

SPECIAL ISSUE PAPER OPEN ACCESS

Postdisaster Reconstruction After the 2021 Floods From the Neighborhood Perspective

 Marisa Fuchs 

Department of Spatial Planning, Research Group of Regional Development and Risk Management, TU Dortmund University, Dortmund, Germany

Correspondence: Marisa Fuchs (marisa.fuchs@tu-dortmund.de)

Received: 5 June 2024 | **Revised:** 2 April 2025 | **Accepted:** 29 April 2025

Funding: This work was supported by Bundesministerium für Bildung und Forschung (01LR2102L) and Deutsche Forschungsgemeinschaft.

Keywords: community resilience | disaster governance | neighborhood | postdisaster reconstruction (PDR) | social capital | social inequality | social infrastructure | social vulnerability

ABSTRACT

The floods in Western Europe in July 2021 demonstrated the diverse ways and varying paces at which neighborhoods recover from disasters. Based on two exemplary neighborhoods affected by the floods in the city of Hagen, Germany, this study examines the reconstruction process, highlighting the influence of social vulnerabilities and community resilience on private reconstruction processes. Despite differing contexts, both case studies demonstrated a significant reliance on external support during reconstruction. Individual needs varied based on social vulnerabilities within and between population groups, primarily manifesting as challenges in information dissemination and access to support services like funding and expertise. The findings reveal differences in the ability and capacity of neighborhoods to collectively address these vulnerabilities. While small neighborhood networks effectively facilitated information sharing in both cases, one case study relied more heavily on external assistance from nonprofit organizations for larger and longer-term community-driven initiatives. The study underscores the need for improvements in postdisaster reconstruction governance. Public authorities predominantly view neighborhoods as recipients rather than partners in the reconstruction process, without adequately addressing their social vulnerabilities within their governance approaches. Supporting local social infrastructures is crucial, as they connect formal reconstruction with the neighborhood, aiding resource access and resilience building.

1 | Introduction

The floods in Western Europe in July 2021 have once again shown that neighborhoods recover from disaster in various ways and at different speeds (see e.g., Aldrich 2012; Kammerbauer 2014). Natural disasters are also social disasters (Heidbrink et al. 2010). The social context in which such a disaster occurs is directly linked to patterns of morbidity, mortality, displacement, loss and recovery (Tierney 2007). Thus, postdisaster reconstruction (PDR) is not only about reconstructing damaged physical infrastructure according to the principle of “building back better” (see UNDRR, 2015), as politicians and planners have pursued for a long time (Aldrich and Meyer 2014;

Pfister 2020). Reconstruction policy and planning must be holistic (Jha et al. 2010). The focus must include ensuring equitable access to resources and equal opportunities for the most disadvantaged members of affected neighborhoods, and reducing the vulnerability of neighborhood communities to hazards (Lewis 1999). “Building back better” also includes improvements in structural social inequalities and injustice (UNDRR, 2015). Thus, PDR also becomes a question of appropriate disaster governance. Compared to the immediate disaster response or flood risk management in general (see e.g., Aldrich 2012; Comfort 2005; Koers et al. 2024; Forrest et al. 2021), few studies have so far been dedicated to PDR governance focussing on the social context at neighborhood level (see e.g., Aldrich 2016).

This is an open access article under the terms of the [Creative Commons Attribution](https://creativecommons.org/licenses/by/4.0/) License, which permits use, distribution and reproduction in any medium, provided the original work is properly cited.

© 2025 The Author(s). *Journal of Flood Risk Management* published by Chartered Institution of Water and Environmental Management and John Wiley & Sons Ltd.

Effective as well as holistic PDR policy and planning require both larger bureaucratic or formal structures in dealing with disasters and more flexible structures and resources of the local neighborhood (Boin 2010; Daly et al. 2017). On their own, neither approach can effectively manage disasters: while bureaucratic or formal structures often lack the flexibility to adapt or react quickly to unforeseen events, neighborhoods rely on local skills and capacities, which often lack the resources required for sustainable recovery (Daly et al. 2017; Hawkins and Maurer 2010; Shea 2018). The community resilience approach provides a necessary collaborative framework for linking these two structures for disaster risk reduction and management (Shea 2018). Moreover, this approach reflects an awareness of the impact that the social construction of disasters and social inequalities have on vulnerability and community resilience (Shea 2018).

This study examines the hypothesis that social context is a decisive factor of community resilience during PDR: neighborhoods whose social structure is associated with a range of social problems and vulnerabilities tend to exhibit lower community resilience (Cutter et al. 2003, 2014) and reconstruct less effectively. Based on two case studies in Hagen, Germany—neighborhoods with significantly different social structures—this paper traces the reconstruction governance after the 2021 flood, focusing on private homes. Reconstructing private buildings is a significant part of PDR, primarily within the domain of citizens' actions, where the capacities of citizens play a particularly crucial role. Throughout the tracing process, the study provides insights into the roles different actors and particularly neighborhoods are playing in PDR governance. It also explores whether and how social vulnerabilities shape access to resources and influence the recovery process and how PDR governance reproduces vulnerabilities.

2 | Conceptual Bases: Disaster Governance and Community Resilience

Disaster governance refers to the ways in which public authorities, nongovernmental organizations, the private sector, the media, and civil society work together at different levels to manage and reduce disaster and climate-related risks (UNDP, 2013). It is a collaboration or activity that goes beyond the remit of a single organization and requires more than a conventional top-down approach of a centralized leadership. Particularly, the concept of *governance* recognizes the existence of power and knowledge inside and outside formal authorities and government institutions (Biermann and Pattberg 2008; Folke et al. 2002). For effective disaster governance, transferring power and authority as well as building capacity within local neighborhood communities are some of the most important elements. They enable neighborhoods to effectively participate in developing relevant policies, decisions, and actions that reflect their local context (Djalante et al. 2011; IPCC, 2012; Pelling 2011; UNISDR, 2011). They contribute by providing resources and local knowledge to disaster management. This is where the community resilience approach comes into play.

Community resilience is a normative concept that is closely linked to the concept of social resilience (Berkes and Ross 2013),

but refers to a collective or community—in this study the neighborhood community. It is defined in different ways in the literature, although most definitions have key terms and concepts in common. Community resilience is the ability of a community to resist disturbances, to adapt or adjust to a disruption, or to bounce forward (Aldrich and Meyer 2014; Kendra and Wachtendorf 2003; Magis 2010; Manyena et al. 2011; Ross 2014). The resilience of a community is driven by six core capacities based on social, human, economic, institutional, physical, and environmental capitals (Cox and Hamlen 2015; Cutter et al. 2010; Haase et al. 2021; Peacock et al. 2010; Ross 2014). Describing each type of capital in detail would go beyond the scope of this article, but Haase et al. (2021) provide an overview.

Nevertheless, this study pays particular attention to social capital. Social capital is capacities and resources that are embedded in one's social network and can be accessed or mobilized through ties in the network (Lin 2002, 2010). Therefore, it encompasses access to a range of other resilience capacities and facilitates self-organized, collective, community-driven problem solving (Aldrich 2012; Briggs 2004; Comfort et al. 2010; Morrow 2008). *Linking* social capital, derived from relationships with institutions and individuals who hold relative power, provides access to government support, political power, and financial capital that are required for effective recovery and reconstruction (Aldrich 2016; Cutter et al. 2003, 2014; Hawkins and Maurer 2010).

Community resilience is not an inherent ability but a social achievement and an effect of the community's social characteristics (Bonß 2015). Thus, community resilience also relates to the concept of *social* vulnerability. Social factors such as economic status, age, gender, and ethnic descent, as well as inequalities in access to education, political participation, and other resources and services manifest themselves in various vulnerabilities and forms of resilience capacities (Bohle 2002; Cutter 2006). Social vulnerability arises when there is unequal risk exposure and unequal access to resources due to social and cultural conditions (Morrow 2008).

3 | State of Research: Experiences From Past Postdisaster Reconstruction Governance Systems

The effects of devastating and supra-local disasters quickly exceed the capacities for reconstruction (e.g., expertise, coordination, money) of individual affected citizens, neighborhood communities, sectors, and municipalities (Cho 2014). They often highly depend on the capacities and resources of higher-level government organizations (Scolobig et al. 2015). As disaster risk management (DRM) systems are historically rooted in the institutionalization of DRM processes and practices (Melo Zurita et al. 2018; Scolobig et al. 2015), governmental top-down approaches often still dominate PDR (Cho 2014; Daly et al. 2017; Scolobig et al. 2015), although neoliberal regimes increasingly shape the way PDR systems are governed (Meriläinen et al. 2020). However, hierarchical and bureaucratic structures are limited in the types of knowledge they can mobilize due to the limited number of actors involved and are usually ineffective in dealing with uncertainty and discontinuity (Levin 2000; Shea 2018). Additionally, top-down and centralized approaches

to reconstruction struggle with time delays due to less flexibility and adaptability (Cho 2014). The release and distribution of resources—especially financial budgets—often require negotiations and new bureaucratic structures (Daly et al. 2017; Miller and Douglass 2015). The authority to determine the purpose and allocation of resources is linked to a position of power in disaster governance. Previous studies on PDR show that resources have often been limited to the reconstruction of physical infrastructure (Cho 2014). Affected individuals and institutions are recipients of resources. Many PDR governance systems failed to integrate a system of meaningful participation (Cho 2014). Instead, public authorities often simply conduct explanatory meetings, listen to residents' opinions, or conduct surveys among residents (Cho 2014).

