

Dutch Natural Resiliency of below Sea-Level Living Residents

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Abstract: The Wester coastal Delta zone of the Netherlands, the relatively more crowded area of the country hosting ten out of seventeen heading to twenty million people, asks for a growing alertness on the topic of resiliency the light of climate-change, like many coastal urban areas do. Approaches of resiliency are often pre-dominated by governmental rescue planning and mobilization of technology innovative solutions. By comparing the float disasters of the 2015 Katrina and 2012 Sandy thunderstorms that hit respectively New Orleans and New York we can learn that the behaviour of people can make the difference in overcoming climate change impact disasters. Post-PhD research with focus on the Dutch Zaanstreek-Waterland area north of the city of Amsterdam, where in 1916 a severe flood took place, proved such. The outcome from focus group sessions is that the alertness and availability of the people to act in case of disaster urgency makes a positive difference, if the memory of the area residents to previous disaster handling is kept alert. This Zaanstreek-Waterland research showed that the disaster from 100 year before still kept the residents alert into resiliency. With that result the definition of resilience should be improved by adding: 'the interplay in a triangular relationship of civil servants, technicians and residents'.

Keywords: Resilience, Climate-change, Social-capital and Resident-empowerment.

1. 'Water Resilience', the Dutch situation

An Old Dutch saying tells 'God created the world, but the Dutch created the Netherlands', unfortunately the Western part of the country counted flooding too in history. History tells us about the highlights, how the severe storms of 1421 and 1675 layers of peat poured into the sea. In more recent times the floods of 1916 and the last flood of 1953 set large numbers of polder land areas under water. Most of the damage was caused human action and intervention, by wrong agricultural exploration and deferred water management maintenance. The Dutch learned from these accidents and every disaster was followed-up by new and better delta defence water resistant constructions (Aten and Wieringa, 2015). Remarkable of these moments of activated action is that not the national and local governments, but water authorities took the initiative and the responsibility needed. With the 'Delta Plan' developed after the flood of 1953 for defending the country against storms and high tide combinations, the coast defence system is upgraded to what is called delta-level, to the chance of exceeding 'one in a million years' called one of the best water defence systems globally the forecast on sea-level rise by climate-change according to the 2015 UN Paris-agreement included (Delta-commission, 2017) (UN, 2015).

Today Dutch experts with knowledge of this new defence systems advise globally to make flood defence barriers in the USA, India and South America concerning several cities over the last

years. Remarkably some of these cities managed to recover much faster then the others unless nothing profound was done yet. The city of New York for example recovered in 2012 from the Sandy hurricane in only a number of weeks while New Orleans is still starting up the recovery of the Katrina hurricane from 2005. The difference should possibly be the behaviour of the residents, how they took initiative and started-up cleaning and recovery tasks (Chamlee - Wright and Storr, 2011). This possibly shows that the action prospects of the people does make the difference to make cities resilient for water flood disasters not just technology and governmental ruling alone.

Recently, a Dutch television series showed possible staged behaviour of the Dutch residents if the dikes would collapse by severe storm. The behaviour prediction was based on interviewing governmental officials, water authority representatives and the residents involved and the results showed that people do act very differently. Most of the people follow governmental instructions in the beginning as long as no fellow residents take the lead, based on post-PhD research on civilian initiatives a focus group was researched in the water and security area 'Zaanstreek-Waterland' recently. Analyses of the focus group sessions proved that the survival potential of people in-group formation could be mobilized faster than governmental can organize. The power of bravery should be an action-prospect for all related to resilient programming (Sanders, 2018).

2. 'Water Resilience', to be defined

'Climate Resilience', which includes 'Water resilience', has been given a number of expressions depending on the focus chosen, by people related to climate-change. Resilience focuses on the ability to handle, as a society, mobilizing the capacity to adapt to extreme undesirable changing circumstances (Nelson et al., 2007). Concerning the far-reaching circumstances of climate-change, which can be severe storms, severe rainfall, seawater rising, loss of bio-diversity, and economic recession; many of these climate change examples are water related.

Adaptation to such extreme external stimuli and stress to Nelson should be seen as a system wide result from which the social component and social actors behaviour could be made particular; see the cycle of 'Adaptedness and resilience' figure 1. Nelson also sketches the slight differences between adaptation and resilience. Resilience concerns the power of people to learn and to develop resilience capacity more than adaptation (Berkhout et al., 2006). Resilience therefore is a process of development making the system of adaptation stronger by every new experience (Walker et al., 2002).

