

Fickle Waters, Resilient Societies?

A Roundtable on Resilience, Sustainability and Water History around the North Sea

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Discussants: Petra van Dam, Eline Lathouwers, Elly Robson, Tim Soens

Abstract

What did it mean to organise a society sustainably in watery environments? And what happened when sustainable practices failed? How did societies cope with fickle waters? The history of water in the lowlands around the North Sea offers a case in point to think historically about resilience alongside sustainability. In this roundtable, four scholars reflect on the possibilities and limits of resilience as a concept through which to read the interactions of humans and the rest of the natural world.

This roundtable was organised as part of the symposium **Beyond missed opportunities: a history of sustainability in the Low Countries** convened by Peter van Dam at the Netherlands Institute for Advanced Studies (NIAS). It was moderated and has been edited by Mathijs Boom and Davide Martino. The discussion began in writing: starting from a set of questions similar to the ones below, the four discussants formulated preliminary written answers, and commented on each other's contributions. The live roundtable discussion was held on 4 February 2022, virtually: constraints associated with the COVID-19 pandemic prevented us from meeting in person in Amsterdam. Nonetheless, the conversation was lively, starting from the preliminary written questions and answers and ranging widely beyond them. What follows is thus the edited result of a hybrid discussion, both written and oral. It is our hope that it captures some of the vibrancy, excitement, and enjoyment of our exchanges, and that it invites further thought and research on water history, sustainability, resilience, and the connections between these.

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Introduction

Where sustainability falls short, resilience offers a different perspective to think about the relations between humans and the rest of the natural world: adaptation. Sustainability stresses durability and stability, whereas resilience stresses long-term adaptability and short-term strategies of coping with risk and disturbance. The former is conservative in spirit, while the latter is dynamic. It is a buzzword that resonates in the higher echelons of policy making. Resilience appears to offer a way out of the dilemmas of sustainability: in the face of unsustainable social, ecological and economic practices, we might yet prove resilient. But does it? And will we?

This roundtable explores the uses of resilience to think about the history of water management in the Low Countries, as well as in the English lowlands across the North Sea. The discussants examine possible ways in which histories of water and water management can be read in light of the long history of sustainable, unsustainable, and resilient practices. Four historians at various career stages were invited to contribute. Eline Lathouwers is a PhD Candidate at KU Leuven, studying the history of human-environment interactions in three connected river valleys in North-Eastern Belgium after 1800. Elly Robson is a research fellow at Jesus College, Cambridge, interested in efforts to ‘improve’ the environment in early modern Britain and the Atlantic World, with recent work examining controversial projects of fen drainage and forest enclosure. Tim Soens is a professor at the University of Antwerp whose work includes studies of flood disasters in the late middle ages and the early modern Low Countries. Petra van Dam is a professor of environmental history and water history at Amsterdam’s Free University, who has published extensively on Dutch water history, particularly in the early modern period.

How should we think about the relationship between ‘resilience’ and ‘sustainability’? Are these concepts complementary, compatible, or contradictory?

Tim Soens:

The concept of resilience originated in the study of ecosystems. It indicates the capacity of a system to deal with disruptions, absorb them or adapt to them, while still maintaining the essential features of the system. So resilience is basically about disruptions — shocks, disturbances — and how to react to them.¹ Sustainability on the other hand is a concept originating in resource-use and resource management. In English, the term ‘sustainability’ only became widespread in the 1970s, but the German equivalent *Nachhaltigkeit* already emerged in the eighteenth century as resource management which respected the boundaries of nature. As Paul Warde recently argued, this modern idea of sustainability departs from the ‘idea that it was a problem that society may inadvertently undermine the ecological conditions for its own survival’.² This kind of sustainability is profoundly ‘modern’ as ‘more human control’ is seen as the solution, and not the problem. When carefully managed, the earth can be tempted to produce a steady and even gradually increasing flow of resources, from timber and fish to hay and grain.

Of course, scarcity-driven incentives to avoid over-exploitation were much older than the eighteenth century, and they can be found in different cultures and contexts all over the world, but they fundamentally lack this idea of control over nature. One can see why sustainability became popular in the last quarter of the twentieth century, and resilience only in the early twenty-first century, when the idea of human control over nature was fundamentally put into question. Sustainability theory seeks the origins of disruption in human overexploitation of nature, but also offers a way to avoid such overexploitation. Resilience in contrast, sees disruption as inevitable, and beyond human control. Only adaptation remains feasible.

