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DOI

[10.1002/eet.1985](https://doi.org/10.1002/eet.1985)

Publication date

2022

Document Version

Final published version

Published in

Environmental Policy and Governance

Citation (APA)

Snel, K. A. W., Hegger, D., Mees, H., Craig, R. K., Kammerbauer, M., Doorn, N., Bergsma, E., & Wamsler, C. (2022). Unpacking notions of residents' responsibility in flood risk governance. *Environmental Policy and Governance*, 32(3), 217-231. <https://doi.org/10.1002/eet.1985>

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SPECIAL ISSUE ARTICLE



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Unpacking notions of residents' responsibility in flood risk governance

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Abstract

Environmental disasters, and especially floods, are among today's biggest sustainability challenges. The number and intensity of floods are increasing, challenging current governance approaches. Governments worldwide are looking to diversify their flood risk management and adaptation strategies, among others, by increasing resident involvement in flood risk governance. Such involvement of individuals shifts responsibilities from public to private actors. A clear understanding of the extent and implications of this shift is difficult to reach as theoretical perspectives on the concept of responsibility vary. Similarly, grounds for attributing responsibility for flood preparedness and response differ across countries. This lack of analytical and empirical clarity complicates academic and policy discourses on what it actually means to 'be responsible'. The current article systematises these different approaches to responsibility in flood risk governance. To improve current knowledge on residents' responsibilities in flood risk governance, we present a conceptual framework that distinguishes among four theoretical notions of responsibility: legal responsibility, accountability, perceived responsibility, and moral responsibility. These notions are elucidated with the help of examples of flood risk governance practices in the United States, Germany and the Netherlands. We find that the four notions are closely intertwined. In addition, this article documents divergences between what individuals perceive as their own responsibility in flood risk management and the responsibilities that governments assume. We conclude with a discussion on the tensions between perceived responsibilities and the other three notions. Explicit, transparent and open discussion on these tensions is needed to allow attribution of responsibility in flood risk governance and to reconsider residents' roles in particular.

KEYWORDS

climate adaptation, flood risk governance, Germany, Netherlands, residents, responsibility, United States

1 | INTRODUCTION

The risk of flooding is generally seen as an external threat (i.e. an environmental disaster) against which societies should protect themselves. Over the 20th century, governments have been the main actors responsible for protecting their countries (Johnson & Priest, 2008; Wiering et al., 2014). However, the protection measures have been insufficient to prevent widespread increases in flood damage. Floods have been increasing both in frequency and intensity, and the expectation is that floods will become more severe in the coming century as a result of climate change (IPCC, 2014; Wehn et al., 2015; Winsemius et al., 2013). The increasing number of floods all over the world has shown that financial and organisational constraints severely limit public authorities' capacity to cope with floods, in terms of providing protection and disaster relief (Jongman et al., 2014; Michel-Kerjan & Kunreuther, 2011). Public authorities are not able to fully control floods and hence cannot be the sole actor in charge of flood risk management (Tullos, 2018). Governments increasingly recognise this fact, allowing them to be more open to involving other stakeholders in the processes of managing floods (McEwen et al., 2018; Söderholm et al., 2018). Public authorities and academia alike have therefore called for a greater degree of resident involvement in flood risk governance (Bubeck et al., 2012; Mees et al., 2012; Osberghaus, 2015). The concept of flood risk governance is understood as 'the arrangements of actors, discourses, rules and resources through which flood risk management strategies are delivered and put into practice' (Hegger et al., 2014; see also, Wiering et al., 2017).

Opening up flood risk governance to involving residents has increasingly turned the attention to residents' responsibility in flood risk governance (Snel et al., 2020). Academics and policymakers both profess that a shift in the division of responsibilities, from government to residents, is a sensible and imperative transition. As a consequence, residents have become part of the cost-benefit equation, because resident behaviour can contribute to flood damage mitigation and adaptation (Aakre et al., 2010; Doorn, 2016; Hegger et al., 2017). Residents can mitigate and adapt by implementing measures that, for instance, retain water or minimise damage at the property-level (Attems et al., 2019). Yet, increasing residents' responsibilities in flood risk governance requires consideration of both their role and the meaning of responsibility in flood risk governance.

In this article, residents' role mostly concerns their capacity as citizens vis-à-vis governmental actors and—to a lesser extent—as consumers in the market and as members of civil society (Hegger et al., 2017). Moreover, assessing the meaning of responsibility is more complicated. While researchers often mention residents' responsibilities, they do not always use the term 'responsibility' in the same way, leading to miscommunication and scholarly dissonance (Doorn, 2012; Giddens, 1999; Pellizzoni, 2004). This requires an objective reconsideration of the concept of responsibility and its various facets. Not only because of this scholarly confusion, but also because actors are less willing to take action if responsibility is unsuccessfully assigned (Doorn, 2019; Miller, 2001). Especially since residents generally expect public authorities to be responsible for

protecting against floods (Terpstra & Gutteling, 2008; Lawrence et al., 2014; Raška et al., 2020).

This article contributes to existing research (e.g. Meijerink & Dicke, 2008; Raška et al., 2020; Lawrence et al., 2014) by unpacking what it actually means to 'be responsible', both acknowledging and explicating the various notions of responsibility that come into play in flood risk governance and related disciplines. The concept of responsibility varies based on roles, actor capacity, and whether responsibility arises before or after a flood. These different perspectives reveal a multiplicity of meanings surrounding the concept (Doorn, 2012; Giddens, 1999; Pellizzoni, 2004).

This article aims to contribute to our conceptual understanding of existing residents' responsibilities in flood risk governance by answering the following research question: How can responsibility in flood risk governance be conceptualised, and how do different notions of residents' responsibility manifest themselves in practice? It does so by, first, providing a nuanced conceptualisation of responsibility. Second, it will demonstrate, through examples of flood risk governance practices in the United States, Germany and the Netherlands, how responsibilities are attributed differently, formally and informally. These examples show how different theoretical notions have become institutionalised in different countries. All three countries are western democratic countries where flood risk is a pressing societal issue—major flood events have taken place in each country over the past 30 years, and the risk of flooding will likely increase in the near future (Suykens et al., 2019). Third, conclusions are drawn from this conceptualisation and illustrative comparison. The final section provides a discussion on the tensions between the different notions of responsibility, including suggestions for future research.

2 | UNPACKING THE CONCEPT OF RESPONSIBILITY

Responsibility is an ambiguous and complex term with many connotations. This article aims to conceptualise the term in such a way that it distinguishes the different uses of the term, both in academia in general and, more specifically, in flood risk governance. Academics from various disciplines have aimed to clarify the term, which has led to a diverse set of characteristics, principles, and notions of responsibility. This article builds on the work of Pellizzoni (2004), Mostert (2015) and Hart (1968). They all have conceptualised responsibility from the perspective of disciplines that are closely related to flood risk governance, namely environmental governance, environmental management and legal philosophy. All made a distinction between grounds for attributing responsibility and notions of responsibility that arise from these attributions.

