Policy Sciences (2022) 55:311–335
https://doi.org/10.1007/s11077-022-09456-4

RESEARCH ARTICLE

# Integrating biodiversity: a longitudinal and cross-sectoral analysis of Swiss politics

**Ueli Reber[1,2] · Manuel Fischer[2,3] · Karin Ingold[2,3] · Felix Kienast[1] · Anna M. Hersperger[1] · Rolf Grütter[1] · Robin Benz[1,3]**

Accepted: 18 March 2022 / Published online: 4 April 2022


**Abstract**
The effective conservation and promotion of biodiversity requires its integration into a wide range of sectoral policies. For this to happen, the issue must receive attention across policy sectors. Yet, we know little about how attention to the issue evolves over time and across sectors. Drawing from the literature on environmental policy integration/mainstreaming and policy process theories, we develop competing hypotheses, expecting either increasing or fluctuating attention to the biodiversity issue. We tested the hypotheses using the case of Swiss politics between 1999 and 2018. Applying a combination of computational methods, we analyze the content of a comprehensive collection of policy documents ($n \approx 440{,}000$) attributed to 20 policy sectors. Comparing the sectors, we find that (1) a persistent increase in attention is the exception, (2) if there is an increase in attention, it is likely to be temporary, and (3) the most common pattern is that of invariant attention over time. Biodiversity integration—if it does happen at all—tends to occur in cycles rather than in steady long-term shifts. This implies that the conservation of biodiversity does not follow the cross-sectoral nature of the problem, but is subject to the dynamics of "politics," where actors, because of limited resources, engage with (aspects of) an issue only for a certain amount of time.

**Keywords** Policy integration · Mainstreaming · Biodiversity · Issue attention · Quantitative text analysis

## Introduction

Traditional policymaking very often happens in so-called sectoral silos (Metz et al., 2020; Tosun & Lang, 2017;). By contrast, the mere nature of some problems is cross-sectoral. This is the case, for example, when the causes of a problem span different policy sectors,

✉ Ueli Reber
ueli.reber@eawag.ch

[1] Swiss Federal Institute for Forest, Snow, and Landscape Research (WSL), Birmensdorf, Switzerland

[2] Swiss Federal Institute of Aquatic Science and Technology (Eawag), Dübendorf, Switzerland

[3] University of Bern, Bern, Switzerland

such as pollutants in waters originating from industry, agriculture, or hospitals. Similarly, the causes and effects of a problem may involve different sectors, like the use of pesticides in agriculture and their impact on the health of bystanders. Scholars therefore argue that policies introduced in one single sector cannot effectively or appropriately address these problems (Driessen et al., 2012; Ingold et al., 2018; Peters & Hoornbeek, 2005). This is also the reason why the environmental policy integration (EPI) literature (Lafferty & Hovden, 2003; Runhaar et al., 2014) is mostly focusing on such cross-sectoral policy problems as climate adaptation and flood prevention (Bolognesi et al., 2021), water management (Metz & Glaus, 2019), or food systems (Mintcheva, 2005). In this context, integration means two processes in particular (Tosun & Lang, 2017): the inter-sectoral coordination or the concrete integration of specific elements such as considerations, issues, and stakeholders (see, e.g., Candel & Biesbroek, 2016) from one sector into others. We are here interested in the second and more concretely in biodiversity issue integration, as also the literature on environmental mainstreaming (Whitehorn et al., 2019) explicitly emphasizes the importance of integrating an issue into various related sectors. This line of research further focuses on learning mechanisms that, over time, should lead to a continuous increase of cross-sectoral inclusion of the issue—that is, more attention to the issue to be mainstreamed within all critical sectors (Norton, 2005).

The literature on policy process theories (Sabatier & Weible, 2014) takes a different perspective on policymaking and the attention paid to given issues. This line of research argues that an issue (such as biodiversity) is driven by attention cycles and, thus, is subject to fluctuations in attention over time (Baumgartner & Jones, 1993; Downs, 1972).

Thus, although the mainstreaming literature expects an issue's attention to increase over time in diverse sectors, policy process theories would expect fluctuating attention and a rise and fall of the importance of the issue, with no specific longer-term trend of increasing attention. Against this background, we ask: *How does attention to an issue evolve over time and across sectors?*

To answer this, we study Swiss biodiversity policymaking from 1999 to 2018. Fighting against the loss of biodiversity is one of the most important sustainability challenges that needs to be addressed (Neumayer, 2003; Norton, 2005). Biodiversity is a cross-sectoral issue; it has an impact on different ecosystem services and is threatened by numerous human activities. To counter the loss and promote the conservation of biodiversity, the literature on biodiversity integration argues that coordinated work and action are needed with other sectors, such as agriculture, spatial planning, landscape protection, housing, energy, or trade (Díaz et al., 2018). Using computational methods, we analyze a comprehensive collection of policy documents, such as parliamentary proceedings, reports, laws, regulations, and court decisions, to assess how much attention is given to the issue. With this approach, we focus on what is included in the policy documents, hence understanding biodiversity as the subject of the political discourse around the biological concept of biodiversity.[1]

Furthermore, we apply an encompassing view on policymaking, looking at three different stages of the policy process in which a (potentially cross-sectoral and integrated) policy can be shaped and (re)designed: the drafting of policies (including policy formation, and

[1] The biological concept of biodiversity is usually defined as "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems" (UN, 1992).

decision-making), their introduction (i.e., the actual legal texts), and their eventual interpretation by courts. Patterns of policy integration may differ across these stages because different actors are involved throughout (Koppenjan & Klijn, 2004), different decision-making rationales apply (Howlett, 2011), and different capacities for integration exist (Candel & Biesbroek, 2016). However, if an issue does not make it through the legislative process into laws and ultimately into court rulings, its integration remains deficient.

In doing so, we make four contributions to the literature. First, we shed light on policy integration by contrasting it to theoretical arguments from the policy process literature, here in the form of a set of competing hypotheses. Although there is indeed some empirical evidence that the inclusion of an issue increases over time (Gumucio & Rueda, 2015; Zinngrebe, 2016), the policy process literature emphasizes external shocks or the issue attention cycle to explain why a topic gains attention at some point in time (Baumgartner & Jones, 1993; Birkland, 2005). Second, although the processual nature of policy integration is widely recognized (Candel & Biesbroek, 2016), studies systematically analyzing the output of issue integration across stages of the policy process are rare (e.g., Alons, 2017). Moreover, the courts' interpretation of laws has been a blind spot in policy integration research, even though courts often play a critical role in environmental policymaking (Duane, 2013). The present study addresses these shortcomings. To evaluate whether biodiversity integration "proceed[s] beyond discursive levels" (Biesbroek & Candel, 2020, p. 62), we compare three stages of the broader policy process (drafting, introduction, and interpretation by courts). Third, complementing the large share of policy integration studies relying on qualitative methods (Trein et al., 2019), we use quantitative text analysis, allowing us to study biodiversity integration on a large scale in a variety of policy documents written in three different languages over the course of 20 years. Unlike previous quantitative studies (e.g., Biesbroek et al., 2020; Schmidt & Fleig, 2018), we not only analyze different document types, but we propose and compare different quantitative indicators to assess issue attention across policy sectors and the stages of the policy process. Fourth, we study biodiversity and its inclusion in 20 policy sectors (see also Zinngrebe, 2018) and compare these sectors over 20 years. Thus far, most policy integration studies have focused either on the integration of one issue in one sector at one point in time or on the strategy of how integration is to be achieved. Cross-sectoral policy integration is, however, a process likely to take several years or decades, and only an analysis covering a longer period of time can show the respective developments. We look at how biodiversity has been integrated over the years in different public policies of various sectors to see if the importance given to this issue at the international level and in science (Runhaar et al., 2014; UN, 2016; Young, 2011) also applies to policymaking on the national level.

In what follows, we first present the main arguments of the two streams of literature (mainstreaming and policy process), clarify important concepts, and then develop our hypotheses. We then explain how we collected the data and how we proceeded with the analysis before presenting the results. We conclude the article with a discussion of the results and their implications for theory and politics.

## Theory

The first theoretical lens this analysis builds on is cross-sectoral policy integration, also referred to as environmental mainstreaming. The wider literature on environmental policy integration—which encompasses biodiversity—had focused on the incorporation of

environmental objectives in non-environmental policy sectors (Persson et al., 2018). Early research on mainstreaming tried to show that meeting complex environmental challenges is only possible when inconsistencies about the environmental issue are avoided across different policies and sectors (Peters, 1998; Underdal, 1980). The field has developed over the past few decades, which has resulted in the creation of new normative and analytical approaches (Runhaar et al., 2014, 2018; Widmer, 2018). Although a considerable part of the policy integration literature focuses on administrative (re)organization (Christensen & Lægreid, 2007; Molenveld et al., 2021; Nunan et al., 2012; Rietig, 2014), also with regard to biodiversity (Velázquez Gomar et al., 2014), an increasing number of applications are analyzing policies and policy documents (Metz et al., 2020; Nkiaka & Lovett, 2018). They evaluate the degree to which environmental issues and objectives are taken into consideration, coordinated (across sectors to benefit from synergies), harmonized (with objectives in different policies), and prioritized (favoring biodiversity over other issues) (see Cejudo & Michel, 2017; Widmer, 2018). Thereby, the analytical focus lies on different elements, such as policy objectives, normative principles, administrative reorganization, general organizational challenges, policy outputs or outcomes, implementation, and monitoring (Jordan & Lenschow, 2010; Persson et al., 2018).

The second theoretical lens is policy process theories. Most policy process theories—while not a coherent theory—focus on how the given issues appear on the political agenda and how policies change and evolve over time (Birkland, 1997, 2006; Hogan & Howlett, 2015; Jones, 1994). These theories agree that change on the public agenda or policy change, however, represents the exception rather than the rule (Sabatier & Weible, 2014). The punctuated equilibrium framework, for example, argues that policies are characterized by stability over decades and that change happens rarely and in so-called punctuations—that are relatively abrupt and large-scale shifts (Baumgartner & Jones, 1993). Similarly, the advocacy coalition framework expects policy change processes to take a decade or more and policy change to happen only under specific combinations of circumstances (Jenkins-Smith et al., 2018). Also, the multiple streams framework considers agenda and policy changes to occur relatively rarely and when so-called "windows of opportunity" open (Kingdon, 1994). These theories argue that policy change is rare because specific combinations of factors and conditions, such as, for example, changing public opinion, external shocks, or policy learning over time, need to be present for the political system to create considerable change (Dunlop & Radaelli, 2018). We focus here on one specific such potential driver for change being issue attention (Jones & Baumgartner, 2005b, 2012): individuals and organizations in policymaking attribute conscious but limited attention to issues mainly due to reduced capacities or resources such as time (see also Brandenberger et al., 2020).