The two concepts might be labelled complementary, as they discuss different aspects of human-nature relationships, but they are not always compatible, as they start from different conceptions of ‘nature’. When used in the study of disasters, past and present, they sometimes even yield contradictory results. Sustainable resource use prevents disasters from happening, and, in a way, makes resilience superfluous. On the other hand, a society trapped in a ‘culture of disaster,’ as Greg Bankoff has labelled it, permanently exposed to recurrent disruptions, and conditioned to overcome these disruptions time and again, might be labelled resilient, although its interaction with the environment can hardly be labelled ‘sustainable’.³

Let me take the July 2021 river floods in Belgium, North-Western Germany and the Netherlands as an example: the relationship with the river was clearly problematic. However, I expect adaptations in the flood protection system, as the flood might trigger a fundamental rethinking not just of hands-on

¹ Tim Soens, “Resilience in Historical Disaster Studies: Pitfalls and Opportunities”. In *Strategies, Dispositions and Resources of Social Resilience*, edited by Martin Endress, Lukas Clemens and Benjamin Rampp (Wiesbaden: Springer, 2020), pp. 253-74.

² Paul Warde, *The Invention of Sustainability. Nature and Destiny, c. 1500-1870* (Cambridge: Cambridge University Press, 2019), p. 356.

³ Greg Bankoff, *Cultures of disaster: society and natural hazard in the Philippines* (London/New York: Routledge, 2003).

aspects of disaster management, such as communication and timely evacuation, but also of river management policies, as well as of the idea of living in flood-prone areas.⁴ So, in hindsight Belgian, Dutch and German river management in the twenty-first century might as well be labelled resilient. But if the relationship between rivers and societies had been sustainable, the floods would never have happened, and the adaptations would not have been necessary.

Petra van Dam:

Since the concept of resilience comes from the study of ecosystems, as Tim Soens stated, I have not used it yet, maybe because system theories seem a bit old-fashioned. Societies are not systems, they are assemblages of groups of people with varying interests, who think and talk and cooperate or fight. Another reason why I don't usually find studying societal resilience very interesting is: most societies survive most shocks, so do non-resilient societies actually exist?⁵ However, once we realise societies are not systems, the concept of resilience can be used as a kind of metaphor to generate questions about how societies respond to change, in particular how absorptions, adaptations, transformations and transitions occur when societies are confronted with large-scale environmental changes, also labelled as shocks.

The topic of communalisation (*gemeenmaking*) of the dikes in the early modern Low Countries may be suitable for applying resilience questions. The long-term development was that, slowly and region by region, the financing of water infrastructure including dikes, dams, sluices, canals, windmills and other pumping engines, passed from small groups like farms and villages, to large groups like associations of villages, and ultimately to entire regions, usually institutionalised in regional water authorities (*regionale waterschappen / hoogheemraadschappen*). This improved the material quality of the infrastructure and implied, among other things, the development of an elaborate tax system and a professionalisation of bureaucracies. One may consider this as a specific aspect of the more general state-formation process. The condition *sine qua non* was the commercialisation of the countryside: the rise of specialised and productive farms and the development of a lease- and land market.⁶ For the communities involved the chances of keeping the dikes closed against hazards like storm surges at sea or high river water levels thus increased, and their capacity to drain the lands improved – both of which one may label as an increase in societal resilience.

To which extent was the communalisation of the dikes sustainable? Sustainability or rather sustainable development as a concept became popular after having been introduced in the United Nations Brundtland report of 1987. Fundamentally, it means that when promoting economic development, we must take into account future generations and peoples outside Western society. Higher and stronger dikes seem beneficial for future generations. However, in the long run, the dikes affected the natural dynamics of the river bed, as Tim Soens has already hinted at.

⁴ E.g. Alexander Fekete and Simone Sandholz, "Here Comes the Flood, but Not Failure? Lessons to Learn after the Heavy Rain and Pluvial Floods in Germany 2021". In *Water* 13:21 (2021), p. 3016. <https://doi.org/10.3390/w13213016>

⁵ Bas van Bavel *et al.*, *Disasters and History. The Vulnerability and Resilience of Past Societies* (Cambridge: Cambridge University Press, 2020), pp. 33-7.

