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Intermediary Organizations in Nature Conservation Initiatives: The Case of the EU-Funded LIFE Programme

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Abstract: This study was aimed to identify intermediary organizations active in nature conservation initiatives by adopting a multi-level (ML) and network governance (NG) framework and using social network analysis (SNA). We identified 256 coordinating beneficiaries and 1090 associated beneficiaries connected through 8310 project relations and financed through the EU-funded LIFE Programme from 2014 to 2020. Our results evidence a central component of the network where organizations from Italy, Spain, and the United Kingdom play a central role. In contrast, peripheral components return a framework of partnerships mainly constituted by actors of the same country (68%). Moreover, the characterization by type of actor confirms the widespread implementation of a multi-level governance approach in LIFE-Nature (NAT) projects, evidencing the significant presence of non-governmental organizations and foundations, mainly at a national level, in nature conservation initiatives. Our findings reveal that the intermediary capacity of key actors should be further reinforced, particularly toward the promotion of transnational cooperation and cross-sector alliances, by encouraging the involvement of stakeholders operating at the ground level (i.e., provincial and municipal levels).

Keywords: conservation; nature; projects; European Union; LIFE Programme; network governance; multi-level governance; biodiversity; SNA

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1. Introduction

Alarming evidence regarding the state of nature at the global level [1–3] highlight humanity's failure to achieve the internationally agreed upon objectives for the conservation and protection of species and ecosystems [4–8], with severe consequences for the wellbeing of humanity [9]. For example, the "species leap" that led to the SARS-CoV-2 pandemic is considered one of the most apparent consequences of violating ecosystem integrity [10,11]. It demonstrates how animals, plants and the human health closely interlink with the quality of the environment, a concept included in the One Health approach, which assumes that human, animal, and ecosystems health are interdependent and bound to the health of ecosystems [12,13].

Due to its multifaceted nature, One Health requires a collaborative, multisectoral, and transdisciplinary approach to working at the local, provincial, regional, national, and global levels [14,15]. Thus, effective environmental initiatives that sustain the health and wellbeing of society require integration between multiple aspects and needs concerning both the social and the ecological context in which they are embedded.

This recognition is at the premises of social–ecological systems (SES), a concept based on a mutual and reciprocal adaptation process in human–ecosystem co-evolution and, therefore, on the interdependencies between institutions (*à la* North) and ecosystems [16]. Complex interdependencies between societies and ecosystems [17,18] highlight—among other factors—the importance of collaboration in the management of natural resources

based on multi-participatory approaches that usually cross different temporal and spatial scales [18–20].

Addressing complex issues, such as the loss of species and ecosystems [21], requires the participation of multiple actors who exercise synergic actions across different jurisdictional levels. Complex interactions concretize the concept of governance seen as "the formal and informal rules, rule-making systems, and actor networks at all levels (i.e., local, regional, and global) that influence how societies identify, design, and implement conservation actions" [22] (p. 155). Additionally, Bulkelev affirmed that environmental decisions would be "created, constructed, regulated and contested, between, across and among scales" through networking [23] (p. 876), which was proposed as a suitable approach to guiding decisions and actions toward sustainable development.

The multi-level governance (MLG) concept emerged in the context of the reform of the EU cohesion policy and within the analysis of the European integration process [24]. It refers to the distribution of power between not only different levels of administration (vertically) but also heterogenous stakeholders (horizontally), including the private and civil sectors [25]. We define MLG as the interaction between the various actors of the private, governmental, and voluntary sectors, representing the different levels of the jurisdictional scale (i.e., the decision-making process) where the local, regional, national, and international levels can be distinguished [21,26,27].

MLG is visible in conservation policies acting at multiple levels, from global agreements (e.g., Convention on Biological Diversity) to European policies (e.g., the Habitats and Birds Directives), as well as the ones implemented at the national level (e.g., national biodiversity strategy) and declined in regional strategies and local governance frameworks [27–29].

Effective collaboration is achieved through a collaborative governance approach that brings benefits from the local to the global scale [30]. Conversely, collaboration could not be considered a panacea solution, as it could lead to conflicts and misalignments between the governance structures and the environment, thus reducing the ability to effectively address environmental problems [31].

Governance structures reflect how different stakeholders are arranged to achieve specific outcomes [32]. In the governance of SES, for example, the structure could range from a strictly hierarchical—a top–down or a bottom–up governance structure—to a governance network, i.e., a structure supporting stakeholder interaction across multiple geographical jurisdictions, policy sectors, and governance levels [33,34]. Therefore, networks emerge as a relational and organizational tool helpful in improving the quality and effectiveness of the environmental initiatives and supporting the increasing adoption of governance participatory approaches.

Network governance (NG) reflects vertical and horizontal social relationships and structural arrangements that connect citizens, agencies and organizations, and private sector actors in collaborative efforts to achieve a range of objectives [22,35,36]. A multi-actor network ties horizontally connect actors across a single jurisdictional or political level [22], while multi-level network ties vertically connect actors across multiple administrative and institutional levels [37].

Some significant examples of NG applications in managing natural resources and biodiversity are linked to (i) the analysis of collaborative initiatives in conservation strategies [38,39], (ii) the identification of the key stakeholders and patterns of interactions within the network [40,41], and (iii) the analysis of conditions that can facilitate the coordination of action and overcome conflicts [42,43].

By observing the structures and dynamics of a social network composition, it is possible to identify central actors, also called intermediary organizations. Intermediary organizations are seen as brokers and negotiators in disseminating knowledge, as well as facilitators of new arrangements in a network [41,43]. Furthermore, intermediary actors may exert influence over others by occupying a strategic position in a social network [30,32].

The European Union (EU), as a supranational and regional organization, is increasingly recognized at the international level as a laboratory of multilateral environmental action that is based on NG principles and the formalized collaboration of member states in sharing policy tools [44].

The EU supports the MLG approach by promoting transnational cooperation in project partnerships and involving (in various initiatives) partners who differ in legal status and interests, objectives, and backgrounds. The European cooperation concretizes (i) the coordination and involvement of actors from multiple sectors, from the local to the regional and national level [45], and (ii) the promotion of network in policy implementation [46,47].

For example, the new Biodiversity Strategy for 2030 is aimed to halt biodiversity loss and move towards inclusive and sustainable development, focusing on the restoration of degraded habitats, extending the network of protected areas (PAs), and improving their effective management through improved governance [48–50]. In Europe's long-term vision, the Biodiversity Strategy for 2030 is aimed to restore and adequately protect all ecosystems by 2050, strengthen ecological resilience, and prevent future pandemics [7].

The Natura 2000 network constitutes the EU's largest network of protected areas. It is regulated by the Habitats and Birds Directives and represents a fundamental instrument for achieving Biodiversity Strategy objectives for 2030 and, generally, EU environmental objectives. Its aim to safeguard the biodiversity also includes not-harmful human activities to species and habitats of European interest [51] and integrating ecological needs with social ones [52,53]. Thus, the successful management of Natura 2000 sites requires a network governance approach to coordinate conservation measures or management plans taken by multiple actors with multiple and specific environmental challenges depending on the natural context where interventions occur [54,55].

To achieve the EU's strategic objectives, EU programs usually foresee financing projects typically promoted by partnerships of actors directly or indirectly involved in an initiative. This is the case of the EU Programme for the Environment and Climate Action (LIFE), a fund directly managed by the European Commission to protect nature and biodiversity and to promote mitigation and adaptation to climate change via bottom–up projects proposed by multi-actors and multi-level partnerships. Through an MLG approach, LIFE objectives are reached by networks of actors consisting of public, private, and not-for-profit bodies acting at different jurisdictional levels. Through networking, actors can develop innovative techniques, methods, and approaches or diffuse best-practices resulting from LIFE projects. By linking initiatives through the exchange of ideas and results from a local context to another one, transnational networks demonstrate enormous potential to catalyse transformative innovations in sustainability [56]. Extending from this aspect, our perspective provides a conceptual starting point to further explore the development and dissemination of transformative innovation and transition governance strategies [56].

To date, there is a minimal understanding of the characteristics of the actors, the multi-level and transversal relationships that bind them, the network structure, and how these factors are related in the network governance approach [57,58].

Despite the advantages of different stakeholders' involvement [59,60], implementing a joint management and governance model is often difficult to realize [61].

