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Flood disaster subcultures in The Netherlands: the parishes of Borgharen and Itteren

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Abstract The Netherlands knows a persistent threat of flooding. To adapt to this dangerous reality, the Dutch have cultivated what disaster research literature has labeled 'disaster subcultures' or a set of cultural (tangible and intangible) tools to deal with the recurrent hazard. While there is abundant attention for the way the Dutch 'coastal' and 'low-lying' communities deal with the recurrent threat of (coastal) flooding, less is known about the way the Dutch 'high-lands' deal with the yearly threat of (fluvial) flooding. This article presents the findings of an explorative research endeavor (2011–2013) aimed at discerning if the disaster subculture concept has contemporary relevance in the Netherlands, particularly with respect to flooding, and if so, whether applying this lens would reveal more about the nature of existing disaster subcultures. Because less is known about the Dutch 'high-lands,' we chose to look into the existence and attributes of disaster subcultures in the parishes Borgharen and Itteren, which experience a systematic threat of flooding. Our findings suggest that the disaster subculture lens is valuable as it enables the empirical appreciation of disaster subcultures, even in a small country like the Netherlands, and it unveiled elements of these neighboring parishes' flood reality that otherwise might have gone unnoticed and that seem central to understanding these two parishes' levels of

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vulnerability and resilience. It is our contention that the concept 'disaster subculture' makes a greater understanding possible of the cultural context from which vulnerability and resilience to specific and recurrent threats emerge.

Keywords Disaster · Subculture · Flood · Community · Resilience · The Netherlands

1 Introduction

Communities living in hazard-ridden or disaster-prone areas develop an array of coping mechanisms as well as more deeply embedded practices to deal with threats and opportunities their environments encompass, resulting in specific disaster subcultures. The Dutch occupy a risky region and flood disasters have historically played a significant part in the development of their culture. The historian Simon Schama, for instance, speaks of the Dutch having a 'Christianized diluvian culture' (1987: 45). Similarly, Petra van Dam (2012) illustrates how from 1600 to 1953 parts of the Netherlands developed an 'amphibic culture' to ensure continued inhabitation of flood-prone areas. While Schama highlights the role of flood *disasters* in the development of Dutch culture, both recognize that floods are 'agents of cultural formation as much as they are physical events' (Bankoff 2001: 13) in the Netherlands.

The assemblage of cultural practices that over time emerges in response to recurring disasters has been identified as 'disaster subcultures' (Moore 1964; Wenger and Weller 1972, 1973; Anderson 1965, 1968). This concept was put forward in the 1960s and 1970s to shed light on the complex but intricate relationship between the human and natural world. Since then the notion has often been referred to (see for instance Gaillard et al. 2008 or Marín et al. 2010), but remains underemployed conceptually (Granot 1996; Bankoff 2003).

When reading this literature, we wondered whether this concept would have a contemporary relevance in the Netherlands, particularly with respect to flooding, and if so, whether the application of a 'disaster subcultures lens' could reveal more about the nature of existing disaster subcultures. In addition, we were curious to find out whether this lens could be applied in another context than it was developed in and if doing so would result in valuable findings.

In light of this, we designed an explorative Dutch/American research venture into two parishes in Zuid-Limburg, namely Borgharen and Ifteren, that are located close to the Belgian border along the river Meuse. We chose these parishes because they are part of the Dutch 'high-lands.' Most studies have looked at the presence of flood cultures along the North Sea Basin (see Franz Mauelshagen (2007, 2009) on the German North Sea Coast, Greg Bankoff on the English 'Lowlands' (2013) and Petra van Dam (2012) on the North Holland region of the Netherlands) and focused on how the Dutch 'low lands' and 'coastal' communities have adapted to coastal flooding resulting from storm surges. However, less is known about possible disaster subcultures in the Dutch 'highlands' where, unlike other parts in the Netherlands, *fluvial* floods are a recurrent phenomenon. This study fills a knowledge gap in this connection.

The fact that culture is continuously in the making merits a historic perspective. An in-depth historical study is, however, beyond the scope of this article, as we choose to focus

on the application of the 'disaster subculture' concept to these parishes, but we do incorporate past experiences as shared by our respondents and available documentation.

Data collection was carried out in 2011, 2012 and 2013 and relied on document analysis, participant observation, focus group discussions and in-depth interviews with inhabitants and disaster management professionals. For the analysis of our findings, we used concepts and ideas derived from disaster subculture literature (Moore 1964; Wenger and Weller 1972; 1973; Anderson 1968; Turner 1982). The study revealed that the two communities show distinct characteristics in terms of disaster subcultures.

This article presents the findings of this study. By presenting this data, we illustrate how the Netherlands knows distinct disaster subcultures and how applying the 'disaster subculture lens' made it possible for us to uncover elements of these two parishes' flood reality that otherwise might have been overlooked. We for instance identified local constraints and capacities for dealing with disaster threats and captured important contextual realities from which degrees of vulnerability and resilience emerge. Cognizance of disaster subcultures can be very helpful to local disaster managers and authorities who wish to build on existing capabilities and reduce enduring vulnerabilities. This moves us to also argue for the reappraisal of 'disaster subculture' as a conceptual tool.

To make our argument and position our findings, we first introduce the notions of culture, resilience, subculture and disaster subcultures. We then present the disaster subculture framework as developed by Wenger and Weller (1972, 1973) and use this framework to depict the disaster subcultures of the parishes Borgharen and IJteren in the Netherlands. We discuss how recurrent high-water threats and flooding have affected both Borgharen and IJteren and how these communities have dealt with this recurrent phenomenon. In the last section, we present our conclusions.

2 The role of culture and disaster subculture in disaster management and resilience

2.1 Culture

The classic definition by Tylor (1871) describes culture as '[t]hat complex whole which includes knowledge, belief, art, morals, law, custom and any other capabilities and habits acquired by man as a member of society' (Tylor 1871). To societies, culture has a pragmatic and instrumental value as they are essentially 'problem-solving tool[s] that enable individuals to survive in a particular environment' (Schein 1999: 43) and entail 'the sum total of all the shared, taken-for-granted assumptions that a group has learned throughout its history' (Schein 1999: 29). In other words, cultures encompass strategies and practices that communities turn to when dealing with problems and opportunities they encounter in the short or long term.

One key practice to ever more societies these days is *disaster management*. Disaster management includes all preventive, mitigating and responsive measures that are taken to prevent or reduce disasters and deal with their consequences. It usually comprises local, largely informal mechanisms that evolved over time, as well as modern institutionalized mechanisms that are often professionalized and carried out by governmental bodies. As any practice, disaster management requires its practitioners to be aware of the wider culture in which it is rooted and the cultural themes it embraces: Disaster management should be working with and within cultural frameworks.

