Received: 17 February 2022 | Revised: 15 December 2022 | Accepted: 19 August 2023

DOI: 10.1111/jfr3.12949

ORIGINAL ARTICLE

CIWEM Chartered Institution of Water and Environmental Management | Journal of Flood Risk Management | WILEY

Plugging the holes: Identifying potential avenues and limitations for furthering Dutch civil society contributions towards flood resilience

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Funding information
Interreg North Sea Region Programme

Abstract

Climatic changes can cause unpredictability in flood regimes that traditional flood risk management (FRM) approaches may struggle with. Therefore, flood resilience is seen as a supplementation to these approaches, putting a larger emphasis on flood acceptance and minimising consequences. An (emergent) group contributing towards flood resilience is civil society. This paper examines how civil society contributions can be furthered and guided in the Netherlands as well as exploring potential limitations in doing so. To achieve this, England is used as a good practice example due to a more developed and defined role for civil society being present here. Data were collected on both actual (England and the Netherlands) and potential (The Netherlands) civil society contributions. These were compared to identify potential avenues for Dutch civil society contributions to flood resilience that can be further investigated. The research shows that the most promising avenues are improving advocacy from citizens, improving local flood awareness and developing relationships between FRM authorities and existing citizen groups that can be harnessed and mobilised to support flood resilience. Additionally, the research also provides insights into potential limitations for transferring resilience approaches from one context to another beyond the cases discussed in this publication.

KEYWORDS

civil society, community resilience, comparative research, England, flood risk management, fluvial flooding, resilience, the Netherlands

1 | INTRODUCTION

Most Dutch people know the fictional story of the young boy Hans Brinker who plugged a hole in the dike with his finger to prevent a dike breach from flooding the town of Haarlem (Dodge, 1865). This story vividly imagines how citizens can play a potential role in flood situations, albeit overdramatised. While the story is fictional, there has historically been a role for citizens in flood risk management (FRM) in the Netherlands when managing the threat of flooding. This ongoing threat was unfortunately demonstrated during the 2021 summer

floods in the south of the Netherlands as well as Belgium, Luxembourg and Germany. Amidst these flood events, there is a growing realisation that traditional FRM approaches, besides emphasising 'flood prevention', need to shift their attention to minimising consequences through enhancing 'flood resilience'. This shift represents a more holistic and interdisciplinary flood management approach that recognises that not every flood can be prevented (Forrest et al., 2020; McClymont et al., 2020).

Simultaneously, a shift from 'government to governance' is occurring as traditional FRM governmental authorities (e.g., regional water managers) transfer part of their FRM responsibilities to other stakeholders (e.g., non-state actors and civil society; Mees et al., 2016; Meijerink & Dicke, 2008). This shift leads to increased involvement of such groups within FRM-approaches (Forrest et al., 2019; Mees et al., 2016). The term 'civil society' is broad and can refer to individual actions and social bonds between individuals, citizen initiatives, community organisations and/or local businesses. Businesses are not always considered as part of civil society. However, from a civil-society versus private interest perspective, businesses are part of a community and may contribute resources towards managing flood risks. There is evidence that this governance shift can lead to new exchanges of experiences, ideas and practices between relevant stakeholders as well as in contributions to flood resilience. For instance, sharing local knowledge, using social media to communicate flood risks and coordinate residents to prevent flooding or rescue people (Forrest et al., 2019; Mees et al., 2016) can support communities and FRM authorities to better cope with floods (Dolowitz & Marsh, 2000; Rose, 1993; Spaans & Louw, 2009).

This paper focuses on the Netherlands where 11th century civil society actions led to the formation of community-based water boards for solving flood-related problems (Mostert, 2020). Over time, this civil society role shifted towards the state becoming responsible, but more recently the roles and contributions of civil society are again becoming increasingly prominent and recognised (e.g., Edelenbos et al., 2017; Forrest et al., 2021; Restemeyer et al., 2017; Snel et al., 2020). In comparison, English civil society has a more developed role in FRM, partly due to recent flood experiences and English governmental responsibilities with extensive research regarding their role and contributions to FRM (Forrest et al., 2019; Mees et al., 2016; O'Brien et al., 2014; Wiering et al., 2015).

Our research explores this shift towards civil society engagement, their potential roles and contributions within Dutch flood resilience approaches and compares these to English experiences. To do so, empirical evidence was collected in the Dutch Alblasserwaard-Vijfheerenlanden region (A5H-region) on potential roles and contributions of civil society in the Dutch context. Through comparison with the English experiences, the paper identifies potential new avenues of Dutch civil society contributions towards flood resilience, which can support 'plugging the holes' in Dutch FRM. As part of this, consideration is also given to contextual limitations regarding environmental and flood governance aspects. By understanding these limitations, our findings are therefore not only relevant for FRM-based policy development in the Netherlands but also other international areas at risk of severe flooding.

2 | THEORETICAL FRAMEWORK

2.1 | The concept of flood resilience

The 'resilience' concept gained prominence in ecology (Holling, 1973) and has since been used across a range of disciplines (Alexander, 2013; Trell et al., 2018). Resilience can be understood through three different, but coexisting perspectives (Chelleri & Baravikova, 2021; Davoudi, 2012). *Bouncing back* prioritizes robust, consequence limiting and resistant capacities to try to recover to a previous stable situation (Alexander, 2013); *bouncing forward* relies on innovation, change and transformation to, if needed, a new stable situation (Satterthwaite & Dodman, 2013); *building back better* being a mix of both (Mannakkara & Wilkinson, 2013). It must be noted that these are 'ideal theoretical archetypes' and that in practice there may exist overlap across these approaches.

A flood situation in a diked community can be understood through a series of consecutive phases: no imminent flood, imminent high water levels, resisting flood hazards, responding to flood protection failures, immediate flood aftermath and recovery (Forrest et al., 2019). Furthermore, through the lens of flood resilience, five interlinking capacities can be identified throughout these phases: preventing flooding, limiting flood impacts, recovering, adaptation and transformation (Alexander, Priest, & Mees, 2016; De Bruijn et al., 2019; Forrest et al., 2019; Hegger, Driessen, Wiering, et al., 2016; Zevenbergen et al., 2020). An overview of these capacities with examples is presented in Table 1.

Additionally, literature also distinguishes *continuous processes* occurring throughout the flood cycle and relate to process-based activities between involved individuals, groups and institutions. The learning capacity of stakeholders is a continuous process based on the reflection on previous flood experiences, perceived flood risk and the presence of resilience capacities and their sufficiency

TABLE 1 Overview of the different flood resilience capacities and illustrative examples.

Flood resilience capacity	Relevant flood phase(s)	Explanation of the capacity	Example of interventions that contribute to the specific capacity
Preventing floods	Imminent high water levels; Resisting flood hazards	Emphasises the ability of an area or community to withstand and prevent flooding during high-water situations (Hegger, Driessen, Wiering, et al., 2016; Klijn et al., 2004; Mens et al., 2011).	• Dikes • Flood barriers • Storm-surge barriers • Flood retention areas
Limiting impacts	Imminent high water levels; responding to flood protection failures	Focuses on limiting the potential damage a flood event may cause in an area or community if it does occur (e.g., due to flood defences failing) (EA, 2012; Karrasch et al., 2021; Mens et al., 2011; Restemeyer et al., 2015; Van Herk et al., 2014).	• Spatial development restrictions in low-laying areas vulnerable for flooding • Using waterproof materials for building • Building houses in a way that prevent or limits flood damage • Community emergency plans • Flood damage insurance
Short-term recovery	Immediate flood aftermath	Focusses on a 'return to function' by providing basic living needs and economic activities in an area or community (e.g., providing shelter, food, clean water, electricity and hygiene; Birgani & Yazdanoost, 2016; Haas et al., 1977; Nguyen & James, 2013; Song et al., 2017; Van Ree et al., 2011).	• Providing clean water and food, electricity, access to toilets and shelter to affected citizens.
Long-term recovery[a]	Recovery; no imminent flood	Focuses on rebuilding the area or community to pre-disaster standards and making changes in approaches, policies and measures taken to prevent a future flood event (Haas et al., 1977; Hegger, Driessen, Wiering, et al., 2016; Liao, 2012; Nguyen & James, 2013).	• Rebuilding or repairing damaged structures and infrastructure • Flood damage insurance to support the rebuilding. • Improving previously implemented policies and measures to prevent a future flood event either through adaptation or transformation (see below)
Adaptation	No imminent flood	Focusses on making smaller, more incremental changes to approaches, policies and measures used within the current ideas and arrangements in place for FRM within an area or community (Liao, 2014; Liao et al., 2016; Restemeyer et al., 2015).	• Building stronger and higher dikes to reduce increasing flood risk.
Transformation	No imminent flood	Focusses on systematic changes that can "fundamentally" alter pre-flood approaches and organisations to manage future flood risk within an area or community (Hegger, Driessen, Wiering, et al., 2016; Restemeyer et al., 2015; Walker et al., 2004, p.2).	• The inclusion of new societal groups within FRM-decision making and approaches to support FRM

