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RESEARCH ARTICLE

Conflicting and complementary policy goals as sectoral integration challenge: an analysis of sectoral interplay in flood risk management

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Abstract

The paradigmatic shift from traditional flood defense toward integrated flood risk management has widened the sectors and policies affected and has spurred a growing interest of scholars to understand cross-sectoral flood policy integration. In this paper we argue that the cross-sectoral goal relationship—ranging from complementary to conflictual policy goals—is a useful conceptual framework to understand (1) the policy integration challenge at hands and (2) in particular the unfolding policy integration from a processual perspective. For our empirical analysis we identify three policy subsystems that are highly important for sectoral interplay in flood risk management: agriculture, hydropower generation, and spatial planning. Using Austria as a case study we illustrate the goal relationships and sectoral policy integration challenges in each of these fields of interaction. Based on 45 expert interviews in the selected policy sectors we provide useful insights into the current processes of flood policy integration. The empirical findings from our case studies show that sectoral goal relationships and the nature of the policy integration challenge drive flood policy integration. More pronounced land use conflicts are more strongly reflected in different actor interests, policy frames, policy goals, and the choice of policy instruments. Sectoral goal relationships are an important factor to explain the unfolding policy integration process. Complementary policy goals result in rather informal, harmonious integrative negotiations on strengthening synergies by using soft policy instruments. On the contrary, conflictual policy goals lead to more formal negotiations among the affected sectors relying on hard, regulative instruments.

Keywords Integrated flood risk management · Policy coordination · Policy integration · Integration challenge · Sectoral goal relationships

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Introduction

The succession of high-impact flood events across Europe in 2002, 2005, and 2013 exposed the shortcomings of the traditional flood policy regime which primarily focused on flood protection. The extreme flood events led to a fundamental reconsideration of existing flood policies and accelerated the policy shift from flood defense to an integrated approach of flood risk management (Klijn et al., 2008; Samuels et al., 2006). The new paradigm of integrated flood risk management aims at reducing the severity of and the vulnerability to flooding based on a portfolio of adaptive approaches, comprising structural and non-structural measures (van Herk et al., 2015). The promotion of sustainable land use practices, improvement of water retention as well as the controlled flooding of certain areas in the case of a flood event play an important role in the new flood policy paradigm. As policy emphasis is shifting toward flood retention and mitigating the further increase in damage potential, flood risk management becomes an integrated, multi-sectoral effort characterized by a pluralization of actors and interests (Thaler, 2015). The growing overlap of sectoral responsibilities that comes with a shift toward integrated approaches in flood risk management calls for better coordinated and integrated flood policies to effectively reduce flood hazard exposure and vulnerability (Löschner, 2018). Therefore, adjusting sectoral policies in order to make them mutually enforcing and consistent has become a major concern for implementing integrated flood policies (Bolognesi et al., 2021; Stead & Meijers, 2009). The practical experience with integrated flood policies shows how difficult it is to achieve this goal. Some studies strike an optimistic tone and conclude that there is a noticeable trend toward enhanced cross-sector collaboration (Avoyan and Meijerink, 2021; Löschner & Nordbeck, 2020; Metz et al., 2020). Other studies are rather skeptical about the prospects of integrated flood policies () and highlight the traditional institutional divide between water management and spatial planning and the collision of different modes of governance in these policy subsystems as main factors why flood policy integration is often difficult to achieve (Gralepois et al., 2016; Scholten et al., 2020).

The policy integration literature has identified several categories of drivers and barriers for successful policy integration, including political, organizational, and cognitive factors as well as resources, timing, and the characteristics of the integration problem at hand (Biesbroek et al., 2013; Runhaar et al., 2018). The latter factor has received the least attention in the literature yet. This is somewhat surprising since the factor has been identified as one of the most often mentioned drivers of policy integration. At the same time, conflicting interests—a potential result of linking various sectoral objectives—are among the most frequently reported barriers for policy integration (Runhaar et al., 2018). Taking this into account it seems necessary to shed more light on this specific integration challenge for a given cross-sectoral policy problem and its potential impact on the policy integration process. As several authors have noted, the nature of the policy problem itself can make some integration barriers more tenacious, accentuate other barriers, and/or trigger the emergence of new barriers (Biesbroek et al., 2013; Runhaar et al., 2012). Hence, to understand the sector-specific integration challenge is very important, because it will likely vary from one sectoral context to another (Cumiskey et al., 2019).

In this paper we focus on the characteristics of the integration problem, which is defined as the way in which the integration objective is framed and linked to sectoral objectives, including complementary and conflicting timescales (Runhaar et al., 2018). In the following we will analyze the cross-sectoral goal relationship and its impact on flood policy integration in Austria. In our case study we analyze the sectoral interplay between flood risk management and three other policy sectors highly relevant for flood risk management: hydropower, agriculture, and spatial planning. Each of these policy sectors contributes significantly to adapting to and mitigating future flood risks. Based on expert interviews and an analysis of policy documents we conduct an in-depth case study of flood policy integration. This provides us with a more complete picture of various integration challenges concerning Austria's flood policy regime.

