



# The role of actors' issue and sector specialization for policy integration in the parliamentary arena: an analysis of Swiss biodiversity policy using text as data

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## Abstract

The role of the parliamentary arena and members of parliament (MPs) therein for both mainstreaming and cross-sectoral policy integration is largely unknown. Studying the case of Switzerland, this paper analyzes the integration of the biodiversity issue into policies of 20 different policy sectors over a period of 19 years to assess how two specific actor attributes—issue and sector specialization—increase the chances of MPs of engaging in both biodiversity mainstreaming and its cross-sectoral integration. The results based on a comprehensive collection of political documents from the parliamentary arena, and multilevel regression models show that an increase in MPs' sector specialization is associated with both a decrease in mainstreaming and a decrease in cross-sectoral integration activities. By contrast, an increase in issue specialization typically translates into biodiversity-related activity in a larger number of sectors. In the parliamentary arena, therefore, it is primarily a small group of “issue specialists” who take responsibility for the integration of crosscutting issues, such as biodiversity, into critical sectoral policies.

**Keywords** Policy integration · Cross-sectoral integration · Mainstreaming · Issue attention · Biodiversity · Parliament · Quantitative text analysis

## Introduction

Complex environmental issues such as climate change and the loss of biodiversity require coordinated policies across diverse policy sectors. Scholarly literature has addressed this issue with theories around policy integration and similar concepts such as policy mainstreaming, coherence, whole-of-government, and boundary-spanning policy regimes (Runhaar et al., 2014; Tosun & Lang, 2017). Policy integration across policy sectors constitutes a major challenge for governance and policymaking, as many policy decisions occur in sectoral “silos” (Metz et al., 2020). Policy sectors typically form around entrenched issues

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shaped by specialized actors from parliament and administration, as well as different types of public and private actors (e.g., governments, regulators, and interest groups).

The literature sees policy integration as a continuous process that spans the entire policy process (Candel & Biesbroek, 2016; Jordan & Lenschow, 2010). However, empirical work that allows for a better understanding of policy processes around policy integration remains relatively rare (Biesbroek & Candel, 2020). First, longer-term policy integration processes are rarely analyzed, and there is little focus on specific stages of the policy process or specific actors active therein. To bridge that gap, we focus on the members of parliament (MPs) and their behavior within the parliamentary arena that is the locus through which many different policy documents are produced or passed. Thus, policy integration, when occurring, becomes visible within documents dealt with at this stage of the policy process. Second, to disentangle different mechanisms of policy integration, we explicitly focus on two different aspects: (1) *mainstreaming*, that is the promotion (or at least consideration) of the issue in parliamentary documents, interventions, and policies; and (2) *cross-sectoral integration*, that is, the extent to which mainstreaming occurs across policy sector. Doing so, we analyze the integration of one specific issue into many different policy sectors and do not only focus on a few selected sectors—which sets our paper apart from most existing research on policy integration (Trein et al., 2020).

More specifically, we analyze the integration of the biodiversity issue into the policies of 20 different policy sectors over a period of 19 years. For a better understanding of both biodiversity mainstreaming and cross-sectoral integration, we employ an actor-centered approach, examining characteristics of MPs that engaged in biodiversity integration in the parliamentary arena in Switzerland. We look at how (1) differences in MPs' specialization in the biodiversity issue (*issue specialization*), and (2) differences in MPs' specialization in a particular policy sector (*sector specialization*) affect their biodiversity integration activities. Therefore, we ask: *What is the role of MPs' issue and sector specialization for policy integration in the parliamentary arena?*

To answer this question, we analyze Swiss biodiversity policy between 2000 and 2018. Based on a comprehensive collection of political documents (Reber et al., 2022), we examine the characteristics of the MPs introducing documents containing the issue of biodiversity (mainstreaming) into policy processes across different policy sectors (cross-sectoral integration). Combining quantitative text analysis with regression analysis, we use information extracted from documents (i.e., relevance to biodiversity and policy sector) to estimate the effects of a MPs' issue and sector specialization on both the number of documents on biodiversity a MP produces (mainstreaming) and on the number of policy sectors the MP covers with them (cross-sectoral integration).

This article contributes to the literature on policy mainstreaming and integration in at least three ways. First, this study employs both a long-term (19-year) and a cross-sectional (20-policy sector) perspective. By doing so, we consider the argument of the policy process literature that policy processes need to be studied over longer periods (e.g., Sabatier & Weible, 2007), as well as the argument of the policy integration literature that various sectors and their interactions should be studied jointly (e.g., Runhaar et al., 2014; Tosun & Lang, 2017). Second, by examining how MPs introduce biodiversity into different documents, as well as biodiversity documents into various sectors in the parliamentary arena, we emphasize the role of MPs as specific actors that can push for policy integration, and the parliamentary arena as a specific venue of the policy process where policy integration can happen. Indeed, actors' promotion of policy integration might include not only a problem-solving dimension but also a strategic one (e.g., Peters, 1998; Runhaar et al., 2014; Tosun & Lang, 2017). Additionally, specific MPs might act as brokers or entrepreneurs

between sectors, thus fostering policy integration (Cejudo & Trein, 2022; Ingold & Varone, 2012; Trein et al., 2021). Furthermore, minimal literature has focused on policy integration in the parliamentary arena (e.g., determining how political parties contribute to policy integration; see Bolleyer, 2011). Third, we innovate by combining quantitative text analysis methods and statistical models in our empirical analysis. This approach contrasts with the significant amount of literature on policy integration and related concepts that relies on qualitative case studies (Trein et al., this issue; Reber et al., 2022). Large-N data and quantitative methods do not allow for a given instance of integration to be studied in detail; however, as this article demonstrates, they do allow for a systematic comparison of integration elements over time and different sectors.