Both the mainstreaming and policy process literature emphasize the importance of policy sectors as analytical entities for understanding how policies are made. We define a policy sector—also referred to as policy domain—as a collection of (sub-)issues relevant to a specific topic, such as agriculture, energy, and health (Burstein, 1991). For the case of biodiversity, sub-issues may include wildlife conservation, farming practices, and genetically modified organisms. These sub-issues are specific policy disputes in which questions relevant to biodiversity materialize in policy sectors (see Maier et al., 2018a). Although biodiversity policy can be discussed as such (e.g., when drafting a cross-sectoral biodiversity strategy), it only comes into existence through concrete sub-issues that emerge in and across policy sectors. Therefore, the integration of biodiversity into (sectoral) policies is achieved through these sub-issues. Hence, we understand the issue of biodiversity as the sum of its sub-issues present in the different policy sectors.

We focus on the attention that the issue of biodiversity has received by employing four concepts. More integration can mean a) more attention to the issue compared with others (*relative attention*), b) the diffusion of the issue into a growing number of policy sectors (*sectoral concentration*), c) the fragmentation of the issue into a growing number of sub-issues (*sub-issue concentration*), and d) a more clearly defined issue, that is, an issue that is dealt with more cohesively in terms of key concepts and terms (*cohesion*).

The first concept, *relative attention*, is prominent in policy studies: already Downs (1972) points out that policy issues go through a cycle and receive more or less attention over time. Many policy process theories, such as multiple streams or punctuated equilibrium, follow the assumption that a large amount of attention to an issue at one point in time enhances the chances for an issue to be translated into policies and bring about policy change (Baumgartner & Jones, 1993; Kingdon, 1994). Issue attention can, for example, take the form of media presence or parliamentary discourses. In the mainstreaming literature, issue attention is also important because it serves as a precondition or indicator for inclusion (Zinngrebe, 2018). As soon as an issue such as biodiversity receives attention, this is the first piece of evidence that existing or new policy ideas, objectives, or instruments are being developed, coordinated, or harmonized with this issue (see also Tosun & Leininger, 2017; Widmer, 2018).

The second concept is *concentration*. We distinguish two dimensions of concentration: (1) how uniform attention to the issue is distributed over policy sectors (*sectoral concentration*) and (2) how uniform attention to the issue is distributed over sub-issues (*sub-issue concentration*). Sectoral concentration is more in line with the basic idea of mainstreaming in that an issue is absorbed or even prioritized in different sectors, following this cross-sectoral perspective (Peters, 2015; Whitehorn et al., 2019). Sub-issue concentration, on the other hand, derives from the policy process literature (e.g., Baumgartner & Jones, 1993), where it is argued that the capacities of the political system are limited and, accordingly, only a finite number of (sub-)issues can be dealt with simultaneously.

Finally, the concept of *cohesion* is crucial to the integration process as cohesive issues can favor cross-sectoral policy integration (Jochim & May, 2010). Here, it is important to distinguish between biodiversity as an issue and biodiversity as a label. Some sub-issues, such as protected areas, have existed for a long time but were not and still are not necessarily seen as part of the broader biodiversity issues in the policy process. Thus, biodiversity considerations do not necessarily have to be labeled as such. Addressing this fragmentation, we understand cohesion as the degree to which biodiversity considerations are explicitly linked to the concept of biodiversity by using the label "biodiversity." The "ideational uptake" (Jochim & May, 2010, p. 317) of an integrative concept such as biodiversity by actors across sectors not only allows otherwise fragmented sub-issues to be linked to an overarching goal, but may also strengthen support for that common goal overall (May et al., 2011). This, in turn, may increase interest in integrating biodiversity into sectoral policies.

## Four sets of competing hypotheses

In-line with the four concepts (relative attention, sectoral and sub-issue concentration, cohesion), we have developed a set of competing hypotheses deduced from the two strands of literature introduced above (mainstreaming and policy process theories). The hypotheses are competing in that they emphasize different aspects of policymaking, why they can also both be supported or rejected at the same time. The first set of hypotheses (a) is based on the mainstreaming literature and, more specifically, on its normative

strand. This strand commonly focus on the willingness (of actors) to adopt "constitutional and legal provisions to consider environmental objectives in policy formation and implementation" (Nilsson & Persson, 2017, p. 36; see also Tosun & Peters, 2018), which includes two main facets: either the need for further issue integration is emphasized (purely normative; see UN, 2012) or ways to make cross-sectoral collaboration an institutional reality are illustrated (empirically observable; for a discussion see Jordan & Lenschow, 2010; Persson, 2004). We try to consider both those views while formulating the first of each block of hypotheses (a) below.

The second set of hypotheses (b) is based on the policy process literature and expects issue attention punctuations. It follows the expectation that goes back to the issue attention cycle introduced by Downs (1972) and states that issue attention behaves similarly to changes in politics and policy (Baumgartner et al., 2009): stability and incrementalism are the norm and the degree to which attention is paid to certain issues various over time, increases and decreases again (see also Birkland, 1997).

These two general expectations can be translated into more specific hypotheses.

*Relative attention:* A key factor for understanding policy change is the attention paid to a (new) issue: the more attention an issue receives, the greater its chance of being included in policymaking (Jones & Baumgartner, 2005b). Departing from the fact that biodiversity (such as other environmental issues) are relatively young compared with more "standard" issues of agriculture, health, labor, and market regulation, biodiversity mainstreaming would expect an increase in the attention devoted to the issue. In that sense, EPI and mainstreaming go hand in hand with a normative approach (Persson, 2007), along with the claim that effective environmental protection and biodiversity conservation can only be achieved if other policies integrate the environmental or biodiversity issue. Even policy integration studies that are more critical or show evidence about the (reduced) integration potential over time (mainly in terms of coordination and coherence, see Bolognesi et al., 2021; Cejudo & Michel, 2017) emphasize that (new) issues have the tendency to increase in their extent.

In contrast, policy process theories claim that issue attention is, however, not constant. Here, Downs (1972) presents the issue attention cycle, where after a period of attention, an issue again loses its power on the political agenda. From this, we deduce our first set of competing hypotheses:

**H1a** (mainstreaming) Attention to the biodiversity issue relative to other issues increases over time.

**H1b** (policy process) Attention to the biodiversity issue is subject to temporal fluctuations, with one or more punctuation(s) where issue attention is particularly high (attention cycles).

*Sectoral concentration:* Biodiversity belongs to those issues that are inherently cross-sectoral (Díaz et al., 2018). There is evidence that biodiversity loss is also due to uncoordinated actions and strategies in various sectors, such as land use, agriculture, or species conservation (Whitehorn et al., 2019). Thus, cross-sectoral issues require cross-sectoral solutions (Peters, 2015). From a normative mainstreaming perspective, policies addressing biodiversity conservation should be designed by following the cross-sectoral nature of the issue (Ingold et al., 2018). Following this cross-sectoral principle,

biodiversity mainstreaming should result in more or less equally distributed attention to the issue across all critical policy sectors.

By contrast, the policy process literature claims that policies are rarely designed in an evidence-based and problem-focused way (Cairney et al., 2019). The policy process—and thus politics—is largely governed by political power games and potential (feasible) compromises among political coalitions but not first and foremost by scientific evidence or cross-sectoral considerations. Furthermore, political actors tend to specialize in given issues and use limited resources to pay attention to different issues at a time, especially across sectors (Brandenberger et al., 2020; Henning, 2009). Within this logic, each sector and policy process might follow its own dynamics as to why issue attention might differ to a great degree across the different sectors and not be equally distributed or steadily increase over time. From this, we deduce our second set of competing hypotheses:

**H2a** (mainstreaming) Attention to the biodiversity issue becomes more equally distributed across policy sectors over time.

**H2b** (policy process) Attention cycles for the biodiversity issue are asynchronous between policy sectors.

*Sub-issue concentration:* Successful mainstreaming should initiate a process leading to more mainstreaming per se and to more coherent policy outputs, processes, and outcomes (Nilsson et al., 2012). Norton (2005) claims that a learning process that continuously evaluates and readjusts political content and structures should be activated. For a fragmented issue such as biodiversity, this means that successful integration is not achieved by focusing on individual sub-issues but instead on all aspects relevant to the issue simultaneously.

In contrast to these normative claims, evidence about biodiversity conservation shows that such cross-sectoral learning loops are often too slow to ensure effective integration (Velázquez Gomar et al., 2014). Also from a policy process perspective, it is likely that attention to individual sub-issues fluctuates over time, as does attention to the biodiversity issue as a whole. One reason given in the literature for this is the limited capacity of the political system, which only permits the handling of a finite number of (sub-)issues simultaneously (e.g., Baumgartner & Jones, 1993). From this perspective, the number of sub-issues that are salient at the same time is unlikely to increase. Rather, we expect them to undergo separate attention cycles that are displaced relative to one another in time, hence superseding each other over time. Our third set of competing hypotheses reads as follows:

**H3a** (mainstreaming) Attention becomes more equally distributed across biodiversity sub-issues over time.

**H3b** (policy process) Attention cycles for sub-issues are asynchronous because attention is directed to only a few but varying biodiversity sub-issues at a time.

*Cohesion:* As mentioned above, cohesion can be critical for the integration of an issue into different sectors because the presence of a strong label helps linking specific issues to a larger agenda. From a normative perspective, high issue cohesion is desirable

for the progress of biodiversity integration. Therefore, we expect that actors who want to drive integration will continuously try to unite previously fragmented sub-issues under the banner of biodiversity (May et al., 2011). If their efforts are successful, cohesion will increase over time.

