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奥地利私有土地滞洪工程补偿机制： 洪灾风险管理中的多中心治理探索

COMPENSATING FLOOD RETENTION ON PRIVATE LAND IN AUSTRIA: TOWARDS POLYCENTRIC GOVERNANCE IN FLOOD RISK MANAGEMENT?

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摘要

在洪涝风险管理战略中，滞蓄洪水，尤其是调控滞洪正发挥着愈加突出的作用。滞洪工程虽然能够有效降低洪涝高发地区的洪水风险，但也会占用大量土地，侵犯其所有者的财产权益。因此，此类工程在实施过程中，往往会面临可用土地不足以及越发高昂的（农业）土地补偿费等阻碍。滞洪工程的大规模推广不仅会改变滨河土地的用途，也会使相关权力及机构向低层政府机关下沉，甚至转移到提供滞洪用地的私人土地所有者、滞洪工程受益者等非政府行为主体。本文以奥地利山地城市阿尔滕马克特市的调控滞洪工程补偿方案为例，通过多中心视角探索了一系列新型治理路径；同时以多中心理论的五大命题为依据，辨析了“治理”在奥地利滞洪工程补偿机制中的含义，并分析了滞洪工程在提高滨河区景观韧性方面的潜力和局限性。

关键词

调控滞洪；多中心治理；补偿；景观韧性

ABSTRACT

Flood retention, in particular controlled flood retention, plays an increasingly prominent role in the portfolio of flood risk management strategies. Though a highly effective measure to reduce the risk of flooding for vulnerable areas, flood retention is land-intensive and infringes on landowners’ property rights. Implementation efforts are thus often hampered by the lack of availability of land as well as by the growing demands of (agricultural) landowners for compensation of flood retention services. The proliferation of flood retention not only changes riparian land uses but also results in a shift of authority, power, and agency to lower levels of government as well as to non-governmental actors, including the private landowners who provide the land for flooding but also those who benefit from flood retention. By the example of a compensation scheme for the controlled flood retention in Altenmarkt, an alpine municipality in Austria, this paper explores these nascent forms of governance through the lens of polycentricity. Along five core propositions in polycentric theory, the paper evaluates the governance implications of flood retention compensation in Austria and discusses the possibilities and limitations of flood retention for enhancing landscape resilience in riparian areas.

KEY WORDS

Controlled Flood Retention; Polycentric Governance; Compensation; Landscape Resilience

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1 引言

随着技术性防洪手段逐渐被洪水风险综合管理所取代，防洪政策越来越倾向于通过降低洪水流速和减少洪水流量来缓解洪水风险^[1]。此类政策并非一味借助堤坝拦截洪水，而是利用土地主动滞蓄洪水，以有效控制洪水流量，并提高河流景观的生态质量^[2]——这不仅引发了防洪政策的纲领性重构——如一系列推进基于自然的解决方案^[3]及防洪绿色基础设施建设^[4]的配套政策，也大大颠覆了传统洪水风险管理对水—陆界面的定义，对河流景观质量和洪水风险治理都将产生深远影响^[5]。

将洪水拦截在河床之内的传统防洪手段不仅能够保护人类聚居地，也为农业生产提供了有利条件。然而，随着滞洪与农业之间的关联日益紧密，人们越发希望农业用地除进行农业生产外，也能提供更多其他服务，如作为绿色基础设施发挥蓄洪防险的重要功能^{[4][6]}。

重新连接河流与邻近的洪泛平原也将改变滨河景观。从景观韧性的角度来看^[7]，草地或农田区域的洪涝频率和强度的增加可能会改变：1) 洪水径流的物理过程（通过减缓泄洪速度、减少洪水流量来产生影响）；2) 滨河生境的生物过程（通过滞洪适当降低农业集约化程度，从而提升生态品质）；3) 社会—经济过程（通过限制农业生产和提升河流景观休闲价值来产生影响）^[8]。

此外，利用滨河土地进行调控滞洪，也会对洪水风险治理产生影响。（农业）土地所有者通过为下游土地和财产所有者提供滞洪服务，使他们免受损失并因资产增值而获益，其自身却须承担洪水带来的不利影响（如作物减产、受损，以及土地使用权遭到损害）。这促使相关权力与机构向非政府行为主体转移，使后者在洪水风险管理中的作用愈发显著^[9]。作为重要行为主体，农业土地所有者有权在滞洪措施落实后，要求受益者支付补偿金；这实际上是通过（经济）利益纽带，使更多私人行为主体参与到滞洪工程中来。同时，较低层级的政府，尤其是地方当局在推动滞洪工程实施中所起的作用也愈加关键，

1 Introduction

Amidst the wider shift from technical flood defence toward integrated flood risk management, flood policies increasingly aim to alleviate flood risks by decelerating and attenuating flood discharge^[1]. Rather than keeping flood water away from land through dams and levees, flood policies actively retain and accommodate water on land as a means to effectively control flood discharge and enhance the ecological quality of riverscapes^[2]. This not only constitutes a programmatic reorientation in flood policies, as illustrated by complementary policy efforts to foster nature-based solutions^[3] and implement green infrastructure for flood management^[4], but also materially re-defines the prevailing water-land frontier in flood risk management — with profound implications for both the quality of riverine landscapes and the governance of flood risk^[5].

Aside from protecting settlements, defence-oriented approaches traditionally confined floods to the river beds to provide more favourable conditions for agricultural production. However, with the growing relevance of flood retention, agriculture is increasingly expected to provide additional services. Agricultural land thus no longer exclusively serves agricultural production, but by storing floodwater also fulfils an important function as green infrastructure for risk reduction^{[4][6]}.

Reconnecting rivers with their adjacent floodplains changes riparian landscapes. In a landscape resilience perspective^[7], increasing the frequency and intensity of flooding on grassland or cropland areas modifies 1) the physical processes of flood runoff by decelerating and reducing water discharge; 2) the biological processes due to the improvements in the ecological quality of riparian habitats, provided flood retention measures are accompanied by an extensification of agricultural land uses; and 3) the socio-economic processes due to the limitations in agricultural production, which in turn, may be accompanied by measures to enhance the recreational value of riverscapes^[8].

Beyond the changes in riverine landscapes, the accommodation of floodwaters on land has consequences for the governance of flood risk. By storing floods, (agricultural) landowners provide retention services for others — usually downstream land and property owners, who benefit in the form of averted losses and an increase in the value of their assets — while they themselves bear the flood-related costs (e.g., yield reduction, crop damage, or infringements in land use rights). This implies a shift in authority, power, and agency to non-governmental actors, who by consequence assume a more prominent role in flood risk management^[9]. Agricultural landowners emerge as influential actors due to their bargaining power to demand compensation

因为他们更加了解相关主体的具体需求，也能够更好地平衡不同利益相关方之间的冲突^[10]。

2 滞洪工程实施框架：行为主体关系以及治理的含义

本文探讨的“滞洪”概念特指“调控滞洪”，即在严重洪涝事件发生时，借助引流控制装置将部分洪水引入并淹没上游的滞洪洼地或圩塘，从而削减洪峰流量、降低下游洪灾风险的措施。为此，滞洪所需土地的所有者（通常为农民）将面临各种损失，如作物减产、排水系统受损，以及因地块无法进行开发而造成的土地贬值；与此同时，下游地区则会受益于上游提供的滞洪服务，其中，私人房主、企业、公共机构或基础设施运营商均为直接受益者，下游那些免于洪灾的土地（包括农业用地、已开发及待开发建筑用地）所有者则间接受益，因为这些土地已不再位于洪水易发区，因而可转变为合法的适宜建设用地，其地产价值通常会大幅上升（图1）。

