



Disintegration and discourse: Cross-sectoral story-lines in the German water and forest debates

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ABSTRACT

Policy integration (PI) has been advocated in the literature as a solution to complex environmental problems. It is commonly defined as the joint development of policies across sectors, and deemed beneficial especially in face of cross-cutting issues. As there is little research addressing the ideational integration of two sectors, we introduce a new framework to discursively analyze horizontal policy integration (HPI) and then apply this framework to the German water and forest sectors. We follow the question whether in the context of interlinked forest and water disturbances cross-sectoral story-lines on German national level have occurred, which we assess by examining the story-line's *complexity*, integration of other sector's *concerns*, and *cross-sectoral use*. Although disturbances in the water and forest sectors are becoming more frequent, a fragmentation of the water and forest sectors has been observed in Germany in the past. The analysis is based on Hajer's (1995) definition of discourse and follows his concept of story-lines which can be understood as the lowest common denominator across actor groups. We analyze policy documents on German national level, covering the debate on water and forest disturbances between 2018 and 21. Our results show that in the debates on water and forest disturbances there are commonly used story-lines across sectoral boundaries. The framework, however, enabled us to show an asymmetrical integration across sectors, where the forest sector addresses water concerns while the water sector treats forests as a *non-subject*.

1. Introduction

Policy integration (PI) is often presented as a promising response to environmental challenges (Briassoulis, 2004; Candel and Biesbroek, 2016). The concept of PI presents the idea of cross-sectoral collaborative development of solutions to these ever more urgent and cross-cutting challenges (Briassoulis, 2004). Governmental resorts on several hierarchical levels call for an increase in policy integration: On transnational level the UN promotes integration as a solution to global environmental problems and on supranational level a requirement for policy integration was adopted into EU legislation to tackle consequences of global warming (European Environment Agency, 2021; United Nations Environment Assembly UNEP, 2022). Within recent years, especially the integration of forest and water sectors have gained in attention: Referring to the *water forest nexus*, scholars have emphasized the importance of interlinkages between water and forest (Eberhardt et al., 2019; Springgay et al., 2019; Zhang et al., 2022). With global warming these

interlinkages are observed to change, causing severe disruption and leading scholars to argue for the necessity of policy integration across the responsible policy sectors (Creed et al., 2018; Ellison et al., 2017; Springgay et al., 2019).

Also Germany has been facing severe disturbances. Groundwater levels have decreased significantly since a severe drought in 2018 and led to a loss of forest cover in several regions of Germany (Thonfeld et al., 2022). A disastrous flood in summer 2021 caused numerous casualties (Fekete and Sandholz, 2021) and could no longer be buffered by the already saturated forest soils (Dietze et al., 2022). Nitrate concentrations in groundwater bodies have continuously exceeded European thresholds (Knoll et al., 2020), where forest cover has been shown to be beneficial for low nitrate concentrations (Zhang et al., 2013). At the same time, scholars have observed little institutionalized policy integration across the two sectors in Germany (Baulenas et al., 2021; Baulenas and Sotirov, 2020).

Policy integration is understood as the endeavor to generate a

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common policy across different sectors and levels (Bornemann, 2016; Meijers and Stead, 2004). As such, PI is dependent on policy coordination and cooperation, which aim at increasing consistency across sectors (Stead and Meijers, 2009). Latest since the Brundtland report, higher degrees of PI have been emphasized as a response to current cross-cutting challenges (Steurer and Berger, 2010) and the concept has since evolved tremendously. In the following we will briefly elaborate on the different axes, strands, and schools of thought that evolved during the last decades of PI literature.

First, PI can be analyzed on two different axes: a vertical one, across policy levels, and a horizontal one across sectors (Briassoulis, 2004). Vertical policy integration (VPI) is often focused on intrasectoral processes and information flows from the local to the national level. Horizontal policy integration (HPI), focuses – like this paper – on cross-cutting issues that affect several sectors (Cejudo and Michel, 2017; Jordan and Lenschow, 2010). The two axes are interdependent and both considered relevant to address cross-cutting issues like climate change. Since the first mention of PI in Underdal (1980), three strands have evolved, each following a different understanding of PI (Biesbroek and Candel, 2020). In the first strand, authors mainly address the administrative fragmentation across sectors and elaborate on the difficulties and merits of cross-sectoral coordination (e.g. Metcalfe, 1994; Underdal, 1980). The second strand focuses on the sectoral integration of a certain concern, i.e. environment, climate, or gender (Biesbroek and Candel, 2020). Most popular in this strand is the research object of environmental policy integration (EPI, see Jordan and Lenschow, 2010). And the third strand, in which this paper is positioned, sheds more light on the conceptualization of PI, i.e. its mechanisms, procedural understanding, and the question of its desirability (Biesbroek and Candel, 2020; Cejudo and Michel, 2017).

Research in each of these strands can follow one of three different schools of thought (Hogl et al., 2016). There are, first, institutional perspectives in which the governmental system, processes, and norms are analyzed in terms of policy integration (Briassoulis, 2004; Hogl et al., 2016). Second, there are actor-centered approaches that focus on conflicts and interests of respective actors, as well as power structures and coalition building within a social network (Baulenas et al., 2021; Hogl et al., 2016). And third, there are ideational perspectives on PI, to which we contribute with our paper. Research in this strand focuses mainly on policy learning (Hogl et al., 2016) and integration of an environmental concern into a sectoral policy (Nilsson, 2005; Söderberg, 2008). To this strand we contribute a novel perspective focusing on story-lines across two sectors and their mutual ideational integration. We argue that especially in early stages of policy integration an ideational perspective helps to identify common ideas and their potential for further integration.