2.2 Resilience

While the past decade has seen more studies into the interface of disasters and cultural practices (among others Bankoff 2001, 2003, 2007, 2013; Gaillard 2007, 2008; Granot 1996; Mauelshagen 2009; Oliver-Smith and Hoffman 1999; Hoffman and Oliver-Smith 2002), there is still too little fine-grained local research as to how cultural complexities play out when disaster strikes. However, the recent emphasis on resilience has put the social, organizational and cultural capabilities of local communities center stage again. Since the 1970s, several disciplines have adopted the concept of resilience to address ‘the capability and the ways people deal with crises and disasters’ (Gaillard 2007: 523). In fact, the notion of resilience has rapidly gained popularity in the field of disaster studies and emergency management as an effective and efficient way to reduce prevailing vulnerabilities and thereby the risk of disaster (Cutter et al. 2009; National Research Council 2011; Norris et al. 2008; Ritchie and Gill 2011; Velotti et al. 2013). In relation to earlier paradigms in disaster studies, the resilience approach moves beyond the vulnerability and victimization discourse toward agency and capacity (Hewitt 1995: 325; Bankoff et al. 2004: 34) and from short-term coping toward longer-term adaptation and innovation. It focuses on process rather than being a static state of affairs.

While ‘resilience’ remains an object of conceptual debate, there appears to be consensus that community resilience embraces an emphasis on communities’ capacities to overcome the impact of a hazardous events. In that sense, it inspires more of a ‘can-do’ attitude as it recognizes communities as active problem-solving agents that conceive and cultivate mechanisms that allow them to inhabit and flourish in hazardous places. Additionally, a resilience approach accepts that ‘exposure to hazards and adversity can engender growth and development’ (Engel and Engel 2012: 136). In this sense, it brings back a conception of risk that was introduced in seventeenth century Europe with the development of probability theory: risk as ‘the probability of an event occurring, combined with an accounting for the *losses* and *gains* that the event would represent if it came to pass’ (Dake 1992: 22).

2.3 Subculture

The term ‘subculture’ was introduced in the early 1940s to indicate the internal heterogeneity of societies. Subcultures develop when problems cannot be satisfactorily tackled by a wider established parent culture (Cohen and Short 1958; Gelder 2005; Gaillard et al. 2008: 30). Like cultures, subcultures encompass physical and visible components (artifacts and behaviors) and ‘ideational’ components (values and norms). Furthermore, subcultures are dynamic as a result of their members continuously interacting with others in society (Fine and Kleinman 1979), and subcultures’ referents are varied since normative systems can be differentiated on the basis of factors such as religion, language, diet and moral values (Yinger 1960; Gordon 1947; Gelder 2005).

The usefulness of ‘subculture’ as a concept can be overshadowed by some shortcomings. For instance, since the concept has been widely used, it is at risk of becoming ‘little more than a “catch-all” term’ (Bennett 1999: 605). Also it is sometimes solely associated with ‘a determinate and often deviant relationship to a national dominant culture’ (Bennett 1999: 605). Furthermore, there is a tendency to see subcultures as ‘an aggregate of persons (such as youth) or a collectivity (such as a gang)’ (Fine and Kleinman 1979: 2). This has led to the neglect of some important aspects, such as beliefs, practices, internal identity

variations and change. If carefully used, however, with awareness for its shortcomings, the concept can help highlight important differences between groups in practice.

2.4 Disaster subculture

A common misconception is that disasters are unique and exceptional events. This is not the case (Alexander 1999). Experiencing recurrent disasters pushes communities to develop cultural strategies and practices to deal with these adverse events and ensure increasing levels of resilience. Since hazards vary per locality, different groups face different potential disasters. Subsequently, wider cultures that cover larger geographical areas, such as for instance a Dutch culture that should cover the complete Netherlands' territory, are generally unable to provide all its members with an exhaustive assortment of appropriate hazard-related solutions.

In addition, hazards generally do not strike on a daily basis. Therefore, readily available solutions and habitual modes of actions are often insufficient, and unique adaptations of the 'common' are required to deal with recurrent hazards. Over times this leads to a specific local subculture encompassing adaptive strategies that enable the community at hand to survive within hazardous environments. Moore (1964) first put forward the notion of '*disaster subcultures*' to refer to these subcultures and shed light on 'those adjustments, actual and potential, social, psychological and physical, which are used by residents of [hazardous] areas in their efforts to cope with disasters which have struck or which tradition indicates may strike in the future' (Moore 1964: 195). Since then, various scholars such as Anderson (1965), Wenger and Weller (1972, 1973), Wenger (1978) and Turner (1982) elaborated the concept as a tool to identify subcultural themes that are embedded within a larger culture and conceived in response to repeated experiences of disasters.

Even though disaster subcultures consist of coping mechanisms that communities have historically found adequate, it is important to note that they can become a debilitating factor when conditions change (Wenger and Weller 1972; Kuhlicke et al. 2011). For instance, in New Orleans during both Hurricane Betsy (1965) (Forrest 1979) and Hurricane Katrina (2005), the community's response was ineffective because they were confronted with another disaster agent than the recurrent agent. Their disaster subculture was directed at hurricanes and was not suitable for large-scale flooding. Another concern can be the generation of a defiant attitude toward a disaster agent due to the perceived effective containment of this agent (Wenger and Weller 1972: 2). Such an attitude can lead to what is known as the safe paradox (Burby 2006) or the levee effect (White 1945): a skeptical attitude toward warning signals or the underestimation of a threatening situation due to an increased feeling of safety. In the insurance business, this is referred to as a 'moral hazard': 'the situation when an insured party has lower incentive to avoid risk because an enhanced level of protection is provided' (Interagency Floodplain Management Review Committee 1994: 180). In some countries such as the United States, there are concerns that governments are creating a 'moral hazard' by providing a range of protective flood plain activities. Such a defiant attitude can also be observed in the Dutch context, particularly since after 1953, the Delta works promised full safety. This has from time to time turned out to be debilitating factor, for instance in the province of Zuid-Limburg during the 1993 flood (Rosenthal et al. 1998; Engel 2011).

2.5 A disaster subculture framework

The discussion below is to a significant degree indebted to the work of Wenger and Weller that is based on literature studies of disasters, mainly in relation to the United States. This work provides us a conceptual framework for disaster subcultures that outlines firstly three key *conditions* that should be met for a community to start cultivating a disaster subculture, namely (1) a community should face and acknowledge the existence of a recurrent threat, (2) the focal agent should allow for a period of forewarning and (3) the impact of focal agents should be salient to different segments (various status levels) of the communities (Wenger and Weller 1972). With respect to the second condition, it is important to note that Turner's (1982) research into southern California's earthquake disaster subculture showed that even though earthquakes do not have periods of forewarning, communities facing them do in fact develop subcultures (1982: 208).