⁶ Milja van Tielhof, *Consensus en conflict. Waterbeheer in de Nederlanden 1200-1800* (Hilversum 2021), 76-102.

In a natural river bed, silt carried down by the water, is spread over a large area during the part of the year when the river carries a lot of water. Dikes prevented this. The sediments were deposited in the narrow river channel. The bottom rose and this increased the risk of high water levels and dike breakages. In the late twentieth-century Room for the Rivers (*Ruimte voor de rivieren*) policy this was acknowledged. Therefore dredging in order to lower the water bed was one of the policy's main features, as was opening dikes at special places to let the high water out and store it temporarily in designated areas. Similar discussions about whether or not to build higher and stronger dikes had already taken place about the Red River in Vietnam in the late nineteenth century.⁷ So it seems that, when large timescales of water management are taken into account, resilient features may turn into their opposites. Here resilience and sustainability are contradictory.

Eline Lathouwers:

Transformations in modern river management are often explained as a succession of water regimes, manifesting diverse forms of (increased) human interference. Research then shows how the arrival of new institutional players and the development of novel policy programs facilitated paradigmatic regime shifts.⁸ Yet, little attention therein is paid to river users and communities, who are rightly portrayed as victims, but hardly ever regarded as 'agents of change'. Furthermore, a focus on resilience can help water historians to scrutinise policy discourses and lay bare power relations among different water managers and users. In this narrative, policy change requires bargaining between actors and hence turns resilience into a dynamic political process that takes place on different scales (national, regional, local). Literature on modern disaster policies acknowledges a paradigm shift from prevention in the twentieth century toward the creation of a risk society in the twenty-first century.⁹

Also Flemish river management fundamentally changed after the turn of the century, adopting a more holistic and eco-friendly - if not to say sustainable - approach to river management. In the decades preceding the Room for Rivers policy, respectively in the 1970s and 1980s 'traditional' resilience strategies like dike building and river normalisation (e.g. process of straightening and raising dikes) were questioned. Since they were perceived as harmful for the environment, less invasive ways of river management were put forward by nature networks. I found that, perhaps not surprisingly, (local) environmental action groups rather openly connected their plea for ecological improvement of the river

⁷ O. Tessier, 'Outline of the Process of Red River Hydraulics Development During the Nguyễn Dynasty (Nineteenth Century)' in: M.A. Stewart and P.A. Coclanis (eds.), *Environmental Change and Agricultural Sustainability in the Mekong Delta*, Advances in Global Change Research 45, DOI 10.1007/978-94-007-0934-8_4 (Springer Science+Business Media B.V. 2011), pp. 45-68.

⁸ Mark Wiering and Ann Crabbé, 'The Institutional Dynamics of Water Management in the Low Countries', in: Bas Arts and Pieter Leroy (eds.), *Institutional Dynamics in Environmental Governance* (Dordrecht 2006), 93-114, esp. p. 101; Cornelis Disco, 'Remaking "Nature": The Ecological Turn in Dutch Water management'. In *Science, Technology, & Human Values* 27:2 (2002), pp. 206-235.

⁹ Tim Soens, "Resilience in Historical Disaster Studies: Pitfalls and Opportunities". In *Strategies, Dispositions and Resources of Social Resilience*, edited by Martin Endress, Lukas Clemens and Benjamin Rampp (Wiesbaden: Springer, 2020), esp. pp. 253-255; Julien Vignet, "Thierry Ribault, Contre La Résilience. À Fukushima Et Ailleurs". *Lectures [Online]* (Lyon, France), 2021-10-20.

to society's resilience. An (ecologically) sustainable river management could also be resilient. In other words, resilience was seen as an integral part of sustainability.

Sustainability in terms of water management, for a long time, meant protecting communities against high water and increasing the productivity of arable lands (through either drainage or irrigation). In the 1950s and 1960s for instance, when haymaking in the Demer floodplain was no longer lucrative, farmers switched to more economically sustainable softwood and poplars in particular that were sold to match factories. Thus, depending on the historical context and definition given to resilience and sustainability, both concepts can be complementary, compatible or contradictory.

What, do you think, is the appeal of 'resilience' as a concept in the study of environmental history, and water history in particular? And how, if at all, have you used resilience in your research?