The LIFE Programme (2014–2020) and, specifically, LIFE Nature (LIFE-NAT) could be considered a suitable case for analysing the effectiveness of network governance for nature conservation and restoration that involve municipal, provincial, regional, national, and international actors. In particular, LIFE-NAT identifies as priorities:

- Activities to improve the conservation status of habitats and species considered of communitarian interest.
- Activities for supporting the Natura 2000 network.
- The adoption of integrated approaches for the implementation of priority action frameworks.

LIFE-NAT is a tool for testing and developing new approaches, best practices, and innovative solutions that demonstrate the European added value in conservation benefits, replicability, transferability, and trans-national outreach [62].

In this way, achieving objectives at the level of a single funded project and diffusing good practices through networking, from the local to the international scale, contribute to achieving European environmental and transversal macro-objectives.

This study was intended to analyse how multiple actors from different geographical and jurisdictional scales address shared problems related to nature and biodiversity protection through ML and NG approaches. We conducted an exploratory analysis by focusing on all levels of the jurisdictional scale of governance in the different European countries, i.e., municipal, provincial, regional, national, and international. Specifically, we identified involved intermediary organizations and their specific features within the partnerships under LIFE-NAT projects from 2014 to 2020.

Based on these premises, this article addresses the following hypotheses, further detailed through specific research questions:

Hypothesis 1 (H1). *The presence of intermediary organizations in governance collaborations, which are characterized by dense connections with multiple nodes, implies a higher density within the LIFE-NAT network, promoting cohesiveness in relationships and avoiding binding relationships among actors [32]. (**Q1**) How cohesive was the network of actors of LIFE-NAT projects from 2014 to 2019 at the European level?*

Hypothesis 2 (H2). *LIFE-NAT projects support multi-level and multi-actor governance through intermediary organizations connecting with different actors in terms of nationality, type, and jurisdictional level [63–67]. (**Q2**) What is the degree of homophily and heterophily of the LIFE-NAT network?*

Hypothesis 3 (H3). *Structural differences in LIFE-NAT networks due to relationships created by intermediary organizations reflect a different way to implement MLG and NG through LIFE projects [18,32,68,69]. (**Q3**) What structural differences in MLG of LIFE-NAT project networks emerged from 2014 to 2019? What differences were observable between different countries in Europe?*

Hypothesis 4 (H4). *Within European policy context, state actors have a prominent role in the transmission of information and dissemination of good practices due to their primary responsibility for nature conservation and management, playing the role of intermediary actors in governance processes [70–72]. (**Q4**) To what extent are state actors as widespread in the LIFE-NAT network as intermediary actors? Who are those able to catalyse the process of information, transmission, and control? What is their level of influence in the LIFE-NAT network?*

Hypothesis 5 (H5). *A higher presence in a social network of non-governmental actors as intermediary organizations [73] is linked to changed relationships between governmental and non-governmental actors in the decision-making and governance processes [74,75]. (**Q5**) To what extent does the LIFE-NAT priority area facilitate the emergence of non-governmental actors as intermediaries?*

Consequently, the article is structured in six sections. After this introduction, the theoretical framework is presented in Section 2, followed by the description of materials and methods in Section 3. Section 4 presents results that are discussed in depth in Section 5, along with research limitations and ideas for future analysis. The article concludes with Section 6 summarizing the final remarks.

2. Conceptual Framework and Proposition

2.1. Network Cohesion (H1)

A network's cohesion level is an essential characteristic since it measures the extent a network is united instead of being split into separate subgroups [76]. A subgroup can be defined as an entity having significantly more links between its members than those established with non-members [32].

To investigate the effectiveness of ML and NG approaches in LIFE-NAT projects, the statistical measure of "network density" (i.e., the number of existing ties compared to the total number of possible ties) was used. This statistic reflects the network cohesiveness. The higher the level of cohesiveness among diverse actors implementing environmental initiatives around the EU territory, the higher the capacity of LIFE projects to promote effective collaborations (Hypothesis 1).

Several studies support the hypothesis that a higher presence of social ties in networks corresponds to enhanced possibilities for collaboration, communication, and fosters mutual trust. These dynamics could help avoid conflicts and foster the development of regulations on common natural resources, e.g., [77–79]. Conversely, the existence of subgroups can be disadvantageous for joint actions to govern common natural resources, having consequences on the ML and NG approaches [80]. However, this limitation could be overcome if actors establish bridging links between sub-groups and demonstrate the capacity and motivation to coordinate activities towards a common goal. The formation and maintenance of subgroups in a network allow for the exchange of information, i.e., a continuous and persistent interaction, between actors with different levels of specialization [81]. The presence of these entities could provide opportunities for a high degree of interaction between similar subgroups, develop different typologies of knowledge in diverse subgroups, and hybridize existing knowledge between different clusters of actors, with implications for the effective governance of natural resources [82].

2.2. Network Homophily (H2)

Sociological literature argues that humans tend toward two divergent points: (i) homophily, in which people look for similar people, and (ii) heterophily, in which people look for people who are different [83].

Evidence suggests that individuals prefer to form social ties with people who share their characteristics such as education, race, age, and sex [84–86]. This feature corresponds to the homophilic trait of the social network, which is well-documented in different circumstances [63,87–90].

Nevertheless, in its broadest sense, the LIFE Programme is aimed to catalyse transnational synergies among countries by breaking down barriers to collaboration between the different levels of MLG and among different stakeholders' attributes.

To better understand the transversal dynamics of environmental governance, we observed whether different attributes (i.e., in terms of "nationality" "typology" and "jurisdictional level") represent advantages in the concretization of an MLG within the LIFE-NAT network (Hypothesis 2). To this end, we used the E–I index [91]. Considering a network of mutually exclusive groups, the E–I index is a social network measure calculated as the number of ties external to the groups minus the number of relations that are internal to the group divided by the total number of connections.

2.3. Multi-Level Governance (H3)

Effective coordination and collaborative dynamics within and among groups implementing environmental activities at sub-national levels can support environmental governance on a higher level by promoting the political learning necessary for a legislative change [92]. One of the main objectives of the LIFE Programme is to support the development, implementation, monitoring, and enforcement of relevant union legislation and en-

vironmental policy, including that regarding nature and biodiversity, by improving governance at all levels—particularly by enhancing the capacities of public and private actors and the involvement of civil society [62]. From this perspective, MLG governance is realized through decentralized models constituted by networks of private and public actors interacting at different geographical and jurisdictional scales. Collaborative relationships are regulated by coordination based on the exchange of resources and trust [66,70]. These models allow for the replacement of hierarchical-based models of a government-type [22,35,36].

Researchers have proposed two ideal types of MLG called Type I and Type II [93]. Type I follows the federalist model, characterized by a limited number of jurisdictional authorities. Government agreements are displayed on hierarchical levels and arranged on a vertical scale, among which the "international", "national", "regional", "provincial", and "municipal" levels are distinguished. Type II consists of a set of multiple jurisdictional authorities exercising specific competencies. These entities can transversely operate on various territorial scales and have flexible structures to respond to changing governance needs, thus arranging themselves on a horizontal structure.

Hypothesis 3 was aimed to understand how the transversal relationships between multiple actors involved in environmental governance differ, verifying whether they follow Type I or Type II of MLG.

Considering the complex and uncertain nature of the issues concerning the protection of species and ecosystems, we assumed that the LIFE-NAT network responds to a Type II of MLG, which reflects a flexible framework of relationships on a horizontal structure [94].

2.4. Intermediate Actors (H4)

The presence of intermediary organizations influences the behaviours of other actors embedded in the MLG networks by constituting new relationships and vertically and horizontally reorganizing existing connections through bridging links [32,95,96]. These elements allow us to understand why centrality measures are a widely studied phenomenon in network science [97,98]. By occupying specific central positions in the network, actors gain priority access to the flow of information and can influence others, which can prove beneficial in the intermediation process [72,99]. Intermediation processes have implications that go beyond the exchange of information and knowledge. In the long term, they promote the possible dissemination of social values such as trust, support for future actions, and adaptability or, on the contrary, the emergence of binding actors who preclude the participation of others in future initiatives. Understanding how the social network can support or hinder many governance initiatives concerning the environment is essential in analysing the structural characteristics of these networks and, specifically, the characteristics of intermediate actors [74,100].

To this end, we formulated a specific research hypothesis regarding bridging organizations and their control and transmission of information within the network of LIFE-NAT projects. Considering the state's responsibility for the management of protected areas and generally for the implementation of conservation measures [101–103], we suppose that the central players in the LIFE-NAT network are state actors, although their central role is mediated by other actors (Hypothesis 4).