The framework also encompasses concrete *subcultural themes*. This framework includes *valuative* elements that define what is important and worthwhile when a hazard strikes and *normative* elements that outline desirable behavior in relation to the hazard at hand. For instance, how should one respond to the possibility of the hazard striking in a short period of time? How should such a threat be interpreted and what actions should it trigger? In addition, there are *beliefs* that encompass tenets concerning the hazard and its possible consequences. For instance, community members might believe that certain areas are safer than others or that they have the capability of controlling the hazard to such an extent that it is no longer a threat. Beliefs such as the latter can result in specific attitudes. For instance, a firm belief in a community's ability to control the hazard they face can lead to a 'defiance of nature' attitude. Communities furthermore develop *knowledge*. Knowledge is related to a community's awareness, levels of information and the active application of available information. For instance, previous hazard experiences can enable communities to know possible warning cues and subsequently initiate timely protective behavior. Aside from such ideational elements, the framework also recognizes the role of *technology* or complex technical artifacts. A community could for instance develop sophisticated methods of detection and warning. Lastly, the framework encompasses *patterns for intra- and inter-organizational response* and *socialization mechanisms*. The former encompasses for instance disaster plans and routine responses, while the latter allow for the preservation of the different themes that make up the disaster subculture. Formal and informal mechanisms of socialization serve to engage newcomers and equip them with requisite knowledge and other cultural elements. According to Wenger and Weller '[t]he true indication of the existence of a disaster subculture... is the perpetuation of successful patterns of adaptation to the disaster context through socialization' (1972: 1).

As Wenger and Weller (1972) underline, no disaster subculture is the same. Since every community experiences hazards and disasters differently, draws different lessons, and finds unique ways to deal with the particular perils and opportunities of their environment, the different subcultural themes will acquire different properties. Variations in subcultures are interesting because they enable comparison. To identify such variations, Wenger and Weller (1972) have identified some dimensions along which comparisons are possible. The first is the *manifest/latent dimension*. Fully developed latent disaster subcultures for example can 'have institutionalized their mode of response to the point where they view events such as floods as simply nuisances, or possibly even look forward to the flood period as a time of "carnival" (Wenger and Weller 1972: 2),' while there are other highly developed disaster subcultures that shine through the dominant culture on a daily basis. Such communities have normalized their disaster experiences into their familiar manifest

culture (Anderson 1968; see also Schneider 1957). Another dimension concerns the degree to which disaster subcultural themes 'apply en masse to individuals as contrasted to their more specialized application to the community's organization' (Wenger and Weller 1973: 3). In other words, to what extent do these themes influence individual and organizational behavior? This is the *individual-organizational dimension*. Another dimension is the *instrumental/expressive dimension*. Are the dominant themes of a subculture more instrumental or expressive? Instrumental traits are 'those normative, technological, evaluative, knowledge and resource components that are related to preventing, predicting, controlling and responding to the physical impact of the disaster agent,' while expressive traits often refer to norms, values, beliefs, legends and myths concerning disaster and the relationship between the community and the disaster agent (Wenger and Weller 1972: 4). Lastly, we have the *narrow/broad scope dimension*. Is a disaster subculture narrow in scope and thus limited to small-scale communities in, for example, flood plain or island neighborhoods? Or is the disaster subculture broad in scope and does it extend throughout a large-scale community, including various neighborhoods and both formal and informal organizations.

Even though the different conceptual endeavors have positioned disaster subcultures as a blueprint for individual and group behavior, we do not feel comfortable with such a statement. As Fine and Kleinman stress, 'culture usage consists of chosen behaviors' (1979:12). Disaster subcultures can encompass forces directed at determining or constraining options for individuals or groups, but the latter always possess agency to change or renegotiate their behavior in the face of these subcultures and thereby redefine the subculture itself.

In the next section, we apply the prevailing disaster subculture framework on a specific Dutch case to learn more about the way the Dutch highlands have lived with water and recurrent flooding and then to discuss the usefulness of this US-based framework in a European context.

3 Disaster subcultures in the Netherlands: Borgharen and Itteren

3.1 Flood safety in the Netherlands and Limburg

Since the (coastal) storm surge disaster of 1953 (Gerritsen 2005) in the Netherlands, safety standards and flood management measures have been tightened and large infrastructural protection works have been executed. The principal idea was to reduce the probability of flooding to (negligibly) low levels in areas where impact of coastal or riverine floods was expected to be greatest (Van der Most and Wehrung 2005: 192). This resulted in protection against 1/10,000 years floods for large parts of the Netherlands' low lands, i.e., the area in which Amsterdam, The Hague, Rotterdam and Schiphol are located and in which 65 % of Dutch GNP is produced (Inspectie Verkeer en Waterstaat 2006: 4). Areas that were more thinly populated, where the impact of flooding was expected to be much less, received lower levels of protection (Van Slobbe et al. 2013: 1468), with a minimum of a 1/250 years flood.

Since the province Zuid-Limburg lies in a relatively thinly populated, gently sloping river valley with most of the land higher than the rivers, the Dutch government did not include this province in the wider Dutch flood safety scheme determined by the Dutch *Waterwet* (Water Law). Therefore, Zuid-Limburg enjoyed the liberty of designing and

implementing its own flood protection approach that has historically differed considerably from the rest of the Netherlands, with protection only up to 1/50 years (fluvial) flooding.

However, in both 1993 and 1995, after continuous, heavy precipitation, the province was hit by widespread (fluvial) flooding. The speed and magnitude of the flood surprised both the emergency services and the citizens (Rosenthal, et al. 1998; Van Heezik 2006: 100). In 1993, approximately 10 % of the province's territory was flooded (Rijkswaterstaat 1994), and in 1995, one-third of the total yearly discharge of the Meuse was discharged in only 11 days (Rijkswaterstaat 1995: 15). In response to both floods, the Minister of Transport, Public Works and Water Management established the Meuse Flood Disaster Emergency Committee 'with the instructions to research into how the consequences of such flooding could be addressed in this part of the country' (Hallie and Jorissen 1997: 364). The principal idea was to reduce water levels at high discharge by widening and deepening the Meuse (1997: 364). After the 1995 floods, the implementation of this project called the *Maaswerken* (Meuse Works) was accelerated.

The *Maaswerken* represent a changing flood management paradigm in Zuid-Limburg. While before flood prevention measures were not part of the landscape and flooding was largely accepted, now levees surround vulnerable populated areas and the general populace is told that floods will not be part of their future anymore, despite the fact that the safety norm still remains comparatively low (1/250) and flooding may even be a necessary measure in order to ensure the safety of more densely populated areas downstream. The delusive perception that the flood risk will be reduced to almost zero and that flooding will no longer be part of Zuid-Limburg's future is now settling. However, the reality is different, as the following cases of Borgharen and Itteren show.

3.2 Flooding in Borgharen and Itteren: a recurrent phenomenon

The parishes of Borgharen and Itteren are, almost on a yearly basis, confronted with high water and the threat of (fluvial) flooding. Even when high-water does not result in the flooding of the parishes as such, the communities may still get cut off from the outside world and get isolated. The parishes, with populations of 1810 and 983, respectively, are enclosed by two waterways: the river Meuse and the Juliana Canal. The Juliana Canal is a tributary of the Meuse that was built in the beginning of the twentieth century to bypass an unnavigable section of the Meuse and connect the industries of the south with the ports of the Rhine delta (Rijkswaterstaat; Van Heezik 2006: 43) (Fig. 1).

