



Governance of Ecosystem Services: insights from Life+ Making Good Natura project

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Summary

The Natura 2000 network is the cornerstone of EU Biodiversity Strategy aimed at halting the loss of biodiversity and services natural and semi-natural ecosystems provide to human populations. The Member States are mainly responsible to implement conservation strategies through management plans and conservation measures, but in many cases the level of development and execution of these instruments is very low due to scarce financial resources, and management effectiveness is rarely achieved.

This paper presents first insights from Life+ Making Good Natura (MGN) project and highlights costs and benefits associated to 2 out of 21 Natura 2000 study sites in Italy in order to define the basis for a new governance approach relied on the qualitative and quantitative valuation of ecosystem services (ES) and suitable for reaching management

effectiveness. To date, the habitat cover of the agro-forest sites and socio-economic data for the core area and a buffer zone of 20 km, gathered through questionnaires to management authority, have been analyzed. After mapping and assessing the most important ES for each site based on spatial data and on the information from the questionnaires, meetings with local public and private stakeholders were organized in order to discuss the identified ES and their social and economic importance for the area.

Preliminary results suggest that quantification of costs related to the Natura 2000 network is a crucial point within a systematic approach to environmental accountability that allows to measure and assess management bodies' management strategy effectiveness and efficiency and to redefine Natura 2000 sites conservation priorities. Furthermore, in a general context of stagnant and uncertain funding for biodiversity conservation, also the need of defining a wide range of governance and management tools, referring to the policy mix instruments, seems urgent.

Keywords: Natura 2000 network, ecosystem services, PES, local communities, governance, management, natural resources, protected area

JEL Classification codes: Q570

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1. INTRODUCTION

The EU's biodiversity conservation policy framework follows EU Environmental Action Programmes, as well as international initiatives such as the Convention on Biological Diversity (CBD) and the Bern Convention. The main legal umbrella for the protection of nature and biodiversity in the EU consists of the Habitats Directive (92/43/EEC) and the Birds Directive (79/409/EEC), under which the European Natura 2000 network of protected areas was established. The main purpose of the Natura 2000 network is to ensure the long-term protection of Europe's most valuable and threatened species and habitats. According to the European Natura 2000 Barometer, the Natura 2000 network currently includes 5,315 special protection area (SPA) sites encompassing 593,486 km², and 22,529 sites of community importance (SCI) (719,015 km²) covering around 18% of the EU land area (European Commission, 2011; Hoyos D. et al. 2012). Member States are in charge of managing Natura 2000 sites through implementation of conservation measures and development of specific management plans. Although the latter are not mandatory, they are a major instrument for reaching conservation goals and clearly define allowed and forbidden activities, roles and responsibilities of authorities and other stakeholders potentially involved in managing Natura 2000 sites (Kruk et al., 2010).

On the basis of the principle of subsidiarity, management costs are up to the Member States, but Habitats Directive Article 8 also provides the possibility of Community co-financing where needed. However, one of the main challenges for Member States remains the lack of funding which is a threat to species and habitat conservation goals and doesn't allow local authorities to implement completely management plans or other measures. According to Gantioler (2010), the overall cost for implementing Natura 2000 in the EU-27 is estimated at €5.8 billion per year. The current amount of funding available to support the network is not clear, even though the annual EU budget for Natura 2000 is estimated at around €550-1,150 million (Kettunen et al., 2011). However, while putting a monetary figure on the cost of implementing these plans is an essential prerequisite for ensuring sufficient economic resources for their management, establishing the economic benefits of Natura 2000 helps to determine its social desirability, as well as increasing awareness about the importance of Natura 2000 for human well-being (Hoyos D. et al. 2012). In this context, primary economic valuation studies can be considered a promising evaluation instrument for Natura 2000, as they may contribute to managing the network by explicitly acknowledging

relevant socio-economic implications (Rojas-Briales, 2000; Halahan, 2002; Ten Brink et al., 2002) particularly in a regional context (Getzner and Jungmeier, 2002).

The completion and appropriate management of Natura 2000 form an integral part of the EU Biodiversity Strategy and the specific actions include securing adequate financing for the conservation measures required for Natura 2000 sites at both EU and national/regional level. To date, most EU co-funding for Natura 2000 has been made available by integrating biodiversity goals into various existing EU funds or instruments. This integrated co-financing model continues to form the basis for EU funding for Natura 2000 in the next programming period 2014-2020, supporting strategic goals to further embed the implementation of the EU Biodiversity Strategy into other relevant policy sectors and their financing instruments and, at a practical level, linking biodiversity goals with a broader management of land and natural resources (Kettunen et al., 2014).

Table 1. Funds available for financing Natura 2000 during period 2014-2020.

EU funding instruments	Proposed budget 2014-2020 (€)	European Commission Regulation
European financial instrument for the environment (LIFE)	€ 3.2 billion (of which €2,713.5 million for sub-programme for Environment)	COM(2011) 874 final
European Fund for Regional Development (ERDF) European Territorial Cooperation under ERDF	€ 183.3 billion	COM (2011) 614 final
European Territorial Cooperation (ETC) under ERDF	€ 11.7 billion	COM (2011) 614 final
European Social Fund (ESF)	€ 84 billion	COM(2011) 500 final
European Agricultural Fund for Rural Development (EAFRD)	€435.6 billion for Common Agricultural Policy €101 billion for Rural Development	COM(2011) 627 final
European Maritime and Fisheries Fund (EMFF)	€7,535 billion	COM(2011) 804 final
Framework Programme for research and innovation (Horizon 2020)	€80 billion	COM(2011) 500 final

Source: own elaboration

1.1. Natura 2000 management in Italy

In Italy, Regions are in charge of Natura 2000 sites management even if Provinces, Municipalities, other local authorities and also private organizations can be authorized to manage a site instead of a Region. Management authorities can adopt a management plan or integrate conservation measures into other planning instruments such as sectorial or territorial plans in order to reach site's conservation goals. It is worth noting that according to the Italian law, when a site is included in an existing National Park, a management plan is not mandatory, but conservation objectives have to be incorporated into the Park Plan and habitats and species status monitored.

