, especially when conservation policies are applied without due consideration of the interests and needs of local communities (Kovács *et al.*, 2015). This chapter follows the three main pillars of environmental justice (Sikor *et al.*, 2014; Martin *et al.*, 2016; Zafra-Calvo *et al.*, 2017; Chaudhary *et al.*, 2018): procedural justice, distributive justice and recognition justice. Procedural justice refers to how decisions are made, including transparent management and communication approaches, access to practice to solve conflicts and the participation of all stakeholders in decision-making (Zafra-Calvo *et al.*, 2017). Distribution focuses on fair distribution of benefits, costs and values to different groups of a society (Martin *et al.*, 2016; Chaudhary *et al.*, 2018). Finally, recognition refers to who or what is recognised in decision-making processes, without necessarily actively participating (Chaudhary *et al.*, 2018).

6.2. OBJECTIVES

In this chapter, ES approaches were extended by adding an EJ framework to analyse how and why the ES conservation policies generated different benefits and costs among different groups within society and

were related to diverse kind of injustices. As showed by Figure 6.1, the key objectives are to: understand how decisions were made, who participated and in which measure the ES approach was put into practice in the case study (procedure dimension); identify which social groups suffered the costs from conservation policies and ES trade-offs (distribution dimension); assess the awareness and appreciation of citizens of ES, explore how the values were differentiated by different citizen groups and define the different categories of stakeholders taken into consideration in ES and conservation strategies (recognition dimension). The research underlines the importance of the EJ lens for the ES approach, useful to increase social support for environmental conservation and improve drivers for achieving the sustainable planning and management of protected areas.

Figure 6.1: Specific objectives related to dimensions and the ecosystem services approach, numbered according to the paragraphs of the results section



6.3. RESULTS

6.3.1. Consideration of multiple objectives in the decision-making processes

Italian Law 394/1991, also called “*Legge Quadro sulle Aree Protette*” – Framework Law on Protected Areas – defines fundamental principles for the establishment and management of Italian Protected Areas. The law establishes the figure of Park Authority, the official body responsible of the decision-making and the management of a National Park. The tools of the Park Authority are the Statute, the Regulation, the PP (PP) and the Long-term Economic and Social Plan. Table 6.1 describes in detail the Park Authority and its instruments and how they were implemented in CNP. This is a typical example of top-down decision-making and management approach. Despite following this top-down approach, the statute of CNP guarantees citizens, associations and collective subjects the right to request, petition and proposal. The first are requests of explanation about specific aspects of the Park’s activity. With petitions, citizens call for intervention on issues of general interest and expose common needs. Proposals are requests for the adoption by the Park Authority of specific act. Together with the statute, the PP guarantees, in its development, definition and its subsequent implementation, a shared and participative approach with local Administrations and stakeholders, at any level interested in the Park territory and its surrounding.

Table 6.1: Bodies and tools of the decision-making and management processes and their implementation in Circeo National Park

Body/tool	Description	Implementation in CNP
<i>Park Authority</i>	Institution with people from public law, legal and administrative headquarters in the territory of the park and supervised by the Minister of the Environment. Composed by the President, the Governing Council, the Director, the Executive Council, the Auditors Council and the Park Community. Unlike the other figures, the Park Community is an advisory and proposing body, constituted by presidents of the Regions, presidents of the Provinces and mayors of the Municipalities of Park territories (these administrative figures are elected by local communities).	Since its establishment in 1933, CNP has been managed by the State Forestry Corps. Despite the entry into force of the Italian Law 394/1991, a specific regulatory provision only established the Park Authority in 2005. Moreover, the President and the Governing Council were elected in 2007 and the Director in 2008. The Executive Committee has not yet been established, just as the Vice-President has not been appointed either.
<i>Statute</i>	The Statute of the Park Authority, drawn up by the Governing Council and adopted by the Minister for the Environment, defines the internal organization, the modalities of popular participation and the forms of publicity of the documents.	The CNP Statute was adopted by ministerial decree in 2009.
<i>Regulation</i>	The Regulation of the Park, adopted by the Park Authority, regulates the exercise of the activities allowed within the territory of the Park, including agricultural and commercial activities, transport circulation, recreational and research activities, accessibility in the Park territory, prohibited activities, etc. The Park Regulation is approved by the Minister for the Environment, after consultation with the Council and after consulting the local authorities concerned. After its publication in the Official Gazette of the Italian Republic, the Municipalities are required to adapt their regulations to the Park Regulation.	The CNP regulation was already adopted by the board of the park authority in 2012 but will be approved by the Minister of the Environment only after the approval of the Park Plan.
<i>Park Plan</i>	The Park Plan regulates general organization of the territory in areas characterized by different forms of use, enjoyment and protection; restrictions, rules, destinations for public and private use; systems of vehicular and pedestrian accessibility; systems of equipment and services for the management and social function of the park, museums, visitor centres, information offices, camping areas, agritourism activities; and criteria for interventions on flora and fauna. The Park Plan is draft by the Park Authority, adopted by the Region of competence, after having heard the local authorities and taken into consideration the observations to the Plan that can be presented by anyone (including individuals) in written form. The Plan is published in the Official Gazette of the Italian Republic and in the Official Bulletin of the Region and is immediately binding on administrations and private individuals.	The CNP Park Plan has remained in preparation and discussion for years. In 2011, it was approved by the Governing Council but waited for the opinion of the Park Community. Finally, on the 25th of July 2017, the Regional Council of Lazio adopted the Park Plan and the Strategic Environmental Assessment (SEA). On November 2017, CNP presented 366 observations to the Region for the Park Plan and 150 for the SEA, but, currently, the process for the final acceptance is stopped in the Region.
<i>Long-term Economic and Social Plan (E&S Plan)</i>	Proposed by the Park Community, the E&S Plan suggests the initiatives aimed at favouring the economic and social development of the collectivises residing within the park and adjacent territories. The E&S Plan is submitted to the binding opinion of the Governing Council and is approved by the Region.	The draft of the E&S Plan was developed by the Park Community in the period 2002-2008, validated from a technical-administrative point of view, but not yet adopted.

The first phase of the Park Plan design provided a direct contact with the most representative institutional actors, through interviews. The second concerns the discussion tables, aimed at further detailing the framework of the needs of local realities, considering the visions and ideas of the territory. The third in which the Plan group and the Park presented their vision, with a summary of the framework of naturalistic, territorial needs and needs and proposed it to the discussion tables. CNP Park Plan was set up as an interactive process, conducted by groups of experts from different disciplines and with the involvement of the inhabitants, their associations, institutional bodies, businesses and civil society in general in the Park territory. The interaction took place through two main methods: on the web, through dedicated internet services (questionnaires, forums, interactive maps, social interaction environments, etc.); and through meetings in assemblies open to all, thematic forums and possible work groups. The steps following the adoption of the Park Plan should represent a continuous and open process of governance, which include the relationship with the Park Community, with the world of volunteering, with the world of education, with economic operators and with other social actors. However, the survey results indicated that most people (75%) were not aware of these participatory initiatives (Figure 6.2). Only 12,33% of respondents of the survey participated in the Park Plan initiatives, while 64% declared they would have considered participating if they had been properly informed; 11% stated they would not have participated anyway (Figure 6.3). When further asked to evaluate the communication strategy by CNP, respondents highlighted the low level of communication via different media, including local press, social networks, newsletter, word of mouth and posters (Figure 6.4). Moreover, the findings revealed a very low (66%) level of confidence in the management of the Park, the decision-making processes and in the resolution of problems and tensions with the citizens (Figure 6.5).

Figure 6.2: Participation in Circeo National Park plan initiatives

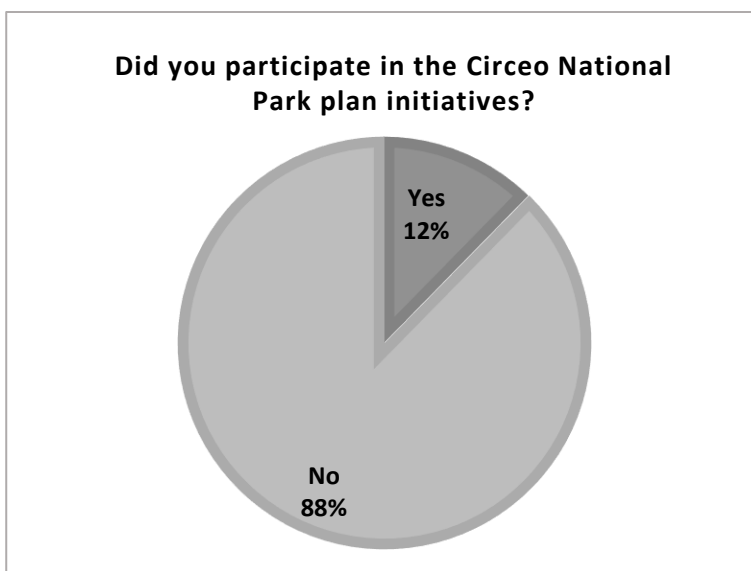


Figure 6.3: Motivations for not participating in Circeo National Park participatory initiatives, such as assemblies, thematic forums, or work groups