## Theory

The environmental governance and integration literature largely agrees that complex environmental challenges are effectively managed only when addressed in all critical sectors, and when cross-sectoral inconsistencies are avoided (Peters, 1998; Underdal, 1980). The practice-related literature continuously emphasizes the importance of overcoming work in silos, thereby strengthening cross-sectoral policy integration (i.e., the integration of an issue into the documents or procedures of various sectors) to tackle crucial sustainability challenges, such as climate change and biodiversity loss, or sustainability more generally (Messerli et al., 2019; OECD, 2018). However, the academic policy integration literature (Runhaar et al., 2014; Tosun & Lang, 2017) emphasizes the fact that cross-sectoral policy integration constitutes a major challenge to policymaking processes and actors involved therein, as many policy decisions are traditionally made within specific policy sectors and silos. As research on crosscutting issues such as water or climate change has shown (Brandenberger et al., 2022; Glaus, 2021), most actors are still “trapped” in their subsystem or sectoral logic. According to the literature, policy integration often involves at least two phenomena (Tosun & Lang, 2017): procedures and content. On the one hand, the literature has focused on the inter-sectoral coordination, typically among agencies or divisions of the state or the administrative apparatus (Christensen & Lægread, 2007; Molenveld et al., 2021; Nunan et al., 2012; Rietig, 2014; with regard to biodiversity, see Velázquez Gomar et al., 2014). An example for this procedural dimension for biodiversity integration would be an administrative coordination body or cross-sectoral working group dealing with biodiversity. Research focusing on procedures of policy integration implicitly or explicitly takes an actor-centered perspective, as actors put procedures to action. On the other hand, research has considered the concrete integration of specific elements, such as ideas and issues, into policies and political content (see, e.g., Candel & Biesbroek, 2016). For biodiversity integration, an example for this dimension would be the inclusion of biodiversity-relevant considerations and instruments in sectoral policies of the finance, education, or land use-planning sectors. We combine both approaches—namely actor and content focus—to study policy integration.

An increasing number of studies have analyzed policies and policy documents (e.g., Bolognesi et al., 2021; Metz et al., 2020; Nkiaka & Lovett, 2018) to investigate how specific issues relate to one or more policy sectors, and have related this to policy integration and similar concepts. However, few have adopted an actor-centered approach and analyzed which actors bring issues into which sectors (for exceptions, see Vogeler, 2022; Brandenberger et al., 2022; Metz & Glaus, 2019; Metz et al., 2020). For instance, Brandenberger

et al. (2022) studied how actors link different issues in Swiss water politics, and the mechanisms that typically drive their tendency to deal with one or several issues. Additionally, Metz et al. (2020) found that actors connect issues related to flood risk management differently than it is done in legal texts. Thus, actors are an important element of our understanding of how cross-sectoral policy integration occurs (Biesbroek & Candel, 2020; Tosun & Lang, 2017; Trein et al., 2019).

To shed light on how specific types of actors contribute to policy integration, we analyze two aspects of policy integration. The first aspect is best known as *mainstreaming* (for the issue of biodiversity see, e.g., Redford et al., 2015; Whitehorn et al., 2019; Zinngrabe, 2018). Building on Persson (2004), we define mainstreaming as the ongoing inclusion of objectives related to a crosscutting issue in any sectoral policy potentially affecting the subject matter. The second aspect of our analysis that we call *cross-sectoral integration* then accounts for the diversity of sectors in which mainstreaming takes place. Cross-sectoral integration thus tackles the extent to which mainstreaming effectively occurs not only within one sector, but also across policy sectors. For biodiversity, this includes also non-environmental sectors like spatial planning and housing, agriculture, energy, and education (Nunan et al., 2012).

The policy process involves several parallel arenas in which different types of actors deal with a number of issues. One of them is the parliamentary arena, where MPs are active. Of course, laws, regulations, and public policies are shaped by a long and complex process that is not restricted to only MPs and the parliamentary arena (Knill & Tosun, 2015; Sabatier & Weible, 2007). Furthermore, other actors such as representatives of the government and public administration, as well as representatives of different types of interest groups or substates, are also directly or indirectly active in the parliamentary arena (Sciarini et al., 2015). The activities of MPs are thus only one part of the policy process, even within the parliamentary arena. Yet in the parliamentary arena, MPs collectively either make binding decisions on policies or are involved in holding the government accountable by asking questions. MPs also use the parliamentary arena for setting the agenda, making use of the diverse instruments that allow them to either intervene in ongoing policy processes or bring a completely new issue on the agenda (Fischer et al., 2019). MPs thus have the opportunity to integrate issues into many different policies, and thus into the policies of many different sectors. Different studies, mainly at the EU and global levels, analyze crosscutting issues, such as sustainability, climate change, and energy, by focusing on the parliament—specifically the role of MPs, parties, and the parliamentary arena (Buzogány & Četković, 2021; OAS, 2017; Vogeler, 2022), but with no clear focus on policy mainstreaming and cross-sectoral integration.

MPs—at least in Switzerland—operate largely on their own and have considerable freedom to set their own agendas (Vatter, 2018). Given that there is no fixed coalition government in the Swiss system, but all major parties are represented in government, MPs have considerable freedom in supporting or opposing issues when formulating parliamentary interventions or voting. Different types of MPs differ with respect to their competences, capacities, and incentives to introduce a crosscutting issue into various documents and policy sectors. Depending on these and other factors, MPs can specialize on given issues, on broader policy sectors, or they can develop more of a generalist profile. Thus, two attributes that characterize MPs are of particular interest when it comes to the integration of a crosscutting issue: (1) how much of a MP's attention is devoted to a given issue relative to all of her or his activities in the parliamentary arena (*issue specialization*), and (2) the number of sectors in which a MP engages in total, that is with all of her or his activities in the parliamentary arena (*sector specialization*). Sector specialists—MPs whose activities

are concentrated on only a few policy sectors—are usually experts in their respective fields and are mainly active in one policy subsystem, such as energy, environmental protection, or water quality preservation (Brandenberger et al., 2022). Thus, they rarely engage in decision-making processes outside of their specialization. Issue specialists, on the other hand, are—like instrument constituencies (Simons & Voß, 2018)—primarily interested in a particular issue, such as biodiversity conservation. They have particular expertise regarding the issue (May et al., 2014) and strive to bring it into one or multiple sectors (Spruijt et al., 2014). Sector and issue specialists are not mutually exclusive, as a MP can be both or neither at the same time. For example, an MP may have a strong focus on the environmental sector (sector specialist) while also being a specialist for the issue of biodiversity. These attributes are also not absolute but gradual, as a MP's activities can be more or less concentrated on a particular issue or sector.