Disaster research shows that neglected neighborhoods and/or groups of people often continue to be marginalized during reconstruction (Ensor 2009; Fothergill and Peek 2004; Kammerbauer 2014; Olivo Diaz Lopez 2002; Fuentealba et al. 2020). When formal top-down approaches to reconstruction remain ineffective or fail to meet the needs of neighborhood communities (Auf der Heide 1989; Daly et al. 2017; Hollingshead et al. 2007; Stallings and Quarantelli 1985), some neighborhood communities, emergent groups, or local nonprofit organizations (NPOs) respond with community-driven approaches that are far more responsive to existing vulnerabilities (Blöschl et al. 2013; Mees et al. 2016). They organically self-organize outside of formal structures to take control of their own recovery efforts (Drabek and McEntire 2003) and/or to facilitate an effective response (Aldrich 2012; Barton 1969; Gilligan 2018). In some cases, local NPOs function as quasi-public agencies and substitute missing, inadequate, or failed public services (Cho 2014). In other cases, groups emerge from neighborhood members and/or local NPOs, for example, a *community reconstruction committee* after the 2015 Nepal earthquake (Daly et al. 2017). Whether and how these groups are sustained or develop in the medium or long term varies (Pelling 2011). While some groups disappear after achieving reconstruction, others develop a new common goal in the long term.

However, there is often a lack of connections between neighborhood communities and formal recovery systems at the state level. Sometimes, emerging groups may not be immediately recognized in their new role by public authorities (Shea 2018). This can hamper recovery processes and lead to misunderstandings, misdirected resources, and missed opportunities (Aldrich 2012; Barton 1969; Comfort et al. 2010). In particular, marginalized neighborhoods or groups often lack access to *bridging* or *linking* social capital (Aldrich 2012; Hawkins and Maurer 2010), which prove to be essential and effective in recovery and reconstruction processes (Khan 2024). This can lead to exclusion from recovery and reconstruction processes, displacement, or unbalanced claims between neighborhoods/groups (Aldrich 2012; Portes 1998).

We know from research on neighborhoods, segregation, and inequality that increasing social inequality due to significant external shocks (such as a flood disaster) can promote segregation processes in the longer term (Meen et al. 2012). Social segregation goes hand in hand with the possibility of positive but also the risk of negative neighborhood effects (Galster 2011; van

Ham et al. 2011). Disadvantaged, socially segregated neighborhoods tend to lack institutional and normative integration into organizations, structures, and contexts of action (Baum 2007). This lack of access to resources (especially linking social capital) negatively affects community resilience (Cutter et al. 2003, 2014; Hawkins and Maurer 2010).

4 | Research Design and Methods

This paper is based on two case studies that examine the reconstruction in two neighborhoods affected by the 2021 floods in the city of Hagen, Germany (see Figure 1). As one of the few large cities significantly affected by the 2021 floods in Germany, Hagen's urban context offers the opportunity to analyse reconstruction processes across socially diverse neighborhoods within the same municipal context. This makes it an ideal setting to explore how social structures shape PDR and governance dynamics.

To test the hypothesis, the case studies were selected based on two criteria: (1) similar flood exposure and (2) contrasting social structures in terms of characteristics influencing vulnerability and community resilience. Due to the lack of reliable data, exposure was assessed through site visits with the fire brigade and validated via participatory mapping with residents. Social structure differences were identified using an explorative, multivariate cluster analysis (Ward's procedure) across all 39 statistical districts of Hagen. The analysis considered social characteristics that are associated with a high or low level of social vulnerability and community resilience (see e.g., Cutter et al. 2003, 2014):

1. Population density,
2. Youth ratio,
3. Old-age ratio,
4. Proportion of recipients of social benefits,
5. Proportion of people with a migration background, and
6. Fluctuation rate.

This approach ensures that the selected case studies represent a contrasting spectrum of social conditions (see Table 2 in chapter 5), allowing for an in-depth exploration of how social characteristics of neighborhoods influence vulnerability, resource access, and reconstruction efforts in the aftermath.

Within the case study research, qualitative methods of empirical social research were conducted, including

1. Semi-structured interviews with representatives of different municipal departments and local social infrastructures ($n = 6$)
2. Informal and semi-structured interviews with affected residents ($n_A = 10$; $n_B = 12$),
3. Storytelling circles ($n_A = 2$; $n_B = 2$) based on Richter and Rohnstock (2016) with affected residents and helpers, and
4. Participatory observations of local events dealing with flood relief and preparedness.

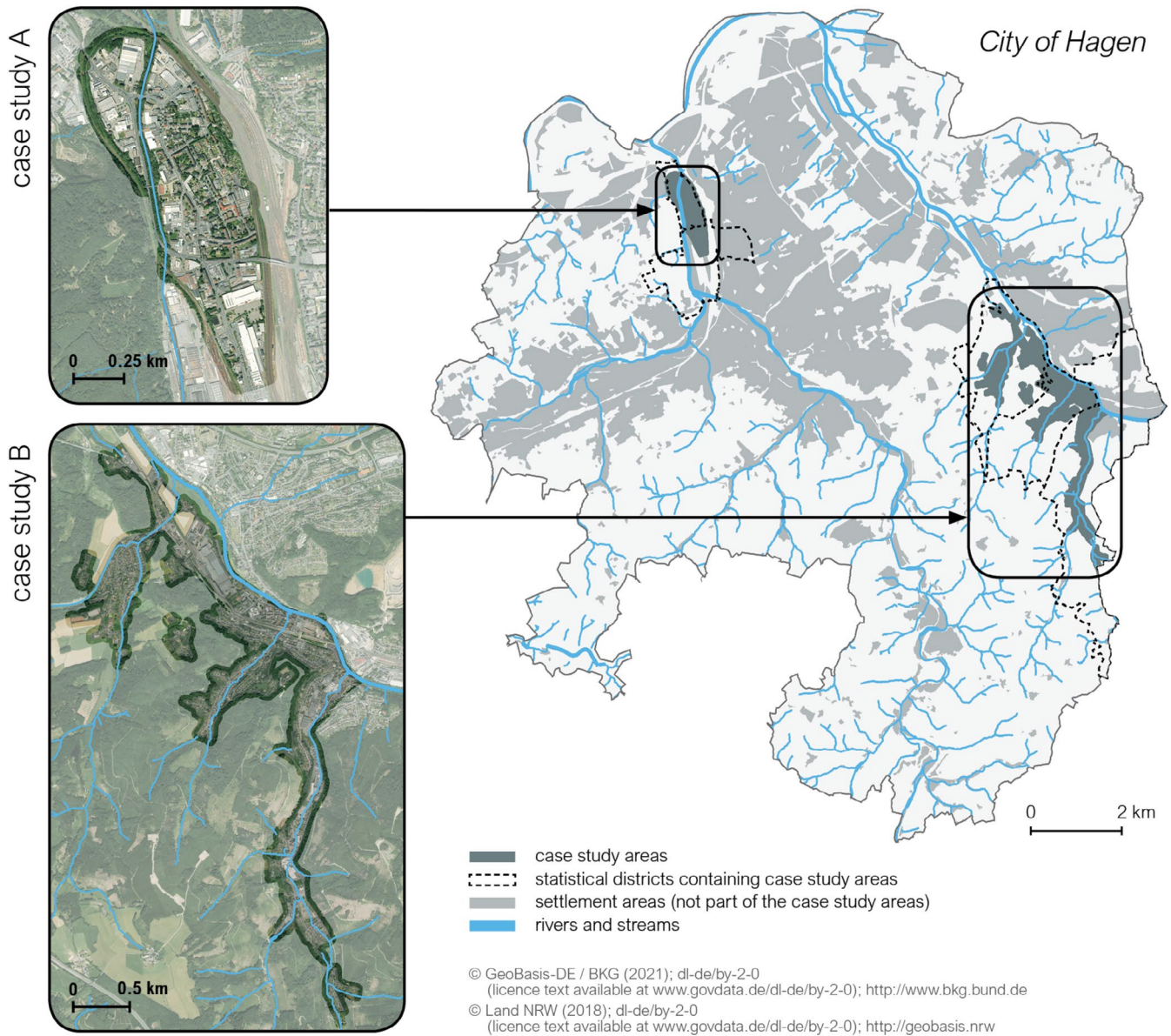


FIGURE 1 | City of Hagen and the location of the case studies A and B; own illustration.