The Meuse is the primary source of flooding for Borgharen and Itteren. It flows from its source on the French Plateau de Langres, via the French Ardennes and Liege (Belgium) into the province of Zuid-Limburg. Because the Meuse is a rain river, her discharge is largely determined by precipitation and the saturation levels of the soils and thus very changeable. Discharge levels vary from 25 to 3,120 m³/s (December 1993). Since in Belgium, the Meuse comes from substantial heights and the stream bed is rather impermeable, the speed with which substantial discharges can flow toward the sea can be great: Most water from the Belgian Ardennes can be in the Netherlands in half a day (Rijkswaterstaat 1995: 7–9).

The largest fluvial floods that Borgharen and Itteren have experienced were in 1926, 1993 and 1995 (Rijkswaterstaat 1995: 12). The most recent flooding was in 2011. Both parishes faced alarming water heights and unprotected lands, including several farms, were flooded and isolated. A small number of individuals identified as being vulnerable were evacuated. Even though most inhabitants are used to high-water and flood events, for some,

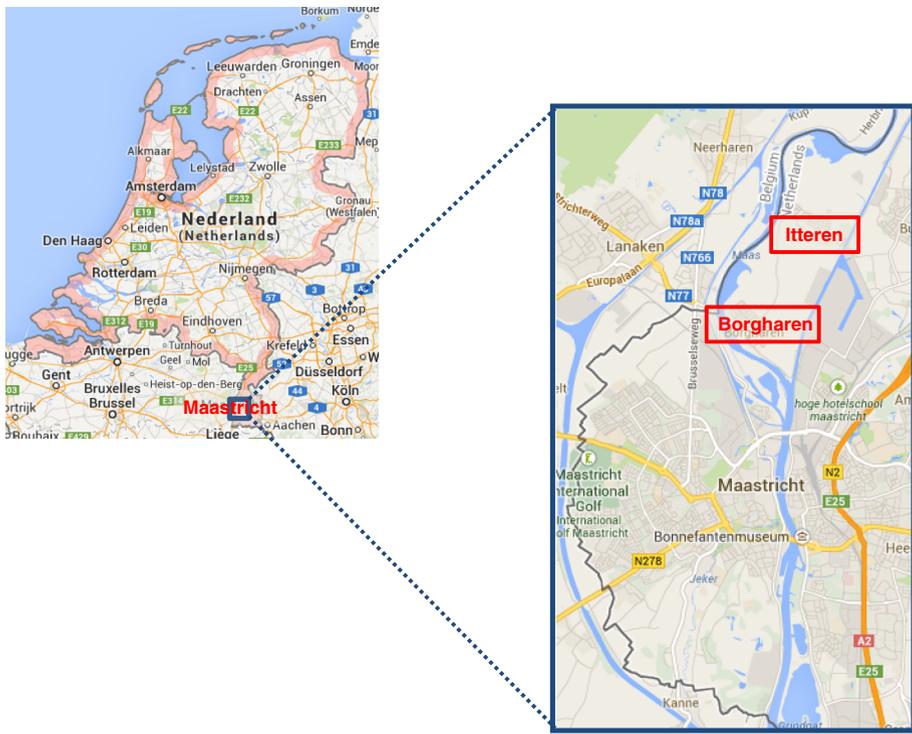


Fig. 1 Map of Borgharen and Itteren (from google maps)

mainly new residents that have no experience with flooding, these situations can be traumatic and stressful.

In the past, people would live on high grounds and would only cultivate the lower lying lands. Whenever the river would creep outside its banks, this would not be catastrophic since people would reside safely on higher grounds. This changed in the eleventh century when the population increased and the higher grounds became too small to host all residents. This is when fluvial floods were described for the first time (Rooijendijk 2009: 216, 217). Since then, floods and high-water events are recurrent phenomena. To residents from Borgharen and Itteren, they are part of the past, present and future. This is strikingly different to the rest of the Netherlands for which the central government ensures high levels of flood safety and flooding is generally not perceived as a risk to be concerned about anymore.

With respect to the conditions required to foster a disaster subculture (see Sect. 2.4 above), both Borgharen and Itteren meet all three of them. Firstly, both parishes face a recurrent threat of flooding that is fully acknowledged. Most if not all residents of these parishes have either actual recent experiences with flooding in for instance 1993, 1995 and/or 2011 or know about it from stories, governmental communication (Gemeente Maastricht 2011) and/or media reports. As a recently interviewed, 96-year-old resident of Itteren told the local newspaper *De Limburger*: ‘high water levels are no fun, but you get used to it’ (Maas 2012:1).

Even in light of Turner's (1982) study perhaps not essential, both parishes also meet the second condition, namely that fluvial flooding allows for a period of forewarning. Threatening water levels of the Meuse originate in either France or Belgium and can subsequently, albeit with significant margins of error, be monitored. Lastly, the third condition is met. The impact of the focal agent is indiscriminate and salient to all segments of both communities. For instance, when high-water reaches alarming levels, all residents are isolated and nobody can enter or exit without military assistance. This is not to say that the effect is exactly the same for everyone. In the past, some houses were built at a higher elevation than others, while the recently established levee system has left a number of inhabitants outside and unprotected.

3.3 Borgharen and Itteren: a description of two disaster subcultures

Comparing the two communities, Itteren seems to enjoy a more intimate relationship with water and in particular the Meuse than Borgharen. This relationship is accompanied by positive ideas concerning both. Rather than foes, both water and the Meuse seem to be perceived as a friend; a sometimes disorderly neighbor. The community of Borgharen on the other hand seems to have a more reserved and detached relationship with water and in particular the Meuse (Table 1).

3.3.1 *Valuative and normative elements: solidarity*

Over time, both communities have learned that in the case of flooding solidarity is most important. In this sense, 'the joint fight against water produces a bond that cannot be found anymore in many other communities'¹ (Interviews Borgharen 2011). Solidarity becomes apparent in different ways. For instance, Itteren includes an important core of families that have lived there for generations. These families know each other and regularly come together. Because of this, during high-water or flood events, people know who require special needs and the latter stay calm because they know that someone will come to help them (Interviews Itteren 2013). Solidarity is an important norm guiding behavior during high-water and floods. A good illustration of this is the activities of an old Itteren family company (agricultural and industrial contractor) that provides numerous labor opportunities for the community, financially supports community activities and associations, and in times of high-water and flooding provides all assistance it can at no cost (Interviews Itteren 2013). Solidarity is not just viewed as an asset the parishes possess, but also as an important value and norm that has enabled them to effectively engage with their environment.

While both parishes seem to enjoy considerable solidarity on a day-to-day basis, water levels are high and flooding impending levels of solidarity peak. The first thing people do is run out and help each other get their household effects up on trestles or to the first floor. Then when everything is secured, people come together in those houses that lie higher and are thus less affected. Families come together and 'cafés are full, cozy and fun' (Interviews Itteren 2013). Children build rafts, play and come back home all wet (Interviews Borgharen 2013). People in both parishes compared high-water and flood events with a fair and one 93-year-old lady from Itteren told us how she would never evacuate since she would never want to miss the water and the conviviality and coziness these events entail. She happily tells us how in 1993 she and her son would cook dinner in the kitchen with

¹ Translated by Karen Engel from Dutch.