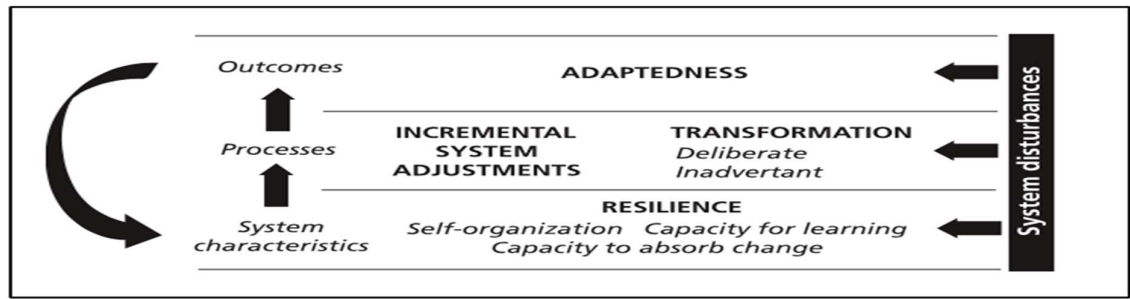


Figure 1. Showing the cycle of 'Adaptedness to Resilience' (Nelson et al., 2007).

According to Nelson, the resilience approach is unfortunately narrowed down to mainly the technological and governmental policy approach (Holling, 1973). Resilience though should be seen as an ecological reaction that cannot be considered void of peoples' action and behaviour (Nelson et al., 2007). Searching for resilience requires exploring and defining variables to create vulnerable preconditions and action-prospects for the time at which an impact takes place (Tompkins and Adger, 2004).

The understanding of 'Climate resilience' has developed in the past four decades along with the understanding of climate-change (Martin-Breen and Anderies, 2011). Originally in the sixties of the past century resilience became ecologically related and initially outlined as 'the capacity for ecological systems to persist and absorb changes'. By which ecological systems are described as from nature searching for the equilibrium towards some stable prior point under all circumstances (Holling, 1973). In the years after these ecological systems were seen less stable and functioning in a dynamic surrounding by adaptive management and environmentally limited resources (Holling, 1973). In the seventies the resilience phenomenon became connected to social science in a more evolutionary approach and transformed in the eighties to a reacting system approach through which external stresses could be offended. In the nineties when the issue of global-warming emerged resilience became related to climate-change (Pelling, 2010). Resilience related to climate-change water flooding became an important new issue of growing attention from the beginning of the twenty-first century. The extreme flooding of New Orleans, New York and recently Houston are examples of that (Sebastian et al., 2017).

3. What we don't know of 'Water Resilience'

Recently in 2017, Delft University of Technology in a 'Hackaton' session of researchers and 80 students discussed the tropical hurricane 'Harvey' that hit Houston Texas USA on August 17th 2017. In a four-day period the areas received more than a 1,000 mm of rain as the system slowly meandered over eastern Texas and adjacent waters, causing catastrophic flooding, with peak accumulations of 1,539 mm with made Harvey the wettest tropical cyclone on record in the United States. The resulting floods inundated hundreds of thousands of homes, displaced more than 30,000 people, and prompted more than 17,000 rescues'. One of the conclusions generated by 3D mapping analyses studying the flooded area and the city development of Houston over the last decennia found that new housing built in recent decennia's replaced former 'swamp' water storage areas that surrounded the city. Since 2001 over a period of 15 years the Houston had grown 23% without taking into account new water collection facilities (Sebastian et al., 2017). The residents of Houston showed the self-reliance of concerned residents. Volunteer firemen, neighbourhood's brigades, individual residents, and others mobilized themselves by successfully rescuing area residents and managing the reconstruction afterwards.

Comparing the disastrous flood hurricane effects of 'Katrina' New Orleans August 29th 2005, 'Sandy' New York October 30th 2012 and 'Harvey' Houston August 17th, these severe USA hurricanes of the 21-century show remarkable differences in reconstruction speediness', see figure 2. Unless 'Sandy' hit New York enormously by which 650.000 houses became uninhabitable and downtown Manhattan became flooded, the city recovered very fast after the hurricane. After only a number of days Manhattan was again in business. In the surrounding areas people left their houses to other places making place for new housing developments. The New York city council asked Henk Ovink from the Netherlands to be their special advisory to take the damage as a change for building a better city back, for transforming New York to a resilient region (Ovink, 2014). Houston the young the damage to the city is, already making recovering progress as well. New Orleans pitiful for the residents is still starting-up the recovery from the 'Katrina' hurricane of 2005 years longer ago. As Henk Ovink wrote in his report to the New York council, what the city needs is 'Working together to build a more resilient region'. Like the Houston residents after 'Harvey' showed, the mobilization of the people makes the difference.



Figure 2. USA hurricanes from left to right: Sandy, Sandy, Katrina and Harvey.

Europe has laid in the shadow zone of these hurricanes in the past decennia. It was in autumn 2017 that the first Atlantic hurricane in 100 years reached the coast of Ireland. It was on the 17th of October 2017 that 'Ophelia' hit the mainland. It became the first time that Ireland needed a national storm alert. 120.000 houses lost electric power and three people were killed by the storm. According to 'The New York Times' the latest comparable storms were in 1893 and 1961. According to Ovink, Europe will become more vulnerable to hurricanes as a result of climate-change in the coming years. However, it will not be the storms but, the water nuisance from heavy rainfall and seawater rise that will cause the damage and threat (Ovink, 2014), see figure 3.