目前已有多种农业用地滞洪方案。政府可以通过合法征用、收购或公有土地置换的方式获得所需土地，也可以不改变土地所有权，仅对滞洪造成的土地使用及财产权益损失进行补偿。后者包括两种补偿方式：1）公众补偿：由公众共同分担，即通过财政税收进行补偿；2）受益者补偿：由滞洪服务受益者支付全部或部分补偿费用（在该方案中，政府需要核定直接和间接受益程度，以确定各受益者需支付的补偿份额）。

对滞洪用地提供者的补偿通常包括：1）一次性或按年支付补偿金，和/或2）为洪灾造成的损失支付赔偿金。水利工程机构会对滞洪工程的成本和效益进行技术评估，为补偿方案的协商提供依据。

在滞洪补偿方案的制定过程中，政府作为中间方发挥着关键作

for controlled flood retention. In addition, efforts to request financial contributions from the beneficiaries for the realisation of flood retention measures enlarge the group of private actors with a (financial) stake in flood retention. But also lower levels of government, in particular local administrations, plays an increasingly pivotal role for promoting flood retention due to their proximity to the actors’ specific needs and their capacities to balance conflicting interests between different stakeholders^[10].

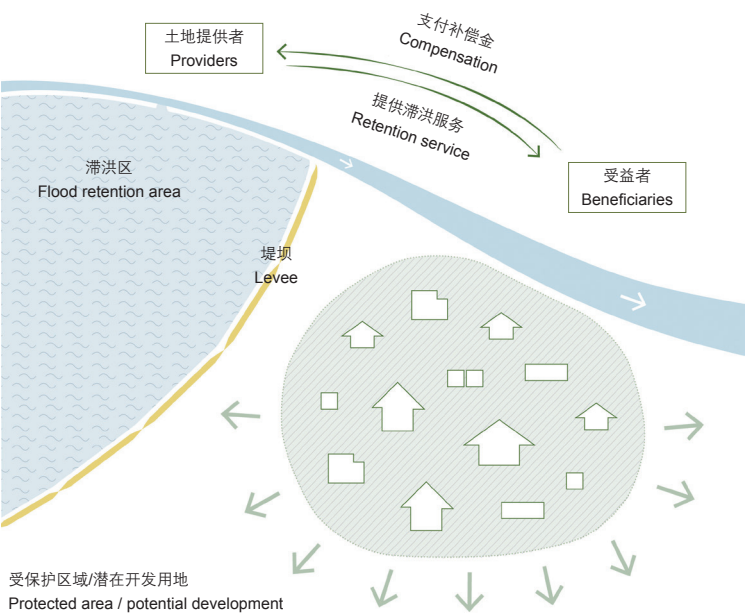
2 Framing Flood Retention: Actor Relations and Governance Implications

The “flood retention” discussed in this paper specifically refers to the controlled flood retention. It means using upstream rentention basins or polders to reduce flood peaks through an inlet and outlet structure, so the flooding of open lands within retention basins is on purpose to alleviate downstream flood risk in an extreme event. By providing their lands for flood retention, landowners, usually farmers, bear different types of costs, e.g., reduced crop yields, damage to drainage systems as well as the depreciation in land value due to the foreclosure of development options. Downstream areas, on the other hand, benefit from the flood retention services provided upstream. Private homeowners, commercial businesses, public institutions, or infrastructure operators benefit directly from reduced flood risk. Landowners of flood-protected land, both agricultural and (unbuilt) building land, benefit indirectly from flood retention because previously flood-prone areas are now located outside of flood hazard zones and may thus become legally suitable for development — usually implying in a significant appreciation in property value (Fig. 1).

There are different options to realize flood retention on agricultural land. Public authorities may opt to make the land available for flood retention by means of legal expropriation, buyouts or land swaps. Or they may decide to not interfere in land ownership and instead compensate the flood-related infringements in land use and property rights. In the latter case two types of compensation approaches can be distinguished: 1) Public compensation: Compensation costs are allotted to the general public, i.e., being compensated through tax money; 2) Beneficiary compensation: Those benefiting from flood retention services cover (at least part of) the compensation costs (in this approach, public authorities also have to account for the direct and indirect benefits to determine the extent of the beneficiaries’ contribution to the compensation scheme).

Compensation for the “providers” usually consists of 1) one-time or yearly payments to compensate for the provision of land for flood retention, and / or 2) payments in the event

- 1. 滞洪补偿机制建立在滞洪用地提供者与滞洪服务受益者之间的互惠关系上（改绘自参考文献[10]）。
- 1. Compensation for flood retention builds on the reciprocal relationship between the providers and the beneficiaries of retention services (adapted from Ref. [10]).



用。本质上，政府代表着公共利益，其目的是以尽量少的公共支出实现最佳防洪效益。此外，政府也负责协调各方利益，促使他们就补偿方案达成共识（表1）^[10]。

显然，各级政府和利益相关方之间合作关系的转变是滞洪补偿方案得以推进的基础。本文从治理视角分析了洪水风险管理中合作关系的 变化。尽管“治理”（governance）一词的应用范围很广，但其含义因具体的应用领域而异。扬·库伊曼将治理定义为“在社会、政治和管理主体合作采取行动时形成的行为模式”^[11]，这与有目的地指引、控制或管理社会团体的行为明显不同。

在治理视角下，社会可被视为一个多中心系统，各社会主体都会对公共事务产生影响^[12]。部分涉及多中心治理的观点认为，目前私人及非政府主体掌握着绝大部分权力^[13]。虽然这种情况在某些研究领域的确属实，但在洪水风险管理的决策过程中，尽管其他行为主体的地位不断提高，政府部门和公共机构仍然起决定性作用；尤其值得注意的是，农业土地所有者不断提高的重要性主要体现在提供蓄洪所需的（农业）土地，而非影响策略的走向上。鉴于上述主体所处层级各不相同，本研究采用以政府为中心的多中心治理视角，即“政府机构贯穿于其他各类主体之间，且不同政府机构主体的管辖权相互交叠”，其中管辖权是指“一个政府单位在一定空间和职能范围内可行使的政治和法律权限”^[14]。根据这一理解，“多中心性”既可以指政府和非政

府 flooding to compensate for flood-related losses. In the case of beneficiary compensation, water engineering offices can support the negotiation of the compensation schemes by providing the technical expertise for the assessment of the costs and benefits of flood retention services.

Public authorities play a pivotal role as intermediaries in flood retention compensation schemes. Fundamentally, they represent the public interest by aiming to keep public expenditures low while providing the best flood protection possible. At the same time, they have the task to coordinate the respective stakeholder interests and to achieve a consensus for the compensation scheme (Table 1)^[10].

