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Forest Policy Information Networks and the Role of Trust: Cooperative and Competitive Orientations and Underlying Causes

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Abstract: The importance of trust has been widely acknowledged as a major antecedent and a constitutive element of information exchange in policy networks. The ultimate objective of the present article is to understand whether and how trust is a factor explaining patterns of limited information exchange between forestry and nature conservation actors in forest policy networks in Europe. Drawing upon analytical insights of actor-centered institutionalism (ACI) and building upon a qualitative network analysis (QNA) as a research strategy, the study focuses on the German forest policy network in order to provide deeper insights into the cooperative (i.e., generalized trust) and competitive (i.e., generalized distrust) orientations of forestry and nature conservation actors. The results reveal trust issues with respect to forest information, which can be framed according to the interests of forestry and nature conservation actors and used as a discursive weapon, softly steering them in a particular direction. The underlying causes of the trust issues are deeply rooted in conflicts of interests and power, preventing from exchanging forest information among forestry and nature conservation actors. It is therefore argued that forest information should be understood as a political asset rather than a neutral and objective form of expertise. This could explain persistent trust issues and conflicts among forestry and nature conservation actors when it comes to the exchange of forest information in the context of European forest policy networks.

Keywords: trust; forest policy; network; information exchange; actor-centered institutionalism; Germany

1. Introduction

In Europe, forest policy networks have emerged as new modes of governance that foster consensus-seeking processes and enhance the coordination and collaboration between a wide range of forestry and environmental actors [1,2]. In this context, the exchange of forest information, often packaged as statistical data or representations such as indicators, has been outlined as a prerequisite for successful collaborative action [3–6]. It supports the development, implementation and monitoring of forest and forest-related policy and decision making processes, and in turn can help facilitate cross-sectoral coordination and increases efficiency in developing legitimate sustainable forest management policies and practices [5,7,8]. Generally, information exchange encompasses all facets of information production, provision, sharing, access, and use [5].

However, as the forest policy network literature shows, the patterns of forest information exchange can vary. Recent studies revealed that the ties of information exchange among actors within the forestry sector and within the nature conservation sector are much stronger than the ones between forestry and nature conservation and vice versa [7–10]. Assuming that forest information exchange is key for cross-sectoral collaboration, the question of the rationale for limited forest information exchange across the different sectors appears. Still, little knowledge exists regarding factors explaining the limited

information exchange (and forest information exchange patterns are not well understood) as most of the forest policy network studies, by utilizing social network analysis (SNA), provide only a static view on the emergence and evolution of forest information exchange patterns.

The importance of *trust* has been widely acknowledged as a major antecedent and a constitutive element of information exchange in policy networks [11–13]. With many individuals and organizations in policy networks potentially providing and using information, there are the risks of information misuse or misinterpretation. Given the inherent difficulty in knowing or doubting one's true intentions behind the misuse/misinterpretation, information exchange in policy networks may be hampered by the reluctance or unwillingness of actors to share valuable information. Thus, whereas trust facilitates strong ties of information exchange, the lack of confidence of one's intentions might result in weak or no information exchange [11,12,14,15].

In the context of European forest policy, most academic literature so far has approached trust from a policy network approach, which has been increasingly adopted in the forest policy domain [16,17]. Most recently, by employing a social network analysis (SNA), a major focus has been placed on interpreting trust as a social capital and measuring its degree (i.e., level) in collaborative action within forest policy or governance networks [7,17–19]. For example, Hasangas [1] indicated a high degree of trust impact on determining the salience of both an actor and scientific forest information in European forest policy networks. In the context of the Finnish forest governance network for biodiversity conservation, Borg et al. [2] ascertained the key role of trust, which was found in high levels among like-minded actors and actors of similar position, or based on past history of working together. Similarly, by analyzing the centrality of the actors' trust positions in the decision networks of and around Bavarian forest owner associations, Aurenhammer [3] emphasized the role of trust in forest land use governance networks. Trust was also found to play a role in the different stages (e.g., implementation, formulation, evaluation) of a policy process within forest governance networks [17]. However, although these studies certainly confirm trust as an important ingredient for collaborative action in forest policy networks, they provide limited insights into the role of trust in forest information exchange. Furthermore, although the SNA approach has proven valuable in mapping out trust in forest policy networks, generally it is criticized for omitting underlying causes and hence failing to take into account the dynamics that are associated with complex social interaction in a policy network [20–22].

Drawing upon analytical insights of actor-centered institutionalism [23], and building upon qualitative network analysis [24] as a research strategy, the ultimate objective of this paper is to fill in the empirical gap and better understand whether and how trust is a factor explaining patterns of forest information exchange among nature conservation and forestry actors within European forest policy networks. Generally, there are many definitions of trust in the broader academic literature of public policy and administration. For some scholars in the field, trust is an expectation [25], for others, it is the cement of society [26] or a container concept that can hardly be separated from the shared norm or rules [27]. To be useful in empirical research, however, the concept must be defined clearly and rather narrowly [28]. For the purpose of this study, trust is defined based on Scharpf [4,5] in the context of policy networks and is presented in Section 2.2. Empirically, the analysis is targeted in Germany, which represents an established Western-style democracy and socially-oriented market economy with a long tradition of disputes between different actors in forest and environmental policy [2]. Thus, Germany is a particularly suitable case for exploring the role of trust in information exchange among nature conservation and forestry actors in a forest policy network. More specifically, the focus is on the use and provision of technical forest information, in particular national forest inventory (NFI) information, which is of great importance for forest policy, especially in connection with international commitments to report on forest resources [29].