This paper hypothesizes that the sectoral integration challenge is closely linked to the characteristics of the cross-sectoral policy problem. The cross-sectoral policy problem sets the stage for the relationship between the affected policy sectors based on the adverse, neutral, or complementary character of their sectoral policy objectives. The more adverse the sectoral policy objectives, the bigger the integration challenge. For each of our three fields of policy interaction we illustrate the integration challenge based on the competing interests to understand the fundamental constraints of sectoral interplay.

Cross-sector goal relationships and the challenge of policy integration

The institutional landscape of flood risk management (FRM) in the majority of European countries, including Austria, is typically rather fragmented (Wiering et al., 2017). A broad range of actors is responsible for different aspects of flood risk management. Figure 1 exemplifies potential areas for flood policy integration, given different flood risk management strategies and sector-specific policy domains.

Most policy domains can contribute to more than one FRM strategy. For example, spatial planning can help to prevent future risks and manage residual risks by regulating building and infrastructure development or agriculture can support the reduction of risks as well as risk prevention due to the provision of flood retention areas. However, these sectoral overlaps, or combinations thereof, can result in policy integration challenges. In practice, certain sectoral integration challenges may be prioritized over others because of the type of flood risk they pose, combined institutional responsibilities or urgency due to recent flood events (Cumiskey, 2019). Given the wide range of policy integration challenges across various sectors, multiple sources of flood risks, and different flood risk management strategies, it is important to understand the specific integration challenges because they will likely vary from one sectoral context to another. It is reasonable to assume that policy sectors with a full congruency with

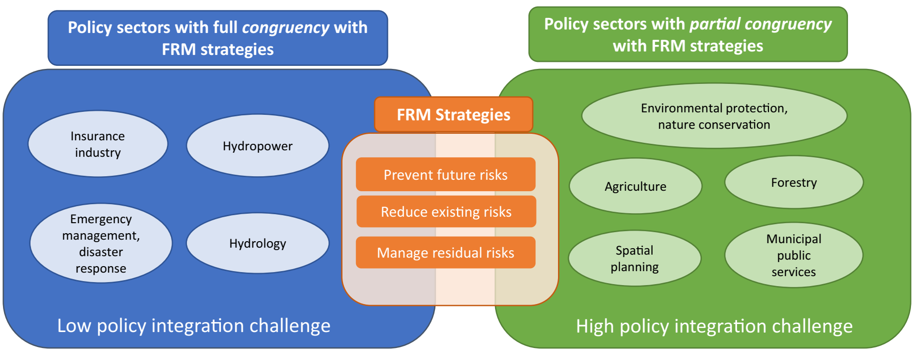

Fig. 1 Flood risk management (FRM) strategies and examples of sector-specific policy domains and challenges for flood policy integration

flood risk management strategies pose a lower challenge for policy integration than policy sectors with only a partly congruency. Figure 1 shows an example of how the various policy sectors could theoretically be assigned to these two categories (based on Cumiskey et al., 2019; Löschner, 2018; Nordbeck et al., 2019; Seher, 2011). A more detailed, sector-based empirical assessment will help to define more precisely the interests and willingness of the affected stakeholders to enable flood policy integration as well as potential barriers for specific integration challenges.

Flood policy integration strives to solve cross-sectoral policy problems—e.g., flood retention on agricultural land, the socio-economic pressure to develop floodplains, or the use of reservoirs of hydropower plants for flood retention. The features of the cross-sectoral policy problem influence the capacity of governments to address the problem, the ambition for policy integration, the potential formulation of common policy goals as well as the range of appropriate policy instruments. The underlying cross-sectoral policy problem thus frames the sectoral integration challenge:

1. It defines the sectors and stakeholders affected by the specific integration challenge,
2. Based on the existing sectoral policy goals, the cross-sectoral problem creates either a harmonious or conflicting initial situation, and
3. The starting situation ("goal relationship") potentially may have a significant impact on the unfolding process of policy integration.

Cross-sectoral goal relationships can be defined as interdependencies that arise when instruments which are used to achieve certain sectoral goals, resulting in side effects that influence the achievement of sectoral goals in other policy domains. In the context of formal goal relationships, a distinction is made between three variants (Table 1).

Goal relationships among policy sectors can range from complementarity to neutrality to competition. Sectoral goals can support each other, be neutral, or contradict each other. This results in different institutional settings that may have an adversarial impact on the processes of policy integration. In a complementary situation, we can assume that sectoral stakeholders will talk to each other in a friendlier and more cordial atmosphere. Negotiations will probably take place in a rather informal setting with many direct personal contacts, but often without a formal organizational framework such as an inter-ministerial commission or working group. Policy integration will be driven by soft instruments to support the already existing synergies between the affected policy sectors. A neutral situation will also be characterized by a friendly atmosphere among the stakeholders, a more formal organizational framework, and a focus on incentive-based instruments to promote policy integration. The competitive situation is the most problematic for the process of policy integration. Stakeholders will have to argue and negotiate about conflicting policy objectives. A formal organization framework is to be expected in this situation. Any progress on policy integration is less secure. Potential agreements will be fixed in a way that legally binds all involved parties; thus, a preference for regulatory instruments is to be expected in this case.