It becomes evident that the compensation for flood retention is underpinned by a change in collaboration among different levels of government and stakeholders. In this paper, we analyze these changes in flood risk management through a governance perspective. While governance itself is a widely-used term, its meaning is debated. Jan Kooiman defines governance as “the patterns that emerge from the governing activities of social, political and administrative actors”^[11], hereby differentiating the term from the act of governing that is a purposeful effort to guide, steer, control, or manage societies.

A governance perspective typically represents society as a polycentric system where numerous social actors contribute to influencing issues of public concern^[12]. Some accounts of polycentric governance argue that most power is now controlled by private and non-governmental actors^[13]. While such accounts hold true for some fields of study, in flood risk management the governmental institutions and public authorities still control the policy-making processes, notwithstanding the growing relevance of other actor groups. In particular agricultural landowners play an increasingly important role in flood policy — not so much concerning the strategic orientation but with regard to providing the necessary (agricultural) land for the realization of flood retention. As these actors, however, remain embedded in a multi-level setting, for this study we thus adhere to a government-centered perspective of polycentric governance, defined as the situation where “political authority is dispersed across separately constituted bodies with overlapping jurisdictions,” where jurisdictions refer to “the political and legal competence of a unit of government to operate within a spatial and functional realm”^[14]. In this understanding, polycentricism refers not only to the distribution of power between governmental and non-governmental actors, but also to the distribution of power across governmental departments and public agencies involved in policy making^[12]. Initially defined as an antithesis

表1：滞洪补偿中各类主体的角色与责任
Table 1: Overview of the types of actors, and their roles and responsibilities in compensating flood retention

主体 Actors		角色与责任 Roles and responsibilities
土地提供者 Providers	佃农、土地所有者 (Tenant) farmers, landowners	提供滞洪用地 获得损失补偿 Provide land for flood retention Receive compensation for losses
	私人房主、企业等 Private homeowners, businesses, etc.	因洪灾风险降低而受益 因免于洪灾损失而支付补偿金 Benefit from hazard and risk reduction Pay compensation on the basis of averted flood damage
受益者 Beneficiaries	土地所有者 Landowners	因所持有土地的开发价值提升而受益 根据土地升值情况支付补偿金 Benefit from options for land development Pay compensation on the basis of land value appreciation
	水利工程师 Water engineers	提供专业知识 评估成本和收益 Provide technical expertise Assess costs and benefits
中间方 Intermediaries	政府 Public authorities	代表公共利益 协调各方利益，促进补偿方案协商 Represent public interests Coordinate interests and negotiate compensation scheme

注释
本表改绘自参考文献[10]。
NOTE
This table is adapted from Ref. [10].

府行为主体之间的权力分配，也可以指参与政策制定的不同政府部门和公共机构主体之间的权力分配^[12]。多中心系统最初被定义为与单中心系统（即由政府等单一权力主体控制的系统）相对的概念，涉及多个治理主体，每个主体可以在特定的地理范围和权力领域内相对独立地制定规范与规则^[15]。各主体可以与其他主体在横向上协同处理共同问题，同时相互交织构成更大规模的治理单元，建立纵向关联^[16]。安德鲁·乔丹等根据多中心理论中的5个命题对多中心系统的主要特征进行了概括（表2）^[17]。在第三章中，我们将通过奥地利的案例论述这些命题在多中心治理实践中的具体表现。

3 奥地利的滞洪补偿机制

在奥地利，洪水是破坏性最大的自然灾害^[18]。近年来陆续发生的一系列重大洪灾（分别在2002年、2005年、2013年）暴露了线性防洪工程的缺陷，因此，通过调控滞洪手段来减轻防洪设施负荷成为了一项优先策略^[19]。根据《欧盟洪水管理指令（2007/60/EC）》^[20]，奥地利制定了《国家洪水风险管理计划》，强调了调控滞洪的效益，以及利用控制性空间规划工具合法保护滞洪用地的重要性^[21]。通过分析奥地利391个具有潜在重大洪水风险的区域（APSFR）的洪水风险管理计划，我们发现56%的APSFR将推行调控滞洪作为重点策略，这表明各地方政府越来越重视滞洪能力的提高^[22]。

表2：多中心理论的5个关键命题
Table 2: Overview of the five key propositions of polycentric theory

命题 Proposition	阐释 Description
地方行动 Local action	通过地方层级上的自组织过程来实施治理举措 Governance initiatives are likely to take off at a local level through processes of self-organisation
试验 Experimentation	试验意愿与能力能够推动治理创新，探索解决方案 The willingness and capacity to experiment is likely to facilitate governance innovation and learning about what works
相互协调 Mutual adjustment	相关主体会自发协作，增强互信 Constituent units are likely to spontaneously develop collaborations with each other, producing more trusting interrelationships
信任的重要性 Importance of trust	自组织主体之间更容易产生信任，以更好地实现共同目标 Trust is likely to build up more quickly when units can self-organize, thus increasing collective ambitions
统领性规则 Overarching rules	统领性规则保证地方行动能够更好地实施，从而实现目标，解决冲突 Local initiatives are likely to work best when they are bound by a set of overarching rules that enshrine the goals to be achieved and / or allow conflicts to be resolved

注释
本表改绘自参考文献[17]。
NOTE
This table is adapted from Ref. [17].

to monocentric systems, i.e., those controlled by a single unitary power, usually an encompassing governmental authority, polycentric systems are characterised as multiple governing authorities where each unit exercises considerable independence to make norms and rules within a specified geographic area and domain of authority^[15], and each unit may link with others horizontally on common issues, and be nested within broader governance units vertically^[16]. According to Andrew Jordan et al. the defining features of polycentric systems may be summarized by the five propositions in polycentric theory (Table 2)^[17]. In the next section we will explore the empirical manifestation of polycentric governance along these key premises for the case of Austria.

3 Compensation for Flood Retention in Austria

Flooding is the most costly natural hazard in Austria^[18]. In recent years Austria experienced a succession of large flood events (2002, 2005, and 2013) which made evident the deficiencies of linear flood defence and resulted in a programmatic prioritisation of load reduction based on controlled flood retention^[19]. The Austrian National Flood Risk Management Plan, which was developed in accordance with the EU Floods Directive (2007/60/EC)^[20], highlights the effectiveness of controlled flood retention and the importance of legally securing these areas with regulatory spatial planning instruments^[21]. A review of the flood risk management plans for Austria’s 391 areas with potentially significant flood risk (APSFRs) shows that 56 percent of APSFRs define controlled flood retention as a top priority, indicating the growing relevance of flood retention also at the local level^[22].

3.1 Policy and Legal Context of Austria’s Governance for Flood Retention

Flood risk management is, like many policy areas in Austria’s federal system, a shared task across different levels of government. Non-governmental actors at the local level (in particular private owners of land and other properties) play an important complementary role with regard to the implementation of flood retention measures and the realization of compensation schemes (Fig. 2).

