



The introduction of catchment-wide co-operations: Scalar reconstructions and transformation in Austria in flood risk management



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ABSTRACT

The management of flood risk in Europe is changing. In several European Member States there are significant ongoing processes to shift certain flood risk management duties and responsibilities from the national to the local level. Previously, national authorities dominated the discourse about national flood risk management policy, but increasingly, local and private stakeholders have become responsible for flood risk management. This has greatly influenced the governance structure and arrangements for flood risk management policy. As a result, the co-operation among various stakeholders has become increasingly important. The consequences of this shift toward local stakeholders can be understood in the context of rescaling. This paper analyses the rescaling processes through catchment-wide management plans in the Austrian flood risk management system. Therefore, we selected three different Austrian study sites (Aist in Upper Austria, Triesting-Tal in Lower Austria and Ill-Walgau in Vorarlberg). New management ideas required new dynamics within the current scales and allowed changes in the interaction of local, regional, and national stakeholders in terms of negotiation, funding, and strategy development. The new policy direction demonstrates not only the importance of network connections between stakeholders at the same scale, but also networks between stakeholders at different scales, especially between local and national levels. However, engagement at the local level strongly depends on social capacities, such as knowledge, motivation/self-interest, networks at various levels, and procedural capacity. The theoretical framework of politics of scale helps in understanding and analysing the impact of the new decentralisation policy and practice.

1. Introduction

Flood risk management has changed over the past few decades, due to major flood events and subsequent policy changes (Klijn et al., 2008; Harries, 2012; Porter and Demeritt, 2012; Thaler, 2016). The most notable change is the EU Floods Directive, but there are also ongoing changes in national water legislation. As the EU Floods Directive mandates stronger stakeholder participation, governance matters are becoming key issues in flood policy. Well-rehearsed roles and responsibilities, which were traditionally dominated by state policy for flood protection, have been redirected (Hartmann and Driessen, 2017). This has influenced governance arrangements within flood risk management, as water authorities are becoming just one of many players, and other public and private stakeholders are increasingly involved (Thaler and Priest, 2014; Hartmann and Driessen, 2017), including individual households (Johnson and Priest, 2008) or sectoral planning authorities

(Holub et al., 2012; Adger et al., 2013; Thaler et al., 2016). These developments have encouraged the transformation of state roles by sharing responsibilities for risk management (Adger et al., 2013, 2016; Geaves and Penning-Rowsell, 2016; Thaler and Levin-Keitel, 2016). As a result, the new policy agenda leads to a reduction of control by national authorities towards the inclusion of private stakeholders in the decision-making process (Hartmann and Spit, 2016; Thaler and Hartmann, 2016). Politics of scale play a fundamental element in current flood risk management debates, particularly when related to responsibility for flood risk management and the current relationship between state stakeholders and non-state stakeholders (see for example Lebel, 2006; Norman and Bakker, 2009; Dore and Lebel, 2010; Cohen and Davidson, 2011; Norman, 2012; Norman et al., 2012; Huesker and Moss, 2015). But this is also an element when considering stakeholder participation in how decision-making processes are organized and conducted in a catchment-wide management process. Therefore,

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understanding and analysing scalar re-arrangements by exploring the consequences and impact on power relationships in the governance arrangement of flood risk management is important for future flood risk management.

Traditional flood risk management is organised within the boundaries of a local authority. However, catchment-wide management plans often include the implementation of flood storage areas¹ in the upper part of the catchment to reduce the negative consequences on communities in the lower part of the catchment (Thaler, 2014; Seher and Löschner, 2016). The change from local solutions towards catchment-wide management concepts encourage new governance structures and arrangements for ongoing flood risk management policy, where local authorities within a catchment co-operate in developing and providing flood risk management strategies for the whole catchment (Yazdi et al., 2013; Milman et al., 2017; Waylen et al., 2017). Usually the aim is to use flood retention areas in the upper part of the catchment to protect downstream communities (Fuchs, 2009; Normann and Bakker, 2009; Thaler, 2014; Rouillard et al., 2015; Short, 2015; Thaler et al., 2016). However, the main challenge is to get such options implemented on private land. Most measures need to be realized on land that is currently owned by farmers, citizens, or other private entities (Hartmann, 2011; Thaler, 2014). A limiting factor is finding land with sufficient enough storage to be useful (Hartmann, 2009; Thaler, 2014; Seher and Löschner, 2016). In these cases, interventions to reduce risk at any one point must take place upstream of that point so flood risk management increasingly becomes a catchment-scale problem and a land and water governance problem (Evans et al., 2002; Seher and Löschner, 2016; Hartmann and Driessen, 2017; Green, 2017). Those who bear the burden of flood storage or runoff reduction are not those who gain the benefits of a reduced risk of flooding. Additionally, work areas are often outside of the administrative area where flooding currently occurs. As such, the boundaries imposed by the behaviour of the catchment at a certain point are relocated upstream by human intervention (Thaler, 2014). These types of arrangements are encouraged by the EU Floods Directive (Hartmann and Juepner, 2014). However, with recent flood events, the guarantee of safety for residential and non-residential properties or new funding resources boosts the development of catchment-wide management plans (Thaler, 2014). However, these changes ultimately affect the power relationship between the different stakeholders in existing governance arrangements (Gualini, 2006; Thiel, 2009; Thiel and Egerton, 2011; Kythreotis and Jonas, 2012; Cohen and Bakker, 2014).

The research question this paper addresses is how changes in scales influence the interaction and performance of governance arrangements. This question is operationalized with a focus on power relationships in the political processes. First, how does the involvement of different public and private stakeholders in the policy decision-making process create and change scales? Second, how does rescaling create new spaces of interaction among different groups in the rescaled policy debate (e.g. the method of debating, bargaining, and negotiation between different stakeholders with the same or different scale backgrounds)?

The remainder of this paper is organised as follows. Section 2

includes a literature review of the political geography debate on scale to environmental governance. Section 3 provides an overview of the method used. Section 4 presents the empirical results for the case of Austrian flood risk management and outlines the interaction and performance of new scale arrangements. Section 5 draws conclusions on new flood risk management strategies and highlights lessons learned for use in other flood-prone countries.

2. The politics of scale in flood risk management

Politics of scale (or scalar politics) include different forms of scales and their impact and consequences on governance arrangements (Swyngedouw, 2000; Görg 2007; Guerrin et al., 2014; Cohen and McCarthy, 2015). Wissen (2009) argues that politics of scale is an important framework to understand governance arrangements as ‘the social production of the scale concept tends to sidestep the structuring effects of scalar configurations as well as the social struggles through which these effects may be challenged’ (ibid:886). One of the consequences is that the role of public administration merely changes its purposes and objectives. A central tenet is the introduction of socio-spatial relationships into analytical research for a more holistic understanding of scale concepts and linkages to policy discussions and their outcomes (Wallerstein, 1974; Taylor, 1982; Smith, 1992; Brenner, 2001; Peck, 2002; Clarno, 2013). Today, based on the work of Brenner (2004), Swyngedouw (1997) and others, scholars such as Gualini (2006), Jessop et al. (2008) or Fisher (2015) include a broader view of the scale concept. These authors describe politics of scale as a spatio-temporal interaction of human, environmental, and political discussions or dimensions. To this extent, scholars define the rescaling as ‘the spatial, temporal, quantitative, or analytical dimensions used to measure, or rank, and study any phenomenon and levels as the units of analysis that are located at different positions on a scale’ (Dore and Lebel, 2010:62). Thus, the concept of scale is based on social construction and evolution as well as on the interactions of territory and structure, which organise and rule social relationships (Howitt, 1993; Swyngedouw, 1997; Cox, 1998; Brenner, 2001; 2004; Gualini, 2006). The outcome is a change in the actual power relationship between national and local stakeholders (Paasi, 2004). Nevertheless, a key objective is to understand the mobilisation of the local stakeholders and their influence on changing social structures, especially the shift in power structure (Smith, 1990; Cox, 1998; Molle, 2007). This also demands that the space broaden to include socio-spatial relationships (Jessop et al., 2008; Jessop, 2016). Central aspects in scale discussions are the hierarchical nesting of responsibility and the organisation and sharing of power between different scales (Brenner, 2004). In line with Howitt (1993), the hierarchical concept (national-regional-local relationship) is a key attribute of the concept of scales, whereas the concept of scale ‘should not be seen as a simple hierarchical concept’ (ibid: 36). However, scalar arrangements are currently under review (fluid), as scalar re-arrangements are socially constructed and influenced by the social interaction at geographical spheres (Brenner, 2004; Brown and Purcell, 2005). Nevertheless, this also includes fixed arrangements of pre-defined social structures and power, especially the hegemonic position of elite groups in policy-decision-making practices (Brown and Purcell, 2005), which pre-define political, economic and cultural activities (Hoogester and Verzijl, 2015). Thus, scales include a dialectical interplay between fixed and fluid scalar structures, where power and hegemony is a central point in the ongoing policy decision practice (Allen, 2009). Jones (1998) observed the scale arrangements and production based on geographical and cultural variables. These also include ‘a contingent outcome of structural forces and practices of human agents’ (Cox, 2009:885). Scalar re-arrangements also led to new policy frames, relationships, and networks presenting new possibilities for policy interventions, such as new definition of responsibility and power among the different stakeholders. The new arrangements cause changes in formal and informal codes and norms as well as in