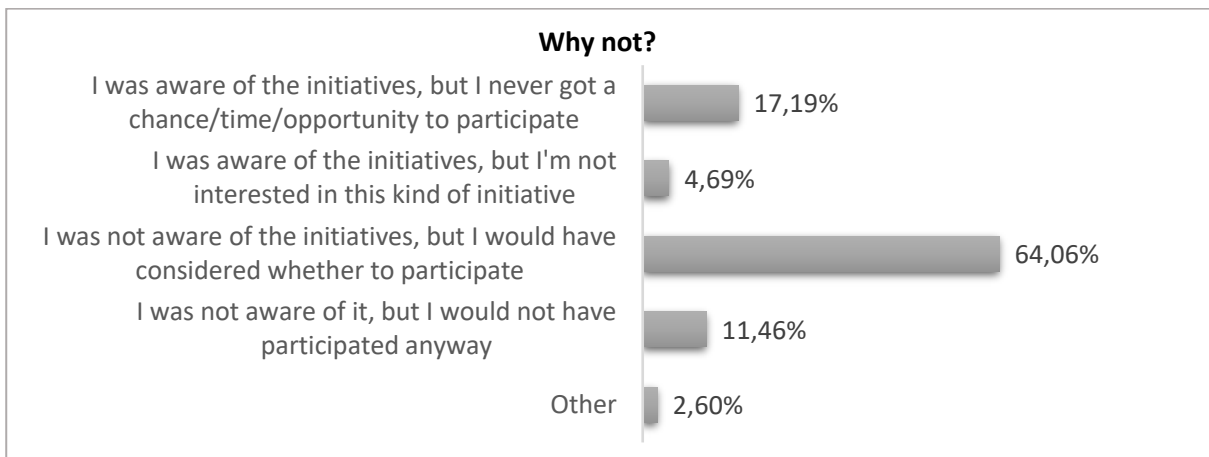


Figure 6.4: The communication level (%) of Circeo National Park initiatives and events, based on residents' perceptions

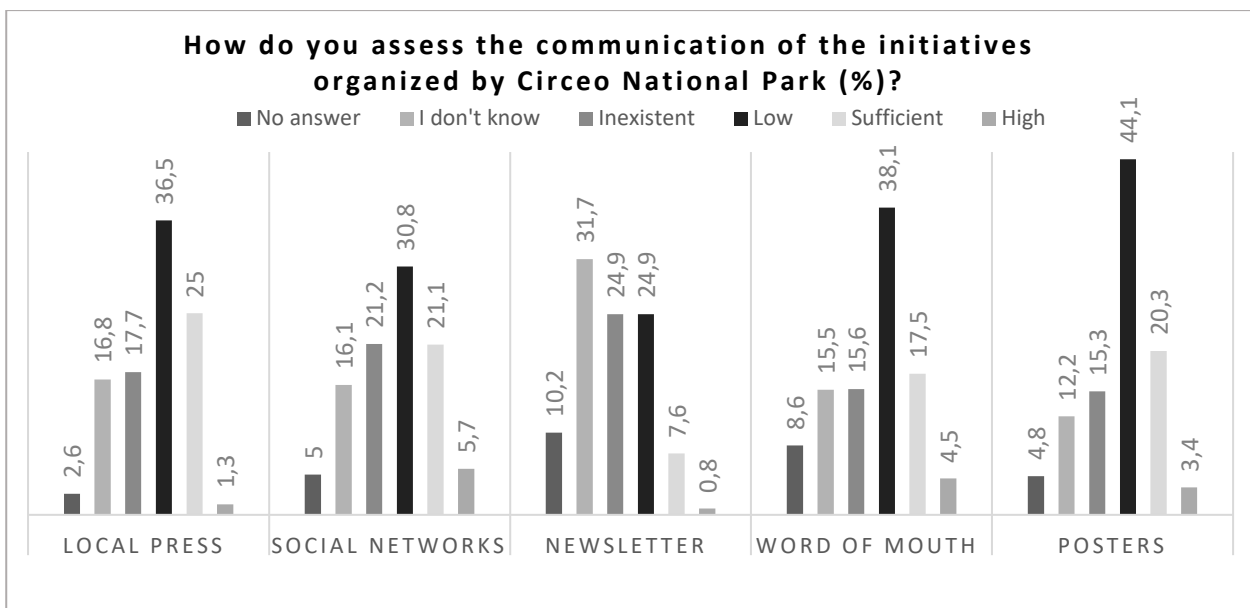
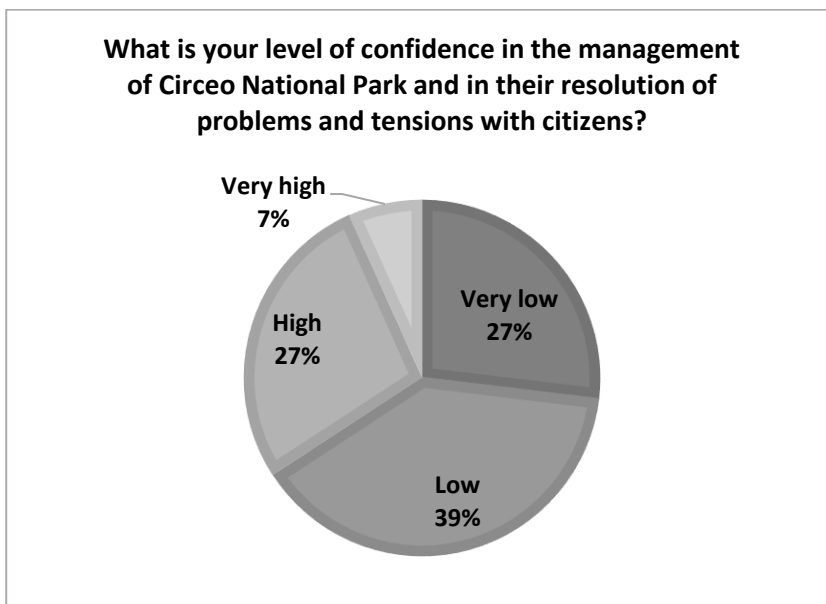


Figure 6.5: The level of trust in Circeo National Park management, based on residents' perceptions



6.3.2. Ecosystem services approach

Table 6.2: Identification of ecosystem services in the case study area, based on policy documents, according to the Common International Classification of Ecosystem Services (Haines-Young and Potschin, 2011) and the Economics of Ecosystems and Biodiversity (TEEB, 2010a) classifications

CNP policy documents		CICES and TEEB classification		
Datasheet of Environmental Strategic Assessment	General and specific objectives and other contents of the Park Plan	Examples and indicative benefits	Ecosystem service	Group
E8B: Sustainable agricultural supply chain with greenhouse and field cultivation E8C: Promotion and enhancement of sustainable multifunctional agriculture E8D: Realization of a quality/biologic rural-tourist district	G. Ob. 11: Local economic sectors S. Ob. 4.B: Sustainable agriculture Art. 39: Agricultural surfaces	Commercial cropping (cereals, vegetables, fruits)	Food	PROVISIONING
B2D.1: Identification of a scientific management model of the fish populations present in the coastal lakes B3D and B3E: Coordination of socio-economic activities on Paola Lake	S. Ob. 4.C: Fishing and aquaculture Art. 40: Lake surfaces aimed at aquaculture	Commercial fishing (mussels)	Food	
B1H: Sustainable mushroom harvest in the forest	-	Harvesting wild plants and animals for food (mushrooms)	Food	
B1E: Increased suitability of the buildings surrounding the forest for the bats' shelter B1F: Reduction of the load of wild boar in the forest B1G: Elimination of fallow deer disturbance in the forest B2C.2: Creation of suitable habitats for the reproduction of species of waterfowl target in the coastal lakes B4A.5: Observatory implementation for monitoring the migration of birds of prey B5A: Monitoring of Zannone biodiversity B2D.3-4: Numerical control of alien Nutria and tortoises B5B: Management of the mouflon in Zannone C1, C2, C3: Conservation of species and habitats of national, community and international interest	G. Ob. 1-5: Conservation of biodiversity, habitat and species S. Ob. 2: Conservation of species and habitats of national, community and international interest Art. 20: Protection of biodiversity	Maintaining nursery populations (habitat refugees) and maintenance of biodiversity	Lifecycle maintenance and genetic pool protection	REGULATING AND HABITAT
B7B: Sustainable management of the dune system E5: Sustainable development of dune areas	G. Ob. 7: Coastal erosion S. Ob.4.A: Conservation of the dune system S. Ob. 4.A: Sustainable beach management and defence of the dunes Art. 18: Protection of the soil resource	Erosion protection	Erosion prevention	

CNP policy documents		CICES and TEEB classification		
Datasheet of Environmental Strategic Assessment	General and specific objectives and other contents of the Park Plan	Examples and indicative benefits	Ecosystem service	Group
-	Art. 19: Protection of the quality of the art and the urban environment	Air purification and oxygenation	Air purification	REGULATING AND HABITAT
B2A.1: Improvement of the chemical-physical water quality parameters in coastal lakes B2A.2: Activation of new scoops of Fogliano Lake B2A.3: Activation of agreement protocol with ARPA Lazio on water quality monitoring B3A: Purification of the waters of Paola Lake E11: Sustainable management of the water and material cycle	Art. 17: Protection of water resources	Water purification and oxygenation	Water purification	
B1A: Sustainable use of the forest B2C.1: Regulation and organization of tourist access to the shores of coastal lakes B2C.3: Construction of a Monitoring Centre for the coastal wetlands of the Park B4A.2: Sport climbing regulation B4A.3: Tourist use of the Promontory B4C.1: Recovery and use of the promontory caves B5C: Sustainable development of the island of Zannone B5F: Hospitable Zannone B7B: Sustainable management of the dune system E5: Sustainable development in dune areas E6A: Sustainable tourism development plan for the Island of Zannone	G. Ob. 11: Local economic sectors S. Ob. 4.A: Naturalistic tourism S. Ob. 4.A: Sustainable beach management and defence of the dunes Art. 35: Areas of environmental interest compatible with touristic and hotel activities Map: Ecotourism	Recreational and sports activities	Recreation and tourism	
B4B.4: Hydrogeological risk management in a way that is compatible with the environmental and landscape value	G. Ob. 12: Landscape, archaeological, monumental, historical and cultural heritage Art. 24: Protection and enhancement of heritage of historical, architectural and environmental value Art. 27: Areas of particular historical and landscape value Map: Landscape heritage	Areas of outstanding natural beauty and tranquillity	Aesthetic values	
F1: Plan of the researches and of the monitors considered priority F2: Information and environmental education	S. Ob. 5: Promotion and promotion of research, monitoring, information and environmental education activities	Scientific research and environmental education	Information for cognitive development	