The aim of this work is two-fold: We first introduce a framework to discursively analyze horizontal policy integration and then apply this framework to the German water and forest sectors. In this second part we follow the question whether in the context of environmentally interlinked forest and water disturbances cross-sectoral story-lines occurred on German national level. In other words, the question how the water forest nexus is addressed and narrated by the respective sector and what the similarities and differences are. In this contribution we focus on *horizontal*, cross-sectoral policy integration from an *ideational* perspective. We consider this ideational and horizontal perspective on PI especially relevant for three reasons: First, we expect awareness for the cross-sectoral interdependencies to rise with the increase in severe disturbances and understand this attention to be carried by discourses (Höferl, 2010). Second, ideas, as part of discourses, are considered the “glue” (Hogl et al., 2016, p. 411) of policy integration. Policy making as such is dependent on ideas and stories that circulate in the discourse (e.g. Höferl, 2010; Stone, 1988) and also the process of horizontal policy integration happens on a discursive ground (see Hogl et al., 2016; Nilsson, 2005). And third, the frequency of disturbances is rapidly increasing (IPCC, 2022; Kundzewicz, 2011; Thober et al., 2018) and

policy reforms may not be adopted as quickly. Responses may, however, become visible much sooner in the respective debates (De Brito et al., 2020) which can thus exhibit first signs of a changing awareness. In the following, we will first develop the analytical framework to analyze cross-sectoral ideational policy integration and then give some background on our case study and the environmental interlinkages between the two resources addressed. For this, we analyze policy documents on forest and water as published by governmental departments. Subsequently, we will summarize and discuss the main results as well as the benefits and limits of the newly developed framework.

2. Analytical framework

The angle on discourse we follow in this paper is based on Hajer (1995), using story-lines as the unit of analysis. Hajer (1995) defines discourse as “a specific ensemble of ideas, concepts, and categorizations ... through which meaning is given to physical and social realities” (p. 44). Following Hajer (1995), meaning is made through stories that directly or indirectly affect the policy process. The unit of analysis in this paper is story-lines which we define as abbreviated narratives (Hajer, 1995) forming around a policy problem. Full narratives, according to Jones et al. (2014), usually address a certain *policy problem* and have *characters*, a *setting*, a *plot* and a *policy solution*. From a full narrative, then, story-lines emerge which carry less information and are frequently adopted by other groups and actors (Hajer, 1995). A story-line can be powerful, as parts of the narrative are left out and leave space for different interpretations. Due to their capacity of bridging different perspectives, story-lines are crucial when it comes to analyzing coalition-building (Hajer, 1995) and, as we argue, policy integration across sectors. In our case, we focus on the *policy problem* in connection with its *policy solution*, as conveyed by the story-lines. As such, our understanding of story-lines is close to the general conception of frames and framing (Aukes et al., 2020; Benford and Snow, 2000). In our study, however, we stick to story-lines, as their capacity to bridge different perspectives and thereby act as the lowest common denominator across actor groups is crucial for the sake of our analysis.

2.1. A new conceptualization of ideational policy integration

In her work, Söderberg (2008) finds that policy reform was made possible where stories aligned across different sectors. Similarly, we assume that cross-sectorally used story-lines may provide the grounds for dealing with complex issues. We find, however, focusing only on commonly used story-lines runs the risk of neglecting early signs of policy integration. Consequently, we propose a framework (see Fig. 1) that accounts for three levels of ideational policy integration across sectors. When all three levels have been addressed across the analyzed sectors, we define ideational HPI as successful: Story-lines address both areas of responsibility and therefore show an understanding of the *complex* interactions of the two resources, story-lines include *concerns* of the opposing sector, and there are story-lines that are *used cross-sectorally* (see Fig. 1). In the following, these three levels will be

- | | |
|---|---|
| i. | Understanding cross-sectoral <i>complexity</i>
→ Story-line refers to respective other resource |
| ii. | Incorporating cross-sectoral <i>concerns</i>
→ Story-line includes concerns of respective other sector |
| iii. | <i>Cross-sectoral use</i> of story-lines
→ Story-line is used cross-sectorally |
| No PI: story-lines differ across sectors and references to the respective other sector are non-existent | |

Fig. 1. Three levels of ideational policy integration as identified through story-lines, drawing on concepts by Candel and Biesbroek (2016), Briassoulis (2004) and Cejudo and Michel (2017).

grounded in the existing literature on ideational HPI.

First, [Cejudo and Michel \(2017\)](#) describe PI as a “*process that starts by understanding a public problem as a complex one*” (p. 758). Following their definition, we define a public problem to be understood as complex if the story-line addresses both areas of responsibility, in our case the water and forest resources. This step allows us to see whether the ecosystem interlinkages between the two sectors are acknowledged. Second, [Briassoulis \(2004\)](#) suggests to understand PI as “*incorporating the concerns of one policy into another*” (p. 10). Thus, in addition to the exhibition of *complexity* in a story-line, we analyze whether in a sectoral story-line, i.e. a story-line that is focused on forest management, *concerns* of the other sector are integrated. This step of the analysis is crucial when it comes to the question of who integrates whom and allows to observe asymmetries in the integration process ([Briassoulis, 2004](#)). These two levels are both relevant in their distinction. The first relates to the natural resources, and whether their interlinkages are acknowledged in the policy programs. The second highlights the impact of sectoral policies, e.g. objectives for forest management, on the other policy field. Finally, as a third step of ideational PI, we analyze whether a story-line is *used cross-sectorally*. If given, the last step shows that ideas reach across sectoral boundaries; and common ideas are, according to [Jochim and May \(2010\)](#), necessary for further policy integration. Note, that our interest here is not to know how these ideas crossed over, which would lean towards perspectives of coordination and actor-centered integration, but to analyze whether ideas crossed over and which. If a story-line is *used cross-sectorally*, plus exhibits *complexity* and integration of other sector’s *concerns*, we understand this as a sign for ideational policy integration across two sectors. It needs to be stressed, however, that ideational policy integration only covers the policy process, while integrated policy outputs, as the end goal of policy integration ([Underdal, 1980](#)), are not examined in our analysis.

In summary, extracting story-lines from the debates provides insights into the main topics and arguments discussed. The focus on sectors enables an analysis of early stage policy integration and is especially relevant for sectors that share multiple interconnections. Analyzing the story-lines in terms of *complexity*, acknowledgement of *concerns*, and *cross-sectoral use* allows an assessment of the *degree* of policy integration, accounting for the fact that “a unified whole” ([Briassoulis, 2004](#), p. 10) as the high end of policy integration is hard to achieve and not always beneficial (e.g. [Meijers and Stead, 2004](#)).