Surprisingly in the reports of these hurricane disasters little information is given about the role of residents in the recovering of the cities concerned. Their contribution is mentioned as important and indispensable in many of the witness reports and related research. It becomes unclear what the role of residents is in overcoming climate-change disasters, how these are mobilized, and what their motivation factors are. Because climate-change disasters are predicted to increase in intensity and frequency, the importance of fulfilling these knowledge gaps is obligatory. Therefore a comparative case in the Netherlands was used because the Netherlands has a history of struggling with water disasters since its existence. Additionally, there is conformity of the lack of knowledge with the Dutch research on the theme of resident-initiative and resident responsibility. Research done recently concerning sustainable city refurbishing and reintroducing neighbourhood responsibility group programs could be used as the 'body of knowledge' for this new research on 'Water resilience' (Sanders, 2014b) (Sanders and Van Timmeren, 2017a) (Sanders and Van Timmeren, 2017b).

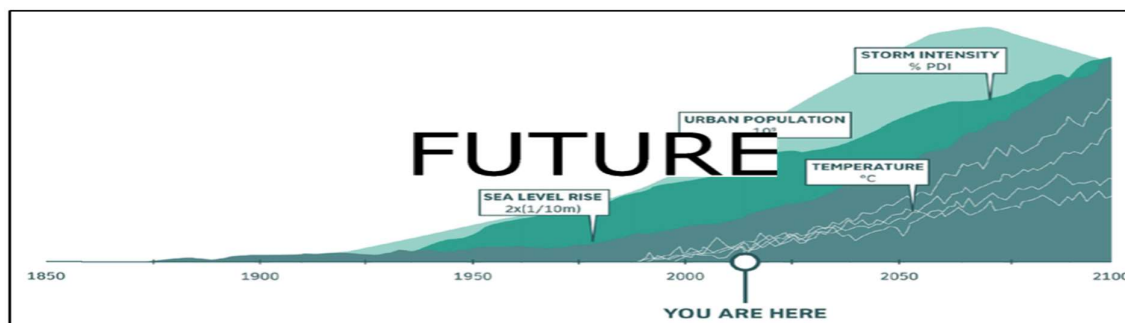


Figure 3. The main effects of climate-change globally (Ovink, 2014).

The 'Zaanstreek-Waterland' area North of Amsterdam is the chosen Dutch case study is the role of civilian initiative and bravery. This area is chosen because of the great impact of the 1916 flood, which resulted in this entire area submerged under water. Today this area in the Netherlands is still known for its volunteer organizations that are coordinated under one umbrella regional safety organization. This is remarkably distinctive, even for the Netherlands. Officials, volunteers and residents will be interviewed on location in a focus group Living-Lab setting to clearly distinguish what the

important factors of resiliency for the area are. The invited interviewees are: one or two mayors, representatives of the volunteer fire brigade, the regional police, ambulance, water authority with two civilians and other dedicated residents.

The research questions with focus on the 'Zaanstreek-Waterland' safety area are:

1. What makes the volunteer participation degree in the Zaanstreek-Waterland area successful?
2. Is governmental 'crisis planning' stimulating or overruling civilian responsibility?
3. Do civilians have a basic and learning resilience capacity¹, individually and group coupled?

For the research the following steps are executed:

1. 'Water Resilience' knowledge and examples inventory for the Dutch NW area
2. A lessons-learned 'Zaanstreek-Waterland' security zone debate
3. Water Resilience' lessons-learned by combining new and background knowledge.

4. Dutch NW 'Water Resilience' insights and examples

Large areas of the Netherlands were situated below sea level in the past, today it is up to 6,7 meters minus NAP near the city of Rotterdam at 'Zuidplaspolder' [NAP the general sea-level of the North Sea]. Climate-change will make this situation worse in the coming decennia, the seawater level will rise and storms will become more severe (Vousdoukas et al., 2017). In 2016 the EO local television broadcast organization presented a drama series in the Netherlands concerning 'What would happen when the dikes break' [Dutch; Als de dijken breken'] by Johan Nijhuis creator and Hans Herbots cineaste. This series ushered in a period of more interest by the Dutch people on the topic of seawater rise dangers as a result of climate-change and included a call to the national government for better information concerning the personal risks of people and their houses. The result was that the national 'Rijkswaterstaat' government organization, among other things responsible for the national water defence system, consulted experts, started-up informational processes, and opened a website through which every house could review what the current risks are and how far the house is below sea level [www.overstroomik.nl]; in addition, a report on the risks of flooding for common people became available (Vergouwe, 2016), see figure 4. The maps of figure 4 show the threats of climate-change for the Netherlands come from both rising sea levels and heavy rainfall. Concerning the rainfall, the increasing intensity of rainfall will not only increase the water influx from the East, but also the 'polders' maintenance will also difficulties with too little pumping capacity.