2.5. Governance vs. Government (H5)

To support an environmental policy aimed at generating effective results and fostering sustainability, the literature suggests two main vital strategies, (i) adapting the spatial scale and level of governance to the environmental problem [104] and (ii) strengthening the participation of non-governmental actors in the decision-making process, as well as in the implementation of initiatives [36].

Although the term governance was considered synonymous with government for a long time [105,106], in recent decades, a widespread consensus emerged in understanding

governance as the evolution of Montesquieu's concept of government (i.e., executive power) [106,107].

Governance overcomes the clear distinction between public and private actors [106], valorising the latter's role in the supply of public goods if organized in the form of horizontal networks through collaborative arrangements [54].

The meaning of collaborative governance [18,108,109] led us to formulate Hypothesis 5 regarding the role of non-state actors in the mediation of relationships among actors. Thus, they behave as brokers and impact the political decision-making process, determining a change in the relational setting [43,71,110].

Indeed, as demonstrated by Reimer and Saerbeck's (2017) exploratory analysis, different types of actors—non-governmental organizations and government actors—act as real political entrepreneurs [73].

3. Materials and Methods

3.1. Database Creation

The authors of this study analysed LIFE-NAT projects through a network approach. Data were organized in three different levels of information:

- Project-level, i.e., general and specific objectives of projects, achieved results, and localization of activities retrieved from the project website.
- Beneficiary level, i.e., nationality, website, type of actor, and level of governance, based on the specification of the project website.
- Project partners' relationship level, i.e., the direction of the relations among beneficiaries.

The LIFE Project Database makes it possible to access information on projects funded during the LIFE programming period of 2014–2020. However, data referring to the year 2020 are not included, as they will be published in the first half of 2022. The projects covered by our analysis belong to the same LIFE programming period (2014–2020) and comply with the same EU regulation (Regulation (EU) N° 1293/2013) [62]. The project is based on a contract between the concerned parties (namely the coordinating beneficiary and the European Commission), regulating the co-financing over the years and maintaining the partnerships' stable composition for the duration of a project. The average duration of a project is around 5.4 years, with 26.3% of the projects funded from 2014 to 2020 having been completed. Throughout the project, the partnership is not subject to governance changes.

The list of selected projects was exported and organized into two MS Excel spreadsheets. The first one shows the list of projects and includes their general administrative features. Information was manually obtained by consulting each specific project sheet.

The second MS Excel spreadsheet is focused on data related to the project partnership. For each project, information for each type of beneficiary (coordinating and associate beneficiary) were entered after being uniquely identified by the VAT number (abbreviation for value added tax).

Detailed information for each project actor included its country, level of governance (i.e., international, national, regional, provincial, and municipal), and the type of actor. From civil society to local authorities, the LIFE Regulation (Art. 3) does not exclude any type of organization for the selection and co-financing of a project initiative [62]. Types of beneficiaries refer to the taxonomy proposed by the database of LIFE projects, which includes different categories of actors located in public, private, or public–private spheres [54]. Specifically, the following categories were utilized in this study: international enterprise, large enterprise, mixed enterprise, small and medium-sized enterprise (SME), public enterprise, non-governmental organization–foundation, national authority, regional authority, local authority, park–reserve authority, professional organization, research institute, university, and educational centre.

The level of governance for each actor is highlighted through the following attributes: international, national, regional, provincial, and municipal, as proposed by the scientific literature of MLG [21,111].

For our analysis, we connected all organizations participating in the same LIFE-NAT project through links (i.e., network edges) [110]. Consequently, we associated each project beneficiary with a unique progressive code to obtain a list of "Nodes" constituting the analysed network.

Subsequently, another MS Excel spreadsheet was created to identify the links among beneficiaries constituting the partnership of each project. The graph ties are considered "not-directional" since two actors shall participate equally in the relationship. For this reason, the type of relationship was considered "undirected" if the flow of information, communications, and (more generally) the "exchange" between the two nodes took place from both parties [112].

Data collected in the "Nodes" and "Ties" sheets were imported into the GEPHI software® for graphic and statistical processing.

3.2. Network Analysis

Social network analysis (SNA) is a method for analysing and visualizing the structural characteristics of a network. [113,114]. SNA displays social relations through graphs consisting of ties (arcs) connecting individuals (nodes) [115]. This method aids in identifying structures and patterns between project partners [116] and highlights best-practice examples for establishing effective conservation partnerships [54,117]. Notably, the SNA approach can reveal the position of each actor participating in the network and its influence, so it can help optimize the information flow [22]. GEPHI software® was used to generate network images.

Quantitative Analysis

Through SNA, the description of different network structural characteristics, such as the number of ties, the network density, and centrality measures, allows for the quantitative description of the network governance supported by LIFE projects analysed [32].

SNA, through the representation of nodes (i.e., actors) and ties (i.e., the relationships between nodes), can help identify what organizations serve as "bridges" for disconnected actors or can reveal subgroups of actors that are separated from the others [22].

From a methodological point of view, the analysis was structured using different statistical network measures depending on the specific research question.

(Q1) How cohesive was the network of actors of LIFE-NAT projects from 2014 to 2019 at the European level?

Density, i.e., the total number of ties in a network, is a fundamental network measure [118]. This measure expresses the level of saturation of relationships between nodes. In other words, density measures the actual connections between those that could exist, given the number of nodes. The level of network cohesion could be predictive of the ease with which information is transmitted and the condition for the emergence of intermediary actors [55].

(Q2) What is the degree of homophily and heterophily of the network?

The E–I index [90], comparing internal and external group ties, determines the degree of homophily or heterophily.

A positive value of this index indicates the presence of heterophily while a negative one indicates homophily. The approximation of the E–I index to +1 means that all relationships result between actors with differentiated attributes (high heterophily). In contrast, a value close to−1 would indicate that all connections are between subjects with the same attribute, revealing high homophily. If the links are equally distributed, the index will be equal to zero [90].

Considering the E–I index value for "nationality", "type of organization", and "jurisdictional level", it is possible to determine whether actors with homogeneous characteristics are inclined to interact more or if different attributes do not represent obstacles to communication and network collaboration [63].

Characterizing the LIFE-NAT network as homophilic or heterophilic for these characteristics allowed us to verify multi-actor and MLG's presence.

(Q3) What are the structural differences in MLG in the LIFE-NAT project networks from 2014 to 2019? What differences are observed between Northern and Southern Europe countries? What are the characteristics that describe such projects?

GEPHI ® allows for the manipulation of the structure, shape, and colours of a graph to simultaneously highlight different attributes within a network, possibly combining different layouts. In this way, a qualitative comparison of the network of actors is made possible by varying the attribute.

Using the GEPHI software®, it was possible for us to obtain the different network structural characteristics, such as the number of ties, the network density, and centrality measures, to achieve the research objectives. It was possible to obtain a graphic representation of the network structure, highlighting central actors. The graph aided the understanding of which relationships are facilitated within LIFE-NAT and which European countries are most involved in forming project partnerships for nature conservation.

(Q4) What types of actors catalyse the process of information transmission and control? What is their level of influence in the LIFE-NAT network?

Through the analysis of betweenness centrality at the level of a single node, it was possible to define the centrality of these nodes and, consequently, understand what characteristics could catalyse the process of transmission and control of information.

Through this measure, we could identify the key actors in the LIFE-NAT network and understand at what jurisdictional level they operate and what type they belong to.

(Q5) To what extent does the LIFE-NAT priority area facilitate the emergence of non-governmental actors as intermediary organizations in the network?

As statistical network's measures, the degree and betweenness centrality indices aided our investigation of whether the LIFE-NAT network favours the emergence of "non-governmental actors" as intermediaries [119,120].

The degree of a node is the total number of ties it possesses, regardless of its direction. It measures the importance of a node based on the number of neighbouring nodes. It indicates its potential in communication activity and, more generally, to pass whatever is flowing in a network [119]. However, a node with a high degree value but located in a peripherical area of a network has a limited capacity to act as an intermediary actor [120]. Intermediate actors are identified using the statistical measure of betweenness centrality. Betweenness centrality is considered a measure of the influence that a node exerts on the entire network based on its ability to establish bridges between clusters of nodes which allows the functioning of the entire network [120]. An organization that acts as an intermediary appears decisive in implementing European environmental policies on different jurisdictional levels through LIFE projects.