The ES approach allowed us to recognise the wide range of benefits that CNP provide. The concept of ES was explicitly mentioned three times within official policy documents of CNP. Some policy documents, such as the SEA and the Park Plan, identified intervention strategies to conserve ES, but without explicitly referring to one or more specific ES. On the other hand, some of these strategies referred to specific conservation objectives for the benefits provided to people. First, the fifth article of the Park Authority ensured the continuous and permanent analysis of the territory and its transformations, activating monitoring systems, including ES. Second, the sixth objective of the Park Plan was the conservation of ES guaranteed by the biodiversity of the Park, as well as the associated processes. Thirdly, the map of cultural value, education, art and research was related to archaeological heritage, landscape heritage and ecotourism. For instance, one of the Park Plan objectives was to preserve the landscape, archaeological, historical and cultural assets present on its territory, for the benefit of future generations and their intrinsic value. Other goals and strategies were strictly related to food production from agriculture, aquaculture and mushrooms picking. Others highlighted the importance of CNP for different touristic activities, ecotourism, environmental education and research. Except for air purification benefitting the urban population, CNP policy strategies did not clearly consider the benefits provided to people from habitat end regulating services.

A comparison between the Common International Classification of Ecosystem Services (Haines-Young and Potschin, 2011) and the Economics of Ecosystems and Biodiversity (TEEB, 2010a) classifications and policy documents revealed 10 major ES provided by CNP (Table 6.2), including: food from agriculture, food from aquaculture, food from mushrooms picking, habitat for species, soil erosion control, air purification and water purification, nature recreation activities, aesthetic value and tranquillity of nature and environmental education and science.

6.3.3. Different distribution of benefits and costs and implications of ecosystem services trade-offs

In order to understand who benefitted from conservation efforts and who bear the costs, the questionnaire asked how the presence of the Park impacted respondents' activities. More than half (56%) of respondents defined the impact of the Park as positive, 37% null and 7% negative (Figure 6.7). Therefore, a small group of respondents affected by the protection regime of the park emerged. Most of these respondents lived within the Park area or worked in the agricultural areas of CNP. The main reasons for the negative perception of the Park were (Table 6.3) limitations for production and economic development, the inefficiency of the Park Authority, the high level of bureaucracy for permissions and the general sense of prohibition.

Figure 6.6: Impact of Circeo National Park on inhabitants' life and activity, based on residents' perceptions

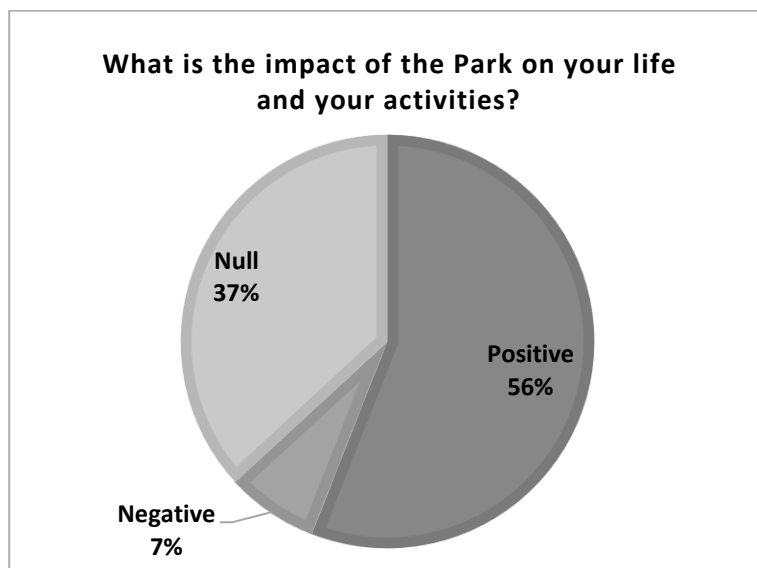


Table 6.3: Main motivations for the negative impact of Circeo National Park on inhabitants' lives and activities

Motivation	%
Limitations for production activities and economic development	37,6
Inefficiency of Park Authority	20,8
High bureaucracy for permissions (ex: tree cutting)	19,4
Sense of prohibition and not protection	18,5
No maintenance (fences, roots, trees, drains, paths, walkways, etc.)	15
Limitations to urbanization	14,4
Privatization of Paola Lake	5,9
Inability of Park Authority to enforce regulations (ex: illegal cut and waste in the park area)	3,9
No animals control	3,6
No answer	19

These results were confirmed from the grey literature analysis. Starting from people who lived and worked in the Park areas, research focused on the main goal of a protected area: biodiversity conservation, strictly related to the provision of suitable living and nursing places for wild species.

- One of the problems caused by the conservation of this ES was the pressing surplus of wild boars in CNP. Many farms have been damaged by these animals which attack crops to find food. The presence of such many specimens of wild boars, as well as fallow deer, became a risk for road traffic, causing serious accidents. If on the one hand, the goal of conservation can increase the benefits for future generation, on the other, it can reduce that of people who live or work in CNP areas. Additionally, the regulation of CNP defines the rules for interventions and construction on buildings in the park area. Consequently, citizens who lived and worked in the park areas also suffered additional limitations from the protection regimes. This was reflected in some answers, as shown in Table 6.3, such as “high bureaucracy for permissions”, “sense of prohibition and not protection”, “limitations to urbanization”.

Moreover, two categories of workers were identified in relation to the “limitations for production activities and economic development” in Table 6.3: farmers of the park areas and touristic workers in the coastal dunes.

- The areas of the park destined for agriculture cover more than 18% of the Park’s territory and these areas must follow the criteria established by the Park Authority and informed by the concept of “sustainable development”. CNP regulation disciplines agricultural and pastoral activities in the park area, for instance, encouraging farmers to adopt the methods of organic farming. Moreover, CNP is surrounded by other kinds of agriculture: indeed, Pontina Plain is one of the largest coastal plains in Central Italy and is a rich agricultural area. Intensive agricultural production has developed in the area, not regulated by the Park Authority. On one hand, the Park Authority limits the diffusion of intensive agriculture in CNP territory, but, on the other, this can decrease the benefits for CNP farmers.
- Different studies (Acosta et al., 2000; Aretano et al., 2017) have analysed the problems of soil erosion in CNP dunes caused by the recreational activities in these areas. The intensification of tourism, which includes construction, trampling and parking areas, is considered the principal cause of the degradation of coastal dunes (Acosta et al., 2000; Aretano et al., 2017). During the period 1954–1988, despite the official designation of CNP, strong negative changes occurred in the protected coastal area several, mainly in the dune systems and natural areas with vegetation (Aretano *et al.*, 2017). Land cover suffered serious degradation mechanisms, reducing their ecosystem function of soil erosion control. During the period 1988–2013, the coastal area appeared to be more or less stable, with a very small percentage of change (Aretano *et al.*, 2017). The vegetation of coastal dunes is still well preserved by CNP, though the spatial distribution of some vegetation communities has been reduced due to human disturbance (Acosta, Blasi and Stanisci, 2000). Since recreational activities in the coastal dunes can damage the function of soil erosion control, CNP adopted different conservation strategies, such as the installation of walkways to reach the beach, or specific solutions and limitations for new buildings or the expansion of existing buildings. Thus, touristic activities in these areas bear the costs of conservation.

Next to these results which underlined the trade-offs between nature conservation and benefits to people, the findings underlined also trade-offs among ES, with implications on different social groups. The ES of interest were food from agriculture, water purification and food from aquaculture.

- Different studies (Manca, 2014; Sappa et al., 2005) on the Pontina Plain, showed the consequences of the intensive agriculture. First of all, intensive agriculture with the use of a significant amount of pesticides (also allowed in the park area) pollutes the soil and consequently the ground and surface waters (Manca, 2014; Sappa et al., 2005). The second consequence is

related to the groundwater pumping to supply water for this activity. In the springtime, agricultural production is intense and the strain on groundwater resources is great (Manca, 2014). Furthermore, greenhouses are the primary means of agricultural production, which do not recycle water or directly recharge aquifers. The absence of regional water regulation (Manca, 2014) and uncontrolled withdrawals endanger the natural system, amplifying the depletion of groundwater the degradation of the quality of underground water resources due to the progressive increase in the phenomenon of seawater intrusion (Manca, 2014; Sappa et al., 2005). The degradation of ES risks reducing the benefits for future generations.

- Another group of interest was the owners of Paola Lake. Despite being part of CNP, the Paola Lake is private. Starting from 2007, the family implemented a project of environmental and productive requalification of the area, focused on some economic activities, such as aquaculture, mussels' cultivation and tourism. Another consequence of intensive agriculture is the situation of the polluted waters of CNP Lakes. Together with civil waste, which probably does not properly dispose of wastewater, the pollution and loads of nutrients increase in the lakes, decreasing the oxygen. A decrease of oxygen and increase of temperatures can determine habitat crisis, as happened in Paola Lake, for example, in July 1979, with a disastrous death of fish. Other similar phenomena, even if less intense, occurred in 2003 and 2015. These phenomena become also a problem for the economic activities in the Paola Lake. Problems related to the water pollution negatively affect the ES food from aquaculture, reducing benefits for Paola Lakes owners.