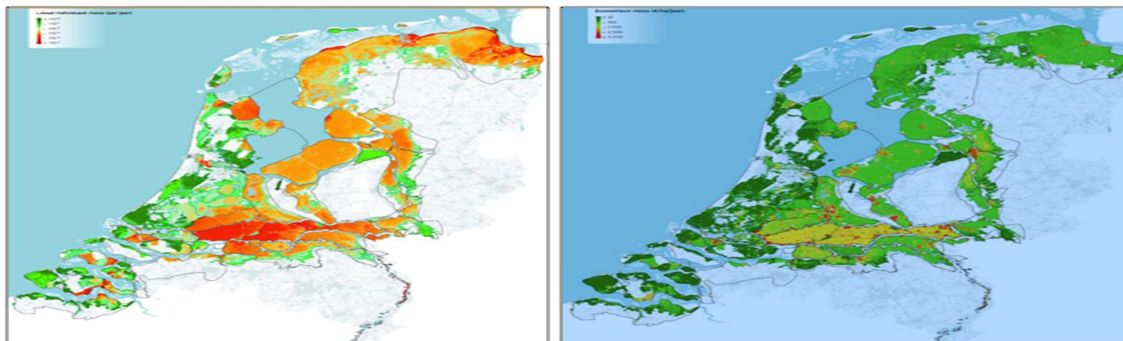


Figure 4. The risks for flooding [left] en the economic effect risks by flooding [right] (Vergouwe, 2016).

A special website of the 'Rijkswaterstaat' department features the opinions of specialists available to explain the current situation to Dutch people and address their role and responsibilities. The message was that the Dutch people could do more themselves for reducing their risks: building different houses, more green gardening for stimulating water storage inside cities and showing interest

for civilian movements and organizations that are related to water safety programming [<https://www.rijkswaterstaat.nl/water/waterbeheer/bescherming-tegen-het-water/onze-experts-over-als-de-dijken-breken/index.aspx>].

The Dutch people show awareness of their risks of flooding in the Delta areas both in past and present. Taking responsibility has always been a part of the mentality only the incentives have changed and become more urgent due to climate-change developments. (Wiering and Winnubst, 2017). Examples of people's behaviour from the present and past do help to create a mental picture.

In the past two decennia the Netherlands had to cope with a number of heavy rainfall, storms, flooding crises, and extreme warm summer periods. In two situations the event was extreme enough that people had to be evacuated (Aten, 2009):

- From January 25th until February 4th 1995, 250.000 residents were evacuated from of the 'Ooijpolder' near the city of Nijmegen and other areas alongside the rivers the 'Rijn', 'Maas' and 'Waal' because of heavy water rising. If the dikes had broken the houses would have been flooded completely. Supported by the local police and army troops, the people of a number of villages were assisted in the evacuation of the polders.
- On August 26th 2003 the dike of Wilnis broke as a result of the very dry summer that year and 1,500 people had to be evacuated. [The different layers of soil of the dike construction lost contact and slid past each other pushed by the pressure of the adjacent channel. The effect of the flooding remained limited to a 0,5 meter water rise because of instantly dike repairing by army forces.

Dutch people also had to cope with severe water flooding in the past. The earliest events began with the construction of the Dutch water defence system and the formalizing of Water-authorities. The most severe were:

- The 'Saint Nicolas' flooding of 1196 resulted in the Northwestern part of the country, near the city of Alkmaar, submerged under water when seawater broke through the dunes using an old gully. The villages in the area decided to build a new dike for protection and they divided the work. The effect was the creation of the first Water-authority in the Netherlands by Count Willem I in 1214 (Aten, 2009).
- The 'Saint Elisabeth' flooding of 1421 resulted in sea-dikes breaking in the Southwestern and Northwestern row of dunes resulting in the seawater finding its way to the land. Almost thirty villages flooded and 2.000 residents did not survive.
- The flooding of 1916 resulted in sea-dikes and river-dikes succumbed to damage because of the combination of a severe storm and heavy rainfall. The most affected was the 'Waterland' area North of Amsterdam, which flooded completely. There were only three casualties.
- The flooding of 1953, caused by breaking of dikes along the whole Dutch coastal line from South to North, resulted in severe damage to villages, infrastructure, and the water defence system; in addition to the severe damage, 1836 people died. This disaster motivated the decision of the national government to build a complete new water defence system to defence the Western Delta called the 'Delta-works' [Dutch: 'Deltawerken'].