¹ Flood retention is the temporary storage of water in the water cycle (Morris et al., 2004). It requires interventions in the landscape and land use planning which considers the catchment scale (Thaler, 2014; Thaler et al., 2016). Techniques range from upland forestry to river restoration, including interventions in the floodplains with wetland or wetland restoration, storage reservoir implementation and changes in agricultural practices. Flood storages provide certain advantages compared to the other natural flood management techniques. They aim to safeguard natural storage capacities by restoring or enhancing natural features and characteristics of wetlands, rivers and floodplains, and by increasing soil and landscape water retention and groundwater recharge (Mazzorana et al., 2009; Thaler, 2014). Therefore, storing water makes it possible to change the shape of the catchment hydrograph (reduce flood peak and increase flood duration) during out-of-bank events (JBA Consulting, 2005). Different options have different characteristics and effects on the flood risk. The technical and hydrological conditions are relatively well known (Patt and Jüpner, 2013).

administration practices which also allow stakeholders to change their position in the decision-making practices (change of power relationships) (Swyngedouw, 2004; Molle, 2007; Thiel and Egerton, 2011; Pugalís and Townsend, 2013; Lintz, 2016). Usually, the renewal of scales changes the interaction and performance of different stakeholders (Gualini, 2006; Thiel, 2009; Thiel and Egerton, 2011; Lintz, 2016). Therefore, the new scale construction encourages new definitions or discussions by each stakeholder in the decision-making process (Edwards et al., 2001; Thiel, 2015). This creates questions about the transfer of power and responsibility of national and local stakeholders to overcome the official-formal procedure in the decision-making process, which cannot respond adequately to the existing conflicts between national and local authorities.

The re-organisation of scalar construction allows stakeholders to move (jump) between the scales, as often happens when local stakeholders interact at the national level to ensure their local interests. Jumping scales is generally a synonym of the ‘ability of social groups and organisations to move from lower to higher levels’ (MacKinnon, 2011:24), mainly to qualify the interests and objectives at a national or international level (Collinge, 1999; Moore, 2008). However, Kythreotis and Jonas (2012) argue that the jumping process is multidirectional and not just from the local to the global level. Therefore, the rescaling process does not only include the change of interaction between international, national, regional and local stakeholders, but also a shift of interaction between public and private stakeholders. Consequently, jumping between scales is defined as the ‘breakout’ of stakeholders in their actual scale position, and it enforces a change in boundaries (Smith, 1992). Stakeholders in unfavourable political positions often see this possibility as a political strategy (Smith, 1992; Brown and Purcell, 2005). Further, it changes current power relationships (Smith, 1990). Besides, Cox (1998) stressed that ‘scale jumping’ includes new modes of engagement and transformation of scales through networking. Therefore, a key point in this conceptualisation is the focus on linkages (relationships, interconnections and interactions) between the different agents over spatio-temporal developments (Cox and Mair, 1989; Massey, 1992; Sayre, 2005). Interaction allows different stakeholders to plan, manage, and enforce, measures (Reed and Bruyneel, 2010; Metzger and Schmitt, 2012; Cox, 2013; Pugalís and Townsend, 2013; Baird and Quastel, 2015). These developments were also embedded in new scaling constructions where the national government introduced new water management strategies at catchment-level, whereas the decision-making and implementation of flood risk management strategies is outside the traditional political boundaries (Hüsker and Moss, 2015; Penning-Rowsell and Johnson, 2015). Nevertheless, rescaling is a process of empowerment and disempowerment of involved stakeholders in the policy process (Smith, 1990).

The aspect of power is substantial in the scale debate (Allen, 2009). It is a key attribute in the social relationship and structure (e.g. policy relationship) between different entities. Power is the possibility to modify the behaviour of stakeholders in decision-making practices. A central point is the possession of power, which depends on the position of the actor in the interaction with the others (Cox, 2013; Sayre, 2005; Bues and Theesfeld, 2012). Consequently, this paper views key elements of power in the policy decision making process at different scales as: who decides the policy processes, how is power used, who is excluded from the process, and who is responsible at the national, sub-national, or local levels for decision making and implementation. Theesfeld (2011) added the aspect of consequences of power in the bargaining process, which can be distinguished between relative bargaining power and the distributional effects on the bargaining. According to Dencker (2009), relative bargaining power is understood as the outcome of the relationship between different actors, which are dependent ‘one of the parties to this relationship on the other party to secure needed resources’ (ibid: 453).

3. Methodology

3.1. Research design

The research method applied in this paper is centrally focussed on a qualitative research design, including document analysis, expert interviews, and case study research in three Austrian water boards (see section ‘study sites description’). The use of case studies allows investigation into how flood risk management policy functions in practice, in particular exploring the consequences and impacts of the changes in the scalar re-arrangements on institutional work. The aim of a case study approach permits exploratory in-depth research, which focuses on achieving an understanding of the problem (Yin, 1994). The goal of semi-structured in-depth interviews is to better understand current policy documents and background information as these factors are not available from the secondary data source. Moreover, open-ended questions encourage the provision of further information to explain policy decision-making practices.

For this study we interviewed 28 stakeholders (from the national, regional and local levels) with different backgrounds and experiences in catchment-wide flood risk management co-operations (water boards). (A list of expert interviewees is located in Appendix A). The semi-structured interviews, which lasted between 60 and 90 min each, were conducted face-to-face or by phone (in general in the office of the interviewee) between February and May 2012, audio recorded and fully transcribed. The interviews were structured as follows: (1) preconditions of catchment-wide management concepts, (2) development stage of catchment-wide management plans and co-operation, (3) role of different stakeholders in the catchment-wide management plan as well as their interactions, and (4) legal status of the co-operation. At the end of the interview, interviewees were asked to reflect on the dialogue and contribute additional information that they deemed relevant (Graham and Ernstson, 2012).

Interview partners were selected based on a multilevel sampling design (Onwuegbuzie and Leech, 2007): two or more subgroups were interviewed to understand and to analyse the knowledge and understanding of national, regional, and local stakeholders regarding new flood risk policy. The selection process focussed on the key decision-makers (national, regional, and local levels) from the study sites (Somerville and Haines, 2008; Thaler et al., 2016). The interview partners were found through networks and selected through recommendations from other interviewees and academics, and especially from newspaper articles, academic journals, and internet websites. The selection of interviewed people comprised a mix of academics, public authorities, and relevant stakeholders. The collected data were analysed with thematic analysis, utilising a systematic process of open and selective coding in Atals.ti (Charmaz, 2006).

3.2. Study sites description

This article builds on three selected study sites in Austria, namely Aist in Upper Austria, Ill-Walgau in Vorarlberg and Triesting-Tal in Lower Austria. The selection of study sites is based on various evaluation criteria: (1) inclusion of different types of involved organisations at the public level (Federal Water Engineering Administration vs. Austrian Service for Torrent and Avalanche Control); (2) recent flood events; (3) different members (public/private) in the catchment-wide organisation; as well as (4) different political administration organisations (federal states) to generate and test research objectives and questions to provide new explanations. Table 1 summarises the main criteria for the selection of the study sites.