Finally, another issue was related with this last point. As shown in Table 6.3, 5,9% of respondents who declared a negative impact, perceived the privatization of Paola Lake as an injustice. However, the study didn't focus on the justice questions about private and public goods.

In order to understand if these results were linked to respondents' perception of ES, the next section and seeks to acknowledge the awareness and assessment of ES, disaggregating values for social groups.

6.3.4. Recognition of ecosystem services awareness and appreciation

Local residents were aware of the multifunctionality of CNP and the provision of several ES when asked for their perceptions, yet, with a different degree of awareness regarding different ES (Table 6.4). For example, most respondents recognised the benefit from air purification (93,4%) and habitat for species (91,8%), while awareness for the provision of other services, such as water purification (59,2%), food from agriculture (68,8%) and food from aquaculture (75,2%) was considerably lower.

The most important ES for the individual well-being was air purification (0,882), followed by environmental education (0,8676). The least important was food from mushroom picking (0,5421), followed by food from aquaculture (0,6564). Even if water purification was the least recognised service (59,2%), it was perceived of as very important (0,8481). At the same time, food from agriculture was the

second least recognised service (68,8%), but it was considered the most important among provisioning services (0,7778).

Table 6.4: Awareness (%) and appreciation of ecosystem services for personal well-being (mean value according to residents' answers: no importance = 1, little importance = 2, some importance = 3, much importance = 4 and standardised considering 1 = 0 and normalised considering 1 = 0 and 4 = 1)

GROUPS OF ES	ECOSYSTEM SERVICES	AWARENESS (%)			IMPORTANCE FOR PERSONAL WELL-BEING (0-1)		
		Yes	No	I don't know	Mean for single ES	SD for single ES	Average of ES groups
PROVISIONING	Food from agriculture	68,8	11	20,2	0,7778	0,2908	0,6588
	Food from aquaculture	75,2	12	12,7	0,6564	0,29457	
	Food from mushrooms picking	89,8	3,2	7,1	0,5421	0,30057	
REGULATING	Habitat for species	91,8	3,2	5	0,8503	0,23037	0,8594
	Soil erosion control	87	4,2	8,8	0,8572	0,22806	
	Air purification	93,4	1,5	5,1	0,882	0,20167	
	Water purification	59,2	9,3	31,5	0,8481	0,24927	
CULTURAL	Nature recreation activities	85	5,8	9,2	0,8184	0,22689	0,8332
	Aesthetic value and tranquillity of nature	81,2	5,7	13,2	0,8137	0,24854	
	Environmental education and science	89,7	1,6	8,7	0,8676	0,20909	

Interestingly, disaggregating the data, respondents living in the park area tended to give lower scores for habitat for species, compared to respondents who didn't live in park area. Similar results are for people who lived and also worked in the park areas. Also analysing business sectors of respondents, differences among groups appeared. Interesting and statistically relevant results were included two sectors: industry and crafts and building. Respondents from the industry and crafts sectors tended to give lower scores for habitat for species and air purification, while workers in the building sector tended to give lower scores for food from agriculture and aesthetic value and tranquillity of nature.

6.3.5. Recognition of stakeholders

The previous paragraphs 6.3.3 and 6.3.4 allowed us to recognise stakeholders on which the conservation costs and ES trade-offs weighed. These social groups were people who lived in the park area; people who worked, in particular in agricultural and touristic sectors; the owners of Paola Lake; workers in the industry and crafts and building sectors; and future generations.

The policy document analysis highlighted that recognising stakeholders' needs was a prerequisite to the planning process of the Park Plan. Indeed, the Park Plan guaranteed a shared and participated approach with stakeholders, at any level interested in the Park territory and its surrounding. These interlocutors were identified in the various sectors involved in the planning process, but they are not explained in the

Park Plan. The explicit references were farmers and breeders, tour operators, commercial operators in the fisher-touristic sector and the owners of Paola Lake.

6.4. DISCUSSION

One of the principal recommendations of the Millennium Ecosystem Assessment for protected areas was to develop policies and other effective means based on the benefits and values of the services the protected areas provide (MA, 2005). However, although protected areas shall be designed and managed to provide benefits to society, they are not understood in that sense (Palomo et al., 2011). Furthermore, ES are still often not explicitly considered in many protected areas (Geijzendorffer *et al.*, 2017), as in the case of CNP, and conservation approaches are still primarily driven by an exclusionary model, in which people are separated from nature (Martin *et al.*, 2016). In the case of CNP, only a few of the specific conservation objectives were related to the benefits provided to specific groups of citizens. Embracing an ES approach can help conservation strategies to integrate multiple policy objectives, including diverse social interests in parallel with preserving ecosystem integrity and health (García-Llorente *et al.*, 2018). The ES approach allowed us to reason in terms of benefits to people and understand who actually benefitted or bear the costs of the ES conservation strategies and the ES trade-offs. Moreover, the present study adopted also an EJ framework in order to understand how and why the ES conservation policies in CNP were related to different kind of injustices and produced different benefits and costs among diverse social groups. Starting from the study of the case, CNP followed a typical top-down decision-making and management process. However, conservation strategies for protected areas following a top-down approach may enhance the conservation vs. development model dichotomy and can bring out conflicts (West, Igoe and Brockington, 2006; Palomo *et al.*, 2011). Actually, this was true considering some of the results. First, the decision-making and the management processes of CNP were negatively perceived of by respondents: many declared very low or low levels of trust in the Park Authority (procedure injustice). Second, different social groups were negatively affected and bore the costs of ES conservation policies and the consequences of ES trade-offs (distribution injustice). Third, these and other groups of respondents, who gave lower scores to ES, were not recognised in the Park Plan (recognition injustice). The discussion of the findings follows these three environmental injustices: procedure, distribution and recognition.

6.4.1. Procedural injustice

Over the last few decades, many have argued that a sustainable management of natural resources cannot be achieved without the involvement of the affected communities, participating in the management of protected areas (Palomo et al., 2011). Moreover, embracing an ES approach in protected area management requires the engagement with people. In CNP, the Statute and the Park Plan promoted

citizens' participation in the formation of decisions by the Park Authority administration, in particular in the Park Plan design process. The interactive design process lasted a long time and included face-to-face approaches (interviews and discussion tables, work groups and open assemblies) and internet services (questionnaires, forums, interactive maps, social interaction environments) to involve inhabitants, associations, stakeholders and local Administrations, at any level interested in the Park territory and its surrounding. As underlined by the same Park Plan, the actual success of the planning process and the subsequent phases will depend on the ability to interact with the local society and with the wider social system on regional, national and international scales. However, survey results indicated a low level of participation of respondents in the Park Plan design process, mainly due to a low communication of CNP initiatives. As mentioned by Bueno, Pediaditi and Carsjens (2012)(Bueno, Pediaditi and Carsjens, 2012)(Bueno, Pediaditi and Carsjens, 2012)(Bueno, Pediaditi and Carsjens, 2012)(Bueno, Pediaditi and Carsjens, 2012)(Bueno, Pediaditi and Carsjens, 2012), inappropriate participation procedures or ineffective information provisions can result in failing communication and loss of motivation of the local communities to participate or to recognise and accept decisions made by the Park Authority. The results underscore the need for training park managers and staff in participation and communication strategies and tools.

6.4.2. Distributive injustice

As mentioned in the introduction, conservation activities in protected areas in many cases lead to land use changes due to restrictions placed on land use or to rehabilitation activities in degraded ecosystems: these changing consequently causes trade-offs between ES and conflicts between certain stakeholder groups (Kovács *et al.*, 2015). This emerged in the results related to the different distribution of benefits and costs. For instance, a distributive injustice was identified in the agriculture sector due to different regulation: while an intensive agriculture developed in the areas surrounding the park, the Park Authority encouraged farmers of CNP to a biological agriculture, placing some limitations, but decreasing the benefits for CNP farmers. Moreover, intensive agriculture in the surrounded areas caused the degradation of lake water, reducing water purification benefits for future generations and aquaculture benefits for the economic activities in Paola Lake. Intensive land use around many protected areas cannot be managed as isolated and static entities (Palomo *et al.*, 2013). Land use change and intensification outside protected areas create border effects that impinge upon the ES delivered within the protected area (García-Llorente *et al.*, 2018). Regulations should consider the land uses surrounding a protected area and the extent of its isolation from or connectivity to other natural areas (Hockings *et al.*, 2006). Other conflicts emerged from the conservation goals of the park: on the one hand, the conservation strategies ensured the benefits for the future generations (conservation of habitat for species ES and soil erosion control), but, on the other, they reduced benefits for some social groups of the local communities

(disservices from animals; limitation for touristic activities on the dunes). The different distribution of benefits and costs due to the ES conservation strategies and the implications of ES trade-offs were reflected in people's perceptions, generating the classic vision of conservation vs. development conflict (Palomo et al., 2011). Management should confront the problem of managing the entire complexity of social-ecological landscapes, which often consists of interactions among different habitat and ecosystems and integrating phenomena across multiple spatial, temporal and organizational scales (Petrosillo et al., 2009). Still, protected areas are too often not understood in that sense (Palomo et al., 2011) and tend to focus on their main mission to preserve biodiversity. Incorporating the idea of ES conservation in their objectives (Schirpke *et al.*, 2018) may help to identify and overcome conflicts given in protected areas and increase the acceptance for conservation measures.