Since different types of regulatory instruments are available (general regulatory measures, specific administrative measures or contracts between public and private stakeholders) and their integration is not always so clear for management authorities, the Ministry of Environment adopted the Decree Guidelines for Natura 2000 management (Decree September 3rd 2002) with a technical manual (Manuale delle linee guida per la redazione dei piani di gestione dei siti Natura 2000). This included guidelines for Natura 2000 management plans definition.

Along with biodiversity conservation the Natura 2000 network provides a wide range of ecosystem services (ES) which are defined as the benefits offered by natural ecosystems to humans (MEA, 2005; TEEB, 2010). However, these benefits are rarely taken into account by politicians, enterprises and other

important decision makers mainly because they don't recognize the value of natural and semi-natural ecosystems. In this regard, the recognition and demonstration of the wider socio-economic benefits of Natura 2000 should be an important tool for influencing stakeholder attitudes, attracting new funding, informing land-use decisions, and integrating protected areas in regional development planning (European Commission, 2013). Furthermore the value of these benefits mostly exceed the costs associated with Natura 2000 and have been estimated around €200-€300 billion per year (European Commission, 2013). The inclusion of ES in conservation increases not only the social acceptance and attainment of conservation objectives, but their economic valuation also raises new arguments and tools in favour of biodiversity conservation (Cimon-Morin et al., 2013). So the challenge is how to integrate ES assessment in managing Natura 2000 sites and encourage local communities and other stakeholders to adopt sustainable environmental practices in order to protect habitats and species.

1.2. Governance of Ecosystem Services

Recently, theoretical and empirical works have identified linkages between changes in biodiversity and provision of ES (Schulze and Mooney, 1993; Loreau et al., 2002) and, as a consequence for decision makers, it is important to identify adequate policy tools to manage them as a whole, also within Natura 2000 sites.

In general, to protect biodiversity and ES there is a need for:

- *providing information*, for instance, by reforming national accounting system and integrating their values into policy assessment;
- *setting incentives*, for instance, by rewarding benefits through payments and markets, reforming harmful subsidies and addressing losses through regulation and pricing;
- *regulating the use*, for instance, by creating protected areas and investing in green infrastructure (TEEB, 2011).

Therefore, it is necessary to define and implement a wide range of governance and management tools, referring to the policy mix instruments, including both command and control approach and market based instruments (Ackerman and Steward, 1985; Freeman, 1997). The latter are instruments that provide incentives for undertaking particular actions (OECD, 2004), such as price-based instruments (taxes and charges), liability instruments, subsidies, market creation measures and assignment of well-defined property rights and other instruments, such as environmental agreements (EA) for biodiversity conservation. EA consist of legal frameworks for contracts between a landowner and another part, where the landowner voluntarily commits himself to refrain from land use (conservation contracts) or to carry out activities conserving or promoting biodiversity (management contracts) in a specific area. The other part (either a private or a public participant) makes a financial payment in return that can assume different forms such as money transfer, tax exemptions or reduction (subsidies), or a credit (for instance, in the case of carbon market). In this framework, particular attention should be paid on Payments for Ecosystem Services (PES), defined as voluntary transactions where a well-defined ES (or land-use likely to secure that service) is 'bought' by at least one ES buyer from at least one ES provider, if and only if the ES provider secures ES provision (conditionality) (TEEB, 2011).

1.3. *Aim of the paper*

This paper presents first insights from Life+ Making Good Natura (MGN) project that seeks a new governance approach for an efficient management of Natura 2000 sites in Italy based on the qualitative and quantitative valuation of ES and innovative models for financing. Project's core areas are 21 agro-forest Natura 2000 sites whose habitat cover and land use were analysed and socio-economic data gathered through questionnaires. Subsequently, in order to define the most important ES identified for each study sites through the above-mentioned information, meetings with local public and private stakeholders were organized. After the local meetings, main ES were selected also on the basis of socio-economic and environmental characteristics of the sites considering critical issues and opportunities for the development of the territory (Marino et al., 2014).

In this paper, on the basis of the MGN project preliminary results, we assessed 4 ES in 2 out of 21 study sites and compared these benefits with (direct) costs for conservation measures. The two study sites presented here (Table 2) are “Bagni di Masino e Pizzo Badile” (IT2040019) in the Forest of Lombardy Val Masino (Lombardy Region) and “Monte della Stella” (IT8050025) in Cilento and Vallo di Diano e Alburni National Park (Campania Region).

Table 2. Natura 2000 study sites and related ES.