[a]This publication focuses on civil society contributions before, during a flood crisis and its immediate aftermath that may contribute towards the above mentioned capacities associated with flood resilience. As such, while long-term recovery is mentioned in Table 1, it is not addressed further in the remainder of this publication.

for future flood events (Davoudi et al., 2013; Kuang & Liao, 2020; McClymont et al., 2020). Part of this is understanding and evaluating what worked well (or not) during previous (near) flood events or practices to further enhance existing flood resilience capacities to prepare for future flood events (Davoudi et al., 2013). Another continuous process is linked to the ongoing development of social capital and trust, and restructuring of social networks in flood risk areas (McClymont et al., 2020). Highly prepared communities with strong social connections and networks can mobilise themselves and organise local capacities, increase lay knowledge, retain flood memories from previous flood experiences and develop and nurture social networks within these communities (Forrest et al., 2019; McEwen et al., 2017). However, as argued at the end of this section, this can be a double-edged sword.

While presenting a summarised conceptualisation of 'flood resilience', not all capacities are emphasised equally in practice as there is not a universally accepted understanding of what constitutes 'resilience' as well as different prioritisations of resilience capacities between management strategies (Laurien et al., 2020; McClymont et al., 2020; Wiering et al., 2015). For example, in the Netherlands, the aspect of flood prevention is dominant (Restemeyer et al., 2017) whilst in England, the aspects of preventing damage, responding to flooding and recovery are emphasised (Hegger, Driessen, Wiering, et al., 2016). Therefore, the concept inherently possesses fluidity in its operationalisation (McClymont et al., 2020). When comparing civil society contributions to flood resilience, we therefore need to consider such differences in practice-based interpretations. As such, the contextual and cultural reasoning for why FRM approaches are employed are considered important and can limit such efforts (see Section 2.3).

Finally, flood resilience conceptually also receives criticism through the lens of the government to governance shift. This shift has seen governments delegating both FRM responsibilities to civil society as well as the blame should flood measures fail (Begg et al., 2015; Kuhlicke et al., 2016; Raikes et al., 2019). This can lead to the privatisation of FRM and ties in with concepts such as decentralisation and localisation. This may lead to inequality over time due to inherent inequalities between and within communities (Begg et al., 2015; Forrest et al., 2020; Houston et al., 2021; O'Hare & White, 2018; Restemeyer et al., 2019; Van Bavel et al., 2018). For example, evidence from the 2011 Brisbane flood showed that government and civil society collaboration is necessary for community resilience and that a government 'retreat' may reduce community capacities instead (Walters, 2015). If left unchecked, such practices may lead to resilience of some being enhanced at the cost of others (Hornborg, 2009).

2.2 | Civil society's flood resilience contributions in England

As previously mentioned, England can be considered an appropriate example due to a well-documented civil society that is encouraged to participate in FRM efforts (Forrest et al., 2019; Geaves & Penning-Rowsell, 2015; Johnson & Priest, 2008; Kuhlicke & Steinführer, 2013) as well as experiencing a shift towards flood resilience in policymaking (e.g., the EA National Strategy—Environmental Agency [EA], 2020). For the purpose of this paper, a literature review was undertaken to identify civil society contributions to flood resilience in England (Appendix A). When it comes to the contribution of civil society actors to FRM in the English context, several general trends can be observed over the course of the previously mentioned flood phases (e.g., Forrest et al., 2017, 2019; Twigger Ross et al., 2016). Firstly, there is an important role for community groups (e.g., flood groups) and volunteers to help preparing communities for flood events. Such preparations include supporting river management, setting up floods stores to provide equipment during a flood, advising or helping to implement flood measures (either at a property or local level), and developing/practicing flood plans (e.g., Nye et al., 2011; O'Brien et al., 2014; Seebauer et al., 2018; Thaler & Levin-Keitel, 2016). Secondly, there is evidence of community groups sharing local flood knowledge to increase residents' flood risk awareness and with FRM authorities in order to improve or tailor flood measures and policies to their local needs (e.g., McEwen & Jones, 2012; Twigger-Ross et al., 2016; White et al., 2010). Local communities and citizen groups have also been identified as advocating for certain flood measures and policies to be implemented or changed by FRM authorities (e.g. EA, 2020; McEwen et al., 2018; Thaler & Priest, 2014; Twigger-Ross et al., 2014).

When high water levels are imminent, the literature from the English context also shows that communities may contribute through actions such as pre-emptively setting up temporary flood barriers, warning citizens about potential flooding, and helping to evacuate at-risk citizens (e.g., Forrest et al., 2019; Geaves & Penning-Rowsell, 2015; Neal et al., 2011; Walker-Springett et al., 2017) Additionally, individual volunteers (e.g., flood wardens) can also use this time to mobilise and organise spontaneous volunteers who can undertake actions over the course of a flood such as reinforcing flood barriers (if necessary) and monitoring the water levels in rivers/

streams (e.g., McEwen & Jones, 2012; O'Brien et al., 2014). The earlier mentioned community-organised flood stores can provide volunteers with additional equipment to prepare for flooding (e.g., Twigger-Ross et al., 2016). Active members of the community may also update local residents and FRM authorities on flood conditions in the area and the status of local flood defences (e.g., Forrest et al., 2019; Harris et al., 2016). In the case of a flood defence failure, volunteers have informally helped with emergency responses such as cordoning off flooded roads, installing temporary flood barriers to limit potential flood flow routes and evacuating remaining citizens (e.g., Forrest et al., 2019; Harris et al., 2016; Twigger-Ross et al., 2016).

After a flood has passed, several studies (e.g., Harris et al., 2016; Thaler & Levin-Keitel, 2016; Twigger-Ross et al., 2014; Wehn et al., 2015) have identified volunteers as helping with the clean-up, setting up donation points, acting as emergency responders, and providing shelter and emotional support for displaced flood victims in the English context (Forrest et al., 2019; Goodchild et al., 2018; O'Brien et al., 2014). Flood wardens and flood group members in this moment can also act as a source of local leadership and may communicate information to authorities on flood impacts (Forrest et al., 2019; Harris et al., 2016).

The contributions of civil society to flood resilience are often limited by the availability of resources with their activities restricted to smaller-scale local actions (Forrest et al., 2019; Harris et al., 2016). Furthermore, the longevity of civil society contributions can also be a limiting factor and, when memories fade away, the perceived need for these contributions potentially reduces as active citizens with relevant experience and knowledge might leave the community (e.g., locals moving away; McEwen et al., 2018). The literature also points out the existence of a potential unequal distribution of skills and resources are available in the communities (Forrest et al., 2020; O'Hare & White, 2018). Over time, this can lead to differences in or between communities regarding flood resilience, bringing with it potential issues relating to social injustice and inequality (Johnson et al., 2007; Pitt, 2007; Walker & Burningham, 2011) with some communities being less able to undertake abovementioned actions (Harris, 2018). Finally, it should be noted that civil society involvement in FRM in England is partly influenced by the nature of FRM responsibility with authorities having permissive powers to prevent flooding, but no legal obligation to do so (Begg et al., 2015; Thaler & Levin-Keitel, 2016; Wiering et al., 2015). Understanding these limitations is important when identifying the potential consequences of a greater role for civil society in contributing to flood resilience, such as in the case of the Netherlands.