The distribution of responsibilities in flood retention is determined by the federal structure of the Austrian political system, as defined in the Federal Constitutional Act. At the national level, the Federal Water Engineering Administration is responsible for the maintenance and regulation of all water bodies (except for torrents and waterways). It provides the majority of funding for flood protection measures (including

2. 奥地利洪水风险治理体系中的责任与角色分配
2. Distribution of roles and responsibilities in Austria's flood risk governance system

3.1 奥地利滞洪治理的政策与法律背景

和奥地利联邦制度中的诸多政策领域一样，洪水风险管理需要各级政府相互协作。地方层级的非政府行为主体（特别是土地等财产的私人所有者）也在蓄洪措施的实施及补偿方案的落实过程中发挥着重要的辅助作用（图2）。

在奥地利，防洪工作的责任范围根据《联邦宪法法案》中规定的联邦制政治体制结构进行划分。在国家层面，联邦水利工程管理局负责维护管理所有水体（不包括急流和水道）。其职责包括为滞蓄洪水等防洪工作提供大部分资金、协调各联邦州之间的防洪政策，以及为政策实施制定纲领性战略指南，《联邦水利工程部技术指南》即为典型代表之一^[23]。这些指南明确规定，滞洪措施比线性防洪措施享有更高的优先级，且由联邦负责出资对于滞洪的私有土地和财产（如河岸带、滞洪区等）予以补偿，补偿比率的高低则视实际措施中对可用于排洪或滞洪的土地的新增、维持或削减情况而定。

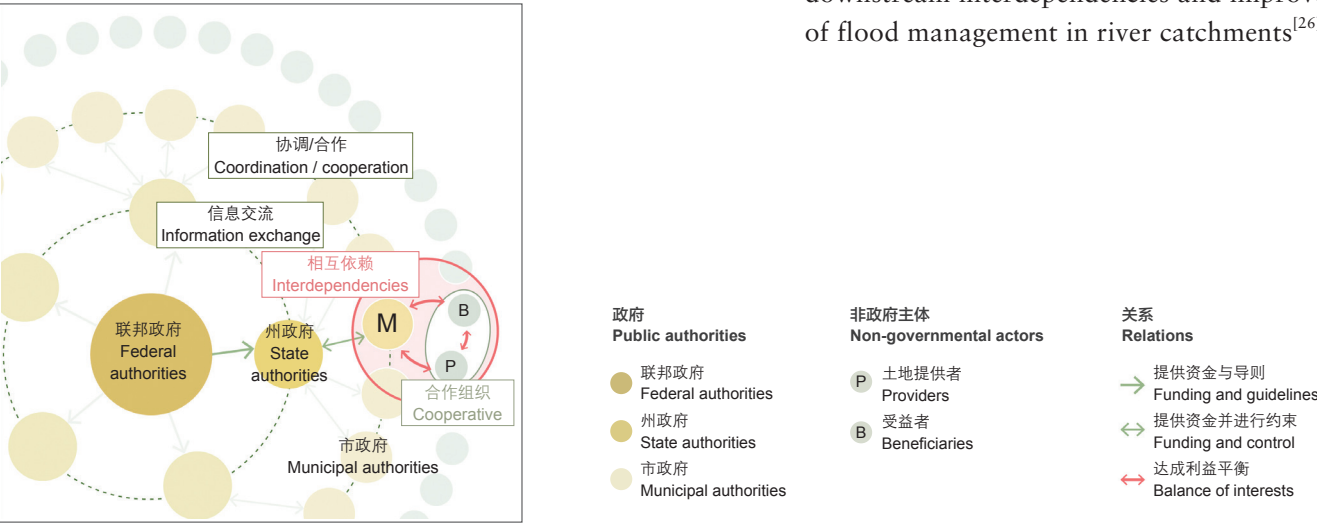
州政府无权就洪水管理单独立法，但可通过间接联邦管理行使联邦执行权。州政府负责为防洪措施提供全部或部分资金，同时直接监督防洪工程的规划和实施。州政府会定期与各市政府就相关事务进行沟通与探讨，邻近市政府间的横向合作则较少，仅限于信息交换。

地方政府（市政府）是防洪工程的项目管理者，但不具备编制防洪工程规划的法律权力。他们竞相向联邦或州政府申请防洪资金，同时承担防洪工程的部分费用^[24]。在滞洪补偿方面，市政府扮演着中间方的重要角色：既要代表公共利益，也要在各利益相关方之间进行协调和平衡，以商定切实可行的补偿方案。根据《联邦水法》（WRG）^[25]第87条的规定，市政府可以与公法承认的水务协会开展合作，从而更好地协调上下游的相互依赖关系，并制定出更符合当地实际情况的流

flood retention), coordinates flood policies between the different federal states, and sets strategic and programmatic guidelines for policy implementation, notably the Technical Guidelines for the Federal Water Engineering Department^[23]. These guidelines explicitly prioritize flood retention over linear flood defence measures and define that compensation for privately-owned land and properties (riparian strips, flood retention areas, etc.) is eligible for federal funding. In this vein, funding rates may actually increase or decrease depending on whether flood protection measures create, maintain, or reduce the available space for flood runoff and flood retention.

Governmental authorities at the state level do not develop own legal provisions in flood management but exercise federal executive power through indirect federal administration. They provide (co-)funding for flood protection measures and directly supervise the planning and implementation of flood protection projects. They are in regular exchange on related issues with municipal authorities. However, horizontal cooperation between neighboring local municipalities is rather weak and limited to information exchange.

Local governmental authorities (municipalities) act as project owners in flood protection, but they have no legal competences in project planning. They apply and compete for federal / state funding and cover part of the costs of flood protection projects^[24]. With regard to flood retention compensation, municipalities play a pivotal role as intermediary actors. On one hand, they represent the public interest; on the other hand, it is their task to coordinate and balance stakeholder interests and to negotiate a viable compensation scheme. Municipalities can cooperate in water associations under public law (Wasserverbände), as defined in Article 87 of Federal Water Act (Wasserrechtsgesetz, WRG for short)^[25], in order to better address upstream-downstream interdependencies and improve the “spatial fit” of flood management in river catchments^{[26][27]}. The basis for



域洪水管理政策^{[26][27]}。滞洪补偿方案根据下述法律框架拟定：

WRG全面明确了奥地利水管理的各项规定，其中也包括洪水管理。为了响应《欧盟洪水管理指令（2007/60/EC）》，奥地利对WRG进行了修订，增加了洪水灾害地图以及针对APSFR的洪水风险管理计划。针对滞洪工程，WRG第55条第4段则明确要求在《国家洪水风险管理计划》中划定合适的滞洪区域^[25]。政府可根据洪水灾害地图及相关洪水风险管理计划制定防洪措施。不过，根据WRG，确保防洪安全的义务主要由受影响的滨河区域利益相关方承担，而非政府。因此，地方层级的“利益相关方”（以市政府为代表）负责制定防洪方案，而联邦和州政府只需为方案实施提供必要的资金（和法律）支持。根据《水利工程开发法案》^[28]的规定，地方需要承担的资金支出因河流类型而异。一般情况下，联邦政府承担总支出的50%，州政府和市级政府分别承担30%和20%。部分情况下，联邦政府需要承担绝大部分甚至全部支出，剩余部分才由市政府、水务协会和/或相关受益者分担。如果市政府无力承担相应的支出，联邦政府和州政府的出资份额便会相应增加^[29]。

尤为重要的是，由于洪水往往会影响到大量滨河土地所有者，WRG建议：1）成立主要由各市政府组成的水务协会，或主要由个人和非政府利益相关者组成的水务合作组织；2）由受益者分摊防洪措施所需的资金和维护费用^[25]。这类水务或防洪合作组织拥有明确的法律地位（即符合公法规定的法律实体），拥有自己的管理委员会，并按照一定的规则条例运营，如制定协作目标和成本分摊机制^[30]。防洪合作组织在急流沿岸地区较为普遍，在大型河流沿岸地区则不常见^[31]。