Building on these considerations, we expect to find specific patterns in response to our research question on the role of MPs' issue and sector specialization in their pursuit of policy integration in the parliamentary arena. First, we expect MPs with a high degree of sector specialization to focus less on crosscutting issues than on the sectoral issues that are relevant to their field. For this reason, we expect them to engage less in the mainstreaming of crosscutting issues, such as biodiversity, even within the scope of the sectors they focus on.

**H1** An increase in sector specialization is associated with a decrease in the mainstreaming of crosscutting issues.

Second, the distribution of a MP's biodiversity-related activities across sectors does not necessarily match the cross-sectoral distribution of all the MP's activities. Therefore, it seems worthwhile to determine the strength of the relationship despite the fact that MPs with a high sector specialization limit their activities to only one or a few sectors, restricting their possibilities for cross-sectoral integration a priori. We thus expect the lower level of sector involvement and interest in crosscutting issues that presumably come with an increased sector specialization to translate into issue-related activities in a smaller number of sectors. On the other hand, we expect MPs who specialize in a crosscutting issue (i.e., issue specialists) to be more likely to be aware of the cross-sectoral nature of "their" issue, thus pushing for its integration in a larger number of policy sectors.

**H2a** An increase in sector specialization is associated with a decrease in the cross-sectoral integration of crosscutting issues.

**H2b** An increase in issue specialization is associated with an increase in the cross-sectoral integration of crosscutting issues.

## Methods

### Case selection

The conservation and promotion of biological diversity is a wicked problem that can only be addressed effectively if it is mainstreamed into all policies that affect genetic, species, and ecosystem diversity. In addition to environmental policy, this issue affects numerous

policy sectors, including spatial planning and housing, transport, agriculture, energy, and the economy. The need for biodiversity integration is well recognized, which is why the Convention on Biological Diversity (CBD; UN, 1922) calls for parties to “integrate, as far as possible and as appropriate, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programs and policies” (CBD, Art. 6b). However, when it comes to integrating biodiversity “on the ground” (i.e., in individual sectoral policies), much work remains to be done (Karlsson-Vinkhuyzen et al., 2017; Velázquez Gomar et al., 2014; Whitehorn et al., 2019) because there are numerous policies that directly harm biodiversity (Gubler et al., 2020), while simultaneously the awareness for the issue in most sectors besides environmental policy is minimal or nonexistent (Reber et al., 2022). Biodiversity integration is thus an ongoing process that requires continuous advocacy by the actors involved in policymaking within and across policy sectors.

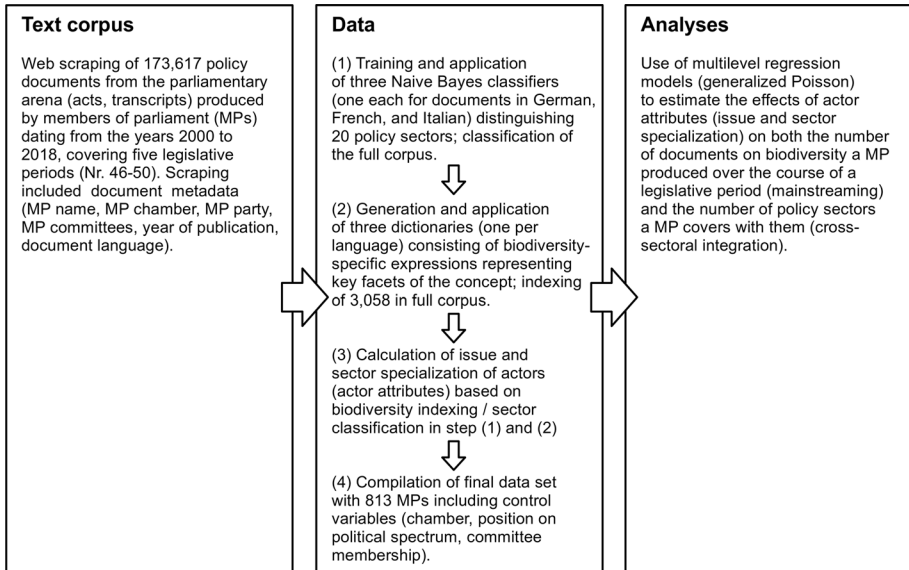
When it comes to the issue of biodiversity, Switzerland is a typical case. As many other countries, Switzerland designed its biodiversity policy in accordance with the CBD, a process that started after the Rio Summit in 1992 and developed rather slowly. Only 20 years later, in 2012, Switzerland adopted the national Biodiversity Strategy, and 5 years later, 2017, the related Action Plan. Both documents should specify the international commitments and guide the three pillars of biodiversity protection: species protection, protection of the genetic variety, and protection of habitats and landscapes.

When it comes to politics and the parliamentary arena more specifically, Switzerland might be a special case, as MPs have rather large room of maneuver and freedom in designing policies (Sciarini et al., 2021; Vatter, 2018). In comparison to other countries, parliament is quite independent from the government, and there is no fixed coalition government with clear support from given parties in parliament. While the Swiss parliament and MPs do not have many resources for research and staffing, they do have different “instruments” at their disposition in how to affect policy design and thereby produce different documents. Given this, Switzerland is an ideal case to study the integration of an issue through text analysis: MPs have the possibility to promote an issue through mechanisms that remain fairly insulated from external shocks (e.g., new government) or conflicting internal structures, and in the process produce documents that are accessible to researchers.

## Research design

To answer our research question, we focus on the Swiss parliamentary arena over the course of 19 years, taking into account five different legislative periods (periods 46–50). In the Swiss parliament, there are 246 MPs split into two chambers: the National Council, with 200 members and proportional representation of the overall population, and the Council of States, with 46 members representing each Swiss sub-national unit (canton) with two members. MPs influence the parliamentary process by discussing the legislative projects proposed by the government (or, in exceptional cases, by a parliamentary committee). We capture these discussions by analyzing transcripts of plenary sessions.