2.3 | Relevant contextual factors for flood resilience approaches in England and the Netherlands

This paper aims to utilise experiences regarding civil society involvement in the English context, to help identify potential avenues and limitations in the Netherlands. It is therefore necessary to consider both the context from which experiences regarding these civil society contributions originate in England and the Dutch context to which these are to be applied. These contexts influence and may limit the potential success of insights, lessons and approaches transferred from one context to another (Dieperink et al., 2018; Minkman et al., 2018). Analysing these conditions can provide insights on the extent to which experiences in the donor country (i.e., England) can provide inspiration in the development of future FRM policies and approaches in the recipient country (i.e., The Netherlands; Dolowitz & Marsh, 2000; Janssen-Jansen et al., 2008; Rose, 1993, 2005).

First, when comparing flood-prone areas, a commonly used set of factors within academic literature are the geographical characteristics of vulnerable areas (Bubeck et al., 2017; Minkman et al., 2018) as well as the type, impact and frequency of flood events (e.g., Bubeck et al., 2017; Hegger, Driessen, Wiering, et al., 2016; Mees et al., 2016). These factors together determine the floodwater height, flood impact and time that authorities and communities have to respond. This can result in the need for either higher safety standards (i.e., for high impact floods with a short response time) or policies that enable more flexibility (i.e., for lower impact floods with a longer response time) or somewhere in between (Bubeck et al., 2017). An second set of often used factors are the characteristics of the governmental system deciding on flood approaches (Mees et al., 2018; Minkman et al., 2018). This includes elements such as how this system operates, the main types of stakeholders involved, the distribution of responsibilities between FRM authorities and civil society, and the flood resilience approaches commonly used (Ek et al., 2016; Hegger, Driessen, Wiering, et al., 2016). These factors help determine whether a certain measure or policy fits the 'flood governance context' (e.g., the involved stakeholders and the main FRM approaches used). Finally, socio-economic development aspects such as the disposable household income and gross domestic product per capita can help approximate the ability of citizens and public actors to be able to afford measures (Laurien et al., 2020; Mees et al., 2016; Minkman et al., 2018). However, as England and the Netherlands are both Northwestern European countries and are relatively similar in nature regarding socio-economic aspects (OECD, 2020a, 2020b), these contextual factors are therefore less relevant and are not included

within the context of this paper. Furthermore, these factors are derived from the national level and may not reflect the local context. In Table 2, these contextual factors are presented for both countries.

3 | METHODOLOGY

3.1 | Case study description

The research used the A5H-region as an explorative case study area exemplifying a Dutch area experiencing flood risk with physical features similar to the ones explained in Table 2. A case study approach was followed to extensively analyse the area within a real-life context to gain a better understanding of potential Dutch civil society contributions (Yin, 2013). This practice-based knowledge from a case study fits with the explorative aim of this study. To this end, the case of the A5H region was selected as being a good example of how civil society contributions to FRM and accompanying limitations could take shape within the context of the Netherlands as well as being an area that shares similarities with other Dutch regions, thereby allowing for a certain degree of generalisation in regard to the findings of our research.

The region is located in the west of the Netherlands between the rivers Lek in the north and the rivers Waal and Merwede in the south, which are part of the Rhine river basin (Van der Hulst et al., 2017). Topographically, the area is considerably lower laying than the surrounding river water levels during a high water situation, making it flood-prone. Additionally, the region's landscape also has a 'sloped' profile with the eastern part being higher than the west (Den Hertog & Verhagen, 2010; Vergouwe et al., 2014). Consequently, floodwater depths vary from no risk to up to 4–5 m in the Western part and are also dependent on the location of dike breaches (see also Figure 1a–d). Additionally, flooding is not instantaneous as it can take hours to multiple days before areas located further away from the breach location are affected (LIWO, 2020a; Vergouwe et al., 2014—see Figure 1e). Finally, the western part is also vulnerable to storm surges which may cause high river water levels (Vergouwe et al., 2014). Both flood types (fluvial and storm surges) have occurred in regions past with the 1953 flood and the 1995 near-flood being the most recent instances (Vergouwe et al., 2014).

Should a potential flood situation occur, it would require evacuation of up to ~230,000 inhabitants out of the area (horizontal evacuation) due to an insufficient amount of places suitable for large-scale vertical evacuation (staying at high places; LIWO, 2020b). However, timing an evacuation may be difficult as potential high-water levels originating from the river catchments can only be predicted several days in advance and only 24–36 h beforehand for a storm surge.

3.2 | Data collection and analysis

A combination of semi-structured interviews (14 in total) and focus group sessions (three in total) were conducted in the A5H region (see Table 2). The interviews were conducted in Dutch between April and July 2019 with key informants from civil society groups (e.g., local community event groups, sport clubs, local businesses, church communities; interviews 1–7/CS1–CS7), Dutch authorities (local, regional and national; interviews 8–12/G1–G5) and semi-governmental organisations (utility services; interviews 13–14/SG1–SG2). This use of key informants helped to gather representative data from groups and organisations that reflects the case area as a whole or their type of stakeholder (O'Leary, 2014). All respondents were asked about their perception on the impact flooding may have in the A5H-region, the role they saw for themselves and other actors during the different phases of a flooding, and the interaction between civil society and the Dutch authorities. In addition to these interviews, focus group meetings were held in the same period with experts in water management, public administration, spatial planning and communication, as well as members of emergency services, the Province of South Holland and the regional Safety Region. Participants in the focus group meetings were asked to review and reflect upon the collected data. These responses are included in the results. Finally, observations from the 2021 summer floods are also included in the discussion to provide further insights into how civil society could react during this hypothetical A5H-flood, especially during the aftermath as this was a topic that was underrepresented during the interviews and focus group sessions due to a lack of (at that time) of recent flood events in the Netherlands.

Summarising reports were made to analyse the interviews and the focus group sessions. These were then coded based on the contributions made towards flood resilience by civil society using the earlier mentioned flood phases as a framework to place these contributions over the course of a flood event (Table 3).

4 | RESEARCH FINDINGS

The presented evidence from the A5H-region are a combination of experiences that some respondents had from the 1995 flood event threating the region, current civil society contributions and perceptions on potential civil society contributions could be over the course of a hypothetical flood event.

TABLE 2 Comparison of contextual environmental and governance factors influencing flood resilience approaches in England and the Netherlands.

Factor	England	Netherlands
Environmental factors		
Physical characteristics of vulnerable areas and the types of flood events occurring	Geographically diverse. Height variations in the landscape leading to parts of the country to be susceptible for flooding and concentrating flood risk areas to lower areas, coasts and valleys (EA, 2019). Coastal flooding and particularly tidal flooding can occur on the east coast. River flooding can also occur (~3 million properties at risk of surface water flooding, of which ~0.6 million also at risk of sea/river flooding) (UK Government, 2016).	A significant proportion of the western part of the country is below sea level and therefore vulnerable for coastal flooding (UK Government, 2016). Also high water levels in rivers may lead to potential flooding as well (Plummer et al., 2018). Urban areas are also at risk of experiencing pluvial flooding due to old drainage systems (Forrest et al., 2020). Finally, rural areas are also vulnerable for flooding from the regional water system
Scale of flood risk	"12% of the land area, ~8% of the population and 2.4 million (8%) properties (residential and non-residential) are at risk of sea/river flooding" (UK Government, 2016, p. 111)	"59% of the land area is susceptible to flooding (55% is protected by embankments or dunes, 4% is unprotected). At least 11 million people (65% of the population) are at risk of flooding. The 'Randstad', where 70% of the GDP is produced and population density is highest, is susceptible to flooding" (UK Government, 2016, p. 111)
Flood frequency and history	Frequent flood events (Hegger, Driessen, & Bakker, 2016). For example 2004 (Boscastle flooding), 2007 (Hull flood), 2015 (Christmas flooding) and floods end 2019/beginning 2020 affected different parts of the country. Also at risk of storm surge flooding such as the 1953 flood.	Low frequency of flood from the major rivers (Rhine/Meuse) and the coast due to flood protection measures (Plummer et al., 2018). Last major near floods in 1993 and 1995 and last actual floods in 1953, 1993 and 2021. Smaller scale flooding from regional water systems have occur more frequently such as in 1998 (Amersfoort) and 2020 (Nijverdal).
Flood risk governance factors		
Governmental system characteristics	There is a dominant public sector with a key role for the UK government in setting national policies that are delivered by the public (e.g., the Environment Agency) and private (e.g. water and sewerage companies) sector in collaboration. Lead local flood authorities (i.e. county councils and unitary authorities are responsible for managing local flood risks) (Local Government Association, 2022; UK Government, 2016).	There is a dominant public sector with a key role for the national and regional governments (e.g., municipalities and water boards) for flood (defence) and crisis management (Bubeck et al., 2017; Matczak et al., 2016; Mees et al., 2016)
Responsibilities of FRM authorities towards flood risk management	Roles & responsibilities are set out in the National Flood and Coastal Erosion Risk Management Strategy for England. • Central: Department for the Environment Food and Rural Affairs (DEFRA)—FRM policy; Department for Levelling Up, Housing and Communities—spatial planning policy; Cabinet Office—civil contingencies; Environment Agency—overview, coordination and delivery; national Flood Forecasting Centre—flood warnings.	Roles and responsibilities are set out in the 2011 Administrative agreement on Water. • Central: Ministry of Infrastructure and the Environment—water policy; Rijkswaterstaat—operation and maintenance of main water system; Deltares—applied research institute which works closely with the public sector; Delta commissioner—oversees delivery of the Delta programme for FRM and freshwater supply. • Regional: water boards—flood defence maintenance supported by STOWA (foundation for applied water research) which acts as their