在此背景下，下文中的滞洪补偿方案可看作一个较有代表性的个例。该案例体现了防洪合作组织在制定基于“受益者补偿原则”的筹资方案时发挥的重要作用——这种方案对传统洪灾防护中的共同筹资模式进行了补充^[32]；同时展示了在奥地利洪水风险治理中相关机构与权力向更低层级的政府和非政府行为主体转移的过程。

flood retention compensation is defined in the following legal frameworks:

The WRG comprehensively regulates water management in Austria, including flood management. In response to the EU Flood Directive (2007/60/EC), the WRG was amended to account for flood hazard mapping and the establishment of flood risk management plans in APSFR. With regard to flood retention, the WRG explicitly lists the need to identify suitable retention areas in Paragraph 4, Article 55 of National Flood Risk Management Plan^[25]. Public authorities use flood maps and the associated flood risk management plans as a basis for planning protection measures. According to the WRG, however, not public authorities but affected riparian stakeholders have the formal obligation to ensure flood protection. Flood protection schemes are thus initiated by “interested parties” at the local level (often represented by the municipal government), while federal and state authorities provide the necessary financial (and legal) support for their implementation. Depending on the type of river, the local share of the total costs differs, as defined by the Hydraulic Engineering Development Act^[28]. Typically, the federal level covers 50% of the costs, the state 30%, and the municipalities 20%. In some cases, the federal level covers the majority or even the entire costs, leaving the remaining share to the “interested parties,” i.e., municipalities, water associations and / or beneficiaries. The federal and state share may also be stocked up, if the municipality is structurally weak and cannot provide its share of the funding^[29].

Importantly, because in practice flooding often affects a multitude of riparian landowners, WRG provides the possibility to 1) establish water associations mainly comprising municipalities, or water cooperatives which mainly include private and non-governmental stakeholders, and 2) to distribute the funding and maintenance costs for flood protection measures among the beneficiaries^[25]. Such water or flood protection cooperatives have a defined legal status (statutory corporations under public law), and are governed by a management board and operate according to a statute that defines the objectives of the cooperative and the distribution of costs^[30]. Though rather common for riparian areas of torrents, flood protection cooperatives are not particularly widespread along larger rivers^[31].

In this light, the case of flood retention compensation presented below marks an interesting and rather unique case. It illustrates the role of flood protection cooperatives in preparing the ground for funding schemes that are guided by the “beneficiary-pays-principle” — complementing the traditional co-financing model in flood hazard protection^[32] — and shows how agency and authority in Austrian flood risk governance is transferred to lower levels of government and to non-governmental actors.

3.2 阿尔滕马克特市的滞洪补偿方案：多中心治理案例辨析

根据以上关于奥地利洪水风险治理的背景，本节将结合多中心治理的5个命题，对高山城市阿尔滕马克特的滞洪补偿案例展开探讨。所有研究发现来自对工程文件、已发表文章、水务合作组织会议记录，以及对州级、区域级和地方政府机构工作人员、政界人士和个体倡议者的专家访谈内容所进行的分析。

本文的研究区域阿尔滕马克特市拥有约4 200位居民，隶属奥地利萨尔茨堡联邦州，位于恩斯河上游。该市的洪水风险主要来自恩斯河，其次为其支流之一扎赫巴赫急流。与许多其他高山城市一样，阿尔滕马克特的城市开发明显受地形限制，其可永久定居用地面积仅占全市土地面积的约22%，建筑用地和基础设施都集中分布在河谷盆地中。

3.2.1 命题一：地方行动

阿尔滕马克特市的防洪工程及其补偿方案始于21世纪初。早在2004~2006年，已有相关研究指出了阿尔滕马克特市存在的洪水风险：水利模拟表明，当面临百年一遇的特大洪水时，该市的大部分住宅和商业区都将遭受破坏。根据洪灾分析结果，阿尔滕马克特市于2008年开始采取地方行动，积极动用各种手段提高相关意识，并为此召开了一次市民会议。2009年，市政府绘制了洪灾区域地图并启动了技术性防洪工程规划，其最终于2013~2016年间在恩斯河沿岸落地实施。该防洪方案旨在保护阿尔滕马克特市的人口聚居区（包括1 200余位居民和350栋建筑）免受百年一遇洪灾的侵袭。除线性防洪措施（总长约3.5km）外，该方案最主要的举措是在农业草场上修建了一处储水量约为38万立方米的大型滞洪洼地（图3）。当洪水流量超过 $59\text{m}^3/\text{s}$ （相当于35年一遇的洪灾）时，洼地入口处的引流装置便会启动（图4）^[33]。

由于恩斯河受联邦政府管辖，因此该方案的全部成本（共计约940万欧元）由联邦州政府和市级政府共同承担，依照初始分配方案，二者分别支付84%和16%。总成本包括施工成本、征地费用，以及为一处由于建造滞洪洼地而迁走的马场支付的补偿金。在百年一遇的洪灾发

3.2 Flood Retention Compensation in Altenmarkt: A Case of Polycentric Governance?

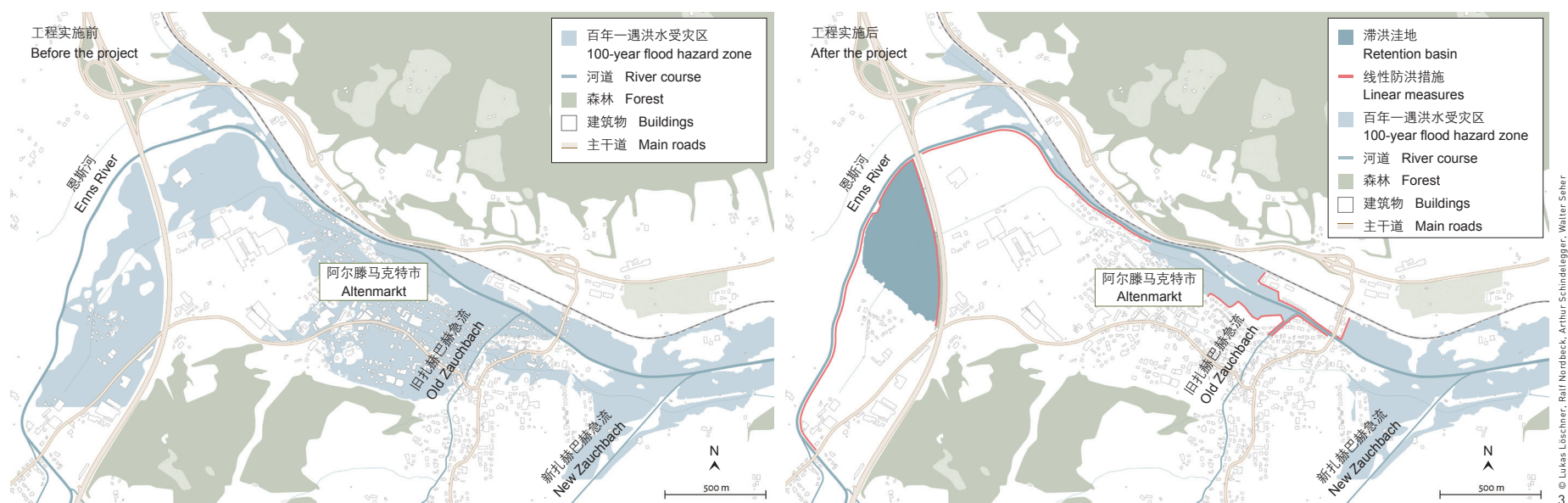
Against the above context of flood risk governance in Austria, we now present the case of flood retention compensation in the alpine municipality Altenmarkt along the five defining propositions of polycentric governance. Our findings are based on an analysis of project documents, published articles, minutes of the meetings of the water cooperative as well as expert interviews with state, regional, and local authorities, politicians, and the citizen initiative.