MPs also have various instruments with which they can direct the parliamentary process, including parliamentary initiatives, motions, and postulates. Furthermore, they have instruments with which they can hold the government accountable (e.g., interpellations and



**Fig. 1** Overview of the steps taken in the data collection, creation, and analysis

questions). We consider all these parliamentary acts by analyzing the written versions submitted by the MPs archived in written form.<sup>1</sup>

We opted for the legislative period as our reference time frame—that is, we use the output of documents of a MP during a legislative period as the basis for our analysis. Accordingly, one case in our analysis is the activities of an individual MP in biodiversity integration over the course of a legislative period. The same MP could therefore be present up to five times, namely if that MP had contributed to biodiversity integration through all five legislative periods between 2000 and 2019. Legislative periods are suitable time frames for our analysis as they cover all dynamics occurring before and after elections, as well as the alleged political *courant normal* in between.

To compile our data set, based on the parliamentary acts and transcripts, we used a combination of content analysis techniques to determine both the policy sector to which a document contributes and its relevance to biodiversity policy. Based on the documents in the text corpus, we also determined the degrees of issue and sector specialization of the MPs taking part in biodiversity integration based on their activities during a legislative period. To calculate these measures, we used the results of the content analysis done before (i.e., a document’s policy sector and its relevance to biodiversity policy). We then used multilevel regression models to estimate the effects of a MP’s issue and sector specialization on both the number of documents on biodiversity the MP produces and the number of

<sup>1</sup> Parliamentary bodies such as commissions may use the same instruments as MPs. However, we excluded acts initiated by parliamentary bodies from the analysis. The reasons for this are twofold: First, the actors in this group are heterogeneous in terms of their roles and competences, rendering it meaningless to look at them as a collective. Second, from a quantitative perspective, the actors in this group contribute little to biodiversity integration (i.e., they produce only few documents), thus making statistical reasoning problematic.



policy sectors these documents are spread across. Figure 1 provides an overview of all the steps of the analysis. In the remainder of this section, we explain each step in detail.

## Text corpus

We compiled a text corpus of 173,617 unique policy documents from the parliamentary arena between 2000 and 2018. Using only freely available databases, we collected different types of policy documents from MPs, that are parliamentary acts and transcripts. We aimed to obtain a complete collection of all these document types for the period mentioned. To collect the documents, we relied on the official application programming interface of the parliament. Along with its written content (i.e., “text”), we obtained the following meta-data for each document: information on its originator (i.e., name, chamber, party, and committees of the MP), the year of its publication, and its main language. Switzerland is a multilingual country with several official languages, which is why our corpus consists of texts in German ( $n = 132,781$ ), French ( $n = 39,001$ ), and Italian ( $n = 1835$ ).

## Data

To obtain data for our analysis of biodiversity integration, we processed the text corpus using the following steps: (1) We classified all documents by their policy sector; (2) we then indexed the documents relevant to biodiversity; and (3) calculated the issue and sector specialization of the MPs; and finally, (4) compile the final data set for our analysis using all the information produced in the previous steps.

1. *Classification by policy sector* To determine the policy sector to which a given document is related, we classified the documents using three Naive Bayes classifiers—one each for the German, French, and Italian documents.<sup>2</sup> Based on the Bayes theorem, the Naive Bayes classifier calculates the conditional probability of an event  $A$  given event  $B$  (Manning et al., 2008). In our case, event  $A$  is the policy sector a given document contributes to and event  $B$  is the frequency of the words present in that document. For the purposes of this analysis, we defined a policy sector as a collection of issues relevant to a specific topic, such as agriculture, energy, or health (Burstein, 1991). We trained the classifiers on parliamentary acts, which were assigned to one or more of the 20 different policy sectors (see online Appendix A for the complete list) by the Parliamentary Services when submitted by an actor of the parliamentary arena. Due to Switzerland’s multilingualism, all parliamentary acts are translated into all official languages by the administration, which provided high-quality training data for our study. After applying common preprocessing steps (removal of punctuation, removal of numbers, lowercase reduction, removal of stopwords, and stemming), the classifiers showed satisfactory accuracy for all languages (Macro F1, based on tenfold cross-validation:  $F1_{\text{German}} = 0.73$ ,  $F1_{\text{French}} = 0.76$ ,  $F1_{\text{Italian}} = 0.79$ ).<sup>3</sup> To further increase accuracy, we classified a document

<sup>2</sup> We used the *quanteda* package family for *R* (Benoit et al., 2018) to train and apply the classifiers.

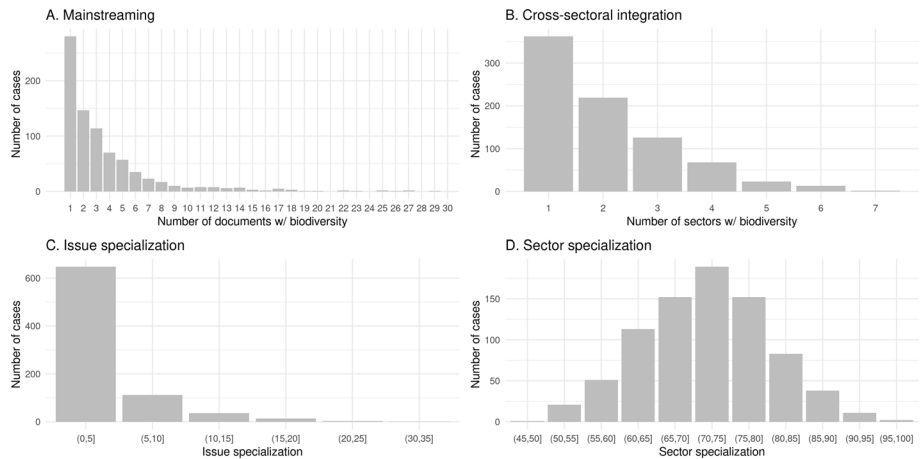
<sup>3</sup> The F1 score is a measure for the accuracy of a classification and calculated as the harmonic mean of *precision* and *recall* of a test, with *precision* being the number of true positives divided by the number of all positive results and *recall* being the number of true positives divided by the number of all true positives and false negatives (i.e., cases that should have been identified as positives). The Macro F1 score is the arithmetic mean of all per-class F1 scores, i.e., the F1 scores for the individual policy sectors. A F1 score of 1 would indicate both perfect precision and recall, a F1 score of 0 would indicate either precision or recall to be 0.