Table 1 Comparative table-Borgharen and Itteren subcultures

Elements	Borgharen	Itteren
Valuative and normative elements	Solidarity	Solidarity
Beliefs toward water and Meuse	A hazard to be dealt with from time to time. Both communities have strong beliefs of self-sufficiency that lead toward an aloof relationship with outside authorities with respect to issues concerning the Meuse. Borgharen accepts mainly high-water emergencies as part of their reality. However, when it comes to flooding from time to time an 'attitude of defiance' shines through.	Friend and sometimes disorderly neighbor Strong attitude of acceptance. High-water and flooding is part of their past and will be part of their future. The Meuse will come to visit from time to time.
Symbols	Hardly any symbols of (past) flooding available throughout the public space.	Presence of symbols throughout public space, including poem in which attitude of acceptance is expressed.
Knowledge	The main source of knowledge is the river: understanding of the river derived from the communities' historic interaction with it. Since the people from Itteren seem to have a closer relationship with the Meuse, their knowledge and understanding seems to be greater than in Borgharen. Still in both parishes knowledge is present.	
Technology	Architecture and structural levees. While some houses represent mitigating architecture, several do not represent any awareness of possible flood events.	Architecture, flexible levees, structural levees and pump stations. The greater part of the parish physically emanates a lifestyle that includes possible flooding.
Patterns for intra and inter-organizational response	Joint community response supported by flood risk management professionals that have specific flood plans. In Borgharen, however, the joint response is more structured and predefined than in Itteren. Itteren has chosen to rely more on emergent structures rather than a predefined one, so as not to take away people's own initiatives.	
Socialization	Stories, information from local authorities, experience, DVD, pictures	Stories, information from local authorities, continuous presence of symbols and technique, movies, pictures.
Degree of manifestation (manifest or latent)	Latent	Manifest
Degree of influence on disaster behavior	High degree of influence on disaster behavior. In Itteren also high degree of influence on more daily personal choices. In addition to the disaster subculture having en masse influence, there are also specific formal organizations that are guided by it.	
Instrumental or expressive traits	Mainly instrumental, but also some expressive. Expressive mainly in the form of norms, values and stories.	Instrumental and expressive. More than Borgharen also expressive. Manifest symbols, stories and art.
Scope (narrow/broad)s	Narrow, but including both formal and informal organizations within and outside flood-prone parishes.	

their wellies on in 48 cm of water. Children who had moved away would come back because 'high-water is fun and exciting' (Interviews Itteren 2013). It is important to note that the positive perception of flooding enables a more speedy recovery than in areas where floods are deemed traumatic and devastating. The inhabitants do not see themselves

experiencing continuous disaster, but rather a recurrent inconvenience that even may have some characteristics of a fair.

The existence of strong social bonds, particularly in times of high-water, is not new. Before approximately 1950 Borgharen boasted 23 cafés run by stay-at-home wives. These cafés enabled bonds to be forged and preserved and during floods served as open living rooms (Interviews Borgharen 2011). Mutual help was also traditionally part of daily routine. Those families owning the few ovens in the village would make bread for those who did not have one. In Itteren, the whole parish would help each other to slaughter pigs for winter, going from one house to the next (Interviews Itteren 2013).

Both community members and local authorities actively try to promote community solidarity. For example, solidarity is explicitly put forward by the municipal authorities as worthwhile and desirable. In other words, aside from people spontaneously coming together, there is also an institutionalized expectation for them to do so. The municipal instructions emphasize how in the past both communities have shown substantial levels of solidarity during high-water and floods and how authorities expect this will also be the case in the future (Gemeente Maastricht 2011: 1). For example, the instructions provided by the municipality of Maastricht tell the inhabitants to:

- ‘Talk to neighbors and find out whether certain neighbors would require specific attention.
- Keep in touch with neighbors.
- Inform neighbors of updated information if necessary.
- Discuss with neighbors to ensure that everyone receives the help they require.
- Help people without upper floors.
- Assist Parish Council members with their coordination and communication tasks (Gemeente Maastricht 2011).’

The local Parish Council of Itteren also strongly relies on solidarity and even decided against a specific community flood disaster response organization because they felt that this would thwart the more spontaneous community organizations that currently emerge in such situations. In their view, having such a specifically tasked organization would only lead to people absolving themselves of their (community) responsibilities in case of flooding (Interviews Itteren 2011, 2013; Velotti et al. 2011: 8).

3.3.2 Beliefs

While water is a unifying force to both communities, their relationship with it is different. For Borgharen, the relationship seems more reserved and detached. Water is a hazard to be dealt with from time to time and is more often referred to as an enemy or possible threat. To people from Itteren, however, the Meuse is a relished neighbor: ‘...everything we have is thanks to the Meuse... [and] when it rains in France, we know we get company’ (Heijnen 1996).

In our interviews (Interviews Borgharen and Itteren 2013), people also mentioned the economic dimension of the river in the past. Tow boats passed the Meuse and stopped at Itteren to change and feed the horses. There was also fishing on eel and some families engaged in the cutting of twigs and reed to weave baskets that were used in the mines and ceramic industry for transport and packing. One respondent mentioned that the Meuse had brought the Jerusalem artichoke from France. The Meuse was under normal situations seen as something beautiful. Children played along the Meuse and learned to swim; adults recall

how they walked along it with their first girlfriend, and even at an old age many like to stroll along the river.

When reminiscing about previous high-water and flood events, members of both communities generally recall pleasant memories. People would tell us how their children enjoyed driving in an army truck, how people would take advantage of their (forced) time off from work or the daily 'crisis-meetings' at the local bar. To most, high-water and flood events were important moments of togetherness in which old family rivalries (temporarily) dissolve and people are driven by a sense of togetherness. So while people from Borgharen are a bit tenser in their relationship with the water, overall sentiments seem more positive than negative. This leads us to believe that in neither community the river is considered a serious threat. In fact, it seems that high water and floods are seen 'as a social moment during which the community comes together to support each other' (Velotti et al. 2011).

This attitude seems to be related to the prevalent belief of 'community self-sufficiency.' People from both communities feel ready and able to overcome such events. They know exactly how to build and organize their houses to mitigate impact. One house in Itteren has for instance a drain in the middle of the living room which the owner can open to empty his living room when the water is down. Also several families have invested in collapsible trestles. Another respondent from Borgharen told us how everything on the ground floor is mobile and can be brought up in a timely fashion. There is always timely help from neighbors (even those who have not been on speaking terms for ages), friends and relatives. Today with increasing electrical appliances and luxury goods, costs may be higher, but both communities are sure that they are capable of recovering quickly. This belief makes them somewhat aloof and critical toward any authority figure from outside their parish trying to tell them what to do with respect to the Meuse (Interviews Borgharen and Itteren 2011). Borgharen's Parish Council, for instance, installed an informal organization comprising 'block leaders'² to respond to high-water or floods as a result of the, in their eyes, inadequate governmental response to the 1993 flood event (Interviews Borgharen 2011).