There are four different outcomes that can result from our analysis. First, neither of the sectors may exhibit any signs of ideational HPI when none of the three levels are fulfilled. Second, there may be signs of low ideational HPI when both sectors show understanding of *complexity* or *concerns* similarly. Third, the framework can show asymmetrical integration, when e.g. one sector integrates *concerns*, while the other does not. And finally, as a fourth outcome, we can find ideational HPI in form of at least one *cross-sectorally used* story-line. In the following, we apply the framework to investigate the degree of ideational policy integration across the German water and forest sectors.

2.2. Case analysis: water and forest interactions in the political system of Germany

In the second part of this paper we apply the framework to a case study addressing the level of ideational integration between the forest and water sectors in Germany. In European comparison, Germany has been perceived as taking on a strong lead in terms of environmental policy ([Wurzel, 2008](#)). Already in 1976, environmental policy was formally defined as ‘cross-sectoral’ ([Lafferty and Hovden, 2003](#); [Wurzel, 2008](#)). This development, however, serves as the first example of a long register of unsuccessful calls for PI: Back then and up to today the demand for PI mostly remains rhetorical ([Kleinschmit et al., 2017](#); [Wurzel, 2008](#)). In our analysis, we focus on the water and forest sectors, which have previously been observed as institutionally fragmented ([Baulenas et al., 2021](#); [Baulenas and Sotirov, 2020](#)) while still being

underresearched ([Seijger et al., 2021](#)). The few studies so far have found a low amount of integrated policy instruments on German national level in comparison with other EU member states ([Baulenas and Sotirov, 2020](#)) and a low degree of PI across water and forest sectors also on federal level in the state of Baden-Württemberg, Germany ([Baulenas et al., 2021](#)). Overall, ministerial autonomy is traditionally high in Germany ([Jordan and Lenschow, 2010](#)) which is also reflected in the institutional fragmentation of water and forest. The water and forest resources are highly interlinked and what affects one is likely to affect the other ([Creed et al., 2018](#); see [Box 1](#)). Due to anthropogenic impacts, amongst them global warming, these interlinkages are increasingly disturbed ([Ellison et al., 2017](#)). As a result, extreme weather events such as floods ([Kundzewicz, 2011](#)), prolonged periods of droughts ([Thober et al., 2018](#); [Thonfeld et al., 2022](#)), and a reduction in water quality ([Lorz et al., 2007](#)) are less and less absorbed by forest and water resources, resulting in bigger impacts for society ([Creed et al., 2018](#); [Ellison et al., 2017](#)).

There are two main reasons why the German water and forest sectors provide a suitable case to test the framework. First, Germany has only recently been confronted with severe effects of climate change: Several subsequent years of drought have been affecting water provision and reducing forest cover since 2018 ([Müller and Kruse, 2021](#); [Thonfeld et al., 2022](#)), and a disastrous flood in summer 2021, that could no longer be buffered by already saturated forest soils, has shed light on the increase in frequency of extreme weather events ([Fekete and Sandholz, 2021](#)). Second, while the recent developments have led to awareness for water and forest interactions by non-governmental actors (e.g. [Öko-Institut, 2020](#)), political scientists have observed a low degree of institutional policy integration across water and forest sectors in Germany ([Baulenas et al., 2021](#); [Baulenas and Sotirov, 2020](#)). The case study thus provides an example of a recent but severe crisis in the context of which ideational policy integration across two interdependent sectors could be expected to accelerate. While there are multiple drivers of PI ([Baulenas and Sotirov, 2020](#); [Trein et al., 2021](#)), the focus of our study is not to causally link the disturbances with the policy integration, but rather to investigate whether common story-lines were established in the context of these severe circumstances. Natural disasters have often been discussed as initiating policy change ([Giessen, 2011](#)) and, accordingly, we assume a crisis to be a catalyst that directly or indirectly affects the debates and possible responses. In summary, both, the recentness as well as the institutional fragmentation observed in the past, enable us to respond to our research question; namely, whether in the context of environmentally interlinked forest and water disturbances cross-sectoral story-lines on German national level occurred.

3. Methods

We conducted a qualitative policy analysis using documents as prime data source. In three screening steps we identified 29 policy documents on German national level relevant to the interactions of water and forest resources within the years of 2018–2021. We limit our analysis to these four years, as the drought in the beginning of this time period is commonly considered as the starting point of significant forest cover loss ([Mack et al., 2023](#); [Thonfeld et al., 2022](#)). While a subsequent discussion might take time to unravel, the four years can be seen as a cross-section of the debate, including plenary protocols with instant discussions of recent events and also policy strategies in response to earlier events, such as a flood in 2016 ([Dietze et al., 2022](#)) and infringement procedures in 2017 due to insufficient water quality ([Schaub, 2021](#)). Thus, the four years cover occurrences and follow-up debates of the water forest disturbances previously identified as most relevant. We chose to focus on the national level, as we deem the national approach to integrating water and forest as crucial for further implementation also on lower levels. The study at hand thus extends the output-oriented analysis by [Baulenas and Sotirov \(2020\)](#) by adding an in-depth analysis of the policy

Box 1 WATER AND FOREST INTERACTIONS IN GERMANY.

According to the scientific literature, disturbances like droughts, floods, and low water quality are generally connected to both, water and forest resources. First, forests are crucial for water cycling. They consume and then transpire water and thereby affect water quantity negatively downstream and positively downwind (Ellison et al., 2012). Along with a rising temperature the ratio shifts towards higher transpiration rates and, thus, water availability decreases (Creed et al., 2018; Ellison et al., 2017). Second, forest soils can store water and thereby buffer rainfall and reduce flood peaks. With global warming there is a higher likelihood of heavy rainfall and resulting flood events, as the maximum humidity increases with the temperature (Kundzewicz, 2011). Flood peaks, then, can be buffered by forest soils due to their water infiltration capacity, which is also crucial for groundwater recharge (Hümann et al., 2011; Lorz et al., 2007). And third, water quality is high in forested areas as forest soils infiltrate and purify water (Lorz et al., 2007) and forest cover losses may then increase influx of pollutants. In brief, forests are seen as modulators of water flows (Creed et al., 2018), while being themselves dependent on water availability: Droughts and heat waves since 2018 have led to a severe loss of forest cover in Germany and required a massive increase in subsidies for timber logistics and reforestation (Haeler et al., 2023; Thonfeld et al., 2022). The two resources are thus highly interlinked and Germany is confronted with disasters that result from a change in interlinked forest and water resources.

process.