Since the 2000s, all three study sites have introduced an inter-organisational (catchment-wide) flood risk management strategy (with upstream-downstream land use co-operation) instead of local structural defence schemes. Consequently, the local stakeholders have a more prominent role in the Austrian flood risk management policy (Thaler,

Table 1
Overview of study sites.

Criteria	Selected study site		
	Aist	Ill-Walgau	Triesting-Tal
Involved organisation	Federal Water Engineering Administration and Austrian Service for Torrent and Avalanche Control	Federal Water Engineering Administration	Federal Water Engineering Administration and Austrian Service for Torrent and Avalanche Control
Recent flood history	2002	1999; 2005	1991; 1997; 2002
Number of members within the water board	27 members (only local authorities)	20 members (local authorities, Highway Road Authority (Asfinag), National Rail Way (ÖBB) and Regional Road Authority (Landesstraßen) and five utility operators	12 members (only local authorities)
Public administration	Upper Austria	Vorarlberg	Lower Austria

2014; Thaler et al., 2016). The first study site, the Aist, is in the federal state of Upper Austria. The catchment shows a very low degree of river regulation. However, following heavy damage during the flood event of 2002, the national and regional authorities as well as local councillors started a draft management concept for the whole catchment, based on a catchment-wide strategy. The stakeholders developed a catchment-wide management plan with the aim to have a holistic view of the catchment with the main objective to implement flood storages and ensure natural retention areas at the upper part of the catchment to reduce the hazard potential, especially for the highly vulnerable areas in the downstream part of the catchment.

The second study site, Ill-Walgau, shows a long tradition in the regulation of the river. After the 2005 flood event, the regional authority introduced a river development scheme to achieve a more holistic and catchment-wide approach to river basin management. The river development scheme includes various strategies and measures, especially the introduction of an upstream-downstream co-operation to implement a set of flood storages along the river Ill (mainly in the upper part of the catchment) to reduce the impact of future flood events on the downstream communities. Finally, the third study site, the Triesting catchment, shows a long tradition of structural flood defence measures within the catchment. Since the 2000s, the regional authorities have developed and implemented catchment-wide planning instruments, e.g. regional studies, and the flood risk management strategy shifted towards a more holistic catchment approach. The new flood risk management strategy includes the implementation of catchment-wide flood alleviation measures, especially in the implementation of flood storages on private land in the upstream communities to protect the overall catchment.

4. Processes and outcome of new scalar reconstruction in Austria

4.1. Austrian flood risk management system

The Austrian flood risk management system goes back to 1884 with the first official act dealing with flood risk management (Holub and Fuchs, 2009). As in other federal countries such as Germany or Switzerland, flood policy in Austria is characterised by fragmented responsibilities and a complex distribution of competencies between the federal, state, and municipal levels (Kanonier, 2006). At the federal level, responsibilities are divided in three areas: (i) river regulation and maintenance, (ii) torrent control, and (iii) maintenance and development of waterways. The maintenance and regulation of all water bodies (except for torrents and waterways) is the responsibility of the Federal Water Engineering Administration (BWV), organised in cooperation with the state governments. The Federal Forest Engineering Service on Torrent and Avalanche Control (WLV) is responsible for torrents, while the Ministry of Transport, Innovation and Technology (BMVIT)

oversees the (international) waterways Danube, March and Thaya.

Main national acts include the Forest Act (1975) (Republic of Austria, 1975), the Water Act (1959) (Republic of Austria, 1959) and the Hydraulic Engineering Assistance Act (1985) (Republic of Austria, 1985). Overall, the Austrian law system encourages the development of catchment-wide management plans. However, the national focus on flood risk management policy lies mainly in developing local strategies instead of catchment-wide management concepts, often due to political conflict between downstream and upstream local authorities. The Austrian Water Law 1959 (Article 87) foresees the establishment of voluntary flood risk co-operation in the form of formal water boards (*Wasserverband*). The water law regulates how the water boards function administratively to organise the catchment-wide co-operation. Within this formalized form of co-operation it is explicitly permitted to include non-governmental stakeholders (Article 88b). All three case studies confirm that the formal water boards in the Austrian water law substantially facilitated the establishment of co-operation to develop a catchment-wide management plan. The governance structure in the inter-organisational water boards remains highly hierarchical, with the consequences that legislation is a significant stabilising construct in flood risk management policy.

Due to the catchment-oriented and formalized water boards, the co-operation between stakeholders has changed the boundaries and scalar arrangements in the management system from a local perspective to a catchment-wide management. In particular, the networks between the different local municipalities enable them to realise catchment-wide flood defence schemes. This also includes allowing local stakeholders (mainly local authorities) to change their positions in decision-making practises (change of power relationships). However, a key aspect is the mobilisation of local stakeholders. In Austria, the mobilisation is focussed on local politicians and regional authorities in all three study sites. As an outcome, the inter-organisational structure of the water boards distributed responsibilities among national and regional authorities as well as to the water boards themselves (in particular for policy implementation and evaluation). Overall, local authorities in the study sites played a much more prominent role in the planning and implementation policy stages, such as negotiation processes between upstream and downstream local authorities to design flood storage, but also with private land owners to implement flood storage. Here, we observe in all three study sites a downscaling process, where the national government transfers duties and tasks towards the local level, which was mainly transferred to the new inter-organisational co-operation.

The catchment-wide management concept also causes changes in formal and informal codes and norms as well as in actual administration practices. Catchment-wide co-operation has changed the boundaries and scalar arrangements in the management system away from a local perspective and instead to a catchment-wide management perspective,

Table 2
Sharing responsibility within catchment-wide management plan.

Policy stages	Scope of responsibilities		
	Aist	Ill-Walgau	Triesting-Tal
Policy making	Split responsibility between national, regional authorities, and inter-organisational co-operation	Exclusive regional responsibility	Exclusive national and regional responsibility
Policy implementation	Split responsibility between national, regional authorities and inter-organisational co-operation	Split responsibility between national, regional authorities and inter-organisational co-operation	Split responsibility between national, regional authorities and inter-organisational co-operation
Policy evaluation	Split responsibility between national, regional authorities and inter-organisational co-operation	Split responsibility between national, regional authorities and inter-organisational co-operation	Split responsibility between national, regional authorities and inter-organisational co-operation
Policy maintenance	Exclusive inter-organisational responsibility	Exclusive inter-organisational responsibility	Exclusive inter-organisational responsibility

including an upstream-downstream nexus. The networks between the different local municipalities enable them to realise catchment-wide flood defence schemes. This also includes allowing local stakeholders (mainly local authorities) to change their positions in the decision-making practises (change of power relationships). However, a key aspect is the mobilisation of local stakeholders. In Austria, the mobilisation is focussed on local politicians and regional authorities in all three study sites. As an outcome, the inter-organisational structure has a strong influence on the question of who is responsible for what. An overview of the responsibilities division is provided in Table 2 (detailed overviews can be found in Appendix B). The design of the table was derived from the empirical data of document analysis and expert interviews. The summary shows that the catchment-wide management plan is mainly organised by the public administration. However, the local authorities in the study sites played a much more prominent role in the planning and implementation policy stages, such as overseeing negotiations between upstream and downstream local authorities to design flood storages, but also with private land owners to implement flood storages. Here, we observe in all three study sites a downscaling process, where the national government transfers duties and tasks towards the local level, which was mainly transferred to the new inter-organisational co-operation.

The national and regional authorities were mainly manifest for the policy making in the cases of Ill-Walgau and Triesting-Tal. The local involvement in the discussion and decision-process depends on the local capacity (capacity to act), such as resources (knowledge, financial, time), and interest. Especially, the example of Aist, show the ability to overcome the classical top-down flood risk management policy, and the inter-organisational co-operation is able to ensure their interests and needs at a higher level. On the other hand, the Ill-Walgau and Triesting-Tal study sites are characterised by low engagement within the catchment-wide management process. The national and regional authorities are mainly responsible for the strategic planning and implementation within the catchment. Additionally, the national and regional authorities are also responsible for the project controlling and monitoring of the implementation process.