6.4.3. Recognitional injustice

Next to biodiversity conservation, protected areas should improve the understanding of ES benefits provided for human well-being (García-Llorente *et al.*, 2018). For this reason, the research made the ES awareness and appreciation of citizens in two Municipalities of CNP explicit and tried to recognise diverse perceptions of different social groups. People living and working in the park area tended to give less importance for habitat for species ES, because, as also underlined in the distributive section, this group was affected by the costs of ES conservation and were the most damaged by animals of the park. Moreover, the disaggregated analysis allowed us to recognise other social groups negative affected by costs of ES preservation, which were previously unidentified. Indeed, data indicated that respondents from the building, industry and crafts sectors had minor appreciation of some ES, maybe because the regulation for their conservation limited the development of these activities. Thus, social actor groups, can have very different perceptions of and interests placed on, the benefits provided by ES (Cáceres *et al.*, 2015). However, conservation strategies for protected areas follow a top-down approach and tend to exclude local practices or interests (West et al., 2006). Different forms of exclusion can be related to either vulnerable groups from decision-making, environmental management, or policy-making (Hanaček and Rodríguez-Labajos, 2016). In the case of CNP, the participatory process of Park Plan design underlined the importance of recognising and consulting different stakeholders. Some interlocutors were actually identified in the Park Plan and involved in the design process. However, other groups of respondents were affected by the protection regime of the park and were not explicit recognised in the Park Plan. Many respondents who stated being negatively affected by the park lived within the park boundaries. Such as the results in the distributive section showed, this group felt the negative effects of the conservation approaches. These stakeholders are in a state of latent conflict, which may raise to an opposition to the conservation (Hanaček and Rodríguez-Labajos, 2018). This highlights the importance of streamlining the participatory process; the Park Authority should consider and integrate in the Park Plan

these groups of citizens and their motivations. Effective management approaches should consider involving local communities and should at least record the quality of relationships between protected area managers and local people (Hockings *et al.*, 2006). Moreover, policies should include developing a common understanding of ES and reaching agreements that consider the interests of all stakeholder groups, especially when many different actors with their different perceptions and needs are involved (Hauck *et al.*, 2013).

6.5. CONCLUSIONS

The analysis of the case study showed that, despite an attempt to involve citizens in the Park Plan design, there are many challenges to overcome: improving the relationship and the communication with the local society to gain more trust; recognising minor groups who get the benefits or bear the costs of ES conservation; monitoring the ES perceptions of local people; and considering trade-offs in the distribution of ES, both inside and outside the protected area borders. The present study has shown the potential of a combined approach of EJ and ES to provide a critical understanding of ES traded off with conservation policies. EJ approaches can help in informing ES policy and practice, exploring perceptions of the decision-making procedures, recognition of different values, distribution of benefits and costs. The risk of an isolated vision of protected areas can damage the same ES: as the case of intensive agriculture, the surrounding areas of CNP became degraded, damaging different ES. The ES-EJ approach could help to clarify the role and consider the interests of local communities and other stakeholders in the management of protected areas and their surroundings. Using the concept of ES provides a significant opportunity to shed light on conflicting ES and trade-offs ES and conservation strategies. Protected areas objectives should integrate the problem of managing the entire complexity of social-ecological landscapes, considering multiple scales of space, time and organizational levels. The success of protected areas' strategies may lie in the ability of managers to reconcile biodiversity conservation goals with social, environmental and economic issues of local communities.

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CHAPTER 7. CONCLUSIONS

7.1. BACKGROUND

The main goal of the present research was to explore the extent to which an Ecosystem Services (ES) approach with an Environmental Justice (EJ) lens can support environmental governance. Since first developed, ES approaches have become increasingly important for linking human and nature (Costanza *et al.*, 2014; Santana-Cordero, Ariza and Romagosa, 2016) and for supporting different decision-making and management contexts (Daily *et al.*, 2009; Fisher, Turner and Morling, 2009), in particular conservation strategies, landscape and urban planning and compensatory policies. Chapter 1 introduced the necessity to integrate the ES concept into environmental governance for different reasons. For instance, regardless of the context, ES are tools for communicating the benefits that nature provides to society and recognise trade-offs among different stakeholders (Oteros-Rozas *et al.*, 2014; Schmidt *et al.*, 2017). Moreover, ES can help to understand how plans or policies can affect the relationship society-environment (de Groot *et al.*, 2010; Silvestri *et al.*, 2013; Santana-Cordero, Ariza and Romagosa, 2016). Nevertheless, the aggregated and homogenous idea of ES does not consider the heterogeneity of society (Sikor, 2013; Iniesta-Arandia *et al.*, 2014; Chaudhary *et al.*, 2018; Díaz *et al.*, 2018). This led to an extension of the analysis of ES, adding a justice framework and focusing on the three dimensions of EJ: distribution, recognition and procedure. The literature and systematic reviews of Chapters 3 and 4 and the empirical application in Circeo National Park (Italy) of Chapters 5 and 6, showed how the approaches of ES under the different dimensions of EJ could be integrated and prove useful for environmental governance. With the results obtained from the research conducted in this dissertation, I hope to contribute to: the ES research (7.2), questioning the supremacy of economic and ecologic assessments and highlighting the importance of social dimension of ES; the environmental governance (7.3), proposing a possible solution to integrating the issues about ES and EJ in the policymaking; and the political ecology (7.4), offering a new approach to overcome the division between nature and people. In the end, paragraph 7.5 discusses the key messages of the dissertation.

7.2. ECOSYSTEM SERVICES RESEARCH

The dissertation contributes to ES research in three aspects. First, the dissertation underlined the need for the integration of EJ in the ES field. Chapter 3 showed different meetings points of these two literatures, underlined the positive strengths of a combined approach. Starting from the distributive dimension of EJ, the research showed that ES studies can analysing the distribution of benefits, costs, accesses, responsibilities or compensations of ES among different individuals or social groups (Schlosberg, 2004; Boone *et al.*, 2009; Sikor, 2013; Sikor *et al.*, 2014; Aragão, Jacobs and Cliquet, 2016). Focusing on the recognition dimension, this can help to recognise social and cultural differences and minority groups

in decision-making and management processes about ES (Fraser, 2000; Bohman, 2007; Sikor, 2013; Sikor *et al.*, 2014; Martin *et al.*, 2016). Next to distribution and recognition, procedural justice can support the comprehension of the roles of different stakeholders in decision-making and management procedures related to ES (Sikor, 2013; Gustavsson *et al.*, 2014; Sikor *et al.*, 2014; Aragão, Jacobs and Cliquet, 2016; Hanaček and Rodríguez-Labajos, 2018). Furthermore, the literature analysis of Chapter 3 showed the birth of other EJ concepts correlated with ES research: commutative justice in its utility for studying fairness in compensation for natural capital and ES employed in productive uses (Jonge, 2011; Aragão, Jacobs and Cliquet, 2016); retributive justice in its contribution to the contemplation of legal consequence for any relevant human influence on ES, like taxations, sanctions, economic retributions, subventions and others (Aragão, Jacobs and Cliquet, 2016); restorative justice that analyses the corrective actions in case of ES degradation or loss (Aragão, Jacobs and Cliquet, 2016); intragenerational, intergenerational and interspecies justice investigate that the distribution of access rights to ES among persons of the present generation (intragenerational), between persons of the present and future generations (intergenerational) (Baumgartner and Glotzbach, 2012; Glotzbach, 2013; Sikor, 2013) and justice with other species (Lele *et al.*, 2013). Lastly, Chapter 3 highlighted that, sometimes, there is no clear division between dimensions and the ES and EJ approach cannot be focused on a single dimension only, because each dimension can have effects on the others (Boone *et al.*, 2009; Sikor, 2013; Martin *et al.*, 2016; Chaudhary *et al.*, 2018). The need for integrating the EJ framework is thus especially important for ES approaches.

Secondly, this research contributed by identifying possible gaps in academic research and relevant search paths for the future. The systematic review of Chapter 4 highlighted how the scientific literature about ES and justice has evolved over time and which trends it has followed. The relevance for an ES and justice combined approach is seen in the rapid increase in academic publications, for which academic circles have been showing conspicuous interest in recent years. However, still fewer studies considered provisioning and cultural and social ES. The strong emphasis on the regulating and maintenance group revealed a correlation with compensation programs (such as PES or REDD, also related to the provisioning group) and conservation dimensions (e.g. protected areas), confirming the general tendency of ES research to lean towards economic and ecological solutions (Lele *et al.*, 2013). Moreover, in the cultural and social group studies, most were focused on economic valuation of recreational activities, especially in urban contexts (i.e. green areas), as previously underlined by Luederitz *et al.* (2015). Thus, the results confirm the gap about socio-cultural values in the ES research, as also shown by Scholte *et al.* (2015). In terms of EJ, few investigations have explored recognition issues, confirming the prominence of distributional and procedural dimensions. In past years, indeed, much literature has defined justice exclusively as a question of equity in the distribution of social goods (Schlosberg, 2001) and general notions of ES and EJ were commonly focused on theoretical discussions of how to define distributive

justice of ES (Matulis, 2014). Over the years, EJ moved beyond the issue of distribution to also consider issues of recognition and participation (Chaudhary *et al.*, 2018), but with some difficulties in the recognitional dimensions, as shown by Martin *et al.* (2016) and this research's findings. All dimensions are essential to understanding and studying the effects of environmental policies and strategies and recognition is necessary to identify who or what is recognised in decision-making processes, in terms of respect for differences and avoiding domination (Bohman, 2007). The dimension for recognition is crucial in terms of respecting social and cultural differences and resisting any pressure on minority groups to assimilate to dominant norms (Sikor, 2013), which should not be overlooked.