(Continues)

TABLE 2 (Continued)

Factor	England	Netherlands
	• Local/regional: local government, Regional Flood and Coastal Committees, and Drainage Authorities are relevant (Association of Drainage Authorities, 2022; EA, 2020; UK Government, 2016) There is a fragmentation of roles and responsibilities across public and private actors. Public authorities in England have permissive powers to manage flood risk but no legal obligation to do so.	knowledge centre through coordinating research and sharing information, improvement and operations; Safety Regions—emergency planning & management (Havekes et al., 2021; UK Government, 2016). Municipalities carry responsibility for managing pluvial flooding through rainwater management (Jong & Hobma, 2012). The Dutch governmental branches (both national and regional) carry legal responsibilities for protecting land or property from flooding. Such efforts have to meet legally set standards (Wiering et al., 2015).
Flood risk management approaches used	Diversified set of FRM approaches focusing on the different capacities of resilience (Alexander, Priest, Micou, et al., 2016;Hegger, Driessen, Wiering, et al., 2016; Matczak et al., 2016). The aim here is to reduce the impact on communities by optimising investment benefits (UK Government, 2016). Examples from English practice are the concept of 'Making Space of Water' and catchment-based approaches (Van Buuren et al., 2015).	Strong focus on flood protection in the Netherlands (Hegger, Driessen, Wiering, et al., 2016; Matczak et al., 2016), which is combined with spatial interventions to 'fit' water within the landscape such as the 'Room for the River'-project (Matczak et al., 2016; Van Rijswick & Havekes, 2012). This is also known as the 'Multilayer Safety Approach' as utilised in for example Dordrecht (Van Herk et al., 2014). The aim of these interventions is to minimise the loss of life (UK Government, 2016).
Current involvement of civil society in FRM approaches	Currently, civil society initiatives involve the formation of flood groups that may for example take FRM measures on a community level, advocate at FRM authorities for different approaches. Additionally, citizens can also become flood wardens that act as community leaders during a flood event (e.g., Forrest et al., 2019). Increasing civil society involvement is supported by the EA National Framework (EA, 2020), which aims of appointing community 'climate champions'. Second, the National Flood Forum are a charity that supports and represents flood-affected citizens (National Flood Forum, 2020). Therefore, the current civil society in England can be due to this structure be seen as formal and often organised in nature.	At the moment, citizens are sporadically involved. With the exception of areas that face more frequent floods (e.g., areas outside of river embankments, brooks and unprotected areas along the coasts). Notable river flood exceptions are, for example, Dordrecht and Kampen where yearly flood protection exercises take place with citizens to place temporary flood barriers. Additionally also, new climate adaptation approaches such as the risk dialogues are used to further increase citizen participation in the process (Ministerie van Infrastructuur & Waterstaat et al., 2020). Towards pluvial flooding, citizens and civil society have a growing role (Dai et al., 2017; Forrest et al., 2020).

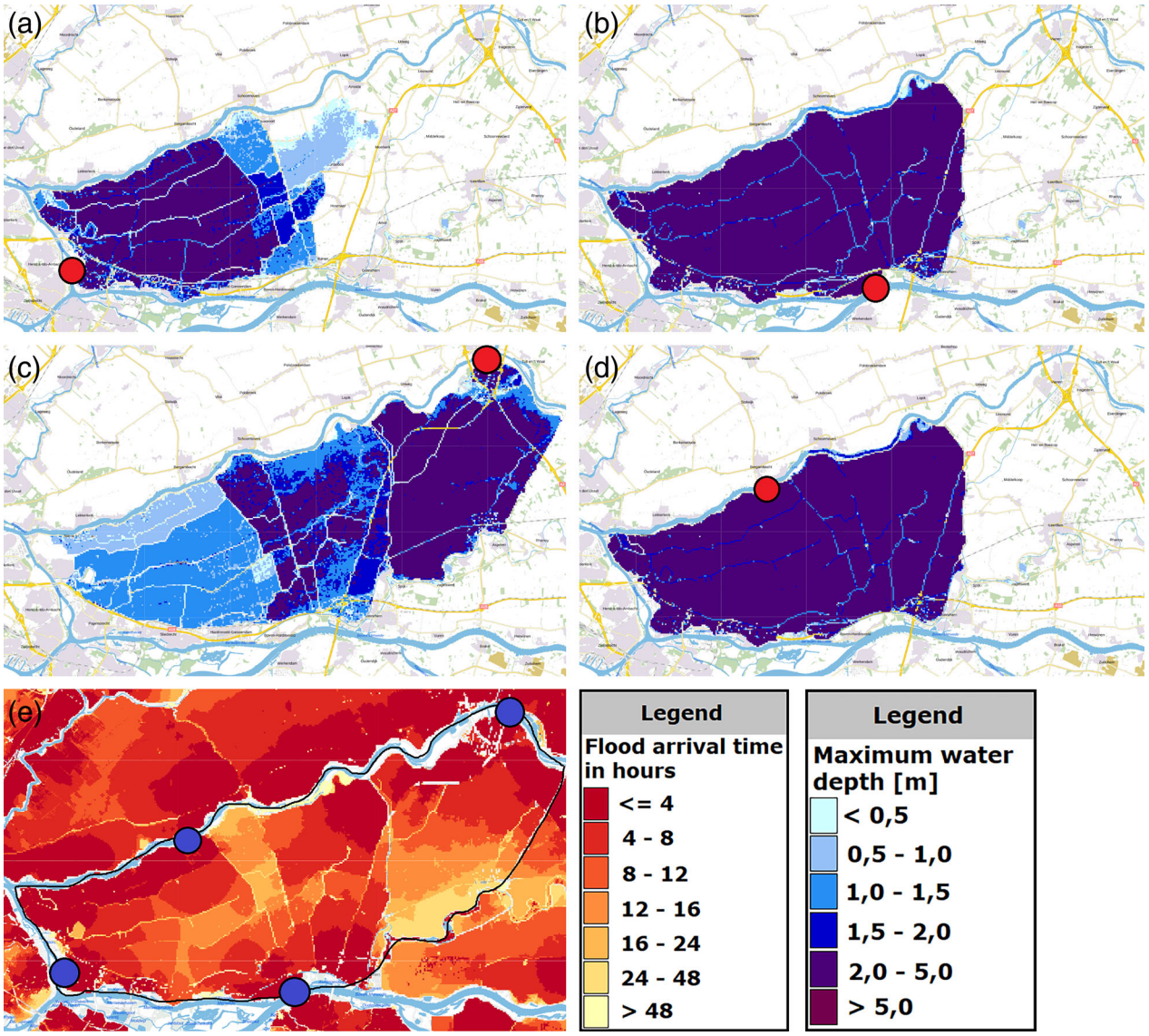

FIGURE 1 An overview of different flooding scenarios (flood probability = 1/2000) based on the location of a primary dike breach (shown by the red dots) and the arrival time of water in these areas ((e); blue dots). These are: (a)—breach at Papendrecht; (b)—breach at Hardinxveld-Giessendam; (c)—breach at Vianen; (d)—breach at Ameide. *Source*: LIWO, 2020a, 2020c.