All semi-structured interviews and the storytelling circles were transcribed, and all other elements of data collection were documented as reconstructed notes. Additionally, excerpts from the radio broadcast of Erdenberger and Krause (2021) were transcribed, in which residents of one case study shared their flood experience and reconstruction efforts. The transcripts and notes, as well as relevant public reconstruction and planning documents, were analyzed using MAXQDA 24, following a structuring qualitative content analysis according to Kuckartz and Rädiker (2023). MAXQDA is a software tool for qualitative and mixed methods data analysis. It facilitates the systematic coding and analysis of data, enabling researchers to identify patterns and draw insights. In this study, the coding categories were formed deductively and inductively. They reflect the spatial and temporal dimensions of reconstruction. Based on the concepts of community resilience and social network theory (Lin 2010), resilience capacities were analyzed by coding the tangible and intangible resources and assistance offered during the reconstruction process, including their providers, adequacy,

and the level of difficulty in accessing them. Table 1 provides a description of the actors cited in this article.

5 | Case Studies

Located in the state of North Rhine-Westphalia (NRW) in the south-eastern part of the Ruhr region, Hagen has a population of around 190,000. Hagen ranks among Germany's poorer cities. In 2021, its disposable private income averaged €20,862 per inhabitant, placing it 374th out of 396 municipalities in NRW (IT.NRW, 2024). Four rivers and approximately 360 smaller streams traverse the city, many running through private property. The estimates of the number of households affected by the July 2021 flood event range from 6000 (MUN#1C) to 9000 (Bodin 2021). Overall, the flood event required over 1500 relief operations of around 1200 relief workers, marking the largest mission of relief workers in Hagen since World War II (MUN#1A). Private loss amounts are not (yet) known for Hagen, but 2 years after

TABLE 1 | List of cited interviewees including a short description; own table.

Interviewees	Date	Type of data collection	Short description of interviewees
MUN#1A	05.07.2022	Narrative contribution	Flood protection advisor
MUN#1B	04.10.2022	Interview	
MUN#1C	17.08.2023	Narrative contribution	
MUN#1D	05.02.2025	Narrative contribution	
MUN#2	27.02.2023	Interview	Group of representatives tasked by the city administration with managing public and private funding applications
NPO#1A	09.02.2023	Interview	Welfare organization that also runs a flood relief office in case study A
NPO#1B	28.09.2023	Personal communication	
NPO#1C	05.11.2024	Narrative contribution	
NPO#2A	04.10.2022	Interview	Welfare organization that also runs a flood relief office in case study B together with four other stakeholders
NPO#2B	21.01.2025	Personal communication	
ASSOC#1	05.05.2022	Interview	Representative of a group (now: association) of helping residents in case study B
ASSOC#2	14.07.2023	Narrative contribution	Representative of a sports association in case study A
RES#1	23.11.2022	Informal interview	Resident from case study B
RES#2	12.02.2024	Interview	Resident from case study B
RES#3	09.02.2024	Interview	Resident from case study B
RES#4	23.11.2022	Informal interview	Resident from case study B
RES#5	28.09.2023	Narrative contribution	Resident from case study A
RES#6	28.09.2023	Narrative contribution	Resident from case study A
RES#7	23.11.2022	Narrative contribution	Resident from case study B

the flood, 1349 citizens have requested approximately €20.9 million in public funding for private reconstruction in Hagen (excluding insurance payouts and pending applications) (Stadt Hagen 2023). Information on the sociospatial distribution of public funding is not (yet) available.

Case study A consists of one and a half statistical districts and forms a neighborhood of around 6000 inhabitants, characterized by a comparatively high population density and a dynamic population composition (see Table 2). In comparison to the citywide average, the social structure is on average very young, financially weak, and the neighborhood has one of Hagen's highest proportions of residents with a migration background. Based on the findings of Cutter et al. (2003) and Cutter et al. (2014), it is hypothesized that it demonstrates higher vulnerability and lower community resilience. Spatially, it is bounded by commercial areas to the north (west) and south, a river to the west, and railway tracks to the east (see Figure 1). The settlement pattern is characterized by perimeter blockhouses, row constructions, and some detached houses.

Case study B comprises two and a half statistical districts, perceived by many residents as a cohesive neighborhood with around 6000 inhabitants. This neighborhood has a low population density and a more stable population composition (see Table 2). The social structure is on average rather old, financially strong, and the neighborhood has a rather low proportion of people with a

migration background. According to the underlying hypothesis, case study B is expected to be more resilient and less vulnerable than case study A and consequently reconstructs more effectively. Spatially, it consists of three narrow valleys with streams converging into a river at the neighborhood centre (see Figure 1). The settlement structure mainly consists of detached houses.

In both case studies, most residents were unaware of the flood risk, despite watercourses intersecting the case studies and posing a significant risk in case of a fluvial extreme event with a return period exceeding 100 years (MULNV NRW, 2021). Consequently, the level of private flood preparedness was relatively low. During the 2021 flood, many buildings in both case study areas were damaged; however, a reliable overview of the total extent of the damage is not (yet) available. In areas with high flow velocities, as particularly in case study B, the floodwaters swept away (parts of) buildings. The event required rescue operations in both case studies, including the evacuation of elderly/care-dependent residents from care homes. For many residents, their homes were (initially) no longer habitable after the flood. There are varying reports on the number of affected residents in both case studies, making it almost impossible to provide a reliable figure. The flood affected more than 300 households in case study A (MHKBD NRW, 2025) and 350 households in case study B (NPO#2B). As of today, in case study A, 308 individuals/households successfully applied for public funding amounting to €6.68 million, while

TABLE 2 | Social characteristics of the case studies including their ranking in relation to all 39 statistical districts in the city (reference date: 31.12.2020).

Social characteristics	Case study A				Case study B					
	Statistical district A.1		Statistical district A.2		Statistical district B.1		Statistical district B.2		Statistical district B.3	
	Rank ^a	Value	Rank ^a	Value	Rank ^a	Value	Rank ^a	Value	Rank ^a	Value
Population density (Persons per hectare of settlement area)	9	55.7	6	60	14	47.7	33	20.8	32	21.6
Youth ratio (Persons under the age of 18 per 100 persons of working age ^b)	5	36.7	1	46.6	29	28	35	26	27	28.5
Old-age ratio (Persons aged 60 and over per 100 persons of working age ^b)	31	41.1	39	28.2	14	60.2	11	62.2	28	45.8
Proportion of recipients of social benefits (Recipients per 100 persons of working age ^b)	8	15.2	1	21.4	20	8.4	38	3.5	16	9.7
Proportion of people with a migration background	3	66.9	1	72.5	28	30.6	35	19	20	38.5
Fluctuation rate (Number of moves in and out of the neighbourhood per 100 persons within 1 year)	14	21.5	8	25.2	15	19	28	13.4	16	17.6

^a1 = the highest value; 39 = the lowest value.

^bWorking age: 18–59 years.

Source: Stadt Hagen (2021).

in case study B, 196 individuals/households successfully applied for €8.67 million (MHKBD NRW, 2025; see Figure 2). Interpreting the allocated public funding as an approximation of damage, the modal value suggests that a larger number of applications for moderate damage amounts were approved in case study A. This contrasts with the higher mean and median values in case study B, indicating that while some very high individual amounts skew the statistics upward, the most frequent damage amounts remained generally lower. This could imply a greater variance in damages in case study B, whereas case study A exhibited a more homogeneous distribution with more frequent moderate damages. In addition, the greater proportion of structural damage claims in case study B indicates more severe building destruction, whereas household-related damages were more prevalent in case study A.