This paper proceeds as follows: Section 2 presents the theoretical underpinnings in relation to policy networks and trust in the context of the actor-centered institutionalist framework, popularized by Scharpf and Mayntz [6]. Section 3 describes the proposed methodology that builds on a qualitative

network analysis. The last sections present the main results (Section 4) and a concluding discussion (Section 5).

2. Theoretical Underpinnings

2.1. Policy Networks: An Actor-Centered Institutionalist Approach

The central idea of the actor-centered institutionalist (ACI) framework is that social interactions, such as information exchange, are structured, and their outcomes shaped, but not determined, by the characteristics of the institutional settings in which they take place. The framework holds that actors act according to their behavioral orientations (e.g., preferences, perception and capabilities) and their choices determine the course of action. In this paper, actors are understood as composite actors, i.e., a group of individuals acting in the interest and perspective of larger units rather than for themselves, such as organizations of all kinds, administrative bodies, political parties, government ministries and the state [30].

In the ACI framework, Scharpf [4] defines policy networks as informal institutional settings that structure the patterns of (semi-) permanent non-hierarchical relations of resource exchange within the wider set of actors within a given policy domain. Such relationships arise and are maintained because of the benefits that they provide in comparison to "single-shot" interactions. Yet, due to the informal and flexible character of policy networks, even the slight risk of aversion constitutes a sufficient ground to exhibit egoistic and opportunistic behavior, motivated by the maximization of interests for some actors and reduced fulfillment of interests for others [30,31]. Interests in this paper are understood as preferences, which encompass self-interests and normative roles that cannot be disentangled in practice and are closely intertwined [23]. Self-interests include the calculated reasoning of actors in relation to particular forest policy predicaments and designate the benefits an actor can receive from a certain object, such as a forest or information [30,32]. Norm-related interests, on the other hand, are organizational missions, tasks and responsibilities as well as limitations defined by the purpose or goals of an organization. In this context, drawing from sociological research, ACI also acknowledges the influence of organizational goals on actors' "selective perception" [30]. This implies that actors with different norm-related interests can give variable importance to different indicators and apply different causal interpretations of the phenomena. In other words, actors are likely to ascribe different meanings to the same piece of information, and therefore come to doubt one another's good intentions.

2.2. Generalized (Dis-) Trust in Policy Networks: Cooperative and Competitive Orientations

Schaprf [4] defines trust as the *generalized expectation* that information communicated will be truthful, rather than purposefully misleading, commitments/promises will be fulfilled, and that actors will avoid strategy options attractive to themselves that would seriously hurt other actors' interests [30,31]. According to Scharpf [4], the inherent difficulty of evaluating one's true intentions results in a generalized caution and limits the opportunity for a productive and mutually profitable exchange relationship. Thus, there is a pervasive tendency for actors to dichotomize salient exchange relationships into cooperative (generalized trust) or competitive (generalized distrust) orientations.

Cooperative orientations or generalized trust will take place mainly in constellations where actors find themselves pursuing objectively common interests and/or being able to maximize mutual benefits by agreeing on concerted strategies [31]. This involves the generalized expectation for integrity (honesty), i.e., that actors will refrain from opportunistic behavior (that will hurt other actors' interests) even if the opportunity for it arises without having any guarantee that the other party will indeed act as expected [30,31,33]. Cooperative orientations presume the precondition of unrestricted exchange relations, characterized by mutual responsiveness and openness of the actors. However, generalized trust can be easily destroyed, if the outcome should be disappointing or conflicts of interests arise, implying a general switch to competitive orientations as an immune response to disappointment of boundedly rational actors. Thus, competitive orientations will have a foundation in constellations

in which the actors often find themselves pursuing objectively incompatible interests [31,33]. In the forest area, an example of incompatible interests relate to the nature conservation interests aiming at protecting and conserving the forests, and forestry interests aiming at wood production [34]. Competitive orientation, characterized by generalized distrust, involves the negative expectation about opportunistic behavior and lack of integrity. As a consequence, actors want to protect themselves against opportunistic behavior where opponents might inflict damage to their interests [31]. This is what Schaprf refers to as the "security dilemma," which in terms of information exchange, might lead to intrinsic conflicts, non-transparent behavior, and even worse, withhold and reluctance of sharing valuable information [12,13]. Thus, actors with similar interests are more likely to trust and exchange valuable information among each other as they are equally likely to refrain it from opponents or actors with competing interests [11–13].

While interests play a significant role in determining the subjective orientations of policy network actors, other factors may also determine the level of trust. In this regard, Scharpf also put emphasis on social norms, which will be most likely respected by the actors as their violation can be sanctioned by loss of reputation, social disapproval or withdrawal of cooperation and rewards [30]. More specifically, he refers to the repeated history of interaction and close relationships, which builds a mutual reputation or expectation for being trustworthy, and in turn supports future cooperative relations. Knowing each other and having former relationships creates familiarity among actors which leads to trust. These repeated interactions provide a base for mutual understanding and trust while reducing fear and uncertainty between the actors. Moreover, shared membership in a network facilitates the understanding of similarities and differences in another's interests and allows access to a larger number of potential partners of trustworthy interactions. This increases not only the visibility of potential violations of trust but also the severity of sanctions, since actors are likely to distrust partners that are known to have been untrustworthy in other instances [30].

Based on the theoretical underpinnings presented above, the following empirical objectives emerge:

i.　　to provide deeper insights into the cooperative (i.e., generalized trust) and competitive (i.e., generalized distrust) orientations of forestry and nature conservation actors, and

ii.　　to identify the most salient underlying causes by putting an emphasis on the actors' interests.