By contrast, recent literature emphasizes the institutional complexity trap (Bolognesi & Nahrath, 2020): transaction costs of coordination rise over time (Kim et al., 2020) and achieving both policy coherence and cohesion becomes more difficult (see Bolognesi et al., 2021). However, the policy process literature emphasizes shocks and focusing events (Birkland, 2005; Jones & Baumgartner, 2005a)—either internal or external to the political system (new government, migration wave, nuclear accident, flood event, etc.)—that decisively shape public attention (in media, the parliament, or even government). There is also evidence that such shocks lead to an increase in issue cohesion, which, however, is difficult to sustain when the momentum fades (LaPira, 2014; May et al., 2011). Consequently, issue cohesion develops in cycles. From this, we developed our fourth set of competing hypotheses:

**H4a** (mainstreaming) Cohesion of the biodiversity issue increases over time.

**H4b** (policy process) Cohesion of the biodiversity issue is subject to temporal fluctuations, with one or more punctuation(s) where cohesion is particularly high.

## Case, data, and methods

### Case selection

The Convention on Biological Diversity (CBD) calls 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). Switzerland signed the CBD in 1992 (party since 1995), thus committing to integrate biodiversity considerations into all critical policies. This goal is also reflected in the Swiss biodiversity strategy, which was adopted in 2012. Moreover, climate change and other environmental issues rank high on the public agenda (Golder et al., 2020). However, different direct democratic initiatives either demanding greater environmental protection or trying to prevent it have been intensively debated by the public over the past few years. This tension between more abstract political goals (i.e., biodiversity integration) and possible civil society interference in their implementation (i.e., the integration of biodiversity) makes Swiss politics an interesting case for studying the evolution of biodiversity integration.

The Swiss political system is a highly participatory, integrative, and consensual type of democracy, where many and changing coalitions of political parties, business associations, NGOs, or subnational entities can influence agenda-setting and policymaking—not least because of direct democratic instruments (Sciarini et al., 2015). The partisan composition of government and parliament do not greatly change over time, which means that the evolution we are observing over the past 20 years has not been influenced by changing government majorities but instead reflects the long-term dynamics of political agenda-setting and policymaking as a result of the concertation of all relevant political actors present in the system.

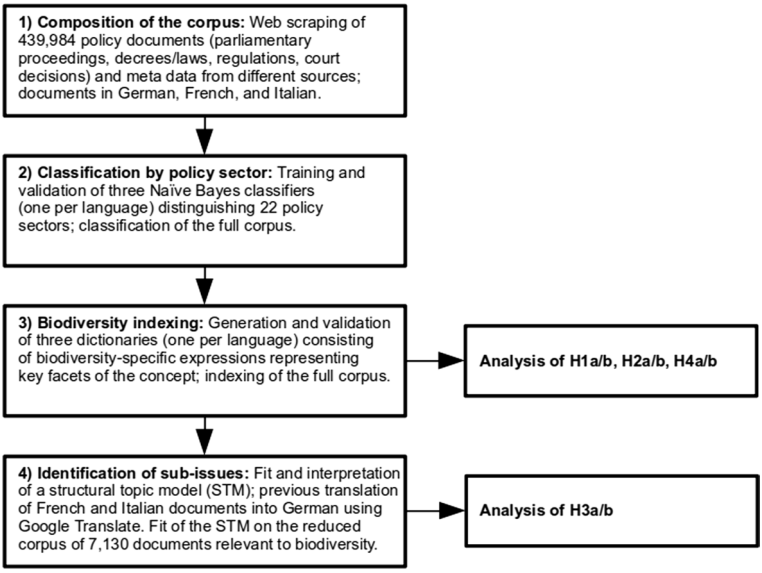


**Fig. 1** Steps in collecting and analyzing policy documents

**Table 1** Document types in the corpus categorized by issuing institution (rows) and stage of the policy process (columns)

| | Drafting | Introduction | Interpretation |
|---|---|---|---|
| *Legislative* | Acts | Constitution | |
| Parliament | Transcripts | Laws | |
| | Reports* | (Simple) Federal decrees* | |
| *Executive* | Responses to acts | Ordinances | |
| Federal Council | Transcripts | Federal Council decrees* | |
| | Reports* | General decrees* | |
| | Dispatches | Treaties* | |
| | Draft laws* | Strategies, action plans* | |
| *Judiciary* | | | Decisions* |
| Federal Supreme Court | | | |
| Federal Criminal Court | | | |
| Federal Administrative Court | | | |
| *Not identifiable* | Reports* | | |
| Parliament and/or Federal Council | | | |
| *N* | 257,825 | 7186 | 174,973 |

Documents that could not be linked to a single institution were categorized as "not identifiable." Documents marked with an asterisk (*) are possibly incomplete. This is because of the (possibly) incomplete indexing of the given documents by the websites and databases used for corpus compilation

## Data

To study biodiversity integration in Switzerland, we draw on a comprehensive corpus of 439,984 publicly available policy documents published between 1999 and 2018 and

methods of automated content analysis. When collecting and analyzing the documents, we proceeded in four steps, which are summarized in Fig. 1.

*Composition of the corpus:* We collected different types of political documents made publicly available by entities of the Swiss federal government in a digital format. This last criterion limits the time period covered by the corpus, as many documents from the 1990s are not (yet) digitally available. Table 1 gives an overview of the different document types sorted by issuing institution (parliament, executive/administration, and courts) and stage of the policy process (drafting, introduction, and interpretation).[2]

The literature offers many models describing distinct stages of the policy process (e.g., Lasswell, 1956). However, these models have often been criticized for their lack of political realism (Howlett et al., 2015), and thus their limited use for empirical studies. In particular, it is usually impossible to draw a clear line between policy formation and decision-making. We therefore use a simpler model that combines these two stages into one—the drafting of policies—and can thus be put to empirical use. Encompassing much of the policy process, we look at the joint drafting of policies by parliament and executive/administration, their introduction in the form of legal texts, and eventually their interpretation by the courts what results in the three stages of drafting, introduction, and interpretation (Table 1). Even though we do not explicitly follow each policy from its drafting to its introduction and then its potential interpretation by courts because the vast corpus and interrelated stages of the policy process make this an impossible task, we can still observe the different "trends" of biodiversity integration at these different stages of the "maturation" of a policy document. Our goal was to compile a complete collection of the document types listed, even though we were not able to achieve this in every case because of the sources available to us (see Online Appendix A1 for a list of sources). For document collection, we relied exclusively on freely accessible websites and databases that we accessed via web scraping or an application programming interface (API). We respected the eventual restrictions imposed by the providers (i.e., robots.txt). In addition to the text data, we collected some metadata for each document. This includes the document type, the issuing institution (e.g., parliament), the year of publication, and the language. Because Switzerland is a multilingual country with several official languages, our corpus consists of documents written in German ($n = 323{,}202$), French ($n = 103{,}651$), and Italian ($n = 13{,}131$). When translations were available, we used the German version of a document. When the language of a document was not available in the form of metadata, we used a language-detection algorithm to determine it.[3]

*Classification by policy sector:* To assess biodiversity integration, we had to determine the policy sector to which a document contributes to. To do this, we categorized them using three Naive Bayes classifiers—one each for the German, French, and Italian documents. We used parliamentary acts as training material for the classifiers, which are assigned to one or more of 20 policy sectors by the general administrative office of the parliament. These are sectors such as security policy, spatial planning and housing, agriculture, and the environment (see Table 2 for the complete list). Because of Switzerland's

[2] The complete text corpus is included in the replication files of this analysis available at https://doi.org/10.16904/envidat.302.

[3] All data processing and analyses were done using R (R Core Team, 2021), tidyverse (Wickham et al., 2019), the quanteda ecosystem (Benoit et al., 2018), stm (Roberts et al., 2019), fuzzyjoin (Robinson, 2020), cld2 (Ooms, 2020), and other packages. The files with the code produced for the analysis can be found at https://doi.org/10.16904/envidat.302.

**Table 2** List of 20 policy sectors and 13 sub-issues distinguished in the analysis

| | |
|---|---|
| Policy sectors | Agriculture (7883), Culture, religion (978), Economy (29,764), Education (3616), Energy (9514), Environment (7349), Finance (37,155), Health (34,263), International politics, foreign policy (10,874), Media, communication (6626), Parliament (1885), Policy on Europe (631), Policy on immigration and asylum (52,694), Political context (23,148), Right/law (109,002), Science, research (462), Security policy (14,721), Social affairs (39,756), Spatial development, housing (1280), Transport (20,343), Not identifiable (28,040) |
| Sub-issues[a] | Agriculture subsidies (0.05), Aquatic habitats protection (0.07), Aquatic restoration (0.02), Biodiversity policy (0.05), Construction projects (0.03), Costs (0.03), Ecosystem services (0.03), Genetic resources (0.02), Genetically modified organisms (0.07), International treaties/foreign policy (0.05), Pesticides (0.03), Protected areas (0.09), Wildlife (0.1) |

Numbers in parentheses represent the number of documents (policy sectors) or the mean sub-issue probability over all documents ($n = 7130$)

[a]The sub-issue on genetic resources concentrates on the genetic diversity within species (i.e., diversity of the genome between individuals of a species). The sub-issue on genetically modified organisms is about organisms whose DNA has been edited using genetic engineering techniques (e.g., GMO seeds)

multilingualism, parliamentary acts are always translated into all other national languages by the office of the parliament. As a result, the parliamentary acts provide us with a high-quality set of already annotated and translated training data. For both the training and application of the classifiers, we used some common preprocessing steps. This includes the removal of punctuation, the removal of numbers, lowercase reduction, the removal of stopwords, and stemming. The obtained classifiers have shown satisfactory accuracy for all languages (Macro F1 based on tenfold cross-validation: $F1_G = 0.73$, $F1_F = 0.76$, $F1_I = 0.79$; see Online Appendix A2 for the individual categories). To increase the accuracy further, we classified a document as not identifiable when it contained less than 15 model terms or when the probability for the most likely policy sector was less than 0.4. We chose such a conservative approach to sector classification because we did not want to coerce documents into a single sector if they relate to several ones (e.g., agriculture and environment or agriculture and health).