Concerning Q5, the degree centrality measure helped us identify the organizations linked with many participants within LIFE-NAT projects (e.g., their higher level of expertise in applied conservation projects). In contrast, the betweenness centrality indicated key actors in the network's communication flow within LIFE-NAT partnerships [121].

4. Results

Quantitative Results

R1. Cohesiveness

The density index was calculated using GEPHI®. Density equalled 0.009, which means that the existing relationships were 0.9% of all possible relationships if all the actors

were connected. This value revealed a lack of cohesion in the network; however, it can be expected if the European dimension of LIFE-NAT is considered.

R2. Homophily

The homophily index was calculated by considering the total network relationships (8310) for each attribute, i.e., "nationality", "typology", and "jurisdictional level". The E–I index value for the "nationality" was −0.2880, revealing homophily for this attribute and, therefore, the tendency of actors belonging to the same country to mainly interact with each other (Table 1).

Table 1. Values of IL, EL, and E–I index observed for the different considered attributes (Source: our elaboration of the LIFE dataset).

	Ties by "Nationality" (n°)	Ties by "Typology" (n°)	Ties by "Jurisdictional Level" (n°)
IL	5352	1820	3438
EL	2958	6490	4872
E-I index	–0.2880	+0.5619	+0.1725

The "typology" and "jurisdictional level" categories show the involvement of heterogeneous actors in LIFE-NAT projects. The E–I index values calculated for these two attributes were +0.5619 and +0.1725. Based on these results, it is possible to confirm heterophily in the jurisdictional scale and typology of nodes.

The EL (i.e., the number of external links) for "typology" resulted in 6490 and exceeded the IL (i.e., the number of internal links) (1820), so it is possible to state that the collaboration between actors who belong to different types is well-established in LIFE-NAT projects. The network was found to be distinctly heterophilic for this attribute, demonstrating the role of the LIFE Programme in acting as a facilitator in removing the barriers to collaboration between the different typologies of actors.

Collaborations between actors at different levels of governance were not found to be sufficient to characterize the LIFE-NAT network as heterophilic, given that the EL (4872) relationships exceeded IL (3438) relationships, evidencing that the network is slightly heterophilic regarding the jurisdictional level of actors. In conclusion, based on results indicating homophily in the nationality of actors, it can be understood how the network realized within LIFE-NAT projects expresses the tendency of actors to more intensively collaborate with those of the same nationality. Conversely, these actors belong to different typologies.

R3. Structural differences in multi-level network governance

From the general structure of the graph, a significant central component and peripheral components can be observed. It is possible to see how the countries with the most significant number of LIFE projects—including Italy, Spain, the United Kingdom, France, Bulgaria, and Germany—constitute a connected structure at the centre of the network (Figure 1a).

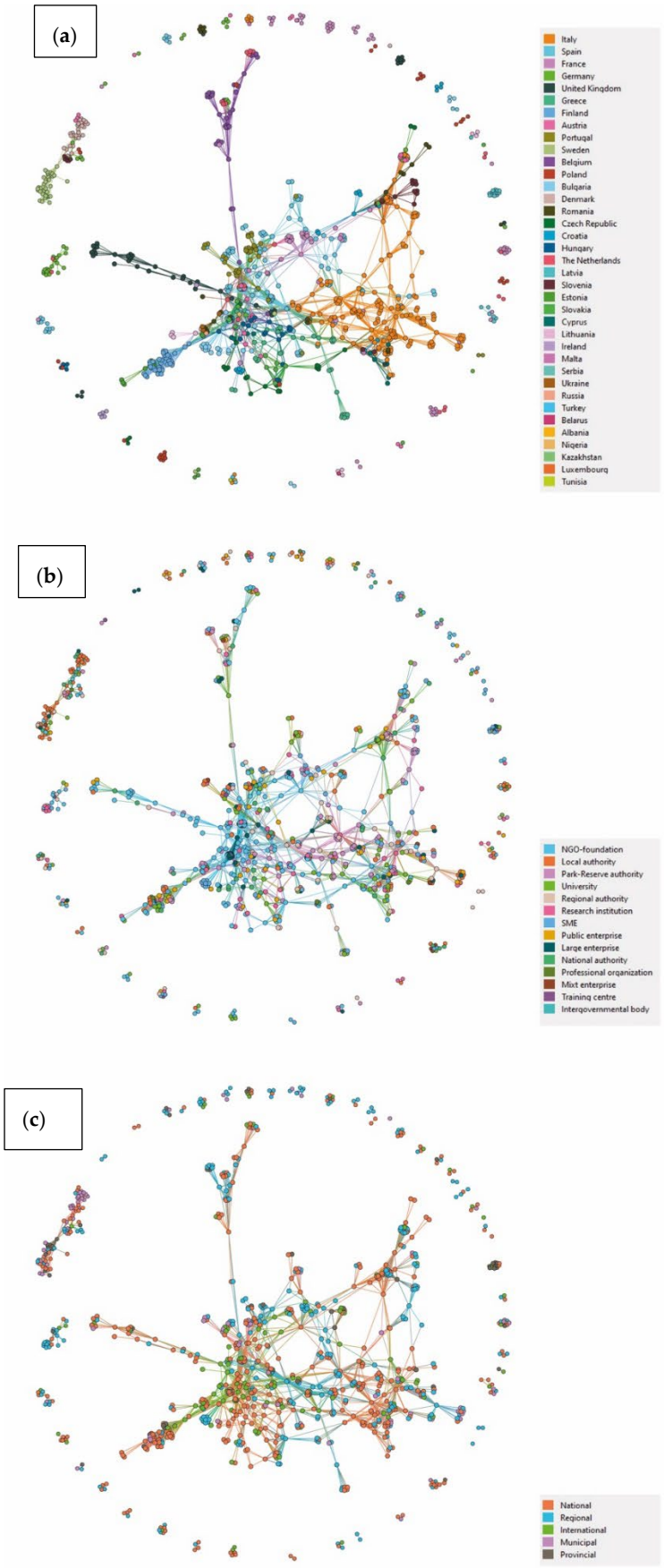

Figure 1. Graphic representation of the network formed by LIFE-NAT in the period of 2014–2019. The colours refer to the nationality (**a**), type (**b**), and jurisdictional level (**c**) of the actors (Source: GEPHI® elaboration of the LIFE dataset).

The marginal area of the network, on the other hand, appeared to be dotted with partnerships mainly constituted by organizations of the same nationality. Out of 47 peripheral structures, 32 (68%) were found to be composed of actors from the same nation. Conversely, 15 (32%) of these satellite structures were found to comprise partnerships from neighbouring countries.

Considering the characterization of nodes and ties by type of actor, the analysis of the central structure of the entire network revealed the strong presence of non-governmental organizations (NGOs), transversal to several countries and widespread in the United Kingdom, Belgium, and the Czech Republic. Italy showed a heterogeneous network that stood out for the role of research institutions, park–reserve authorities, and universities (Figure 1b).

Regarding the jurisdictional level, the graph confirms the predominance of organizations working at the national level (Figure 1c).

Observing the central structure of the entire network showed that this level was particularly evident for countries such as Italy, Germany, Belgium, and the United Kingdom. In this last case, regional actors were also well-represented.

In the periphery of the network, mainly focusing on collaborations between Sweden, Germany, Denmark, and Belgium, it could be observed that for Denmark, the relations mainly involved actors at the municipal level. In contrast, for Sweden, the national, regional, and provincial levels of governance were equally represented.

R4. Types of intermediary organizations

Within the LIFE-NAT network, the average value of the degree centrality was found to be equal to 8290. The value means that, on average, each actor had eight relationships with other project actors, with a minimum value of 1 (if we did not consider projects with a single actor) and a maximum value of 53.

Out of a total of 972 organizations

- 4 organizations (0.4%) had a null degree value.
- 840 organizations (86.4%) had a value between 1 and 15,
- 113 organizations (11.6%) had a value between 16 and 30.
- 15 organizations (1.6%) had a value between 31 and 53.

Considering this last class, NGOs constituted 40%, regional authorities represented 26.6%, research institutes represented 13.3%, and the remaining 20% was equally distributed by public and private companies and national authorities. The jurisdictional level for this class of actors was predominantly national (40%), international (33.3%), and regional (26.6%). Central actors mainly originated from the countries of the Mediterranean basin, namely Spain, Italy, and Greece (53%), followed by actors coming from Eastern Europe (27%). In comparison, actors of Northern Europe were less represented (20%).