As captain of the ship, X was responsible for the safety of his passengers and crew. But on his last voyage he got drunk every night and was responsible for the loss of the ship and all aboard. It was rumoured that he was insane, but the doctors considered that he was

responsible for his actions. Throughout the voyage he behaved quite irresponsibly, and various incidents in his career showed that he was not a responsible person. He always maintained that the exceptional winter storms were responsible for the loss of the ship, but in the legal proceedings brought against him he was found criminally responsible for his negligent conduct and in separate civil proceedings he was held legally responsible for the loss of life and property. He is still alive and he is morally responsible for the deaths of many women and children (Hart, 1968).

Hart (1968) depicted the complexity of the concept by determining various grounds for attributing responsibility. He used an example of a captain who lost his ship to illustrate four grounds for attributing responsibility to an actor, namely: [1] role, [2] causation, [3] liability and [4] capacity. Role refers to a distinctive place or office a person occupies within a social organisation. Causation refers to whether actors, actions or events have been the cause of, for instance, a disaster. Liability refers to whether an actor is to be punished or to be made to pay compensation for his or her actions. Finally, capacity addresses the mental, financial, or physical ability of an actor to positively influence the outcome/consequences of his or her actions.

Pellizzoni (2004) distinguished four dimensions (i.e. notions) of responsibility (care, liability, accountability and responsiveness). The two factors that determine which of these dimensions of responsibility apply to a situation are, according to Pellizzoni (2004), as follows: time of imputation and grounds for justification. 'Time of imputation' refers to whether responsibility is attributed ex-ante or ex-post, that is, before or after the event for which responsibility must be attributed. For instance, the obligation or duty to ensure preparations are made is an ex-ante attribution of responsibility (Doom, 2019; van de Poel et al., 2012). The obligation to compensate for damages resulting from an action or decision is an ex-post attribution of responsibility. Ex-post refers to responsibility that arises after something has happened. Pellizzoni (2004) defined grounds for justification as actions driven by previous experience or future desire. These in-order-to-motives and because-of-motives indicate the justification of behaviour based on respectively 'pull factors' or 'push factors', that prompted somebody to act. Pellizzoni (2004) justified all four notions of responsibility through their presence in governmental systems (Figure 1). Liability relates to judicial power, while accountability and responsiveness relate to the democratic processes of electing representatives. Care is expressed in the relationship between a government and its citizens.

Mostert (2015), in turn, has distinguished 12 principles for attributing responsibility in environmental management: capacity, social costs, causation, interest, scale, subsidiarity, structural integration, separation, solidarity, transparency, stability and acquired rights. Similar to Hart (1968), Mostert (2015) did not distinguish between different notions of responsibility that exist based on combinations of these principles; instead, he focuses solely on the allocation of responsibilities that is conducive for managing the environment, mainly from the perspective of public authorities. Nevertheless, the

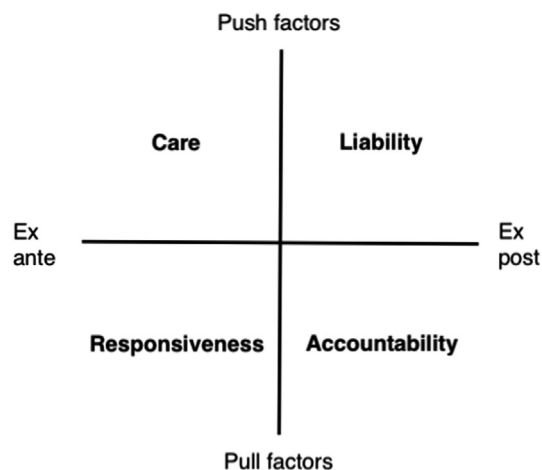


FIGURE 1 Typology of responsibility adjusted from Pellizzoni (2004)

fact that Mostert (2015) emphasises the plurality of responsibilities indicates that, beyond the 12 principles, multiple notions of responsibility exist.

As Pellizzoni (2004: p. 546) stated; providing a comprehensive analysis of the concept of responsibility is 'out of the question'. Therefore, our aim is not to provide an all-encompassing synthesis of the concept, but rather to operationalise responsibility in flood risk governance. Our conceptual framework has three dimensions. First, we categorise the meaning of responsibility into four notions: legal responsibility, accountability, perceived responsibility and moral responsibility. These notions are abstract and similar to the notions or dimensions of responsibility elucidated in Pellizzoni (2004) and Hart (1968). We argue that legal and moral responsibility are commonly understood as key aspects of the responsibility concept, but these two do not fully cover all connotations of responsibility in flood risk governance. Building on Pellizzoni's (2004) conceptualisation, this article argues that accountability addresses the gap that arises when an actor has a certain role, capacity or cause, but without legally defined tasks. Moreover, how residents and other actors perceive responsibility may have little connection to legal or moral responsibility. Actors can perceive a responsibility to fall on themselves that is not based on legally defined tasks or moral considerations. These four notions of responsibility cover the different forms of responsibilities applicable in terms of flood risk governance. They are explained in detail in the following sections. Overall, the notions are robust and abstract enough to allow for an open-minded analysis of responsibility divisions in flood risk governance on various scales (such as individual or governmental).

Second, these four notions of responsibility are comprised of varying combinations of attributes (see Table 1). Based on the conceptualisations by Hart (1968), Pellizzoni (2004) and Mostert (2015), we distinguish four grounds for attributing responsibility to an actor, namely role, causation, liability, and capacity. These attributes reflect an actor's involvement in relation to a flood event. Role refers to the responsibility that originates from having a certain position or office in an organisation.