*Biodiversity indexing:* To assess whether a document includes biodiversity considerations, we relied on purpose-built dictionaries consisting of biodiversity-specific expressions that represent the key facets of the concept (i.e., diversity within species, between species and of ecosystems) in all three languages. This deductive and supervised approach ensures that we capture biodiversity considerations based on substantive rather than semantic criteria. The construction and validation of multilingual dictionaries are costly and hold some potential pitfalls. To avoid these, we followed the procedure proposed by Lind et al. (2019). First, we selected keywords in one language (German), then translated them into the other languages (French, Italian), and finally evaluated them. For the first step—keyword selection—we relied on three different sources: (1) We conducted a survey asking biodiversity researchers familiar with the Swiss context for keywords relevant to their field.[4] (2) We carefully collected around 90 documents from public administrations, research institutions, and non-governmental organizations (NGOs) that were alien to our main corpus, from

[4] Starting from researchers we personally know, we used snowball sampling to identify further researchers involved in biodiversity research, and asked them for words they think are commonly used when biodiversity issues are, or have been, addressed in Swiss politics (open-ended question).

which we extracted keywords using different numerical measures (i.e., word frequency, tf-idf, topic model φ distribution of words for topics, etc.). (3) Finally, we supplemented the keywords from the survey and literature review with words close in the semantic space of a comprehensive word embedding model trained on texts of diverse actors (e.g., mass media, parties, NGOs) of Swiss public communication (Krasselt et al., 2020). Native speakers with a background in biodiversity research then translated the resulting list of German keywords into French and Italian. We then constructed the final dictionaries in an iterative process using the list of keywords as a starting point (e.g., the French word for wolf: "loup"). The first step of this process is consolidation, which includes the identification of word stems and the combination and completion of these with regular expressions so that inflections and word compositions can be recognized (e.g., adding a possible "s" to match also the plural wolves: "loup(s)?"). The second step is the validation of the preliminary dictionary by manually checking the computational classification of text snippets (i.e., three consecutive sentences) from the corpus. To do so, a trained coder categorized a sample of classified sentences as true or false relative to biodiversity (see Online Appendix A3 for coding guidelines). Sentences classified as false-positives were then used to remove terms from the dictionary and further consolidate it (e.g., by adding a prefix "(?<!saut(s)?.de.) loup(s)?" to avoid matching the word "saut-de-loup," meaning light well). We repeated this procedure for every dictionary/language (D: 4 iterations, F: 5, I: 3) until satisfactory accuracy values were achieved ($F1_G = 0.91$, $F1_F = 0.91$, $F1_I = 0.94$; using manual coding as gold standard). The final dictionaries consisted of 167 terms for German, 189 terms for French, and 204 for Italian. They can be found in Online Appendix A4. We then applied each dictionary to the corresponding language subset of the corpus, resulting in a set of 7130 documents (out of 439,984) containing biodiversity considerations.

*Identification of sub-issues:* To better understand the structure of the biodiversity issue, we took a closer look at the sub-issues prevalent in the documents containing biodiversity considerations. We did this by computing a structural topic model (STM; Roberts et al., 2019) on the relevant documents ($n = 7130$). STM is a probabilistic mixed membership model whose output (i.e., topics) can be meaningfully interpreted as sub-issues (Maier et al., 2018a). However, because the topics are derived from the vocabulary of the modeled documents, topic models are not applicable to multilingual corpora. One way around this is to convert the multilingual corpus into a monolingual one by translating the documents. Thereby, the use of machine translation services has proven to be an efficient and valid approach (De Vries et al., 2018; Reber, 2019). Therefore, we translated the French and Italian documents in our reduced corpus into German using Google Translate. Before the translation, however, we trimmed the documents, leaving only biodiversity-relevant passages. We did this by selecting the sentences containing a term from our dictionaries along with the two sentences before and after that sentence while removing the other sentences. Further preprocessing steps after the translation included the following: (1) lemmatization, (2) the removal of punctuation, numbers, symbols, URLs, and separators, (3) removal of terms with less than three characters, (4) removal of stopwords, and (5) removal of features that appear in less than 0.25% and in more than 99% of all documents (relative pruning). For model selection, we then adopted the approach by Maier et al. (2018b), using a combination of metrics, such as semantic coherence and best interpretability. Considering both metrics and interpretability, we finally opted for a model with 30 topics. Looking at both the topic top words (i.e., words with the highest probability per topic; see Online Appendix A5 for the list) and the documents with high topic probability, we then labeled or removed each topic of the model. Following Maier et al. (2018b), a topic was removed when no interpretable and coherent concept could be identified. Based on this in-depth evaluation,

we merged topics that were substantially similar. This resulted in a final list of 13 sub-issues (10 removed, 11 merged; see Table 2 for the complete list).

### Integration measures

We relied on four indicators to assess attention to the biodiversity issue across time, stages, and sectors/sub-issues, which is in line with the concepts introduced above: *relative attention*, *sectoral concentration*, *sub-issue concentration*, and *cohesion*. Each indicator sheds light on a particular aspect of the integration process.

*Relative attention:* We measured relative attention as the ratio of biodiversity-related documents to all documents attributed to that stage in a given year. A relative attention of 1 would mean that every document from a given year and stage contains biodiversity considerations. A relative attention of 0, on the other hand, would mean that no document contains biodiversity considerations.

*Sectoral/Sub-issue concentration:* Concentration measures how uniform attention is distributed over policy sectors or sub-issues and is assessed by the inverse Gini coefficient (iG). Therefore, an iG value of 0 would mean maximum concentration, for example, that biodiversity considerations are only found in documents of one policy sector. An iG value of 1, on the other hand, means that biodiversity considerations are present in every document of every policy sector.

*Cohesion:* By cohesion, we mean the degree to which biodiversity considerations are explicitly linked to the concept of biodiversity. To determine this, we look at the relationship between documents that explicitly mention biodiversity as a concept and documents that only implicitly address the biodiversity issue. Thus, a cohesion value of 1 would indicate that biodiversity is explicitly named in every document.

Because biodiversity integration is a process, it is important to recognize changes over time. Thus, we calculated each indicator for each stage on an annual basis (1999–2018). To identify the long-term trends (e.g., a persistent increase of attention to the issue), we used an ordinary least square regression. Despite its relative simplicity, this linear approach has proven to be effective in determining continuous changes in political discourses (Adam et al., 2020). To detect cycles (e.g., temporarily increased issue attention) in the time series, we then fit local polynomial regressions (LOESS) for all indicators and stages. LOESS is a nonparametric approach that uses weighted regressions in local neighborhoods to fit a smoothed curve between two variables (Cleveland & Devlin, 1988). This curve allows us to graphically assess the evolution of biodiversity integration in Swiss policymaking.

## Results

*Relative attention:* As plot A in the top row in Fig. 2 shows, there is no persistent increase in attention to the biodiversity issue in both the drafting and interpretation stages. If anything, attention to the issue even slightly decreases in the interpretation stage over the 20-year period ($\beta = -0.0003$, se $= 0.0001$, $p < 0.01$). Compared with the other stages, the introduction stage has the highest relative attention on average ($\bar{x}_{intro} = 0.0355$ compared with $\bar{x}_{draft} = 0.0206$ in the drafting stage and $\bar{x}_{intpn} = 0.0099$ in the interpretation stage) while also showing the highest variance between years ($sd_{intro} = 0.0123$, $sd_{draft} = 0.0038$, $sd_{intpn} = 0.0029$). Using linear regression to detect the long-term trends in issue attention, the model does not indicate a positive trend. However, what distinguishes the curve from

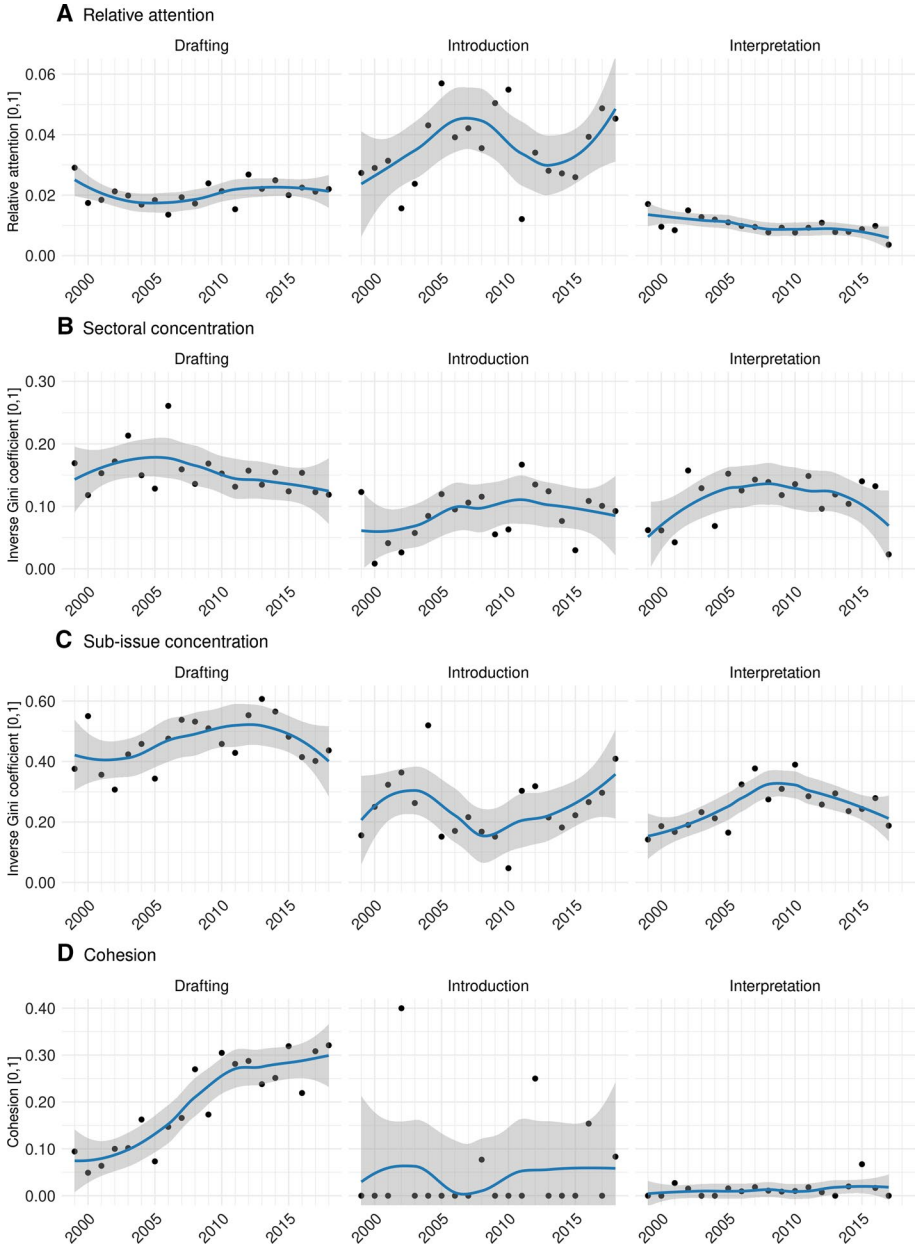


**Fig. 2** Integration measures. Gray area indicates 0.95 confidence interval of LOESS curve

the others are the two attention cycles that resulted in increased issue attention during several years: 2004 to 2010 and from 2016 onward.