Tim Soens:

Resilience is clearly a concept of our time. In the present 'Age of Risk', we are obsessed with shocks and hazards and our inability to control them.¹⁰ Resilience tells individuals that they should prepare for the worst, as neither government nor market can protect them. Moreover, there is something appealing in the idea of the shock as enabling a complete makeover: a new world and a better world will rise from the ashes of the old one. When used in a 'normative' way, as a way of assessing the 'quality' of human-nature relationships, it is a dangerous idea, and it has been widely criticised.¹¹

Elly Robson:

The normative use of resilience in the present also extends to the past. While these precise terms may not have been used by flood-prone communities in the early modern period, they did construct and contest notions of vulnerability and resilience, which guided practices of water management. The question of whether a risk was considered acceptable or unacceptable was crucial. Where risk was defined as acceptable or inevitable, individuals and groups adapted their behaviour, becoming resilient. Where it was not, society (or particular groups) was defined as vulnerable, and political action was required to prevent risk or mitigate its impact. Moments in which the risk paradigm shifts – whether rapidly or gradually, via 'natural' processes or human intervention – illuminate the negotiations, redefinitions, adaptations, and interventions that occur in response.

¹⁰ Ulrich Beck, *Risk Society: Towards a New Modernity*, translated by Mark Ritter (London: Sage Publications, 1992).

¹¹ In the field of urban studies, Maria Kaika's vigorous attack on 'resilience policies' summarises the main arguments against resilience: Maria Kaika, 'Don't call me resilient again!': the New Urban Agenda as immunology ... or ... what happens when communities refuse to be vaccinated with 'smart cities' and indicators'. In *Environment and Urbanization* 29:1 (2017), pp. 89-102. doi:10.1177/0956247816684763.

Often, a struggle occurred around these definitions, as was the case in Hatfield Level near the Humber estuary in the mid-seventeenth century. Seasonal flooding was deemed an unacceptable risk by politicians, landowners, and investors who wanted to develop the land agriculturally. Rather than eliminate water, however, the new drainage system redistributed it: engineers closed meandering branches and forced water into straight channels with large banks. While the flood-resilient fens had previously absorbed excess water, it could not be contained by the new infrastructure and burst through the older and lower banks designed to protect local villages' fields, barns, and homes. Riverside communities responded with a chorus of petitions enumerating their 'infinite losses' and calling for urgent intervention. Different groups therefore identified different places and resources as vulnerable and different types of flooding as disastrous. Wetland inhabitants were acutely aware of the contingency and precarity of flood risk after drainage; in 1632, for instance, commoners from Haxey parish (Lincolnshire) negotiated a legal exchange of 1,000 acres of low-lying common for a share less liable to flood, with a proviso to prevent any further hydraulic interventions that would make their new lands 'more subject to surrounding'.¹² Such evidence makes visible how competing groups articulated and contested unacceptable risk, its causes, and solutions. These strategies constituted an environmental politics, in which questions of who should adapt and what should be protected were central.

Tim Soens:

This does not mean that we should get rid completely of the idea of resilience. In line with the later work of C.S. Holling, the Canadian ecologist who did much to popularise the use of resilience, the concept should be conceived as the process of adaptation. In a system — whether an ecosystem or a socio-environmental system — such adaptations happen continuously at different interacting scales, from the very local and small to the global and large scale. Moreover, adaptations sometimes accelerate and sometimes slow down. In some cases a fundamental reshuffle can be noticed.¹³ Such processual view on resilience can perfectly be applied to water history, as it allows us to investigate how adaptations are achieved, but also how adaptations enforced on one level might stimulate but also hamper adaptations on other levels.

My own argument on resilience in the study of historical flood disasters was indeed that societies as a whole easily overcame these disruptions, mostly by absorption, but sometimes also by 'improving' their infrastructures or even retreating when a coastline could no longer be held. What differed however, was the degree to which such resilience was achieved at the expense of particular groups in society: the adaptive processes triggered by a flood often created giant opportunities – work, capital, land – for some actors, but they left others in utter misery and desolation. Hence I suggested to limit the label 'resilience' to those adaptive processes which A) helped to prevent floods from turning into disasters and B) allowed

¹² The National Archives, Kew, E112/198/104: Exchequer Bills and Answers: Sir Cornelius Vermuyden v. Robert Ryder, William Dalbyes, John Newland, William Torkesey, Ezekias Browne, Humfrey Poplewell et al (1632).