The organization with the highest degree was the NGO Sociedad Española de Ornitología (SEO). In the second place, in the ranking of the five organizations with the highest degree, there was another NGO, the Bulgarian Society for the Protection of Birds (BSPB), followed by the Spanish Regional Authority Junta de Extremadura, Legambiente Onlus (Italy), and the Finnish public company Metsähallitus Parks & Wildlife Finland (MHPWF) (Table 2).

Table 2. The five organizations with the highest index degree (Source: our elaboration of the LIFE dataset).

Id	Label	Country	Type	Jurisdictional Governance Scale	Degree	Betweenness
282	Sociedad Española de Ornitología (SEO)	Spain	NGO-foundation	National	53	0.074316
95	Bulgarian Society for the Protection of Birds (BSPB)	Bulgaria	NGO-foundation	International	51	0.042237
340	Junta de Extremadura	Spain	Regional authority	Regional	47	0.029317
633	Legambiente Onlus	Italy	NGO-foundation	National	45	0.05317
356	Metsähallitus Parks & Wildlife Finland (MHPWF)	Finland	Public enterprise	International	44	0.042942

As emerged from the representation of the network structure, the nodes that were central in the network referred to actors from Italy, Spain, France, Finland, Belgium, and Greece. The national, international, and regional levels stood out for the jurisdictional scale. In contrast, the central nodes were chiefly constituted by NGOs, research institutes, and regional authorities for typology.

Analysing the network of LIFE-NAT projects showed that the values of betweenness centrality generally proved to be very low: only 186 (19%) out of 972 organizations showed a positive value of betweenness centrality, among which the highest stood at 0.12907 and the lowest was 0.000004. NGOs (27%), universities (13.4%), and regional authorities (11.3%) together comprised 51.7% of the categories of actors with a positive betweenness centrality. The level of governance for these actors was predominantly national (38.3%), followed by international (35%) and regional (20.5%). Central actors mainly originated from the countries of the Mediterranean basin (46.1%), followed by actors from the countries of Northern Europe (28.8%), while the actors from Eastern Europe represented the minority (17.2%). NGOs entirely constituted the ranking of the five organizations with the highest betweenness centrality index values; Hellenic Ornithological Society (Greece) came first, followed by Sociedad Española de Ornitología (Spain), Ligue pour la Protection des Oiseaux (France), Natagora Asbl (Belgium) and Legambiente Onlus (Italy) (Table 3).

Table 3. The five organizations with the highest betweenness centrality index degree (Source: our elaboration of the LIFE dataset).

Id	Label	Country	Type	Jurisdictional Governance Scale	Degree	Betweenness
227	Hellenic Ornithological Society	Greece	NGO-foundation	International	37	0.129066
282	Sociedad Española de Ornitología (SEO)	Spain	NGO-foundation	National	53	0.074316
439	Ligue pour la Protection des Oiseaux	France	NGO-foundation	National	29	0.07207

70	Natagora Asbl	Belgium	NGO-foundation	Regional	24	0.054413
633	Legambiente Onlus	Italy	NGO-foundation	National	45	0.05317

R5. Characterization of partnership composition

From 2014 to 2019, 256 coordinating beneficiaries and 1090 associated beneficiaries were involved through the constitution of 8310 relations.

The average number of actors in a LIFE-NAT project partnership was 5.25, and the average number of associated beneficiary actors in the project partnership was 4.25. Most of the coordinating beneficiaries were represented by NGOs and foundations (32.81%), followed by public bodies such as park–reserve authorities (11.71%), local authorities (10.54%), national authorities (9.37%), and universities (8.98%) (Figure 2).

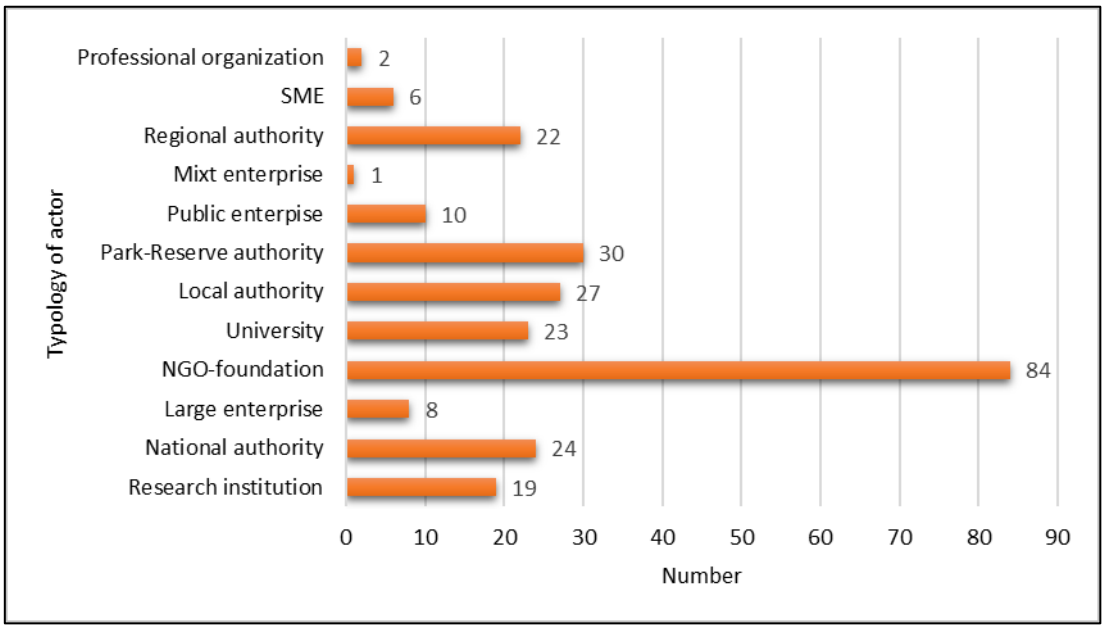

Figure 2. Typology of coordinating beneficiaries for LIFE-NAT (2014–2019) (Source: our elaboration of the LIFE dataset).

Regarding the associated beneficiaries, most of them were represented by NGOs and foundations (24.04%), followed by public bodies such as park–reserve authorities (10.37%), local authorities (10.37%), regional authorities (10.37%), and universities (9.54%). Considering all the beneficiaries, the number of actors belonging to NGOs and foundations (25.71%) stood out, followed by actors from public bodies such as the park–reserve authorities (10.62%), local authorities (12.84%), regional authorities (10.03%), and universities (9.44%) (Figure 3).

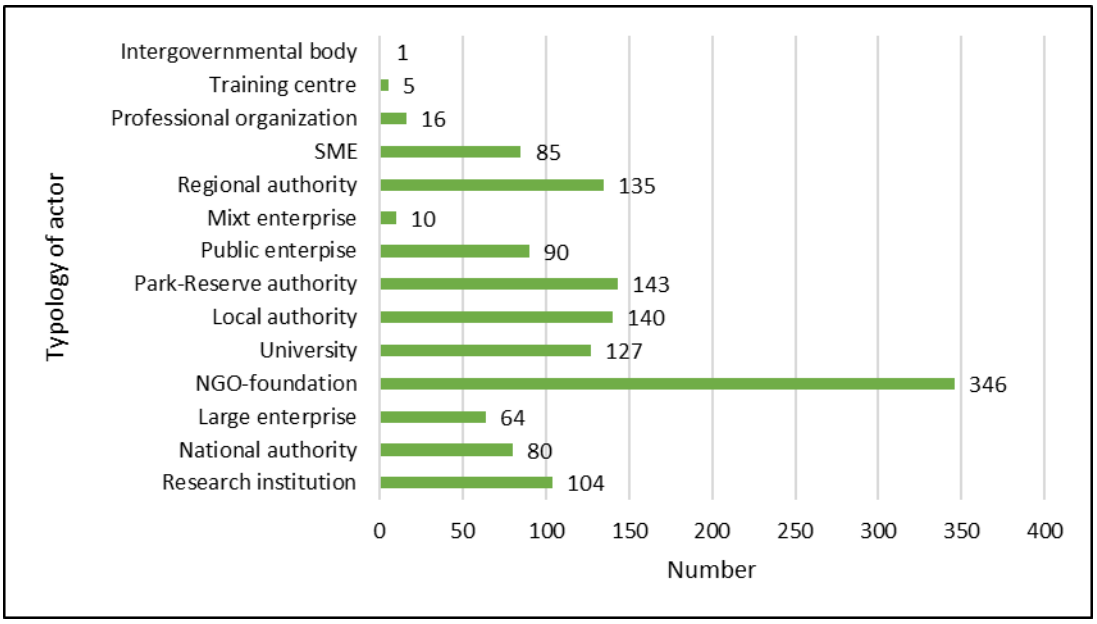

Figure 3. Typology of the overall beneficiaries for LIFE-NAT (2014–2019) (Source: our elaboration of the LIFE dataset).