Our findings show that members of both communities believe that their experience with flood events has enabled them to develop coping mechanisms ranging from 'reading' the environment and the early warning signs their environment provides, to vertical evacuation, and that there is no need for them to evacuate out of the village. For instance, in Itteren, the majority of houses have their first floor as high as, or higher than, the highest flood levels reached before the house was built (Velotti et al. 2011: 6). This enables them to stay in their houses when the parish is flooded. Furthermore, this makes recovery quicker as most private goods remain untouched by the water. Interestingly enough, even before 1993 people from Itteren would build their houses higher, even though municipal regulation permitted the ground floor of newly constructed houses only to be 10 cm above street level. Ten centimeters is, however, far too low in Itteren's experience with flooding, so residents would find ways to add sometimes over 50 cm to this level. In Borgharen, architectural adjustments are less prominent than in Itteren. There are for instance a number of houses with just one floor. Overall, however, both communities are not afraid of flooding and feel experienced, prepared and knowledgeable enough to cope self-sufficiently.

² In Dutch: 'Blokhoofden'. The structure in Borgharen was inspired by the civil protection system the Netherlands used to have when the 1952 Civil Protection Law or 'Wet Bescherming Bevolking (BB)' was still in force. Central to this law was a civil protection organization based on volunteers. Society was divided into block groups (In Dutch: *blokploeg*) that were led by block leaders (*blokhoofd*).

Even though this belief of 'community self-sufficiency' tends to a standoffish and critical attitude toward authorities, it seems to be encouraged by local authorities. Official communication to the residents of Borgharen and Itteren emphasizes how the local government considers them self-sufficient enough to cope with high-water and flood events. In fact, such communication stresses how they are responsible for their own safety and will only receive assistance when in dire need because of a special needs situation. People are expected to help themselves and each other and not expect assistance from authorities. For instance, people that occupy houses with more than one story that are not in the vicinity of levees are advised to stay in their houses unless informed otherwise and take in people with houses with only one story or close to levees.

While on paper official expectations regarding community self-sufficiency seem consistent, our findings suggest that in times of flooding officials might act differently. In such a case, authorities may expect a blind obedience that neither community will provide. In fact, the members of both communities will act in accordance to their own decision-making process which may or may not include directives provided by authorities. An important reason for this is the common idea that authorities from outside the parishes have no true understanding of the reality the parishes experience and are thus unable to provide adequate counsel in whatever situation. Subsequently, they are on their own.

An underlying subcultural theme seems to be a prevalent attitude of acceptance: 'Itteren is a Waterhole, Governed by the Water Wolf (Heijnen 1996).' Flooding is part of the everyday life: '...in my lifetime the water has come into my house six times. I'm used to that. In Itteren, we are all used to the Meuse. The street has been flooded numerous times, but nobody cared... [and] in the future the water shall continue to come often' (Heijnen 1996). Here, we must, however, note that the impact of flooding has increased over the years in both parishes. While in the past mere 'farmer furniture' was in harm's way when the Meuse visited, today we find first floors with luxury items such as parquet flooring, TVs and freezers that cannot endure in long-lasting water. Still, however, it is accepted that living in Borgharen and Itteren means living with water.

In addition, the authorities convey that despite the recent levees, the *Maaswerken* and a subsequent reduced risk of flooding, water remains an important force to be reckoned with. The inhabitants of Borgharen and Itteren realize this and have subsequently no illusions of a flood free future. In fact, they are well aware that the establishment and development of the levee system has in fact enhanced the possible impact of flooding. The levee system has made both Borgharen and Itteren into so-called bathtubs. '[People from Borgharen and Itteren] will really be able to swim' (Heijnen 1996) if water does surpass the levees. Moreover, once the water has entered the protected area with great force, it cannot get out as easily, as it is blocked by the levees (Interview Rijkswaterstaat Maastricht 2012; Interview Water Safety Expert 2012; Interview Waterschap Roer en Maas 2012; Gemeente Maastricht 2006a).

While this attitude of acceptance is most dominant, from time to time, governmental authorities also spread messages that hint at an 'attitude of defiance.' Local authorities communicate that 'in 2025 high-water will no longer be an issue' (Interview Municipality of Maastricht 2012) and residents of Borgharen and Itteren will subsequently no longer have to worry about flooding. Therefore, when the *Maaswerken* are completed, the current attitude of acceptance could be replaced by an attitude of defiance of nature. With the termination of the *Maaswerken*, the 'waterwolf' will have been tamed.

Our findings suggest that this attitude of defiance is generally more present among local authorities that deal with water safety issues, than with the inhabitants of Borgharen and Itteren. While this attitude of defiance seems to have strengthened due to the different flood

reduction projects, it was already there in 1993. For instance, in 1993, local authorities ignored obvious signs that pointed at critical water levels, including Belgian television stations showing images of floating caravans, Belgian government officials speaking of a deluge (Engel 2011; Rosenthal, et al. 1998) and formal warnings from the Ministry of Public Works and Water Management. The different signs were received with disbelief by local authorities. This attitude eventually led to an overall tardy and poor governmental response to what is today known as one of the most severe flood events of Dutch recent history.

3.3.3 Symbols

The primary difference we encountered between the disaster subcultures of Borgharen and Itteren has to do with symbolism. When walking through Itteren one is continuously reminded of the water threat through, for instance, flexible flood walls (Fig. 2), signs indicating past flood levels (Fig. 3) and a work of public art: a boat at the height of the [1993] flood, which would float should the water ever reach that level again (Fig. 4) (Velotti et al. 2011: 6).

There is also a reading table with a poem about the Meuse River (Herberghs 2004) that conveys the attitude of acceptance characterizing the parish. In the poem, the river Meuse is portrayed as a kind, old woman, who from time to time loses her wits, escapes her embankments and leaves the people of Itteren in disarray. In the last paragraph of the poem, the people of Itteren forgive the Meuse for her quirky and whimsical nature, since the river is essentially kind; they straighten out the disarray and continue with their ordinary activities such as reading the newspaper (Fig. 3).

In contrast, when walking through Borgharen one is hardly confronted with the proximity of the Meuse. The levee system hides the river from view as opposed to Itteren where the banks of the river are made accessible and are sometimes included as backyards of houses located along the river (Fig. 5). In Borgharen, there are also less signs of past flood levels.