4.2. Consequences of scalar re-arrangements in Austrian flood risk management policy

The decision-making process in the selected study sites includes a wide range of different stakeholders, such as executive administration, politicians and in the case of Ill-Walgau, the private sector. As an outcome, all three study sites introduce a new administrative and regulative structure to organise and manage the catchment-wide management strategy. The interview analysis illustrates that the introduction of catchment-wide co-operations includes one side of a downscaling process from national and regional level as well as an

upscaling process from the local level towards the new meta-governance structure catchment-wide co-operation, so called inter-organisational flood risk authorities. Main tasks for the new governance structure are: (1) negotiations with local land owners, (2) organising aspects of financing of new flood alleviation schemes, (3) management of implementation of new flood alleviation schemes and (4) maintenance of new flood alleviation schemes. The inter-organisational flood risk co-operation includes a steering committee with support from a director and administrative office. The development of the steering committee foresees a shift in current scalar politics. Local authorities transferred responsibilities, tasks, and power resources toward the new steering committee of the new inter-organisational governance structure. An outcome would be the steering committee interacts with private land owners to negotiate retention areas, as well as interacts with national and regional authorities about the implementation process of the catchment-wide management strategy. Steering committees also participate in the planning process to develop catchment-wide management strategies, but the range of responsibility and power transfer depends highly on the self-interest and capability of the steering committee. Catchment-wide co-operation has afforded the opportunity for local authorities to adopt more tasks and responsibilities from regional and local authorities.

Besides the new governance arrangement, the Ill-Walgau study site shows a new policy direction (outsourcing process), which refers to a greater involvement in the decision-making process from non-state stakeholders, such as private utility businesses. In the case of Aist, universities and private consultant groups have a significant role in gathering and distributing information and technical knowledge to the local stakeholders. Here, especially, external support allows local stakeholders to develop individual flood risk management strategies without national support. Overall, local authorities have the ability to get more involved in the flood risk management policy.

4.3. Conflicts within new governance arrangements

In the selected study sites, the national and regional authorities play a crucial role in the development and management of catchment-wide flood risk management process. The interviewees recognised that the catchment-wide co-operations are important drivers in strategic planning and initiation of new projects. A key observation from this analysis is that the catchment-wide co-operation focussed mainly on the implementation of pre-defined tasks provided by the national and regional authorities. The main work conducted by the local stakeholders refers to negotiations with private land owners about compensation agreements or purchase of farmland. In particular, the Aist and Triesting-Tal study sites demonstrate large conflicts for control over the land.

Private land owners have the power to block the implementation process. However, their interest depends strongly on whether they are

directly affected by flood defence measures. In the study sites, the catchment-wide management plans have to re-design frequently, mainly due to the lack of support from farmers as the following quote states:

‘With the small flood storage projects, we had only a few problems, especially with some detail questions, but in the whole it was not the big problem. The approvals we had relatively quickly in an open and transparent procedure. We didn’t use more than three meetings: prior information, an update meeting and final meeting with the clear message if there is consent or not. With some farmers, we signed directly on the table, with some others we had further negotiations and then we got the necessary signatures. With the large flood storage projects, we followed the same process, but in the final meeting we had three agreements and five against the project, and with this number you cannot realise the project. We accepted the final decisions, we weren’t angry with anyone, but the expectation was that all was dead now. But no, it isn’t dead, we will think about how to organise and to deal with this situation’ (Local authority).

A second conflict was raised in the negotiations between upstream and downstream local authorities. The negotiation processes between the different local authorities can have a lengthy framework. The upstream municipalities have demonstrated large concerns about the projects, including the lack of benefits for the upstream municipalities, as well as financial risks and costs for them. The result is that the upstream municipalities have a lower interest and preference to engage in co-operation compared to the downstream municipalities. Yet the power between upstream and downstream is unbalanced. We identified a strong dependent relationship between the different stakeholders in terms of power and resources. The overall results show that the upper part of the catchment has a clear advantage over the lower part of the catchment.

The implementation of flood storage shows a long-term bargaining process. This includes high transaction costs between the involved stakeholders and conflicts between the downstream and upstream municipalities. The dependency on natural resources (mainly availability of potential areas for flood protection on private land) illustrate a central factor in the success or failure of catchment-wide management strategies. As a result, the downstream municipalities are strongly dependent on the municipalities in the upstream area. Therefore, the downstream municipalities in all three study sites transfer financial resources toward the upstream municipalities as an incentive to co-operate and to ensure a fair financial arrangement between the different stakeholders. The empirical results showed that flexibility and creation of new policy space outside the traditional political system is essential in the success of the introduction of catchment-wide management concepts:

‘Obviously there were variants already planned, but there is always that one plan does not come through and there we have to adapt it, but until now we have still managed in a slimmed-down version to achieve our targets (Regional Authority).

Similar results have been found in the aspect of time preferences. The negotiation processes between different stakeholders can have a lengthy framework. The main reason is lack of trust by the upstream municipalities, including the lack of benefits for the upstream municipalities, as well as financial risks and costs. The result is that the upstream municipalities have a lower interest and preference to engage in the co-operation compared to the downstream municipalities. It means that the upper part of the catchment has a clear advantage over the lower part of the catchment. Both variables have a direct impact on the cost of leaving the partnership (exit costs). In general, high exit costs

restrain co-operation. In this line, the downstream local authorities in the study sites, which are in a weaker position in the negotiation process, try to send incentives to reduce the risk of failure and, subsequently, the exit costs. For example, downstream municipalities transfer financial resources to the upstream municipalities as an incentive to co-operate and to ensure a fair financial arrangement between the different stakeholders. This includes high transaction costs between the involved stakeholders and creates conflict between the local municipalities.

5. Discussion and conclusion

This paper investigates the implementation of catchment-wide co-operations as an example of rescaling governance structures in Austria. First, with the introduction of catchment-wide co-operations, there was a shift in the scalar re-arrangements in flood risk management policy with the result of new governance arrangements at the local level (co-operation among different municipalities within the catchment), as well as among local, regional, and national levels. Subsequently, the number of stakeholders increased in the decision-making process from two administrative levels (one local authority, regional authority, and national authority) to several state and non-state stakeholders. This changed the administration practice at the national, regional, and local levels. Thus, the catchment-wide partnership approach changed the decision-making practice. On the other hand, the national government uses a standardised approach (Republic of Austria, 1959) in the organisation structure of catchment-wide co-operations, but also has similar fixed rules for administration processes and approaches, especially in relation to planning, approval, and funding. This legal framework allows non-state stakeholders to get involved in ongoing policy discussion to make place-specific decisions, and especially to secure local needs and interests. In a more plural-multiple form of scale construction, the national government transfers tasks, duties and responsibilities from a national perspective towards lower administration levels. In this form, scale is perceived as relationships, interconnections, and interactions among the different stakeholders for spatio-temporal developments, through which power is manifested. This stipulates the political processes and interactions between the different stakeholders as central in the production of scale. In sum, the Austrian flood risk management system includes the introduction of multiple spatial scales with the introduction of inter-organisational scales.

This study confirmed that in Austria, scale jumping and scalar re-organisations of local and private stakeholders mix up the established system of nested hierarchies in flood risk management. Nevertheless, this is not a special situation for Austria as other countries’ involvement in flood risk management plays a crucial role, albeit differently. In England and Wales, for example, ‘partnership funding’ has recently been introduced (Thaler and Priest, 2014; Geaves and Penning-Rowsell, 2016; Thaler and Levin-Keitel, 2016). This scheme allows local and private stakeholders to co-finance flood risk management measures to get them implemented faster (Thaler and Hartmann, 2016). This strengthens the role of local and private stakeholders, who can now influence flood risk management beyond the local scale. In France, flood risk management is in a permanent struggle in different levels of government about implementing measures. This manifests itself in the implementation of the Floods Directive (Barraqué, 2017). Similar results can be observed in the English flood risk management system, especially after the Summer Floods in 2007 and the introduction of the partnership funding scheme in 2010, where the national government downscaled responsibilities towards the local level without any added resources or legitimacy (Thaler and Priest, 2014; Haughton et al., 2015). Nevertheless, the state remains dominant in the policy making.