3. Methods

3.1. Qualitative Network Analysis as a Research Strategy

To answer the empirical questions, a qualitative network analysis (QNA) was chosen as a research strategy. Although QNA is relatively young and lacks systematic introductions and a distinctive methodology of its own, recent studies [21,35,36] suggested it as a useful technique to explore policy network-related questions from a qualitative perspective. More specifically, by employing qualitative research methods, the QNA unfolds the subjective orientations of the network actors, who have their own perceptions of whom in the network they can trust or not and why. This, in contrast to quantitative SNA, allows for obtaining an "insider" instead of an "outsider" view of network relationships, which takes better into account underlying causes for the respective orientation and thus capturing the complexity and dynamics of social interaction in a policy network. To omit this "insider" view would provide a wrong image of the real structure of a policy network [21,24].

3.2. The Case of the German Forest Policy Information Network

To define the boundaries of the German forest policy information network, I applied three theoretical criteria, mainly adopted from Löblich and Pfaff-Rüdiger (2011). First, due to the federal structure of Germany, I used the criterion of a *geographical boundary* and limited the analysis to forest policy making at national level. Then, based on qualitative desktop research and document analysis of web pages, reports, policy documents, and scientific articles, several groups of relevant forestry and environmental actors, each containing a vast number of organizations, were determined [2,37–40]. Yet,

to gain a complete census of all of them is probably in most cases a fiction. Therefore, by applying a second criterion—*event participation*—the analysis was limited to those actor groups that were mostly present in major forest-environment policy events [39,40]. These include federal and state public authorities (i.e., federal ministries, state administrations, research institutes) responsible for forestry and nature conservation, private forestry (timber industries, large-scale forest owners), and environmental non-governmental organizations. Then, in order to identify the most relevant actors to be interviewed for the purpose of this study, I applied a third criterion—*topical relevance* [41]. Thus, I selected key actors that are dealing with forest data collection and processing (information providers) and/or using technical forest information (information users) to support the development, implementation, and/or the evaluation of forest policy making at national level. Yet, in order to avoid omitting actors being of subjective importance for the identified key actors within the network, I also applied the snowball sampling approach until no new types of actors were added.

3.3. Data Collection

QNA makes use of common qualitative research strategies, like interviewing, observing, and analyzing documents and archival material [21,35]. For the purpose of this paper, 15 semi-structured interviews were conducted with representatives of key nature conservation and forestry actors that use and/or produce forest information for forest policy making at the national level (Table 1). Although the analysis is targeted at the national level, state public authorities were also considered in this study as the German national forest inventory is conducted as a joint mission of the Federal Government and the Federal States that requires close collaboration during preparation and implementation [29]. In this perspective, interviewees representing state public authorities were selected from the federal state of Baden Württemberg, mainly for analytical rather than representative purposes. Another argument for selecting interviewees from Baden-Württemberg and not establishing contacts with other federal states is because of accessible evidence and topical relevance [41]. For example, Baden-Württemberg is the only state with a research unit permanently dealing with technical forest data issues and tasks [29,38,42].

In this perspective, representatives of state public authorities from the federal state of Baden Württemberg were also interviewed as Baden-Württemberg is the only state with a research unit permanently dealing with technical forest data issues and tasks with respect to forest policy making at national level [29,38,42].

The majority of the interviews (11) took place in 2016. An additional four interviews were conducted in November 2018. The interviews were held in English or German and lasted between 30 min and 1 h. Generally, qualitative researchers rely on face-to-face interviewing when conducting semi-structured or in-depth interviews. However, for sensitive topics such as trust, interviewing by telephone might be more suitable as they may increase data quality and respondents' perceptions of anonymity [43]. Thus, the majority of the interviews were held via telephone or skype and were recorded with the permission of the interviewees. The recordings were later transcribed and the German interviews translated to English for further analysis. To capture the subjective orientations of the actors and the underlying causes, the interview guide consisted of two major sections, focusing on cooperation and conflict respectively. In line with the QNA, interviewees were first asked to identify those organizations that they most frequently exchange forest information with. Then, they were asked to provide their views on the type of information exchange relations (cooperative, conflicting) of their own organization (as well as those of other actors). In order to determine how they dichotomized their relations into cooperative or competitive based on (dis-) trust, specific questions were formulated based on the analytical understanding of trust presented above. Yet, trust is a sensitive topic, particularly when it comes to network-related issues. Therefore, direct questions using the word "trust" were avoided. From this perspective, expressed satisfaction, approval or confidence that another would appropriately use and interpret forest information was an indication of generalized trust characterizing the cooperative orientations, even if the word "trust" was not used. Similarly, an expressed concern, reluctance, disagreement, conflict or a lack of confidence was an indication of a generalized distrust

characterizing the competitive orientations. In order to understand the underlying causes for the respective orientations, questions about the reasons or motives were posed. Yet, based on the analytical framework of the paper, and in line with the QNA, greater emphasis was put on the actors' interests and specific questions about shared or contrasting goals and views were posed.

Table 1. Major actor groups and relevant organizations (forestry, nature conservation) interviewed for this study.