- as “not identifiable” when it contains less than 15 model terms or when the probability for the likeliest policy sector is lower than 0.4 ( $n = 24,460$ ).
2. *Biodiversity indexing* To then identify documents that address biodiversity, we used purpose-built dictionaries. Dictionaries consist of selected terms that are typically used when speaking about a concept in question. If the documents are then searched for these terms, relevant texts can be distinguished from irrelevant ones. Such a supervised approach is particularly suitable for concepts that are touched upon in different thematic contexts but are rarely mentioned by name, such as biodiversity (Reber et al., 2022). Using a multi-step process, we gathered and validated 167 terms for German, 189 terms for French, and 204 for Italian to reliably detect biodiversity references in the respective languages (see Reber et al., 2022 for a detailed description of the dictionary generation process). Using manual coding as the gold standard, the dictionaries achieved satisfactory accuracy values ( $F1_{\text{German}} = 0.91$ ,  $F1_{\text{French}} = 0.91$ , and  $F1_{\text{Italian}} = 0.94$ ). In applying the dictionaries to the documents in our corpus, we found 3058 documents that pertained to biodiversity policy, of which we excluded 69 from the analysis because their policy sectors were categorized as not identifiable in the previous step. This means we have a final number of 2989 documents mentioning one or more aspects of biodiversity.
  3. *Calculation of the issue and sector specialization of the MPs (actor attributes)* To determine a given MP’s degree of specialization, we looked at the following two metrics: (1) how a MP’s total activity (i.e., not only related to biodiversity) is distributed over sectors (sector specialization), and (2) how much of the MP’s overall activity is related to biodiversity (issue specialization). To answer the first question, we calculated the Gini coefficient on the number of documents a MP produced per sector as percentage.<sup>4</sup> A sector specialization of 100 would therefore indicate a complete concentration of activities on only one policy sector. A sector specialization of 0 would mean that the actor showed the same level of activity in all sectors. For the second question, we used the percentage of biodiversity-related documents to non-biodiversity-related documents produced by a MP as a metric. An issue specialization of 100 would therefore indicate a complete concentration of activities on the biodiversity issue, while 0 would indicate no activities related to biodiversity.
  4. *Compilation of final data set* Based on the 2989 documents attributed to a policy sector in step 1 and indexed as relevant to biodiversity policy in step 2, as well as the actor attributes computed in step 3 (i.e., issue and sector specialization), we compiled our final data set consisting of 813 cases, with a case being a MP’s contribution to biodiversity integration during a legislative period (i.e., the number of documents produced on biodiversity and the number of sectors these documents were distributed across). Additionally, we added information on the MP’s chamber (National Council or Council of States), the MP’s position on the political spectrum (left, center, or right),<sup>5</sup> committee

<sup>4</sup> Reducing distributions to a single number naturally comes with limitations. This is also true for the Gini coefficient as two MPs with different distributions of documents across sectors can potentially have the same Gini coefficient (De Maio, 2007).

<sup>5</sup> We determined the position of MPs on the political spectrum via their parliamentary group or, in the case of MPs without group membership, via their party affiliation. Left: Social Democrats (parl. group), Green Group (parl. Group), Swiss Party of Labour (party), Alliance de Gauche (party); Center: Christian Democrats/Center Group (parl. group), Green Liberals Group (parl. group), Evangelical Group (parl. group);



**Fig. 2** Distribution of cases by **A** the number of documents related to biodiversity, **B** the number of sectors these documents are distributed across, **C** the MPs' issue specialization, **D** the MPs' sector specialization

membership (dummy variable if a MP was member of the commission primarily responsible for biodiversity policy in the respective legislative period), the MP's seniority (number of legislative periods in office at the time of the legislative period in question), and the MP's degree of specialization in the environmental policy sector (calculated in the same way as issue specialization, but for the documents attributed to the environmental policy sector) in order to allow us to control for their effect in the models.

## Analysis

To assess how the two actor attributes—issue specialization and sector specialization— increase the chances of mainstreaming and cross-sectoral integration, we used multilevel regression models for count data (i.e., number of documents, number of sectors) testing for a linear relationship between actor attributes and integration efforts. Count data typically consists of non-negative integers and shows a distribution that is skewed with a mean close to zero (Hilbe, 2014). Figure 2 shows that this is also the case for the number of documents (plot A) and sectors (plot B), indicating a Poisson distribution of the dependent variables. However, regular Poisson models assume that mean equals variance. This assumption is violated by our data, as the distribution for the number of documents is over-dispersed (mean = 3.68, variance = 16.04), while the distribution for the number of sectors is under-dispersed (mean = 2.04, variance = 1.51). For this reason, we opted for generalized Poisson models capable to fit both over- and under-dispersed data (Consul & Famoye, 1992). Generalized Poisson models are based on generalizations of the Poisson distribution and can be interpreted as log-linear model, meaning that a regression coefficient  $\beta$  associated with a predictor  $X$  is the expected log change in the dependent variable per unit change in  $X$  given all other variables are kept constant (incidence rate ratio).

Footnote 5 (continued)

Right: Swiss People's Party (parl. group), FTP/Liberals Group (parl. group), Lega dei Ticinesi (party), Swiss Democrats (party).