Regarding our hypotheses, we have to reject H1a because there was no substantial and, above all, continuous increase in relative attention to the biodiversity issue in any of the stages. Regarding H1b, the findings are mixed. Although we do not see any noticeable

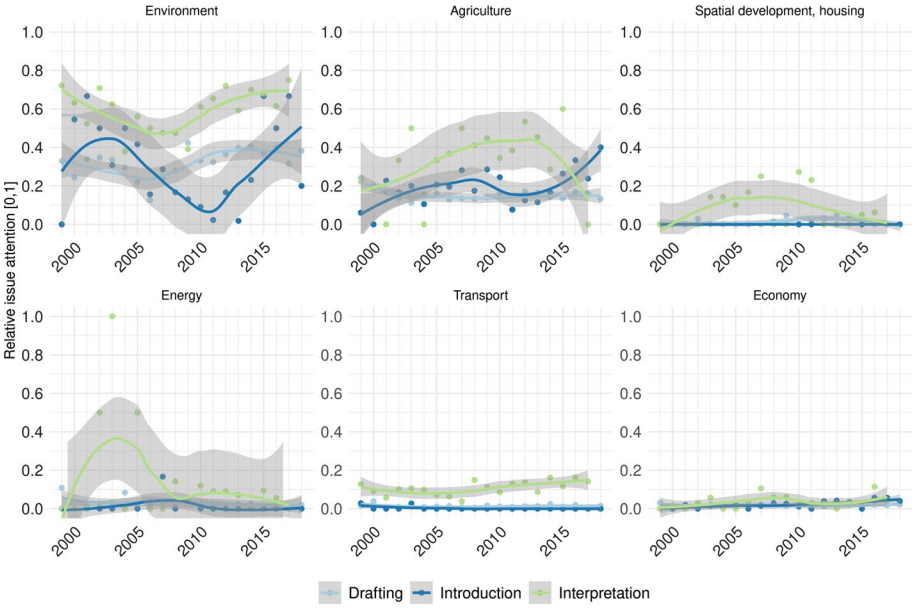


**Fig. 3** Relative issue attention in the selected policy sectors

temporal fluctuations in issue attention in either the drafting or interpretation stages, such fluctuations can clearly be seen in the introduction stage. Therefore, the evidence for H1b is inconsistent.

*Sectoral concentration:* As can be seen from plot B in Fig. 2, the concentration on policy sectors is at similar levels for all three stages ($\overline{x}_{draft} = 0.154$ (0.034), $\overline{x}_{intro} = 0.0865$ (0.411), $\overline{x}_{intpn} = 0.11$ (0.0401); sd in parentheses). The relatively low inverse Gini coefficients indicate that attention to the biodiversity issue is unevenly distributed across policy sectors. Moreover, there is neither a positive nor negative continuous change in sectoral concentration in any stage. However, if we look at the LOESS curves, we can see a more uniform distribution across the sectors at times (at a low level), most notably in the interpretation stage. This suggests that attention to the biodiversity issue has varied over time in individual policy sectors.

Looking separately at the smoothed curves of the selected policy sectors in Fig. 3, this assumption can be confirmed. Although there are significant positive trends across all stages in at least one sector when looking at the entire time period (i.e., Drafting/Environment, Introduction/Agriculture, Introduction/Economy, Interpretation/Transport), waves dominate the picture. There are relatively clear punctuations, especially in the environmental sector and in agriculture and energy policy. Attention cycles are particularly pronounced in the courts' interpretation of the policies. Most importantly, however, the attention cycles proceed differently across policy sectors, thus showing no cross-sectoral uniformity.

These results indicate that H2a, which posits that attention to the biodiversity issue becomes more equally distributed across policy sectors over time, must be rejected. Sectoral concentration has remained relatively stable over the 20-year period. As the more in-depth examination of selected policy areas has shown, however, H2b can be confirmed. For some sectors and stages, there are quite pronounced attention cycles, yet their trajectories are asynchronous.

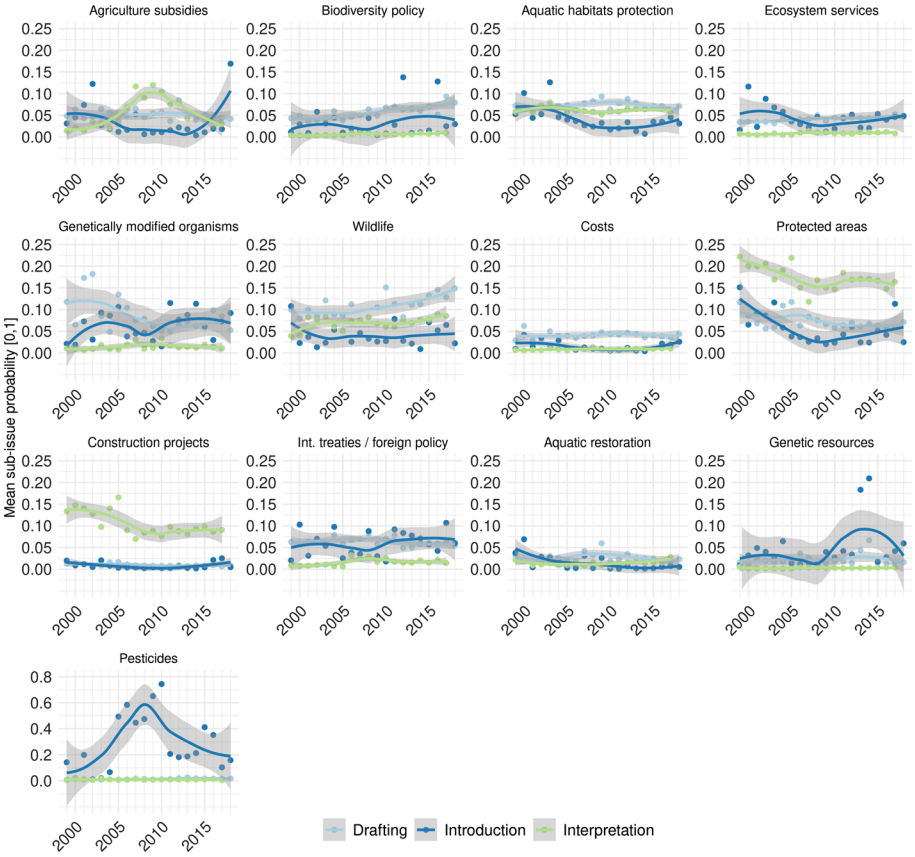


**Fig. 4** Sub-issues of biodiversity. *Note*: For better readability, the *Y*-axis scaling of the pesticides tile differs from the others

*Sub-issue concentration:* Considering a document's top sub-issue (i.e., the sub-issue with the highest probability), there are no significant long-term trends that would indicate a decrease (or increase) in sub-issue concentration. This means that attention is always distributed among a similar number of sub-issues in all stages. Given the highest mean value, attention is most evenly distributed in the drafting stage ($\overline{x}_{draft} = 0.461$, $sd_{draft} = 0.0817$), which is followed by the introduction stage ($\overline{x}_{intro} = 0.250$, $sd_{intro} = 0.107$), and, eventually, the interpretation stage ($\overline{x}_{intpn} = 0.250$, $sd_{intpn} = 0.0702$). However, looking at the LOESS curves in plot C of Fig. 2, the sub-issue concentration varies over the years. The pattern is most pronounced in the interpretation stage, where sub-issue concentration decreases until 2010 and then increases again. However, similar patterns can also be found in the drafting and introduction stages. This suggests that sub-issues are also subject to attention cycles.

The separate display of the sub-issues in Fig. 4 confirms this to some extent. The figure shows the sub-issue probability averaged over all documents of the respective stage in a given year. Because these probabilities are relative to each other, we can interpret the numbers as the relative attention given to the corresponding sub-issue. Although there are punctuations for different sub-issues (e.g., agricultural subsidies, genetic resources), the pattern is particularly pronounced for the pesticide sub-issue in the introduction stage,

where it temporarily attracts almost 80 percent of the attention. However, the other pattern of continuously increasing sub-issue attention is also prevalent. Examples are the wildlife ($\beta = 0.0026$, se $= 0.0007$, $p < 0.01$), ecosystem services ($\beta = 0.0007$, se $= 0.0002$, $p < 0.001$), and biodiversity policy ($\beta = 0.002$, se $= 0.0004$, $p < 0.001$) sub-issue in the drafting stage. Yet, their gains are countered by a somewhat steady decline of other sub-issues, such as genetically modified organisms ($\beta = -0.0034$, se $= 0.0013$, $p < 0.05$) or protected areas ($\beta = -0.0016$, se $= 0.0007$, $p < 0.05$). What is also noteworthy is that for some sub-issues, prevalence varies greatly between stages. For example, construction projects and protected areas are sub-issues that are prevalent primarily in the judicial interpretation of policies. Pesticides, on the other hand, are mainly a concern in the introduction stage.

Over all, attention does not become more evenly distributed across biodiversity sub-issues over time. Therefore, we must reject H3a. On the other hand, we can confirm H3b: sub-issue concentration is not stable but varies over time, which is because of shifts in attention between sub-issues. However, patterns for sub-issues are mixed: although some receive increased attention only during a certain period, others gain or lose attention over the 20-year period.

*Cohesion:* Our final indicator—cohesion—captures the degree to which biodiversity considerations are explicitly linked to the concept of biodiversity in the indexed documents. As plot D in Fig. 2 shows, the picture differs greatly between stages. Most notably, there is a strong, positive long-term trend in the drafting stage ($\beta = 0.0141$, se $= 0.0018$, $p < 0.001$). In the 20-year period, issue cohesion increases from around 0.1 to 0.3, indicating that 30 percent of the documents related to biodiversity contain the term "biodiversity." However, no such trend is evident in the other two stages. Moreover, the average cohesion in both the introduction and interpretation stages is very low ($\overline{x}_{intro} = 0.0482$ (0.106), $\overline{x}_{intpn} = 0.0129$ (0.0155); sd in parentheses). Accordingly, the term "biodiversity" is hardly ever used in decrees and court rulings, even if the concept of biodiversity is addressed in these documents. Unlike the interpretation stage, however, there are individual years in the introduction stage with increased issue cohesion.