Actor Group	Abbr.	Description of Organization	No. of Interviews	Code
Forestry actors				
Federal public authorities	FP	Federal ministry of Food and Agriculture	2	O1–2
		Research institute (forest inventory)	1	O3
State public authorities	SP	State administration responsible for forestry	1	O4
		Research institute (forest inventory)	1	O5
Private forestry	PF	Public forest owner association	1	O6
		Timber industry enterprise (wood energy)	1	O7
Nature conservation actors				
Federal public authorities	FP	Federal ministry for the Environment, Nature Conservation and Nuclear Safety	1	O8
		Federal agency for nature conservation	2	O9–10
State public authorities	SP	State nature conservation administration	1	O11
		Forest research institute focusing on nature conservation (NATURA 2000	1	O12
Environmental non-governmental organizations	EO	Nature conservation organizations	2	O13–14
		Forest certification organization	1	O15
Total				15

3.4. Data Analysis

All interviews were recorded with permission of interviewees, translated into English (where necessary) and transcribed. The content of the interview material was first qualitatively analyzed [44] and coded with the MAXQDA software. The coding system focused on recurring views, concepts and categorizations based on the analytical framework of this study. The codes were grouped into two major categories, i.e., cooperation and competition, in order to highlight the subjective orientations of the actors. Generally, codes are tags or labels for assigning units of meaning to the descriptive or inferential information compiled during a study [44]. Thus, each of the two major categories contained sub-codes (i.e., "labels"), centering upon (dis-) trust and associated motives. For example, the words "concern," "reluctance," "disagreement," or "conflict" were used to label competitive orientations in the data text. Similarly, the words "satisfaction," "approval" or "confidence" served as labels of cooperative orientations during the data analysis. Then, a socio-matrix [24] was used to visualize and summarize the subjective orientations of the actors as informed by the interview material. Considering that cooperative orientations can easily switch to competitive and vice versa, the socio-matrix (Figure 1) provides a "snap-shot" of the actual orientations of the actors. Although a socio-matrix is naturally not as elaborate as the mathematical models of social network analysis, it helps understand the network dynamics nevertheless [24]. As interviews were conducted on a non-attribution basis, no direct link between interviewees and statements will be made in the results section. In order to render the interviews anonymous, they were assigned numbers from 1 to 15, i.e., O1–O15, where O stands for an organization.
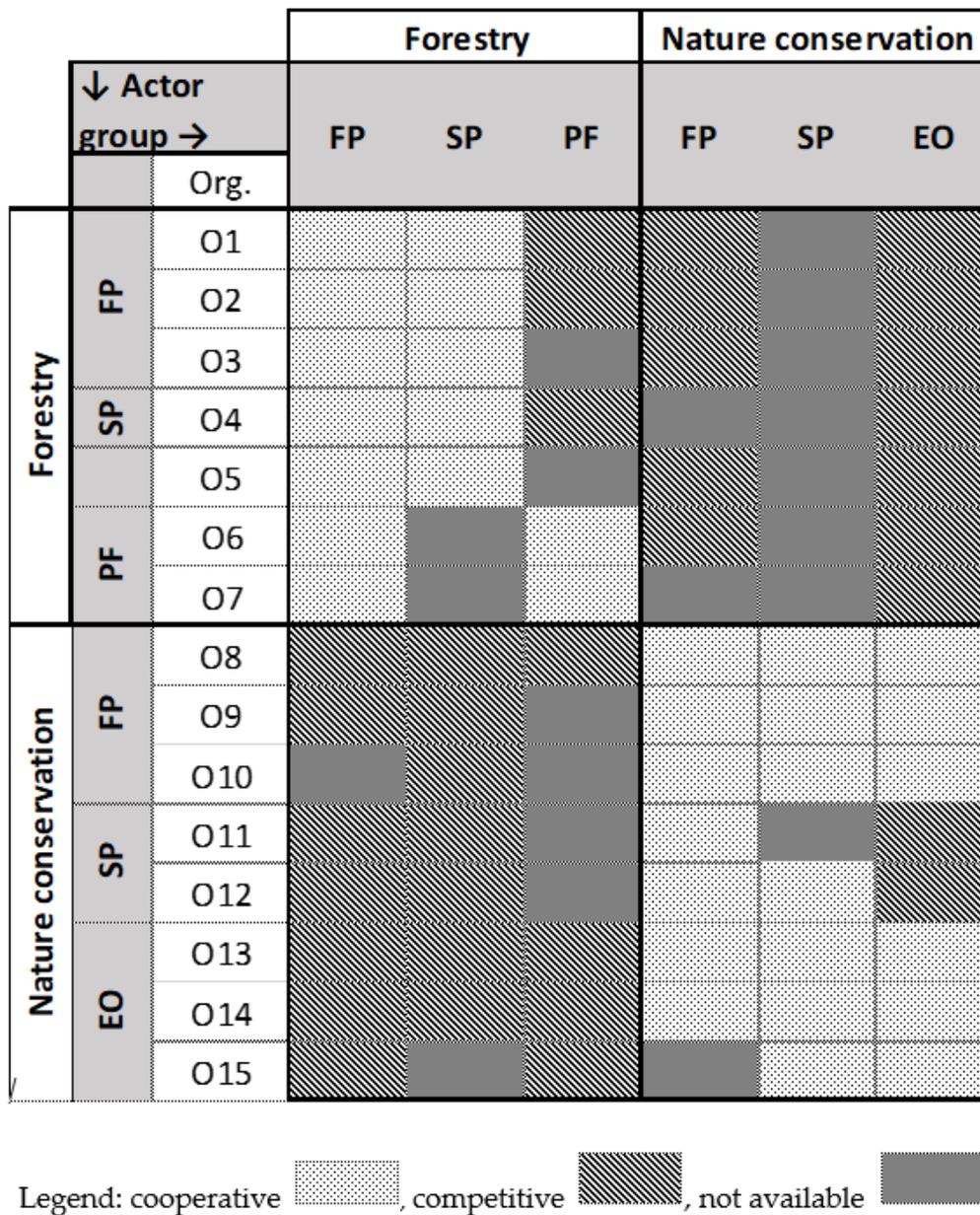
Figure 1. A socio-matrix of cooperative and competitive orientations of forestry and nature conservation actors with respect to the use of technical forest information for forest policy making at federal level.