First, we extracted the documents via key word search from the official websites of the German Bundestag as well as the ministry for environment (BMU), responsible for water resources, and the ministry for nutrition and agriculture (BMEL), responsible for forest resources. Publications were only included if they addressed both key words *water* and *forest*. Excluding redundant documents, we extracted 174 policy documents. Second, we eliminated documents in which the main topic was neither water nor forest related. In a third step, we looked within the documents for water and forest disturbances, such as e.g. droughts, flood and (reduced) water quality. These were identified inductively by a literature review prior to the sampling as the predominant disturbances of water and forest interlinkages and enabled us to relate the story-lines to the recent disturbances. In order to focus on (dis-)integration within the discourse of political institutions, we excluded non-state actors from the analysis (see also the concept of coordinative discourse by Schmidt, 2008). The resulting sample consists of 29 documents, including plenary protocols (n=4), as well as investigations (n=5) and reports published by the respective ministries (n=20). Of these ministerial reports especially the ministry for environment and nature conservation (BMU, n=6) and the ministry for nutrition and agriculture (BMEL, n=5) are relevant units as they hold responsibility of the water (BMU) and forest (BMEL) sectors. The exact documents are listed in the appendix.

We qualitatively analyzed the documents in two steps. First, using the software *MaxQDA2020*, we coded for story-lines concerned with water and forest interlinkages within the national policy documents. Here we identified eight story-lines relevant to the water and forest sectors. In a second step, we synthesized the material looking for degrees of ideational policy integration within the story-lines, using the levels developed in the framework (*complexity, integration of concerns, cross-sectoral use*; see Fig. 1) and their corresponding outcomes (i.e. asymmetrical ideational HPI). In this second step information on who reproduced a certain story-line was crucial in order to account for asymmetric integration. Therefore, we focus on publications by BMU and BMEL as the responsible ministries for water (BMU) and forest (BMEL) resources. Publications by the BMU are thus considered to represent the water sector and publications by the BMEL the forest sector. Publications by the other ministries, as stated above, were still important to identify the dominant set of story-lines, as part of the first step of the analysis. While they are not affiliated to one of the two sectors, they frequently followed story-lines identical to those published by the BMU or BMEL. This observation shows, that setting the ministries equal to the respective sectors is a simplification, not only because the ministries hold responsibility over more than one resource. In order, however, to address the previously observed institutional fragmentation (Baulenas and Sotirov, 2020) we deem this simplification necessary for our analysis.

We deliberately extracted the story-lines in a first step, and only thereafter identified the respective sectors. This step-by-step approach allowed us to avoid a confirmation bias in which our critical reflection of a story-line's cross-sectorality is hindered by previous information on the ministry that reproduced it. All first-cycle coding was conducted by the first author who extracted and synthesized all story-lines. The synthesis of all codes was then discussed and interpreted in several constellations with co-authors. The extensive case analysis was subsequently revised and shortened to the case analysis presented in this paper. Direct quotes necessary for the argument were translated by the author and double-checked with co-authors.

4. Disintegration of the forest and water sectors: prevalent story-lines

We found eight story-lines relevant to the water and forest interactions that are discussed amongst policy officials in Germany. They are allocated according to the integrative topics of renaturation, water storage, drinking water provision and water usage regulations. In the following, first the respective story-lines are presented including problematization, corresponding solutions and actors reproducing the story-lines, and second the ideational HPI is assessed according to the criteria developed above.

4.1. Story-lines

Renaturation. Renaturation of alluvial forests is discussed mainly as a solution to biodiversity loss and flood events. Alluvial forests are presented as filtering nitrate emissions (BMU 2020/05), offering shelter from predators and sun light (BMU 2019/04), and reduce flood damages (BMU 2019/09; BMU 2020/10a). Consequently, the loss of retention areas, and especially the loss of healthy alluvial forests, is problematized and renaturation is considered crucial: „Due to the loss of floodplains and land use changes, about 70% of dry alluvial forests have no or at least a significantly limited retention capacity“ (BMU 2020/05, p. 218). Flood protection and biodiversity conservation are both considered to largely benefit from renaturation efforts. The synergies are explicitly emphasized in several reports, for example by the BMU: “These have considerable synergy potential with regard to other societal objectives. Corridors in which the water body and the riparian vegetation form a functional unit are valuable for nature and species conservation, biotope cross-linking, water storage, climate adaptation and flood retention.” (BMU 2020/05, p. 241 f). While the water sector addresses alluvial forests, they are not mentioned in publications by the BMEL. By addressing alluvial forests, the BMU exhibits cross-sectoral complexity. As planning and management of renaturation efforts, however, is solely in the hands of the BMU, the topic of alluvial forests remains in the water sector; neither story-lines

nor responsibilities transcend sectoral boundaries.

Water storage. Both sectors frequently discuss water storage, mainly as a solution to drought and flood events. Within the BMU, measures to increase water storage capacities revolve around retention areas and technological infiltration measures. The BMU problematizes the flood disasters and presents them as a result of the past century's ill-management. As a solution they call for rebuilding the area for water retention, mainly via technological solutions such as the relocation of dykes and the use of polders (BMU 2019/09). The BMU frequently refers to water storage as one of the „*natural soil functions*“, without explicitly mentioning forest soils (BMU 2020/10a, p. 46). In publications by the BMEL, in contrast, water storage is emphasized as an important forest ecosystem service. Forest soils are presented as clean water storage, crucial for flood prevention, and as CO₂ storage (BMEL 2021/07). Furthermore, the reference to water is made more explicit: *“The forest soil thus plays an important role in the water cycle, forming the largest freshwater reservoir of Germany.”* (BMEL 2021/07, p. 16) and the importance of water is deemed to increasingly influence forest management decisions (BMEL 2021/09). These management decisions mainly include a transition to mixed stands and forest soil conservation (BMEL 2021/07). In brief, water storage capacities are discussed across sectors with the forest sector including the *concerns* of the water sector. From the water sector, however, there is no recognition of forests and forestry concerning water storage (*one-sided complexity*). While there are no story-lines that transcend the water and forest sectoral boundaries, outside of the two sectors the topic of water storage instigates a call for policy integration: Steffi Lemke (Bündnis 90/DIE GRÜNEN), for instance, expresses a necessity for *“thinking the two [resources] together”* (Steffi Lemke, 2019/12, Plenary protocol, p. 17057) in order to secure water storage capacities.