TABLE 1 Overview of notions, attributes and operationalisation of responsibility (pp. 6–7)

Notions of responsibility	Attributes (Hart, 1968; Pellizzoni, 2004; Mostert, 2015)	Theoretical understanding	Implication
Legal responsibility Ex-ante and ex-post responsibility (Pellizzoni, 2004)	Liability (ex-post) Role (ex-ante)	Legal liability: duty to compensate for flood damage resulting from (in)actions controlling floodwaters. Legal responsibility: duty to mitigate flood risk	Who has duty to mitigate? Who has duty to compensate for damages caused or experienced?
Accountability Ex-post responsibility (Pellizzoni, 2004)	Role (ex-post) Causation (ex-post) Capacity (ex-post)	Accountability as the external aspect of responsibility; those actors bearing responsibility should be answerable for it to other actors and held to account.	To which extent are actors account holders or account givers? Account holders: e.g., residents can hold authorities accountable. Account givers: actors who are part of decision-making processes become accountable to other actors.
Perceived responsibility Ex-ante and ex-post responsibility (Pellizzoni, 2004)	Role (ex-ante and ex-post) Capacity (ex-ante and ex-post)	Perceived responsibility describes individuals' view of their own, and others', responsibility.	What are actors' respective points of view on flood risk governance? What are their beliefs, worldview, awareness, understanding?
Moral responsibility Ex-ante responsibility (Pellizzoni, 2004)	Role (ex-ante) Causation (ex-ante) Capacity (ex-ante)	Responsibility as moral obligation. Person A is responsible to person B to ensure that X. A = who is responsible X = responsible for what?	Determine who is responsible to whom and for what? Grounds for attributing responsibility can be role, causation, capacity. Take into account, interpret and weigh the empirical information (legal/accountable/perceived).

Causation refers to whether an actor has (partially) caused a flood or has negatively influenced its impact. Capacity refers to an actor's capacity to minimise or prevent a flood or flood damage. Liability refers to the duty to compensate for flood-related damages. The attributes of role, causation, and capacity are relevant to both ex-ante and ex-post attribution of responsibility, while liability is only an ex-post ground for attributing responsibility because it applies only after a flood has caused damage. For the conceptualisation of responsibility in flood risk governance, the parsimonious examples of Hart (1968) and Pellizzoni (2004) were followed. Specifically, a more abstract approach was chosen by identifying four broader attributes rather than multiple finer-grained ones similar to Mostert (2015). Although these attributes are equally important, they are not equally divided across the notions of responsibility (see Table 1). For instance, the attribute of role applies to all the notions because of the numerous actors involved in flood risk governance. Moreover, they often have multiple roles (e.g. employee, community member, property owner).

Finally, this article unpacks the concept of responsibility in flood risk governance by focusing only on residents as citizens in relationship to governmental actors and less as consumers in the market or as members or addressees of civil society organisations. The discussion is narrowed to these actors to shed a light on the shifting expectations of governments and residents in flood risk governance. In addition, it also allows this article to focus on relevant aspects of the topic. Table 1 provides an overview of the notions, attributes and operationalisations, and each notion is unpacked in more detail in the sections below.

2.1 | Legal responsibility

Legal responsibility generally follows from human agency (Balkin, 1990). Thus, for legal purposes, a baseline assumption regarding flood responsibility is that humans do not cause rain or sudden snowmelt and play no part in controlling or changing the flood's progress. Such floods are entirely natural phenomena for which neither residents nor governments acquire legal responsibility. In other words, not one actor involved in flood risk governance, whether it is a government, organisation or individual resident, can be held legally responsible for a flood when it is considered purely an act of nature.

In most cases, legal responsibility for flood damage and flood risk management follows from the recognition of legally cognisable human agency in a given flood situation. The interjection of human agency into floods can arise from two sources. First, humans can cause the flood themselves. This situation remains more theoretical than legally actualised. Second, and far more common, humans can change the behaviour of floodwater and enhance or mitigate the damage that floods cause. Infrastructure that changes flood behaviour is quite common. Governments and property-owners around the world use technology to contain, channel, direct and otherwise control floodwater (Bergsma, 2018). Such direct human intervention can give rise to both a legal duty to act (i.e. to mitigate flood risk) as is suitable to an actor's role and legal liability (a duty to compensate for damage resulting from incompletely controlled floodwaters or infrastructure failure). Often these two aspects of legal responsibility are closely intertwined.

2.2 | Accountability

The concepts of responsibility and accountability are related, and they are often used interchangeably (e.g. Mason, 2008; Mulgan, 2000). A common link between the two concepts is that responsibility entails that actors are accountable for their actions to some other actor (Mulgan, 2000). In environmental governance literature, accountability is usually regarded as a specific framing of responsibility. It entails that actors who bear responsibility should be answerable to others for how well they exercise this responsibility or, in other words, their role. In the context of flood risk governance, accountability mechanisms thus allow others to attribute responsibility to an actor ex-post, based on improper action or inaction, relating to the attributes of causation and capacity (Mason, 2008). This article adopts this 'external framing' of accountability. This implies that others can scrutinise actors' responsibility and thus can externally control the responsible actors, calling them to account for their actions, or sanctioning them for irresponsible actions, because they were in the position, had the means or sanctioned actions that influenced the impact of a flood (Mulgan, 2000). Bovens (2007, p. 450) has defined accountability as 'a relationship between an actor and a forum, in which the actor must explain and justify his or her conduct, the forum can pose questions and pass judgement, and the actor may face consequences'. In traditional forms of government, governments bear the majority of responsibilities for the public domain. As such, through political mechanisms, residents or their representatives are the forums that can hold governmental actors to account for their actions (e.g. Mason, 2008). In this default scenario, residents operate as account holders.

However, the situation changes when residents start to bear responsibilities as a result of their involvement in public issues. It has become quite common to involve residents in local decision-making processes that affect the community as a means for achieving improved democracy and effectiveness (Abels, 2007). Some of this resident involvement creates more direct accountability, essentially leaving responsibilities with governmental actors but allowing residents to hold them accountable more immediately instead of through indirect political processes (Abelson & Gauvin, 2004; Damgaard & Lewis, 2014). For example, residents can hold authorities accountable by directly participating in the development of public policy (Damgaard & Lewis, 2014). Through their voices, residents can increase the responsiveness of public authorities to residents' concerns (Devas & Grant, 2003).

2.3 | Perceived responsibility

How actors perceive their own and others' responsibilities is not necessarily similar to how they are legally defined, held accountable, or morally considered. Legal responsibilities are written and tend to leave little room for interpretation; however, perceived responsibility can vary greatly from, for instance, legal responsibilities. Residents' awareness of, beliefs about and assumptions regarding their own and others' responsibilities influence perceived responsibility (Wamsler, 2016). Imprecisely or

ambiguously assigned responsibility for mitigating flood risk allows for perceived responsibilities to emerge and, occasionally, to dominate legal responsibilities (Wamsler & Brink, 2014). As such, perceived responsibility often translates into political pressure and conflicts, especially in situations where accountability, and perceived and legal responsibilities are inconsistent (Wamsler, 2015, 2016). This highlights that attributes of role and capacity apply to the notion of perceived responsibility. When residents do not perceive it as their role to act, or when they do not perceive that they have the capacity to act, they will refrain from taking indicated actions.