4. Results

The figure below (Figure 1) provides an overview (i.e., a "snap-shot") of cooperative and competitive orientations of forestry and nature conservation actors regarding the exchange of technical forest information for forest policy making at national level. As illustrated, cooperative orientations, characterized by generalized trust, were found mainly in forestry and nature conservation constellations respectively. Competitive orientations, characterized by generalized distrust, were found to take place mainly between nature conservation and forestry actors. The sections below present, in detail, the cooperative and competitive orientations and the associated underlying causes accordingly. The results also revealed a few cases of generalized trust among forestry and nature conservation actors. As these cooperative orientations were found to take place mainly on an individual level, they are not included in the socio-matrix, but presented in the section below (Section 4.1 Cooperative orientations). Furthermore,

in line with the QNA approach, direct quotations from the interviews were used to underline and highlight major arguments shared among the interviewees.

4.1. Cooperative Orientations

4.1.1. Generalized Trust among Forestry Actors

Nearly all forest public interviewees (O1–O5) expressed confidence in the integrity of both federal and state forest public authorities (federal ministry, state forest administrations, and the research institutes linked to them) when it comes to the qualitative interpretation and use of technical forest data for forest policy making at federal level. More specifically, interviewees referred to the national forest inventory, which was described as one of the most scientifically robust, honest, unfiltered information sources at federal level that provides a holistic picture on sustainable forest management (O1, O2, and O3). One of the most profound reasons related to the shared interpretation and use of forest information among forest public authorities in a vein that reflects all aspects of sustainable forest management, e.g., economic (timber use), social (recreation) and ecological (nature conservation). For example, as one interviewee representing a forest public authority stated:

"For policy and decision making, trustworthy information […] is all the solid statistics that, I mean the information that we collect for instance with our national forest inventories. I think this is something you very much can rely on. […]. Then the question is who is putting this information together. Generally, […] if it comes from forest public authorities [ministries, state forest administrations, research organizations], I think you can trust" (O2).

Other reasons for the cooperative orientations and trust among forest public authorities related to common tasks and responsibilities under the statuary duty of the Federal Forest Inventory under the Federal Forest Act (O2, O3, and O5). Mutual benefits in this context were also indicated by one interviewee: "it is very important that the state authorities benefit from the data. Because if they benefit, we can gain them for a constructive cooperation and the financing" (O3).

Private forestry interviewees (O6–7) also revealed cooperative orientations towards forest public authorities. More specifically, they expressed satisfaction with the content of the national forest inventory in terms of sustainable forest management aspects and approved guidance for multifunctional forest use by the forest governmental authorities. The underlying motive, as demonstrated in the following quote, lies in the interest of private forestry actors to justify and demonstrate sustainable timber use approaches for public acceptance reasons. For example:

"It's very important for us to have reliable information on forest wood potential and the wood residue […] because we are in a position of needing to justify why we are burning wood; public acceptance has diminished for wood energy, so we need to show that we are already using a sustainable wood energy approach and for this we need information on sustainable forest management [e.g., on the annual increment of carbon and biomass in forests, biodiversity, soil nutrient balance]" (O7).

However, when it comes to socio-economic criteria of sustainable forest management (e.g., employment, added value, etc.), private forestry interviewees pointed towards "blindspots" in the national forest inventory and expressed confidence in obtaining this information from membership organizations, "who try their best to provide the data that they have" (O6). This also demonstrates the importance of shared membership in a forest policy networks for establishing trustworthy relationships. Yet, although private forestry interviewees revealed cooperative orientations towards federal and state public authorities, the majority of the forest public interviewees viewed private forestry actors as lacking integrity when it comes to the use and interpretation of forest information (see Section 4.2).

4.1.2. Generalized Trust among Nature Conservation Actors

Similarly, the majority of the nature conservation interviewees (O8–15) expressed generalized trust mainly towards other nature conservation actors, particularly when it comes to the interpretation and use of technical information on forest conditions and protection. In this context, several interviewees

(O9, O14) expressed confidence in the integrity of public nature conservation authorities, environmental non-governmental organizations, and forest scientists or experts with nature conservation background (e.g., biologists, ecologists) in generating indicators and using information, e.g., for the evaluation of the conditions of the forest habitats. The most profound underlying cause for trust related to the shared nature conservation and forest protection policy goals in the context of nature and environmental legislation (O10, O11, O13 and O15). More specifically, interviewees (O9, O10 and O11) referred to the common understanding and interpretation of information when it comes to the condition of forests and their role in providing ecosystem services such as nature protection, climate regulation and recreation. In this context, although the importance of the national forest inventory was acknowledged, when it comes to the condition of certain forest habitats, some environmental actors expressed confidence in using alternative assessments produced by nature conservation public authorities (O14, O15). As one interviewee representing an environmental NGO stated:

"The NFI is a very important information source for us. However, technical information about nature protection are often missing (e.g., on ecosystem services) or there are cases where we see the condition of certain forest habitats not as good as it might have been interpreted in the NFI. Then, we use some alternative assessments produced by [nature conservation public authorities] […] that apply similar criteria to ours for the evaluation of forest habitats" (O14).