Thirdly, this dissertation contributed by bringing together a combined ES and EJ approach as related to its implementation in a protected area's governance. The case study underlined the importance of socio-cultural assessment for the consideration of social heterogeneity in the ES field. Chaudhary *et al.* (2018) criticized ES approaches for their idea of aggregated well-being that neglects the heterogeneity of societies. Indeed, communities are socially diverse, made up of different groups (Lau *et al.*, 2018) and different stakeholders can have very distinct perspectives on the values of ES, based on their dependency upon specific services to provide income or sustain their living environment (Hein *et al.*, 2006; Carpenter *et al.*, 2009). For this reason, the present investigation focused on socio-cultural aspect of ES, which allowed for an understanding of how all ES are perceived of by people (Sherrouse, Clement and Semmens, 2011; Martín-López *et al.*, 2012; Scholte, van Teeffelen and Verburg, 2015). One of the aims of the case study survey was to explore people's perceptions about ES, in order to get an idea of what was important to them and why. This helped to generate a better understanding of which societal groups actually benefitted or bore the costs of ES conservation strategies and ES trade-offs. ES assessments should consider social heterogeneity, develop a common understanding of ES and include the interests of all stakeholder groups, especially when many different actors with their different perceptions and needs are involved (Martín-López *et al.*, 2012; Hauck *et al.*, 2013; Daw *et al.*, 2015; Langemeyer *et al.*, 2015; Chaudhary *et al.*, 2018). As emphasized by Sikor (2013), the socialization of ecosystems cannot stop at the level of aggregate human well-being but needs to consider differences among people. Thus, it is important to consider social heterogeneity during the process of ES analysis (Cáceres *et al.*, 2015) and this thesis sought to encourage future research not to leave this topic out. Moreover, this research underlines the importance of recognising social heterogeneity in order to acknowledge people's distinct identities, histories, perceptions, differences and eliminate forms of cultural domination of some groups over others (Sikor, 2013; Sikor *et al.*, 2014). The contribution of this empirical application for the environmental governance will be discussed in the following paragraph (7.3).

7.3. ENVIRONMENTAL GOVERNANCE

As underlined by Chaudhary *et al.* (2018), the EJ framework has rarely been applied to ES discourse, but it can make an important contribution. The aim of this dissertation was to investigate to what extent a combined approach based on ES and EJ could support the environmental governance. This combined approach allowed the analysis of an Italian protected area, Circeo National Park (CNP), in terms of justice dimensions related with ES (distribution, recognition, procedure).

The distributional dimension allowed for the visualisation of how benefits and costs of ES are distributed among different social groups (Schlosberg, 2004; Boone *et al.*, 2009; Sikor, 2013; Sikor *et al.*, 2014), in order to better understand social heterogeneity. This caused trade-offs among certain stakeholder groups (Kovács *et al.*, 2015; Hanaček and Rodríguez-Labajos, 2018): distributive injustices, indeed, emerged due to the management of protected area as an as isolated entity, with different regulations for the agriculture sector, the absence of regional water regulation, conservation goals that were in conflict with interests of some social groups and some implications of ES trade-offs. All these factors were reflected in people's perceptions, generating an idea of the conflict between conservation and development, as previously highlighted by Palomo *et al.* (2011).

The recognitional dimension allowed for the recognition of social differences and minority groups in decision-making and management processes (Fraser, 2000; Bohman, 2007; Sikor, 2013; Sikor *et al.*, 2014; Martin *et al.*, 2016). In CNP, exploring ES values, linked with different types of stakeholders, helped to reveal potential losers of conservation policies. Some groups, affected by costs of ES conservation, tended to give less importance for ES more related with conservation policies (such as habitat for species or aesthetic values). Indeed, issues of recognition can occur when stakeholders have different visions, perceptions, of interests about the ecosystem (Sikor *et al.*, 2014; Cáceres *et al.*, 2015; Spangenberg, 2015). Moreover, in excluding these groups from decision-making, environmental management or policy-making processes, there is a recognitional injustice (Fraser, 2000). In the case study, only some stakeholders were actually identified and involved in the Park Plan design process, while others were not explicitly recognised. Thus, an ES and EJ combined approach becomes necessary not only to understand the social heterogeneity, but also to recognise it.

Procedural dimensions allowed for the disclosure of an omission of public participation (Sikor, 2013; Gustavsson *et al.*, 2014; Sikor *et al.*, 2014; Aragão, Jacobs and Cliquet, 2016), due to a top-down approach in decision-making and management processes. Despite the efforts of CNP to promote an interactive design of the Park Plan, procedural injustice occurred because of the low level of communication of participatory initiatives. Undertaking the ES and EJ approach means understanding, recognising and including social heterogeneity in environmental governance.

Additional empirical evidence showed that the ES and EJ approach cannot be focused on only a single dimension, because each dimension can affect the others (Boone *et al.*, 2009; Sikor, 2013; Martin *et al.*,

2016; Chaudhary *et al.*, 2018). In effect, the analysis of distributive justice was the starting point to comprehending which social groups should be recognised in decision-making and management processes. Additionally, the recognition of social difference was fundamental to understanding different distribution of benefits, due to conservation strategies. At the same time, procedural aspects allowed for the understanding of institutional contexts, rules and policies, which could affect some stakeholders.

However, what did not decisively emerge from the case study results was a general sense of discontent of inhabitants and the tendency to complain. Coming from the case study area, I could see that the population often identified CNP as a limitation or a prohibition for their activities. This emerged only in the 7% of survey respondents, negatively affected by the protection regime of the park. More incisive was the results about the level of confidence in the management of CNP and in the resolution of problems and tensions with citizens: most of respondents declared very low (27%) or low levels (39%) of trust in the Park Authority. Furthermore, I noticed a general tendency of local communities to remain in a state of apathy, that is when people only become interested when the issues at hand are immediately relevant to them (Buono, Padiaditi and Carsjens, 2012). This propensity did not emerge in the survey results, though the literature identifies local communities' apathy as one of the main barriers to the participation (Buono, Padiaditi and Carsjens, 2012).

Despite this limitation, the application of ES and EJ combined approach allowed for different kind of injustices that other approaches do not consider to be revealed. Moreover, CNP represented an instrumental case study (Yin, 2011), a particular case where two cities and some agricultural areas were located in a protected area, highlighting a greater link between nature and human welfare. However, despite this uniqueness, the results can potentially be applicable to other similar scenarios. The ES and EJ analysis demonstrated as well that this conservation regime confirmed the classic exclusionary model of protected areas, in which people are separated from the rest of nature (Martin *et al.*, 2016) and are not completely considered in environmental governance.

Decisions concerning ES are reflected in environmental governance and, at the same time, governance policies and decisions can affect the justice sphere. Approaches based on ES and EJ can better capture important responses to ecosystem governance (Dawson *et al.*, 2017), allowing for the performance of ES valuations while systematically balancing fairness (Sikor, 2013), identifying trade-offs among stakeholders and support for justice in environmental conflicts (Sikor *et al.*, 2014; Aragão, Jacobs and Cliquet, 2016; Jacobs *et al.*, 2016). All justice dimensions can be fundamental for the governance of ES and, clearly, there is not an established way of integrating the ES and EJ into environmental governance processes (Hauck *et al.*, 2013) and there is not a specific approach that can understand all the phenomena of a case study. But, analysing a space in terms of ES and EJ allows for the understanding of some issues, providing opportunities for their alleviation and the identification of corrective policies.

7.4. CONTRIBUTION IN POLITICAL ECOLOGY

Political ecology research addresses nature-society phenomena, including inequalities and power relations (Greenberg and Park, 1994; Görg *et al.*, 2017). The environmental politics surrounding the claiming, using and managing of the natural resources are often the focus of political ecology debates (Castree *et al.*, 2009). The application of the ES and EJ combined approach contributed to the use of a political lens ecology to overcome the strict division between nature and people, conservation and development which is still immanent in protected areas contexts (Petrosillo *et al.*, 2009; Palomo *et al.*, 2011, 2013; Martin *et al.*, 2016; García-Llorente *et al.*, 2018). The dissertation proposed an instrument for the spatial analysis of inequality and injustice (Forsyth, 2008; Byrne and Wolch, 2009; Chitewere, 2010) and for the identification and the recognition of the competing social, political and economic interests in natural resource governance (Bryant, 1998; Chitewere, 2010). Here, ES were a useful link in the integration of natural and social sciences (Cáceres *et al.*, 2015), but, at the same time, created winners and losers (Kull, Arnauld de Sartre and Castro-Larrañaga, 2015; Lakerveld *et al.*, 2015), depending on the different variables taken into account. Thus, the EJ lens was the instrument to identify who won, who lost and what the impacts were for different parts of society and different components of the environment (Castree *et al.*, 2009; Kull, Arnauld de Sartre and Castro-Larrañaga, 2015). In the end, the thesis sought to integrate political ecology approaches underlining the importance of considering how individuals and communities access and appreciate nature and its benefits, putting a strong emphasis on the issue of the social impacts, exploring the political and economic dimensions of conservation policy (Adams and Hutton, 2007).

7.5. FINAL KEY MESSAGES

The present research sought to highlight three key messages: the need to overcome the economic idea of ES, the requirement to better develop the concept of EJ focused mainly on the distributive sphere and the usefulness of an ES and EJ combined approach.