4.1 | No flood imminent phase

In this phase, several activities are currently already undertaken by civil society. First, local residents volunteer as 'dike guards' for the water board. In this role, they patrol the dikes during high river water levels to spot potential signs of dike breaches (e.g., G2). These volunteers are relatively formalised and receive annual training from the water board. Additionally, several construction companies in the region are contracted via an agreement with the water board to help during high water events with dike reinforcements (Waakvlamovereenkomst). The water board and these companies routinely doing practical field exercises to simulate what they need to do in the case of a flood event where they then need to reinforce dikes during a 'live' flood (G2).

Furthermore, individual citizens can be encouraged by authorities to keep emergency supplies (CS1; SG1) and communities could opt to develop flood stores with flood supplies (e.g., sandbags) that can be utilised when needed (CS2). FRM authorities may also develop, improve or maintain relationships with local community leaders to establish contact points for during a flood event (FG1; FG3). This in turn can help FRM authorities to coordinate volunteer efforts when needed. Respondents also reported that Dutch citizens are often unaware of local flood risks (e.g., CS1; CS3; CS4). Therefore, citizens can be informed by dissemination of flood risk information within the community (e.g., local newspapers or flyers; CS1; CS3) or educating schoolchildren (G2) to improve flood awareness. However, the respondents did mostly state that the government should arrange this

TABLE 3 Overview of the semi-structured interviews and expert focus group meetings that form the empirical evidence from the A5H-region.

#	Respondent organisation	Location	Type of stakeholder
Civil society respondent 1 (CS1)	Huis 't Bosch (Event organiser)	Lexmond	Civil society
	Kingsday association Lexmond		Civil society
	Business association		Civil society
CS2	Blauwzaam (Foundation)	Hoornaar	Civil society
CS3	Safety brigade Hardinxveld-Giessendam	Hardinxveld-Giessendam	Civil society
CS4	Korfbal club Vriendenschaar	Hardinxveld-Giessendam	Civil society
CS5	Herik (private business)	Sliedrecht	Civil society
CS6	IV Infra (private business)	Sliedrecht	Civil society
CS7	Protestant church community 'De Morgenster'	Papendrecht	Civil society
	Football club Papendrecht		Civil society
Governmental respondent 1 (G1)	Municipality Molenlanden	Papendrecht	Governmental
G2	Water board Rivierenlanden	Tiel	Governmental
G3	Department of Waterways and Public Works (Rijkswaterstaat)	Rotterdam	Governmental
G4	Safety region South-Holland-South – Emergency response 1	Rotterdam	Governmental
G5	Safety region South-Holland-South – Army involvement 2	Rotterdam	Governmental
Semi-governmental respondent 1 (SG1)	Stedin (Gas and electricity network manager)	Rotterdam	Semi-governmental
SG2	Oasen (Drinking water company)	Gouda	Semi-governmental
Focus group meeting 1 (FG1)	Focus group consisting on academic experts on the topics water management, governance, communication and spatial planning, as well as participants from the Province of South Holland and the Safety Region South Holland-South.	Gorinchem	Academic / governmental
FG2		Lexmond	Academic / governmental
FG3		Hardinxveld-Giessendam	Academic / governmental

Note: Similar numbered interviews were group interviews. The respondent code in the first column is referenced to in Sections 4 and 5.

instead of civil society (e.g., CS3; CS5; CS7; G2; G3; SG2; FG2). Finally, respondents also saw a potential role for the government in interventions to create artificial high-point in the landscape to allow for vertical evacuation as well as being safe locations for flood stores (e.g., CS2; CS5; CS5; SG2); to develop (local) evacuation plans (CS5; G4; SG1; FG2) or to increase the road capacity to support horizontal evacuation efforts (CS1).

4.2 | High water levels imminent phase

With (imminent) high water levels, dike guards will patrol the dikes, respond to calls from local residents (e.g. when residents spot seepage behind the dike) and report back to the water board. Additionally, the water board can also request additional dike guards from other water boards when additional human resources are needed (G2). These dike guards are also deployed in these roles for the next two phases.

Respondents reported that another potential contribution would be the sharing of information provided by FRM authorities throughout the community via social media (e.g., WhatsApp and Facebook). This may work better than when only the authorities communicate this information for they might be unable reach to all community members (CS1). Respondents also stated that

citizens are often better informed about where vulnerable people that might require help live. Therefore, community members can help these groups so that authorities can concentrate on other pressing matters (e.g., reinforcing dikes; CS1; CS7; FG2). Additionally, evacuation can take place by citizens driving out of the area or via alternative modes of transportation such as car-sharing, trains or locally owned boats (CS 1; CS3; CS4; CS6; CS7; G1; FG2). However, this can only be done until conditions become unsafe. Citizens and businesses located outside of areas of risk can also provide shelter for evacuated people by opening their houses and offices (CS5; CS6). Finally, citizens and local businesses can support FRM authorities (G5). For example, citizens might act as emergency responders (CS2; FG2) and businesses may provide materials (such as sand and sandbags) and heavy machinery that can be used for reinforcing the dikes (CS1; CS2; CS4; G2; G3). These contributions are applicable for the next two phases as well.

4.3 | Resisting flood hazards phase

As stated earlier, the water board Rivierenlanden has the earlier mentioned agreement (the 'Waakvlamovereenkomst') in place with several construction companies so that they may help with reinforcing dikes if necessary. This agreement exists due to water board fearing that businesses might otherwise act independently from the water board and reinforce dikes themselves when feeling threatened during a high-water situation. This uncoordinated reinforcement might affect the structural integrity and instead weaken the dike (G2). However, other respondents (e.g., CS2; CS5; G3) as well as during the expert focus group sessions (FG1), it was stated that such limitations may also lead to a reduction of contributions from civil society to flood resilience since it might dampen efforts and instead lead to citizens waiting for the government to act.

Another potential civil society contribution stated by respondents is that citizens can support FRM authorities by performing tasks that require no prior education or specialisation, such as filling sandbags (CS7; G4). While this is currently a task performed by army reservists (trained citizen volunteers that help the army out in crisis events), these authorities are often busy and overstretched due to the situation. This was also the case in, for example, the 1995 near-flood (De Veen, 2018; Veger & De Koning, 1998). The delegation of tasks from authorities to volunteering citizens frees up human effort and time for authorities to perform more specialised tasks instead.

4.4 | Reacting to the failure of technical flood protection measures phase

Despite the construction of dikes around the A5H-region, there still exists a residual risk of flooding. Should these dikes fail to hold and water starts flooding the region, citizens still remaining (e.g., volunteers helping out with the actions mentioned in the previous section) should flee and if possible, also take other remaining residents with them (CS1; CS7; FG2). Alternatively, another viable option (if available) is that higher buildings or higher laying areas are utilised (vertical evacuation) should escape routes become cut off by flood water (CS5). Additionally, citizens in the area might also opt to evacuate using boats (CS3; CS4, CS6; G1).

Furthermore, as official emergency responders might not be available during this and the subsequent phase, respondents stated that citizens might potentially need to step up and take over leadership, emergency response and healthcare roles that authorities normally fulfil (CS4; FG1). Finally, citizens can also take up leadership positions within their communities as well (CS1; FG2). A flood crisis could become chaotic during which the government loses control over the situation leaving citizens without help from FRM authorities for a period of time (FG1). In such a situation, citizens could then act as temporary leadership figures.

4.5 | Immediate flood aftermath phase

After the flood, water is expected to remain within the A5H-region for an extended period (historically several months to up to a year—Vergouwe et al., 2014). Therefore, a potential contribution might be rescue attempts using boats to retrieve citizens stranded in the flood-affected areas (CS3; FG2). However, this needs to happen under the guidance of authorities as boats going into the area need to be aware of the surroundings and potential underwater obstacles (FG2). Another important role in this phase might be the sharing of resources, such as water and food, with fellow citizens in addition to local businesses providing electricity generators and other basic needs (CS1; SG2). Finally, members from the community can also use social media for sharing information within the community itself as well as with FRM authorities, although this will not be possible if phone networks

stop functioning due to flood damage (CS1; CS3; G3; G5; SG1).

5 | DISCUSSION

The comparison between English and Dutch findings led to insights regarding the operationalisation of civil society contributions to flood resilience. These insights identified both potential relevant avenues to further Dutch civil society contributions towards flood resilience, as well as limitations due to the environmental or governance context (Table 4). For example, environmental factors influencing potential comparisons include the likelihood of a flood occurring and the potential impact and scale of a flood event: in England, there is a higher chance of flooding but at a lower scale and impact while in the Netherlands the opposite holds true. This difference can partly explain a notable difference in the protection level between both countries and the accompanying flood governance structure (Restemeyer et al., 2017; Wiering et al., 2015). This may limit potential civil society contributions in the Netherlands as with an increasing scale and complexity of measures the coordination required increases. Additionally, path-dependency resulting from past choices is also relevant (Haasnoot et al., 2013; Van Buuren et al., 2016, 2018).