4.1.3. Generalized Trust among Nature Conservation and Forestry Actors

The analysis also revealed generalized trust among nature conservation and forestry actors, mainly at the individual level. In this regard, a few interviewees gave examples for trustful relationships based on past history of interaction (i.e., regular and repeated contacts), and the role of promise in reducing uncertainty for using forest information in an opportunistic way. For example, the following two quotes from nature conservation interviewees emphasize the importance of regular and repeated interaction in creating familiarity and hence building trust relationships with forestry actors:

"Although there is a certain basic mistrust between environmental and forestry representatives, good information exchange relations do exist [rather on a personal level], which build up during the years […]. Yet, the better you know each other and the more you worked together in the past, the better you trust each other when it comes to the use of forest data […]" (O10).

The role of commitment in keeping a promise is demonstrated in the following quote:

"[…] the only way to cooperate with the state forest administrations was to promise on an individual basis that we will not do sub-state specific analysis and a map diagram […] also we promised that the data will always remain within our institute. The reason was that that one can only do abstract analysis, which do not permit to draw any conclusions about individual actors or specific areas. […] If you would not make such agreements, no state would provide its data or further cooperate with [nature conservation authorities] at the federal level" (O9).

4.2. *Competitive Orientations*

4.2.1. Generalized Distrust towards Environmental Actors

Although nature conservation public authorities were described as "strategic partners" in integrating nature conservation into forestry (O2) and more specifically ecological criteria into the national forest inventory, such as forest structure, close-to-nature, non-timber forest products (O5), the majority of forestry interviewees expressed generalized distrust when it comes to the use and interpretation of forest data on nature conservation aspects. Major concerns were expressed with respect to the federal public nature conservation authorities that use forest data to produce assessments on forest habitats. In this context, they were blamed for "making sure that the results fit" (O1) in favor of their forest protection interests, without considering the other aspects of sustainable forest management. As one interviewee stated:

"Very often [. . .] their assessments contain subjective statements, which in the political sphere, are then sold as truth, without mentioning how the data was generated. [. . .] for example, statements like the forest management is a main threat for Natura 2000 areas are politically used in the sense of 'it is the fault of forestry'. It's all related to a cascade of [political] interests, and at the end things are said in a way they cannot be said . . . this results in a completely controversial picture regarding sustainable forest management" (O5).

Actors from the forestry sector also showed disappointment about the subjective use of national forest inventory information to serve nature conservation interests:

"It was disappointing for us that very little of the NFI went into their reporting [i.e., nature conservation assessment]; because they have their own nature conservation interests. We have then read it and found out that many things were used subjectively and not presented correctly with respect to the whole picture of SFM" (O3).

Likewise, nearly all forestry interviewees expressed distrust towards environmental non-governmental organizations. In this perspective, some environmental non-governmental organizations were also perceived as lacking integrity when it comes to the use and interpretation of NFI information. More specifically, they were liable for "cherry-picking" results (O6), using them to pinpoint economic mismanagement and make their own arguments in favor of their forest protection interests (O1, O4, O6, O7). For example, as the following interviewee stated:

"We consider the information interpreted by NGO's as less trustworthy, and they also blame us for being not trustworthy. Environmental NGO's, not all, but some of them, misuse the NFI information for their own nature conservation interests and arguments. They emphasize maybe only certain elements and misinterpret the data knowing that it is wrong" (O7).

In this context, several interviewees (O1, O4, O5) expressed cautiousness to share more specific forest data with environmental non-governmental organizations. As one interviewee representing a state forest public authority stated: "[. . .] because of their special [nature conservation] goals and aims and often hidden agendas, we are a bit cautious when it comes to sharing our forest data with environmental lobby- organizations" (O4).

Private forestry interviewees expressed concerns that the use of forest data favoring forest protection interests would put restrictions in using forests and endanger their profitable forestry as well as diminishing their legitimation for sustainable timber use. For example:

"We fear that the data might be used intentionally against us by pointing out economic mismanagement of forest. This might lead to unfair standards and plans that might restrict our work or diminish our image for sustainable timber use in front of the society" (O6).

The subjective use and interpretation by environmental NGOs was also confirmed by a few environmental state public interviewees. As one interviewee stated:

"It depends who is putting the information together. If it comes from public authorities, I think you can trust. When it comes to information from some environmental NGOs or other stakeholders you always have to keep in mind that they have a certain interest behind and use the data for their arguments" (O14).

4.2.2. Generalized Distrust towards Forestry Actors

Majority of the environmental interviewees expressed distrust in forestry actors when it comes to use and interpretation of forest information. Although the national forest inventory was described as "a valuable fundus" (O9), several interviewees (O9, O11, O13, O15) questioned its integrity and described it as a governmental activity of the federal ministry that mainly serves forestry goals in favor of economic interests such as exploiting the forests as a resource for producing commodities. While some nature conservation variables are already integrated into the NFI, the major focus is still on economic aspects and very often ecological and social aspects in the official NFI analysis are ignored on purpose, as a few interviewees stated (O9, O10, O12, O13). For example:

"The NFI always presents a very positive picture of the German state forests; the interpretation comes from the agricultural ministry and usually ignores on purpose some aspects. They always say everything is good in the forest, e.g., the volumes in the stands are growing, the biodiversity level is good. But we do not trust them. For example, the official interpretation points towards growing amount of deadwood, but [. . .] the high and large dimensional deadwood that are really important for biodiversity have actually decreased over the time of the last entry. And this is something that has not been mentioned in the official analysis of this inventory. That is why we publish an alternative analysis of their data" (O13).