6 | Results: Key Elements and Actor Roles in the Multilevel PDR Governance Setting

The analysis of the case studies reveals that numerous actors from politics, administration, the private sector, NPOs, and citizenship are involved in the still ongoing recovery and reconstruction after the 2021 flood event. PDR governance in Hagen and the case studies emerged from a combination of existing and newly developed organizational structures and instruments. Based on the empirical results, Figure 3 provides an overview

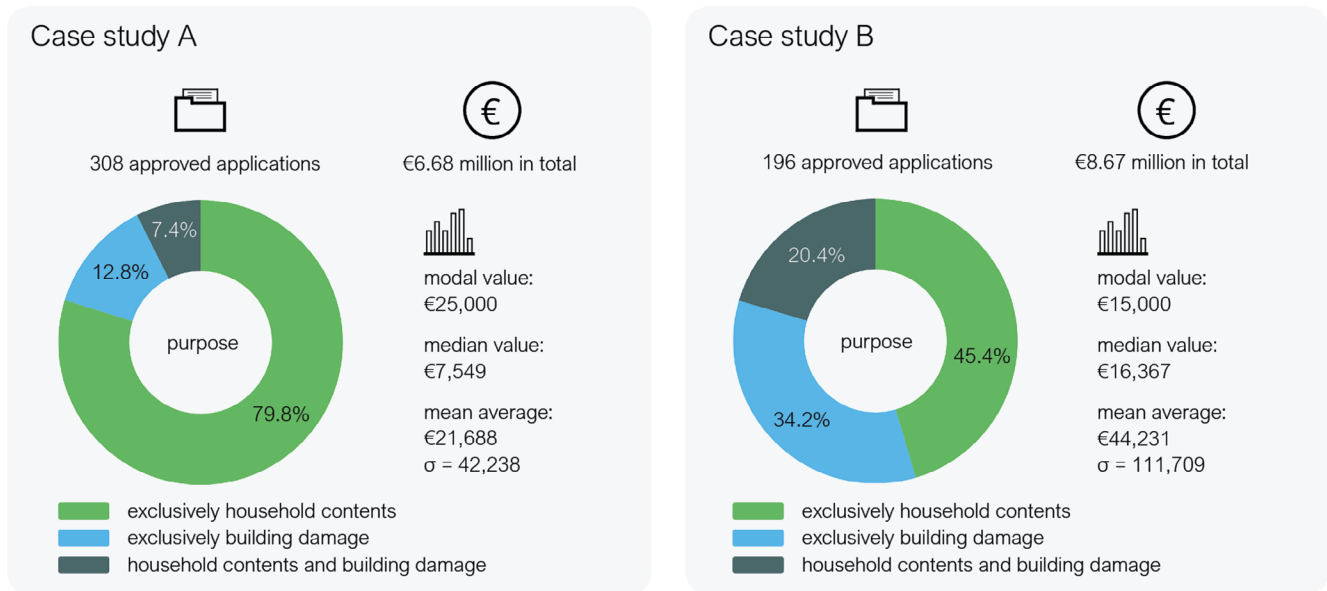
of the key actors, instruments employed, and resources mobilized across various levels in the multilevel governance system. The figure illustrates that both top-down approaches and community-driven approaches are applied in the reconstruction process, with various actors assuming partly different roles. The roles of these actors are subsequently examined using key PDR structures as examples.

6.1 | Top-Down Approaches to Reconstruction

The public and private sector predominantly operate at the municipal or higher levels, following a top-down approach and targeting individuals as recipients of resources, thereby positioning them in the role of passive beneficiaries. Furthermore, these approaches focus exclusively on the physical reconstruction and property protection. This becomes particularly clear with examples of three key structures: the provision of (1) financial resources and (2) knowledge about suitable adaptation and protection measures, and (3) the development of municipal concepts for flood-adapted reconstruction.

6.1.1 | Provision of Financial Resources

Affected citizens in both case study areas can access finance from three different sources: insurance coverage, government



Reference date: 27 January 2025; Own calculation based on MHKBD NRW (2025)

These figures are difficult to interpret due to the unknown total number of those affected and insured persons, the unknown total extent of damage, and various reasons for absent applications.

FIGURE 2 | Measures of central tendency for the distribution of public funding in the case studies; own figure based on MHKBD NRW (2025).

funding, or monetary donations. According to the principle of subordination (Art. 2, German Social Security Code XII), residents are required to exhaust insurance claims first (if insured), followed by public funds that cover up to 80% of the costs via a €12.3 billion reconstruction fund for NRW established by the federal government within 3 months (MHKBG NRW, 2022). Once these entitlements are exhausted, affected residents can receive financial donations for reconstruction from charitable organizations. However, clarifying financial claims and the procurement and use of funds involve significant bureaucracy, including applications, expert opinions to assess damage, at least three different quotes from craft businesses, and in some cases evidence of how the funds were spent and for what purpose (RES#1).

The source of financing steers reconstruction. Insurance policies and the state funding guidelines provide frameworks for the way in which reconstruction takes place. Insurances adhere to business-oriented principles, covering only repairs and replacements of damaged buildings. In the two case studies, however, only few affected residents had (sufficient) insurance coverage (NPO#1A). Therefore, it is even more the state of NRW that steers reconstruction. NRW's funding guidelines incorporate the principle of "building back better" by subsidising flood-adapted reconstruction of buildings. Charitable donations, by comparison, have fewer restrictions.

6.1.2 | Provision of Knowledge About Suitable Flood Protection and Adaptation

Advice is available from private companies and from the city-wide municipal flood advisory service established after the flood event. So far, the municipal service has conducted around 500 counselling sessions citywide (MUN#1D). The services differ

in costs, accessibility, and service package. Unlike the private service, the municipal service is free of charge. However, private consultants, who addressed the affected people on site, often provide "total packages" including implementation, a valuable option for those who can afford it during high competition for craftspeople and materials after the 2021 flood. The municipal service cannot offer such a package or further contacts due to advertising restrictions (MUN#1B). Either way, the advisory services influence to a certain extent the way in which reconstruction takes place.

6.1.3 | Development of Concepts for Flood-Adapted Reconstruction

The passive role assigned to residents and the neighborhood communities of the case studies by public authorities is most evident in the conceptual preparation of public reconstruction (*public reconstruction plan*) and flood protection and prevention (*municipal flood protection concept*). While these are not directly related to private reconstruction, the primary focus of this study, they will still have local impacts in the case study areas. In the ongoing development of the municipal flood protection concept, the population has not yet been meaningfully involved, although there have been individual discussions with local key stakeholders during the concept's preparation (NPO#1A; NPO#1C). The same lack of participation applies to the municipality's reconstruction plan for public infrastructure. So far, participation has not extended beyond informational events (in August 2023 in case study B and in February 2025 in case study A) (MUN#2; RES#2). In particular, riparian property owners of smaller streams in case study B regret that their local knowledge is not sufficiently considered (RES#2). This indicates that public authorities do not adequately recognize neighborhoods and

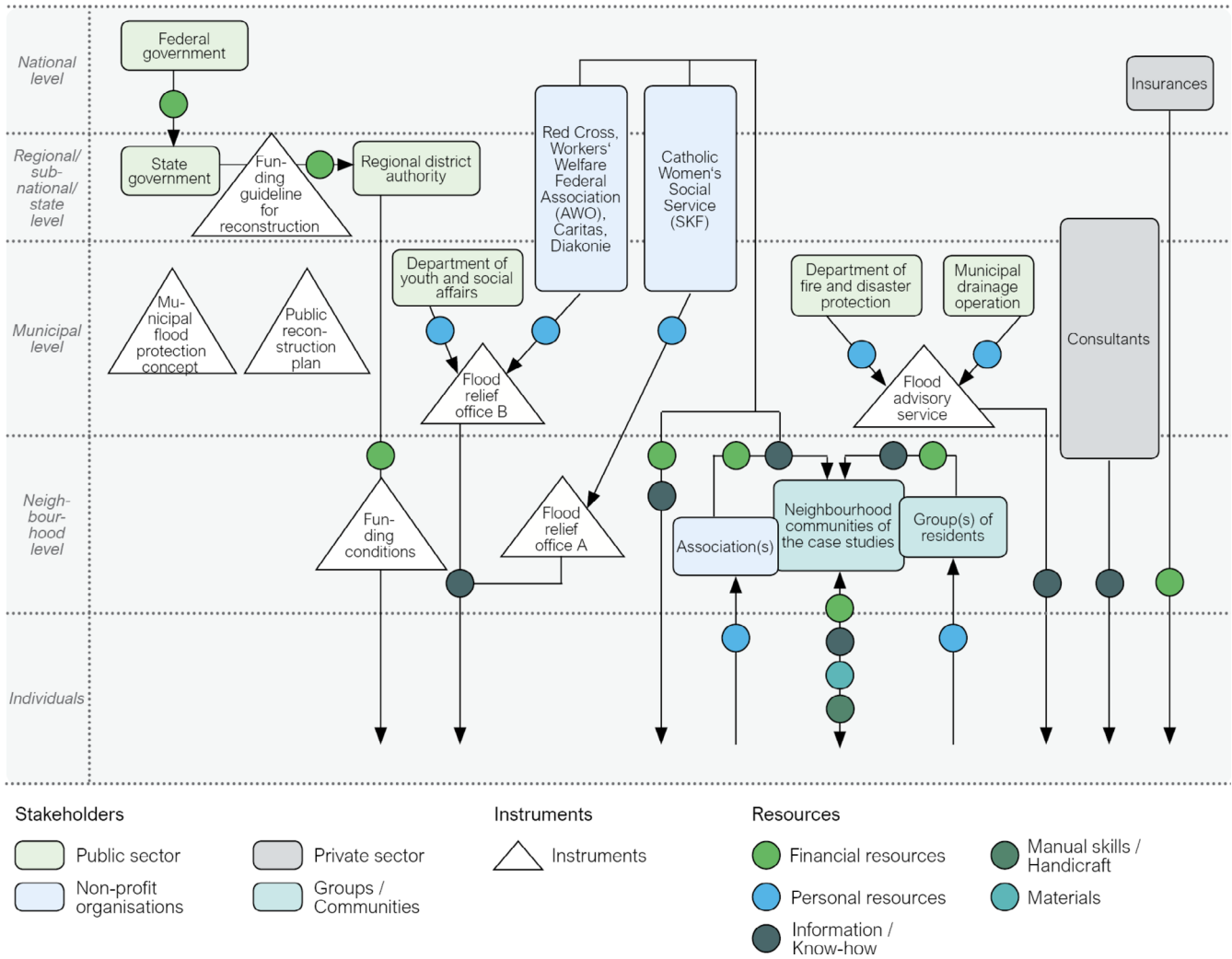


FIGURE 3 | Organigraph of the private reconstruction process after the 2021 flood event in the case study setting; own figure.

residents as reliable collaborative partners in the recovery and reconstruction process.