5.1 | No flood imminent phase

The examples from the English context primarily emphasise civil society contributions on preparedness by the community advocating for new or improved FRM measures, implementing these themselves, and raising community flood awareness. Conversely, the findings from the Dutch context identified such actions as being less prevalent and often perceived/expected by citizens as responsibilities belonging to FRM authorities. In several interviews (e.g., CS3; G2; FG1; FG2), '*The government should do...*' emerged as a recurring theme that echoes previous findings in the Dutch context (e.g., OECD, 2014; Terpstra & Gutteling, 2008). This was attributed to the strong role of Dutch FRM authorities, which have a legal responsibility for flood management and 'keeping Dutch feet dry' (Hegger et al., 2014; Van Buuren et al., 2012; Wiering & Winnubst, 2017). This partly contributes to limited civil society contributions towards Dutch FRM (Hegger et al., 2017; OECD, 2014; Wehn et al., 2015). There was some evidence of civil society involvement in the A5H-region regarding community preparedness for flooding as businesses were asked to provide input on flood preparedness strategies (CS2). However, in practice, these meetings are often held sporadically and are not integrated within contemporary Dutch FRM practices. Furthermore, the government arranged these meetings as opposed to examples from the English context where civil society initiated these (e.g., McEwen et al., 2018). Furthermore, Dutch civil society contributions such as the dike guards and the earlier mentioned 'waakvlamovereenkomst' also exist (G2); however, these are more in collaboration with FRM authorities as opposed to their English counterparts such as local flood groups.

The research findings show a combination of both environmental and institutional limitations for civil society contributions in this phase that should receive consideration (Table 4). Especially, the strong Dutch governmental role towards FRM may limit the viability of English examples in the Netherlands as it takes away the communities' opportunity to 'own the problem', resulting in a lack of actions (OECD, 2014; Terpstra & Gutteling, 2008) and existing civil society contributions being codified. This is exacerbated by a lack of recent flood events in the A5H-region, which generally negatively effects the flood risk perception and interest within communities (Kuhlicke et al., 2011).

Considering these limitations, a first relevant insight from England for the Netherlands is a further improvement of the voice and participation that citizens have within FRM decision-making. This is inspired by English examples on citizen advocacy (EA, 2020; Twigger-Ross et al., 2014). As a starting point, Dutch citizen involvement in FRM decision-making is currently sporadic (e.g., CS2) but this could be expanded upon by traditional FRM-authorities through collecting input on proposed FRM-approaches through for example community meetings. Through participation, local knowledge is mobilised, which allows for tailoring of FRM measures and policies that considers regional context (Thaler & Levin-Keitel, 2016). Such participation in FRM decision-making can also contribute to increasing community flood awareness (e.g. Feteke et al., 2021), which partially addresses the current low level of awareness in the Netherlands amongst communities. Advancing Dutch civil society participation in FRM could also benefit from the development of (in)formal connections between FRM authorities and local community groups/keypersons (e.g., sporting associations, church communities). Through these interactions, FRM authorities can become more aware of local groups, which can be called upon for help when needed during a flood situation in an organised manner to help support their efforts, resulting in a higher level of community preparedness. Such efforts can be further enhanced when civil society groups are encouraged to participate and collaborate with FRM authorities (Forrest, 2020).

TABLE 4 Overview of English examples, their potential counterpart in the Dutch context and contextual factors that may (positively or negatively) affect these avenues for civil society contributions to flood resilience.

Flood phase	Flood resilience capacity and continuous processes (Section 2.1)	Summary of English examples of civil society contributions (based on Section 2.2)	Evidence of A5H civil society contribution equivalent (if found) (based on Section 4)	Main contextual environmental and/or (flood) governance influences limiting application in the A5H-region (based on Section 2.3)
No flood imminent	Preparedness	Governmental support towards civil society activities regarding FRM	The government is perceived as the main stakeholder for taking FRM measures, limiting interactions to citizens supporting government efforts (e.g. by citizens volunteering as dike guards)	(Governance) FRM is perceived in the Netherlands as a governmental task, limiting interactions between the government and civil society (OECD, 2014; Wiering et al., 2015).
	Preparedness; social network restructuring	Organising in informal social groups focusing on FRM (−associated) activities (e.g., flood groups)	Citizens are sometimes organised in non-flood related associations that can be of use for finding volunteers on a community level	(Governance) FRM is traditionally managed by governmental authorities which perform the equivalent activities done by English flood groups.
	Prevent flooding	Implementing FRM measures and performing river management tasks	FRM measures and river management tasks are performed by FRM authorities	(Environmental) The scale of river management and FRM measures in the Netherlands necessitates this to be (Governance) organised on a regional/national level and being a governmental responsibility.
	Limiting impacts; Adaptation	Improvement of flood risk awareness by sharing knowledge within the community and practicing flood plans	Flood risk awareness can be improved through information spread by the government, in schools and during dike guard training. Dike guards practice annualy. Local communities can opt to practice flood and evacuation plans but this is currently seldom taking place.	(Governance) FRM is perceived by citizens as a governmental task and responsibility. As such, citizens are often not concerned with the matter and give little to no thought about the flood risk they experience (OECD, 2014). As such, this provides room for improvement.

(Continues)

TABLE 4 (Continued)

Flood phase	Flood resilience capacity and continuous processes (Section 2.1)	Summary of English examples of civil society contributions (based on Section 2.2)	Evidence of A5H civil society contribution equivalent (if found) (based on Section 4)	Main contextual environmental and/or (flood) governance influences limiting application in the A5H-region (based on Section 2.3)
	Adaptation; Learning capacity	Sharing local knowledge with FRM authorities to improve flood approaches	Businesses and the government are discussing how the area should be better prepared for a potential flooding	(Governance) In the Netherlands, flood approaches are developed primarily by FRM authorities and the public sees them as the leading experts and as such accepts their decision-making. Exceptions are possible (e.g., Roth & Warner, 2007).
	Adaptation; Transformation	Advocating for FRM measures/policies or changes to current existing ones at local/regional FRM authorities	Changes to FRM strategies were described by respondents. However, these should be thought of as suggestions for the government rather than that citizens advocate actively for changes	(Governance) Within the Netherlands, FRM measures and policies are traditionally perceived as a governmental responsibility. Therefore, advocating for additional measures or changes is often seen as unnecessary by citizens (OECD, 2014). There are exceptions such as Amsterdam Rainproof (Amsterdam Rainproof, 2021) and the situation after the rainfall flooding in Arnhem (Forrest et al., 2020).
High water levels imminent	Prevent flooding	Setting up temporary flood barriers	Not stated in the interviews but are used where roads and railroads cross flood-defences or are built up on boulevards along rivers (Rijkswaterstaat, 2012)	(Environmental) The scale of a severe flood is too large for local temporal flood barriers to be effective (LIWO, 2020a). As such, temporary flood barriers are used to reinforce primary flood defences.

TABLE 4 (Continued)

Flood phase	Flood resilience capacity and continuous processes (Section 2.1)	Summary of English examples of civil society contributions (based on Section 2.2)	Evidence of A5H civil society contribution equivalent (if found) (based on Section 4)	Main contextual environmental and/or (flood) governance influences limiting application in the A5H-region (based on Section 2.3)
	Limiting impacts	Flood wardens or community leaders mobilise community volunteers	Associations and communities (e.g., churches) can provide volunteers when necessary. Additionally, trained volunteers (dike guard) will be called upon by the water board to patrol the flood defences	(Environmental) In the Netherlands there is a lack of (recent) floods resulting in the lack of a proper flood volunteer structure at the moment with the exception of trained volunteers (Rijkswaterstaat, 2012). However, the existence of a dike guard volunteer scheme, the army resevervists as well as existing civil society groups does show that there is potential for mobilising community volunteers.
	Limiting impacts	Pre-emptively evacuate citizens out of the area	Citizens can evacuate and also help elderly and/or less mobile citizens to evacuate as well (either preparing or transporting them).	(Environmental) High population number may lead to the potential traffic jams on roads going out of the area (Kolen & Helsloot, 2012). This was also the case in the 1995 evacuation (FG1).
	Limiting impacts; Adaptation	Making local residents aware of an approaching flood	Done via official communication channels and then further spread by citizens through social media (e.g. WhatsApp or Facebook) and official channels (e.g. NL Alert sms-messages on the phone as well as officials broadcasting that citizens need to evacuate).	(Environmental) Citizens response time to react before the flood hits the area affects the effectiveness of making the community aware and evacuate (Kolen & Helsloot, 2012; LIWO, 2020d).