Also in Germany, local and private stakeholders have become more powerful and influential, predominantly driven by European directives, such as the European Floods Directive (Cassel and Hinsberger, 2017; Johann and Leismann, 2017).

The inter-organisational co-operation is an ideal vehicle for the implementation of flood storages. With current pressures on local authorities to reduce spending and, in parallel, a reduction in the central state's resources, inter-organisational co-operation has been seen as a possibility to both increase the 'value' of budgets available and to increase efficiency in using current public funds and resources. Furthermore, they may allow direct and indirect benefits including harmonisation of spatial and land use management plans. From the interviews, most mentioned advantages are the access to additional resources (e.g. funding, land) and the effects of economies of scale. Here, the inter-organisational co-operation has the possibility to ensure natural retention or flood storage areas in the upstream communities, which is less expensive than individual solutions for each community.

Finally, we can conclude that an ongoing rescaling process in flood risk management —not only in Austria — indeed changes the involvement of different public and private stakeholders in the policy decision-making process as well as the interaction and performance of new stakeholders within the new scale construction. This is supported

by the recent EU Floods Directive, which foresees that national and regional public flood risk management authorities increasingly need to deal with local and private stakeholder interests. These developments show some similarities with the paradigm shift that took place in spatial planning and planning theory since the 1970s (Allmendinger, 2002; Allmendinger and Haughton, 2009; Haughton et al., 2013; Heley, 2013; Sielker, 2016), where the spatial planner as an 'engineer of space' became a mediator of different and competing interests. Also, spatial planning needed to learn to deal with less clear scalar boundaries between stakeholders. The planning theory of recent decades contains some valuable hints, although there is no perfect solution for such a mode of governance.

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Appendix A

See Table A1.

Table A1
Details of interviews.

Code	Organisation interviewed
Interview 1:	Regional Authority
Interview 2:	Academic organisation
Interview 3:	Academic organisation
Interview 4:	Local Authority
Interview 5:	Local Authority
Interview 6:	Local Authority
Interview 7:	National Authority
Interview 8:	Regional Authority
Interview 9:	National Authority
Interview 10:	Regional Authority
Interview 11:	Regional Authority
Interview 12:	Local Authority
Interview 13:	Local Authority
Interview 14:	Local Authority
Interview 15:	Local Authority
Interview 16:	Private organisation
Interview 17:	Local Authority
Interview 18:	Local Authority
Interview 19:	Regional Authority
Interview 20:	Regional Authority
Interview 21:	Regional Authority
Interview 22:	Regional Authority
Interview 23:	Regional Authority
Interview 24:	Regional Authority
Interview 25:	Academic organisation
Interview 26:	National Authority
Interview 27:	Academic organisation
Interview 28:	Academic organisation

Appendix B. Overview of responsibilities divisions in selected study sites

See Tables B1–B3.

Table B1
Overview of responsibilities in Aist.

Policy stage	Roles per stage	Actors	Specifics
Policy making	Agenda setting	Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration	Both organisation are the official state authorities with the duty of planning and managing the flood alleviation schemes.
	Knowledge creation	Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration	Cost-benefit analysis, conducting research on the technical feasibility and legal responsibility
	Initiation of policy	Local authorities, Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration	Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration mainly bases initiative of catchment-wide management plan with the implementation of retention basins on the plan. Local authorities are mainly responsible in bringing together the local stakeholders into catchment-wide co-operation as well as have to organize the private land for retention basins.
Policy implementation	Target setting	Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration	Both organisation set up the norms of retention basins in terms of design and set up the dam, in terms of height and length.
	Strategy making	Local authorities, Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration	Strategy to implement catchment-wide management strategies were provided by local authorities (especially by downstream local authorities) and Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration.
	Information provision and dissemination	Inter-organisational co-operation, Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration	Inter-organisational co-operation were responsible to inform and negotiate with private land owners. Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration provide the technical information for the inter-organisational co-operation.
	Financing measures	Local authorities, Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration	The implementation of flood storages were funded by local authorities (downstream communities funded a higher share of the costs), Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration.
Policy evaluation	Physical implementation	Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration	Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration were responsible for the realisation of the retention basins.
	Monitoring of results against targets	Local authorities, Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration	All three organisations (local authorities, Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration) monitored the process of implementation against targets.
	Enforcement through sanctions/incentives	Not used.	
Policy maintenance	Maintenance after implementation	Inter-organisational flood risk management co-operation	New inter-organisational flood risk management co-operation were responsible for flood alleviation scheme

Table B2
Overview of responsibilities in Ill-Walgau.

Policy stage	Roles per stage	Actors	Specifics
Policy making	Agenda setting	Federal Water Engineering Administration	Federal Water Engineering Administration is the official state authorities with the duty of planning and managing the flood alleviation schemes.
	Knowledge creation	Federal Water Engineering Administration	Cost-benefit analysis, conducting research on the technical feasibility and legal responsibility
	Initiation of policy	Local authorities and Federal Water Engineering Administration	Federal Water Engineering Administration mainly bases initiative of catchment-wide management plan with the implementation of retention basins on the plan. Local authorities are mainly responsible in bringing together the local stakeholders into catchment-wide co-operation as well as have to organize the private land for retention basins.
Policy implementation	Target setting	Federal Water Engineering Administration	Federal Water Engineering Administration set up the norms of retention basins in terms of design and set up the dam, in terms of height and length.
	Strategy making	Local authorities and Federal Water Engineering Administration	Strategy to implement catchment-wide management strategies were provided by local authorities (especially by downstream local authorities) and Federal Water Engineering Administration.
	Information provision and dissemination	Inter-organisational co-operation and Federal Water Engineering Administration	Inter-organisational co-operation were responsible to inform and negotiate with private land owners. Federal Water Engineering Administration provide the technical information for the inter-organisational co-operation.
	Financing measures	Local authorities and Federal Water Engineering Administration	The implementation of flood storages were funded by local authorities (downstream communities funded a higher share of the costs), Highway Road Authority (Asfinag), National Rail Way (ÖBB) and Regional Road Authority (Landesstraßen), five utility operators and Federal Water Engineering Administration.
Policy evaluation	Physical implementation	Federal Water Engineering Administration	Federal Water Engineering Administration was responsible for the realisation of the retention basins.
	Monitoring of results against targets	Local authorities and Federal Water Engineering Administration	Local authorities and Federal Water Engineering Administration monitored the process of implementation against targets.
	Enforcement through sanctions/incentives	Not used.	
Policy maintenance	Maintenance after implementation	Inter-organisational flood risk management co-operation	New inter-organisational flood risk management co-operation were responsible for flood alleviation scheme

Table B3
Overview of responsibilities in Triesting-Tal.

Policy stage	Roles per stage	Actors	Specifics
Policy making	Agenda setting	Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration	Both organisation are the official state authorities with the duty of planning and managing the flood alleviation schemes.
	Knowledge creation	Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration	Cost-benefit analysis, conducting research on the technical feasibility and legal responsibility
	Initiation of policy	Local authorities, Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration	Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration mainly bases initiative of catchment-wide management plan with the implementation of retention basins on the plan. Local authorities are mainly responsible in bringing together the local stakeholders into catchment-wide co-operation as well as have to organize the private land for retention basins.
Policy implementation	Target setting	Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration	Both organisation set up the norms of retention basins in terms of design and set up the dam, in terms of height and length.
	Strategy making	Local authorities, Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration	Strategy to implement catchment-wide management strategies were provided by local authorities (especially by downstream local authorities) and Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration.
	Information provision and dissemination	Inter-organisational co-operation, Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration	Inter-organisational co-operation were responsible to inform and negotiate with private land owners. Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration provide the technical information for the inter-organisational co-operation.
	Financing measures	Local authorities, Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration	The implementation of flood storages were funded by local authorities (downstream communities funded a higher share of the costs), Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration.
Policy evaluation	Physical implementation	Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration	Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration were responsible for the realisation of the retention basins.
	Monitoring of results against targets	Local authorities, Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration	All three organisations (local authorities, Austrian Service for Torrent and Avalanche Control and Federal Water Engineering Administration) monitored the process of implementation against targets.
	Enforcement through sanctions/incentives	Not used.	
Policy maintenance	Maintenance after implementation	Inter-organisational flood risk management co-operation	New inter-organisational flood risk management co-operation were responsible for flood alleviation scheme

Appendix C. Supplementary data

Supplementary data associated with this article can be found, in the online version, at <http://dx.doi.org/10.1016/j.landusepol.2017.08.023>.