¹³ Lance Gunderson and C.S. Holling (eds), *Panarchy. Understanding transformations in human and natural systems* (Washington: Island, 2002). For the application of such processual view on resilience on societies, see Martin Endress, Lukas Clemens and Benjamin Rampf (eds.), *Strategies, Dispositions and Resources of Social Resilience* (Wiesbaden: Springer, 2020).

all - and not just some - stakeholders to adapt to changing conditions. The focus then moves automatically from the post-hoc 'radical' adaptations to slow day-to-day adaptations aimed to cope with natural variability.¹⁴

What other concepts have historians used to think about historical processes of adaptation and recovery?

Petra van Dam:

In addition to resilience and sustainability, it is important to consider concepts like transition and transformation. In current discussions about preventing climate change (or adapting to it), people state that we need a food, a water and an energy transition, and those are tightly interconnected. One of the goals of such transitions is to move away from linear production chains and arrive at a more circular economy. In a major study putting sustainability and increasing welfare in a long-term perspective, Harry Lintsen and others have chosen as one of their case-studies the building sector.¹⁵ Applying their analysis of building material to the history of water infrastructure, we may say that in the nineteenth century we started to change from circular to linear production chains. Before then, we used organic materials to protect the dikes made of sand, clay and peat against erosion. These included living plants (grasses and reed fields protecting dikes against waves), dead reed (layers inside dikes promoting drainage), dead mosses (making wooden constructions watertight), dead sea grass (made into cushions fastened to dikes for protection against waves) and all sorts of dead soft and hard woods (including protective dike shields, 'paalschermen' at very exposed, dangerous places, and mats, 'zinkstukken', protecting underwater bottoms against waterflow).

Organic materials are circular by nature, as they decompose over time and become nutrients for new plants and other biota. A famous example of circular production use in the modern sense (re-use), is that in sluice building the skins of old, demolished ships were re-used, as archaeological excavations show, a reason that shipbuilders belonged to the professions involved in sluice building. Recently, the Dutch national forest service (*Staatsbosbeheer*) has started to investigate the future of the market for soft woods, as harvested in its biodiverse willow and alder plantations along the rivers. If we turn to this and other organic building material again at a large scale, a true transition in the field of water infrastructure building may take place.¹⁶

¹⁴ Tim Soens, "Resilient Societies, Vulnerable People: Coping with North Sea Floods Before 1800". In *Past & Present* 241:1 (2018), pp. 143–177, <https://doi.org/10.1093/pastj/gty018>

¹⁵ H.Lintsen, F. Veraart, J.P. Smits and John Grin, *De kwetsbare welvaart van Nederland 1850-2050. Naar een circulaire economie* (Amsterdam: Prometheus, 2018).

¹⁶ At a small scale this is happening already. In many places we can observe how protection of banks has turned from artificial materials to organic wickerwork (twigs woven into shields).



Master of the St Elizabeth Panels, Outer Right Wing of an Altarpiece with the St Elizabeth's Day Flood, 18–19 November 1421, with the broken dike at Wieldrecht (c. 1490–5). Rijksmuseum Amsterdam.

How has resilience been used to think about the historic interaction between humans and water in the North Sea area, both along the coasts and in river deltas? What new perspectives has it opened up? What scales—from the local (e.g. river valleys) and the regional (e.g. the North Sea coast) to the global (e.g. climate change)—are best suited for the study of resilience?

Petra van Dam:

Although the long-term trend in Dutch water management can be conceptualised as more resilience to rising water levels for some periods, dikes kept breaking. The frequency and scale, which affected maintenance quality, depended on the regional geographic, social-economic and political particularities. So I was fascinated to discover how at the local and regional level, people had opportunities to cope with floods. Here vulnerability rather than resilience, and how that differed per group, is an important concept, for social and cultural inequality played a role.