These floods show that combinations of government and civilian action helped to overcome these disasters. Searching for the equilibrium between government responsibilities and civilian initiatives was in every flooding case and seems to be influenced by local and national circumstances. What is interesting in this context is the relationship between initiative-rich civilians and water- extreme situations concerning preventive action, life retention and responsibility for others. In 2016, research was done that focused on the water-consciousness and self-reliance of the Dutch people. The result gave a double conclusion: Dutch people are very aware of flooding risks and their responsibility to handle and invest, but they also rely generally upon government and related organizations, such as

Water-authorities, to solve problems and watch over the safety of their people (SAMR, 2016). After learning about this equilibrium it is interesting to focus on the Northwestern part of the Dutch Delta area where relatively the majority of the countrywide flooding took place in the past. The most recent flooding, the one of 1916, is interesting because this area is since 1916 a safety area in which all cities and civilian organizations worked together, including a large number of volunteers.

5. Knowing civilian societal responsibility constrains

Resident group initiatives seem to flourish when their household base is on order, when the group searches for social togetherness instead of bonding, and when the municipality facilitates the small scale of such initiatives (Sanders, 2014a). Resident group initiatives differ greatly in their goal setting and involvement; that is why there is a large difference between passive and active resident-ship (Tonkens, 2009) (WRR, 2012) related to the ladder of participation (Qu and Hasselaar, 2011). Secondly differences are found concerning the governmental attitude towards such initiatives, being static or dynamic, directive or facilitating (Hendriks, 2006) (Oude-Vrielink and Van de Wijdeven, 2011). As result of the for the Dutch SBE16 Utrecht Conference executed research on Amsterdam resident initiatives, three stages of resident initiative could be distinguished: thinking-along [a passive civilian-ship, civilians reflect and advice by accepting governmental initiatives], joining-in [a passive civilian-ship, civilians participate in and support government initiatives] and investing-in [an active civilian-ship, civilians take responsibility for initiatives dealing with government] all stages of exceed-ing civilian empowerment of resident involvement

Within this for the SBE16 research, joining-in and investment-in gave the best sustainable re-sults when researching the number of Dutch IKS2 city projects (Sanders and Timmeren, 2016). As said in this congress peer-reviewed publication: “The research concerned the Dutch 2010 innovation pro-gram for speeding-up the transition of cities towards climate neutrality 2010 [IKS] (Ministerie-VROM, 2009). This program started with 20 projects [IKS1] from and 8 projects ended-up in project realization [IKS2] for being innovative projects that were realistic enough for execution and 4 projects concerning neighbourhoods coupled with renewable-energy sustainability projects. The 2013 evaluation of this IKS program (Boon et al., 2013) scanned all climate neutral activities in 55 of the 400 [2009] municipali-ties working on climate neutrality. The conclusion of this 2013 research was that the municipality, civil servants, and civilians could be the difference between failure and success if they act together. To make the picture more clear these 4 IKS2 are given a closer research for this SBE16 Congress. Analysis of these four IKS 2 projects in 2015 for the SBE16 Congress was done using these three stages of civil-ian participation. This diversity of stages helped to make the differences of civilian participation in the projects clear and made it possible to couple the renewable-energy results to these.” The conclusion was that projects dominated by both local governments, the municipality, and civilian initiatives can be successful. Hybrid cooperation’s of both are less successful. As given a picture in figure 5.

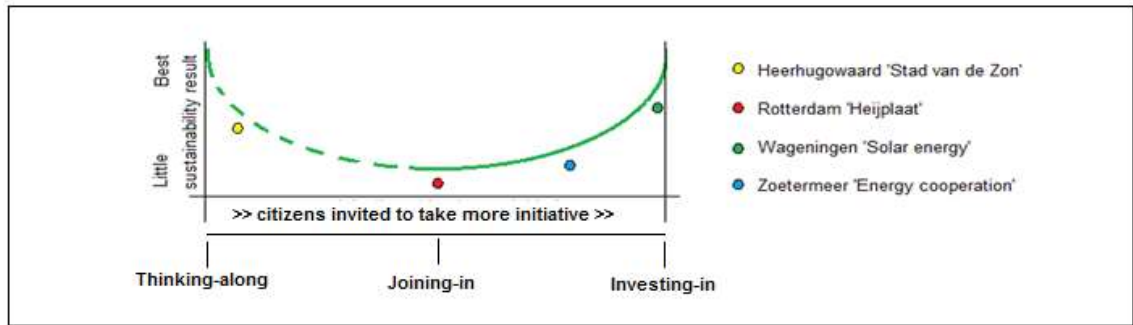


Figure 5. Scores of the four IKS2 sustainability neighbourhood projects (Sanders and Timmeren, 2016).

6. The 'Zaanstreek-Waterland' security region since 1916

The security region of 'Zaanstreek-Waterland' (www.veiligheidsregiozaanstreekwaterland.nl) is an independent organization in which seven municipalities in this region have supervision. This security region finds its historic existence in the flooding of January 14th 1916, when almost the entire region was flooded, see figure 6 for the impression. This incident created a feeling of mutual responsibility between the municipalities, related organizations, and civilians to manage safety and a diversity of tasks together. The mission statement of this security region still addressed these responsibilities in 2017: managing integral security, ready for disasters and crises, working together with police, and working together with civilians in self-reliance. The security region is active in case of fire, disasters, and crisis, has an emergency and coordination room and facilitates medical help in the region included ambulance help.