First, the thesis showed that there are other relevant ES evaluations, in addition to economic ones, which can recognise the importance of people's perspectives. The original idea of ES was to underline the contribution and reframe the relationship between humans and natural system (Millennium Ecosystem Assessment, 2003; Costanza *et al.*, 2014). However, their practical applications have often revealed the translation of biological and ecological measures in economic terms. Therefore, where is the real relationship between people and nature if we don't consider the society and people's perceptions and needs? Where is the infusion of multidisciplinary perspectives (Portman, 2013), if we only consider the predominance of ecologic and economic sphere? More qualitative and social assessments are required to balance the traditional reliance in ES research on quantitative economic phenomena. The dissertation aimed to underline the importance of supporting the classic evaluations of ES with social and

disaggregated assessments in order to explore human attitudes, make explicit people's preferences and recognising the interaction between beneficiaries and ES (Carpenter *et al.*, 2009; Martín-López *et al.*, 2012; Iniesta-Arandia *et al.*, 2014; Oteros-Rozas *et al.*, 2014; Scholte, van Teeffelen and Verburg, 2015; Zoderer *et al.*, 2016). It is my hope that this research provides another key to enhancing awareness for the human-nature relationship, recognising value perceptions by communities as a whole and by different societal groups.

Secondly, the dissertation wanted to highlight the importance of recognising and actively involving and minority groups in environmental governance, in addition to the distributive dimension of justice. Certainly, studying the distributional aspects is an essential step for the EJ analysis (Schlosberg, 2001; Sikor, 2013; Sikor *et al.*, 2014), but is this enough to understand the total phenomenon? Perhaps research needs to integrate the justice analysis also considering the implications for how conservation policies are perceived by different social groups and how local communities are engaged in the decisional processes. If on the one hand conserving biodiversity and nature is globally important, on the other one, we should ask whether and to which extent conservation policies create negative impacts at local level and on which social groups. How can environmental governance listen and help such groups? Ignoring or underestimating the recognitional and procedural dimensions of justice only provide a partial view of the problem. Thus, it is also my hope that future research can work to overcome unequal distributional aspects and consider all the dimensions of justice.

Third, the thesis emphasised the strength of the compatibility of ES and EJ literatures. Their combination is essential in the recognition of social heterogeneity (Cáceres *et al.*, 2015; Chaudhary *et al.*, 2018; Lau *et al.*, 2018), previously not considered in ES approaches and as a possible management tool. Indeed, the thesis underlined the potentiality of the ES and EJ combined approach to support environmental governance. From a practical point of view, this kind of approach can help in informing environmental governance, exploring and revealing perceptions that other approaches cannot capture and related to decision-making procedures, the distribution of benefits and costs among different stakeholders and the recognition of different ES values and social heterogeneity. In policy terms, it can support conservation strategies to integrate multiple policy objectives, including diverse social interests in parallel with preserving ecosystem integrity and health. Moreover, it can be useful as starting point for understanding some issues, providing opportunities for their alleviation, including the multitude of users and beneficiaries and identifying corrective procedures or limiting damages or existent policies. Clearly, exploring these varied aspects has required a plurality of theoretical perspectives, methods and literatures, but one of the aims of this research was to demonstrate the rewards of this combined approach and it is the hope that this approach can be improved in the future.

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ANNEX I – QUESTIONNAIRE FOR THE CASE STUDY

PERCEPTION OF CIRCEO NATIONAL PARK

Welcome to the “Perception of Circeo National Park” questionnaire. The survey, carried out as part of a Ph.D. research at La Sapienza University, aims to analyse the perception and importance of Circeo National Park for the citizens of Sabaudia and San Felice Circeo. The questionnaire is anonymous and the data collected will be treated in an aggregate manner, in compliance with the law on privacy. This analysis is carried out in collaboration with Circeo National Park and, therefore, the results can be used by the Park in order to improve its services.

*** Questions marked with asterisk are mandatory**

Perception of Circeo National Park territory

The first sections of the questionnaire will ask to answer the questions based on your knowledge and personal opinions. Feel free to answer in total sincerity as the questionnaire is anonymous and the data collected will be treated in an aggregate manner, in compliance with the law on privacy.

1. Which of the following natural environments are part of Circeo National Park?

You can mark one or more answers

- Forest
- Circeo Promontory
- Paola and Caprolace Lakes
- Fogliano and Monaci Lakes
- Sabaudia dunes
- San Felice Circeo dunes
- Islands of Ponza and Palmarola
- Island of Zannone
- None

2. Which of the following inhabited areas are part of Circeo National Park?

You can mark one or more answers

- Sabaudia city
- Old town of San Felice Circeo
- Molella
- Baia d’Argento
- None

3. On which of the following Municipalities does Circeo National Park territory extend?

You can mark one or more answers

- Latina
- Ponza
- Sabaudia
- San Felice Circeo

Perception of Circeo National Park activities

4. Which of the following activities are carried out by Circeo National Park?

You can mark one or more answers

- Firefighting
- Forest Rangers
- Authorizations
- Summer events organization
- Agriculture promotion
- Touristic promotion
- Excursions and environmental education
- None

5. Who manages Circeo National Park?

You can mark one or more answers

- Sabaudia Municipality
- San Felice Circeo Municipality
- Forest Rangers
- Park Authority
- Lazio Region

6. How does the presence of Circeo National Park impact on its activities or those of its family? *

You can mark only one answer

- In no way
- Negatively
- Positively

7. Why?

Trust and Communication

8. What is your level of confidence in the management of Circeo National Park and in the resolution of problems and tensions with the citizens?
You can mark only one answer

	1	2	3	4	
Very low	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	Very high

9. Select the themes that are taken into consideration by Circeo National Park in the implementation of initiatives and/or events.
You can mark one or more answers

- Agriculture
- Cultural heritage
- Biodiversity
- Deterioration and environmental pollution
- Park presentation
- Promotion of the territory
- Tourism
- None

10. How do you assess the communication of the initiatives organized by Circeo National Park?
You can mark only one answer per row

	I don't know	Inexistent	Low	Sufficient	High
Local press	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Social Networks	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Newsletter	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Word of mouth	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Posters	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Participation

11. Which of the following Circeo National Park initiatives did you participate? *

You can mark one or more answers

- Training activities
- Park Plan meetings
- Meetings with farmers
- Meetings with touristic operators
- Promotional meetings
- Cultural heritage meetings
- Biodiversity meetings
- Deterioration and environmental pollution meetings
- None

12. If you didn't participate in any initiative, why?

You can mark only one answer

- I was aware of it, but I'm not interested in this kind of initiative
- I was aware of it, but I never got a chance/time/opportunity to participate
- I was not aware of it, but I would not have participated anyway
- I was not aware of it, but I would have considered whether to participate
- Other: _____

13. Which of the following Circeo National Park touristic events did you participate? *

You can mark one or more answers

- Environmental education
- Food and wine
- Cultural conferences
- Summer initiatives
- Sport initiatives
- Guided tours
- None

14. If you didn't participate in any initiative, why?

You can mark only one answer

- I was aware of it, but I'm not interested in this kind of initiative
- I was aware of it, but I never got a chance/time/opportunity to participate
- I was not aware of it, but I would not have participated anyway
- I was not aware of it, but I would have considered whether to participate
- Other: _____

Future perspectives

15. In order to improve the management of Circeo National Park and communication with citizens, are you available to participate in the following initiatives? *

You can mark only one answer per row

	Not available	Hardly available	Quite available	Very available
Meetings with inhabitants of Circeo National Park	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Meetings with workers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Training meetings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Focus groups to solve conflicts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Administrative meetings	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

16. In order to improve the management of Circeo National Park and communication with citizens, are you available to use the following services? *

You can mark only one answer per row

	Not available	Hardly available	Quite available	Very available
Information desk at the visitor centre	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Discussion forum on the website Parcocirceo.it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Online survey of citizens' satisfaction	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Social networks as information moment	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

17. Other suggestions?

Perception of Circeo National Park benefits

This section wants to evaluate which benefits of Circeo National Park are important for the well-being of society and citizens. Therefore, it will ask to assess the importance of some benefits for social well-being and then for personal well-being.