The examples highlight the public sector's proactive role in steering reconstruction by providing essential resources free of charge—in some instances with conditions, as demonstrated by the funding guidelines. Residents expect or demand proactive action from politicians and public authorities (RES#2; NPO#1A). However, the examples also highlight missed opportunities to involve neighborhoods and residents as active partners in reconstruction efforts.

6.2 | Community-Driven Initiatives

In addition to the top-down approaches of the public and private sectors, residents and neighborhood communities in both case studies demonstrated a clear willingness to shape and actively support the reconstruction process. This willingness was partly a response to inadequate/ineffective public reconstruction efforts, which were often protracted, inflexible, or difficult to access.

Community-driven and grassroots initiatives are evident in both case studies (see Figure 3). These initiatives differ in genesis, approach, and long-term focus between the case studies. In case study B, for example, citizens rapidly formed a group to support reconstruction with unbureaucratic financial and material donations and quickly formalized into an association to regulate monetary donations legally. This association also developed long-term neighborhood development goals (ASSOC#1). In doing so, the association established a broad network with various stakeholder groups, including residents, local associations, NPOs, and public actors such as the municipal advisory service. In case study A, a smaller, short-term initiative emerged around an association focusing on the reconstruction of a local clubhouse, with many members and neighbors contributing money and manual skills (ASSOC#2). In contrast to the initiative in case study B, the one in case study A dissolved after its successful completion.

Furthermore, in both case studies, informal family and neighborhood networks play a crucial role in sharing information and providing situational support during reconstruction, for example, helping with manual skills or everyday tasks to free up resources for organizing reconstruction efforts (RES#1; RES#2; RES#3).

In addition to the grassroots and community-driven initiatives, some charitable NPOs organized themselves outside formal structures in response to inadequate/ineffective public reconstruction efforts and to address various needs of affected citizens. In both case studies, local charitable organizations established flood relief offices to assist citizens with public funding applications, free of charge (see Figure 3). The flood relief offices in the case studies differ in origin and organization. In case study B, four charitable organizations collaborated with the municipal department of youth and social affairs to establish a flood relief service. This alliance also operates in the other districts of Hagen, but temporarily dedicated its own on-site office to case study B. By January 2025, this alliance had advised around 350 households at least once in case study B (NPO#2B). In case study A, an independent flood relief office emerged under the leadership of a local charitable organization to meet on-site needs, assisting over 100 clients with public funding applications (NPO#1A).

Initially focused on assisting with public funding applications, the flood relief offices broadened their activities to address a wider range of community needs. They positioned themselves as intermediaries between community members and public reconstruction structures, while also acting as facilitators and networkers, connecting neighborhood residents with other stakeholders such as public authorities and academia. They also supported this study by co-organizing the storytelling circles and providing access to the neighborhood communities. In return, they used their network to scientists to offer information events in the neighborhoods. Altogether, the charitable organizations took on responsibilities in social care, emotional support, education, and flood hazard awareness (NPO#1A; NPO#2A). They organized storytelling and exchange sessions, information workshops on flood risks for children, and events on flood awareness and prevention. In addition, many NPOs supported the community with easily accessible financial and material donations.

These efforts extend far beyond physical reconstruction, focusing on community welfare and developing social capital and other resilience capacities within the case studies. In case study A, the flood relief office is transitioning into a neighborhood management in response to community needs. This shift is supported by the professional training of its staff (NPO#1B). In doing so, the NPO addresses a similar gap that was filled in case study B by the community-driven association, which residents established during the reconstruction process and has since evolved further.

7 | Results: Social Vulnerabilities, Inequalities, and Capital in PDR

The PDR governance system exhibits several weaknesses that reveal and/or reproduce social vulnerabilities and inequalities across the case studies and certain population groups. In both case studies, many affected residents lacked the capability to access necessary resources on their own (NPO#1A; NPO#2A; ASSOC#1). These challenges manifest in relation to (1) information about available resources, (2) acquisition of resources, and (3) *linking* social capital and status. These three points are empirically supported below through specific examples.

7.1 | Dissemination of Knowledge About Available Resources

Socially isolated residents and population groups proved particularly vulnerable as they are less involved in information networks. For example, traditional mass media proved insufficient channels for providing information about the public funding (NPO#1A). Many affected residents were informed about it after some delay through family, friends, neighborhood networks, or the on-site approach of local flood relief offices (NPO#1A). Even 3 years after the federal government established the reconstruction fund, some residents—especially in case study A—were still unaware of it or did not realize they were eligible for this support (NPO#1C). In the latter cases, personal outreach by the flood relief offices was necessary to inform about the respective entitlements (NPO#1C).

7.2 | Acquisition of Resources

Social vulnerabilities especially revealed in the formal process of applying for public funding, which involves significant bureaucratic efforts. Despite the state's manual, many residents in both case studies struggled with applications due to various reasons, ranging from unfamiliarity with the bureaucratic language to a lack of required technical skills and knowledge (NPO#1A; NPO#2A). For instance, elderly people often lacked email addresses to apply for public funding, and people with limited proficiency in German were disadvantaged (NPO#1A). Consequently, the bureaucratic application process can be daunting, which deterred some affected citizens from applying for public funding or initiating reconstruction measures (NPO#1A; RES#4). In this context, the flood relief offices and their visiting counselling approach proved highly successful to access public funding (NPO#2A). However, in some cases, encouragement or accompaniment by close acquaintances or neighbors was necessary to accept support from the flood relief office. Some residents in these situations, especially those from migrant backgrounds, associated seeking assistance from institutions with feelings of shame (NPO#1A).

7.3 | Linking Social Capital and Status

In contrast to case study A, case study B was the only neighborhood, apart from Hagen's city centre, temporarily provided with its own local office by the alliance of organizations, including the city administration. Many citizens of case study A feel they receive less focus or priority in public efforts compared to case study B, but also to other affected cities (RES#5; RES#6). This also applies to general public efforts apart from reconstruction (RES#5; RES#6).

Overall, individual social vulnerabilities accumulate differently in the case studies due to different social structures. Ultimately, most affected residents in both case studies needed help, albeit in different or multiple respects and to different extents. The example of access to public funding reveals a key difference: unlike poorer residents in case study A, wealthier residents in case study B were more likely able to disregard obstacles in obtaining funding and cover reconstruction costs themselves (RES#4). When examining the potential of neighborhood support networks, both case studies demonstrated their functionality.

However, differences emerged regarding *linking* social capital. Case study B tends to exhibit more effective *linking* social capital derived from relationships with public actors, while case study A simultaneously reveals a greater reliance on resources from relationships with public actors and NPOs. Consequently, the residents of the two case studies had unequal rapid access to resources, which can be empirically attributed not only to varying levels of social vulnerability but also to differences in the strength of networks and contacts. Consequently, private reconstruction progresses unevenly, with some residents already having completed reconstruction while others have not utilized entitled resources. Excluding the particularly severe damage cases in case study B, the residents of a subarea within case study B, where a high proportion of wealthy individuals live, proved to be particularly quick in reconstructing (RES#7).

8 | Discussion

The PDR governance system examined in this study cannot be assessed as merely useful or insufficient to deal with the 2021 flood disaster. Rather, it is important to discuss its specific effects on neighborhood recovery and community resilience. Overall, the PDR governance covers a range of residents' requirements. The resources associated with the governance approaches are essential for the affected residents. However, several limitations and weaknesses hinder a truly effective and holistic PDR approach (see Jha et al. 2010; Lewis 1999):

8.1 | Equitable Access to Resources and Reducing Vulnerability

The findings indicate that the top-down approaches of the public and private sectors tend to reinforce existing inequalities rather than mitigate them. They target individual residents, making access to resources and systems dependent on individual capacities (e.g., financial, linguistic, or knowledge capacities). This indicates a significant gap in equitable access; those who are socially isolated, less informed, or cannot navigate the system effectively may miss out on essential support. From the private and public sectors' perspectives, addressing individuals appears logical, as it enables targeted and efficient resource utilization, but it fails to consider social vulnerabilities, as already experienced in similar reconstruction systems (see e.g., Cho 2014; Fothergill and Peek 2004). Although these elements of the PDR governance system aim at reducing vulnerability through targeted funding and advisory services, without adequate additional support, these efforts are undermined by structural barriers that disproportionately affect disadvantaged neighborhoods and groups. The findings suggest that without addressing underlying social vulnerabilities at a strategic level—including issues related to information dissemination and resource acquisition—the PDR governance system risks entrenching or even exacerbating social inequalities during the recovery and reconstruction phase.