Regarding the jurisdictional level for coordinating beneficiaries (256), it emerged that the analysed network was dominated by actors at the international level (34%), followed by the national (31%), regional (26%), provincial (5%), and municipal (4%) levels.

Regarding the jurisdictional level for the associated beneficiaries (1090), it emerged that the network was dominated by actors at the national level (47%), followed by the regional (29%), international (12%), municipal (7%), and provincial (5%) levels.

Considering the entire network of beneficiaries, it emerged that actors predominated at the national level (43.68%), followed by the regional (28.38%), international (16.49%), and municipal (6.68%), and provincial (4.75%) levels (Table 4).

Table 4. Actors benefiting from LIFE-NAT (2014–2019) described by jurisdictional level (Source: our elaboration of the LIFE dataset).

Jurisdictional Level	N°	Percentage
Municipal	90	7%
Provincial	64	5%
Regional	382	28%
National	588	44%
International	222	16%

The total number of organizations that benefited from co-financing through LIFE-NAT projects amounted to 1346. We found that 374 (27.8%) accessed funding more than once during the 2014–2019 programming period, covering different roles. In the considered six years, the countries benefitting most from participation in the LIFE-NAT priority sector were in order: Italy (46 projects), Spain (25), the United Kingdom (19), France and Bulgaria (15), and Germany (14).

5. Discussion

This study allowed us to deepen knowledge of how multiple actors from different geographical and jurisdictional scales address shared environmental problems through MLG and NG approaches. Below, the evidence from the analysis concerning each research question is discussed.

(Q1) How cohesive was the network of actors of LIFE-NAT projects from 2014 to 2019 at the European level?

The density value observed is coherent if we consider the spread of LIFE beneficiaries in 28 countries and the variety of project types implemented in heterogeneous areas of the EU. A low network density index has also been observed in other European programmes, as Buckner and Cruickshank (2008) reported and can be traced back to barriers to establishing collaborations, as evidenced by choice of project partners predominantly within national boundaries [122].

This sort of "fatigue" in establishing collaborative relationships can have multiple concomitant causes, such as language barriers, diverse national legislations, the heterogeneity of environmental conditions, and the diverse historical and cultural backgrounds that characterize the different European countries [123–125]. This "fatigue" appears evident in the peripheral network region, where most of the partnerships were found to be constituted by beneficiaries from the same country.

On the contrary, the central part of the network refers to partnerships from different countries that submitted more projects within LIFE-NAT (Italy, Spain, France, Germany, and the United Kingdom). It is possible to highlight how most of these countries are neighbouring member states. Therefore, even if the network generally did not show cohesion, it is possible to appreciate the efforts of neighbouring countries in Southern Europe to promote concrete actions aimed at nature conservation via LIFE-NAT.

As reported in the literature, density is related to trust among actors and collective action [126–128]. Sandström and Carlsson (2008), for instance, related network density and the differentiation in actors' composition to success in collaboration achieved through joint-action efforts [128]. Although the trend in network density over time did not constitute the subject of our investigation, we hypothesize that the LIFE-NAT network could suffer from a lack of joint collective action if the bridging relations do not increase in the coming years. The same hypothesis was raised for the LIFE-ENV sub-programme by Pisani et al. (2020) [129].

Density could play a crucial role in different aspects of learning [55]. In a less dense network, information can become distorted when transmitted via many different actors. Moreover, the exchange of ideas and arguments, known as the "deliberation" process, is scarce [55,130,131].

While it is true that the level of cohesion does not distinguish the LIFE-NAT network, it has the potential to provide fertile ground for strengthening the position of leading actors in network collaboration for nature-related initiatives. As Newig (2010) argued, actors can exploit network structural holes to act as brokers and connect otherwise disconnected groups, thus promoting innovation and learning to address the complexity of the issues surrounding nature and ecosystem services. Therefore, the lack of cohesiveness could be overcome if "bridging" actors demonstrate the ability and motivation to coordinate the activities of the sub-groups towards a common goal [32,55].

Further analysis could investigate (i) the trend of the density of networks for LIFE-NAT over time (ii) and the number of organizations participating to understand the further extension of the network and its consequences.

(Q2) What is the degree of homophily and heterophily of the LIFE-NAT network?

According to the E–I index, the LIFE-NAT network demonstrates homophily for the attribute "nationality".

We attribute this result to the greater ease in which collaborative relationships between actors belonging to the same country are tightened, e.g., thanks to the absence of the language barrier or the greater probability of belonging to networks already well-established within the same territory. These conditions may foster a greater sense of trust among organizations, which is also a condition needed to develop a learning-supporting environment and to lead to a reduced perception of risk, both critical elements for dynamics of collaboration within a governance network [132–134]. Under LIFE-NAT, homophily

for this attribute can cause a reduced exchange of resources (e.g., new knowledge, information, and innovative solutions outside national boundaries), thus harming the resonance of the outcomes of nature conservation projects.

Based on the number of relationships concerning the attributes "level of governance" and "type of actor", the LIFE-NAT network was found to have a weak and moderate heterophily level, respectively. Hypothesis 2, therefore, is only partially verified.

It is relevant to highlight this evidence that the actors belonging to different typologies tend to collaborate in the same country. Therefore, LIFE-NAT proves to be a tool capable of breaking down the barriers to collaboration among different types of organizations, resulting in a more effective ML and NG in managing issues concerning nature.

Again considering the number of EL and IL relationships, a marked tendency of the majority of actors to collaborate with other ones belonging to different levels of governance was observed, even if the overall level of heterophily for this attribute was shown to be low.

Thus, more incentives are needed to break down resistance to cross-level interactions. In particular, our analysis showed a limited involvement of the local authorities (e.g., at the provincial and municipal levels). This cluster of actors play a critical role in nature conservation initiatives [135,136]. These stakeholders may include natural resource managers and planners, county or municipal governments, communities, local NGOs, natural resource-based industries, individual landowners, and locally-based interest groups [137].

Given the multiple institutional and geographic levels at which transboundary conservation decisions are made [138–140], opportunities for local stakeholders to participate in the decision-making process have not been well-identified yet [104,141].

Creating opportunities for local stakeholders to participate in nature conservation initiatives could mitigate gaps in communication among actors at multiple jurisdictional levels and, therefore, partly compensate for the low network density found within LIFE-NAT [136,141,142].

Meso-level organizations (i.e., the intermediates between different levels of governance and across resource and knowledge systems) can be critical players in this [138,141,143]. Our network analysis, applied to the LIFE-NAT priority area, revealed that these broker actors are NGOs and foundations, mainly at the national level, that can be facilitators in cross-level relationships. Within and among the other jurisdictional levels, they vertically integrate the decision-making process and, as meso-level actors, serve a bridging role, thus enhancing bi-directional communication (i.e., among macro and local level actors) [137].

Looking at the macro-level (i.e., the representatives who occupy positions of high-level, often administrative or regulatory authority), it is equally necessary to rethink the LIFE funding scheme, providing that local authorities must necessarily be included in the project partnership in the collaborative arrangements. The local authorities often only intervene in the project scheme as simple co-financiers. Instead, their participation should be strengthened and aimed at an operational role as associated beneficiaries (if not coordinators) to be holders of the specific execution of some project actions. This would allow them to increase their level of responsibility for the protection, conservation, and enhancement of local resources by providing the presence of a supervisor who could facilitate the transfer of knowledge and skills where local authorities are lacking.

(Q3) What structural differences in MLG in the LIFE-NAT project networks were visible from 2014 to 2019? What differences are observable between different countries in Europe? What are the characteristics able to describe such differences?

GEPHI® proved to be an effective tool for effectively visualizing the complex interweaving of relationships consisting of nodes (organizations) and ties (relationships) (R3).