A set of related examples may illustrate this and I have labelled those as elements of an ‘amphibious culture,’ a culture adapted to changing water levels, both in everyday life and during flood disasters. Firstly, people settled on natural and human-made elevations, but this was the case for old villages (including churches that often served as shelters) and large farms more often than for town extensions and landless labourers. Also people made adaptations in the design of buildings (raised stables, raised floors for cattle, high rooms (‘opkamers’), cooking facilities in the attic, cellars covered by tiles), yet more so in large farms in the rich soil regions than in small farms in poor soil regions. Secondly, the land was compartmentalised by interior dikes (left-overs from earlier reclamations and polders), which slowed down the invasion of water and gave inhabitants more chances to take measures or even evacuate in time. However, those dikes did not always hold, depending on maintenance quality and that was related to regional prosperity. Thirdly, the presence of canals and other water transport infrastructure implied that many people had access to boats. That was a great asset for conditioning instant relief efforts (provisioning essentials like drinking water, food and fodder), but also for evacuating people, and animals (the main movable capital of farmers in large areas of the Netherlands), for guarding the fixed capital (like buildings) left behind by the refugees (e.g. by the army), and for realising the repairs of the dike holes. No doubt, more aspects of these coping strategies can be traced, but it is evident that the more affluent people had more access to such coping strategies and they were less vulnerable in cases of flooding, than the less-well-to do, and it also differed regionally.¹⁷

¹⁷ I introduced these coping strategies in P.J.E.M. van Dam, *De amfibische cultuur: een visie op watersnoodrampen*, oratie Vrije Universiteit, Amsterdam, 29 oktober 2010, [www.DARE.nl: http://hdl.handle.net/1871/18457](http://hdl.handle.net/1871/18457) (last accessed 20/01/2022). Recent revision: Idem, ‘The Amphibious Culture along the Zuider Sea and the Big Rivers in the Netherland, 1500-1850’, in: *Proceedings Rhine-Yangtze river conference Rotterdam 2019* (working title), in press.

Eline Lathouwers:

The concept of resilience is perhaps best known in the framework of disaster studies, investigating how societies responded to natural disasters. The North Sea coast, especially during the early modern period, is well researched. Little, however, is known about the impact of floods on societies' resilience in river deltas, perhaps partly because river floods were less catastrophic in nature. This is somewhat compensated by the increasingly interdisciplinary field of river historiography.

Following Richard White, river historians analyse how and why people have altered the flow of rivers in the past. Some historians, like Marc Cioc, also evaluate the effects of human impact (canalisation, pollution etcetera) on the (a)biotic life in the river, admiring the adaptability of a river ecosystem.¹⁸ Human-riverine relations are central to these kinds of narratives, but there is still ample room for more studies on changing water management regimes and discourses in the Low Countries: alongside people's resilience, natural hazards also tested political systems and ruling discourses. Studies of resilience as a dynamic process of 'continuous adaptation' could complement a narrative on evolving river discourses. We could ask: how successful were river managers, users and environmental groups in their quest to alter dominant discourses on river management?

The question of scale in relation to resilience then proves more challenging, because 'systems consist of nested dynamics operating at particular organisational scales - sub-systems, as it were'.¹⁹ Who suffered what amount of damage after a natural hazard differed between individual households, but also between communities up- and downstream of a river. Scale also matters, particularly when investigating twentieth-century river management, because power was distributed among multiple governmental levels. The European scale, for example, provided a platform for exchange of knowledge and expertise. It was for instance the EU Water Framework Directive (2000) that facilitated the shift toward an integrated water management approach around the turn of the century. Two years prior, in 1998, a major regional flood had occurred in the Demer basin in Belgian Flemish-Brabant, damaging local village infrastructure and flooding houses. The local communities recovered, thanks to kind acts of solidarity and relief aid, but river policy, designed to keep people safe, was critiqued and eventually transformed.

Tim Soens:

Resilience is seldom universal. Many people simply lack the resources, networks and knowledge to adapt their livelihood in a dynamic response to changing conditions or external pressures. In the words of Amartya Sen and Martha Nussbaum, they are simply not *capable* to 'control their own environment' or to 'live with concern for and in relation to animals, plants and the world of nature'.²⁰ Designing and implementing adaptive policies and practices will be easier to achieve in a wealthy country with a

¹⁸ Richard White, *The Organic Machine* (New York: Hill and Wang, 1996). Marc Cioc, "Seeing like the Prussian State': Re-Engineered the Rivers of Rhineland and Westphalia". In *A History of Water*, vol. 1: water control and river biographies (New York: I.B.Taurus, 2006) Edited by Terje Tvedt and Eva Jakobsson: pp. 239-252.