Our study area, the municipality Altenmarkt, with 4,200 inhabitants, is located in the upper reach of the Enns River in the federal state of Salzburg, Austria. The danger of flooding for the municipality originates firstly from the Enns River and secondly from one of its tributaries, the Zauchbach Torrent. Like many other alpine municipalities, development options in Altenmarkt are topographically restricted. With only about 22 percent of the municipal surface available for permanent settlement, building land and infrastructure are concentrated in the valley basins.

3.2.1 Proposition 1: Local Action

The flood protection and compensation scheme in Altenmarkt dates back to the early 2000s. First ideas for a flood risk concept in Altenmarkt were already discussed during 2004 to 2006 when hydraulic simulations had shown that large parts of the municipality's residential and commercial areas would be affected in a 100-years flood event. Based on the results of flood hazard analysis, local action started in 2008 with awareness-raising measures and a town meeting. In 2009, the municipality adopted a hazard zone map and the planning for a technical flood protection project began. Finally, a flood defence project was implemented along the Enns River between 2013 and 2016. The protection scheme aims to protect the municipality's settlement area (including more than 1,200 residents and a total of 350 buildings) against a 100-year design flood. Most prominently, in addition to linear measures (totally around 3.5 km long) the project features a large retention basin with a storage capacity of about $380,000\text{m}^3$ in an agricultural grassland area (Fig. 3). This retention basin is activated through an inlet structure (Fig. 4) when flood discharge exceeds $59\text{m}^3/\text{s}$, which corresponds approximately to a 35-year flood event^[33].

Since the Enns is under federal responsibility, the project costs (totalling about EUR 9.4 million) were co-financed by the federal state (84%) and the municipality (16%) as originally distributed. In addition to the construction costs, the total project costs also included payments for land acquisition as well as compensation payments for a horse ranch, which had to be relocated from the



生时，该防洪方案可使总价值约3 400万欧元的建筑物及土地（以建筑用地和农业用地为主）免遭破坏，效益约为成本的3.6倍。

在上述典型分级出资制度的推动下，滞洪洼地不仅有效保护了阿尔滕马克特市现有的聚居区，也保障了该市在高山地形条件的限制下也能实现未来的长期发展^[34]。

3.2.2 命题二：试验

阿尔滕马克特市政府采用了一种创新方法为该防洪工程筹集资金。基于此前为扎赫巴赫急流防洪工程筹资的经验，市政当局决定仅支付恩斯河沿岸防洪方案的部分费用（共计40万欧元），剩余部分中

retention area. With the averted damage (in a 100-year design flood) to buildings and surface areas (mainly building land and agricultural land) totaling about EUR 34 million, the flood protection scheme can be considered highly effective with a benefit-cost-ratio of about 3.6.

Within this typical hierarchical funding structure, the project was pushed towards realizing a flood retention basin to protect existing settlements but also to safeguard future development options of Altenmarkt in such a topographically confined alpine area^[34].

3.2.2 Proposition 2: Experimentation

To cover its share of the project cost, the municipality of Altenmarkt came up with an innovative approach. Given its past experiences with funding flood protection measures along the Zauchbach Torrent, the municipality decided to cover only part of the costs for the flood protection scheme along the Enns River (EUR



4-1



4-2

3. 防洪方案实施前后阿尔滕马克特市的洪水受灾状况
4. 阿尔滕马克特市滞洪洼地：可作为农业草场的滞洪区（图4-1）和枯水期时的恩斯河上游，在滞洪洼地的入水口处设有引流控制装置（图4-2）。
3. Overview of the flooding situation in Altenmarkt before and after the implementation of the protection scheme
4. The flood retention basin in Altenmarkt. View of the flood retention area with its agricultural grassland use (Fig. 4-1) and upstream view of the Enns River during low-water period, with the inlet structure for controlled flooding of the retention basin (Fig. 4-2).

的86.4万欧元由该防洪工程的受益者支付。由于阿尔滕马克特市的大部分区域都位于洪水影响范围内，因此这种筹资方式是可行的。根据WRG第44/1条和第78条，防洪措施的受益者有义务支付工程修建与维护费用，支付数额取决于其直接或间接受益程度^[31]；第44/2条则规定具体的筹资方式由相关的市级和区级政府自行决定。

根据WRG的建议，阿尔滕马克特市政府还成立了一个水务合作组织，涉及原百年一遇洪灾影响区（具体范围见图3）的约1 200位财产和土地所有者。所有受益于此防洪工程的财产和土地所有者都受邀加入水务合作组织^[35]，且其中多数人都接受了邀请。依照法律，持反对意见的35名受益者也被强制要求加入，并支付相应费用。

水务合作组织的每位成员应支付的费用由水利办公室计算，主要考虑土地价值、用地类型（如建筑用地、开放土地），并根据建筑类型（如住宅建筑和商用建筑）和结构特征（如建筑物房龄和地窖出入口）计算出免受损失额^[36]。受益者必须承担的费用包括一次性支付的施工成本，以及按年支付的维护费用，后者主要用于向上游农业用地所有者支付年度补偿金。对于防洪工程的间接受益者，由于他们原本的开放土地转化为可开发的建筑用地并因此升值，故而需支付部分费用作为未来潜在补偿的储备资金，这被称为“土地价值捕获”。

修建该方案中的滞洪洼地共需要20hm²土地，涉及12位农业用地提供者，必须获得其一致同意才可动工。经过反复协商，当地政府与土地所有者商定每平方米土地的年补偿金额为0.25欧元，即整个滞洪洼地的年补偿金额约为5万欧元，其中一部分由水务合作组织的年度预算来支付。补偿金将用于赔偿洪水给农业用地和农业基础设施带来的损失，如作物歉收和农田排水设施损坏。此外，农民还可以获得联邦灾害基金的补偿。

该补偿协议表明，农业用地所有者在滞洪工程补偿谈判中拥有较

400,000) and transfer a remaining share (EUR 864,000) to the beneficiaries of the flood protection measures. Since large parts of the municipal area would be affected in case of a flood event, this collective approach made sense. According to Article 44/1 and Article 78 of the WRG the beneficiaries of flood protection measures can be obliged to contribute to the construction costs as well as the maintenance costs, depending on the extent to which they benefit directly or indirectly from a protection measure^[31]. However, it is the internal affair of the involved municipal and district authorities how the funds are raised, as defined by Article 44/2.