Case study area and methods

Flood risk management in Austria—as in other countries with federal political systems, such as Germany or Switzerland—is characterized by a complex distribution of responsibilities across different levels and sectors of government (Nordbeck et al., 2019; Rauter

Table 1 Cross-sectoral goal relationships and policy integration. Sources: based on Hummel, 2007

Goal relationship	Definition	Potential impacts on process of policy integration
Goal complementarity	Sectoral goals work harmoniously with each other and also support each other. If one sectoral goal is achieved, this pays off for the achievement of other cross-sectoral goals	Friendly negotiations Informal setting Soft instruments to support synergies
Goal neutrality	Sectoral goals do not influence each other. They behave neutrally and/or indifferently	Friendly negotiations Formal setting Focus on incentive-based instruments
Goal competition	The sectoral goals contradict each other. When one goal is achieved, it hinders the achievement of other sectoral goals	Conflictual negotiations Formal setting Hard regulatory instruments

et al., 2019). In addition to water management and hydraulic engineering, this concerns policy sectors such as agriculture, energy, nature conservation, spatial planning, and many others. The legal basis for flood risk management is defined in three main federal laws: the Water Act, the Forest Act, and the Hydraulic Engineering Development Act. The responsibilities for spatial planning lie exclusively at the state level, where planning laws and building codes have been passed. The shortcomings and deficits of the flood policy regime were analyzed in detail after the extreme flood events in 2002 and 2005. The following policy recommendations for an integrated flood risk management were derived (Habersack et al., 2010): (1) policy integration in the sectors of flood protection, spatial planning, and agriculture through the coordination of all public sector planning and the legally binding anchoring of designated floodplains and hazard zones in the planning and building laws of the federal states, and (2) creation of the administrative prerequisites for integrated flood risk management through uniform objectives and harmonized implementation of administrative measures. These recommendations highlight two key issues in the risk governance of Austrian flood protection: intersectoral coordination and the harmonization of policy objectives. To investigate the progress made in these areas during the last 10–15 years makes Austria an interesting case from the perspective of policy integration. To provide a broader picture of the integration challenges we selected three "fields of interaction" as case study units to analyze the interactions between flood risk management and these policy sectors: (1) hydropower, (2) agriculture, and (3) spatial planning. Each of these three policy sectors plays a fundamental, but also controversial role concerning both flood hazard prevention and flood risk mitigation in Austria. The first case focuses on hydropower dams in alpine catchments and the possibilities of integrated policies to attenuate peak floods. The second case focuses on the growing need to provide agricultural areas for temporary flood storage and upstream flood retention services for downstream beneficiaries. The third case analyzes the reciprocal relation between flood protection schemes and spatial planning policies and the possibilities to mitigate the increase in damage potential in flood-protected areas.

This study used two data collection techniques to generate primary data sources: (a) document analysis of policy and legal documents and (b) semi-structured expert interviews. First, we reviewed the relevant scholarly literature on integrated flood risk management in Austria as well as the relevant federal, state, and local policy documents and legal frameworks for each of the three selected fields of interaction. The documents were examined with the aim of formulating relatively broad topics that summarize the content of the material with regard to policy integration. To gain insights into the current processes of policy integration among the policy sectors we then conducted in total 45 expert interviews between February 2020 and February 2021: 10 interviews in the field of hydropower, 15 interviews in the field of agriculture, and 20 interviews in the field of spatial planning. Our interview partners were senior administrative officials at federal and state level, planners, and representatives of environmental NGOs, chambers of agriculture, civil defense associations, hydropower plant operators, and insurance companies. Eight interviewees were interviewed twice because of their expertise in more than one field of interaction. Some interviews were held in person, and others were conducted online via Zoom. For the interviews we used structured open-ended questions related to various analytical categories, inter alia (1) the underlying problems and conflicts of interest, (2) the relevant actors and stakeholders, (3) policy goals and the regulatory framework, (4) the process of policy integration, and (5) the mechanisms and instruments of policy integration. These analytical categories reflect the process-oriented approach toward policy integration developed by Candel and Biesbroek (2016), who distinguish between four dimensions: policy frames, subsystem involvement, policy goals, and policy instruments. The premise is that policy integration is an agency-driven process of multi-dimensional policy and institutional change that manifests itself in varying degrees across these four dimensions. The expert interviews lasted between 45 and 90 min. All interviews were fully transcribed and analyzed using the qualitative software program MAXQDA (Rädiker & Kuckartz, 2020).

The qualitative content analysis combined inductive and deductive approaches of coding. In the first step, codes were deductively defined based on the analytical categories of the interview guideline outlined above, and relevant text passages of the empirical material were assigned to these codes. In a second step, the interview transcripts were screened in detail for additional text segments using in vivo coding to create new codes. The combination of theoretically and empirically driven coding is known as deductive–inductive strategy and widely recommended in the literature in order to increase analytical flexibility and thus utilize the qualitative material as effectively as possible (Rädiker & Kuckartz, 2020). This combined approach guaranteed that no relevant text segments were overlooked in the coding process.

The empirical material we obtained from the document analysis and expert interviews as primary sources will be used alongside secondary sources for the empirical analysis of the three selected fields of interaction in the following "Sectoral interplay in Austrian flood risk management" section. Wherever possible we included direct quotes from the interviews to let the interviewees speak for themselves. Throughout the text, the interviews will be cited as i1, i2,…, i45 to ensure anonymity. All quotations from the interviews were translated by the authors.