Type	Code	Name	Region	Bioregion	Extent [km ²]
SIC	IT8050025	Monte della Stella	Campania	Mediterranean	11.8
SIC	IT2040019	Bagni di Masino - Pizzo Badile	Lombardy	Alpine	27.6

Source: Schirpke et al., 2013a,b; Marino et al., 2014

2. MATERIALS AND METHODS

2.1. *Management instruments analysis*

Habitats Directive has a crucial role for Natura 2000 sites conservation and management. According to Habitats Directive Article 6, Member States establish necessary conservation measures including, in case, appropriate management plans specifically designed for Natura 2000 sites or integrated into other development plans, and appropriate statutory, administrative or contractual measures which correspond to the ecological requirements of the natural habitat types in Annex I and the species in Annex II present on the sites. In particular, the term “conservation measures” refers to “a series of measures required to maintain or restore the natural habitats and the populations of species of wild fauna and flora at a favourable conservation status” .

In our study, the first step was the analysis of two sites’ management instruments that include all measures and tools defined and implemented for the site area and that are crucial for reaching management effectiveness. This first analysis aimed to identify differences in management approaches between both sites and to highlight conservation objectives for each habitat and/or species and related management and environmental issues involving the provision of ES.

2.2. *Questionnaires to local management authorities*

In order to acquire other specific information on the Natura 2000 study sites, a questionnaire was administrated to each site’s management authority.

The main issue for constructing the questionnaire on administrative, functional and management conditions of Natura 2000 sites (Gaglioppa et al., 2013) was related to the different characteristics and responsibilities of local partners (National Parks, Interregional Parks, Regional administrative authorities, Regional forest management bodies, etc.), and consequently to the different management approach of each Natura 2000 site (direct, mediated by Regions or by Provinces). Therefore, it has been decided to structure the questionnaire on levels and sectors about different types of information in order to gather a first general set of data with the collaboration of management authority and other local administrative bodies and stakeholders.

Indeed, the main objective of the questionnaire was the collection for each Natura 2000 study sites of information related to the environmental and managerial context in order to provide a functional cognitive framework for setting and implementing the following project activities (“Actions A2 Analysis of Ecosystem Services in the pilot sites” and Action A3 “Analysis of the management and the financings respect to the ecosystem services in pilot sites”).

The questionnaire was divided into five sections including both closed and open format questions:

1. General information: for information that allows to identify pilot site and interviewee;
2. General framework: for a synthetic description of the site from an ecological, administrative and managerial point of view (connection with Protected Areas, state of maintenance of habitats, fauna and flora, river basin description, surface and groundwater state, cartographic and GIS data, different authorities involved in managing the site and their interaction also with the citizens, land planning instruments for the site’s area, management plans and conservations measures and regulatory framework for Natura 2000 sites, local communities civic uses and rights of common, scientific publications and research on the site);

3. Economic-financial framework: for information about site's economic and financial resources (management authorities budget, site's annual institutional financing, last 5 years site management outflows, costs for administration, management and conservation measures, human resources, participation to projects and other measures for improving maintenance of habitat and species);
4. Economic, environmental and social aspects: for qualitative information on some environmental, economic and social aspects such as change of land cover and landscape in the last years and the relationship between this change and site creation, state of conservation of the habitats, present forest and agricultural activities within the site and other economic issues, difficulties and threats for the maintenance of protected habitats due to social-economic activities, stakeholders involved directly and indirectly in managing the site, RDP (Rural Development Program) measures to promote organic farming and and finance Natura 2000 network, Land Maintenance and Environment Conservation Contracts);
5. Ecosystem Services (ES): for information on main ES provided by the site; stakeholder directly or indirectly involved in the management of these ES; fauna species threatened by habitat fragmentation, fund raising actions, self-financing and PES or PES-like schemes implemented (Wunder, 2005; Pettenella et al., 2012).

2.3. Stakeholder meetings

Along with cartographic analysis (Schirpke et al., 2013b) and questionnaires to site management authorities (Gaglioppa et al., 2013), another useful tool for defining main ES for each study sites were meetings with institutional and private stakeholders during the preliminary project phase. Indeed, habitats and land use-based ES analysis (Schirpke et al., 2013b) determined some differences on the relative values among ES; while analysis through questionnaires mainly reflected management authority point of view without fully taking into account local institutions and community perception and needs.

Meetings with institutional and private stakeholders were organized in each Natura 2000 pilot site. During these events project actions and objectives have been presented and main ES and environmental issues have been debated in order to bring some specific aspects to light (local peculiarities, local community's perception of the site, rivalries and oppositions between different stakeholders and other factors) and chose with more confidence main ES on which defining innovative financing schemes (Marino et al., 2014).

2.4. Ecosystem Services Assessment

According to similar studies (Burkhard et al., 2012; Bastian, 2013), ES were first valued qualitatively by relating an ordinal score (3-high, 2-medium, 1-low, 0-not significant) to Natura 2000 habitats and CORINE land cover classes. The scores were obtained by expert knowledge and account for specific ecological functions, potential distance of ES demand, and intrinsic biodiversity (further details in Schirpke et al., 2013b). For each study site, an area-weighted mean was calculated for the selected ES (Table 5). Furthermore, this qualitative ES valuation was integrated by additional qualitative or quantitative data, where possible. In the following, a short description of the applied method is provided:

- *Wild food (mushrooms)*: The productivity of mushrooms is very variable and depends on local conditions like climate, vegetation, soil, but also on disturbance. As no data about collected quantities were available, the annual mean production was estimated by 1.5 - 3 kg mushrooms per ha forest (Croitoru

and Gatto, 2001; Goio, 2006). The production area was delimited by including forest land cover classes and excluding areas above 2000 m a.s.l. and slopes over 80%. The monetary value was estimated based on the mean market value of 22.50 €/kg (De Marchi and Scolozzi, 2012).