(Continues)

TABLE 4 (Continued)

Flood phase	Flood resilience capacity and continuous processes (Section 2.1)	Summary of English examples of civil society contributions (based on Section 2.2)	Evidence of A5H civil society contribution equivalent (if found) (based on Section 4)	Main contextual environmental and/or (flood) governance influences limiting application in the A5H-region (based on Section 2.3)
Resisting flood hazards	Prevent flooding	Reinforcing flood barriers	Dikes are reinforced by the water board with assistance from building companies	(Governance) Reinforcing dikes is a specialistic job that needs to be done under guidance of authorities (G2). (Environmental) Additionally, as expected flood impacts in the region are high, other barriers such as PLP-are ineffective.
	Limiting impacts	Updating FRM authorities on the current status	Dike guards share observations with the water board who can then react on potential situations	(Governance) The dike guard position is embedded within the official structure of flood crisis management within the Netherlands. As such, official protocols on how to handle are also in place (G2; Rijkswaterstaat, 2012).
Reacting to flood protection failures	Limiting impacts	Emergency response by volunteers (e.g., cordoning off flooded areas, installing temporal barriers)	When flood defences fail, remaining citizens should evacuate the area if possible or otherwise opt for horizontal evacuation.	(Environmental) Parts of the Netherlands may flood if defences fail (LIWO, 2020c). This makes cordoning of areas and installing temporary barriers not effective. This leaves evacuation (both vertical or horizontal) as the only option in that case. (Governance) During a partial flooding (LIWO, 2020a) it can be expected that authorities (e.g. the police) will cordon off flooded roads and areas.
	Limiting impacts	Evacuating remaining citizens out of the area		

TABLE 4 (Continued)

Flood phase	Flood resilience capacity and continuous processes (Section 2.1)	Summary of English examples of civil society contributions (based on Section 2.2)	Evidence of A5H civil society contribution equivalent (if found) (based on Section 4)	Main contextual environmental and/or (flood) governance influences limiting application in the A5H-region (based on Section 2.3)
(Immediate) flood aftermath	Limiting impacts	Acting as temporary replacement emergency responders	Citizens with appropriate skills can act as replacement emergency responders when officials are not available	Contextual factors do not influence application in the Netherlands as this is an incidental case. (Governance) The main difference may be that such responders are trained for the situation in England whereas in the Netherlands this will happen in an incidental basis (someone requires help and by chance someone is nearby).
	Limiting impacts; Adaptation; Learning capacity	Passing along information to FRM authorities on the impact of a flood and where water is receding	Not stated in the interviews	(Governance) It can be expected that information on the flood impact will be passed along to FRM authorities if communication channels are available (e.g. mobile phone networks or internet) or by eye witness reports (Matthijsse & Van der Klei, 2021). Additionally, reports were written on how the Dutch FRM approaches could learn from the event (Task Force Fact-finding Hoogwater 2021, 2021).
	Recovery	Helping with clean-up	Not stated in the interviews	(Governance) While not stated in the interviews, volunteers for a cleanup are to be expected to help the affected citizens. This was also the case during the

(Continues)

TABLE 4 (Continued)

Flood phase	Flood resilience capacity and continuous processes (Section 2.1)	Summary of English examples of civil society contributions (based on Section 2.2)	Evidence of A5H civil society contribution equivalent (if found) (based on Section 4)	Main contextual environmental and/or (flood) governance influences limiting application in the A5H-region (based on Section 2.3)
				last major flood in 1953 (Waternoodsmuseum, n.d.) and the 2021 flood in Limburg (Rode Kruis, 2021).
	Recovery	Setting up and running donation points	Not stated in the interviews	(Governance) While not stated in the interviews, donations are to be expected from non-affected areas to help the affected citizens. This also occured during the last major flood in 1953 (Waternoodsmuseum, n. d.) as well as during the 2021 summer floods (e.g. Dorlo, 2021).
	Recovery	Providing housing for displaced citizens	Citizens living outside of the affected area can provide temporary housing	(Environmental) The number of citizens that may need shelter is potentially high, making it therefore potentially difficult to provide shelter for all displaced citizens immediately after a flood. However, the 2021 floods did show that there is a large willingness to provide shelter in the Netherlands (e.g. Nieuwkoop, 2021).

5.2 | High water levels imminent phase

With high water levels imminent, environmental contextual factors act as the main limitations for transferring ideas from England to the Netherlands. In both countries, flood warnings and information are disseminated within communities via, for example, social media. Additionally, also the pre-emptive evacuation of at-risk citizens were found in both countries (Harris et al., 2016; CS7). However, environmental factors cause variations in terms of operationalisation due to the time citizens have to evacuate, the type (horizontal vs. vertical) and the number of people to evacuate. This also explains the major emphasis in the A5H-region towards horizontal evacuation and associative efforts (CS1; CS4; CS5; CS6; CS7; FG2; IVF, 2008) as the area is flood-prone with potential high-water levels and relatively few high buildings or higher laying areas to flee to (LIWO, 2020b). As stated, Dutch civil society could support this by helping to evacuate for example more vulnerable citizens (e.g., CS 1; CS7; G1; FG2). Furthermore, while in England, as part of official FRM approaches, community volunteers such as the flood wardens exist, this is less the case for the Netherlands. Only dike guards and army reservists are currently formalised within current Dutch FRM plans with the former focusing on observing the situation and informing authorities and the latter supporting activities such as reinforcing dikes (G2; Mijling, 2021). However, at the same time, we did observe that 'spontaneous' help from civil society occured during, for example, the 2021 floods hinting at a pool of volunteers that were till then unrecognised within Dutch FRM approaches. This is again connected to the strong government role regarding FRM in the Netherlands and the need for more centralised steering to organise the level of flood protection that is necessary, which requires such formalised volunteer structures. At the same time, civil society contributions to FRM in the English context have developed partly due to previous recent flood experiences and/or dissatisfaction with authority approaches to FRM, lack of accountability arising from the fragmentation nature of FRM responsibilities, and the necessity to be self-sufficient in areas that may become cut off during a flood event (especially in rural or remote areas) (Forrest et al., 2019; Geaves & Penning-Rowsell, 2015; Wiering et al., 2015). This difference shows that such flood governance aspects may also act as a potential barrier. Finally, unlike England, in the A5H-region, we did not find contributions such as setting up temporary flood barriers. This is mainly due large parts of the Netherlands being low laying and flood-prone areas, that are at risk of experiencing high flood depths. Respondents did state the use of smaller sandbags to reinforce existing flood defences (CS7; G4) instead as a standalone option as mentioned in several English cases.

Regarding lessons from the English context, the focus on mobilising spontaneous volunteers can be of interest although that this also for the English sometimes a point of struggle (e.g. Harris, 2018). This since, within existing Dutch flood plans, the potential role of spontaneous volunteers (such as shown in the 2021 floods) is not codified nor are they considered to be part of these plans. However, there are organised volunteers, like army reservists and dike guards, which can be readily activated to support FRM if needed (e.g., to help fill up sandbags) in the A5H-region. Finally, as mentioned in the previous phase, FRM authorities also should invest time to network with civil society leaders so that these can provide volunteers in an coordinated manner if needed. In this and the next flood phase, this network can be called upon to support FRM actions (e.g., helping with evacuating vulnerable or less mobile citizens or to fill sandbags).