In the drafting stage, issue cohesion increases steadily over time. Therefore, H4a is valid for this stage but not for the others. In the introduction stage, the prominence of the label "biodiversity" is subject to some temporal fluctuations. Yet considering their brevity, we regard these fluctuations as bursts rather than punctuations. In the interpretation stage, no trend or fluctuation is found. Hence, we must reject H4b.

## Discussion and conclusions

In the current article, we have asked how attention to the issue of biodiversity has evolved over the course of 20 years in Switzerland across policy sectors. More concretely, we investigated biodiversity and its sub-issues based on close to 440,000 policy documents that were attributed to 20 policy sectors and distributed to either the policy drafting stage, the policy introduction stage, or policy interpretation by courts. Deduced from the normative strand of the mainstreaming literature we expected a general and continuous increase in the attention devoted to biodiversity within and across sectors; whereas and following the policy process literature, we expected attention to rather evolve in cycles. Using quantitative text analysis, we found that (1) a persistent increase in attention is the exception, (2) if there is an increase in attention, it is likely to be temporary, and (3) the most common pattern is that of invariant attention over time. Of the mainstreaming hypotheses, only H4a

can be confirmed for the drafting stage. There we see a significant and continuous increase in cohesion, meaning that biodiversity considerations are explicitly linked to the concept of biodiversity. Of the policy process hypotheses, we can confirm H2b and H3b finding that attention cycles for the issue of biodiversity are asynchronous among policy sectors and sub-issues.

Most interestingly, we observe that only some selected sub-issues (e.g., wildlife) have shown a long-term increase in attention, yet only at the expense of others (e.g., protected areas). Thus certain sub-issues can have the potential to compensate each other, at least to a certain extent. This is in-line with earlier work (see Howlett, 1997) emphasizing not only that issue attention does not increase incrementally, but that there are anomalies within issue attention cycles as well. The rise and fall of attention can be impacted by various factors such as the institutional setting, subsystem specificities, and exogenous shocks (as diverse as, e.g., fish kills or changes in policies of the European Union).

Attention to the biodiversity issue as a whole has not increased relative to other issues and did not become more evenly distributed across policy sectors. Hence, the policy field of biodiversity conservation seems to follow more a "politics" than "problems" perspective. What we mean by this is that the literature on mainstreaming and environmental policy integration is first and foremost interested in the nature of the problem (rather than in processes and politics), and if this problem is cross-sectoral (diverse sectors being at the source of the problem but also cross-sectoral interrelation between sources and effects; Ingold et al., 2018), the processes of mainstreaming and integration make the most sense (Persson, 2007). However, biodiversity conservation in Switzerland at the national level seems to follow more the dynamics of "politics," where actors, because of limited resources and other reasons (Henning, 2009), pay attention only for a certain amount of time and to some sub-issues, rather than to others. The above-mentioned asynchronous changes in attention to sub-issues and the fact that when sub-issues gain attention others lose it at the same time are indicative of this. Also, our results have shown that for certain sub-issues to biodiversity, such as pesticides, agriculture subsidies, or genetic resources, attention fluctuations are rather common. Thus, the salience of the broader biodiversity issue is predominantly impacted by a few selected sub-issues, and this only during a certain point in time. This temporal sub-issue salience is furthermore and most probably a product of a variety of factors such as public or media attention, and how political agenda-setting and bargaining works (Wlezien, 2005). It can only partially, if at all, be related to the urgency of the problem per se (Fesenfeld & Rinscheid, 2021).

Our results further confirm fluctuations in issue attention for certain sectors (e.g., environment and energy) and time frames. Thus, biodiversity integration tends to occur in cycles, as the policy process literature has led us to expect (Baumgartner & Jones, 1993; Downs, 1972) rather than in steady long-term shifts, as we have hypothesized based on the integration literature (Nilson et al., 2012; Norton, 2005). The most common pattern we have found, however, is that of invariant attention over time. For example, there is no substantial change (i.e., increase or decrease) in the attention to the biodiversity issue compared with other issues over time in the drafting and interpretation stages. Although this does not mean that no biodiversity integration occurs—there are shifts in attention to sub-issues, after all, as has been pointed out—it certainly does not accelerate the process.

Furthermore, we have identified some blind spots of lacking biodiversity integration in Swiss politics. As our results show, biodiversity receives hardly any attention in critical policy sectors, such as economic policy, transport, energy, or spatial planning. Thus, the importance attributed to biodiversity integration in the scientific community and at the international policy level is not fully reflected at the national level. This result is in

line with many analyses of integration among the sustainable development goals (SDGs), where policy coherence and cross-sectoral mainstreaming seem accomplished for certain goals and sectors but not for others (Pham-Truffert et al., 2020; Tosun & Leininger, 2017). Persson and Runhaar (2018) go even one step further and critically ask if EPI is still relevant: its incremental and slow nature might be inappropriate to promote and realize radical change, as what is asked by the SDGs.

Our results further indicate that different mechanisms are at play at the different stages of the policy process. First, issue attention cycles are the most prominent and clear in both the policy drafting and the introduction stage. The drafting stage is also the stage that is the most focused on in policy process studies (Sabatier & Weible, 2014) and where we expect, as a result, issue attention to materialize in policy change—that is, the introduction stage (Jones & Baumgartner, 2005a). Second, the interpretation stage is sensitive to issue attention cycles: our results show how courts pay attention to certain sub-issues and sectors more than to others, and this occurs unsteadily over time. This also corresponds to the mere nature of the judicial stage and certain sub-issues in our sample: for example, it is rather common to take legal action against construction projects (sub-issue), and this is mainly in the energy sector (e.g., wind parks, small hydro-power plants), whereas legal actions in relation to other sub-issues and sectors are rare or impossible. To better understand the mechanisms of the different stages, future studies on policy integration need to go deeper, for instance by systematically comparing the dynamics of individual policies across the stages.

Third, issue cohesion also shows a particular pattern in one specific stage. In the drafting stage, there was a strong positive trend in contrast to the other two stages. Is this good or bad news in terms of biodiversity integration? This question is difficult to answer. As other research on (biodiversity) mainstreaming has shown (Persson & Runhaar, 2018; Runhaar et al., 2014; Zinngrebe, 2016), the process of integration takes time. Therefore, it is possible that cohesion in policy drafting—thus the emergence of an own biodiversity regime—sooner or later materializes in policy change and further integration and cohesion at the level of policy introduction and court interpretation. However, to better understand the interdependencies between the stages in biodiversity integration, it would be necessary to track individual biodiversity considerations from the moment they enter the process until the attention for them fades. Such a pathway analysis is beyond the scope of the present article.

Furthermore, to see whether some of our results are specific to the Swiss case or the case of biodiversity, future research should adopt comparative research designs. A comparison with climate change adaptation could be of particular interest: similar to biodiversity, climate adaptation consists of various sub-issues (such as flood prevention; water scarcity; land use change) that have usually been regulated long before the emergence of a potential own regime of climate adaptation.

Yet, our analysis has shown that the evolution of issue attention over time, across policy sectors, and stages of the policy process can be studied effectively using the methods of automated content analysis. As our analysis of Swiss policymaking has shown, this is possible even with multilingual corpora. We proposed and applied operationalizations for different theoretical concepts, such as sub-issues or issue cohesion—most of them relying on a (multilingual) dictionary that is both transparent and reproducible.

However, three limitations of the present analysis warrant discussion. First, our approach does not allow us to make a statement about the priority of biodiversity goals versus other policy goals (i.e., if biodiversity goals are prioritized over other policy goals), nor whether biodiversity is integrated coherently (i.e., without measures counteracting biodiversity

measures). Both concepts are central in the policy integration literature (Cejudo & Michel, 2017; Trein et al., 2019). However, to measure this in an analysis of a country's complete policymaking over 20 years would require that all other issues concerning policymakers during this period to be identified as well. Although possible in theory, it is a rather challenging task in practice, which is why we have refrained from doing so. Second, we have no information about the impact of the policy documents included in our analysis on the actual state of biodiversity. We did not consider whether a document is, for example, a law or a decree, and whether the biodiversity considerations it contains are substantive or merely symbolic. Both has to be known in order to assess the eventual success of policy integration strategies (see Gubler et al., 2020 for such an evaluation of biodiversity damaging subsidies in Switzerland). Finally, we ignored the subnational level. In a federal system like in Switzerland, this results in the loss of a lot of relevant policies from the regional and municipal levels, including many court decisions. Nevertheless, we were able to show not only that biodiversity integration in Switzerland is a rather arduous affair, but also that the process is the product of various developments resulting in patterns that prove two theoretical approaches right and wrong at the same time.

**Supplementary Information** The online version contains supplementary material available at https://doi.org/10.1007/s11077-022-09456-4.

**Acknowledgements** The authors thank Michèle Kaennel Dobbertin, Marco Conedera, and Matteo Riva for their help in translating and validating the biodiversity dictionaries.

**Funding** Open Access funding provided by Lib4RI – Library for the Research Institutes within the ETH Domain: Eawag, Empa, PSI & WSL. This work was supported by the ETH Board through the Blue-Green Biodiversity (BGB) Research Initiative 2020.

**Data availability** The text corpus generated and analyzed for this study is available in the Envidat repository, https://doi.org/10.16904/envidat.302.

**Code availability** The R code produced for this study is available in the Envidat repository, https://doi.org/10.16904/envidat.302.

## Declarations

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



## References

Adam, S., Reber, U., Häussler, T., & Schmid-Petri, H. (2020). How climate change skeptics (try to) spread their ideas: Using computational methods to assess the resonance among skeptics' and legacy media. *PLoS ONE, 15*(10), 1–23. https://doi.org/10.1371/journal.pone.0240089

Alons, G. (2017). Environmental policy integration in the EU's common agricultural policy: Greening or greenwashing? *Journal of European Public Policy, 24*(11), 1604–1622. https://doi.org/10.1080/13501763.2017.1334085

Baumgartner, F., Christian, B., Christoffer, G.-P., Jones, B., Mortensen, P., Michiel, N., & Stefaan, W. (2009). Punctuated equilibrium in comparative perspective. *American Journal of Political Science, 53*(3), 603–620. https://doi.org/10.1111/j.1540-5907.2009.00389.x

Baumgartner, F., & Jones, B. (1993). *Agendas and instability in American politics*. University of Chicago Press.