Figure 6. Impressions of the 1916 'Zaanstreek-Waterland' flooding (Aten and Wieringa, 2015).

The Western storm and the dike break of January 14, 1916 started on January 11th as a storm and flooding. Starting as an average storm, the water level in the North Sea rose, after many hours. As a result, the storm sparks by which the dikes come doubled in pressure. Due to the high water level the crown and the backside of the dikes are charged with more water than accounted for, and the dike construction becomes weak. The dikes broke like dominos in a row. First the 'Katwouder' dike near the village of 'Edam' broke. Afterwards the inner-dikes of the villages of 'Monnickendam', 'Zeevang' and 'Kwadijk' broke. Step by step the whole 'Waterland' and thereafter the 'Zaanstreek' polders filled-up as a result of the flooding. In the 'polders' many of the houses, typically built of wood in these days, were washed away, cattle fled to higher places and were brought into churches on high places. The alarm systems in these days consisted of hanging flags on church towers and other buildings. This system was in the area not completely implemented yet. Many people and cattle were saved due to locals giving their priority to alarming others instead of saving personal cattle and other belongings. Some of them ringed the church-tower clocks to alarm others. Adjacent municipalities became confronted with refugees and the local population took care of them spontaneously. Civilians of the adjacent municipalities also organized crowd funding for helping households personally. Already in the evening of January 14th the Mayor of 'Nieuwendam', situated in the area just out of the flooded area, asked some local notables to form an 'Assistance and Safety' organization. This organization organized reconstruction and reoccupation of the area including funding by the national government. The safety region 'Zaanstreek-Waterland' eventually arose out of this original 'Assistance and Safety' organization. The 1916 flood demonstrated the overwhelming commitment of governmental and civilian people because of both official employment tasks and personal choice (Aten and Wieringa, 2015).

The 1916 flooding, what happened and why, and its effect on present safety in the region is badly documented according to Aten and Wieringa (Aten and Wieringa, 2015). Looking back at the symbiotic cooperation of the people in the region and the local municipalities have remarkable importance in minimizing the number of casualties, the reoccupation of the people, and the help during this disaster. The 'Zaanstreek-Waterland' safety region still has large numbers of volunteers in the fire

brigade, health care and other civilian supported organizations like welfare and animal-ambulance work sectors. The present situation makes the civilian history of interest in relation to resilience capacity of regions to research the dynamics of this cooperation.

7. A 'Zaanstreek-Waterland' security region debate

On January 15th, 2018, exactly 102 years after the 1916 breaking of dikes and flooding of the 'Zaanstreek-Waterland' area a research focus group of representatives of the present safety of the region came together to discuss the dynamics of safety organizations, local civilians included. Within the focus group was: the mayors of 'Waterland' and 'Wormerland' from two of the seven cities in the 'Zaanstreek-Waterland' area, the chairman of HHNK Water-authority council with the title 'Dijkgraaf', an 'Alarm-room' manager for the area, a volunteer fireman from the housing community 'Spijkerboor' as well the manager of 'Jisp' for the natural ice-skating 'Bannetocht' event. A researcher and second reporter volunteered to support this focus group because they are civil servants at the Wormerland municipality

The mayor of 'Wormerland' facilitated the focus group-session to secure the confidentiality to the participants. This promotes high attendance and stimulating communication. Focus group sessions have proven their effectiveness and usefulness during the session by achieving the three levels of contribution: observation, opinion formation and the underlying argumentation. The mayor was the official chairman for the focus group session, facilitated by the researcher who had the function of first observatory and writer. A civil servant of the council support [Dutch: griffie] functioned as second writer and facilitated the analysis done by the first writer and researcher. For the analysis a diagram containing both the three research questions and the three levels of analysis is used. The analysis is then worked out in each of the nine boxes. The result was:

Question 1: What makes the volunteer participation degree in the Zaanstreek-Waterland area successful?