A shared concern among several of the nature conservation interviewees (O9, O11, O8) was that the use of forest information favoring timber production might lead to likely increased demand for energy wood or timber use that could negatively affect forest biodiversity.

Distrust towards state forest administrations was also prominent among the majority of environmental interviewees (O9–14), particularly when it comes to disclosure of a certain type of nature conservation data (e.g., old growth forests, natural forest development, silvicultural land use data, designation of protected areas). In this context, state forest administrations in several states (e.g., Baden-Württemberg, Bavaria, Hesse) were described as "forest companies" (O12) and perceived as lacking integrity (i.e., openness) in sharing forest data with respect to forest protection and condition (O9–11). One of the most profound causes for the reluctance of state forest administrations related to economic interests, and the relatively dominant influence of wood-based industries in some of the states. More specifically, interviewees referred to the strong influence of the agricultural and forestry lobby groups (e.g., industry and large-scale forest owners) that intentionally hinder the disclosure of any nature conservation aspects that might be used "against them" (O9, O10, O13, O15). For example:

"There are clearly blind spots in the ecological area of the German NFI. What we do not have until now is a reasonable biodiversity monitoring. Some of the German states [e.g., Bavaria, Baden-Württemberg] do not like that someone looks at their cards, they do not provide these data for the national level and have no interest to do so because the respective [agricultural and forestry] lobby groups are so strong, they know to hinder this [. . .] they follow clear [economic] interests, which might not coincide with nature conservation interests" (O10).

As few interviewees pointed out, private forestry companies fear that the nature conservation data might be used for the development of new ecological standards or policies or guidelines that will restrict wood or biomass harvesting and production, and hence reduce their profitability and competitiveness (O9, O11, O15). This was confirmed by forestry interviewees (O1, O4), who emphasized that the timber industry has hidden agendas, driven by economic interests, and strong influence on the government in some states. Other reasons for the reluctance of state forest administrations to share openly nature conservation data related to political interests. More specifically, it was pointed out to the environmental performance of the states, which "might not be as good as they claim" (O10) and the fear of "uncomfortable questions," prejudgments or confrontation by nature conservation authorities and environmental non-governmental associations, which could diminish their legitimate authority with respect to sustainable forest management (O14, O15). Furthermore, forest public authorities and scientific organizations are not willing to exchange forest information with organizations from other forest-relevant disciplines (e.g., biology or geology). One reason is that these disciplines might question or challenge conventional forest practices and ways of thinking in terms of forest management, as one interviewee stated:

"Forest information stay in the hands of the forestry administration and also the forest universities and research institutes [. . .] They don't want to exchange information with other disciplines looking at forest data in the network (e.g., biology, geology) [. . .] because some of the findings of other disciplines might challenge the findings of the conventional forestry. And, sometimes it's easier to ignore them, because it can be too uncomfortable. It would mean that [the forestry sector] maybe have to question what they're doing and how they're researching or also how they are developing forestry management concepts" (O15).

Changing behavior and traditional forest management practices might be difficult considering the economic interests of some forestry state administrations or enterprises, as one forestry interviewee pointed out:

"Forestry state administrations or enterprises—if you look at the name you can already see how the wind blows. There are economic interests behind, which are touching upon the sub states. I think behind that are these old boys' networks that work well. They do the forest management as they have always done it. It is hard to change their behavior and conventional way of doing things and open their eyes and motivate them to use and apply new methods and practices" (O6).

5. Discussion and Conclusions

In this study, I proposed that a more thorough understanding of the role of generalized (dis-) trust can help better explain the patterns of forest information exchange among nature conservation and forestry actors within European forest policy networks. For this, drawing upon the actor-centered institutionalist framework of Mayntz and Scharpf [6], this study aimed to explore the cooperative and competitive orientations of forestry and nature conservation actors in the context of the German forest policy network. To this end, by utilizing the QNA, and a series of in-depth semi-structured interviews, the study was able to demonstrate the importance of trust in forest information exchange and provide insights into the underlying causes by putting a greater emphasis on the actors' interests.

In line with Scharpf [4], the results demonstrated that cooperative orientations, characterized by generalized trust, take place mainly within forestry and nature conservation constellations respectively where actors exchange information in order to pursue objectively common interests, e.g., sustainable timber production for forestry and forest protection for nature conservation actors [34,45]. As the results demonstrated, forestry actors tend to trust each other mainly because of common interests with respect to multifunctional forest management and the use of forest information in a vein that reflects all aspects for sustainable forest management (economic, ecologic and social). Other causes for mutual trust among federal and state forest public authorities related to shared tasks and responsibilities in the context of the national forest inventory and mutual benefits. Similarly, trust among nature conservation actors was built based on a common interest and shared interpretation of forest information with respect to forest habitat and species conservation. At the same time, competitive orientations, characterized by generalized distrust, were found to take place mainly between nature conservation and forestry actors that pursue objectively incompatible interests (timber production vs. forest protection) with respect to the use of forest resources. As the results showed, these different interests imply different interpretation of the same piece of forest information, which results in distrust among the actors. In this context, nature conservation actors accuse forestry actors for misusing and/or misinterpreting forest information only for purposes that serves their timber production interests, whereas the forest sector actors describe the nature conservationists in a similar vein. This is also what is known as the "devil shift" [46] phenomenon, which may provide an explanation for these vice versa stigmatizations. This results in a security dilemma [31] which in the context of information exchange, means production of alternative assessments, and/or reluctance or withhold of sharing valuable forest information among forestry and nature conservation actors. Thus, also in line with previous studies [11,12], forestry and nature conservation actors tend to trust information produced or used by those who are similar to themselves, particularly in terms of policy preferences with respect to forest management, and mistrust information produced or used by actors with conflicting interests. Yet, this may be at least a partial explanation for why forestry actors tend to trust like-minded forestry actors, and mistrust nature conservation actors with interests contrary to their own, and vice versa. This phenomenon is not new in the network literature and has been labelled as "homophily," which may be based on any set of easily observed attributes (e.g., policy preferences, educational background, institutional affiliation), and is often considered to be an important explanation for the types of segregated network structures that are often observed in social and policy networks [7,11]. In this context, our results also revealed that (dis) similarity with respect to the type of organization (e.g., public authority, private industry, NGOs) might