References

- Adger, W.N., Quinn, T., Lorenzoni, I., Murphy, C., Sweeney, J., 2013. Changing social contracts in climate-change adaptation. *Nat. Clim. Change* 3 (4), 330–333. <http://dx.doi.org/10.1038/NCLIMATE1751>.
- Adger, W.N., Quinn, T., Lorenzoni, I., Murphy, C., 2016. Sharing the pain: perceptions of fairness affect private and public response to hazards. *Ann. Am. Assoc. Geogr.* 106 (5), 1079–1096. <http://dx.doi.org/10.1080/24694452.2016.1182005>.
- Allen, J., 2009. Three spaces of power: territory, networks, plus a topological twist in the tale of domination and authority. *J. Power* 2 (2), 197–212. <http://dx.doi.org/10.1080/17540290903064267>.
- Allmendinger, P., Haughton, G., 2009. Soft spaces, fuzzy boundaries, and metagovernance: the new spatial planning in the Thames gateway. *Env. Plan. A* 41 (3), 617–633. <http://dx.doi.org/10.1068/a40208>.
- Allmendinger, P., 2002. Towards a post-positivist typology of planning theory. *Plann. Theory* 1 (1), 77–99.
- Baird, I.G., Quastel, N., 2015. Rescaling and reordering nature-society relations: the Nam Theun 2 hydropower dam and Laos—Thailand electricity networks. *Ann. Assoc. Am. Geogr.* 105 (6), 1221–1239. <http://dx.doi.org/10.1080/00045608.2015.1064511>.
- Barraqué, B., 2017. The common property issue in flood control through land use in France. *J. Flood Risk Manage.* 10 (2), 182–194. <http://dx.doi.org/10.1111/jfr3.12092>.
- Brenner, N., 2001. The limits to scale? methodological reflections on scalar structuration. *Prog. Hum. Geogr.* 25 (4), 591–614. <http://dx.doi.org/10.1191/030913201682688959>.
- Brenner, N., 2004. *New State Spaces. Urban Governance and the Rescaling of Statehood*. Oxford Univ. Press, Oxford.
- Brown, J.C., Purcell, M., 2005. There's nothing inherent about scale: political ecology, the local trap, and the politics of development in the Brazilian Amazon. *Geoforum* 36 (5), 607–624. <http://dx.doi.org/10.1016/j.geoforum.2004.09.001>.
- Bues, A., Theesfeld, I., 2012. Water grabbing and the role of power: shifting water governance in the light of agricultural foreign direct investment. *Water Altern.* 5 (5), 263–266.
- Cassel, M., Hinsberger, M., 2017. Flood partnerships: a participatory approach to develop and implement the flood risk management plans. *J. Flood Risk Manage.* 10 (2), 164–172. <http://dx.doi.org/10.1111/jfr3.12086>.
- Charmaz, K., 2006. *Constructing Grounded Theory: a Practical Guide Through Qualitative Analysis*. Sage, London.
- Clarno, A., 2013. Rescaling white space in post-apartheid Johannesburg. *Antipode* 45 (5), 1190–1212. <http://dx.doi.org/10.1111/anti.12015>.
- Cohen, A., Bakker, K., 2014. The eco-scalar fix: rescaling environmental governance and the politics of ecological boundaries in Alberta, Canada. *Environ. Plann. D: Soc. Space* 32 (1), 128–146. <http://dx.doi.org/10.1068/d0813>.
- Cohen, A., Davidson, S., 2011. An examination of the watershed approach: challenges, antecedents, and the transition from technical tool to governance unit. *Water Altern.* 4 (1), 1–14.
- Cohen, A., McCarthy, J., 2015. Reviewing rescaling: strengthening the case for environmental considerations. *Prog. Hum. Geogr.* 39 (1), 3–25. <http://dx.doi.org/10.1177/0309132514521483>.
- Collinge, C., 1999. Self-organisation of society by scale: a spatial reworking of regulation theory. *Environ. Plann. D: Soc. Space* 17 (5), 557–574. <http://dx.doi.org/10.1068/d170557>.
- Cox, K.R., Mair, A., 1989. Levels of abstraction in locality studies. *Antipode* 21 (2), 121–132. <http://dx.doi.org/10.1111/j.1467-8330.1989.tb00184.x>.
- Cox, K.R., 1998. Spaces of dependence, spaces of engagement and the politics of scale, or: looking for local politics. *Polit. Geogr.* 17 (1), 1–23. [http://dx.doi.org/10.1016/S0962-6298\(97\)00048-6](http://dx.doi.org/10.1016/S0962-6298(97)00048-6).
- Cox, K.R., 2009. 'Rescaling the state' in question. *Camb. J. Reg. Econ. Soc.* 2 (1), 107–121. <http://dx.doi.org/10.1093/cjres/rsn029>.
- Cox, K.R., 2013. Territory, scale, and why capitalism matters. *Territ. Polit. Gov.* 1 (1), 46–61. <http://dx.doi.org/10.1080/21622671.2013.763734>.
- Dencker, J.C., 2009. Relative bargaining power, corporate restructuring, and managerial incentives. *Adm. Sci. Q.* 54 (3), 453–485.