We believe that this different use of symbolism represents the different relationship both parishes enjoy with water. For instance, through the use of symbols, Itteren has made water and the Meuse a part of their daily life. It seems that through the use of these symbols throughout their public space, they have to some extent 'normalized' disasters and subsequently integrated disaster experiences into the community's daily manifest culture. From our findings, we believe that this process of normalization (Anderson 1968) is related to a more dominant attitude of acceptance in Itteren than in Borgharen. Specifically, when speaking to people from Itteren, the Meuse seems to have a special place in their hearts. They did not speak of a threat or a disaster, but rather spoke of 'water coming in,' water 'visiting' and more often acknowledge all the good that the Meuse has brought to them. We believe that this might be because Itteren kept its agrarian outlook longer and stayed closer to its environment than Borgharen. While today there are less and less farmers, it has only been a few decades that the agrarian character has started to fade in Itteren. Being largely farmers and having lived from their natural environment (fishing, agriculture, stock raising) has meant that they found ways to deal with both the perils and opportunities their environment had to offer. Throughout our research, it became clear that people from Itteren love and respect their environment, while in Borgharen, the environment seems more of a reality to deal with. We felt more of a reserved relationship as opposed to the emotional attachment observed in Itteren. Subsequently, in Borgharen, most subcultural themes are irrelevant



Fig. 2 Iteren symbols: flexible flood walls



Fig. 3 Symbols of past flood events on house walls

in ‘peace time’ and thus stay latent, but in ‘war time,’ they come to the surface and fulfill their purpose.

While historically both parishes were agrarian (Habets 1872), the arrival of the ceramics industry in Maastricht in the nineteenth century moved Borgharen residents away from agriculture and closer to the industries of Maastricht. From then on, Borgharen would know more and more day laborers and basket weavers for the ceramics industry (Interviews Borgharen 2011). This moved the parish and its residents closer to the city and away from the land and the water. Since the 1960s, this development appears to have intensified, when Borgharen got marketed as a suburb that offers pleasant and affordable living and a short commute to employment opportunities in the city of Maastricht. This has led many outsiders to settle in Borgharen. Iteren on the other hand knows an aging population as young people move away and the older generation stays behind. While an aging population has various drawbacks, in light of disaster knowledge they have considerable more expertise and coping capacity (Figs. 4, 5).



Fig. 4 Itteren symbols: boat at the height of the last major flood in 1993



Fig. 5 Access and approximation of living space to the Meuse

3.3.4 Knowledge

Central to both the disaster subcultures of Borgharen and Itteren is a substantial body of knowledge concerning the environment they inhabit. Again, we find this knowledge more in Itteren than in Borgharen, but still locals from both parishes know their environment. Representatives from both communities and the local authorities revealed the importance of being able to read the environment, in particular the Meuse River, for warning signs and to determine in a timely fashion which actions should be carried out. Also local authorities,

in particular, those with extensive high-water and flood experience, stressed the importance of 'reading the river.' They emphasized that scientific knowledge is valuable but that information attained directly from the river is key to determining any appropriate course of action.

To the communities of Borgharen and Itteren, the most important knowledge comes directly from the river. In the past, residents would look at the Meuse and know what to expect: 'if the Meuse reaches this level at that fence, we will be dealing with high-water' (Interviews Borgharen 2012). To read the river, artifacts such as fences, steps and water-level gauges were used. In particular, the water-level gauge at Borgharen was central. This gauge was situated visibly and close to both parishes, enabled community members to independently interpret the river, generate possible high-water and/or flood scenarios and determine which actions to take in light of their predictions. Furthermore, the water-level gauge made it possible for local authorities and community members to speak the same language with respect to high-water and/or flood levels and to coordinate their activities, even when direct communication was impeded. For example, the governmental flood instructions pamphlet provided both communities with suggested actions that were dependent on water levels measured at the water-level gauge at Borgharen. The pamphlet informed both parishes that at a water level of 45.00 m at the Borgharen gauge, the access roads to Borgharen and Itteren will be closed and cars should be parked outside the parishes and at 45.20 m the parishes cannot be exited anymore (Gemeente Maastricht 2006b). This meant that everyone was referring to the same standards, even with respect to the 'technical' water data.

Today, however, the *Maaswerken* have changed the regime of the river and the water-level gauge at Borgharen is deemed unreliable. As a result, actions are prescribed on the basis of another gauge at the parish of Sint Pieter. This change led to substantial resistance in Borgharen and Itteren, since its impact is significant. First and foremost the communities cannot see the gauge, and thus, they will become dependent on others to interpret the river, provide them with possible high-water and/or flood scenarios and determine which actions to take. Additionally, they will have to rely on tools like the internet or phones which are significantly vulnerable in times of high-water and flooding, to receive relevant data concerning the river. Essentially, the foundations of both communities' disaster subcultures and coping practices are disintegrating and this could be debilitating for future self-sufficiency in light of the flood risk both communities will continue to face, even when the *Maaswerken* are done.

3.3.5 Technology

Before the floods of 1993, the primary technical measures were architectural measures, particularly in Itteren. Most of the houses in Itteren have stairs to their first floor. The first floor would be built at least higher than previously encountered water levels (Fig. 6).

Farmers living in Itteren would even have vertical evacuation locations for their animals. This is in contrast with the majority of houses in Borgharen. Some older houses still have higher first floors, but the majority does not. The majority of houses are typical 1970s architecture, including bungalows and houses with underground parking places (Fig. 7).

Since 1993 and the call for increasing flood protection levels, technical measures such as levees and pumps are becoming more dominant and visible in the landscape. This hints at a shift toward a greater emphasis on preventing flooding through engineered safeguards, similar to the north and the west of the Netherlands. In light of this, our research findings point at a possible challenge this shift could bring about. Firstly, we see how the increasing



Fig. 6 Iiteren architecture: flood adaptation to houses



Fig. 7 Borgharen architecture: houses vulnerable to flooding

use and importance of highly sophisticated tools to deal with flood risk is distancing the community from the river and rendering the prevailing disaster subculture and local coping mechanisms, inept. We also see the risk of the so-called safe paradox arising. This paradox is prevalent throughout the Netherlands where technical preventive measures taken entail indeed a safer system, but are simultaneously increasing the vulnerability of communities as they are less aware of and prepared for disaster threats (Engel and Trainor 2010).

Here, we would like to note that we perceive a level of co-construction between the natural (Law 2009), technical and socio-cultural realm. For instance, communities' risk perception seems closely linked to the way communities perceive nature as well as their proximity and understanding of the technological means utilized. The close proximity of the Meuse to Iiteren as well as their techniques to read and interpret nature results in a specific level of risk awareness as well as the existence of technical as well as socio-cultural capacities that enable the mitigation of damage in case flood events take place. A similar co-construction between these three realms we find with respect to beliefs, symbols and knowledge. For instance, the belief in self-reliance could hardly exist if those communities did not feel secure in their knowledge and expertise to interpret their environment and develop adequate knowledge, effective practices and techniques to deal with the perils of their habitat. In light of this, a focus on material-semiotic relationality is appropriate for the further analysis of such cases (Law 2002, 2009).