18. Do you consider the following statements are true? *

You can mark only one answer per row

	Yes	No	I don't know
Agricultural goods are cultivated in some areas of Circeo National Park	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Different fishes and mussels are caught in Paola Lake	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Picking mushrooms is possible in some areas of Circeo National Park with a special license	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Circeo National Park vital spaces, refuges and protection areas for various animal species	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Vegetation of Circeo National Park has an important role in the soil erosion control	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Environments of Circeo National Park has an important role in the air purification	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Environments of Circeo National Park has an important role in the water purification	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Recreation, touristic and sport activities are possible in different areas Circeo National Park	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Some areas of Circeo National Park have landscape values and provide benefits for human health	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Some areas of Circeo National Park have educational and scientific value	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

19. Consider following groups of benefits provided by Circeo National Park. Which group is the most important for the SOCIAL well-being? *

You can mark only one answer

	Description	Examples
Provisioning	Benefits obtained from the consumption of resources and raw materials produced by nature	Oxygen Water Food
Regulating	Benefits related to natural functions that allow the maintenance of human health and the functioning of the environments	Climate regulation Water depuration Soil erosion control Habitat for species
Cultural	Benefits population gets from nature, through spiritual enrichment, cognitive development, recreational and aesthetic experiences	Recreation activities Educational values Wellness of being in nature Sense of identity Aesthetic value

- Provisioning
- Regulating
- Socio-cultural


20. And which group is the second most important for the SOCIAL well-being? *

You can mark only one answer per row

- Provisioning
- Regulating
- Socio-cultural

21. Consider the following list of benefits provided by Circeo National Park. Evaluate each of them based on what you consider important for your PERSONAL well-being *

You can mark only one answer per row

	Photo	Description	Examples
<i>Food from agriculture</i>		Crops for human consumption from agricultural areas of CNP (Molella, Palazzo, Sant'Andrea, etc.)	Turnips, Carrots, Watermelons, Zucchini
<i>Food from aquaculture</i>		Fish for human consumption from Paola Lake	Mussels, clams, mullets
<i>Food from mushrooms picking</i>		Wild edible mushrooms in the areas of CNP	Different types of mushrooms

	Not important	Not very important	Quite important	Very important
Food from agriculture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Food from aquaculture	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Food from mushrooms picking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

22. Consider the following list of benefits provided by Circeo National Park. Evaluate each of them based on what you consider important for your PERSONAL well-being *

You can mark only one answer per row

	Photos	Description	Examples
<i>Habitat for species</i>		Provision of suitable living and nursing places for wild species	Birds, Wild boards, Fallow deers
<i>Soil erosion control</i>		Role of vegetation root matrix and soil biota in soil retention	Retention of soil via plants roots
<i>Air purification</i>		Role of natural ecosystems in the air decontamination	Clean air
<i>Water purification</i>		Filtering, retention and storage of fresh water	Clean water for consumptive use (drinking, irrigation and industrial use)

	Not important	Not very important	Quite important	Very important
Habitat for species	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Soil erosion control	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Air purification	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Water purification	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

23. Consider the following list of benefits provided by Circeo National Park. Evaluate each of them based on what you consider important for your PERSONAL well-being *
 You can mark only one answer per row

	Photos	Description	Examples
<i>Nature recreation activities</i>		Possibility to benefits by outdoor, touristic, and sportive activities by natural ecosystem	Hiking, Cycling, Bathing, Birdwatching
<i>Aesthetic value and tranquillity of nature</i>		Attractive landscape features and peaceful landscape for the human physical and psychological well-being	Pleasure of beautiful views Pleasure of being in nature
<i>Environmental education and science</i>		Ecosystem features of educational and scientific value	School visits and Research

	Not important	Not very important	Quite important	Very important
Nature recreation activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Aesthetic value and tranquillity of nature	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Environmental education and science	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Personal information

This section will ask some personal information for purely statistical purposes. Remember that the questionnaire is anonymous and the data collected will be treated in an aggregate manner, in compliance with the law on privacy.

24. Gender

You can mark only one answer

 M F Rather not answer

25. Age

You can mark only one answer

 18-24 25-34 35-44 45-54 55-64 65-74 75 and more

26. Nationality

You can mark only one answer

 Italian Other: _____

27. Qualification

You can mark only one answer

 Elementary school Middle school High school University Master Ph.D. None

28. Occupation

You can mark only one answer

 Full time worker Part time worker Unemployed Inactive Student/Professional training Unpaid work experience Retired or Cessation Disabled and/or unsuitable Housework or assistance Other: _____

29. Business sector

You can mark one or more answers

- Agricoltura, Allevamento e Silvicoltura
- Fishing and Aquaculture
- Industry and Crafts (transformation of raw materials)
- Buildings
- Wholesale and retail trade
- Hotel and catering sector
- Rental, travel agencies, business support services
- Transport and storage
- Financial, insurance and real estate activities
- Professional, scientific and technical activities
- Education
- Public administration and defence
- Other activities

30. Residence *

You can mark only one answer

- Sabaudia
- San Felice Circeo

31. How long have you lived here?

You can mark only one answer

- Always
- Less than 5 years
- More than 5 years

32. Consider the areas delimited by black lines and marked with coloured letters on the map. In which area is his house located? *
You can mark only one answer



- Area with letter A
- Area with letter B
- Area with letter C
- Area with letter D
- Area with letter E
- Area with letter F
- Area with letter G









33. Consider the same areas as the previous map. In which area is your main working activity? *
You can mark only one answer



- Area with letter A
- Area with letter B
- Area with letter C
- Area with letter D
- Area with letter E
- Area with letter F
- Area with letter G
- In none of the areas marked with letters
- I don't have a job

THANKS FOR YOUR PARTICIPATION!

ANNEX II – REFERENCES FOR THE PICTURES IN THE QUESTIONNAIRE

	<p>Assunta Tognoni https://www.facebook.com/Circeo-lincanto-della-Maga-Circe-figlia-del-Sole-175925799267571/ [Accessed 11 June 2018]</p>
	<p>Istituto Pangea Onlus https://www.facebook.com/profile.php?id=331404103714438 [Accessed 11 June 2018]</p>
	<p>Lega Autonomie Lazio http://www.legautonomielazio.it/images/stories/sabaudia_1.jpg [Accessed 11 June 2018]</p>
	<p>Natura Mediterraneo https://www.naturamediterraneo.com/forum/topic.asp?TOPIC_ID=61509 [Accessed 11 June 2018]</p>
  	<p>Parco Circeo http://www.parcocirceo.it/gallery.php [Accessed 11 June 2018]</p>
	<p>Proprietà Scalfati http://www.proprietascalfati.it/ [Accessed 11 June 2018]</p>



Radio Luna

<https://www.radioluna.it/news/radioluna/>

[Accessed 11 June 2018]



Own production



ANNEX III – CHI-SQUARED TESTS RESULTS⁵

ES groups		Provisioning			Regulating				Cultural		
ES		Food from agriculture	Food from aquaculture	Food from mushrooms picking	Habitat for species	Soil erosion control	Air purification	Water purification	Nature recreation activities	Aesthetic value and tranquillity of nature	Environmental education and science
Personal Data	GENDER	0,022	0,392	0,515	0,078	0,324	0,176	0,001	0,025	0,070	0,108
	AGE	0,009	0,009	0,000	0,010	0,005	0,000	0,000	0,001	0,001	0,004
	RESIDENCE	0,275	0,217	0,716	0,063	0,189	0,075	0,016	0,124	0,601	0,913
	EDUCATION	0,788	0,135	0,738	0,084	0,202	0,885	0,744	0,017	0,038	0,766
Proximity	PROXHOUSE	0,794	0,201	0,185	0,043	0,051	0,326	0,456	0,089	0,984	0,745
	PROXWORK	0,502	0,763	0,142	0,510	0,051	0,353	0,277	0,302	0,808	0,783
	PROXHW	0,252	0,748	0,194	0,363	0,003	0,960	0,222	0,468	0,151	0,779
Personal Opinion	IMPACT	0,734	0,805	0,598	0,140	0,051	0,109	0,003	0,049	0,256	0,058
	TRUST	0,045	0,068	0,000	0,084	0,345	0,173	0,000	0,003	0,096	0,031
Business Sectors	AGRICULTURE	0,595	0,066	0,788	0,945	0,223	0,423	0,380	0,221	0,729	0,816
	EDUCATION	0,042	0,829	0,424	0,168	0,081	0,612	0,223	0,062	0,365	0,397
	PROFESSIONAL	0,595	0,660	0,759	0,082	0,411	0,207	0,908	0,392	0,527	0,297
	INDUSTRY	0,522	0,878	0,097	0,010	0,108	0,013	0,170	0,778	0,832	0,120
	PUBLIC	0,000	0,007	0,040	0,125	0,434	0,011	0,014	0,155	0,015	0,416
	HOTEL	0,000	0,006	0,016	0,104	0,571	0,134	0,107	0,004	0,890	0,083
	BUILDING	0,033	0,463	0,794	0,797	0,778	0,742	0,704	0,934	0,021	0,801
	OTHER	0,322	0,059	0,188	0,579	0,092	0,174	0,886	0,423	0,032	0,027
	TRADE	0,191	0,007	0,733	0,850	0,132	0,801	0,531	0,480	0,645	0,751
	RENTAL	0,536	0,664	0,687	0,908	0,300	0,894	0,842	0,941	0,885	0,918
	REALESTATE	0,637	0,735	0,537	0,371	0,033	0,133	0,057	0,336	0,604	0,210
	FISHING	0,518	0,032	0,000	0,224	0,813	0,892	0,812	0,543	0,863	0,835
TRANSPORT	0,838	0,487	0,209	0,905	0,914	0,933	0,916	0,839	0,863	0,919	

⁵ In Bold all the statistical relevant results, considering the significance level equal to 0,05. The results highlighted in light blue have been used and discussed in Chapter 6.

ANNEX VI – SCIENTIFIC ACHIEVEMENTS 2016-2019

VISITING PERIOD

29th of April – 28th of June 2019 at the Institute of Environmental Science and Technology (ICTA), *Universitat Autònoma de Barcelona* (UAB).

ORAL COMMUNICATIONS AT CONFERENCES

Benetti S. and Langemeyer J., *Understanding trade-offs between nature conservation and benefits to people: Applying an ecosystem service justice framework to Circeo National Park, Italy*. Ecosystem Services Partnership (ESP) International Conference 2019. Session 8a – Ecosystem services for nature conservation and protected areas Hannover, Germany (October 2019).

Benetti S., Calderón-Argelich A., Baró F., Langemeyer J., *Considerations of justice in ecosystem services research. A systematic literature review*. Ecosystem Services Partnership (ESP) International Conference 2019. G10b – Systematic reviews: describing the state of knowledge and identifying gaps for science and decision making. Hannover, Germany (October 2019).

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