Moreover, the focus on addressing individuals within public and private governance structures results in a lack of strategic coordination and application of reconstruction, adaptation, and protection measures at neighborhood or broader levels. For example, some residents in case study B constructed walls around

their properties during reconstruction efforts. While compliant with building regulations, such actions can inadvertently redistribute flood risk spatially—potentially increasing the risk for others who were previously exposed to little or no risk. For these residents, the implementation of precautionary measures is not financially covered by the public reconstruction fund; they would have to rely on their own financial resources. Governance structures more oriented toward collective solutions would account for such consequences.

8.2 | Equal Opportunities

The role of community-driven initiatives stands in contrast to top-down approaches and offers a glimpse into how equal opportunities, social capital, and community resilience can be fostered within recovery efforts. In the case studies, community-driven initiatives of NPOs and grassroots movements emerged as crucial players in addressing unmet and urgent needs during reconstruction. These initiatives not only facilitated resource mobilization but also empowered residents by providing platforms for collaboration and engagement. However, the study also revealed that the two case studies exhibited different capacities, presumably due to the effects of the interplay of social conditions, social capital, segregation, and place attachment (see also, e.g., Baum 2007; Bailey et al. 2012). For instance, in contrast to case study B, case study A required more support from an NPO for a community-oriented initiative and, in particular, developing long-term efforts aimed at sustainable neighborhood development.

However, despite these developments at the community level, it is evident that public authorities demonstrated limited willingness to meaningfully involve subordinate levels or residents in relation to the state funding guidelines, the municipal public reconstruction plan and, so far, the flood protection concept. They have failed to recognize neighborhood residents as collaborative partners in reconstruction and flood protection planning. The lack of meaningful involvement of affected communities in developing the municipal flood protection concept demonstrates a missed opportunity for fostering equity and inclusivity within the governance framework.

Overall, while there are mechanisms within the PDR governance system aimed at providing support PDR, significant challenges remain regarding equitable access and equal opportunities for disadvantaged neighborhoods and their members. Addressing these challenges requires not only enhancing bureaucratic processes but also fostering genuine partnerships between public authorities, NPOs, and local communities—ensuring that all expertise and competencies are considered in shaping reconstruction and recovery efforts moving forward. This entails that the necessary actors in PDR governance are supported and their tasks are coordinated and strategically prepared. The study demonstrated that, in particular, the necessary tasks of the NPOs were resource-intensive beyond their original scope of responsibilities.

While partnerships among stakeholders are crucial for disaster governance and enhancing resilience in postdisaster contexts, it is important to critically assess how neoliberal principles shape these dynamics, as increasingly recognized in other PDR

systems as well (see e.g., Barrios 2017; Meriläinen et al. 2020). Cheek and Chmutina (2022) argue that the neoliberal constructions of PDR systems and of the principle of “build back better” tend to reproduce or exacerbate social vulnerabilities and inequalities. A balanced approach that maintains government responsibility alongside empowering local communities seems essential for ensuring equitable access to resources and promoting collective solutions in reconstruction efforts.

9 | Conclusions

Based on two case studies undergoing reconstruction after the devastating floods of 2021, this study illustrates that the social structure, through social vulnerabilities and community resilience, influences the nature and effectiveness of reconstructing to a certain extent. The study shows that both case studies, despite their differing social structures, were significantly reliant on (external) support during the reconstruction process. However, individual needs vary according to social vulnerabilities among population groups within and between the case studies. Essentially, vulnerabilities manifested in challenges related to information dissemination and access to support services (e.g., funding, know-how).

The two case studies indicated differences in their ability to collectively address these vulnerabilities. While small neighborhood networks functioned effectively in both case studies for information dissemination and access to support structures, case study B was more reliant on (external) support from NPOs for larger-scale neighborhood initiatives. Case study B managed to quickly form a group independently that supported its neighborhood with in-kind and monetary donations, information, and so on, and later developed long-term goals for neighborhood development. In contrast, larger and longer-term efforts in case study A were initiated with the help of an NPO.

This study underlines the need for improvement in the PDR governance. Despite a general recognition of the importance of local knowledge and structures, public authorities largely viewed residents as recipients of state approaches, with insufficient attention paid to social vulnerabilities. It is therefore up to the capabilities and capacities of residents, neighborhood communities, and local actors such as NPOs to address and ideally mitigate social vulnerabilities through additional support.

Thus, this study emphasises the importance of actively strengthening the resilience of neighborhood communities for reconstruction processes. Public authorities still too often view community resilience as trivial and do not see themselves as responsible for empowering communities. Promoting community resilience in PDR governance also involves supporting or systematically integrating NPOs, which act as a link between formal reconstruction processes and the neighborhoods, making a significant contribution to building the community's resilience capacities through their (everyday) work on-site. Nevertheless, there is a need to learn more about the productivity and counterproductivity of different forms of social capital within the neighborhoods in recovery systems to better understand their functioning and impact on power dynamics within neighborhoods as well.

Acknowledgements

Many thanks to all interviewees for their commitment and many thanks to Hilal Özcan for her support in the research process. The German Federal Ministry of Education and Research funded the study under grant 01LR2102L. I acknowledge financial support by Deutsche Forschungsgemeinschaft and TU Dortmund University within the funding program Open Access Costs. Open Access funding enabled and organized by Projekt DEAL.

Conflicts of Interest

The author declares no conflicts of interest.

Data Availability Statement

Research data are not shared. The data are not publicly available due to privacy or ethical restrictions.

References

- Aldrich, D. P. 2012. *Building Resilience: Social Capital in Post-Disaster Recovery*. University of Chicago Press.
- Aldrich, D. P. 2016. “It’s Who You Know: Factors Driving Recovery From Japan’s 11 March 2011 Disaster.” *Public Administration* 94, no. 2: 399–413. <https://doi.org/10.1111/padm.12191>.
- Aldrich, D. P., and M. A. Meyer. 2014. “Social Capital and Community Resilience.” *American Behavioral Scientist* 59, no. 2: 254–269. <https://doi.org/10.1177/0002764214550299>.
- Bailey, N., A. Kearns, and M. Livingston. 2012. “Place Attachment in Deprived Neighbourhoods: The Impacts of Population Turnover and Social Mix.” *Housing Studies* 27, no. 2: 208–231.
- Barrios, R. E. 2017. *Governing Affect: Neoliberalism and Disaster Reconstruction*. University of Nebraska Press. <https://doi.org/10.2307/j.ctt1mtz7p9>.
- Barton, A. 1969. *Communities in Disaster: A Sociological Analysis of Collective Stress Situations*. 1st ed. Doubleday.
- Baum, D. 2007. “Sozial benachteiligte Quartiere: Der Zusammenhang von räumlicher Segregation und sozialer Exklusion am Beispiel städtischer Problemquartiere.” In *Die Stadt in der Sozialen Arbeit: Ein Handbuch für soziale und planende Berufe*, edited by D. Baum, 1st ed., 136–155. VS Verlag für Sozialwissenschaften. https://doi.org/10.1007/978-3-531-90725-3_12.
- Berkes, F., and H. Ross. 2013. “Community Resilience: Toward an Integrated Approach.” *Society & Natural Resources* 26, no. 1: 5–20. <https://doi.org/10.1080/08941920.2012.736605>.
- Biermann, F., and P. Pattberg. 2008. “Global Environmental Governance: Taking Stock, Moving Forward.” *Annual Review of Environment and Resources* 33, no. 1: 277–294. <https://doi.org/10.1146/annurev.enviro.33.050707.085733>.
- Blöschl, G., A. Viglione, and A. Montanari. 2013. “5.01—Emerging Approaches to Hydrological Risk Management in a Changing World.” In *Climate Vulnerability: Understanding and Addressing Threats to Essential Resources*, edited by R. A. Pielke, 3–10. Elsevier. <https://doi.org/10.1016/B978-0-12-384703-4.00505-0>.
- Bodin, M. 2021. *Flutschäden wirken noch lange nach*. Erzbistum Paderborn. <https://www.erzbistum-paderborn.de/news/flutschaden-wirken-noch-lange-nach/>.
- Bohle, H.-G. 2002. “Vulnerability: Editorial to the Special Issue.” *Geographica Helvetica* 57, no. 1: 2–4. <https://doi.org/10.5194/gh-57-2-2002>.
- Boin, A. 2010. “Designing Resilience: Leadership Challenges in Complex Administrative Systems.” In *Designing Resilience: Preparing for Extreme*