3.3.6 Patterns for intra and inter-organizational response

The recurrent threat of high-water and flooding has led to the development of a flood preparedness and response system at both a municipal and community level. At the municipal level, there are interdisciplinary flood plans outlining the various responsibilities and tasks at certain levels of threat. The plans are primarily developed by local authorities,

but input is provided by both Parish Councils. Currently, the levels of threat are based on the cubic meters measured in the Meuse. This creates a problematic situation since community instructions were earlier based on water levels in meters. During the last high-water event, this created an unfortunate situation since information regarding the high-water threat was provided in cubic meters rather than water levels and this meant that community members did not understand the information and did not know what to do.

Furthermore, the patterns for intra- and inter-organizational response are largely defined by previous experience. Unlike in other parts in the Netherlands, professionals and local authorities remain within their organizations for many years. This enables them to generate necessary knowledge and expertise as well as a network of relevant partners. Partners of the Dutch local authorities, for instance, include relevant German and Belgian counterparts. Such international networks are not just useful to receive timely warning information, but also to increase response capabilities. The Dutch local authorities for example are not in the possession of boats that can withstand strong water flows, but German civil protection authorities do have these. Therefore, generally during high-water, German crafts are used for evacuation purposes (Velotti et al. 2011). Interviewees feel that this joint preparedness and these international networks enable an apt response to high-water and floods.

With respect to the community level, there are social structures in place. Borgharen's parish is divided into blocks, and each block has a coordinating block head. Itteren does not have such a prearranged structure, but relies on emergent social action during any event. Most habitants have lived in Itteren for many years and have experience with high-water and floods. Itteren relies on these people whenever necessary. They express the confidence that, whenever there is a flood, the Itteren community will effectively react in a joint fashion.

3.3.7 Socialization

Any subculture requires a socialization process. In Borgharen and Itteren, three socialization processes can be identified. The first process is socialization done through organized sessions in which available knowledge, experience and expertise necessary to cope with high-water and flood events is shared. This type of socialization is more common with the local authorities.

The second socialization process is more common throughout the communities and entails essentially what the Dutch would call 'being thrown into the deep.'³ Central to this, socialization process are stories and actual high-water and flood experience. Newcomers are told stories about past experiences, and they receive information from the local authorities, but the socialization process is really completed when actual high-water or flooding is experienced. For instance, one interviewee knew about high-water and flood events 'theoretically,' but only started looking into ways of coping with high water and flooding after his cellar flooded (Interview General Practitioner Borgharen and Itteren 2012). Similarly, another interviewee told us she had been living in Borgharen for over seven years, and she had heard many stories, but real understanding and knowing what high-water and flooding in fact meant to her and her family occurred in 2011 when she was surrounded by water and could only leave her residence, with her child, on a tractor (Interviews Borgharen 2012).

³ Being thrown into the deep refers to children learning how to swim. Children generally begin in shallow waters and then go onto more deep waters. Being thrown into the deep refers to the idea that a good way of quickly learning how to swim is essentially being thrown into deep waters from the start.

3.3.8 *Variations in subculture by manifestation, individual/organizational influence, instrumental/expressive traits and scope*

If we compare the two disaster subcultures that we have discerned throughout our research, we have to conclude that Borgharen's disaster subculture is more latent than Itteren's disaster subculture. Even though Borgharen has a disaster subculture, it does not become apparent until one explicitly looks for it or it becomes manifest as a result of flooding. Itteren's disaster subculture includes manifest instrumental and expressive traits, such as remembrances of past floods, art and poetry throughout the public space and instrumental objects, such as pump stations and 'flood-proof' architecture. Borgharen's disaster sub-cultural traits are much more instrumental, although also some expressive traits can be found. For instance, what one immediately can notice are the levees (kades) to prevent Borgharen from flooding. For the rest, the disaster subcultures become for the most part apparent when high-water or flooding takes place and people show their knowledge and experience to act within the developed disaster subculture.

In both parishes, the disaster subcultures largely influence individual disaster behavior, though in Itteren it goes a bit further than in Borgharen. For instance, in Itteren flood awareness and the Meuse seem to affect personal choices such as personal housing and landscaping choices more than it does in Borgharen. In addition, there are local organizations, such as the Veiligheidsregio (Safety Region) Limburg Zuid and Waterschap (Water Board) Roer en Maas that have extensive experience with flooding and have subsequently specific knowledge, understanding and preparations embedded within their organization to effectively deal with floods. The disaster subculture thus also influences some local organizations.

With respect to scope, we have to say that the disaster subcultures are narrow in scope since they are prevalent mainly throughout the flood-prone areas and not, for instance, throughout all of the wider area. The disaster subculture is, however, represented by both formal and informal organizations within and outside the directly affected parishes.

4 Conclusions

This study showed that the disaster subculture framework, as it was originally formulated, can be used to identify and describe disaster subcultures in a context other than the context in which it was developed. Even though it was developed in the United States, applying it in the Netherlands has proven fruitful, mainly because it enabled us to discern that even a small country such as the Netherlands knows distinct disaster subcultures and it allowed us to empirically identify and describe the two concrete cases of Borgharen and Itteren. Furthermore, as a conceptual tool, it unveiled elements of these neighboring parishes' flood reality that otherwise might have gone unnoticed and can shed light on these two parishes' levels of vulnerability and resilience.

Because disaster subcultures evolve, we feel this lens should not be used as a snapshot approach, but should instead try to capture its dynamic dimensions over time. Subsequently, it would be fruitful to carry out these type of studies periodically to monitor the development of specific cases and identify factors or processes of change that affect communities' resilience and vulnerability either positively or negatively. Possible factors and processes of change are numerous and can vary from the occurrence of a specific event to the effects of for instance broader political processes.

In fact, our study uncovered an unsettling reality of change that could increase community vulnerability. The changed flood management paradigm and the subsequent introduction of infrastructural protection works that are common in other parts of the Netherlands, but not throughout the province of Zuid-Limburg, could subvert existing community capacities. Due to the *Maaswerken*, the river's behavior has changed and community members are no longer able to read and interpret the river's behavior. The river and the communities of Borgharen and Ifteren are becoming estranged, engagement with the environment is left to others, mainly water authorities and professionals, and slowly but surely the foundations on which the current disaster subculture has been cultivated are trembling, if not disappearing. It seems that the communities are losing grip of their environment and are subsequently losing their ways to effectively deal with both the opportunities and threats their environment embodies. This does not mean that the disaster subculture will disappear, but it will be altered and lead to new vulnerabilities and levels of resilience. For instance, our findings suggest that these changes could transform two self-sufficient, responsible and resilient communities into two dependent, less prepared and therefore more vulnerable communities.

Even though our objective was not to critically engage with the conceptual framework we used, we do think that the findings of our study could provide empirical evidence to feed a more conceptual discussion aimed at improving it. One element that comes to mind is the fairly static nature of the framework. A dynamic use of it could add significant analytical and explanatory power.

Lastly, we would like to mention that this lens enabled a greater understanding of the way the Dutch 'high-lands' deal with the recurrent threat of fluvial flooding. Even though communities in the high-lands are almost on an annual basis confronted with the threat of flooding, there are few studies in the Netherlands that describe how these communities have found ways to live and flourish in an inherently risky environment.

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