Benoit, K., Watanabe, K., Wang, H., Nulty, P., Obeng, A., Müller, S., & Matsuo, A. (2018). Quanteda: An R package for the quantitative analysis of textual data. *Journal of Open Source Software, 3*(30), 774. https://doi.org/10.21105/joss.00774

Biesbroek, R., Badloe, S., & Athanasiadis, I. (2020). Machine learning for research on climate change adaptation policy integration: An exploratory UK case study. *Regional Environmental Change, 20*(3), 1–13. https://doi.org/10.1007/s10113-020-01677-8

Biesbroek, R., & Candel, J. (2020). Mechanisms for policy (dis)integration: Explaining food policy and climate change adaptation in the Netherlands. *Policy Sciences, 53*, 61–84. https://doi.org/10.1007/s11077-019-09354-2

Birkland, T. (1997). *After disaster: Agenda setting, public policy, and focusing events*. Georgetown University Press.

Birkland, T. (2005). *An introduction to the policy process: Theories, concepts, and models of public policy making*. M.E. Sharpe.

Birkland, T. (2006). *Lessons of disaster: Policy change after catastrophic events*. American governance and public policy series.

Bolognesi, T., Metz, F., & Nahrath, S. (2021). Institutional complexity traps in policy integration processes: A long-term perspective on Swiss flood risk management. *Policy Sciences, 54*, 911–941. https://doi.org/10.1007/s11077-021-09443-1

Bolognesi, T., & Nahrath, S. (2020). Environmental governance dynamics: Some micro foundations of macro failures. *Ecological Economics, 170*, 10655. https://doi.org/10.1016/j.ecolecon.2019.106555

Brandenberger, L., Ingold, K., Fischer, M., Schläpfer, I., & Leifeld, P. (2020). *Boundary spanning through engagement of policy actors in multiple issues*. Advance online publication. https://doi.org/10.1111/psj.12404

Burstein, P. (1991). Policy domains: Organization, culture, and policy outcomes. *Annual Review of Sociology, 17*, 327–350. https://doi.org/10.1146/annurev.so.17.080191.001551

Cairney, P., Heikkila, T., & Wood, M. (2019). *Making policy in a complex world*. Cambridge University Press.

Candel, J., & Biesbroek, R. (2016). Toward a processual understanding of policy integration. *Policy Sciences, 49*, 211–231. https://doi.org/10.1007/s11077-016-9248-y

Cejudo, G., & Michel, C. (2017). Addressing fragmented government action: Coordination, coherence, integration. *Policy Sciences, 50*, 745–767. https://doi.org/10.1007/s11077-017-9281-5

Christensen, T., & Lægreid, P. (2007). The whole-of-government approach to public sector reform. *Public Administration Review, 67*(6), 1059–1066. https://doi.org/10.1111/j.1540-6210.2007.00797.x

Cleveland, W., & Devlin, S. (1988). Locally weighted regression: An approach to regression analysis by local fitting. *Journal of the American Statistical Association, 83*(403), 596–610. https://doi.org/10.1080/01621459.1988.10478639

De Vries, E., Schoonevelde, M., & Schumacher, G. (2018). No longer lost in translation: Evidence that Google Translate works for comparative bag-of-words text applications. *Political Analysis, 26*(4), 417–430. https://doi.org/10.1017/pan.2018.26

Díaz, S., Pascual, U., Stenseke, M., Martín-López, B., Watson, R., Molnár, Z., Hill, R., Chan, K., Baste, I., Brauman, K., & Polasky, S. (2018). Assessing nature's contributions to people. *Science, 359*, 270–272. https://doi.org/10.1126/science.aap8826

Downs, A. (1972). Up and down with ecology: The issue-attention cycle. In Protess, D., & McCombs, M. (Eds.), *Agenda setting. Readings on media, public opinion, and policymaking* (pp. 462–473). Routledge.

Driessen, P., Dieperink, C., van Laerhoven, F., Runhaar, H., & Vermeulen, W. (2012). Towards a conceptual framework for the study of shifts in modes of environmental governance—Experiences from the Netherlands. *Environmental Policy and Governance, 22*(3), 143–160. https://doi.org/10.1002/eet.1580

Duane, T. (2013). Courts, legal analysis, and environmental policy. In Kraft, M., & Kamieniecki, S. (Eds.). *The Oxford handbook of U.S. environmental policy* (pp. 259–279). Oxford University Press. https://doi.org/10.1093/oxfordhb/9780199744671.013.0012

Dunlop, C., & Radaelli, C. (2018). Does policy learning meet the standards of an analytical framework of the policy process? *Policy Studies Journal, 46*, 48-S68. https://doi.org/10.1111/psj.12250

Fesenfeld, L., & Rinscheid, A. (2021). Emphasizing urgency of climate change is insufficient to increase policy support. *One Earth, 4*(3), 411–424. https://doi.org/10.1016/j.oneear.2021.02.010

Golder, L., Jans, C., Burgunder, T., Rötheli, V., Bohn, D., & Rey, R. (2020). *Sorgenbarometer 2020. Wiederbelebung der Willensnation Schweiz in Zeiten der Krise.* Credit Suisse, GFS Bern. https://www.credit-suisse.com/media/assets/corporate/docs/about-us/responsibility/worry-barometer/schlussbericht-credit-suisse-sorgenbarometer-2020.pdf

Gubler, L., Ismail, S., & Seidl, I. (2020). Biodiversity damaging subsidies in Switzerland. *Swiss Academies Factsheets, 15*(7), 1–16. https://doi.org/10.5281/zenodo.3935675

Gumucio, T., & Rueda, M. (2015). Influencing gender-inclusive climate change policies in Latin America. *Journal of Gender, Agriculture and Food Security, 2*(1), 42–61. https://doi.org/10.22004/ag.econ.246049

Henning, C. (2009). Networks of power in the CAP system of the EU-15 and EU-27. *Journal of Public Policy, 29*(2), 153–177. https://doi.org/10.1017/S0143814X09001056

Hogan, J., & Howlett, M. (2015). *Policy paradigms in theory and practice: Discourses, ideas and anomalies in public policy dynamics*. Palgrave Macmillan.

Howlett, M. (1997). Issue-attention and punctuated equilibria models reconsidered: An empirical examination of the dynamics of agenda-setting in Canada. *Canadian Journal of Political Science, 30*(1), 3–29. https://doi.org/10.1017/S0008423900014918

Howlett, M. (2011). *Designing public policies: Principles and instruments*. Routledge.

Howlett, M., McConnell, A., & Perl, A. (2015). Streams and stages: Reconciling Kingdon and policy process theory. *European Journal of Political Research, 54*(3), 419–434. https://doi.org/10.1111/1475-6765.12064

Ingold, K., Driessen, P., Runhaar, H., & Widmer, A. (2018). On the necessity of connectivity: Linking key characteristics of environmental problems with governance modes. *Journal of Environmental Planning and Management, 62*(11), 1821–1844. https://doi.org/10.1080/09640568.2018.1486700

Jenkins-Smith, H., Nohrstedt, D., Weible, C., & Ingold, K. (2018). The advocacy coalition framework: An overview of the research program. In C. Weible & P. Sabatier (Eds.), *Theories of the policy process* (4th ed., pp. 135–171). Westview.

Jochim, A., & May, P. (2010). Beyond subsystems: Policy regimes and governance. *Policy Studies Journal, 38*(2), 303–327. https://doi.org/10.1111/j.1541-0072.2010.00363.x

Jones, B. (1994). *Reconceiving decision making in democratic politics: Attention, choice, and public policy*. University of Chicago Press.

Jones, B., & Baumgartner, F. (2005a). A model of choice for public policy. *Journal of Public Administration Research and Theory, 15*(3), 325–351. https://doi.org/10.1093/jopart/mui018

Jones, B., & Baumgartner, F. (2005b). *The politics of attention: How government prioritizes problems.* University of Chicago Press.

Jones, B., & Baumgartner, F. (2012). From there to here: Punctuated equilibrium to the general punctuation thesis to a theory of government information processing. *Policy Studies Journal, 40*, 1–20. https://doi.org/10.1111/j.1541-0072.2011.00431.x

Jordan, A., & Lenschow, A. (2010). Environmental policy integration: A state of the art review. *Environmental Policy and Governance, 20*, 147–158. https://doi.org/10.1002/eet.539

Kim, S., Swann, W., Weible, C., Bolognesi, T., Krause, R., Park, A., Tang, T., Maletsky, K., & Feiock, R. (2020). *Updating the institutional collective action framework.* Advance online publication. https://doi.org/10.1111/psj.12392

Kingdon, J. (1994). Agendas, ideas, and policy change. In Dodd, L., & Jillson, C. (Eds.), *New perspectives on American politics.* Congressional Quarterly Press.

Koppenjan, J., & Klijn, E.-H. (2004). *Managing uncertainties in networks: A network approach to problem solving and decision making*. Routledge.

Krasselt, J., Dreesen, P., Fluor, M., Mahlow, C., Rothenhäusler, K., & Runte, M. (2020). Swiss-AL: A multilingual Swiss web corpus for applied linguistics. In *Proceedings of the 12th language resources and evaluation conference* (pp. 4138–4144). European Language Resources Association. https://www.aclweb.org/anthology/2020.lrec-1.509

Lafferty, W., & Hovden, E. (2003). Environmental policy integration: Towards an analytical framework. *Environmental Politics, 12*(3), 1–22. https://doi.org/10.1080/0964401041233130825 4

LaPira, T. (2014). Lobbying after 9/11: Policy regime emergence and interest group mobilization. *Policy Studies Journal, 42*, 226–251. https://doi.org/10.1111/psj.12057

Lasswell, H. (1956). *The decision process: Seven categories of functional analysis*. University of Maryland Press.

Lind, F., Eberl, J., Heidenreich, T., & Boomgaarden, H. (2019). When the journey is as important as the goal: A roadmap to multilingual dictionary construction. *International Journal of Communication, 13*, 4000–4020.