We fitted the models as multilevel models<sup>6</sup> to account for the nested structure of our data. Our dependent variables are the output on documents concerned with biodiversity (*Docs*) and the number of sectors covered with these documents (*Sectors*) of individual MPs over the course of a legislative period, whereby (1) legislative periods may differ overall and (2) MPs may have been active in more than one period. Taking any patterns resulting from this structure into account, we allowed varying intercepts for both legislative periods (*Leg\_period*) and individual MPs (*MP*). In addition to our main independent variables—issue (*Issue\_spec*) and sector specialization (*Sector\_spec*)—we included a number of control variables: the MP’s chamber (*Chamber*), the MPs’ position on the political spectrum (*Pol\_spect*), whether or not the MP is member of the commission primarily responsible for biodiversity policy (*Committee*), the MP’s seniority (*Seniority*), and the MP’s degree of specialization in environmental policy (*Env\_spec*). The equations for the models fitted therefore read as follows:

$$\begin{aligned} \text{Mainstreaming (H1)} : \text{Docs}_i = & B_0 + B_1 * \text{Sector\_spec} + B_2 * \text{Chamber} \\ & + B_3 * \text{Pol\_spect} + B_4 * \text{Committee} + B_5 * \text{Seniority} + B_6 * \text{Env\_spec} \\ & + (B_0 | \text{Leg\_period}) + (B_0 | \text{MP}) + e_i \end{aligned}$$

$$\begin{aligned} \text{Cross-sectoral-integration (H2)} : \text{Sectors}_i = & B_0 + B_1 * \text{Issue\_spec} \\ & + B_2 * \text{Sector\_spec} + B_3 * \text{Chamber} + B_4 * \text{Pol\_spect} + B_5 * \text{Committee} \\ & + B_6 * \text{Seniority} + B_7 * \text{Env\_spec} + (B_0 | \text{Leg\_period}) + (B_0 | \text{MP}) + e_i. \end{aligned}$$

## Results

### Descriptive statistics

**Data set** In our sample of 813 cases, 434 individual MPs are represented. That are 70.9% of the 612 MPs active in the years between 2000 and 2018, indicating that the vast majority of MPs engaged at least once in biodiversity integration during their mandates. Taken together, the 434 MPs that took part in biodiversity integration account for a total of 129,934 documents or 74.8% of the 173,617 documents in our corpus. Of these documents, only 3058 address biodiversity, of which 1208 (40.0%) can be attributed to the environmental policy sector and 649 (21.2%) to the agricultural policy sector. Hence, biodiversity documents are distributed unevenly across sectors (see Appendix A for the complete list of documents per sector and Reber et al. (2022) for a more in-depth analysis).

**Document output of MPs** The average document output per MP and legislative period was 161.8 documents. However, there were considerable differences in the productivity of MPs. The same is true for documents on biodiversity as plot A in Fig. 2 shows. In 427 cases (52.5%), the MP engaged in biodiversity mainstreaming only once or twice in a legislative period. Taken together, these “occasional integrators” account for 574 (19.2%) of the 2989 biodiversity documents included in our analysis. In contrast, there are 60 cases (7.4%) in which MPs produced 10 or more documents on biodiversity during a legislative period, accounting for 911 (30.5%) of the biodiversity documents in our sample.

<sup>6</sup> To fit the models, we use the *glmmTMB* package for R (Brooks et al., 2017). For reporting, we use the *ggeffects* and *sjPlot* packages (Lüdtke, 2018).

*Sectors covered by MPs* On average, a MP covered 14.2 out of 20 different policy sectors with the documents produced during a legislative period. This number is substantially lower for biodiversity documents. As plot B in Fig. 2 illustrates, there are 581 cases (71.5%) in which MPs addressed biodiversity in not more than two sectors. The MPs with such a narrow sectoral focus account for a total of 1211 (40.5%) of all documents on biodiversity. On the other hand, there are only 38 cases (4.7%) in which MPs engaged in biodiversity integration in 5 or more sectors. These MPs produced 477 (16.0%) of all biodiversity documents in our sample.

*Issue and sector specialization* On average, only 3.4% of the documents a MP produced during a legislative period were devoted to biodiversity. Plot C in Fig. 2 thereby shows that there are 647 cases (79.6%) in which MPs had an issue specialization of 5 or less, accounting for 1668 (55.8%) of the documents on biodiversity in our sample. However, there is a long tail to the distribution, with 54 cases (6.6%) in which MPs had an issue specialization of 10 or more. These “issue specialists” account for a total of 610 (20.4%) of the biodiversity documents. For sector specialization, plot D in Fig. 2 shows a normal distribution around the mean of 71.72. The 420 (51.7%) “sector specialists” with an above average sector specialization account for 1202 or 40.2% of the documents addressing biodiversity.

*Control variables* 195 (24%) of the 813 cases in our data set come from members of the Council of States and 618 cases (76%) from members of the National Council. In 179 cases (22.0%), the MP was a member of the Environment, Spatial Planning and Energy Committee. In terms of position in the political spectrum, in 267 cases (32.8%) the MP was classified as left-wing, in 213 cases (26.2%) as center, and in 333 cases (40.0%) as right-wing. In 732 cases (90.0%), it was the MP’s first legislative period in office, in 73 cases (9.0%) the second period, and only in 8 cases (1.0%) the MP was in the third or fourth legislative period. The average degree of specialization in environmental policy was 3.6. As with issue specialization, however, the distribution is heavily left skewed with 643 cases (78%) engaging in the environmental policy sector in less than 5% of their activities overall.

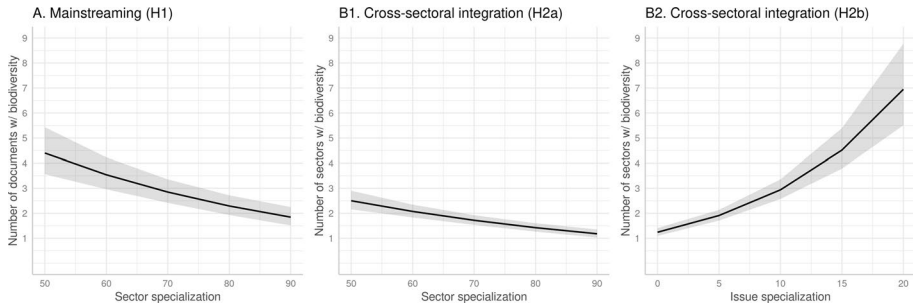
## Regression models

Figure 3 shows the results as counts predicted by the two multilevel models fitted to estimate the effects of actor attributes on both the number of documents produced on biodiversity (mainstreaming) and the number of policy sectors these documents are distributed across (cross-sectoral integration). Table 1 shows the full model results.