- Dore, J., Lebel, L., 2010. Deliberation and scale in Mekong region water governance. *Environ. Manage.* 46 (1), 60–80. <http://dx.doi.org/10.1007/s00267-010-9527-x>.
- Edwards, B., Goodwin, M., Pemberton, S., Woods, M., 2001. Partnerships, power, and scale in rural governance. *Environ. Plann. C: Gov. Policy* 19 (2), 289–310. <http://dx.doi.org/10.1068/c12m>.
- Evans, E.P., Ramsbottom, D.M., Wicks, J.M., Packman, J.C., Penning-Rowsell, E., 2002. Catchment flood management plans and the modelling and decision support framework. *Proceedings of ICE Civil Engineering* 150, 43–48.
- Fisher, S., 2015. The emerging geographies of climate justice. *Geog. J.* 181 (1), 73–82. <http://dx.doi.org/10.1111/geoj.12078>.
- Fuchs, S., 2009. Susceptibility versus resilience to mountain hazards in Austria—paradigms of vulnerability revisited. *Nat. Hazards Earth Syst. Sci.* 9 (2), 337–352. <http://dx.doi.org/10.5194/nhess-9-337-2009>.
- Görg, C., 2007. Landscape governance: the politics of scale and the natural conditions of places. *Geoforum* 38 (5), 954–966.
- Geaves, L.H., Penning-Rowsell, E., 2016. Flood risk management as a public or a private good, and the implications for stakeholder engagement. *Environ. Sci. Policy* 55, 281–291. <http://dx.doi.org/10.1016/j.envsci.2015.06.004>.
- Graham, M., Ernstson, H., 2012. Comanagement at the Fringe: examining stakeholder perspectives at Macassar Dunes, Cape Town, South Africa—at the intersection of high biodiversity, urban poverty, and inequality. *Ecol. Soc.* 17 (3), 34. <http://dx.doi.org/10.5751/ES-04887-170334>.
- Green, C., 2017. Competent authorities for the flood risk management plan—reflections on flood and spatial planning in England. *J. Flood Risk Manage.* 10 (2), 195–204. <http://dx.doi.org/10.1111/jfr3.12097>.
- Gualini, E., 2006. The rescaling of governance in Europe: new spatial and institutional rationales. *Eur. Plann. Stud.* 14 (7), 882–904. <http://dx.doi.org/10.1080/09654310500496255>.
- Guerrin, J., Bouleau, G., Grelot, F., 2014. “Functional fit” versus “politics of scale” in the governance of floodplain retention capacity. *J. Hydrol.* 519, 2405–2414. <http://dx.doi.org/10.1016/j.jhydrol.2014.08.024>.
- Hüscher, F., Moss, T., 2015. The politics of multi-scalar action in river basin management: implementing the EU Water Framework Directive (WFD). *Land Use Policy* 42, 38–47. <http://dx.doi.org/10.1016/j.landusepol.2014.07.003>.
- Harries, T., 2012. The anticipated emotional consequences of adaptive behaviour—impacts on the take-up of household flood-protection measures. *Env. Plan. A* 44 (3), 649–668. <http://dx.doi.org/10.1068/a43612>.
- Hartmann, T., Driessen, P.P., 2017. The flood risk management plan: towards spatial water governance. *J. Flood Risk Manage.* 10 (2), 145–154. <http://dx.doi.org/10.1111/jfr3.12077>.
- Hartmann, T., Juepner, R., 2014. The flood risk management plan—an essential step towards the institutionalization of a paradigm shift. *Int. J. Water Gov.* 2 (1), 107–118. <http://dx.doi.org/10.7564/13-IJWG5>.
- Hartmann, T., Spit, T., 2016. Legitimizing differentiated flood protection levels – consequences of the European flood risk management plan. *Environ. Sci. Policy* 55, 361–367. <http://dx.doi.org/10.1016/j.envsci.2015.08.013>.
- Hartmann, T., 2009. Clumsy floodplains and the law: towards a responsive land policy for extreme floods. *Built Environ.* 35 (4), 531–544. <http://dx.doi.org/10.2148/benv.35.4.531>.
- Hartmann, T., 2011. *Clumsy Floodplains. Responsive Land Policy for Extreme Floods*. Ashgate, Farnham Surrey.
- Haughton, G., Allmendinger, P., Oosterlynck, S., 2013. Spaces of neoliberal experimentation: soft spaces, postpolitics, and neoliberal governmentality. *Env. Plan. A* 45 (1), 217–234. <http://dx.doi.org/10.1068/a45121>.
- Haughton, G., Bankoff, G., Coulthard, T.J., 2015. In search of ‘lost’ knowledge and out-sourced expertise in flood risk management. *Trans. Inst. Br. Geogr.* 40 (3), 375–386. <http://dx.doi.org/10.1111/tran.12082>.
- Heley, J., 2013. Soft spaces, fuzzy boundaries and spatial governance in post-devolution Wales. *Int. J. Urban Reg. Res.* 37 (4), 1248–1325. <http://dx.doi.org/10.1111/j.1468-2427.2012.01149.x>.
- Holub, M., Fuchs, S., 2009. Mitigating mountain hazards in Austria—legislation, risk transfer, and awareness building. *Nat. Hazards Earth Syst. Sci.* 9 (2), 523–537. <http://dx.doi.org/10.5194/nhess-9-523-2009>.
- Holub, M., Suda, J., Fuchs, S., 2012. Mountain hazards: reducing vulnerability by adapted building design. *Environ. Earth Sci.* 66 (7), 1853–1870. <http://dx.doi.org/10.1007/s12665-011-1410-4>.
- Hoogester, J., Verzijl, A., 2015. Grassroots scalar politics: insights from peasant water struggles in the Ecuadorian and Peruvian Andes. *Geoforum* 62, 13–23. <http://dx.doi.org/10.1016/j.geoforum.2015.03.013>.
- Howitt, R., 1993. A world in a grain of sand: towards a reconceptualisation of geographical scale. *Aust. Geogr.* 24 (1), 33–44. <http://dx.doi.org/10.1080/00049189308703076>.
- JBA Consulting, 2005. *Natural Flood Storage and Extreme Flood Events*. Environment Group Research report 2005/1 Scottish Executive, Edinburgh.
- Jessop, B., Brenner, N., Jones, M., 2008. Theorizing sociospatial relations. *Environ. Plann. D: Soc. Space* 26 (3), 389–401. <http://dx.doi.org/10.1068/d9107>.
- Jessop, B., 2016. Territory, politics, governance and multispatial metagovernance. *Territ. Polit. Gov.* 4 (1), 8–32. <http://dx.doi.org/10.1080/21622671.2015.1123173>.
- Johann, G., Leismann, M., 2017. How to realise flood risk management plans efficiently in an urban area—the Seseke project. *J. Flood Risk Manage.* 10 (2), 173–181. <http://dx.doi.org/10.1111/jfr3.12075>.
- Johnson, C.L., Priest, S., 2008. Flood risk management in England: a changing landscape of risk responsibility? *Int. J. Water Resour. Dev.* 24 (4), 513–525. <http://dx.doi.org/10.1080/07900620801923146>.
- Jones, K.T., 1998. Scale as epistemology. *Polit. Geogr.* 17 (1), 25–28. [http://dx.doi.org/10.1016/S0962-6298\(97\)00049-8](http://dx.doi.org/10.1016/S0962-6298(97)00049-8).
- Kanonier, A., 2006. Raumplanungsrechtliche Regelungen als Teil des Naturgefahrenmanagements. In: Fuchs, S., Khakzadeh, L., Weber, K. (Eds.), *Recht in Naturgefahrenmanagement*. Studienverlag, Innsbruck, pp. 123–153.
- Klijn, F., Samuels, P., van Os, A., 2008. Towards flood risk management in the EU: state of affairs with examples from various European countries. *Int. J. River Basin Manage.* 6 (4), 307–321. <http://dx.doi.org/10.1080/15715124.2008.9635358>.
- Kythreotis, A.P., Jonas, A.E.G., 2012. Scaling sustainable development? How voluntary groups negotiate spaces of sustainability governance in the United Kingdom. *Environ. Space D: Soc. Space* 30 (3), 381–399. <http://dx.doi.org/10.1068/d11810>.
- Lebel, L., 2006. The politics of scale in environmental assessments. In: Reid, W., Berkes, F., Willbanks, T., Capistrano (Eds.), *Bridging Scales and Knowledge Systems. Concepts and Applications in Ecosystem Assessments*. Island Press, Washington, pp. 37–57.
- Lintz, G., 2016. A conceptual framework for analysing inter-municipal cooperation on the environment. *Reg. Stud.* 50 (6), 956–970. <http://dx.doi.org/10.1080/00343404.2015.1020776>.
- MacKinnon, D., 2011. Reconstructing scale: towards a new scalar politics. *Prog. Hum. Geogr.* 35 (1), 21–36. <http://dx.doi.org/10.1177/0309132510367841>.
- Massey, D., 1992. *Politics and space/time*. New Left Rev. 196, 65–84.
- Mazzorana, B., Huebl, J., Fuchs, S., 2009. Improving risk assessment by defining consistent and reliable system scenarios. *Nat. Hazards Earth Syst. Sci.* 9 (1), 145–159. <http://dx.doi.org/10.5194/nhess-9-145-2009>.
- Metzger, J., Schmitt, P., 2012. When soft spaces harden: the EU strategy for the Baltic Sea Region. *Env. Plan. A* 44 (2), 263–280. <http://dx.doi.org/10.1068/a44188>.
- Milman, A., Warner, B.P., Chapman, D.A., Gianotti, A.G. Short, 2017. Identifying and quantifying landowner perspectives on integrated flood risk management. *J. Flood Risk Manage.* <http://dx.doi.org/10.1111/jfr3.12291>.
- Molle, F., 2007. Scales and power in river basin management: the Chao Phraya River in Thailand. *Geog. J.* 173 (4), 358–373. <http://dx.doi.org/10.1111/j.1475-4959.2007.00255.x>.
- Moore, A., 2008. Rethinking scale as a geographical category: from analysis to practice. *Prog. Hum. Geogr.* 32 (2), 203–225. <http://dx.doi.org/10.1177/0309132507087647>.
- Morris, J., Bannister, N., Hess, T.M., Gowing, D.J.G., Leeds-Harrison, P.B., Vivash, R., Wade, M., 2004. *Integrated Washlands for Flood Defence and Biodiversity*. (Peterborough: Report to English Nature and Defra, No. 986).
- Norman, E.S., Bakker, K., 2009. Transgressing scales: transboundary water governance across the Canada-U.S. border. *Ann. Assoc. Am. Geogr.* 99 (1), 99–117. <http://dx.doi.org/10.1080/00045600802317218>.
- Norman, E.S., Bakker, K., Cohen, C., 2012. Introduction to the themed section: water governance and the politics of scale. *Water Altern.* 5 (1), 52–61.
- Norman, E.S., 2012. Cultural politics and transboundary resource governance in the Salish sea. *Water Altern.* 5 (1), 138–160.
- Onwuegbuzie, A.J., Leech, N.L., 2007. *Sampling Designs in Qualitative Research: Making the Sampling Process More Public*. (last Accessed: 21 February 2014). <http://www.nova.edu/ssss/QR/QR12-2/onwuegbuzie1.pdf>.
- Paasi, A., 2004. Place and region: looking through the prism of scale. *Prog. Hum. Geogr.* 28 (4), 536–546. <http://dx.doi.org/10.1191/0309132504ph502pr>.
- Patt, H., Jünger, R. (Eds.), 2013. *Hochwasser Handbuch*. Springer, Heidelberg.
- Peck, J., 2002. Political economics of scale: fast policy, interscalar relations, and neo-liberal warfare. *Econ. Geogr.* 78 (3), 331–360. <http://dx.doi.org/10.1111/j.1944-8287.2002.tb00190.x>.
- Penning-Rowsell, E., Johnson, C., 2015. The ebb and flow of power: british flood risk management and the politics of scale. *Geoforum* 62, 131–142. <http://dx.doi.org/10.1016/j.geoforum.2015.03.019>.
- Porter, J., Demeritt, D., 2012. Flood-risk management, mapping, and planning: the institutional politics of decision support in England. *Env. Plan. A* 44 (10), 2359–2378. <http://dx.doi.org/10.1068/a44660>.
- Pugalis, L., Townsend, A., 2013. Rescaling of planning and its interface with economic development. *Plann. Pract. Res.* 28 (1), 104–121. <http://dx.doi.org/10.1080/02697459.2012.699236>.
- Reed, M.G., Bruyneel, S., 2010. Rescaling environmental governance, rethinking the state: a three-dimensional review. *Prog. Hum. Geogr.* 34 (5), 646–653. <http://dx.doi.org/10.1177/0309132509354836>.
- Republic of Austria, 1959. *Wasserrechtsgesetz 1959*. BGBl, Vienna (Nr. 215/1959).
- Republic of Austria, 1975. *Forstgesetz 1975*. Vienna, BGBl (Nr. 440/1975).
- Republic of Austria, 1985. *Wasserbautenförderungsgesetz 1985*. BGBl, Vienna (Nr. 148/1985).
- Rouillard, J.J., Ball, T., Heal, K.V., Reeves, A.D., 2015. Policy implementation of catchment-scale flood risk management: learning from Scotland and England. *Environ. Sci. Policy* 50, 155–165. <http://dx.doi.org/10.1016/j.envsci.2015.02.009>.
- Sayre, N.F., 2005. Ecological and geographical scale: parallels and potential for integration. *Prog. Hum. Geogr.* 29 (3), 276–290. <http://dx.doi.org/10.1191/0309132505ph546oa>.
- Seher, W., Löschner, L., 2016. Balancing upstream-downstream interests in flood risk management: experiences from a catchment-based approach in Austria. *J. Flood Risk Manage.* <http://dx.doi.org/10.1111/jfr3.12266>.
- Short, C., 2015. Micro-level crafting of institutions within integrated catchment management: early lessons of adaptive governance from a catchment-based approach case study in England. *Environ. Sci. Policy* 53, 130–138. <http://dx.doi.org/10.1016/j.envsci.2015.06.009>.
- Sielker, F., 2016. New approaches in European governance? Perspectives of stakeholders in the Danube macro-region. *Reg. Stud. Sci.* 3 (1), 88–95. <http://dx.doi.org/10.1080/21681376.2015.1116957>.
- Smith, N., 1990. *Uneven Development. Nature, Capital, and the Production of Space*. Basil Blackwell, Oxford.
- Smith, N., 1992. Contours of a spatialized politics: homeless vehicles and the production