Drinking water provision. Overall, the importance of drinking water is emphasized cross-sectorally. The BMU states that *“special attention of risk analysis is given to drinking water provision”* (BMU 2020/10a, p. 15) and the BMI emphasizes potential disruption: *“It is to be expected that the piped drinking water supply can no longer be maintained at all times and locations”* (BMI 2019/04, p. 11). As a solution, the BMI suggests developing emergency plans for drinking water provision in times of shortages (BMI 2019/04). Outside of publications by the BMEL, securing drinking water provision is not seen in relation to forests and forestry. The BMU, for instance, sheds light on the importance of soils and their manifold ecosystem functions for drinking water provision without mentioning forests: *“Soil is one of our central foundations of life. It forms the upper layer of the earth's crust and fulfils many functions. Water and carbon storage make it irreplaceable for the earth's ecosystem, climate protection and flood protection. The soil absorbs rainwater, cleans it and makes it available to us as a resource for drinking water. Three quarters of drinking water in Germany come from groundwater.”* (BMU 2019/09, p. 28). And similarly, in the risk analysis report by the BMI, protection of drinking water resources is responded to by establishing water protection zones (BMI 2019/04); that these protection zones often lie in forested watersheds, however, is not addressed. In contrast, the ministry for nutrition and agriculture (BMEL) frequently mentions drinking water, presenting humans and forests as equally benefitting of forest ecosystem functions such as groundwater recharge (BMEL 2021/07). Here, healthy forest cover is highlighted as crucial for drinking water in high quality and quantity (BMEL 2021/07; BMEL 2020/01). In some sections drinking water provision is not presented as a side effect, but as an important contribution of forestry to society: *“Forests are particularly important for drinking water provision. More than 40 percent of the area of water protection zones are located in forest area, which is about 2.1 million hectares of forest land (...). The non-fertilized forest soils have a highly purifying effect against pollutants. (...) The water generated below forest falls below the nitrate limits that apply to drinking water at almost all locations.”* (BMEL 2021/07, p. 16 f). Overall, drinking water provision is discussed across sectors. From side of the BMU, forests are not included in the story-lines, thereby showing no *complexity*. By the BMEL, in contrast, references and

even *concerns* of the water sector are included. None of the story-lines, however, are used *cross-sectorally*.

Water usage regulation. Both, the ministry of environment (BMU) and the ministry of internal affairs (BMI) discuss water usage regulation schemes as a solution to usage competitions. A usage competition as an effect of drought is expected, including the use for drinking water, agricultural use, shipping infrastructure and usage in case of forest fires (BMU 2020/10a). The ministry for internal affairs (BMI) suggests a water usage regulation scheme as a solution (BMI 2019/04) envisioning private usage limitations as a first step of action, such as limiting the water usage for private pools and irrigation of lawns (BMI 2019/04). Furthermore, the BMI mentions water usage regulation as measure to ensure the good ecological state of water ecosystems and, whence, water quality. They suggest to adjust the thresholds for discharge of warm or polluted water and a regulation of water extraction and usage in times of low water levels (BMI 2019/04). This regulation scheme includes water extraction from water bodies and small rivers (Deutscher Bundestag 2020/05b). The debate on water usage regulations is mostly connected to the ministry for internal affairs (BMI) and the ministry for environment, including water (BMU). In the context of the risk analysis for citizen protection (BMI), various scenarios of climate change are discussed, including possible responses to the most drastic scenarios. These usage regulations are, however, not discussed in publications from the forest sector, thus showing neither *complexity* nor integration of *concerns*, despite their dependency on access to water, e.g. for firefighting, irrigating saplings and wetting stored timber.

4.2. Case summary: limited ideational HPI

Overall, we found eight story-lines relevant to the forest and water interactions, with three story-lines exhibiting cross-sectoral *complexity* of which two also show integration of *concerns* of the respective other sector. None of the story-lines, however, were used *cross-sectorally* (Table 1). The two story-lines that exhibit integration of cross-sectoral *concerns* were put forward in publications by the BMEL. The story-lines emphasize continuous forest cover and health as a solution to problems of floods and drinking water shortages, the latter primarily lying within the responsibility of the water sector. Vice versa, forest *concerns* were not mentioned in the water sector publications. *Complexity* without integration of *concerns*, however, could be observed in the story-line on renaturation. Here, alluvial forests are frequently mentioned as mitigators of floods and low biodiversity, exhibiting understanding of cross-sectoral *complexity*. While the topic is discussed not only within the ministry of environment (BMU), but also in plenaries and risk assessments, it is not mentioned in publications by the BMEL. In brief, we find asymmetrical ideational HPI, where the forest sector acknowledges *concerns* of the water sector, but the water sector only acknowledges *complexity*. The topics of renaturation, water storage and drinking water provision show signs of ideational HPI and therefore exhibit potential for further policy integration. In the story-line, renaturation is linked to flood protection, and drinking water provisioning is mentioned in the context of concern for shortages, i.e. due to drought. Concluding, we do find signs of low and asymmetrical ideational policy integration across the two sectors, while, however, there is no common story-line across the two sectors.

Table 1

Story-lines across the forest and water sectors of Germany were analyzed for ideational policy integration. The main story-lines relevant to PI are listed, with a key quote for the respective story-line and the levels of ideational policy integration as presented in the theory section: complexity, integration of concerns, and cross-sectoral use. The sector affiliation is added as W (water), F (forest), or O (other) before the quote.