Based on the legal possibilities provided by the WRG, the municipality established a water cooperative involving around 1,200 property and landowners within the former 100-year flood hazard zone illustrated in Figure 3. All property and landowners who benefited from the flood project were invited to join the water cooperative^[35], and the majority of them accepted. The opposing 35 beneficiaries were legally obligated to join and contribute their share to the flood protection scheme.

The respective financial contribution of all members of the water cooperative was calculated by a water engineering office in consideration of the land value, the type of land use (e.g., building land, open land) as well as the averted flood damage based on the building type (e.g., residential, commercial) and structural features (e.g., age of the building, cellar openings)^[36]. The beneficiaries were obligated to pay a one-time contribution to finance the construction costs as well as an annual contribution to cover the maintenance costs, which primarily consisted of the yearly compensation payments to the upstream agricultural landowners. Those who benefited indirectly from the flood protection due to the rezoning of open land into building had to provide a share of the appreciated land value as a reserve for future compensation payments, i.e., land value capture.

The realization of the flood retention basin required the consent of all the 12 agricultural landowners who provided in total 20-hectare land for controlled flood retention. After lengthy negotiations between the local authorities and the landowners, the involved actors agreed on annual compensation payments of EUR 0.25 per square meter, which amounts to about EUR 50,000 per year for the entire flood retention area. This compensation, which is also financed from the annual budget of the cooperative, covers the damage to agricultural land (e.g., crop failure) and the agricultural infrastructure (e.g., drainage) in the event of flooding. In addition, farmers are eligible to compensation payments from the federal disaster fund.

This compensation agreement reflects the strong bargaining position of agricultural landowners for the realization of flood

大的主动权，在城市建设受限于地形且土地开发收益差异巨大的地区尤其如此。

3.2.3 命题三：相互协调

为了实施防洪方案，阿尔滕马克特市政府还需要与其上游的弗拉绍市合作，因为规划中的部分滞洪洼地位于弗拉绍市境内，所占用的农业用地的所有者也来自弗拉绍市。此外，弗拉绍市也在恩斯河源头采取了进一步的防洪措施^[34]。

2008年初，地方相关政府机构召开会议，讨论阿尔滕马克特—弗拉绍联合水务协会的筹建事宜，但该提议最终未能实现。两市市长均认为，由两市分别与各自辖区内受洪灾影响地区的社区代表和土地所有者沟通更有利于防洪工程的实施。虽然缺乏制度化的合作框架，但多年来两市仍然开展了多次非正式合作，有效解决了许多问题，并通过相互学习受益良多^{[35][37]}。两市均通过自己的水务合作组织确保受益者支付补偿费用。弗拉绍市的恩斯河水务合作组织早已成立，但在此次合作中又将新防洪措施的受益者吸纳了进来^[37]。

3.2.4 命题四：信任的重要性

信任是保障长期滞洪工程顺利实施的最重要的因素。各方一致认可防洪措施对阿尔滕马克特市的重要性^{[35][38][39]}，相关决议也得到了地方议会中所有政治团体的支持。市政府内部决策者（包括市长、施工部门负责人、志愿消防部门等）之间，以及市政府与上级主管部门的决策者之间均配合默契^{[35][38][40]}。为了提高阿尔滕马克特市居民的防洪意识，市长决定在城市里明确标示出30年一遇和百年一遇洪水的淹没线。此外，人们可以定期通过市民会议和市政简报了解防洪规划工作的进展^[35]。

然而，受规划影响的居民和土地所有者的加入也给州政府和市政府带来了很多挑战^{[35][38][41]}。为了就滞洪用地布置和土地受灾风险提高的问题达成协议，双方进行了密切的协商。修建滞洪洼地期间，与土地所有者的谈判也困难重重。部分受影响的农民起初不愿意提供滞洪用地。市政府经过长期谈判，做出了无论是否发生洪灾，在未来100年内均会每年支付补偿金的巨大让步，方才克服阻力。

由于多种原因，成立包含1 200余名成员的水务合作组织也是一项艰巨而漫长的任务。首先，由于受益者人数众多，市政府耗时两年多才争取到多数人的支持，最终于2014年成立合作组织。其次，部分市

retention, especially in areas with topographically limited development options and diverging land use interests.

3.2.3 Proposition 3: Mutual Adjustment

To implement its flood projection scheme, municipal authorities in Altenmarkt had to cooperate with the upstream municipality Flachau because a part of the area for the planned retention basin was located in Flachau and also the agricultural landowners of the designated flood retention area were farmers from Flachau. Additionally, Flachau implemented further flood protection measures in the headwaters of the Enns^[34].

In early 2008, local administration authorities held a meeting to discuss the idea of a joint water association Altenmarkt-Flachau. However, the regional water board was never realized. Both mayors agreed that it would be easier to implement the flood projects in the two affected communities, Flachau and Altenmarkt, with the community representatives and landowners treated separately. Notwithstanding this lack of an institutional framework of cooperation, the informal cooperation between the two mayors remained strong over the years and has proven to be an effective way of problem-solving and mutual learning^{[35][37]}. Both the municipalities established water cooperatives to guarantee that the beneficiaries would contribute to the project funding. In Flachau, a water cooperative for the Enns existed already, but the membership had to be broadened to include the beneficiaries of the new protection measures^[37].

3.2.4 Proposition 4: Importance of Trust

Trust can be regarded as the most valuable asset to implement the flood retention project over the years. The necessity of flood protection measures was uncontroversial in Altenmarkt^{[35][38][39]}. Related decisions were supported by all political groups in the local council and passed unanimously. Cooperation of decision-makers within the municipality (mayor, chief of construction, volunteer fire department, etc.) as well as between the municipality and the responsible authorities at higher levels of government was working well^{[35][38][40]}. To raise awareness about flood risk among local residents in Altenmarkt, the mayor decided to peg the inundation lines of the 30- and 100-year flood in the municipality. In addition, people were informed about the progress of planning in citizen meetings and the municipal newsletter on a regular basis^[35].

The involvement of the affected residents and landowners, however, posed considerably more challenges to the state and municipal authorities^{[35][38][41]}. Intensive negotiations were needed to reach an agreement concerning the assignment of

民提前组成了倡议小组，质疑实施整体性防洪规划的必要性并对其中一些步骤提出了批评，试图减少财产和土地所有者须向水务合作组织缴纳的补偿份额^[42]。不过最后只有35人投票反对成立水务合作组织，绝大多数受益者最终自愿加入了该组织。

3.2.5 命题五：统领性规则

区域和地方利益相关方为防洪工程准备了详细的分步实施计划。大部分居民均对此规划表示理解和支持。为了不使地方政府的工作复杂化，联邦政府和州政府并未向当地社区施加压力，不过仍须向少数持反对意见的土地所有者申明，他们的意愿最终无法阻止防洪规划实施。由此可见，在地方层面的行动中，必须由更高层级的法律框架及一系列统领性规则来平息争端和减少不同行动主体间的冲突。例如，在阿尔滕马克特市案例中，WRG关于建立水务合作组织并强制受益者加入的规定即保证了所有受益者都能公平地支付补偿金额^[34]。

4 讨论与结论

本文探讨了奥地利多中心洪水风险治理的典型案​​例——阿尔滕马克特市的滞洪工程及其补偿方案，并将多中心治理的五大命题与该案

land for the retention basin and for an increased susceptibility of flooding on their land. The negotiations with landowners during the construction of the retention basin were very difficult. Some of the affected farmers were initially unwilling to provide land for flood protection. This resistance could only be overcome after long negotiations with a generous offer from the municipality, which guarantees farmers annual payments irrespective of a flood event for the next 100 years.