Sectoral interplay in Austrian flood risk management

Characterizing the sectoral integration challenges

The main goal of flood risk management is to minimize risks regarding human lives, settlement areas, and economic assets. To reach this goal it is necessary to reduce the probability and intensity of flood events. This can be done by structural and non-structural measures such as dams, retention basins, hazard mapping, or low damage flood runoff.

The main constraint in this sectoral perspective is the limited availability of land for flood defense structures, flood retention, and flood runoff (Grüneis et al., 2021; Nordbeck et al., 2019). From this view, other policy sectors are predestined to fulfill certain roles in flood risk management since they can provide useful services: (1) flood retention capacity in the headwaters (hydropower), (2) flood retention on agricultural land (agriculture), and (3) preservation of areas for flood retention and flood runoff (spatial planning). However, the perspective of flood risk management can be at odds with the main goals of the three policy sectors which have their own ideas how to use the limited land and water resources, namely for generating a steady supply of energy, for agricultural production, and for settlement development. Figure 2 provides an overview of the sectoral goals of flood risk management and each of these three policy sectors.

(1) Hydropower

Flood risk in alpine areas is influenced by the natural and man-made possibilities for water and flood retention in the headwaters. With the construction of hydropower dams in Alpine catchments, starting in the early/mid-1900s, large artificial reservoirs were created, which now provide a significant potential for attenuating peak flows in extreme floods. The use of hydropower is traditionally of major importance for the Austrian energy sector (Wagner et al., 2015), which gives the plant operators a strong and powerful position. Around 70 storage power plants are currently in operation, highlighting the importance for electricity, but also the relevance of potential flood retention by artificial reservoirs, since they are potentially able to store a high percentage of the discharge volume of a year (Pirker, 2005; Wesemann et al., 2018). The relationship between flood risk management authorities and plant operators was described as very friendly by several interviewees (I2, I3, I4). Both sides regard the sectoral relationship as potentially synergetic, i.e., that hydropower plants have a net positive impact on flood hazards (I3, I4, I5). "The synergies are clear from my point of view: storage power plants can contribute to flood retention, very clear" (I7). The policy integration challenge is regarded as very manageable: "In principle, I see a significant potential for combining both objectives, hydropower and flood protection. There are many practical examples of this" (I5). Other interviewees agreed with the synergetic potential, but were more skeptical about it in practice (I1, I8, I9). Altogether, the sectoral goal relationship is seen as either complementary or neutral and the integration challenge as low or moderate.

(2) Agriculture

Flood storage is ideally realized in areas with low damage potential. Agriculture can—and is increasingly expected to—provide the much-needed space to alleviate flooding (Morris et al., 2016). The accommodation of flood water on agricultural land, however, is associated with impacts on agricultural production (e.g., crop failure, soil erosion, or soil contamination) and infringements on existing property rights (Klaghofer, 2003; Neuwirth & Wagner, 2010). Mobilizing privately owned land for risk reduction services thus marks a serious challenge for flood policy. The active function of agriculture for flood alleviation today stands in stark contrast to early flood defense policies and river training works, when agricultural land was protected against flooding to ensure favorable conditions for agricultural production (Wagner et al., 2009). Due to this significant change in flood policy, the goal relationship between agriculture and flood risk management nowadays can be regarded as conflicting, resulting in a substantial need for policy integration. Furthermore, the perspectives of the relevant actors concerning the relationship between the two policy sectors differ significantly. While flood managers describe the sectoral relationship as equal, agricultural representatives view it as hierarchical and dominated by flood managers. Some interviewees have noted that communication between water authorities and agricultural actors is often inadequate (I16, I17): “I would like to see a better basis for discussion” (I15). Conflicts about goals often occur in agriculturally high productive areas and may lead to hardened fronts. One interviewee told that “landowners are given a bad conscience and threatened with laws” which further worsens the situation (I16).

(3) Spatial planning

Structural flood protection has the core function to reduce flood risks for humans, settlements, and other assets. Structural flood protection schemes, however, also enable the use of former flood-prone riverside properties for housing and commercial development. This so-called levee effect often leads to the accumulation of damage potential in “protected” areas (Cutter et al., 2018; Di Baldassarre et al., 2013). In alpine regions this interdependence is particularly pronounced due to the concentration of vulnerable land uses in the valleys resulting from the limited possibilities for development there (ARE et al., 2005, I28, I32, I35, I36). Mitigating future increases in flood risk and developing flood-adapted land uses presents a key challenge for flood risk management, notably against the likelihood of a climate-induced increase in flood discharge and the risks associated with the overtopping and/or failure of flood protection schemes (Löschner et al., 2016). This consideration of extreme events and “residual risks” is a rather new phenomenon, which stands in contrast to historical land use strategies with structural flood protection intentionally contributing to the development of former flood-prone areas, and also differs from the existing planning practice of mostly unrestricted development in residual risk zones (Seher & Löschner, 2018). Flood managers would like to see development in former hazard zones either be halted altogether or at least further measures being implemented to minimize associated flood risks (BMLRT, 2021, I25, I27, I31, I32). However, flood managers are clearly dependent on the willingness of the spatial planning community to address this problem: “When it comes to residual risk, water management lacks an interface with spatial planning and building law” (I28). Due to a currently conflicting goal relationship the need for