- of geographical scale. *Social Text* 33, 54–81.
- Somerville, P., Haines, N., 2008. Prospects for local co-governance. *Local Gov. Stud.* 34 (1), 61–79. <http://dx.doi.org/10.1080/03003930701770488>.
- Swyngedouw, E., 1997. Neither global nor local. *Glocalization and the politics of scale*. In: Cox, K.R. (Ed.), *Spaces of Globalization. Reasserting the Power of the Local*. The Guilford Press, New York, pp. 137–200.
- Swyngedouw, E., 2000. Authoritarian governance, power, and the politics of rescaling. *Environ. Plann. D: Soc. Space* 18 (1), 63–76. <http://dx.doi.org/10.1068/d9s>.
- Swyngedouw, E., 2004. Globalisation or 'glocalisation'? Networks, territories and re-scaling. *Camb. Rev. Int. Aff.* 17 (1), 25–48. <http://dx.doi.org/10.1080/0955757042000203632>.
- Taylor, P.J., 1982. A materialist framework for political geography. *Trans. Inst. Br. Geogr.* 7 (1), 15–34.
- Thaler, T., Hartmann, T., 2016. Justice and flood risk management: reflecting on different approaches to distribute and allocate flood risk management in Europe. *Nat. Hazards* 83 (1), 12–147. <http://dx.doi.org/10.1007/s11069-016-2305-1>.
- Thaler, T., Levin-Keitel, M., 2016. Multi-level stakeholder engagement in flood risk management—a question of roles and power: lessons from England. *Environ. Sci. Policy* 55, 292–301. <http://dx.doi.org/10.1016/j.envsci.2015.04.007>.
- Thaler, T., Priest, S., 2014. Partnership funding in flood risk management: new localism debate and policy in England. *Area* 46 (4), 418–425. <http://dx.doi.org/10.1111/area.12135>.
- Thaler, T., Priest, S., Fuchs, S., 2016. Evolving inter-regional co-operation in flood risk management: distances and types of partnership approaches in Austria. *Reg. Environ. Change* 16 (2), 841–853. <http://dx.doi.org/10.1007/s10113-015-0796-z>.
- Thaler, T., 2014. Developing partnership approaches for flood risk management: implementation of inter-local co-operations in Austria. *Water Int.* 39 (7), 1018–1129. <http://dx.doi.org/10.1080/02508060.2014.992720>.
- Thaler, T., 2016. Moving away from local-based flood risk policy in Austria. *Reg. Stud. Reg. Sci.* 3 (1), 330–337. <http://dx.doi.org/10.1080/21681376.2016.1195282>.
- Theesfeld, I., 2011. Perceived power resources in situations of collective action. *Water Altern.* 4 (1), 86–103.
- Thiel, A., Egerton, C., 2011. Re-scaling of resource governance as institutional change: the case of water governance in Portugal. *J. Environ. Plann. Manage.* 54 (3), 383–402. <http://dx.doi.org/10.1080/09640568.2010.507936>.
- Thiel, A., 2009. Europeanisation and the rescaling of water services: agency and state spatial strategies in the Algarve, Portugal. *Water Altern.* 2 (2), 225–244.
- Thiel, A., 2015. Constitutional state structure and scalar re-organisation of natural resource governance: the transformation of polycentric water governance in Spain, Portugal and Germany. *Land Use Policy* 45, 176–188. <http://dx.doi.org/10.1016/j.landusepol.2015.01.012>.
- Wallerstein, I., 1974. *The Modern World System. Capitalist Agriculture and the Origins of the European World-Economy in the Sixteenth Century*. Academic Press, New York.
- Waylen, K.A., Holstead, K.L., Colley, K., Hopkins, J., 2017. Challenges to enabling and implementing natural flood management in Scotland. *J. Flood Risk Manage.* <http://dx.doi.org/10.1111/jfr3.12301>.
- Wissen, M., 2009. Contested terrains: politics of scale, the national state and struggles for the control over nature. *Rev. Int. Polit. Econ.* 16 (5), 883–906. <http://dx.doi.org/10.1080/09692290802529843>.
- Yazdi, J., Neyshabouri, S.A.A., Niksokha, M.H., Sheshangosht, S., Elmi, M., 2013. Optimal prioritisation of watershed management measures for flood risk mitigation on a watershed scale. *J. Flood Risk Manage.* 6 (4), 372–384. <http://dx.doi.org/10.1111/jfr3.12016>.
- Yin, R.C., 1994. *Case Study Research: Design and Methods (applied Social Research Methods)*, second edition. Sage, London.