Patterns of perceived responsibility vary among countries and social contexts. Moreover, they are influenced by the severity of risk, information provided, access to advice, the public's level of confidence in authorities and worldviews. Important influencing factors are the amount and type of information residents receive (e.g. digital or face-to-face, on adaptation or preparation). Providing information can increase perceived risk and the residents' sense of their responsibility. Additionally, locally focused information (e.g. property-level) as opposed to globally-focused information (e.g. the global impact of climate change) can lead to higher levels of perceived risk and responsibility which may in turn spur motivation to adapt (Osberghaus et al., 2010). However, information alone is not sufficient people's intrinsic belief systems and worldviews are important as well (Brink & Wamsler, 2019; Wamsler & Brink, 2018). Each worldview can be ascribed its own view of risk and nature, preferred policy options, and social order (Dake, 1992; Poortinga et al., 2002; Douglas & Wildavsky, 1992). These diverse worldviews, especially in combination with varying flood risks, produce a diverse array of people's perceived responsibilities regarding their roles in flood risk governance.

2.4 | Moral responsibility

Moral responsibility is a notoriously difficult concept, and its use is often ambiguous (Doorn, 2012). This article focuses on responsibility as a moral obligation. The best way to think of responsibility as a moral obligation is in terms of a threefold relationship: person A is responsible to person B to ensure that something is the case or that something is being done (Duff, 2007). For example, a government has a responsibility to provide safety from flooding. This is a moral obligation the state has to the people present in the country, but not to people globally. For moral responsibility, it is therefore always important to ask to whom something is owed. There are different grounds for assigning moral responsibility. In the context of flood risk governance, an actor's role, causal relation and capacity are the most important sources of moral responsibility (see Doorn, 2019).

Responsibility based on role refers to moral obligations that arise simply because of the actor's position in society. Most obviously, a country's government has moral as well as legal responsibilities towards its citizens. In this context, governmental policy is achieved partly by residents, private companies and non-governmental organisations (Butler & Pidgeon, 2011). If the government delegates responsibility to residents, a risk of increased inequality arises. Vulnerable

groups may lack the social and cultural capacity, or economic power to profit equally from this shift of responsibility (Doorn, 2016). Hence, in the case of these changing responsibility arrangements, where some responsibility is transferred to residents, governments have the moral obligation to secure public values, such as equity, non-discrimination, and inclusiveness (Alexander et al., 2018). However, in their role as residents, residents themselves may also have moral obligations. In the context of flood risk management, residents' moral obligation might be to reduce the hardened surfaces in their gardens. Moreover, residents in their role as neighbours have responsibilities based on the connections within communities (Heying, 1999). In case of an evacuation due to flooding, residents might have the moral obligation to help vulnerable neighbours.

Moral responsibility can be attributed by a person's capacity (Miller, 2001). The moral obligation of having the capacity takes many forms, including a physical ability to act, financial capacity, or ownership of critical property. As such, the obligation to allow one's land to be used for water retention in the event of high river discharges could qualify as residents' moral responsibility based on their capacity (Doorn, 2019). Moreover, moral responsibility may also derive from an actor's contribution to an undesirable situation, such as water shortage by pumping too much groundwater. The causer acquires moral responsibility to set things right. Although causation is mostly formulated in a backward-looking (ex-post) sense, it could also be formulated in a forward-looking (ex-ante) sense as an obligation not to cause an undesirable situation. In the context of flood risk governance, this is the moral responsibility not to cause or bring about a dangerous situation.

Moral responsibility partly overlaps with the other notions, but it is based on different ethical principles. These principles do not find their justification in what is legally codified (legal responsibility) or in the relationship between an actor and a forum (accountability), nor in what individual people consider justified (perceived responsibility), but in moral argumentation and theorising. This explains why moral responsibilities are often also formulated at a more abstract level than the other three notions.

To summarise, in the context of flood risk governance, this article refers to moral responsibility as a moral obligation to not cause harm, to help within your capacities, and to take responsibility for flood risk based on varying roles, such as a member of a community (see Table 1). In contrast, legal responsibilities are based on formally assigned duties (i.e. role) to mitigate flood risk and liability for compensation. Moral and legal responsibility provide the two most common notions of responsibility but they do not cover all aspects of how the term responsibility is used in academia and practice. Therefore, in this article, two additional notions of responsibility are distinguished to provide a more complete analysis of how different institutional frameworks divide responsibilities in flood risk governance. The third notion, accountability, is related to the legal notion of responsibility (also see Pellizzoni, 2004). Accountability addresses the ex-post responsibility of actors involved in flood risk governance. It is identified here as the external framing of responsibility. This implies that others can scrutinise actors' responsibility and thus can externally

control or monitor the responsible actors by calling them to account for their actions or sanctioning them for irresponsible actions (Mulgan, 2000). Whoever bears certain responsibilities should have to answer to other actors for how well, or whether they executed those responsibilities, regardless of whether those actors are residents, governments, companies or communities (Bovens, 2007). This notion resonates with the attributes of role, causation and capacity. The fourth notion is perceived responsibility. Which refers to one's actual understanding of who is responsible for what in flood risk governance, regardless of what the law or norms of morality might otherwise indicate (Wamsler, 2016). Perceived responsibility is helpful to explain disjunctions between formally expected behaviour and actual behaviour before, during and after flood events. This notion emphasises the perceived role and capacity of actors in flood risk governance.

3 | METHODOLOGY

This article analyses responsibility, as conceptualised in Section 2, by applying the notions of responsibility and grounds for attributing them to the flood risk governance arrangements of three countries, namely the United States, Germany and the Netherlands. These countries share a Western democratic context of flood risk governance, which allows for an illustrative comparison across continents. Furthermore, these countries share similar characteristics, such as the risk of flooding, experience with floods, democratic processes and economic development. Nonetheless, some important variations also exist among these three countries in terms of their approaches to flood risk governance, roles of residents and political landscape (see Table 2 for an overview). These are countries with which the author team has empirical expertise, which is helpful given this article's aim to conduct a multi-faceted analysis of residents' responsibility in flood risk governance. The choice for the three countries provides an opportunity to compare and reflect on residents' responsibilities in varying flood risk governance contexts. As the roles of residents are currently at the heart of flood risk governance debates in all three countries, the following section focuses specifically on the responsibility divisions between residents and governmental actors in the United States, Germany and the Netherlands. This way, it will be clarified how the roles of residents differ among the nations and concerning their respective notions of responsibility.

This article does not aim to provide an in-depth empirical analysis but rather uses empirical examples to illustrate conceptual points. The following sections serve the purpose of a preliminary analysis to determine whether the abstract notions of responsibility can empirically be applied to actual flood risk governance arrangements. Additionally, the scope of this article did not allow for an in-depth elaboration, but the methodological choices were made systematically.