Story-lines	Key quote	Levels of PI
Renaturation of alluvial forests to reduce flood risk	W: „Due to the loss of floodplains and land use changes, about 70% of dry alluvial forests have no or at least a significantly limited retention capacity.“ (BMU 2020/05, p. 218)	1) Shows complexity 2) No integration of concerns 3) No cross-sectoral use
Water retention areas to reduce flood risk	W: „While floods are natural events, the potential for damage continues to increase. Reasons for this include the loss of natural floodplains and water retention areas and increasingly dense building development in flood-prone areas.“ (BMU 2019/09, p. 21)	1) No complexity 2) No integration of concerns 3) No cross-sectoral use
Mixed forests increase water storage	F: “It should be noted that the groundwater recharge rate in vital mixed forests is higher than in pure coniferous forests, as is the water availability. Thus, the risk of drought stress is lower and the trees are more resistant.“ (BMEL 2021/07, p. 17)	1) Shows complexity 2) Integration of concerns 3) No cross-sectoral use
Need for emergency plans to secure drinking water provision	W: „Consistent protection of drinking water resources [is necessary, SH], also through the consistent and swift designation of water protection areas and priority areas for drinking water production.“ (BMU 2019/04, p. 13)	1) No complexity 2) No integration of concerns 3) No cross-sectoral use
Soil management to prevent disruption of drinking water provision	W: “The soil absorbs the rainwater, purifies it and makes it available to us as a resource for drinking water. Three quarters of drinking water in Germany come from groundwater.“ (BMU 2019/09, p. 28)	1) No complexity 2) No integration of concerns 3) No cross-sectoral use
Continuous forest cover to prevent disruption of drinking water provision	F: “The drought calamity of recent years has shown that forestry should increasingly include the conservation and improvement of water retention in the forest, but also the securing of sufficient seepage water discharge in the future. This is necessary to better protect forests from the consequences of climate change, to reduce their vulnerability to drought events and to ensure drinking water supply from the forest.“ (BMEL 2021/07, p. 17)	1) Shows complexity 2) Integration of concerns 3) No cross-sectoral use
Implementation of water usage regulations to resolve water conflicts	W: “In order to clarify future user conflicts in times of drought, proposals for hierarchization schemes are to be developed, prioritizing, if applicable, the human need for drinking water.“ (BMU 2020/10a, p. 42)	1) No complexity 2) No Integration of concerns 3) No cross-sectoral use
Regulation of water extraction to sustain aquatic biodiversity	O: “If, in the case of low water discharges, discharges with reduced water quality are only insufficiently diluted by the residual water quantity	1) No complexity 2) No Integration of concerns 3) No cross-sectoral use

Table 1 (continued)

Story-lines	Key quote	Levels of PI
	available in the water body, the water quality in the water body will increasingly deteriorate. Moreover, as water temperatures rise, the amounts of heat that can be discharged become smaller until the temperature limits are reached. Therefore, existing limit values should be reviewed and, if necessary, adjusted, taking into account possible climate change impacts.“ (BMU 2019/04, p. 125)	

5. Discussion

5.1. Lack of integration and its relation to power

Overall, we find a low degree of ideational HPI across the two sectors, with no *cross-sectorally used* story-lines as the main unit of analysis.¹ Moreover, we especially observed the water sector as “indifferent” (Fenger and Klok, 2001, p. 163) to forests and forestry. We found only one story-line from the water sector that exhibits *complexity* and no signs of either *complexity* or acknowledgement of forest *concerns* beyond that story-line. Furthermore, this one story-line addresses the renaturation of alluvial forests for flood risk management which, institutionally, falls solely within the responsibilities of the water sector (BMU, 2020). The clear division of responsibilities can be seen as inhibiting further policy integration (Springgay et al., 2019).

While the water sector seems indifferent towards forests and forestry, there are signs of ideational integration from sides of the forest sector in form of *complexity* and integration of *concerns*. Our results show, that water concerns are integrated in two story-lines promoted in forest publications, indicating asymmetrical ideational HPI. Water related forest ecosystem services, however, have been addressed by the forest sector long before the recent loss of forest cover (cf. Ebermayer, 1900; Thonfeld et al., 2022) and may be an integral part of the foresters self-portrayal (Mack et al., 2023). Thus, the integration of water concerns not being a new phenomenon, it remains uncertain whether they will be institutionalized or rather continue to remain rhetorical (cf. Nilsson, 2005). These observations are in line with previous research: Fermond et al. (2013) find that the water actors in France treat forests as a “non-subject” (p. 419, translated by the author) and Baulenas et al. (2021) observe the forest actors in Baden-Württemberg, a federal state of Germany, to be more “active” (p. 442) in seeking communication across sectors than the actors from water administration.

There are several possible explanations for the observed non-engagement. To begin with, the two sectors have been shown to engage in polarizing debates with other policy fields, possibly inhibiting their capacities to engage with yet another sector. On the one hand, conflicts between the water and agricultural actors are dominating the agenda of the water sector. Nitrate emissions from agricultural land-use have continuously reduced water quality in both surface and groundwater bodies and under pressure of the European Court eventually led to a novelization of the Fertilization Act (Knoll et al., 2020; Schaub, 2021). On the other hand, the conflicts between the forest and the nature conservation actors have been discussed as predominant in the scientific literature. The forest actors highlight the economic use and the

¹ In order to discuss our case study, we will engage with all relevant aspects of integration and fragmentation, including institutional and actor-centred perspectives as well as coordination despite their conceptual differences (Stead and Meijers, 2009).

importance of forest management, whereas nature conservation actors strongly opt for reduced management blaming foresters to solely focus on economic yield (Mack et al., 2023).

In discourse analysis, what is being discussed - and what is not - is understood as intricately linked to power, as the possibility to define a problem comes with great influence (Hajer and Versteeg, 2005). Similarly, we argue that the lack of ideational integration may be related to power struggles, inhibiting the active engagement across sectors. Biesbroek and Candel (2020) have shown, that “turf wars” (p. 76) are an important mechanism for disintegration. By treating forest as a *non-subject*, the water sector may, for instance, refuse responsibility for potential payment for ecosystem services schemes (PES, Bálíková et al., 2019). The implementation of such a PES scheme, e.g. for groundwater recharge below forested watersheds, could increase the sector’s financial burden. In opposition to Biesbroek and Candel (2020), other scholars have argued that power and reputation may also trigger coordination (Lieberherr and Ingold, 2019). In their study, they find increased coordination efforts especially where the partner is considered “important” (Lieberherr and Ingold, 2019, p. 11). Our results suggest that both may be possible: The indifference helps the water sector to defend their “turf” (Biesbroek and Candel, 2020, p. 71), where engaging in integration could increase sectoral dependencies; while forest actors show signs of engagement, appealing to a sector that may societally enjoy a high reputation.