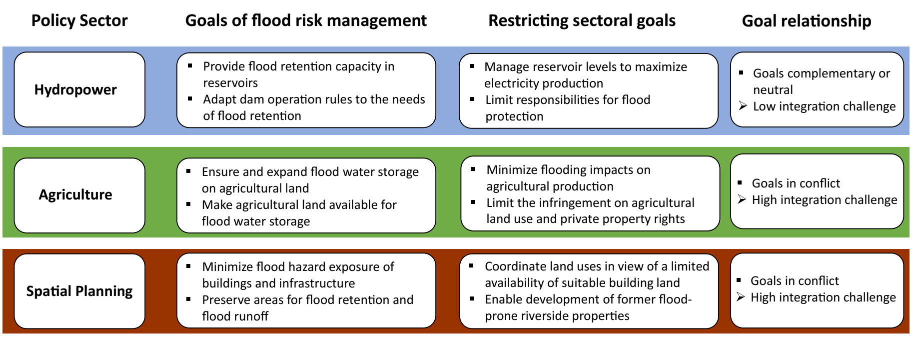

Fig. 2 Cross-sectoral goal relationships between flood risk management and hydropower, agriculture, and spatial planning

policy integration is high. In terms of the institutional relations the policy sectors of flood risk management and spatial planning are structurally separated and operate on an equal footing.

Analyzing the process of cross-sectoral flood policy integration

Flood retention in the headwaters: the integration of hydropower

The integration of hydropower into flood risk management is of special interest for a diverse group of actors including the power plant operators, federal and state authorities, municipalities and local residents, NGOs, and other business companies. The demands of this diverse group of interested parties may result in both potential synergies and conflicts. A reliable power supply and grid stability, also during floods, is a transnational responsibility to fulfill and clearly links different interests, but operational impacts and requirements are a subject to controversial perspectives and narratives when it comes to flood retention. One perspective is that the construction of hydropower plants leads to a loss of retention area due to channelization activities, thus making natural flood attenuation impossible (WWF, 2009). The other perspective argues that larger reservoirs for storage hydropower plants can significantly increase the storage capacity within the valley they are situated (Schöberl, 2003) and are able to reduce the flood peak (Hauenstein, 2009).

Notwithstanding their potential for flood control, operators of hydropower plants in Austria are generally reluctant to uptake responsibilities in flood risk management since their primary goal is electricity generation (Wagner et al., 2015). From their point of view, flood risk management is a relevant but secondary problem. In the event of flooding, the opening of dams, however, can also aggravate flooding downstream. The potential storage capacity at the time a flood occurs depends on the reservoir management and the water level present in the reservoir, which is a function of the past inflow, electricity demand, its price on the markets and operational mode. After extreme floods events (e.g., Danube flood in 2013 or Kamp flood in 2002), hydropower companies in Austria thus frequently face the criticism that they did not adequately manage their reservoirs to reduce the flood peak (BMLFUW, 2016a).

The main instrument to integrate the sectoral policy goals of hydropower electricity production and flood risk management is the Austrian Water Act (WRG, 1959), which establishes a permit requirement for hydropower plants. The permit may not be issued if the hydropower plant violates public interests or existing rights (e.g., property rights) (I6). The Water Act does not necessitate an improvement of the flood situation after the construction of a hydropower plant, but it clearly prohibits a deterioration (I6, I9). As part of the permitting process the plant operator has to propose so-called weir operation rules, which define the operation rules of a hydropower plant for both standard operation and flood events. The weir operation rules are then approved by the authorities. This is basically the core instrument for policy integration. Affected third parties can submit written opinions during the approval procedure to uphold their rights. However, the approved weir operation rules are not publicly available. They can be adapted subsequently by the operator or the authorities, but not by third parties. Smaller adaptations are quite common: “The weir operation rules […] have been adjusted again and again due to experiences during the last floods” (I9). In case of an extraordinary flood event, the weir operation rules can be suspended and the power plant operation becomes a subject controlled by a crisis management team, located and organized by the authorities. Operators of larger hydropower schemes can be part of this team (I3, I4, I7).

The close coordination between public authorities and power plant operators, especially for the larger ones, has grown historically and resulted in a synergetic relationship and rather closed network in Austria. As one interviewee summarized it: “We meet quite often. Not only on the topic of flood protection, but also on the national water management plan. There are a number of topics that we exchange. And we know the people involved well and they know us. So that works well” (I8). This close sectoral relationship generates certain benefits for policy integration, in particular direct personal contacts that allow for fast and informal ways of decision-making in the case of an extreme flood event. In addition, the authorities and plant operators share data (e.g., on runoff), expertise and responsibilities, but also run flood forecasting models together. However, the close network may also generate some shortcomings when it provides the plant operators with an upper hand vis-à-vis other stakeholders. A comparison of ten weir operation rules from various hydropower plants along the Danube showed quite some differences among the operative rulebooks (RH, 2016). Only very few contained rules concerning the rights of agriculture and forest landowners and mechanisms to settle damage compensations. Furthermore, the plant operator is in general liable for any damage caused by the legal existence of the hydropower plant, except the adverse effect was caused by force majeure. Accordingly, in many court cases plant operators argued successfully with force majeure and that they complied with the approved weir operation rules to not be held accountable for flood damages downstream.