According to the core–periphery approach, the network might be structured in a core group of highly linked actors and a peripheral group of less connected organizations.

Contrary to what one might believe, both network groups are equally relevant: the core part may include organizations acting as leaders and project catalysts, while the periphery may include organizations, such as network innovators or actors specialized in a particular taxon (e.g., ornithological society) [144–146].

Although no core–periphery analysis was conducted, graphic representation has allowed us to highlight a core and a marginal area in the network's structure. Similar network structures have also been found in other cases documented in the scientific literature [71,129,147].

The analysis of the core of the graph allowed us to identify countries with the most significant number of LIFE projects funded, namely Italy, Spain, the United Kingdom, France, Bulgaria, and Germany. On the contrary, partnerships mainly constituted by organizations of the same nationality were observed at the network's edge.

Regarding the marginal area of the network, our results indicate a low tendency of neighbouring countries to collaborate on issues related to nature and biodiversity protection compared with partnerships of the same nationality. Such evidence could be used to predict some difficulties in establishing cross-boundary collaborations related to the conservation and restoration of ecosystems among neighbouring member states. It is generally believed that cross-border cooperation for establishing ecological networks in Europe is not well-developed: most plans are only being developed at the regional or sub-national level [148]. It seems that cooperation is often focused on large protected areas, such as national parks, but less on small Natura 2000 sites that may have a low recreational value [149]. One critical aspect of the Natura 2000 network is connectivity in near-border areas where different national authorities have designated neighbouring sites using different methodologies [149,150].

The graphic representation of the core component of the network confirmed the diffused presence of NGOs, transversal to several countries and widespread in the United Kingdom, Belgium, and the Czech Republic. This primacy of the United Kingdom over other countries is not surprising. British environmental associations, such as the Royal Society for the Protection of Birds, the National Trust, and the Wildlife Trusts, claim millions of members and a history dating back to the 19th century [151]. Moreover, in 2011, the United Kingdom made the central document of its environmental policy "The Natural Choice: ensuring the value of nature" White Paper, which focused (among other core themes) on the increased role of the third sector in strengthening human-nature connections [152]. In the United Kingdom, the objectives of the public and voluntary sectors are so close that NGOs contribute to the achievement of "official" environmental objectives [153,154].

The NGOs' role in the decision-making process in nature conservation interventions is also well-documented in the Czech Republic [155]. The Czech Society of Ornithology coordinated the process of implementing the Natura 2000 network. Moreover, some environmental NGOs developed a parallel priority list of sites with a high biodiversity value in the Czech Republic [156].

Focusing on Italy, a heterogeneous network emerged in which the research institutes, the park–reserve authorities, and the universities (among others) stood out. These findings are consistent with those of Nita et al. (2016), where Italian partners were found to have links with important organizations from other countries and to play a significant role in knowledge transfer and communication. Future analysis could be focused on understanding whether involvement in the core component of the network produces more successful collaborations in achieving results than partnerships on the fringes of the network [32,110].

The graphic elaboration returned a framework in which actors of the national level were shown to prevail. Researchers have divergent opinions about which jurisdictional level is the most influential [25,157]. The evidence found here may seem quite apparent if we consider that the protection and the conservation of nature and biodiversity issues are predominantly of national interest [158,159]. However, at the same time, the effectiveness

of actions taken to address species and ecosystem degradation requires collaboration across governance levels [20,160] and, in particular, the involvement of local actors who were found to be underrepresented in the analysed network [161].

(Q4) To what extent state actors are widespread in the LIFE-NAT network as intermediary actors? Who are those able to catalyse the process of information, transmission, and control? What is their level of influence in the LIFE-NAT network?

Our analysis of the centrality of organizations involved in LIFE-NAT projects demonstrated NGOs' shared importance and influence with foundations and universities within the overall network. The centrality of NGOs was also confirmed by the absolute dominance of the ranking of the five organizations with the highest betweenness centrality index.

We can therefore say that Hypothesis 4 is not fully verified, as our analysis showed the fundamental role in initiatives for the nature of NGOs and not only of public actors, despite the latter having the mandate to manage natural resources. It follows that non-governmental actors are the most suitable to act as a bridge in the European network governance relations within LIFE-NAT.

This result is in line with the tendency of NGOs to emerge as political entrepreneurs due to their ability to bridge the network [32,127,162]. In this way, NGOs have proven to have a concrete potential to act as gatekeepers among the other organizations, and, due to the high values of betweenness centrality, they can exploit their position to control and benefit from the flow of resources from different parts of the network [100].

The results obtained here confirm the crucial role of NGOs and research institutes in coordinating and implementing LIFE-NAT projects; specifically, as Rozylowicz (2017) suggested, these two typologies of actors are mainly involved in the management of preparatory, monitoring, and conservation activities [147]. Both these types of actors are to be considered fundamental for their commitment in the promotion of education, having the dissemination of the information and environmental education as main objectives. Sociedad Española de Ornitología (SEO) and Legambiente NGO hold the values of betweenness and degree centrality among the five highest central actors. These organizations were found to have the highest number of partners and the potential to control the information flow within the LIFE-NAT network. Therefore, they can act as network coordinators because they can enhance the capacity of the other actors to further access conservation funds [22,163].

Based on our results, it is possible to highlight how, within the LIFE-NAT network, the number of actors transmitting information between groups while simultaneously having a high probability of receiving new information and knowledge is somewhat limited. The same results were reported for the LIFE sub-programme for the environment (LIFE-ENV) [129].

In particular, the low number of organizations with a positive value of betweenness centrality attests to a shallow intermediation capacity. This trend risks the possibility of coordinating and associated beneficiaries to influence the entire structure of the network and the dynamics of future collaborations under LIFE-NAT interventions.

A more sustained approach of public authorities favouring private investors could ensure a higher flow of resources that could have multiplier effects and thus support the achievement of the European strategic objectives in nature conservation. Although the LIFE Programme does not represent a source of long-term economic investment, it supports education as a critical front for nature protection issues. Through universities, research institutes and educational centres, LIFE supports education by promoting conservation measures and disseminating new approaches and best practices through specific project actions [62]. To mention an example, the LIFE-Brenta 2030 project (https://www.parcofiumebrenta.it/en/life-brenta-2030/, accessed on 8 May 2022), within the project actions for communication, involves local schools to promote environmental education on nature and biodiversity issues. In addition, through the project preparatory

actions, LIFE-Brenta 2030 provides training courses for different stakeholders in the project area devoted to the improvement of the management of the Natura 2000 sites in the same area.

Central actors are diffused in countries of the Mediterranean basin (i.e., Italy, Spain, and Greece), generally endowed with limited funds for addressing the multiple threats that undermine the nature protection and integrity of Mediterranean ecosystems [164]. A higher number of funded projects in the countries of Southern Europe, such as Italy and Spain, is due to more robust project design and management capabilities [110]. Moreover, their high involvement is motivated by the richness of species and habitats they host, which require a high standard of protection against human pressure (e.g., the Mediterranean basin has 35 biodiversity hotspots; in the Balkan area, Bulgaria hosts up to 1300 endemic species) [165,166].

Southern European countries are crucial actors in implementing initiatives in favour of nature and ensuring the results in terms of collective actions within LIFE-NAT. In contrast, countries that recently joined the EU were found to be less represented within the network. This evidence confirms the findings of previous studies on nature conservation projects, such as that by Nita et al. (2016) [110].

Within LIFE, Sociedad Española de Ornitología (SEO) and Legambiente NGO were found to be the organizations with the highest betweenness centrality. Due to their influence and control on information transmission at the national jurisdictional level, they are fundamental communicators and facilitators in disseminating resources and new knowledge among actors on different levels. Given these characteristics, they can also be effective interlocutors with public authorities, having a role in the decision-making process and positively shaping the power relations within the policy arena [54].

However, if actors do not share their knowledge across national borders, a risk of declining interest in collaborative governance initiatives in nature conservation could emerge. On the contrary, transnational cooperation may improve project outcomes by making their impact sustainable [110,167].

(Q5) To what extent does the LIFE-NAT priority area facilitate the emergence of non-governmental actors as new policy entrepreneurs?

Based on R5, it can be said that the activation of LIFE-NAT projects across the 28 EU member states (now 27) confirms the multi-participatory approach supported by LIFE for the achievement of the objectives set out by the European plans and strategies for nature and ecosystems.