Due to the illustrative nature of the analysis, a comparative case study design is not applicable. As a consequence, the methodology and case study selection are mainly based on the expertise of the authors. They form a team of scientific experts in the field of flood risk governance.¹ All have extensive experience with and knowledge

TABLE 2 Descriptive characteristics of the selected countries, including dominant approaches in flood risk governance

	Political system	Legal system	Focus in flood risk management	Dominant flood risk governance approaches
United States	Federal state	Common law	Addressing the consequences of floods through flood preparation and flood recovery	Relatively limited action taken by the federal and state governments—large focus on residents' own responsibility
Germany	Federal state	Civil law	Focus on both reducing flood probability through protection measures and reducing consequences through flood preparation	Residents hold main legal responsibility in addition to governmental flood risk adaptation
The Netherlands	Constitutional monarchy	Civil law	Dominant focus on flood defence, but debates on broadening strategies is ongoing	Government holds main legal responsibility, in addition to residents' responsibility for adaptation and damages

of one or more of these countries based on their involvement in scientific research, empirical data collection, and/or policy advice. In addition, the authors have varying forms of complementary expertise following the different notions of responsibility. This methodological approach entails that the following section encompasses insights from academic literature and tacit knowledge of the authors.

4 | RESPONSIBILITY OF RESIDENTS IN THE UNITED STATES, GERMANY AND THE NETHERLANDS

In this section, the notions of responsibility are illustrated with the examples of the flood risk governance arrangements of three countries, namely the United States, Germany and the Netherlands. In doing so, this article aims to analyse whether the theoretical unpacking of the concept of responsibility is also operative in actual governance settings.

4.1 | Legal responsibility of residents

4.1.1 | Duty to mitigate floods

In the 1960s, the approach of 'floodplain management' was adopted in the United States. This approach focused on reducing flood damage by addressing the individual responsibilities of floodplain residents. It was effectuated in the form of a national insurance program that uses insurance premiums to incentivise flood-wise building choices. While this policy approach addresses the responsibility of residents in mitigating floods, it uses behavioural incentives rather than legal instruments: residents in the United States have no legal duty to either adapt to direct or consequential damage from flooding or to intervene proactively to prevent flooding. However, residents in the United States have long had legal duties to act reasonably in controlling floodwaters on their properties to avoid causing excessive harm to their neighbours.²

The legal basis for flood risk governance in Germany is the Federal Water Act, which corresponds in legal terms to the European Floods Directive (European Commission, 2007; Government of the Federal Republic of Germany, 2009). It was enacted in 1957 and revised numerous times, reflecting a shift from disaster protection as a responsibility of governmental organisations towards individual responsibility and an emphasis on non-structural measures (DKKV, 2015; Thieken et al., 2016). Residents are legally responsible for protecting their property in Germany.

The Netherlands has a long tradition of approaching flood risk as a collective issue where governmental organisations take the lead (Hegger et al., 2017). The Dutch constitution obliges the national government to maintain the country habitable and protect and improve the environment (Suykens et al., 2019). Practically, this obligation is embedded in the Second Delta Act, which also includes a safety norm that guarantees a basic level of protection to each Dutch citizen, expressed as an annual chance of being killed by a flood of no more than 1/100.000. Residents do formally have a responsibility to mitigate floods on their properties, but this legal responsibility is seldom called into action (Bergsma et al., 2012). The legal responsibility of Dutch residents remains limited to paying taxes, both indirectly to the national governments (through income taxes) and directly to the regional water authorities.

4.1.2 | Duty to compensate for flood damages

Governmental organisations are rarely legally liable for flood damage compensation in the United States. However, individual legal liability for flood damage compensation is far more common and focuses on personal liability for flood damage that a resident's actions directly caused or made worse. Thus, for example, individuals incur legal liability for damage compensation when they build structures in waterways that cause or exacerbate the harm a flood inflicts on others. Similarly, landowners building flood control structures on their private properties increasingly must do so reasonably and can be held liable for negligence if the floodwater damages a neighbour's property.

The legal liability of the German government in the recovery phase of a flood disaster is changing. The previous understanding was that impacted residents should receive government funding. Yet, this approach has been terminated after the 2013 floods (Kammerbauer & Wamsler, 2018). In particular, it has been called into question whether at all to provide government funding to uninsured affected residents. Additionally, residents are not only legally responsible for protecting their property but also must compensate for any negative impacts their actions may have on local flood risk governance, such as redirecting water flows to other properties. Overall, residential development is only permitted in areas that have 100-year flood protection (Wamsler, 2016). Following a flood, residents may have to fulfil additional requirements to obtain (re)building permission.

The legal liability of the Dutch national government entails it to bear the burden of damage costs. The Netherlands has a Calamities Compensation Act, a governmental compensation scheme. After an environmental disaster such as a flood, this compensation act can come into force, but it is not a given that it will; and, if it is enforced, it is unclear which damages will be compensated for and to what extent (Suykens et al., 2019). In general, flood recovery is not prioritised in the Netherlands because the focus is on prevention. The safety standards are high. Large-scale floods and the associated need for large-scale recovery are therefore rare.

All in all, legal responsibility in the United States focuses on liability, specifically private liability (see Table 3 for an overview). A duty to mitigate flood risk is generally not legally imposed on either public or private actors. In Germany, the legal responsibility for managing floods seems to be, on the one hand, clearly divided between the different levels of government, and, additionally, residents are above all responsible for their property. In the Netherlands, the government has a legal responsibility to mitigate flood risks, and the government has the opportunity to compensate for flood damage, but it is not a given that it will.

4.2 | Accountability of residents

The division of responsibility for flooding in the United States is rooted in an understanding of floods as 'forces of nature' that can only be partially controlled by human intervention. This understanding limits accountability across all sectors. Concerning government action or inaction, residents remain primarily account holders, but they often must operationalise that accountability through political rather than legal avenues. For example, despite having no legal obligation to do so, the federal government routinely supplies disaster relief after flood events in response to the collectively voiced demands of affected residents, either directly or through their representatives (and often both) (Michel-Kerjan, 2010). In contrast, at the property level, owners are simultaneously account holders and account givers concerning individual flood-related actions, because every private property owner can hold every other actor to account for the flood-related damage that they caused, generally through legal rather than political processes. Finally, albeit rarely, the public at large or governments can hold private property-owners to account for both flood-related risk and actual flood

damage through the doctrine of public nuisance (Big Horn Power Co. v. State, 1915; City of Jackson v. Robertson, 1950).