Flood storage on agricultural land

Agricultural land is necessary to establish flood protection structures, but also as retention area. Agricultural landowners are therefore particularly important stakeholders in flood risk management. However, agriculture in Austria is strongly affected by a decrease of agricultural land (approx. 0.5% annually), since this land is continuously needed for traffic, settlement areas, industrial areas, and ecological compensation (ÖROK, 2018). Especially in the western provinces of Tyrol and Vorarlberg, the shortage of land is a major issue in agriculture, which is reflected in the high prices for agricultural land (I14, I18). Farmers are also confronted with a multitude of laws and requirements in different policy areas (e.g., plant protection, fertilization, subsidies, and nature conservation) and are often very challenged to implement these high requirements. The designation of agricultural land as retention areas in the context of flood protection measures is therefore often perceived as an additional constraint (I13, I14, I16, I18). Especially on highly productive agricultural land, the implementation of land-intensive flood protection structures is more critical and thus more difficult (Seher, 2015).

Flood risk management and agriculture have an ambivalent relationship. While some demands of flood risk management are congruent with agricultural interests, there are also conflicts of interest over land use. On the one hand, agriculture can contribute to enhance floods by certain types of cultivation and management practices. On the other hand, agriculture can contribute to reducing surface runoff from precipitation by restoring or maintaining the water storage capacities as well as acting as retention areas for floods (Morris et al., 2010; Wagner et al., 2009). Due to the conflicts of use, an area of tension has arisen in recent years that is regarded as politically explosive in many federal states. Major conflicts arise in ten percent of flood protection projects. Some flood risk management projects are highly conflict-laden, and resistance groups are forming, making implementation difficult for many years or preventing it altogether (I12, I13, I14, I17). “Many large projects are delayed for years, citizens’ initiatives are founded, very well networked via social media with lawyers in the background” (I13). Altogether, this has spurred an ongoing discussion about the least possible restrictions on land use and compensations for flood storage on private land, as well as compensation for damage in the event of flood-related crop losses.

The institutional frameworks of agricultural and water policy are somewhat supportive to find consensual intersectoral solutions. Agricultural policies are strongly determined by the Common Agricultural Policy of the EU, supplemented by national laws and guidelines such as the Austrian Agricultural Law (LWG, 1992). The LWG outlines a broad range of policy objectives for agricultural policy. One of the goals of agricultural policy is to promote agriculture, so that it is able to (1) ensure the best possible supply of high-quality food and raw materials for the population, (2) to sustainably safeguard the natural resources of soil, water, and air, and (3) to support protection against natural hazards. The last-mentioned aspect of agricultural multi-functionality is particularly important in alpine areas with its precarious economic conditions (Schermer & Kirchengast, 2006). The EU Floods Directive (2007/60/EC) explicitly supports the idea to give more space to rivers. Accordingly, it suggests that flood risk management plans should consider—where possible—the maintenance and/or restoration of floodplains to provide areas for flood retention to reduce flood damages. However, giving rivers more space for flood run off (widening of river space, relocating of dykes) and flood retention (agricultural areas and ponds) leads to an increasing demand of land resources. A demand commonly needs to be met by agricultural land.

The main tools to solve the integration challenge between agriculture and flood risk management in Austria are regulatory instruments. According to the Austrian Water Act and the Hydraulic Structures Development Act, landowners must be compensated for the use of their agricultural land as well as for potential further damages. There are several possibilities for compensation measures, which are all part of civil law agreements. The needed land can be purchased and transferred into municipal or other public property. Another option is to exchange the future retention area for agricultural land of equal value. The third option is an easement contract, which is secured by an entry into the land register. This contract regulates the financial compensation for the easement as well as for the occurring damages, such as crop failure or clean-up work. Easements can also be granted under compulsory law. Coordination between agriculture and water management within this process takes place primarily between the Federal Water Engineering Administration (BWV) and farmers (land owners, tenants) or associations of land users like Agricultural Cooperatives and Communities at the level of private law agreements and contracts. In case of conflicting planning processes, the Agricultural Chamber may be involved to represent farmers’ interests (I11, I12, I13, I14, I15, I17). Stakeholders’ views of these formal procedures under the Water Act differ significantly. For flood risk managers, negotiations between stakeholders take place on an equal footing: "We cooperate very well with the Chamber of Agriculture. The interests are only diametrically opposed on the surface” (I19). Stakeholders from the agriculture sector, however, view the process often as hierarchical and unequal which statements from several interviews make clear: “As long as you are in the theoretical area, partnership is very important. But when it comes to what we do on the ground, the administrative character suddenly takes effect, and the partnership is lost. […] It’s absolutely human, you first try to be friendly and if it doesn’t work, you threaten” (I13). "It is understandable that owners feel a lot of pressure" (I14). "There are still threats of expropriation and run roughshod" (I17). While the majority of flood risk management projects are successfully implemented, others fail mainly due to the different goals of the parties involved. The integration challenges are particularly high in large-scale projects and in highly productive agricultural areas (I21, I22, I23). Those projects require even more efforts to find common ground and overcome the competitive goal relationship.