- *Erosion regulation*: As forest has a protective role (Scrinzi et al., 2006), the area with an elevated erosion and landslide risk, obtained from the Inventory of Landslide Phenomena in Italy (IFFI) (APAT, 2007), was identified and the area without forest was compared to the area covered by forest.
- *Recreational value*: The recreational valuation based on the land cover was integrated with qualitative information including a list of the possible recreational activities. For the study site Bagni di Masino e Pizzo Badile (IT2040019), data from two automatic counting stations were available. The touristic development of the intersecting municipalities was measured by the bed capacity obtained from statistical data (ISTAT, 2011). The bed capacity was then used for an economic valuation of the recreational value by calculating the mean accommodation value based on the mean overnight cost and the degree of utilization (Trademark Italia, 2013). Moreover, potential day-trippers were identified and quantified up to 1.5 hours driving from the study areas (Schirpke et al., 2013c).

3. RESULTS

3.1. *Management approaches*

The management instruments analysis found that both Monte della Stella (IT8050025) and Bagni di Masino e Pizzo Badile (IT2040019) sites have a specific Management Plan whose main objective is ensuring the maintenance of habitats and species of Community interest present on the site area according to the Habitats and Birds Directives (Table 3). However, it is worth noting that those Management Plans differ according to the specific local context.

Bagni di Masino e Pizzo Badile (IT2040019) Management Plan has been adopted in order to define a milestone for the Natura 2000 network implementation in a large and complex area including Valtellina and Valchiavenna. So this Plan has been defined to connect different elements of the environmental network (such as Pian di Spagna-Lago di Mezzola Natural Reserve and other four mountain SICs) and to define main guidelines for their integration. Its general objective is to make anthropic activities development more sustainable and to reduce their direct or indirect impact on species and habitats. The Plan also defines primary management provisions to follow outside the site area.

Differently, since Monte della Stella (IT8050025) is already part of an ecological network along with Cilento, Vallo di Diano e Alburni National Park and other Natura 2000 sites, its Management Plan major objective is to ensure ecological connectivity between these areas along with the maintenance of specific habitats and species.

Table 3. Management instrument identified for each study site.

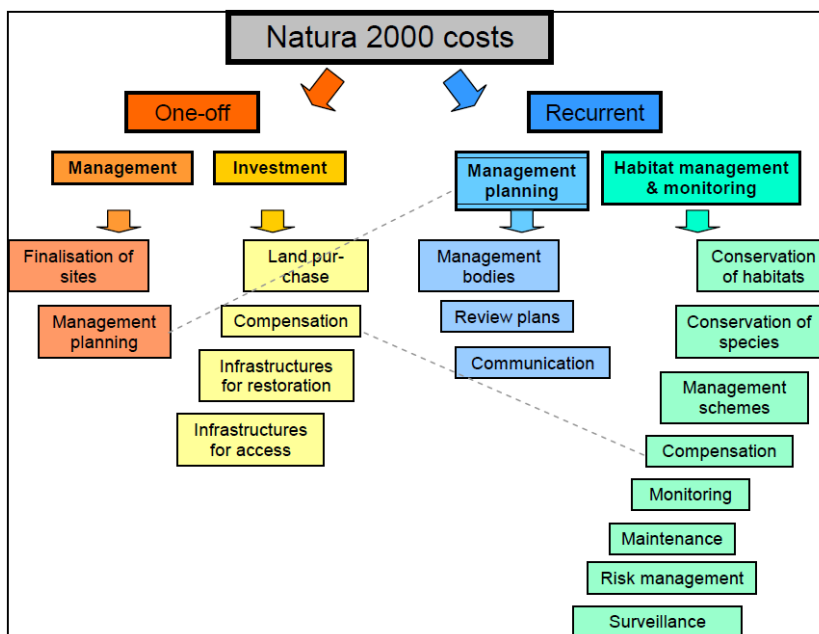
Type	Code	Natura 2000 Site	Management Authority	Management Instrument	General Objective
SIC	IT8050025	Monte della Stella	Campania Region	Management Plan	Ensuring the restoration or maintenance of natural habitats and species of Community interest (Habitats Directive Annex I and Annex II and Birds Directive Annex I) at a favourable conservation status. This general objective includes: ecological sustainability objectives, (habitats and species conservation); socio-economic sustainability objectives aimed at promoting a functional socio-economic development for reaching biodiversity conservation objectives.
SIC	IT2040019	Bagni di Masino e Pizzo Badile	Lombardy Region	Management Plan	Ensuring the restoration or maintenance of natural habitats and species of Community interest and guaranteeing the maintenance and/or restoration of ecological balances through proper management actions.

Source: own elaboration

3.2. Management costs

Management costs quantification related to Bagni di Masino e Pizzo Badile (IT2040019) and Monte della Stella (IT8050025) study sites was based on the EU methodology presented within the report “Costs and Socio-Economic Benefits Associated with the Natura 2000 Network” elaborated by the Institute for European Environmental Policy (IEEP) (Figure 1).

Figure 1. Structure of Natura 2000 costs.



Source: Gantioler et al., 2010

Financial resources identified in Monte della Stella’s Management Plan are related to the Regional Operational Programmes (ROP) and to the Rural Development Plans (RDP) Structural Funds 2007-2013 ROP Campania and, in particular, to Axis I “Environmental sustainability and attractiveness of culture and tourism”, to Axis II “Improving the environment and the countryside” and Axis III “Quality of life in rural areas and diversification of the rural economy”. Bagni di Masino e Pizzo Badile’s Management Plan was prepared within Preparatory Project LIFE03NAT/IT/000139 “Reticnet: 5 SCI for the conservation of wetlands and priority habitat”, funded by the European Union.