The current emphasis on individual risk management in Germany obscures the social obligation of the welfare state to offer certain services and/or funds to residents, specifically in terms of recovery after a flood. In general, German flood risk governance demonstrates a lack of accountability, which also plays a role in local political challenges. An example is the case of Deggendorf in South Germany after floods in 2013. Residents' participation in public forums was muted. Moreover, challenges arose because governmental actors recognised that they were also responsible for resident-volunteers' security and wellbeing on site. Since volunteer help is not 'illegal', it depends on local capacities to integrate such security within their flood risk management plans. Another example is the city of Freising. The local government was held accountable by the residents for having abdicated their responsibility (Freising, 2014). Residents expected municipal authorities to 'properly' conduct flood risk management within the range of their mandate. Subsequently, residents stated that the flood could have been avoided if the municipality had drained ditches and managed water gates (Wamsler, 2016).

The role of residents as account givers is minor in the German context. Local German governments have been legally required to have flood risk management plans in place since 2015. During the process of developing these plans, only local governmental organisations are consulted and residents are not involved (St MUV, 2017). No legal requirements are in place to involve residents in flood risk governance. As long as resident participation is limited, their role as account givers will be limited.

When it comes to Dutch flood risk governance, residents are generally account holders. Dutch accountability mainly consists of residents who hold governments to account through elections. Relevant governmental actors are the national government, the regional water authorities, and local governments. However, issues of flood protection are barely featured on the agendas of political parties. Residents can elect their local water authorities every 4 years, although the turnout in elections is generally very low. Instances, when Dutch accountability mechanisms work more directly, are very specific and locally oriented. These mainly pertain to local participatory processes that involve residents (Mees et al., 2019; Uittenbroek et al., 2019). For instance, some regional water authorities aim to involve residents through volunteering programs or information evenings. In such situations residents have been shown to also become account givers to some extent, meaning to give account of their responsibilities to other actors; but in most cases, the participatory process rarely exceeds giving advice (Mees & Driessen, 2019).

All in all, in all three countries, residents can act as account holders towards public authorities (see Table 3). In the United States, residents specifically hold the government accountable for providing disaster relief to the affected residents. Moreover, residents in their role as private property-owners can be both account holders and account givers, because every private property-owner can hold every other actor to account for the flood-related damage that they caused. In Germany, however, a general lack of accountability is notable as residents rarely hold public authorities accountable after a flood, which is similar to residents of the Netherlands, although Dutch

TABLE 3 Overview of the country-specific understandings of the four notions of responsibility (pp. 19–20)

	Residents of the United States	Residents of Germany	Residents of the Netherlands
Legal responsibility	Legal duty to reasonably control floodwater on property Legal duty to compensate for flood damage caused or made worse	Legal duty to protect their property Legal duty to compensate for negative impact on local flood risk governance	Legally responsible for paying taxes to the regional water authorities and national government No explicit legal responsibility to compensate for flood damage. Residents are legally responsible to mitigate flood damage on their property
Accountability	Floods as ‘force of nature’ Residents are account holders and can demand disaster relief for affected parties. Property-owners are both account holders and account givers.	General lack of accountability Residents rarely participate but hold government to account post flood event.	General lack of accountability Residents hold government to account through elections. Residents could become account givers through participation processes, but are rarely involved. Therefore, they are mostly account holders.
Perceived responsibility	Residents perceive: Government should ‘make people right’ by providing disaster relief. If governments do not provide expected help, residents volunteer and raise money.	Residents perceive: Local governments are responsible even though they are not legally responsible body. Residents have little awareness of their legal responsibility.	Residents perceive: No responsibility for themselves. Governments take care of all flood issues.
Moral responsibility	Residents have moral obligation to make sure they are well protected against floods, either by insurance or adaptation. Residents' moral obligation is mainly visible in providing help to others in need, either by volunteering or by making donations.	Residents at flood risk have moral obligation to be prepared, e.g., by having flood insurance. Policy debates are taking turns towards handing over moral responsibility from government to residents.	Capacity attribute is incorporated into income tax system. Moral obligation for residents to contribute to flood risk adaptation is subject to change, as these obligations are increasingly part of policy debates to increase residents' moral obligation therein.

residents can through democratic processes. Moreover, Dutch residents are rarely involved in decision-making processes as well, so they rarely become account givers themselves.

4.3 | Perceived responsibility of residents

Perceived responsibility in the United States depends on context. The Midwest flooding in 2019 provides considerable insight into how perceived responsibility concerning flooding operates in the United States. A regional flood like that normally generates a public perception that it is the federal government's responsibility to ‘make people right’, often in the form of millions of dollars in disaster relief. Thus, the fact that the federal government could not legally help farmers in the Midwest whose crops and stored surpluses were destroyed by unusually severe flooding made national headlines because of confounded expectations that the federal government would help (CNBC, 2019). The flooding also revealed perceived responsibilities at smaller scales. The City of Davenport, Iowa, has long refused to engage in flood control despite the Mississippi River, where residents complained that the town had become ‘complacent’ (Bosman et al., 2019). Breaching levees throughout the Midwest rivers brought both local government levee districts and the U.S. Army Corps of Engineers into the spotlight for their perceived failures to maintain,

upgrade, and operate large-scale flood control infrastructures as they were expected to by their residents (Smith & Schwartz, 2019). However, many individuals and NGOs decided to help, leading to a variety of volunteer campaigns to fill sandbags and provide emergency assistance to those who needed it (Bosman et al., 2019). Thus, residents perceived themselves to hold a private responsibility to prepare for and respond to existing flood events that had nothing to do with their legal responsibility or individual accountability for that flood.

From the perspective of German residents, local governments are seen as the main body responsible for flood risk governance (Wamsler, 2016). This can be viewed as a holdover from flood protection approaches that predate recent flood risk management schemes, which is particularly salient if individuals built their homes before current EU directives were enacted. According to Wamsler (2016), one resident commented, “the city has responsibility for adaptation. They get our taxes to do this” (p. 188). This understanding translates into political pressure and legal conflicts. Additionally, residents are not aware of the responsibilities of higher-level authorities. The division of responsibilities between municipal and district authorities is not well understood, which leads to confusion, especially post-disaster. Moreover, residents do not know their own responsibilities very well. Residents are becoming slightly more aware of the need to take individual action. Moreover, specific forms of cooperation exist in Germany that supports the involvement of residents within flood risk



management, such as water and land associations and flood communities. German residents of affected areas often assume responsibility by deciding to become volunteers to help impacted individuals (Kammerbauer & Wamsler, 2017b). This includes clean-up tasks or collecting donations. As a consequence, such activities can alleviate their social vulnerability and that of fellow residents (EEA, 2012; Kammerbauer & Wamsler, 2017a, 2017b; Wamsler, 2016).