5.2. Degrees of story-lines: discussion of the analytical framework

One aim of this paper was to introduce a framework for analyzing ideational HPI on the basis of story-lines. Our approach refines the work by Söderberg (2008) who observes a relation between coinciding frames across sectors and policy change. We argue that introducing different levels and thereby going beyond the coinciding frames - which in our analysis are called *cross-sectorally used story-lines* - allows to additionally observe early signs of ideational policy integration as well as asymmetries, i.e. following the question of who integrates whom (Briassoulis, 2004). The discussion above has shown that this nuanced perspective, then, allows not only to understand the degree of ideational HPI, but also gives insights on structural dependencies. *Turf wars* and prestige are important factors when it comes to policy integration (Biesbroek and Candel, 2020; Lieberherr and Ingold, 2019), and focusing on discourses enables the analyst to shed more light on the related power imbalances. Moreover, we find that to capture early signs of HPI across two interdependent sectors may be especially helpful to identify topics the two sectors have in common, such as in our case study renaturation, water storage, and drinking water provision. As in the respective story-lines, two of these topics were directly, and one indirectly, related to the disturbances we identified as relevant, allows to assume that if integration processes go further, they could be driven by these natural disasters. Further exploring these topics and disturbances in their capacity to enable communication, i.e. in the form of boundary objects (Hjalmarsson, 2015), could nicely form a future addition to the developed framework.

We deem the process-oriented perspective on policy integration, as chosen for this analysis, highly relevant, especially when it comes to sectors that have previously been observed as fragmented. We analyze ideational PI as a precursor of actor-centred and institutional forms of PI, assuming that in ideationally fragmented sectors neither interaction (actor-centred PI) nor integrated policy output (institutional PI) may occur (Hogl et al., 2016; Jochim and May, 2010). Vice versa, however, ideational integration cannot guarantee subsequent interaction and institutional integration (Nilsson, 2005). Moreover, policy integration has been critically discussed in the scientific literature and its desirability is under debate. Scholars argue that there is little empirical evidence for the benefits of PI (e.g. Bornemann, 2016; Hogl et al., 2016), that its implementation is highly resource-intensive (Meijers and Stead, 2004) and that consensus-based concepts like PI undervalue the

productive aspects of conflict (Allmendinger and Haughton, 2012). We agree that the ultimate goal of jointly developing a cross-cutting policy may be too costly and not necessarily desirable in its entirety. By focusing on degrees and especially asymmetries of integration as we did in this study, however, the analysis can go beyond an assessment of existent or non-existent (institutional) PI - as previously criticized by Persson et al. (2016). Instead it strengthens the focus on the process of policy integration, to gain a better understanding of the shared topics, the structural dependencies and the turfs to be defended.

5.3. Limitations and tentative signs of change

While many scholars argue that disturbances can instigate policy change (Giessen, 2011), the extreme weather events related to the forest and water resources in Germany have, according to our results, not been followed by ideational policy integration within the time period of our analysis. One reason for that is related to our sampling. Following the question of fragmentation across two sectors, we limited the material to publications by national ministries. While this choice may have been made to study fragmentation across sectors, it raises questions about representativeness. Ministries may not always reflect the full range of perspectives and discussions within the broader policy community, let alone the discussions on local or regional levels.

Including voices outside the coordinative discourse could have shown a changing awareness concerning the importance of the water forest interactions including increased pressures for integration (e.g. Öko-Institut, 2020) and also increasing attention for forest damages (Haeler et al., 2023; Mack et al., 2023; Thonfeld et al., 2022). But also within national policy documents, there are tentative signs of change after our period of analysis: In the German national water strategy (NWS), published in March 2023, there are signs of increased recognition for water-forest interactions, including forest cover losses as a concern (BMUV, 2023).² The publication of the national water strategy underlines the relevance and topicality of our research and shows the late integration of forest concerns in sectoral water policy making. Considering the national water strategy gives reason to assume that the low degree of ideational integration we found may provide the basis for future policy integration processes.

6. Conclusion and outlook

Disturbances related to both, water and forest resources, have increased in frequency and intensity in Germany throughout the last decade. While many voices urgently demand the political and institutional recognition of these interactions, the fragmentation across sectors prevails. In our analysis over 2018–2021 we examined ideational policy integration across the German water and forest sectors. In this endeavour, we introduced a framework to analyze ideational HPI, identifying the levels of *complexity*, integration of *concerns*, and *cross-sectoral use* of story-lines and their respective outcomes. We find that the framework is especially useful to analyze early stages of policy integration, identify integrative topics, and uncover asymmetrical structures across two sectors. We applied the framework to the German water and forest sectors. As we could not find common story-lines reaching across sectoral boundaries, we must conclude that the sectors overall remain not only institutionally but also ideationally fragmented throughout the period of analysis. We did, however, find signs of low level ideational HPI across the respective sectors of Germany and could additionally show that the forest sector exhibited higher integration of water concerns than vice versa, indicating asymmetrical ideational HPI.

As policy integration dynamics can vary significantly, future

² The respective ministry was renamed in December 2021 from Ministerium für Umwelt, Naturschutz und nukleare Sicherheit (BMU) to Ministerium für Umwelt, Naturschutz, nukleare Sicherheit und Verbraucherschutz (BMUV).

applications of the framework would be necessary in order to test its compatibility with different contexts, material or theoretical angles. Overall, we deem the newly developed framework a crucial contribution to the field of policy integration, as it enables an analysis of early-stage or asymmetrical policy integration across sectors and is especially suited for fields that have been affected by common challenges.

Based on our results, we conclude that despite an increased frequency of disturbances related to water and forest, the two sectors exhibit no common story-lines within our period of analysis, and thus low ideational policy integration. Beyond the period of analysis, however, there are signs of increased awareness for the water forest interactions also from side of the water sector (BMUV, 2023), indicating that the process of policy integration is ongoing. Whether the identified signs of ideational integration lead to actual policy changes will be subject of further exploration, as well as a more in-depth exploration of the reasons for the water sector’s apparent disinterest.

CRedit authorship contribution statement

Sabeth Häublein: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Writing – original draft, Writing –

review & editing. **Andy Selter:** Project administration, Writing – review & editing. **Chris Seijger:** Conceptualization, Funding acquisition, Project administration, Supervision, Writing – review & editing. **Daniela Kleinschmit:** Conceptualization, Funding acquisition, Project administration, Supervision, Writing – review & editing. **Tanya Baycheva-Merger:** Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data Availability

Data will be made available on request.