For several reasons, establishing the water cooperative with currently more than 1,200 members was also a difficult and lengthy undertaking. First, the number of beneficiaries was so large that it took more than two years until the necessary majorities were in place to start the cooperative in 2014. Second, a group of potential members had formed a citizen initiative which questioned the need for flood protection measures as a whole and criticized individual implementation steps, aiming at the reduction of the contributions for the property and landowners to the water cooperative^[42]. In the end, however, only 35 people voted against the water cooperative. The overwhelming majority of beneficiaries ultimately joined the cooperative voluntarily.

3.2.5 Proposition 5: Overarching Rules

The steps to implement the flood protection project were well prepared by all stakeholders involved at regional and local level. The measures were widely understood and supported by large parts of the residents. There was no pressure from the federal and state governments on the community to implement the flood retention project since it would have complicated the implementation at the local level. For the few landowners who were still resisting, however, it was necessary to remind them that the measures will ultimately be implemented against their will. In this sense, actions at the local level require a higher legal framework with a set of overarching rules as means to settle disputes and reduce the level of discord between the involved parties, illustrated by the Altenmarkt case that the WRG allows establishing a water cooperative with forced accession to make sure that all beneficiaries pay their fair share of the project costs^[34].

4 Discussion and Conclusion

In this paper, we analyzed the flood retention project in Altenmarkt and its compensation scheme as a case of polycentric flood risk governance in Austria. We reflected the case along the five key propositions of polycentric governance (Table 3). It indicates, at least in part, an evolving “polycentrifcation”

表3：多中心理论的5个关键命题在阿尔滕马克特市案例中的具体表现
Table 3: Manifestation of the five key propositions of polycentric theory in the case of Altenmarkt

命题 Proposition	在阿尔滕马克特市案例中的具体表现 Manifestation in the case of Altenmarkt
地方行动 Local action	在地方尺度上实施防洪工程，使阿尔滕马克特市免遭百年一遇的洪灾侵袭，并保障了其未来社会经济发展的有利条件 The flood project was initiated at the local level to protect the municipality against a 100-year flood and safeguard favourable conditions for future socio-economic development
试验 Experimentation	市政府成立了一个水务合作组织来执行基于“受益者补偿原则”的创新型筹资方案 The municipality established a water cooperative to implement an innovative funding approach based on the beneficiary-pays-principle
相互协调 Mutual adjustment	阿尔滕马克特市与其上游城市通过相互协作和学习彼此的经验，调整各自的防洪工程策略，并建立自己的水务合作组织 Altenmarkt and its neighbouring municipality cooperated and learned from each other’s experiences, adjusted their flood projects and each established a water cooperative
信任的重要性 Importance of trust	建立信任是该防洪工程成功实施的前提。在本案例中，信任对于决策者、当地居民、财产及土地所有者，以及水务合作组织的成员而言都十分重要 Building trust was a precondition for the success of the flood project. Trust was important for decision-makers, residents, property and landowners, and the members of the water cooperative
统领性规则 Overarching rules	WRG促成了水务合作组织的建立，并作为一种强制性措施，从根本上确保了受益者支付其应负担的补偿份额 The WRG promotes the establishment of water cooperatives and allows for beneficiary contributions as well as forced accession as an ultimate means

例的特征进行了对照呈现（表3）。在一定程度上，该案例体现了奥地利洪水风险治理体系的“多中心化”趋势，然而滞洪工程对提升滨河景观韧性的作用仍有待商榷。

一方面，使用农业用地进行调控滞洪能有效降低下游洪灾易发区的洪峰流量和洪水风险；滞洪区还可作为缓冲区，使防洪方案能够更稳健地缓解由气候性因素导致的洪水流量升高的问题^[43]。因此，在开放土地上建设滞洪工程正在成为一项越来越重要的防洪策略^[19]。

另一方面，滞洪区的生态功能很大程度上取决于滞洪类型。将洪泛平原与河流重新相接，使其在丰水期自然地被淹没，通常会促进水陆交界处栖息地的形成^[44]。而人工修建的调控滞洪区并非与河床天然相连，其入口仅在洪水流量超过预设标准后才会打开，以便最有效地调节洪峰^[45]。因此，阿尔滕马克特市滞洪工程的实际效果是依靠技术设施而非农田自身条件实现的，向农业用地所有者支付的相关费用也是用于弥补潜在的作物损失以及洪水风险增加对现有财产造成的破坏，其性质与通过财政拨款来维持现有服务的“生态系统服务费用”截然不同。理论上，洪灾导致的一切作物损失补偿都应由共同农业政策（CAP）框架下的农业—环境资助计划来支付，但目前奥地利尚无相关计划。

虽然仅提供滞洪服务并不能显著改善滞洪区的生态质量，但农业用地所有者（无论其是否受CAP框架的保障）获得的补偿金却可以作为缓解滨河地区农业用地（如湿地草甸）使用过度集约化的手段。通过这种整合了绿色基础设施和灰色基础设施的“混合”解决方案，既可以利用技术设施保证防洪安全，又能通过自然途径提升生态功能^[46]。LAF

of the Austrian flood risk governance system. However, the contribution of flood retention towards enhancing the resilience of riparian landscapes is not so definite.

On one hand, using agricultural land for controlled flood retention is an effective means to reduce the peak flow and the flood risk in vulnerable downstream areas. Against the likely climate-related increases in flood discharge, flood retention areas may also serve as buffer and contribute to enhancing the climate robustness of flood protection schemes^[43]. Flood retention on open land thus assumes an increasingly prominent role in the portfolio of flood risk reduction strategies^[19].

The ecological functions of flood retention areas, on the other hand, are largely dependent on the type of flood retention. Reconnecting floodplains to allow natural inundation in periods of high water generally improves habitat formation at the land-water divide^[44]. Controlled flood retention areas, however, are not naturally connected to the river bed, as inlet structures are opened only when defined discharge levels are exceeded in order to cap the flood peak most effectively^[45]. Thus, flood retention effects in the Altenmarkt case are provided by technical facilities and not by the condition of the farmland itself. Related payments to agricultural landowners are intended to compensate potential crop damages and the interference in existing property rights due to an increased susceptibility to flooding. This kind of compensation differs from the concept of “Payments for Ecosystem Services” where the financial support is used to maintain the existing services. It is conceivable that agri-environmental funding programmes in the Common Agricultural Policy (CAP) framework provide compensation for any cultivation impairment caused by flood retention, however, related programmes are currently not available in Austria.

Although the ecological quality of such retention areas can not improve significantly by providing flood retention services alone, compensation payments to agricultural landowners, both inside or outside CAP, may provide an instrument to incentivize less-intensive agricultural land uses in riparian areas (e.g. wetland meadows). In this way, combining green and grey infrastructure measures into so-called “hybrid” solutions may provide flood security by technical facilities while also enabling ecological functions by natural approaches^[46]. LAF

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