According to Gantioler (2010) costs associated with the Natura 2000 Network can be divided into two main categories: “One-off costs” and “Recurrent costs”. “One-off costs” are land purchase and capital investment type costs which are estimated for the completion of the network. “Recurrent costs” are those that are generally associated with on-going management activities to maintain or improve the state of conservation of the site (Gantioler et al., 2010). In this context, we aimed to estimate current management costs for both study sites Bagni di Masino e Pizzo Badile and Monte della Stella (Table 4). The impossibility of estimating the costs for all types of activity is due to the fact that many items are not reported in Management Plans. For example for both these study sites running costs of management bodies aren’t available because they don’t have their own management body, but are managed by other authorities.

Table 4. Monte della Stella and Bagni di Masino e Pizzo Badile sites' recurrent costs.

Recurrent costs		Monte della Stella (IT80500025)		Bagni di Masino e Pizzo Badile (IT20400019)	
		€	%	€	%
Costs for management planning	Running costs of management bodies	0	0	0	0
	Costs for review of management plans	190,000	6	0	0
	Costs for public communication.	100,000	3	30,000	6
Habitat management and monitoring costs	Conservation management measures– maintenance and improvement of habitats favourable conservation status	1,528,000	49	85,000	17
	Conservation management measures– maintenance and improvement of species favourable conservation status	0	0	30,000	6
	Implementation of management schemes and agreements with owners and managers of land or water for following certain prescriptions	300,000	10	5,000	1
	Provision of services; compensation for rights foregone and loss of income; developing acceptability 'liaison' with neighbours	0	0	0	0
	Monitoring	344,000	11	80,000	16
	Maintenance of infrastructure for public access, interpretation work, observatories and kiosks etc.	590,000	19	242,000	49
	Risk management (fire prevention and control, flooding etc.)	80,000	3	25,000	5
	Surveillance of the sites	0	0	0	0
Total cost		3,132,000	100	497,000	100

Source: own elaboration based on study sites' Management Plans

Data extrapolated from Bagni di Masino e Pizzo Badile and Monte della Stella's Management Plans were processed according to the methodology described above and revealed a total cost estimation of €3,132,000 and €497,000 respectively for a period of around 5 years (average length of a Management Plan). Out of this amount more than 90% are habitat management and monitoring costs for both study sites. Through the process of total cost assessment an average cost per hectare was estimated since the use of average cost provides a more homogenous approach compared to other methods. Results of data analysis are presented in Table 5.

Table 5. Average cost per hectare by types of recurrent costs.

Recurrent costs	Monte della Stella (IT80500025)		Bagni di Masino e Pizzo Badile (IT20400019)	
	€	€/ha	€	€/ha
Costs for management planning	290,000	245.76	30,000	10.88
Habitat management and monitoring costs	2,842,000	2,408.47	467,000	169.39
Total cost	3,132,000	2,654.24	497,000	180.27

Source: own elaboration based on study sites' Management Plans

3.3. Ecosystem Services Assessment

For the qualitative valuation, an area-weighted mean ES value was calculated for the selected ES for both study sites (Table 6, Figure 2). While for Bagni di Masino e Pizzo Badile (IT2040019) the ES values are generally low due to large areas without vegetation, Monte della Stella (IT8050025), which is mainly covered by forest, has high ES values. Regarding the single ES, the following results were obtained:

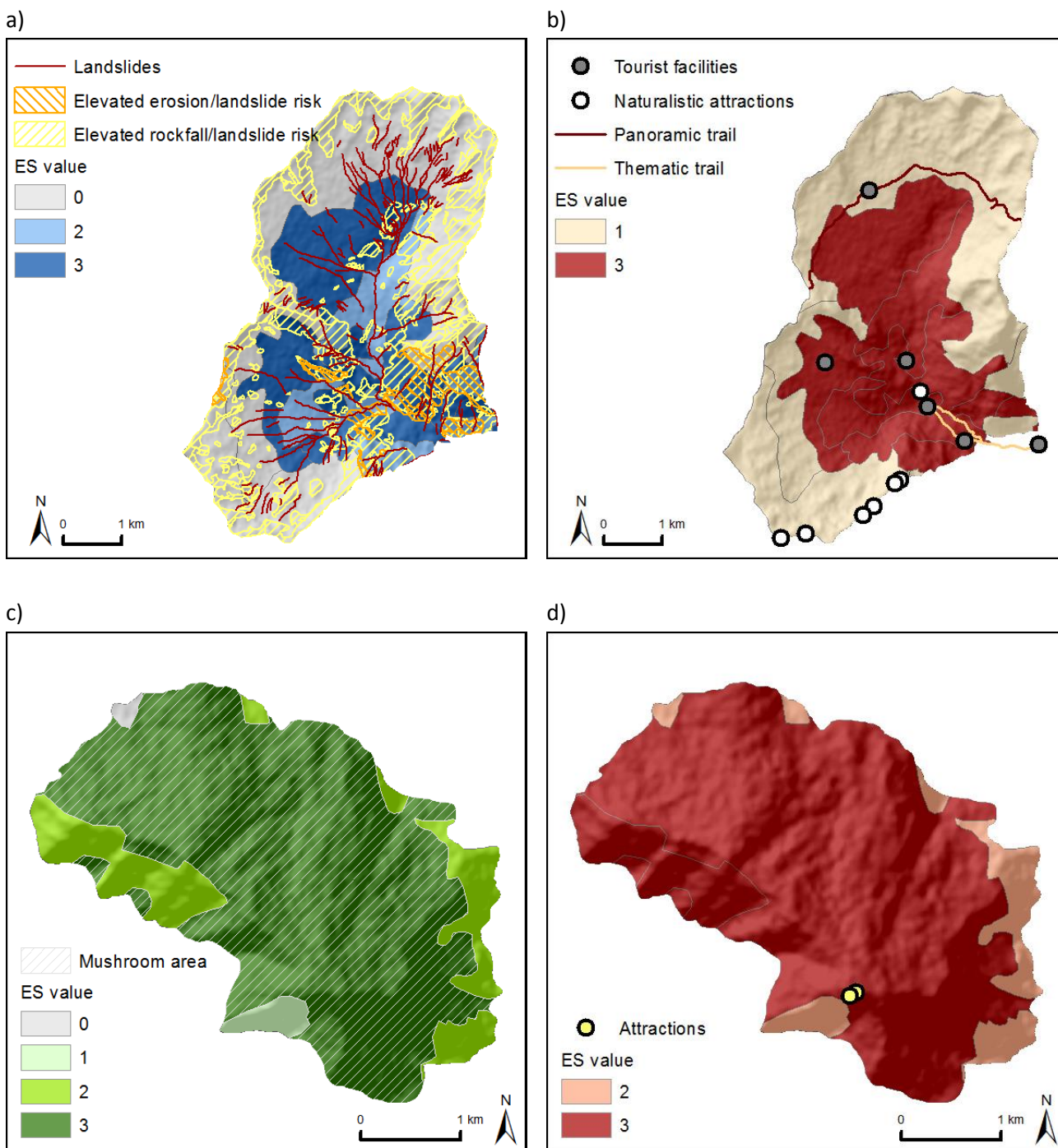
- *Wild food (mushrooms)*: Almost 95% (1,126 ha) of the total area of Monte della Stella (IT8050025) can be considered as suitable for mushrooms, producing a total between 1,689 to 3,379 kg/year. The total economic value was estimated between 38,000 and 76,000 Euro/year.
- *Erosion regulation*: A total of 1,021 ha (37%) of the study site Bagni di Masino e Pizzo Badile (IT2040019) has an elevated erosion and landslide risk of which 178 ha (17%) are covered by forest. Also alpine grasslands contribute to the stabilization of the soil as indicated by Figure 2a).
- *Recreational value*: The alpine landscape of the study site Bagni di Masino e Pizzo Badile (IT2040019) with a rich flora and fauna has an elevated aesthetic value and offers many possibilities for hiking, climbing, and excursions. Just before arriving at the SIC, a campground is located. Within the site, a hotel with thermal Spa (Hotel Relais Bagni Masino Terme & Spa), which is an important point of attraction, is located at Bagni Masino (1,132 s.l.). Furthermore, two mountain huts offer accommodation during the short summer period and are linked to the Path Rome, the most famous hiking trail in the Alps. Two automatic counting stations installed in the study area indicate between 36 and 435 visitors daily. The SIC is located within two municipalities with several accommodation facilities with a capacity of 1,707 beds with an economic value of 61,650 Euro for the year 2013. Up to 1.5 million potential day-trippers reach the study site within 1.5 hours driving.

Monte della Stella (IT8050025) has a dense trail network offering naturalistic itineraries and excursions to historic sites. On the summit of the Monte Stella, also called ‘sacred mountain’, an ancient fort was situated. Nowadays, it hosts an old chapel and a radar station. The seven municipalities, intersecting the SIC, offer various accommodation facilities with a total of 2,143 beds and the economic value amounts to ca. 72,600 Euro for the year 2013. Moreover, the study area has a huge potential of day-trippers, because almost 4 million people live within 1.5 hours driving from the study area.

Table 6: Area-weighted mean value obtained from qualitative ES valuation (3-high, 2-medium, 1-low, 0-not significant).

Study area	ES	Qualitative ES value	
		CORINE	Habitat
Bagni di Masino e Pizzo Badile (IT2040019)	Erosion regulation	1.25	1.29
	Recreational value	1.48	1.92
Monte della Stella (IT8050025)	Wild food (mushrooms)	2.82	2.79
	Recreational value	2.91	2.80

Figure 2. ES value (3-high, 2-medium, 1-low, 0-not significant) based on spatial land cover information for a) erosion regulation and b) recreational value of Bagni di Masino e Pizzo Badile (IT2040019), c) wild food and d) recreational value of Monte della Stella (IT8050025). Where available, further qualitative information was included as indicated on the map legends.



4. CONCLUSIONS

The aim of this paper was to attempt a first quantification of the value of ES and management costs related to 2 out of 21 study sites of the MGN project. Difficulties in estimating some cost items, such as “One off costs”, have oriented this study towards the “Recurrent costs” for those Management Plan measures aimed at ecological and socio-economic sustainability.

Data show a higher financial investment level for Monte della Stella (IT2040019), probably due to the availability ROP-RDP Campania funds and the need for more conservation and development actions. From our analysis, we noted that 49% of costs are for maintaining (or improving) habitats conditions that at the moment are generally in a “good state of conservation”. The assessed ES show both high qualitative values, although the economic value is relatively low. Besides the two ES, which were included in this study, there are many other important ones such as water provision, climate regulation, or erosion control. Our results indicate furthermore that the study area has a great potential in terms day-trippers providing good conditions for recreational activities.