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Appendix

Sample of Policy Documents

Ausschuss für Ernährung und Landwirtschaft	2019/11	Committee of Food and Agriculture	Recommended resolution & report (<i>Beschlussempfehlung & Bericht</i>)	
BMBF	2020/05	Federal Ministry of Education and Research	Consultation (<i>Unterrichtung</i>)	National report Research and Innovation 2020 (<i>Bundesbericht Forschung und Innovation 2020</i>)
BMEL	2019/10	Federal Ministry of Food and Agriculture	Consultation (<i>Unterrichtung</i>)	Agricultural policy report of the Government 2019 (<i>Agrarpolitischer Bericht der Bundesregierung 2019</i>)
BMEL	2020/01	Federal Ministry of Food and Agriculture	Report (<i>Bericht</i>)	In pace with the forest (<i>Am Puls des Waldes</i>)
BMEL	2021/07	Federal Ministry of Food and Agriculture	Consultation (<i>Unterrichtung</i>)	Forest report of the Government 2021 (<i>Waldbericht der Bundesregierung 2021</i>)
BMEL	2021/09	Federal Ministry of Food and Agriculture	Report (<i>Bericht</i>)	Forest strategy 2015 (<i>Waldstrategie 2015</i>)
BMI	2019/04	Federal Ministry of the Interior and Community	Consultation (<i>Unterrichtung</i>)	Report on risk analysis for citizen protection 2018 (<i>Bericht zur Risikoanalyse im Bevölkerungsschutz 2018</i>)
BMI	2020/10	Federal Ministry of the Interior and Community	Consultation (<i>Unterrichtung</i>)	Report on risk analysis for citizen protection 2019 (<i>Bericht zur Risikoanalyse im Bevölkerungsschutz 2019</i>)
BMU	2018/02	Federal Ministry for Environment, Nature Conservation and Nuclear Safety	Consultation (<i>Unterrichtung</i>)	A change in course is needed: climate protection in the transport sector (<i>Umsteuern erforderlich: Klimaschutz im Verkehrssektor</i>)
BMU	2018/10	Federal Ministry for Environment, Nature Conservation and Nuclear Safety	Minor inquiry (<i>Kleine Anfrage</i>)	Extreme weather, climate impact, and climate adaptation in Germany (<i>Extremwetter, Klimafolgen und Klimaanpassung in Deutschland</i>)
BMU	2019/09	Federal Ministry for Environment, Nature Conservation and Nuclear Safety	Consultation (<i>Unterrichtung</i>)	Environmental report 2019 (<i>Umweltbericht 2019</i>)
BMU	2019/10	Federal Ministry for Environment, Nature Conservation and Nuclear Safety	Consultation (<i>Unterrichtung</i>)	Climate protection program 2030 (<i>Klimaschutzprogramm 2030</i>)
BMU	2020/05	Federal Ministry for Environment, Nature Conservation and Nuclear Safety	Consultation (<i>Unterrichtung</i>)	Environmental assessment 2020: For a determined environmental policy in Germany and Europe (<i>Umweltgutachten 2020: Für eine entschlossene Umweltpolitik in Deutschland und Europa</i>)
BMU	2020/10a	Federal Ministry for Environment, Nature Conservation and Nuclear Safety	Consultation (<i>Unterrichtung</i>)	Second progress report of the Government on German climate change adaptation (<i>Zweiter Fortschrittsbericht der Bundesregierung zur Deutschen Anpassung an den Klimawandel</i>)
BMU	2020/10b	Federal Ministry for Environment, Nature Conservation and Nuclear Safety	Consultation (<i>Unterrichtung</i>)	Indicator report 2019 of the Government on the National Strategy for Biological Diversity (<i>Indikatorenbericht 2019 der Bundesregierung zur Nationalen Strategie zur biologischen Vielfalt</i>)

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Ausschuss für Ernährung und Landwirtschaft	2019/11	Committee of Food and Agriculture	Recommended resolution & report (Beschlussempfehlung & Bericht)	
BMU	2021/08	Federal Ministry for Environment, Nature Conservation and Nuclear Safety	Consultation (Unterrichtung)	Accountability report 2021 of the Government on the Implementation of the National Strategy for Biological Diversity (Rechenschaftsbericht 2021 der Bundesregierung zur Umsetzung der Nationalen Strategie zur biologischen Vielfalt)
BMZ	2018/07	Federal Ministry for Economic Cooperation and Development	Minor inquiry (Kleine Anfrage)	Development Cooperation and organic CO2 sequestration (Entwicklungszusammenarbeit und organische CO2-Speicherung)
BMZ	2019/09	Federal Ministry for Economic Cooperation and Development	Major inquiry (Große Anfrage)	State of Implementation of the Agenda 2030 and the Global Sustainability Goals in, by, and with Germany (Stand der Umsetzung der Agenda 2030 und der globalen Nachhaltigkeitsziele in, durch und mit Deutschland)
Bundeskanzleramt	2021/03	Chancellor's Office	Consultation (Unterrichtung)	German Sustainability Strategy – Development 2021 (Deutsche Nachhaltigkeitsstrategie – Weiterentwicklung 2021)
CDU/CSU & SPD	2020/09	Parties with government mandate at the time of analysis	Claim (Antrag)	Protecting climate and environment sustainably (Klima und Umwelt nachhaltig schützen)
Deutscher Bundestag	2018/03	German Bundestag	Written questions (Schriftliche Fragen)	
Deutscher Bundestag	2018/08	German Bundestag	Written questions (Schriftliche Fragen)	
Deutscher Bundestag	2018/11	German Bundestag	Plenary protocol	
Deutscher Bundestag	2019/12	German Bundestag	Plenary protocol	
Deutscher Bundestag	2020/05a	German Bundestag	Plenary protocol	
Deutscher Bundestag	2020/05b	German Bundestag	Written questions (Schriftliche Fragen)	
Deutscher Bundestag	2021/05	German Bundestag	Plenary protocol	
Deutscher Bundestag	2021/06	German Bundestag	Written questions (Schriftliche Fragen)	
Deutscher Bundestag	2021/07	German Bundestag	Written questions (Schriftliche Fragen)	

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