As Dutch residents' current flood risk awareness is low (OECD, 2014), they also perceive they have little responsibility in managing floods (Mees et al., 2014). Dutch governance arrangements appear to indicate that responsibilities are clearly divided among the different levels of government. This is often understood to mean that the government has all responsibility for mitigating flood risk, and residents only need to contribute by paying their taxes (Keessen et al., 2016). This seemingly clear division of responsibilities also limits the involvement of residents and stakeholders (Koop et al., 2018). The main perception of Dutch residents is that floods are a technical issue to be dealt with by (public) professionals, and it is not within a resident's ability to cope with flooding (Snel et al., 2019). Moreover, Dutch residents have been repeatedly told by government officials that they are well-protected against floods, even though they are still at risk of flooding to a certain extent. Residents expect flood safety to be guaranteed by the authorities (Wehn et al., 2015). Especially on the local level, this causes problems. Gradually, a more concerted effort to appeal to residents to take responsibility is being made.

All in all, residents of all three countries perceive strong responsibilities for the public authorities, which go beyond the actual legal responsibilities of these authorities (see Table 3). United States residents perceive the government to be responsible for providing disaster relief after a flood, German residents perceive local authorities to be mainly responsible for flood risk management and Dutch residents perceive public authorities to be responsible for preventing all floods.

4.4 | Moral responsibility of residents

While legal, accountable, and perceived responsibility divisions can be identified through empirical research, moral responsibility is a more normative concept. It needs to be established by confronting considerations of legal, accountable and perceived responsibilities in each country. The moral notion of responsibility is characterised here as having a moral obligation. This obligation is assigned through a person's role, capacity and as causation (i.e. to not cause harm).

Residents in all three countries tend to value the attributes of moral responsibility related to flood risk similarly. They all endorse the same underlying principles. First, residents should not cause a flood or purposely increase the risk thereof for others (Doorn, 2019). Second, as a resident, one can have multiple roles to experience moral responsibility; for instance, property-owners could experience it as their moral responsibility to contribute to flood prevention by adapting their property. However, the same person can also experience moral responsibility to their neighbours to provide help during a flood. Moral responsibility always entails another actor or target. It encompasses

the external responsibility of providing help. Whether that means to help your family, neighbours, or the environment, moral responsibility is rarely about a sense of responsibility to oneself. Third, the attribute of capacity also builds on the moral element of providing help to others but emphasises the capacity for providing this help and considers varying concepts of justice. So, residents seem to agree on moral obligations at an abstract level across the three countries, but responsibilities play out differently in practice and have been institutionalised in different ways.

In the United States, moral responsibility has multiple connotations. On the one hand, it is associated with a general desire to reduce human vulnerabilities to floods. Residents have the moral obligation to ensure their own flood protection. Yet, residents generally expect that governments will make them 'whole' after a flood. When that expectation is not met, residents provide help to others in need, by volunteering or making donations. The political culture of the United States, on the other hand, places much emphasis on individual responsibility and autonomy. Therefore, moral responsibility is understood in terms of residents' capacity to make their location and building choices while not being dependent upon the government for flood protection or damage compensation.

Moral responsibility in Germany is strongly contextual (historical, cultural, political). On the one hand, this is based on a common understanding of the Federal Republic as a welfare state that is thought of as taking care of its residents. For the German government, moral responsibility for adaptation in flood risk governance is often undermined by other demands. Political and pragmatic solutions predominate the debates, and they are handing over more responsibility to residents. Recent developments in flood risk governance clearly indicate a shift towards individual responsibility, where residents take care of themselves. On the other hand, Germany is comprised of 16 federated states with distinguishable regional cultures, related to history, politics, housing tenure and social status, which influence how moral responsibility is understood, all the while being bound to a shared legal framework under the nation's constitution. Thus, moral responsibility might differ between states despite being bound to an overarching federal constitution.

In the Netherlands, the capacity attribute of moral responsibility is incorporated into the tax system. All residents pay taxes to ensure the national flood risk management measures, but the residents who have more money contribute more. Additionally, the Dutch government has a moral responsibility to keep its residents safe. However, the current policy debate revolves around the government's assumption that it is a resident's moral obligation to adapt to flood risk and protect themselves against pluvial floods (e.g. by removing hardened surfaces from their garden). Whether or not residents have such a moral obligation can be debated and answers differ per individual. For instance, if a resident has knowledge of and finances for flood risk adaptation, it increases their moral obligation to adapt. In general, a resident's moral obligation to contribute to flood risk governance is very low in the Netherlands. Residents do not believe they can make a difference concerning the large-scale defences in place (Snel et al., 2019; Terpstra & Gutteling, 2008). But, the moral obligation to

contribute to flood risk adaptation on their properties is subject to change as this depends on residents' role and capacity, and these obligations are increasingly part of the political debates.

All in all, these three countries are coping with the moral considerations based on capacity and role factors (see Table 3). By delegating responsibility to residents, governments are increasing the possibility of inequality within society (Doorn et al., 2012). Morally, the ideal solution would be that the residents who, for example, possess more financial capacity also take on more of the moral responsibility in flood risk governance. In practice, this does not apply to any of the three countries (except for the tax systems in which this is incorporated).

5 | DISCUSSION

Table 3 gives an overview of each country's notions of responsibility for flood risk governance. This discussion section addresses the conceptualisation of the notions concerning the illustrative empirical examples and analyses responsibility divisions regarding the flood risk governance approach in the three countries. Also, the limitations of the methodological approach are discussed.

5.1 | Elucidating the four notions of responsibility

Although we find all four notions in each nation's flood risk governance settings, not every notion can be as clearly contoured per country. Legal responsibility is generally straightforward as the division of responsibility is formulated in rules and regulations. Accountability is a process-oriented notion of who can be held accountable, which addresses an actor's responsibility within a certain task or role and its justification concerning an (in)action. Moral responsibility is additionally closely linked to perceived responsibility, but it emphasises a broader sense of responsibility that is more uniform such as the moral obligation to not cause harm to others. Perceived responsibility is currently under-researched, but the empirical analysis shows a clear gap between perceived responsibilities and the legal division of responsibility. Perceived responsibility turns out to be less clear-cut and might cause confusion as perceived responsibility can be applied to all three other notions of responsibility, meaning perceived legal responsibility, perceived accountability, and perceived moral responsibility. However, the conceptualisation in this article intended that perceived responsibility, although it might apply to the other notions, is a stand-alone notion in itself. Specifically distinguishing perceived responsibility is what makes this conceptualisation applicable to flood risk governance practices, so that it is not limited to merely theoretical considerations. The empirical application of perceived responsibility has shown that actors of flood risk governance perceive responsibilities in a certain way that differs from all the other three notions. How residents perceive their own responsibility in flood risk governance does not necessarily align with legal responsibility, accountability, or moral responsibilities. This points at an important tension between 'perceived' responsibility and the other three notions. We consistently found, in all

three countries, that residents perceive to bear less responsibility than they do. It is striking that this finding holds not only in the Netherlands where flood risk governance historically has been a government's affair but also in the US, a country that has traditionally placed much more emphasis on citizens' self-reliance.