Looking at mainstreaming first, plot A in Fig. 3 shows that with every percentage point increase in sector specialization, the expected number of documents relevant to biodiversity policy produced by a MP over the course of a legislative period decreases by 2.2% ( $p < 0.001$ ). We did not hypothesize an influence of issue specialization on mainstreaming, and therefore did not test for this relationship as the two variables are endogenous.

For cross-sectoral integration, the picture is similar. Looking at plot B1 in Fig. 3, we see that with every percentage point increase in sector specialization the number of sectors we can expect a MP to engage in biodiversity integration decreases by 1.8% ( $p < 0.001$ ). For issue specialization, on the other hand, plot B2 shows that for every one percentage point increase, the number of sectors an MP is likely to cover with biodiversity mainstreaming activities increases by 9.0% ( $p < 0.001$ ).

In both models, we included control variables: First, we controlled for the MP’s chamber as the two chambers vary in size and have different *modus operandi* (Vatter, 2018). Not surprisingly, while this variable does not influence mainstreaming, MPs from the Council of the



**Fig. 3** Predicted counts (marginal effects) adjusted for a member of the National Council from the center of the political spectrum who is not a member of the Environment, Spatial Planning and Energy Committee, having a seniority of 1.11 legislative periods, and an environmental policy specialization of 3.6. Also, predicted counts are adjusted for an issue specialization of 3.4 (plot B1) or sector specialization of 71.7 (plot B2). The gray area marks the 95% confidence interval

States were more active in terms of cross-sectoral policy integration, given that they have to deal with more sectors due to the smaller size of the chamber (46 vs. 200 MPs in the National Council). Second, MPs' position on the political spectrum matters. We observed that MPs from the right spectrum tend to be less active in terms of biodiversity mainstreaming and cross-sectoral integration as compared to center or left MPs. Third, MPs that are members of the commission primarily responsible for biodiversity policy (i.e., the Environment, Spatial Planning and Energy Committee) were more active in terms of both mainstreaming and cross-sectoral integration. Fourth, our results show that the sector in which a MP specializes matters as well, as each percentage point increase in environmental policy specialization is associated with a 21.3% increase in the MP's biodiversity document output ( $p < 0.001$ ) and a 3.2% decrease in the number of sectors covered therewith ( $p < 0.001$ ). Finally, we find no significant effect of the MP's seniority on biodiversity integration activities.

## Discussion

Looking at both the number of documents produced on the issue (mainstreaming) and the number of sectors to which these documents can be attributed (cross-sectoral integration), our results show that both sector and issue specialization of a MP plays an important role for the MP's involvement in policy integration. An increase in sector specialization is associated with both a decrease in mainstreaming of the biodiversity issue (H1) and a decrease in the issue's cross-sectoral integration (H2a). Thus, in general, our results confirm hypotheses H1 and H2a. Yet, our results show that the sector in which an MP specializes matters for biodiversity mainstreaming, as a higher degree of environmental policy specialization is associated with a larger output of biodiversity documents. An increase in issue specialization, on the other hand, is generally associated with an increase in the cross-sectoral integration of the issue, confirming our third hypothesis H2b. Here, a potential specialization in environmental policy does not affect the results.

**Table 1** Full model results

Predictors	Mainstreaming (number of documents w/biodiversity)			Cross-sectoral integration (number of sectors w/biodiversity)		
	Incidence rate ratios	CI	<i>p</i>	Incidence rate ratios	CI	<i>p</i>
(Intercept)	9.29	5.63–15.33	<0.001	5.02	3.50–7.18	<0.001
Issue specialization				1.09	1.08–1.10	<0.001
Sector specialization	0.98	0.97–0.98	<0.001	0.98	0.98–0.99	<0.001
Chamber: Council of States	1.31	1.14–1.51	<0.001	1.19	1.08–1.32	0.001
Spectrum: Left	0.99	0.85–1.17	0.936	1.07	0.95–1.20	0.256
Pol. Spectrum: Right	0.81	0.69–0.94	0.007	0.87	0.78–0.98	0.016
Committee membership	1.18	1.03–1.36	0.017	1.28	1.16–1.42	<0.001
Seniority	1.11	0.95–1.28	0.180	1.06	0.95–1.18	0.271
Environmental policy specialization	1.07	1.05–1.08	<0.001	0.97	0.96–0.98	<0.001
<i>Random effects</i>						
$\sigma^2$	0.32			0.18		
$\tau_{00}$	0.01	Legislative period		0.00	Legislative period	
	0.20	MP		0.12	MP	
ICC	0.40			0.36		
<i>N</i>	5	Legislative period		5	Legislative period	
	434	MP		434	MP	
Observations	813			813		
Marginal $R^2$ /conditional $R^2$ (see Nakagawa et al., 2017)	0.268/0.559			0.276/0.540		

These results, however, must be put into perspective by looking at the underlying frequency distributions. There, our results show that around half of the MPs (52.5%) involved in biodiversity integration do so only once or twice per legislative period, making the MPs pushing for the issue's mainstreaming with ten or more documents per legislative period a relatively small group (4.7%). The same is true for the issue's cross-sectoral integration as in most cases (71.5%) the MPs addressed biodiversity in not more than two different sectors. In only 4.7% of cases, MPs brought biodiversity into five or more different sectors over the course of a legislative period.