5.3 | Resisting flood hazards phase and reacting to flood defence failures phase

During these phases, the research findings identi fied important differences between civil society contributions in the English and Dutch contexts. In England, there is a growing interest in volunteers organising and coordinating certain FRM alongside authorities. Conversely, in the A5H region, the expectation is that FRM authorities provide leadership and specialised work, while civil society contributions support these efforts (e.g., helping to evacuate citizens or reinforcing flood barriers; CS7; G2; G4). Therefore, a limitation in this phase is the scale of a flood occurring in the A5H-region leading to the necessity for flood defence measures such as dikes. As maintaining dikes is a more specialised task than building and maintaining a temporary flood barrier as is the case in England, this leads to a more specialised role that is fulfilled by Dutch FRM authorities. Based on the evidence, we can state that influencing factors for these phases are the role that Dutch FRM authorities have due to the potential size and impact of floods. This has resulted in Dutch coastal and fluvial flood management and response to becoming as a public task and therefore highly centralised amongst involved governmental actors in regard of decision-making (Wiering & Winnubst, 2017). This led to Dutch civil society contributions becoming more supportive in nature. Additionally, in England, this leading civil society role is sometimes also necessitated as otherwise no FRM efforts may be made due to the fragmentation of government responsibilities or due to previous recent flood experiences and dissatisfaction with

authority approaches to FRM (e.g., Forrest et al., 2019; Geaves & Penning-Rowsell, 2015).

Examples for these phases in the English context are aimed on raising community awareness on what to do during a flood event and the availability of trained citizens that act as emergency responders when authorities are unavailable (e.g., providing first aid to people in need). These aspects were both described in interviews (CS3; SG2) and the focus group meeting (FG2) but are not considered to be standardised yet in the Dutch context (OECD, 2014). Therefore, during the 'no flood imminent-phase', Dutch FRM authorities should focus on improving flood awareness within communities so that locals know what to do and can act accordingly.

5.4 | (Immediate) flood aftermath phase

In the flood aftermath, similarities between both countries are observed. Both show a rapid mobilisation of volunteers from unaffected parts of the local area as well as other parts of the country to provide help (e.g., cleaning-up, donating and providing basic necessities such as water, shelter and electricity; Bruijns, 2021; Harris et al., 2016; Rode Kruis, 2021; Wehn et al., 2015). This can be identified as contributions to the capacity of short-term recovery (e.g., Birgani & Yazdanoost, 2016; Song et al., 2017). Furthermore, the dangers of volunteers entering the flooded area are acknowledged (e.g., unseen currents that can sweep someone away or that boats entering the area might hit underwater debris; FG1). Based on these findings, we can identify contextual limitations in this phase related to governance as the recent 2021 flooding in the Netherlands show a currently informal role for civil society in the flood aftermath as opposed to a more established role in England (e.g., Forrest et al., 2019; Thaler & Levin-Keitel, 2016). Additionally, the lack of recent flood experiences within the Netherlands may act as a debilitating factor for a more active civil society due to earlier mentioned lack of flood awareness that comes paired with it (Kuhlicke et al., 2011). Furthermore, the high potential flood impact might also lead to difficulties to immediate responses as the A5H-region might not be the only affected region.

Therefore, learning opportunities from England focus on actual experiences for dealing with the immediate flood aftermath and recovery. For example, local communities and existing civil society groups can be an organisational force for volunteers and donations. To this end, existing community groups that are known to FRM authorities can be utilised. For these efforts, community flood hubs (public buildings located outside of expected flood zones) could therefore be appointed as centralised points of coordination support efforts (e.g., Forrest et al., 2019). Additionally, having plans for setting up fundraising appeals as well as donation points/distribution points can be of value (Forrest et al., 2019; Thaler & Levin-Keitel, 2016). Especially, as 2021 flood experiences show that Dutch citizens were more than willing to donate to affected areas, necessitating the proper management of these efforts (e.g., Jansen, 2021). After all, the changing roles of civil society will also have implications for the roles and contributions that governmental stakeholders have towards climate adaptation and as such also FRM approaches (Mees et al., 2019). Finally, attention should be given to the issue of mental health issues as a result of the flooding. In England, this has been acknowledged as an important problem (e.g., Tunstall et al., 2006) and currently also further researched (Public Health England, 2014, 2020). Therefore, the case of Limburg could also prove to be a good practice study to develop strategies on how to deal with such issues in the long term.

6 | CONCLUSIONS

This paper started from the increasing need to involve civil society in FRM in the Dutch context. Experiences from the English context, as a frontrunner in civil society contributions to FRM, were used to explore the potential contributions of civil society to flood resilience in the Netherlands. In this comparative exercise, the contextual factors (environmental, governmental) were also explored and taken into account.

Our comparative exercise identified the limiting effect that environmental and flood governance factors can have on the transfer of flood resilience ideas from one setting to another. The room for civil society contributions becomes more limited if the area is flooded with high water depths as may happen in the A5H-case. This may in turn lead to a more supportive role and tasks performed by civil society (e.g., helping vulnerable citizens with evacuating or filling sandbags to reinforce primary flood defences). Doing so in turn relieves pressure and allows the authorities to focus on more specialised tasks instead. When comparing England and the Netherlands, we can therefore observe a difference in flood resilience capacities addressed by civil society with the former focussing more on limiting the impact through the use of supporting evacuations rather than taking local measures to prevent flooding (e.g., utilising PLP-defences). These limiting factors should therefore be considered when transferring civil society flood resilience approaches from one setting to another to do justice to their functioning in practice. We believe the factors presented within our

paper could be a good starting point, but that more research in a wider international context could be valuable for not only furthering the resilience debate in theory, but also in practice.

For practitioners and policymakers, these insights may help to understand which civil society contributions may fit their own specific case considering their own contextual influences. Our comparative exercise provided several recommendations to further civil society contributions towards flood resilience in the Netherlands. The first is to improve flood awareness amongst citizens and within communities. This could be achieved by letting authorities become more receptive to ideas and input from civil society and identifying actions to allow civil society to better shape their local place and support FRM as well as spreading information about local/regional flood risks within communities at risk. The second recommendation is that there is room for improvement to harness potential civil society actions to support authorities in pursuing flood resilience (e.g. by acknowledging their potential in (future) flood plans). A third recommendation is relationship building between FRM authorities and existing citizen groups before a flood event happens. This can lead to shorter communication lines and awareness amongst FRM authorities on who to speak to mobilise and coordinate volunteers. This is important as currently this contact is missing, making this process potentially chaotic and ad hoc. However, regardless of the context, a leading conclusion that this research has shown is the importance of relationship-building with local civil society groups as starting point for enabling civil society contributions towards flood resilience.

To conclude, this paper recommends two further research directions to follow in future. The first is the inclusion of different case study sites to gather more empirical evidence on this potential shifting nature of civil society contributions relating to the scale of flood severity addressed in this paper. Here a good starting point would be cases sharing similarities to the English context in terms of a higher flood probability and lower flood-water depths and more local authorities involved. Another suggestion for a case would be to further investigate the role of civil society in the 2021 floods in the Netherlands. Second, we also recommend further research into the role that civil society could play within policy making in international contexts where flooding is an urgent societal problem and that are currently shifting towards flood resilience approaches. Not only in terms of the contributions that they could provide during a flood situation, but also benefits (or drawbacks) of formulising their role as opposed to more spontaneous actions. In doing so, academia, practitioners and communities involved with flood risk will be better equipped to plan for the next flood as by then hopefully some of the holes in FRM approaches will have been plugged, be it with carefully laid-out plans or a passer-by putting their finger in the dike.

ACKNOWLEDGMENTS

First, we want to acknowledge and thank all the respondents and experts who shared their knowledge and time with us during the research process. Additionally, we also like to thank the rest of the project team for their contributions during the INTERREG project FRAMES through which the data used for this paper were gathered. Furthermore, we like to thank the people who proofread the article manuscript and provided valuable feedback to help further improve the paper. Finally, we would like to extend our thanks to the anonymous reviewers and the associate editor for their valuable comments that allowed us to further improve this publication.

FUNDING INFORMATION

The data on the A5H-region were collected through the project FRAMES (Flood Resilient Areas by Multilayered Safety), which was funded by the EU INTERREG North Sea Region Program. The publication was later written using these data.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study is available from the corresponding author upon reasonable request. A note should be made that the collected data from the A5H-region (interviews and focus group meetings) is only available in Dutch.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

How to cite this article: Koers, G. J., Forrest, S. A., & van Popering-Verkerk, J. (2023). Plugging the holes: Identifying potential avenues and limitations for furthering Dutch civil society contributions towards flood resilience. *Journal of Flood Risk Management*, e12949. https://doi.org/10.1111/jfr3.12949

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