So, even though some aspects of the notion are less clear-cut, all are distinguishable in varying flood risk settings. Yet, the theoretical conceptualisation of the notions of responsibility sometimes does not fully align with the practical understanding of those notions, as presented in the case studies. For instance, the legal responsibility of residents is theoretically conceptualised as the duty to mitigate flood risk and the duty to compensate for flood damages caused. In practice, however, legal responsibility seems to focus on the division of tasks as stated in the laws of the countries. This goes beyond the duty to mitigate and compensate damages: it is about which actor is tasked with what aspect of flood risk governance.

5.2 | Country examples

The analysis of the three country examples indicates that even though the countries have similar governance settings, they approach the roles of residents in flood risk governance very differently. This can be related to both administrative and cultural traditions of the countries (e.g., Knill, 1998; Vink et al., 2015). The United States, for instance, has a more individualistic and liberal tradition and appreciation for autonomy when compared to the Netherlands and Germany. So it is not surprising that the notions of residents' responsibility in the United States are more individualistic (Doorn, 2019). Both Germany and the Netherlands have a tradition of social-liberal values and a welfare state, which also characterises their flood risk governance to date, meaning a larger portion of the responsibility is attributed to the government in managing flood risk (Doorn, 2019). However, Germany's federated institutional framework is more top-down and hierarchical than that of the Netherlands (Kammerbauer, 2019). The Netherlands has a mostly egalitarian approach to flood risk management (Keessen et al., 2016). Virtually all Dutch residents financially contribute to the nation's flood risk management plans, and they are well-protected by these governmental efforts. However great the differences between countries may be, they are all facing increasing flood risk due to, among others, climate change. As a consequence, residents of all three countries are increasingly expected to protect themselves against flood damage.

In addition, it is striking that flood events are envisioned differently in the United States than in the European countries in this analysis. Partly, this relates to the different character of floods in Europe as compared to the United States where floods are often hurricane-driven. However, it is also determined by cultural differences in perception of the controllability of floods; Europeans in general, and people in the Netherlands in particular, tend to view flood risk as controllable, whereas in the United States, people place flood risk into the category of 'forces of nature', which puts them largely beyond human control (Tullos, 2018). Also, flood disasters in the United States often exceed European cases in terms of impact (Dartmouth Flood

Observatory, 2020). Perhaps these experiences inflect the idea of control over the environment in ways specific to the selected, which then inform the observations on responsibilities made in this article.

Moreover, it should be noted that the scope of this article did not allow for an in-depth comparison of the country examples, but we favour the added value of the examples over an article with a solely theoretical conceptualisation. Yet, a detailed analysis of the countries promises additional relevant insights on the notions of responsibility and the flood risk governance approaches per country. Ideally, such a comparison would consist of empirical data on perceptions of responsibility from stakeholders in flood risk governance. Future research can determine whether the conceptualisation of responsibility as presented here is also applicable to broader climate change adaptation processes as the debates on residents' responsibility are also applicable to climate issues like heat stress or drought (Doorn et al., 2012; Mees, Driessen & Runhaar, 2015; Mees, 2017).

6 | CONCLUSION

This study has engaged with the emerging debate on the attribution of responsibilities in flood risk governance. We have shown that conceptualising and empirically illustrating 'responsibility' is a daunting task because conceptual confusion pervades in scholarly work on how to understand responsibility. Responsibility is to be understood as a multi-faceted concept. With the aim to structure debates both in academia and in practice, in this study, the concept is disentangled into four notions: legal responsibility, accountability, perceived responsibility, and moral responsibility. As the previous sections have shown, these four notions allow for nuanced and systematic analysis and discussion of the attribution of responsibilities, which strikes a balance between being overly simplistic and lacking parsimony.

The results show that residents' perceived responsibilities often stand in conflict with the other notions of responsibility. Even though residents often have a legal responsibility to protect their properties, this is overshadowed by the other notions. For instance, residents hold governments to account for flood events, and they perceive that governments have the responsibility to pay for disaster relief, even though governments do not have this legal responsibility. But this perception prevails as governments often do provide disaster relief after a flood. This article emphasises the importance of making considerations for responsibility divisions explicit. Transparency is essential in making the shift to involving residents to a greater degree. These insights allow the debates and decision-making on residents' roles in flood risk governance to reconsider responsibilities and, especially, consider the perceived notions. Perceived responsibility has shown in all illustrative cases that what residents perceive as their own or others' responsibility often does not align with the legally stated responsibilities.

This complements and extends arguments made in other recent contributions to the debate on residents' responsibilities as citizens vis-à-vis governments in flood risk governance. Driessen et al. (2018)

highlighted for instance the need to have a more open and inclusive debate on the normative starting points of flood risk governance. Uittenbroek et al. (this special issue 2022) have studied perceptions of local governmental actors on citizen responsibilities in the adjacent domain of climate adaptation governance. Their findings suggest that local policymakers have an implicit understanding of the multi-faceted nature of responsibility attribution, as they also, implicitly, distinguish between the legal or extra-legal allocation of tasks and the question of who is accountable. A transparent, explicit, and nuanced discussion of 'responsibility' will therefore, help societal debates move forward. In this context, our conceptualisation can serve as a basis for future research and policymaking, when defining or analysing residents' responsibilities vis-à-vis other types of societal actors. In addition, future research should also focus on responsibility divisions in other institutional settings on flood-related loss and damages or other types of environmental disasters. Above all, the added value of perceived responsibility prompts an empirical analysis of residents' perceptions of responsibilities.

ACKNOWLEDGMENTS

The work of Neelke Doorn was funded by a Vidi grant from the Dutch Research Council NWO (number VI.Vidi.195.119).

ENDNOTES

- ¹ See for instance, Snel et al. (2019); Hegger et al. (2017); Mees et al. (2019); Mees et al. (2014); Kammerbauer & Wamsler (2017b); Wamsler (2016); Doorn (2019); Bergsma (2018); Bergsma et al. (2012).
- ² See for instance, Keys v. Romley, 412 P.2d 529, 535–36 (Cal. 1966) (en banc); 983 P.2d 626 (Wash. 1999) (en banc).

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How to cite this article: Snel, K. A. W., Hegger, D., Mees, H., Craig, R. K., Kammerbauer, M., Doorn, N., Bergsma, E., & Wamsler, C. (2022). Unpacking notions of residents' responsibility in flood risk governance. *Environmental Policy and Governance*, 1–15. <https://doi.org/10.1002/eet.1985>