These findings are important for understanding the process of policy integration. If MPs only rarely produce documents on biodiversity, and do so only in a very limited number of sectors, this could be an indication of (1) why the issue lacks attention in most sectors outside of environmental and agricultural policy (see also Reber et al., 2022), and (2) why crosscutting issues are often not addressed coherently and therefore effectively (Gubler et al., 2020; May et al., 2005): There is a lack of both issue attention and policy coordination across sectors (Peters, 1998; Trein et al., 2021). Still, as our results suggest, issue specialists can act as brokers or entrepreneurs between sectors by being involved in various policy processes at the same time. So, these are potential actors occupying key positions in political process through linking divers actors across different venues and subsystems and who have the capacity to promote policy integration and coordination (Cejudo & Trein, 2022; Ingold & Varone, 2012; Trein et al., 2021).

Given that most MPs engage with biodiversity only occasionally, our findings also help to explain why integration within sectors proceeds in cycles rather than in steady long-term shifts (Reber et al., 2022). That most MPs address the issue rarely and in a very limited number of sectors suggests that they are reacting rather than acting when it comes to biodiversity integration. A more consistent document output, on the other hand, could be interpreted as an active push for the issue's integration. However, the number of MPs committed to that is not sufficient to increase issue attention for a longer period of time; instead, the evolution of attention depends on the temporary attention to the issue of the "occasional integrators." Hence, we argue that while the small group of "issue specialists" are essential as drivers of the integration process, it is ultimately the MPs who then jump on the issue and allow "punctuations" (Baumgartner & Jones, 1993) and thus successful policy integration to happen.

However, our results at the intersection of several relevant streams of literature only provide a first glimpse into the policy integration dynamics in the parliamentary arena. Future research could offer a more nuanced view of the parliamentary process in multiple ways. First, additional attribute data such as MPs' links to interest groups could be considered to provide a more nuanced picture of who drives policy integration, given that these links provide MPs with knowledge and other resources (e.g., Fischer et al., 2019). Second, different crosscutting issues related not only to the environment (health, gender, etc.) could be compared to determine how the picture of MP activity might change. Third, different parliamentary processes across different countries could be compared to determine the specificities inherent to the executive–legislative relationship, which specificities are issue-specific, and which patterns are generalizable across countries, systems and issues. Fourth, while our reliance on text-as-data approaches has allowed us to analyze a large number of documents and the prominence of biodiversity-related concepts therein, it is not excluded that some of these documents actually oppose biodiversity conservation and the integration of biodiversity in different policy sectors. However, it is unlikely that negative references to biodiversity are highly explicit, and they are very hard to capture using automated text analysis tools. Other, more qualitative approaches might be more appropriate for assessing



these aspects. Fifth, based on our data, we are unable to say if an actor initiates biodiversity mainstreaming or cross-sectoral policy integration in an entirely new policy process, or if the MPs rather reacts to an ongoing process. Even with a hand-coding of the documents, determining which policy document belongs to which policy process exactly, and how they logically follow each other, would be difficult, as policy documents often potentially contribute to several parallel policy processes. Other sources than only documents would help to disentangle this dynamic policy process aspect of parliamentary work, and work beyond the parliamentary arena. Finally, we do not know whether what we assess as biodiversity policy integration in this article—that is, the mentioning of biodiversity-related concepts in many documents (mainstreaming) across different policy sectors (cross-sectoral integration)—leads to policy integration at the end. Our analysis merely allows us to assess whether such integration efforts are present in the parliamentary arena. We assume that the more strongly they are present in this part of the policy process, the more likely we are to observe integration also at later stages, including implementation processes, of the policy process.

## Conclusion

In this article, we adopted an actor-centered approach to policy integration and studied the integration of the crosscutting issue of biodiversity into several policy sectors. More specifically, we examined the parliamentary arena in Switzerland, focusing on the ability of MPs to act as “integrators” of a crosscutting issue by either contributing to mainstreaming or to cross-sectoral policy integration through the documents they are submitting, amending, or discussing. Doing so, we proposed an innovative combination of theoretical insights and empirical foci from different literatures: First, the policy integration and mainstreaming literature emphasizes the importance and the different aspects of policy integration (Candel & Biesbroek, 2016; Cejudo & Trein, 2022; Jordan & Lenschow, 2010; Runhaar et al., 2014; Tosun & Lang, 2017). Second, the literature on parliamentary behavior emphasizes that MPs have different characteristics, resources, interests and strategies for their parliamentary activities, and are successful in achieving their goals to different degrees (Buzogány & Četković, 2021; Fischer et al., 2019; OAS, 2017; Sciarini et al., 2021; Vogeler, 2022). Finally, by employing a long-term perspective, we respond to the emphasis of the policy process literature on studying longer periods and process dynamics (e.g., Sabatier & Weible, 2007). Thus, for the analysis presented in this paper, we relied on data obtained through quantitative text analysis, considering 19 years (five legislative sessions) and 20 policy sectors. To assess how MPs’ issue and sector specialization affect the chances of them contributing to biodiversity mainstreaming and cross-sectoral policy integration, we relied on multilevel regression models.

Our results show that an increase in MPs’ sector specialization is associated with a decrease in both mainstreaming and cross-sectoral integration activities. By contrast, an increase in issue specialization typically translates into biodiversity-related activity in a larger number of sectors. However, our results also show that the number of MPs really committed to biodiversity integration is small. Although such “issue specialists” may act as drivers and brokers for the successful integration of the issue across sectors, their advocacy is not sufficient to sustain biodiversity mainstreaming outside of environmental and agricultural policy. In sectors less sensitive to biodiversity, awareness of the issue very much depends on the temporary commitment of “occasional integrators”. Building on our work,

future research can expand our understanding of the policy integration process by not only looking at additional actor attributes (e.g., their ties to interest groups) and issues (e.g., health, gender), but also by tracing individual policy processes over time in order to identify dynamics among actors with different characteristics (e.g., issue specialists vs. occasional integrators).

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**Availability of data** A use file for the replication of the analysis reported in this study is available at <https://doi.org/10.5281/zenodo.7341147>.

**Availability of code** The R code produced for analysis reported this study is available at <https://doi.org/10.5281/zenodo.7341147>.

## Declarations

**Conflict of interest** The authors declare no potential conflicts of interest.

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