- Events, edited by L. K. Comfort, A. Boin, and C. C. Demchak, 129–142. University of Pittsburgh Press.
- Bonß, W. 2015. “Karriere und sozialwissenschaftliche Potenziale des Resilienzbegriffs.” In *Resilienz im Sozialen: Theoretische und empirische Analysen. Gemeinsame Tagung der Sektionen “Politische Soziologie” und “Wirtschaftssoziologie” der Deutschen Gesellschaft für Soziologie*, edited by M. Endreß and A. Maurer, 15–32. Springer.
- Briggs, X. d. S. 2004. “Social Capital: Easy Beauty or Meaningful Resource.” *Journal of the American Planning Association* 70, no. 2: 151–158.
- Cheek, W., and K. Chmutina. 2022. “‘Building Back Better’ Is Neoliberal Post-Disaster Reconstruction.” *Disasters* 46, no. 3: 589–609. <https://doi.org/10.1111/disa.12502>.
- Cho, A. 2014. “Post-Tsunami Recovery and Reconstruction: Governance Issues and Implications of the Great East Japan Earthquake.” *Disasters* 38, no. S2: 157–178. <https://doi.org/10.1111/disa.12068>.
- Comfort, L. K. 2005. “Fragility in Disaster Response: Hurricane Katrina, 29 August 2005.” *Forum* 3, no. 3: Article 1. <https://doi.org/10.2202/1540-8884.1090>.
- Comfort, L. K., N. Oh, G. Ertan, and S. Scheinert. 2010. “Designing Adaptive Systems for Disaster Mitigation and Response.” In *Designing Resilience: Preparing for Extreme Events*, edited by L. K. Comfort, A. Boin, and C. C. Demchak, 33–61. University of Pittsburgh Press.
- Cox, R. S., and M. Hamlen. 2015. “Community Disaster Resilience and the Rural Resilience Index.” *American Behavioral Scientist* 59, no. 2: 220–237. <https://doi.org/10.1177/0002764214550297>.
- Cutter, S. L. 2006. “The Geography of Social Vulnerability: Race, Class, and Catastrophe. Understanding Katrina: Perspectives from the Social Sciences.” <http://understandingkatrina.ssrc.org/Cutter/>.
- Cutter, S. L., B. J. Boruff, and W. L. Shirley. 2003. “Social Vulnerability to Environmental Hazards.” *Social Science Quarterly* 84, no. 2: 242–261. <https://doi.org/10.1111/1540-6237.8402002>.
- Cutter, S. L., C. G. Burton, and C. T. Emrich. 2010. “Disaster Resilience Indicators for Benchmarking Baseline Conditions.” *Journal of Homeland Security and Emergency Management* 7, no. 1: Article 51. <https://doi.org/10.2202/1547-7355.1732>.
- Cutter, S. L., R. L. Schumann, and C. T. Emrich. 2014. “Exposure, Social Vulnerability and Recovery Disparities in New Jersey After Hurricane Sandy.” *Journal of Extreme Events* 1, no. 1: 1450002. <https://doi.org/10.1142/S234573761450002X>.
- Daly, P., S. Ninglekhu, P. Hollenbach, J. E. Duyne Barenstein, and D. Nguyen. 2017. “Situating Local Stakeholders Within National Disaster Governance Structures: Rebuilding Urban Neighbourhoods Following the 2015 Nepal Earthquake.” *Environment and Urbanization* 29, no. 2: 403–424. <https://doi.org/10.1177/0956247817721403>.
- Auf der Heide, E. 1989. *Disaster Response: Principles of Preparation and Coordination*. Mosby.
- Djalante, R., C. Holley, and F. Thomalla. 2011. “Adaptive Governance and Managing Resilience to Natural Hazards.” *International Journal of Disaster Risk Science* 2, no. 4: 1–14. <https://doi.org/10.1007/s13753-011-0015-6>.
- Drabek, T. E., and D. A. McEntire. 2003. “Emergent Phenomena and the Sociology of Disaster: Lessons, Trends and Opportunities From the Research Literature.” *Disaster Prevention and Management* 12, no. 2: 97–112. <https://doi.org/10.1108/09653560310474214>.
- Ensor, M. O. 2009. “Gender Matters in Post-Disaster Reconstruction.” In *The Legacy of Hurricane Mitch: Lessons from Post-Disaster Reconstruction in Honduras*, edited by M. O. Ensor, 1st ed., 129–155. University of Arizona Press.
- Erdenberger, R., and T. Krause. 2021. *WDR5 Stadtgespräch* [Radio broadcast].
- Folke, C., S. Carpenter, T. Elmqvist, L. H. Gunderson, C. S. Holling, and B. Walker. 2002. “Resilience and Sustainable Development: Building Adaptive Capacity in a World of Transformations.” *AMBIO* 31, no. 5: 437–440. <https://doi.org/10.1579/0044-7447-31.5.437>.
- Forrest, S. A., E.-M. Trell, and J. Woltjer. 2021. “Emerging Citizen Contributions, Roles and Interactions With Public Authorities in Dutch Pluvial Flood Risk Management.” *International Journal of Water Resources Development* 37, no. 1: 1–23. <https://doi.org/10.1080/07900627.2019.1701999>.
- Fothergill, A., and L. A. Peek. 2004. “Poverty and Disasters in the United States: A Review of Recent Sociological Findings.” *Natural Hazards* 32, no. 1: 89–110. <https://doi.org/10.1023/B:NHAZ.0000026792.76181.d9>.
- Fuentealba, R., H. Verrest, and J. Gupta. 2020. “Planning for Exclusion: The Politics of Urban Disaster Governance.” *Politics and Governance* 8, no. 4: 244–255. <https://doi.org/10.17645/pag.v8i4.3085>.
- Galster, G. C. 2011. “The Mechanism(s) of Neighbourhood Effects: Theory, Evidence, and Policy Implications.” In *EBL-Schweitzer. Neighbourhood Effects Research: New Perspectives*, edited by M. van Ham, D. Manley, and N. Bailey, 23–56. Springer. https://doi.org/10.1007/978-94-007-2309-2_2.
- Gilligan, C. 2018. “Community Responses to Disaster: Northern Ireland 1969 as a Case Study.” In *Handbooks of Sociology and Social Research. Handbook of Community Movements and Local Organizations in the 21st Century*, edited by R. A. Cnaan and C. Milofsky, 311–328. Springer International Publishing.
- Haase, T. W., W.-J. Wang, and A. D. Ross. 2021. “The Six Capacities of Community Resilience: Evidence From Three Small Texas Communities Impacted by Hurricane Harvey.” *Natural Hazards* 109: 1–22. <https://doi.org/10.1007/s11069-021-04870-y>.
- Hagen, S., ed. 2023. “Zwei Jahre nach dem Hochwasser: Großteil der Schäden behoben [Press release].” https://www.hagen.de/FIRSTspirtWeb/hagen/de_1/hagen_de/01/0101/010101/PM_509505.jsp?cmcal=1=true.
- Hawkins, R. L., and K. Maurer. 2010. “Bonding, Bridging and Linking: How Social Capital Operated in New Orleans Following Hurricane Katrina.” *British Journal of Social Work* 40, no. 6: 1777–1793. <https://doi.org/10.1093/bjsw/bcp087>.
- Heidbrink, L., C. Leggewie, and H. Welzer. 2010. “Kultur im Konflikt.” In *Von der Natur- zur sozialen Katastrophe*, edited by C. Bieber, B. Drechsel, and A.-K. Lang, 429–432. transcript Verlag. <https://doi.org/10.14361/transcript.9783839414507.429>.
- Hollingshead, A. B., A. Majchrzak, and S. Jarvenpaa. 2007. “Coordinating Expertise Among Emergent Groups Responding to Disasters.” *Organization Science* 18: 147–161.
- Information und Technik Nordrhein-Westfalen (IT.NRW). 2024. *Kommunalprofil Hagen, krfr. Stadt*. Information und Technik Nordrhein-Westfalen.
- Intergovernmental Panel on Climate Change (IPCC). 2012. *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*. Cambridge University Press. <https://doi.org/10.1017/CBO9781139177245>.
- Jha, A. K., J. E. Duyne Barenstein, P. M. Phelps, D. Pittet, and S. Sena. 2010. *Safer Homes, Stronger Communities: A Handbook for Reconstructing after Natural Disasters*. World Bank. <https://doi.org/10.1596/978-0-8213-8045-1>.
- Kammerbauer, M. 2014. “Asymmetrischer Wiederaufbau in Städten nach Katastrophen. Das Lower Ninth Ward in New Orleans nach Orkan Katrina.” *Raumforschung Und Raumordnung | Spatial Research and Planning* 72, no. 5: 427–439. <https://doi.org/10.1007/s13147-014-0309-4>.
- Kendra, J. M., and T. Wachtendorf. 2003. “Elements of Resilience After the World Trade Center Disaster: Reconstituting new York City’s