A multi-participative approach provides many options for decision makers in contrast to blueprint solutions or panaceas [168,169]. Collaborative governance emphasizes a variety of entities (individuals, organizations, and institutions) connecting levels to broaden intervention options in managing the social–ecological system [143,170] by providing practical solutions through processes of learning, coordination, and cooperation [18,133].

The direction toward a multi-participatory approach has also been observed for Natura 2000 Network governance, reflecting the broader trends toward multi-stakeholders' participation in EU environmental policy and governance. In particular, the analysis conducted by Ferranti et al. (2013) showed how a rigorous scientific approach in the first years of Natura 2000 empowered scientific experts from research institutes, European institutions, and environmental NGOs [52].

Environmental NGOs play several roles in the complex political landscape where decisions regarding biodiversity conservation are made. They have supported national governments and the private sector in setting aside millions of hectares in terrestrial and marine protected areas worldwide, e.g., [171]. They have conducted some of the most successful projects on species and ecosystem restoration, e.g., [172], establishing themselves as primary transformative political agents working alongside other social groups to protect the global commons [173].

Our results from the analysis of the network within LIFE-NAT confirm the strong presence of NGOs as LIFE-NAT project beneficiaries, particularly in the leading role of coordinating beneficiaries.

This evidence for the LIFE-NAT network might have its roots in the prominent role these actors have acquired since the early 1990s in biogeographic seminars, which are large-scale political events aimed at presenting lists of sites to be protected [174]. Thanks to their scientific contribution to identifying sites to be protected, the NGOs have distinguished themselves in the European debate [175]. As a result, during seminars, the European Commission and environmental NGOs worked together to achieve common objectives: the effective and efficient implementation of Natura 2000 and the halting of biodiversity loss in the EU [176].

Concerning what was formulated with our research Hypothesis 5, bottom–up collaborative governance in which the decision-making process is determined not only by state actors has been verified.

Nevertheless, some authors have pointed out that nature conservation projects carried out by small environmental NGOs are generally limited in time, space, and resources and, in particular, underline the difficulties of documenting their experiences and spreading out the learned lessons [173,176]. As a result, many of these shreds of evidence and good practices are not scaled up and incorporated into national policies [173]. As the main programme for funding nature projects, LIFE represents an opportunity to overcome these limits by supporting environmental governance and facilitating the participation of small partnerships to determine more relevant impacts.

In recent years, NGOs became active policy entrepreneurs, defined by Roberts and King [177] (p. 147) as "those that, working from outside the formal government, introduce, translate, and help implement new ideas into public practice". They collaborate with governments at the national and international level (public–NGO alliances) and private organizations (private–NGO alliances). Given the trend to decentralize nature conservation policies and budget, more collaboration between environmental NGOs with businesses and municipalities has becomes necessary to realize nature projects [178].

A typical LIFE-NAT project consists of concrete conservation actions, such as biodiversity inventories; monitoring, educational, and dissemination activities; and project management. As a result, a project partner can be selected for its technical expertise (e.g., forest management), political connections and influence at the national level, knowledge of the project area, and capacity to manage funds or provide co-financing [31,179].

In order to involve the right associated partner, the project coordinator needs to foster a mutual exchange of resources [180]. For example, the cooperation could start with an exchange of skills: businesses could gain access to knowledge about the topics related to their core activities. At the same time, NGOs may be interested in the specific resources and competencies of the business. The LIFE Programme promotes this kind of horizontal cooperation to ensure the success and the impact in the long term of strategic initiatives for nature protection.

Considering the total number of beneficiaries constituting the LIFE-NAT network, actors of national and regional levels was found to predominate; this is not surprising if we consider the strong presence of a prevalent national and regional approaches in biodiversity management and conservation in European countries.

Rozylowicz et al. (2017) published a network analysis of Romanian LIFE-NAT projects in which the NGOs' technical expertise and policy influence at the national level emerged [147]. This feature tends to be the case in other geographical contexts, such as the USA: in his analysis, Schoon (2017) evidenced the dominance of national NGOs by describing the dynamics of environmental governance network in the Arizona borderlands over time. In that case study, NGO-led initiatives greatly changed the collaborations from previously government-driven projects to bottom–up types, maintaining the ties built previously [134]. Even if local actors are institutionally involved in concrete actions to protect nature and biodiversity in most member states (e.g., management of Natura 2000 sites), in

our analysis, a low degree of involvement of actors at the municipal level emerged. In our opinion, the absence of such actors could be mainly justified by a general lack of skills (e.g., project design competencies and English proficiency), which drastically reduces their presence as beneficiary actors in LIFE projects [110].

Although ensuring biodiversity conservation is a primary function of public bodies [181], it is expected that several countries will not be able to achieve the goals without support from other societal actors, such as NGOs [173]. This issue calls for hybrid forms of environmental governance among states, markets, and communities [54]. In this context, the LIFE Programme constitutes a fertile scenario to construct and develop cross-sector alliances to address the national funding gap for nature and biodiversity protection [62].

Park and reserve authorities were found to comprise the type of beneficiaries most represented in the LIFE-NAT network after NGOs.

This result proves that the category of park and reserve authorities plays a strategic role to be considered for the implementation of actions related to nature and biodiversity supported by LIFE-NAT, especially in the regions of Europe where there is little access to funds for nature (e.g., Italy), in which they play roles of greater centrality in the network of the different partnerships.

Therefore, park–reserve authorities can play a crucial role in ensuring an MLG approach involving multiple agencies, NGOs, and communities across municipal, provincial, regional, national, and international levels to achieve the conservation outcomes pursued by the LIFE Programme [182,183].

Limits and Future Perspectives

For this study, SNA constituted the central approach that was configured as an effective tool for studying non-governmental and intermediary actors in the LIFE-NAT intervention sector.

Nonetheless, concerning the possible replication of the adopted methodological approach, some caveats and limitations should also be considered, particularly in regard to finding information for the creation of the database. First of all, it is not easy to find some substantial information relating to the projects (e.g., the reference website) and the beneficiary actors, such as the organization's unique name, which is essential for classifying the type of actor. Secondly, it should be noted that the results of the analysis conducted for the characterization of the actors are to be considered partial, as the co-financiers were not considered since they are actors involved in a project only for their financial contribution. The extension of the analysis to these actors, together with information on the economic resources allocated to each co-funding beneficiary (currently, they are not made transparent), would allow for the categorization of the actors from a financial point of view. Despite these difficulties and limitations, the results obtained through this analysis have highlighted some critical aspects in the study of environmental and network governance approaches that can give rise to ideas for the formulation of further hypotheses to develop new evidence in these research fields.

6. Conclusions

Considering the nature conservation projects set up under LIFE-NAT from 2014 to 2019, our study shows how multiple actors address shared problems related to nature and biodiversity through ML, and NG approaches from different geographical and jurisdictional levels. Specifically, SNA, as the research methodology of this study, was used to reveal the intermediary organizations and their structural characteristics within the network of partnerships.

The LIFE-NAT priority area represents a concrete example of how a multi-participatory and collaborative governance approach can be implemented to manage issues concerning the protection and conservation of nature. In this context, public actors can benefit from the intervention of non-state actors for innovative and effective solutions. The NGOs

and the foundations collaborate both nationally and internationally, contributing technical expertise and political influence to the implementation of conservation projects and concrete measures for the protection of nature.

The marked tendency to establish relationships between actors of the same nationality emerged as one of the limits to collaborative governance, potentially undermining the achievement of sustainable impacts in the long term and, therefore, the achievement of biodiversity objectives by 2050. In this regard, the European Commission should stimulate cooperation between partners across borders, which will make it possible to close the collaboration gap between North–South and Eastern European countries.

In this regard, the network measures calculated through SNA can be constituted as essential indicators of the influence and importance of the actors in the network that can be used to identify the intermediary organizations in the LIFE-NAT network and the other priority areas of the LIFE Programme. By supporting these organizations (i.e., NGOs and the foundations) with a crucial role in collaborative and network governance, a more widespread flow of information and dissemination of knowledge and innovative solutions would be ensured.

Biodiversity-conservation goals pursued with low stakeholder participation at the provincial and municipal levels may remain unfulfilled due to a lack of joint efforts and local investment. Cross-sector alliances with these actors are therefore an essential element in the framework of collaborative environmental governance. Based on our results for the LIFE-NAT network, more investment should promote this type of multi-level cooperation.

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