In 2016 when making preparations for the memorial event of the 'Zaanstreek-Waterland' 1916, the flood of a hundred years before, the Water-authority and the municipalities of the area discovered that numerous civilian groups living in the country area and in the housing communities were already planning their own festivities, as told by the 'Dijkgraaf' and confirmed by the mayor of 'Waterland'. The government organization and these local initiatives worked together to make the event of the 'Water-wolf' [nickname for severe flooding, in Dutch: Waterwolf] a mutual success. According to the both speakers, this confirmed that volunteer participation is strong in the 'Zaanstreek-Waterland' area. This should not be interpreted as confirmations that volunteer participation in the area was stronger than in other regions in the Netherlands though. In agricultural areas in general social behaviour among the civilians is more common than in cities. In 1916 it was the farmers that first warned neighbours to bring themselves to safety, leaving their cattle second. Common behaviour for farmers was said, because these are local social people used to accept death cattle. According to the mayor of 'Wormerland' they would act in the same way today. In the past these farmers were less dependent on water and electricity facilities, and that made them less dependable on government. For instance, in 1916 the people drank rainwater and got their heating from wood stove reasoned the former fireman from 'Spijkerboor'. The 'Dijkgraaf' pointed out that what is essential today is how resilient the population of people in cities and in the surrounding farming areas will be when severe disasters overcome us. The mayor added that times have changed during the last century, and today people live in cities more than in the farmland. It was also said that in cities people know each other less and can overlook situations, they are more government-shy and they like to manage their own life. The alarm-room man pointed out that city youngsters easily adapt and that government generally lack the experience to handle moments of emergencies. The mayor of 'Wormerland' said here in the Nether-

lands we are so used to the fact that we are the top country for education, care and safety to the point where many people, not only youngsters, lack lost such experience. He gave the example that after a cacao fire alarm, in which a neighbourhood had to be cleared, parents let their children go to the place for sigh seeing shortly afterwards. It seemed they were themselves not aware of the dangers of air-pollution and fire. It was also noted that today residents do embrace Whatsapp group forming for taking small responsibilities on neighbourhood levels, as in case of AED emergency. As result of the 2017 Dutch national disaster exercise recently concerning a case of mayor flooding, one of the conclusions was that governmental organizations have faltering acting and the acting of the people becomes of more importance in such cases as told by the 'Dijkgraaf'. All attendees agreed that of the severe disasters that could happen like black-outs with days without electricity, hurricane-like storms, and nuclear disasters, how people of official authorities act together is much more important to handle disasters than volunteer participation and the quality of 'crisis planning' alone. It was also said that the urgency of cooperation of civilians and officials will depend on the situation.

Question 2: Is governmental 'crisis planning' stimulating or overruling civilians responsibility?

During the 2017 'Waterwolf' disaster exercise at the island of 'Marken' it seemed that volunteers needed leaders in order to take action. The 'Alarm room' manager argued this is because severe disasters block their thinking because of the personal threat of life. The ice-master of 'Jisp' gave the example on small scale alarming situation of when the ice is really thin and a skater breaks through the ice, less and often no people know what to do and often they are blocked and do nothing. According to the mayor of 'Waterland' volunteers in extreme situations miss the modern communication utilities to handle situations adequately. It was also said that large groups of people do act slower then small groups. The 'Dijkgraaf' said the modern media, news media and social media have a role too, they should give the right information that support officials and volunteers. Others stated that news media are more focusing on what people like to hear then what they should hear and official authority information as 'Red Alarm' is often misunderstood. All agreed that by severe life threatening disasters official authorities and civilian taking initiatives will do what they think is needed each on its own scale. The authority people will focus on the whole area, for example by helping refugees and coordinating to reduce the threat, and the people living in the area will help each other; each acts on the scale they are most effective. Being resilient as a region like 'Zaanstreek-Waterland' though depends on the resilient action of officials and the people separately without getting in each other's way. Still according to the ice-master its important to educate people on what is wise in certain situations. He gave an example from personal experience, the 'Bannetocht' of 2012 when the nature ice route of 20 kilometers was damaged by too intense skating on Saturday the first day, a limit to the number of people that would be allowed to come skating was put in place the Sunday after. In practice it showed to be very difficult to reach the people because they could start everywhere along the trajectory. The ice-skating organization managed numerous of volunteers along with the media and was instructed to send out a no-go alarm. Still many skaters came to the ice and were angry when they were told not to go. To their opinion the ice was ok, they could not imagine that it would not be right for another 20.000 skaters. As said, common people should be helped to be realistic and this is especially important in case of disasters that the message reaches them, in their ear and heart.

Question 3: Do civilians have a basic and learning resilience capacity¹, individually and group coupled?

The mayor of 'Wormerland' stated that the Netherlands as a country has accepted being over-qualified on a diversity of important societal fields of civil service like education, care, housing, revenues and work participation bringing a feeling of unlimited safety among the people. All agreed that the disadvantage of this societal wealth is that people are mentally and physically not ready for intense disasters. Especially younger and low-income people show daily that they see their safety as the responsibility of the government. Taking initiative in situations of severe threats would be lifestyle dependent according to the 'Dijkgraaf'. He said higher educated people and middle class entrepre-

neural people take more easily initiative. The mayor of 'Wormerland' said; that most people, officials and common people could learn from real-life disasters. The 'Dijkgraaf' said officials and their authorities could learn a lot by studying extreme disasters that happened in other countries. For example, we Dutch could learn from the hurricane disaster of St. Maarten recently and how disasters were handled in the USA the last decades. It was also stated that the difference should be made between disasters and disruptions in that case. The 'Alarm-room' manager said common people can learn from disruptions and hopefully it will help their action in the case of disasters. Less people have an emergency stock in house, but some food in tins and water storage in bottles can be enough. We must not make people frightened told the 'Alarm room' manager, but we have to give them learning experiences. The mayor of 'Waterland' informed the group that in water related disasters, combatting the system of three-layer safety is used to focus on dike strengthening, spatial water sheltering and action planning,. He also discussed that there are programs for professionals that are learning to handle with such 'crisis planning'. The groups' reaction was we have to improve awareness among common people to bring some experience of self-reliance among them. That will facilitate resilience for severe situations, as these will come once.