also play an important role when it comes to trust in the use and interpretation of forest information. This might explain why some forestry interviewees representing public authorities viewed private forestry actors as lacking integrity when it comes to the use and interpretation of forest information. Similarly, interviewees representing nature conservation public authorities expressed concerns when it comes to the use and interpretation by some environmental NGOs. As the analysis has shown, the nature conservation interviewees argue that forest public authorities intentionally ignore important nature conservation aspects in the content of the national forest inventory, which was viewed as a political asset serving mainly economic interests. Yet, situations where actors have the ability to shape a programme according to their own interests are inextricably linked with notions of power [47]. In this perspective, shaping the content of the national forest inventory and narrowing down the scope of included information could be also linked to the notion of "agenda setting" power [48], where issues which do not arise on the political agenda can be just as important as those which do [49]. Thus, by not including nature conservation aspects, forestry-centric information becomes dominant in the content of the national forest inventory. As Krott et al. [7] stipulate, dominant information is an important element of power because actors without valid (i.e., complete) information cannot easily make appropriate decisions.

In line with recent scholarship within global environmental politics on "information empowerment" [50–52], this comes down to power-related questions of *who* decides *what* to be included and to *meet what ends*. In this perspective, nature conservation interviewees highlight the strong influence of the German state forest administrations in shaping the content of the national forest inventory by not reporting on aspects such as rare forest species, old-growth forests and ecologically valuable forest habitats. From an environmental perspective with some forestry nuances, this is closely associated with the dominant power position and economic interests of the respective wood-based industry lobby groups in some of these states. The timber industry intentionally hinders the inclusion of any type of forest information that might restrict exploitation of wood and biomass and hence reduce their profitability and competitiveness. These results support previous findings in the forest policy literature about the influence of forest-industry actors and their economic interests in the European multi-level system of forest governance [34,45,53].

Moreover, though expressed much less explicitly, the nature conservation interviewees indicated that disclosing too much information on nature conservation aspects may potentially run against legitimacy of state forest administrations. Underperformance in achieving policy outcomes such as forest protection might lead to prejudgments by nature conservation authorities and environmental non-governmental associations, and in turn diminish the legitimate authority of state forest administrations with respect to sustainable forest management. In line with Gupta [8], this raises questions about the scope and content of transparency, which is itself a main site of another power conflict when it comes to information exchange. These findings also support some recent studies about transparency and legitimacy in the context of the European multi-level system of forest governance [53–55]. Further to that, by sharing too much information with nature conservationists or other environmental disciplines (e.g., biology, geology), forest public authorities (i.e., ministries, administrations and research institutes) might also have to question or challenge their conventional practices and way of thinking in terms of forest management. The findings point towards the role of information as a means for ideological power [48], where information is used to transform how society thinks about, values and acts toward natural resources [56]. This might serve as another reason for explaining the reluctance of forestry actors in sharing information with nature conservationists and rather keeping it within its traditional scope at the cost of non-timber values and interests.

In summary, given the findings of our paper, it is essential that forest information be understood as more than a "bucket of facts" [56]. As scholars in this tradition have long argued, information is an instrument of power rather than a neutral and objective form of technical expertise [50,57–59]. This could explain the persistent trust issue and conflicts among forestry and nature conservation actors when it comes to the exchange of forest information in the context of forest policy networks.

As the results indicated, information may well be biased due to the interests of forestry and nature conservation actors and used as a discursive weapon, softly steering them in a particular direction. This is what is variously referred to in the literature as the strategic acquisition of information, the strategic utilization of information, or, in more generic terms, politics based on information [59]. Information can serve as a means of control, which generally reflects and consolidates the power of those who possess it. It can be used to shape political agendas, justifying legitimate authority and as a scapegoat and cover-up for (policy) change [50,57].

Yet, this leads to a paradoxical situation in which cross-sectoral coordination and cooperation is continuously demanded in the forest policy networks, but in practice, trust issues, deeply rooted in conflicts of interests and power, prevent from exchanging forest information among forestry and nature conservation actors. Nevertheless, despite these controversies, the results demonstrated that trust among actors with different interests builds on an individual level. In line with Scharpf [4], past history of interaction (i.e., regular, and personal contacts) appears to be an important factor in increasing the level of trust and levels of forest information exchange because regular and face-to-face interactions provide opportunity for creating familiarity among actors and assessing each other's trustworthiness. Furthermore, the role of social norms such as keeping a commitment (promise) was also found as an important antecedent for building trust relationships among actors with incompatible interests. Thus, it may be fruitful in the future to further investigate the question of how to build sufficient mutual trust among actors with conflicting interests and using information as an instrument of power. It might also be interesting to investigate the perceptions of a broader group of forest related actors (e.g., civic society), also including those from other relevant sectors (e.g., climate, water) on trust and information sharing in forest policy networks.

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