Instead for Bagni di Masino Pizzo Badile (IT2040019), the share of costs related to habitats conservation is around 17% and 98% of habitats are in an excellent state of conservation. In this case, costs for maintaining facilities for tourists (49%) are significantly high, which is coherent with the identification of “Recreational value” as one of the most important ES for the site area which was confirmed by the qualitative and quantitative ES assessment. Due to the data availability, its economic valuation indicates only a small part of the total value and should be integrated with expenses for transportation, food, recreational equipment, and other. Also for this area, the number of potential day-trippers exceeds many times the accommodation opportunities in the area and they should be considered as an important potential financial resource.

Economic benefits related to three out of four assessed ES (2 for Monte della Stella and 1 for Bagni di Masino) show that average benefit-cost ratio is around 50%. However, due to the current progress of the MGN Project and lack of data, in this paper we have only considered a small number of ES. So we suppose that when all ES will be evaluated benefit-cost ratio will increase and overall benefits will exceed costs in all likelihood according to other previous assessments (Gantioler, 2010; ten Brink, 2011).

Results of this paper stress how the quantification of costs relating to the Natura 2000 network is crucial within a systematic approach to environmental accountability for measuring and assessing management bodies’ management strategy effectiveness and efficiency and redefining sites’ conservation priorities. Furthermore, in a context of stagnant and uncertain funding for biodiversity conservation the need of defining governance and management tools, such as PES or PES-like schemes, should offer a considerable potential to raise new funds for biodiversity or to use existing funding more efficiently. However, it is necessary to pay attention in their design, and to ensure both their particular fit within specific socio-economic contexts and their capacity to modify rule-making structures. These two aspects are fundamental when both effectiveness and social acceptability aim to be reached (Muradian and Rival, 2012). Governance of ecosystem services is characteristically multi-layered and entails a complex architecture involving a multiplicity of actors and many interrelations between the ‘local’ and the ‘global’. Solving such problems normally requires moving from thinking in terms of single, ideal managerial approaches (e.g. command-and-control, markets or community-based management) to combining governance structures, scales and tools (Muradian and Rival, 2012).

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REFERENCES

- Ackerman, B.A., Stewart, R.B., Reforming Environmental Law, *Stanford Law Review*, 37, 1985, pp. 1333-1365
- APAT (2007) Rapporto sulle frane in Italia. Il Progetto IFFI – Metodologia, risultati e rapporti regionali.
- Bastian, O. (2013). The role of biodiversity in supporting ecosystem services in Natura 2000 sites, *Ecological Indicators* 24, 12-22.
- Burkhard, B., Kroll, F., Nedkov, S., Müller, F. (2012). Mapping ecosystem service supply, demand and budgets. *Ecological Indicators*, 21, 17-29.
- Cimon-Morin, Jérôme, Marcel Darveau, and Monique Poulin. "Fostering synergies between ecosystem services and biodiversity in conservation planning: A review." *Biological Conservation* 166 (2013): 144-154.
- Costanza, R., d'Arge, R., de Groot, R.S., Farber, S., Grasso, M., Hannon, B., Limburg, K., Naeem, S., O'Neill, R.V., Paruelo, J., Raskin, R.G., Sutton, P. and van den Belt, M. (1997), The value of the world's ecosystem services and natural capital, *Nature*, 387(6630): 253–26
- Croitoru, L., Gatto, P. (2001). Una stima del valore economico totale del bosco in aree mediterranee. *Monti e Boschi* 52(5), 22–30.
- Daily, G.C., ed. (1997), *Nature's Services: Societal Dependence on Natural Ecosystems*, Washington DC (Island Press).
- De Marchi, M., Scolozzi, R. (2012). La valutazione economica dei servizi ecosistemici e del paesaggio nel Parco Naturale Adamello Brenta. *Valutazione Ambientale* 22, 54–62.
- European Commission, (2013) "The economic benefits of Natura 2000 network", Synthesis report Final Luxembourg: Publications Office of the European Union, ISBN 978-92-79-27588-3.
- European Commission, 2011. Natura 2000 Barometer, Available at: http://ec.europa.eu/environment/nature/natura2000/barometer/index_en.htm (accessed 01.07.2011).
- Freeman, J., Collaborative governance in the Administrative State, *UCLA Law Review*, 1, 1997, pp.14-19
- Gaglioppa P, Guadagno R, Marino D, Marucci A, Palmieri M, Pellegrino D (2013). Analisi della gestione e dei finanziamenti riguardo ai servizi ecosistemici. Report del progetto MakingGood Natura (LIFE+11 ENV/IT/000168), CURSA, Roma, pp. 253.
- Gantioler S., ten Brink P., Rayment M., Bassi S., Kettunen M., McConville A., Financing Natura 2000 – Financing needs and socio-economic benefits resulting from investment in the network. Background Paper for the Conference on 'Financing Natura 2000', 15-16 July 2010. DG Environment Contract ENV.B.2/SER/2008/0038. Institute for European Environmental Policy / GHK / Ecologic, Brussels 2010.
- Getzner, M., Jungmeier, M., 2002. Conservation policy and the regional economy: the regional economic impact of Natura 2000 conservation sites in Austria. *Journal of Nature Conservation* 10, 25–34.
- Goio, I. (2006). La funzione produttiva delle foreste: confronto tra contabilità standard e verde. *Estimo e Territorio* 11, 16–23.
- Halahan, R., 2002. Socio-Economic Benefits of Natura 2000 in the UK, WWF UK, Available at: <http://www.wwf.org.uk/filelibrary/pdf/N2Kuk.pdf>.
- Hoyos D., Petr Mariel P., Pascual U. Etxano I. (2012), "Valuing a Natura 2000 network site to inform land use options using a discrete choice experiment: An illustration from the Basque Country", *Journal of Forest Economics*, 18: 329–344.
-