- Emergency Operations Centre." *Disasters* 27, no. 1: 37–53. <https://doi.org/10.1111/1467-7717.00218>.
- Khan, A. 2024. "Impact of Social Capital on Community Resilience: A Comparative Analysis." *Gomal Journal of Life Sciences* 2, no. 1: 17–33.
- Koers, G. J., S. A. Forrest, and J. van Popering-Verkerk. 2024. "Plugging the Holes: Identifying Potential Avenues and Limitations for Furthering Dutch Civil Society Contributions Towards Flood Resilience." *Journal of Flood Risk Management* 17, no. 1: e12949. <https://doi.org/10.1111/jfr3.12949>.
- Kuckartz, U., and S. Rädiker. 2023. *Qualitative Content Analysis: Methods, Practice and Software*. 2nd ed. Sage.
- Levin, S. A. 2000. *Fragile Dominion: Complexity and the Commons*. 1st ed, 102404. Helix books. Helix Books.
- Lewis, J. 1999. *Development in Disaster-Prone Places: Studies of Vulnerability*. Intermediate Technology Publications.
- Lin, N. 2002. "Structural Analysis in the Social Sciences." In *Social Capital: A Theory of Social Structure and Action*, vol. 19, 1st ed. Cambridge University Press.
- Lin, N. 2010. "A Network Theory of Social Capital." In *The Handbook of Social Capital*, edited by D. Castiglione, J. W. van Deth, and G. Wolleb, 50–69. Oxford University Press.
- Magis, K. 2010. "Community Resilience: An Indicator of Social Sustainability." *Society & Natural Resources* 23, no. 5: 401–416. <https://doi.org/10.1080/08941920903305674>.
- Manyena, S. B., G. O'Brien, P. O'Keefe, and J. Rose. 2011. "Disaster Resilience: A Bounce Back or Bounce Forward Ability?" *Local Environment* 16, no. 5: 417–424. <https://doi.org/10.1080/13549839.2011.583049>.
- Meen, G., C. Nygaard, and J. Meen. 2012. "The Causes of Long-Term Neighbourhood Change." In *Understanding Neighbourhood Dynamics: New Insights for Neighbourhood Effects Research*, edited by M. van Ham, D. Manley, N. Bailey, L. Simpson, and D. Maclennan, 43–62. Springer Berlin Heidelberg. https://doi.org/10.1007/978-94-007-4854-5_3.
- Mees, H., A. Crabbé, M. Alexander, et al. 2016. "Coproducing Flood Risk Management Through Citizen Involvement." *Ecology and Society* 21, no. 3: Article 7. <https://doi.org/10.5751/ES-08500-210307>.
- Melo Zurita, M. d. L., B. Cook, D. C. Thomsen, P. G. Munro, T. F. Smith, and J. Gallina. 2018. "Living With Disasters: Social Capital for Disaster Governance." *Disasters* 42, no. 3: 571–589. <https://doi.org/10.1111/disa.12257>.
- Meriläinen, E. S., M. Fougère, and W. Piotrowicz. 2020. "Refocusing Urban Disaster Governance on Marginalised Urban People Through Right to the City." *Environmental Hazards* 19, no. 2: 187–208. <https://doi.org/10.1080/17477891.2019.1682492>.
- Miller, M. A., and M. Douglass, eds. 2015. *Disaster Governance in Urbanising Asia*. Springer. <https://doi.org/10.1007/978-981-287-649-2>.
- Ministerium für Heimat, Kommunales, Bau und Digitalisierung des Landes Nordrhein-Westfalen (MHKBD NRW). 2025. *Data on Applications for Public Reconstruction Funds as of 27 January 2025*. Ministerium für Heimat, Kommunales, Bau und Digitalisierung des Landes Nordrhein-Westfalen.
- Ministerium für Heimat, Kommunales, Bau und Gleichstellung des Landes Nordrhein-Westfalen (MHKBG NRW). 2022. *Aufbauhilfen für Privathaushalte und Unternehmen der Wohnungswirtschaft*. <https://www.mhkgb.nrw/aufbauhilfen-fuer-privathaushalte-und-unternehmen-der-wohnungswirtschaft>.
- Ministerium für Umwelt, Landwirtschaft, Natur- und Verbraucherschutz des Landes Nordrhein-Westfalen (MULNV NRW). 2021. *Hochwasserrisiko und Maßnahmenplanung Hagen: Hochwasserrisikomanagementplanung in NRW*. Ministerium für Umwelt, Landwirtschaft, Natur- und Verbraucherschutz des Landes Nordrhein-Westfalen.
- Morrow, B. H. 2008. "Community Resilience: A Social Justice Perspective." CARRI Research Report No. 4. Florida International University (FIU). <https://doi.org/10.13140/RG.2.1.1278.9604>.
- Olivo Diaz Lopez, M.-J. 2002. "Relocating Morolica: Vulnerability and Resilience in Post-Mitch Honduras [Dissertation]." University of Florida, Gainesville.
- Peacock, W. G., S. D. Brody, W. A. Seitz, et al. 2010. "Advancing the Resilience of Coastal Localities: Developing, Implementing and Sustaining the Use of Coastal Resilience Indicators: Final Report."
- Pelling, M. 2011. "Urban Governance and Disaster Risk Reduction in the Caribbean: The Experiences of Oxfam GB." *Environment and Urbanization* 23, no. 2: 383–400. <https://doi.org/10.1177/0956247811410012>.
- Pfister, S. M. 2020. *Jenseits der Sicherheit: Deutungsmuster der Katastrophe und ihre Institutionalisierung im Katastrophenschutz*. transcript Verlag. <https://doi.org/10.14361/9783839451052>.
- Portes, A. 1998. "Social Capital: Its Origins and Applications in Modern Sociology." *Annual Review of Sociology* 24, no. 1: 1–24. <https://doi.org/10.1146/annurev.soc.24.1.1>.
- Richter, R., and N. Rohnstock. 2016. "Der Erzählalon als Verfahren strategischen Erzählens: Konzeptionelle Voraussetzungen und empirische Gestalt am Beispiel des Projektes Lausitz an einem Tisch." *DIEGESIS* 5, no. 2: 84–100.
- Ross, A. D. 2014. *Local Disaster Resilience: Administrative and Political Perspectives*. Vol. 9. Routledge. <https://doi.org/10.4324/9780203551912>.
- Scolobig, A., T. Prior, D. Schröter, J. Jörin, and A. Patt. 2015. "Towards People-Centred Approaches for Effective Disaster Risk Management: Balancing Rhetoric With Reality." *International Journal of Disaster Risk Reduction* 12: 202–212. <https://doi.org/10.1016/j.ijdrr.2015.01.006>.
- Shea, J. 2018. "The Community Resilience Approach to Disaster Recovery: Strategies Communities Can Use." In *Handbooks of Sociology and Social Research. Handbook of Community Movements and Local Organizations in the 21st Century*, edited by R. A. Cnaan and C. Milofsky, vol. 24, 371–390. Springer International Publishing. https://doi.org/10.1007/978-3-319-77416-9_23.
- Stadt Hagen (Ed.). 2021. "Socio-Demographic Data as of 31 December 2020 From the Municipal Statistics [Data set]." Statistics Office of the City of Hagen.
- Stallings, R. A., and E. L. Quarantelli. 1985. "Emergent Citizen Groups and Emergency Management." *Public Administration Review* 45: 93–100.
- Tierney, K. J. 2007. "From the Margins to the Mainstream? Disaster Research at the Crossroads." *Annual Review of Sociology* 33, no. 1: 503–525. <https://doi.org/10.1146/annurev.soc.33.040406.131743>.
- United Nations Development Programme (UNDP). 2013. "Issue Brief: Disaster Risk Governance." Bureau for Crisis Prevention and Recovery.
- United Nations International Strategy for Disaster Reduction (UNISDR). 2011. *Global Assessment Report on Disaster Risk Reduction: Revealing Risk, Redefining Development*. United Nations International Strategy for Disaster Reduction.
- United Nations Office for Disaster Risk Reduction (UNDRR). 2015. *Sendai Framework for Disaster Risk Reduction 2015–2030*. United Nations Office for Disaster Risk Reduction.
- van Ham, M., D. Manley, N. Bailey, L. Simpson, and D. Maclennan. 2011. "Neighbourhood Effects Research: New Perspectives." In *EBL-Schweitzer. Neighbourhood Effects Research: New Perspectives*, edited by M. van Ham, D. Manley, and N. Bailey, 1–21. Springer. https://doi.org/10.1007/978-94-007-2309-2_1.