Maier, D., Waldherr, A., Miltner, P., Jahnichen, P., & Pfetsch, B. (2018a). Exploring issues in a networked public sphere: Combining hyperlink network analysis and topic modeling. *Social Science Computer Review, 36*(1), 3–20. https://doi.org/10.1177/0894439317690337

Maier, D., Waldherr, A., Miltner, P., Wiedemann, G., Niekler, A., Keinert, A., Pfetsch, B., Heyer, G., Reber, U., Häussler, T., Schmid-Petri, H., & Adam, S. (2018b). Applying LDA topic modeling in communication research: Towards a valid and reliable methodology. *Communication Methods and Measures, 12*(2–3), 93–118. https://doi.org/10.1080/19312458.2018.1430754

May, P., Jochim, A., & Sapotichne, J. (2011). Constructing homeland security: An anemic policy regime. *Policy Studies Journal, 39*(2), 285–307. https://doi.org/10.1111/j.1541-0072.2011.00408.x

Metz, F., Angst, M., & Fischer, M. (2020). Policy integration: Do laws or actors integrate issues relevant to flood risk management in Switzerland? *Global Environmental Change*. https://doi.org/10.1016/j.gloenvcha.2019.101945

Metz, F., & Glaus, A. (2019). Integrated water resources management and policy integration: Lessons from 169 years of flood policies in Switzerland. *Water, 11*(6), 1173. https://doi.org/10.3390/w11061173

Mintcheva, V. (2005). Indicators for environmental policy integration in the food supply chain (the case of the tomato ketchup supply chain and the integrated product policy). *Journal of Cleaner Production, 13*(7), 717–731. https://doi.org/10.1016/j.jclepro.2004.01.008

Molenveld, A., Verhoest, K., & Wynen, J. (2021). Why public organizations contribute to crosscutting policy programs: The role of structure, culture, and ministerial control. *Policy Sciences, 54*, 123–154. https://doi.org/10.1007/s11077-020-09379-y

Neumayer, E. (2003). *Weak versus strong sustainability: Exploring the limits of two opposing paradigms*. Edward Elgar Publishing.

Nilsson, M., & Persson, Å. (2017). Policy note: Lessons from environmental policy integration for the implementation of the 2030 agenda. *Environmental Science & Policy, 78*, 36–39. https://doi.org/10.1016/j.envsci.2017.09.003

Nilsson, M., Zamparutti, T., Petersen, J. E., Nykvist, B., Rudberg, P., & McGuinn, J. (2012). Understanding policy coherence: Analytical framework and examples of sector-environment policy interactions in the EU. *Environmental Policy and Governance, 22*(6), 395–423. https://doi.org/10.1002/eet.1589

Nkiaka, E., & Lovett, J. (2018). Mainstreaming climate adaptation into sectoral policies in Central Africa: Insights from Cameroun. *Environmental Science & Policy, 89*, 49–58. https://doi.org/10.1016/j.envsci.2018.07.012

Norton, B. (2005). *Sustainability: A philosophy of adaptive ecosystem management*. University of Chicago Press.

Nunan, F., Campbell, A., & Foster, E. (2012). Environmental mainstreaming: The organisational challenges of policy integration. *Public Administration and Development, 32*(3), 262–277. https://doi.org/10.1002/pad.1624

Ooms, J. (2020). *cld2: Google's compact language detector 2*. R package. https://CRAN.R-project.org/package=cld2

Persson, Å. (2004). *Environmental policy integration: An introduction* (Policy Integration for Sustainability (PINTS) background paper). Stockholm Environment Institute.

Persson, Å. (2007). Different perspectives on EPI. In M. Nilsson & K. Eckerberg (Eds.), *Environmental policy integration in practice: Shaping institutions for learning* (pp. 25–48). Earthscan.

Persson, Å., & Runhaar, H. (2018). Conclusion: Drawing lessons for environmental policy integration and prospects for future research. *Environmental Science & Policy, 85*, 141–145. https://doi.org/10.1016/j.envsci.2018.04.008

Persson, Å., Runhaar, H., Karlsson-Vinkhuyzen, S., Mullally, G., Russel, D., & Widmer, A. (2018). Editorial: Environmental policy integration: Taking stock of policy practice in different contexts. *Environmental Science & Policy, 85*, 113–115. https://doi.org/10.1016/j.envsci.2018.03.029

Peters, B. (1998). Managing horizontal government: The politics of co-ordination. *Public Administration, 76*(2), 295–311. https://doi.org/10.1111/1467-9299.00102

Peters, B. G. (2015). *Pursuing horizontal management: The politics of public sector coordination*. University Press of Kansas.

Peters, B. G., & Hoornbeek, J. (2005). The problem of policy problems. In P. Eliadis, M. Hill, & M. Howlett (Eds.), *Designing government: From instruments to governance* (pp. 77–105). McGill-Queen's University Press.

Pham-Truffert, M., Metz, F., Fischer, M., Rueff, H., & Messerli, P. (2020). Interactions among Sustainable development goals: Knowledge for identifying multipliers and virtuous cycles. *Sustainable Development, 28*(5), 1236–1250. https://doi.org/10.1002/sd.2073

R Core Team (2021). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. https://www.R-project.org/

Reber, U. (2019). Overcoming language barriers: Assessing the potential of machine translation and topic modeling for the comparative analysis of multilingual text corpora. *Communication Methods and Measures, 13*(2), 102–125. https://doi.org/10.1080/19312458.2018.1555798

Rietig, K. (2014). Reinforcement of multilevel governance dynamics: Creating momentum for increasing ambitions in international climate negotiations. *International Environmental Agreements: Politics, Law and Economics, 14*, 371–389. https://doi.org/10.1007/s10784-014-9239-4

Roberts, M., Stewart, B., & Tingley, D. (2019). stm: An R package for structural topic models. *Journal of Statistical Software, 91*(2), 1–40. https://doi.org/10.18637/jss.v091.i02

Robinson, D. (2020). *fuzzyjoin: Join tables together on inexact matching*. R package. https://CRAN.R-project.org/package=fuzzyjoin

Runhaar, H., Driessen, P., & Uittenbroek, C. (2014). Towards a systematic framework for the analysis of environmental policy integration. *Environmental Policy and Governance, 24*(4), 233–246. https://doi.org/10.1002/eet.1647

Runhaar, H., Wilk, B., Persson, Å., Uittenbroek, C., & Wamsler, C. (2018). Mainstreaming climate adaptation: Taking stock about "what works" from empirical research worldwide. *Regional Environmental Change, 18*, 1201–1210. https://doi.org/10.1007/s10113-017-1259-5

Sabatier, P., & Weible, C. (2014). *Theories of the policy process*. Westview.

Schmidt, N., & Fleig, A. (2018). Global patterns of national climate policies: Analyzing 171 country portfolios on climate policy integration. *Environmental Science & Policy, 84*, 177–185. https://doi.org/10.1016/j.envsci.2018.03.003

Sciarini, P., Fischer, M., & Traber, D. (2015). *Political decision-making in Switzerland: The consensus model under pressure*. Palgrave Macmillan.

Tosun, J., & Lang, A. (2017). Policy integration: Mapping the different concepts. *Policy Studies, 38*(6), 553–570. https://doi.org/10.1080/01442872.2017.1339239

Tosun, J., & Leininger, J. (2017). Governing the interlinkages between the sustainable development goals: Approaches to attain policy integration. *Global Challenges*. https://doi.org/10.1002/gch2.201700036

Tosun, J., & Peters, B. G. (2018). Intergovernmental organizations' normative commitments to policy integration: The dominance of environmental goals. *Environmental Science & Policy, 82*, 90–99. https://doi.org/10.1016/j.envsci.2018.01.014

Trein, P., Meyer, I., & Maggetti, M. (2019). The integration and coordination of public policies: A systematic comparative review. *Journal of Comparative Policy Analysis: Research and Practice, 21*(4), 332–349. https://doi.org/10.1080/13876988.2018.1496667

UN. (1992, May). *Convention on biological diversity*. https://www.cbd.int/doc/legal/cbd-en.pdf

UN. (2012, June). *The future we want: Outcome of the Conference on Sustainable Development, Rio de Janeiro*. https://digitallibrary.un.org/record/3826773

UN. (2016, December). *Cancun declaration on mainstreaming the conservation and sustainable use of biodiversity for well-being*. https://www.cbd.int/cop/cop-13/hls/cancun%20declaration-en.pdf

Underdal, A. (1980). Integrated marine policy: What? Why? How? *Marine Policy, 4*(3), 159–169. https://doi.org/10.1016/0308-597X(80)90051-2

Velázquez Gomar, J., Stringer, L., & Paavola, J. (2014). Regime complexes and national policy coherence: Experiences in the biodiversity cluster. *Global Governance: A Review of Multilateralism and International Organizations, 20*(1), 119–145. https://doi.org/10.1163/19426720-02001008

Whitehorn, P., Navarro, L., Schröter, M., Fernandez, M., Rotllan-Puig, X., & Marques, A. (2019). Mainstreaming biodiversity: A review of national strategies. *Biological Conservation, 235*, 157–163. https://doi.org/10.1016/j.biocon.2019.04.016

Wickham, H., Averick, M., Bryan, J., Chang, W., McGowan, L. D., François, R., Grolemund, G., Hayes, A., Henry, L., Hester, J., & Kuhn, M. (2019). Welcome to the tidyverse. *Journal of Open Source Software, 4*(43), 1686. https://doi.org/10.21105/joss.01686

Widmer, A. (2018). Mainstreaming climate adaptation in Switzerland: How the national adaptation strategy is implemented differently across sector. *Environmental Science & Policy, 82*, 71–78. https://doi.org/10.1016/j.envsci.2018.01.007

Wlezien, C. (2005). On the salience of political issues: The problem with "most important problem." *Electoral Studies, 24*(4), 555–579. https://doi.org/10.1016/j.electstud.2005.01.009

Young, O. (2011). Effectiveness of international environmental regimes: Existing knowledge, cutting-edge themes, and research strategies. *Proceedings of the National Academy of Sciences of the United States of Americam, 108*(50), 19853–19860. https://doi.org/10.1073/pnas.1111690108

Zinngrebe, Y. (2016). Conservation narratives in Peru: Envisioning biodiversity in sustainable development. *Ecology and Society, 21*(2), 35. https://doi.org/10.5751/ES-08512-210235

Zinngrebe, Y. (2018). Mainstreaming across political sectors: Assessing biodiversity policy integration in Peru. *Environmental Policy and Governance, 28*, 153–171. https://doi.org/10.1002/eet.1800