ISTAT (2011). Rilevazione sulla capacità degli esercizi ricettivi - Anno 2011. Roma

Kettunen, M., Torkler, P. and Rayment, M. (2014) Financing Natura 2000 in 2014-2020: Guidance Handbook, a publication commissioned by the European Commission DG Environment (Jan 2014 draft)

Kettunen, M., Baldock, D., Gantioler, S., Carter, O., Torkler, P., Arroyo Schnell, A., Baumüller, A., Gerritsen, E., Rayment, M., Daly, E., Pieterse, M., 2011. Assessment of the Natura 2000 co-financing arrangements of the EU financing instrument. A Project for the European Commission – Final Report, Institute for European Environmental Policy (IEEP), Brussels, Belgium.

Kruk R.W., De Blust G., Van Apeldoorn R.C., Bouwma I.M. and Sier A.R.J., 2010. Information and communication on the designation and management of Natura2000 sites. Summary Main Report 1: The designation in 27 EU Member States. Wageningen, The Netherlands, Alterra, 29pp. (Alterra-rapport 2043.1)

Loreau, M., Naeem, S., Inchausti, P., eds. (2002). Biodiversity and ecosystem functioning: synthesis and perspectives, Oxford Univ. Press

Marino, D., Schirpke, U., Gaglioppa, P., Guadagno R., Marucci A., Palmieri M., Pellegrino, D., De Marco C., Scolozzi R., "Assessment and governance of ecosystem services: first insights from life+ making good natura project." *Annali di Botanica* 4 (2014).

Millennium Ecosystem Assessment (MEA) (2005), Ecosystems and Human Well-Being: Biodiversity Synthesis, World Resource Institute, Washington, DC.

Muradian, R., Rival, L., (2012) Between markets and hierarchies: The challenge of governing ecosystem services, *Ecosystem Services* 1 (1), 93-100.

OECD, (2004) The Recommendation of the Council on the Use of Economic Instruments in Promoting the Conservation and Sustainable Use of Biodiversity, C(2004)81, Paris.

Pettenella D, Vidale E, Gatto P, Secco L, (2012). Paying for water-related forest services: a survey on Italian payment mechanisms. *iForest* 5: 210-215 [online 2012-21-11] URL: <http://www.sisef.it/iforest/contents?id=ifor0626-005>

Rojas-Briales, E., 2000. Socio-economics of nature protection policies in the perspective of the implementation of Natura 2000 network: the Spanish case. *Forestry* 72 (2), 199–207.

Schirpke U, Scolozzi R, De Marco C (2013a). Analisi dei servizi ecosistemici nei siti pilota. Parte 1: Analisi della letteratura. Report del progetto Making Good Natura (LIFE+ 11 ENV/IT/000168), EURAC research, Bolzano, p. 54.

Schirpke, U., Scolozzi, R., De Marco, C. (2013b). Analisi dei servizi ecosistemici nei siti pilota. Parte 4: Selezione dei servizi ecosistemici. Report del progetto Making Good Natura (LIFE+11 ENV/IT/000168), EURAC research, Bolzano, p. 43.

Schirpke, U., Scolozzi, R., De Marco, C. (2013c). Analisi dei servizi ecosistemici nei siti pilota. Parte 3: Identificazione dei potenziali beneficiari. Report del progetto Making Good Natura (LIFE+11 ENV/IT/000168), EURAC research, Bolzano, p. 44.

Schulze, E. D., Mooney, H. A., eds. (1993), Biodiversity and Ecosystem Function, Springer, New York.

Scrinzi, G., Gregori, E., Giannetti, F., Galvagni, D., Zorn, G., Colle, G., Andrenelli, M. (2006). Un modello di valutazione della funzionalità protettiva del bosco per la pianificazione forestale: la componente stabilità dei versanti rispetto ai fenomeni franosi superficiali. *Forest@* 3, 98-155.

TEEB (2008) An Interim Report. European Communities.

TEEB (2011), The Economics of Ecosystems and Biodiversity in National and International Policy Making. Edited by Patrick ten Brink. Earthscan, London and Washington.

ten Brink, P., Monkhouse, C., Richartz, S., 2002. Promoting the Socio-Economic Benefits of Natura 2000. Institute for European Environmental Policy, Brussels.

ten Brink P., Badura T., Bassi S., Daly, E., Dickie, I., Ding H., Gantioler S., Gerdes, H., Hart, K., Kettunen M., Lago, M., Lang, S., Markandya A., Mazza, L., Nunes P.A.L.D., Pieterse, M., Rayment M., Tinch R. (2011) Estimating the Overall Economic Value of the Benefits provided by the Natura 2000 Network. Final Synthesis Report to the European Commission, DG Environment on Contract ENV.B.2/SER/2008/0038. Institute for European Environmental Policy / GHK / Ecologic, Brussels 2011.

Trademark Italia (2013). Il trend alberghiero 2013. Available at <http://www.trademarkitalia.com>. Last accessed 13.05.2014.

Wunder S (2005). Payments for environmental services: some nuts and bolts. CIFOR Occasional Paper No. 42. http://www.cifor.cgiar.org/publications/pdf_files/OccPapers/OP-42.pdf

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