Flood protection and land development

The current Austrian flood protection policy aims at reducing flood risks by providing structural flood protection for existing buildings and infrastructure (BMLFUW, 2016b). Laying the groundwork for development in former flood plains is regarded as an unintended consequence of flood defense structures implemented (I25, I27, I32, I33, I42). Against the Austrian legal and administrative background, the levee effect emerges from a sectoral interplay between flood protection and spatial planning. Development options in former flood plains depend on (1) the way hazard information is revised after accomplishing protection works and (2) the respective zoning restrictions for these areas.

Flood protection authorities, i.e., the Federal Water Engineering Administration and the Austrian Service on Torrent and Avalanche Control operating at state and national level, are responsible for structural flood protection and hazard mapping, depending on whether a water body is classified as a river or a torrential stream. After implementing flood defense structures like dikes or retention basins, the authorities usually revise flood hazard maps according to the reduced flood hazards. The Federal Water Engineering Administration withdraws red and yellow hazard zones after realizing flood protection structures and replaces them with a designation of residual risk areas (I25, I27, I32). The Austrian Service on Torrent and Avalanche Control usually does not completely withdraw the hazard zones, but "re-evaluates flood hazard based on technical expertise" (I37). However, due to the complexity of exactly calculating overload and failure of flood protection structures detailed representations of residual risks are currently not available (I37). Remaining hazards concerning flood events are thus represented by former hazard zones or by runoff areas of low-probability flood events. This hazard information builds the basis for decisions between prevention and land development in spatial planning processes.

Spatial planning is implemented at state and municipal level with state spatial planning authorities being responsible for regional land use planning and municipalities being in charge of local land use planning. State and municipal spatial planning decisions set framework conditions for land use and land development. Regarding the consideration of flood hazards, these decisions are based on flood hazard mapping. State spatial planning laws provide zoning restrictions for building land in flood hazard zones in order to limit the encroachment of settlements into hazard areas and contribute toward reducing flood-related damages. However, with the exception of one state, Upper Austria, the spatial planning laws do not provide explicit regulation on development in residual risk areas. The Upper Austrian spatial planning law includes a development ban in "former red hazard zones," with "former" relating to the hazard situation before flood protection works were accomplished. The designation of residual risk areas in the hazard maps of the Federal Water Engineering Administration is only indicative without direct implications on municipal land use planning (I29, I30, I39). The practice of the Austrian Service on Torrent and Avalanche Control in revising hazard information enables the authority to further exert influence on municipal zoning decisions and thus consider remaining hazards in local land use planning (I35, I37). Overall for Austria, development in residual risk areas currently faces no extensive zoning restrictions.

Given this conflicting goal relationship one would expect conflictual negotiations and efforts to apply regulatory instruments. However, the interview results suggest a good relationship and close operative contacts between water management and spatial planning stakeholders. This can be explained with the perception of the levee effect as a de facto secondary issue in flood risk management. Further zoning restrictions for highly vulnerable land uses in residual risk areas are thus currently not considered politically feasible, particularly against the background of the spatial situation in alpine regions, where land suitable for development is limited and various land use interests compete in the valleys, and municipalities take advantage of the opportunity to develop former flood hazard areas (Junger et al., 2022, I28, I32, I35, I36, I43). Municipal representatives often even claim development opportunities in return for co-financing flood protection works (I28, I37). Despite the fact that information about remaining hazards is available and widely known by local decision-makers, the levee effect is currently "a very minor issue in local land use planning" (I30, I32, I39). According to the interviewees, the same finding applies to climate change impacts on river floods potentially increasing flood hazards for housing and commercial development in residual risk areas in the future (I28, I29, I30, I31). This overall narrative is in line with the results of a previous online expert survey, where spatial planning options for residual risk areas were attested a high degree of effectiveness in prevention; their practical feasibility, however, was viewed more critically (Seher & Löschner, 2018).

Accordingly, policy instruments such as the National Flood Risk Management Plan (RMP) 2021 focus on recommendations when referring to the levee effect. The guiding approach is to "consider residual risks and to reduce them by suitable flood risk management measures wherever possible" (BMLRT, 2021). With regard to spatial planning policy, the Austrian Conference on Spatial Planning (OEROK) suggests to consider residual risk in spatial planning and building approval procedures (OEROK, 2018). This recommendation is also included in the Austrian Spatial Development Concept 2030 (OEROK, 2021), a policy document providing guidance for spatial planning at state and municipal level.

Although many interviewees would favor regulatory planning approaches to reduce residual risks (I25, I27, I29, I30, I31, I32, I38, I39, I42), they mainly propose instruments not directly related to spatial planning. This mix of instruments includes information and awareness raising on remaining hazards after realizing flood protection works (I25, I28, I32, I34, I35, I39), mandatory and voluntary individual flood proofing (I31, I38, I39), emergency planning considering the impacts of extreme flood events (I27, I28, I32, I33, I34, I44), cutbacks of subsidies for flood defense in case of development considered in former flood plains (I25, I31), and holistic approaches to manage flood overload cases (I37). With an instrument mix available, there is still progress to be made toward integrating residual risks and flood overload cases in the Austrian spatial planning system. Policy integration in this area remains limited.