Based on this focus group session the following general conclusions can be generated:

The role of volunteering to manage disasters was diminished in the last century due to city development, where people know each other less than compared to the agricultural areas and the little villages where most people lived before. This resulted in governmental authorities gaining responsibility and taking over the mayor role of managing safety for the people, residents, and people living in the surrounding areas.

Since the flood of 1953 the Netherlands manages severe disasters by dividing roles by which people and professionals work on the different scales of the village or the neighbourhood and the city or a region respectively. The speculation is that in the case of severe disasters people can act faster to save others personally, and to help older and less able people. The official authorities on the other hand can focus on hospitals and other vulnerable places and begin recovery plans that include refugees.

Wealth and long periods of safety can decrease the basic attitude of people taking responsibility when disasters take place because they are acclimated to a situation where the government has the responsibility. To be ready for severe disasters, based on the predictions of climate change, its important to activate people structurally in better times. Officials should not argue this behaviour as it diminishes the role of common people in case of severe disasters because these are needed to overcome disasters.

Common people, residents, and people in the agricultural areas can be taught to learn and prepare themselves for volunteering in case of severe disasters by involving them in minor disturbances and giving them feedback on the results. Official authorities can learn additional information from previous severe disaster recoveries in other countries, the hurricane disasters in the USA for example.

8. 'Zaanstreek-Waterland' 'Water resilience' lessons learned

From the 1916 'Zaanstreek-Waterland' and other flooding recapitulations [Chapters 3 and 5] it becomes clear that the cooperation and tuning of civilian initiatives and government ruling in case of emergencies depends more on the values and choices of individual people, residents, and civil servants, than crisis planning and hierarchies. Crisis planning becomes stronger and more effective when the situation becomes clear to official authorities at helicopter level and when police and/or military forces arrive at the area of damage.

During the Zaanstreek-Waterland flood of 1916 individuals were self-motivated and took the initiative to warn others unless they needed to first save their own cattle and household goods. Civilian initiatives after the disaster continued and focused on others in nearby areas. Civilians of the surrounding areas also began crowd-funding actions to support people in the damaged areas and they gave shelter to the refugees before official organizations had started.

What is interesting is years after the 'Zaanstreek-Waterland' flood is that the willingness to volunteer as a civilian continued and stayed strong up to a hundred years after the damaging flood of 1916. There is a causal relation between the occurrence of the flood and the still existing high level of volunteering. This is based on literature research and not proven outright though, too much happened within the Netherlands in the century in between to not consider other external factors.

Former research on civilian initiatives, group dynamics and action-prospects, added with the insights of resilience and resilient behaviour [Chapters 1, 2 and 4] makes it clear that the combined action of official authority and civilian action can be effective when one of each is in the lead or their cooperation is based on the division of tasks; because cooperation without task division works poorly for both groups effectiveness.

The 2018 focus group session with representatives of the 'Zaanstreek-Waterland' safety area [Chapters 6] confirmed that the contribution of official authority, people, and civilians in case of emergencies differs based on the scale of focus and the quickness of taking action, with different socio-cultural dynamics in cities and the agricultural areas, and surrounding cities. The existence of large cities makes the present situation not comparable to the situation of the 1916 flood. Cities today are bigger and the social structures have become weaker. In addition it is new that sections of the population are older and people with lesser income are more left out of the initiative richness of social inter-related networks.

To overcome the severe disasters yet to come, residents and people living in the farmland areas show that they can learn from less severe disturbances on two levels: 1. Learning to take action and volunteer on small scale in their neighbourhood or farmyard area by socially warning others and becoming prepared themselves, and 2. Experiencing that civilian initiatives in case of emergencies is important in the first hours and days after a disaster takes place because the official authorities need more time to take action and their first focus is taking away the threat, evacuation of less mobile people, such as hospitals and houses for elderly, and organizing refugees.

That's the positive message for making a country such as the Netherlands resilient: civilians and professionals from government and other authorities can work together successfully in case of severe disasters as long they know and accept their own role, and work on different scales and time schedules. Sharing experiences from overcoming less severe disturbances helps to bring these skills and motivations into practice to both civilians and professionals. This will make the Netherlands resilient for the coming future, with new initiatives based on experiences from the past.

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