Discussion

This paper calls for greater efforts to analyze the sectoral integration challenge as an important factor to explain processes of policy integration. We have illustrated the relevance of complementary and conflicting policy goals on the basis of three fields of interaction in Austrian flood risk management. The operationalization of the integration challenge by means of sectoral goal relationships has proven to be a valuable concept. First, it allows to unpack sectoral relationships in a policy field and discover an unequal "network of relations" among various policy subsystems. Second, it clarifies the starting point for the integration process among the policy subsystems and helps to develop realistic expectations about the process of policy integration. Small steps toward political integration are often denigrated as failures, but in an antagonistic relationship they should rather be interpreted as small successes in a long race. Our empirical analysis supports in general the hypothesis that the sectoral goal relationship has a significant impact on the unfolding policy integration process.

On the one hand, we see the complementary or neutral sectoral goal relationship between hydropower and flood risk management in the case of flood retention in the headwaters. The harmonious sector goals in this case study lead to a friendly integration process using soft instruments to support synergetic relationship between water authorities and power plant operators. The cross-sectoral problems regarding flood risk management are acknowledged by the plant operators, but rather viewed as a secondary issue. Third party stakeholder demands, however, might lead to some conflicts. Overall, the integration challenge is low or moderate at worst due to a manageable conflict situation in this policy field. The main instrument for policy integration is the weir operation rules for standard operation as well as for flood events. These rules are substantive policy instruments proposed by the operator and approved by the water authorities, though providing only limited inclusion of third parties. Additional cross-sectoral integration in terms of shared data and expertise takes place in a bilateral, informal setting.

In contrast, we have the case of flood retention on agricultural land with a competitive goal relationship. With farmland already being under pressure by settlement development, farmers are increasingly reluctant to provide land for flood storage or to accept cultivation restrictions resulting from modified flood runoff areas. While flood risk managers perceive the sectoral relationship as equal, farmers´ representatives observe a hierarchical relationship dominated by water authorities. Some demands of flood risk management are congruent with agricultural interests; however, if flood retention projects request farmland and restrictions and compensation issues are raised, the conflicting land use interests are much more present. Accordingly, the sectoral integration challenges are very high in this policy field. The main instruments used to foster policy integration are regulatory instruments. At the project level, negotiations among the stakeholders take place in a formal setting based on the regulations provided by the Water Act. Compensations for agricultural landowners for flood risk management interventions in private property rights are based on civil law agreements. Despite the difficult framework conditions, the majority of projects aiming at the practical integration of agriculture and flood risk management on the ground are successful. However, in one out of ten cases the attempt to integrate runs into major conflicts. What is interesting about these cases is that authorities in the end refrain from regulatory coercion. Instead they return to softer instruments such as arguing, persuasion, and renegotiation after some time has passed.

Our third case study on flood protection and land development is at first sight somehow at odds with our hypothesis about the impact of goal relationships on the policy integration process. The case also represents a competitive goal relationship—here between spatial planning and flood risk management—and one would expect conflictual negotiations and a preference for regulatory instruments as in the case of flood storage on agricultural land. On the contrary, the empirical findings in this case show a good relationship and close operative contacts between the sectoral stakeholders. Furthermore, we see a preference for soft policy instruments to solve the cross-sectoral problem. This can be explained with the perception of the levee effect as a de facto secondary issue in flood risk management.

Stakeholders are not prone to escalate this issue into a real conflict that might damage the otherwise good relationship. Even more so as harder policy instruments such as further zoning restrictions for highly vulnerable land uses in residual risk areas are currently not considered politically feasible.

Overall, our analysis confirms the assumption of the policy integration literature that the nature of the integration problem is an important factor in the analysis of policy integration processes. We found significant differences in our empirical case studies with regard to the sectoral goal relationship and the resulting integration process, ranging from the joint search for synergies to stakeholder conflicts and antagonistic negotiations. Complementary and conflicting sectoral policy goals influence the policy integration challenge at hands and are an important factor to explain the unfolding policy integration process in terms of policy frames, stakeholder relationships, and policy instruments. Complementary policy goals result in rather informal, harmonious negotiations on strengthening synergies by using softer policy instruments such as information, guidelines, and voluntary measures. On the contrary, conflictual policy goals lead to rather formal negotiations among the affected sectors based mainly on hard, regulative instruments. However, our case studies also show that stakeholders might prefer progress in small steps by using soft policy instruments in a conflictual situation to avoid a policy integration failure or even policy disintegration.

However, our study has also some limitations. First, we analyzed three highly relevant fields of interaction, but there are several other policy subsystems that are also important for an integrated flood risk management, such as disaster management and nature conservation. Second, our study focused solely on Austria and the sectoral integration challenges in other countries might be very different. From this empirical point of view, further research is needed to gain more empirical knowledge about integration challenges with other policy subsystems and about sectoral integration challenges in a number of other countries. Another research direction might be an examination of the influence of non-policy stakeholder expectations, actions, and relationships which could not be thoroughly examined in this study.

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Declarations

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