¹⁹ Brian Walker, C. S. Holling, Stephen R. Carpenter and Ann Kinzig. 'Resilience, adaptability and transformability in social-ecological systems'. In *Ecology and Society* 9:2 (2004), p. 5.

²⁰ Martha Nussbaum, *Creating Capabilities. The Human Development Approach* (Harvard: Belknap Press, 2011), pp. 33-34.

functioning government and an empowered civil society, and more difficult in a poor region with weak or unstable infrastructures and institutions. On a more local scale, it is highly difficult to show resilience after a flood disaster when you are living in a nineteenth-century low-cost house with structural deficiencies, situated in a former wetland next to an abandoned industrial complex – as was the case with many houses devastated along the Vesdre river in Belgium during the July 2021 floods. The only option left for many households was to sell off their properties at much reduced prices, and leave the area.²¹ Ten years after Hurricane Katrina (2005), the city of New Orleans was ‘older, richer and whiter’ than it was before the disaster, as many low-income African American households left the city for good.²²

Whose resilience are we talking about? If access to power is unequal, does the resilience of one group always come at the expense of the resilience of another?

Elly Robson:

The question of ‘whose resilience’ calls our attention to social inequalities and the dangers of considering society as a single system.²³ Deriving from the Latin *resilare*, meaning ‘to jump back’, resilience has sometimes been interpreted as the ability to return to the status quo after disturbance.²⁴ Certainly, many studies have convincingly shown that the world was rarely turned upside down in the wake of disaster, but instead existing inequalities or hierarchies were reinstated and reinforced.²⁵ The ecologist C.S. Holling suggested that rigidity causes a loss of resilience and that ecological resilience should be understood as a ‘zone of stability’ in which ecosystems reorganise and adapt in response to disturbance, rather than a return to a fixed point.²⁶ The point at which adaptation gives way to the transformation or collapse of the existing socio-ecological system is less well defined, however.²⁷ Further historical research is needed to understand how and when this threshold has been reached in the past, what processes of transformation have looked like, and what has emerged afterwards. By examining

²¹ At least this is what seems to happen during the winter of 2021-2022, Benoît July, ‘Inondations: en bord de Vesdre, le nouveau marché des maisons sinistrées’, *Le Soir*, 10 December 2021. <https://www.lesoir.be/411647/article/2021-12-10/inondations-en-bord-de-vesdre-le-nouveau-marche-des-maisons-sinistrees> (last accessed 23 February 2022).

²² Mary C. Waters, ‘Life after Hurricane Katrina: The Resilience in Survivors of Katrina (RISK) Project’. In *Sociological Forum* 31 (2016), pp. 750-769. <https://doi.org/10.1111/socf.12271>

²³ Tim Soens, ‘Resilient Societies, Vulnerable People: Coping with North Sea Floods Before 1800’. In *Past & Present* 241 (2018), pp. 143–177.

²⁴ L. Gunderson, ‘Ecological and human community resilience in response to natural disasters’, *Ecology and Society* 15 (2010).

²⁵ See for instance, John E. Morgan, ‘The representation and experience of English urban fire disasters, c.1580–1640’, *Historical Research* 89 (2016), 268- 293; Soens, ‘Resilient societies’, 160-74.

²⁶ C. S. Holling, ‘Resilience and stability of ecological systems’, *Annual Review of Ecology and Systematics* 4 (1973), pp. 1–23.

²⁷ For a theoretical attempt to differentiate adaptation from transformation, see: Brian Walker et al., ‘Resilience, Adaptability and Transformability’.

periods of both relative stability and rapid change in water management regimes, we may arrive at more precise answers about the politics of resilience.

Seasonal flooding was not experienced as a disaster in early modern wetlands. Hydrographic communities managed floodwaters as a resource as well as a risk; fertilising wetland pastures in winter, even as cattle were moved to higher ground. While quotidian ‘cultures of coping’ were well-established in early modern wetlands, they were never harmonious or static, but involved competing interests, negotiation, and change.²⁸ Hydrographic communities were aware of the dynamic social distribution of risk and responsibility; that is, who paid or worked to maintain drains and banks, what was protected, and what was made vulnerable. They also recognised that decisions in one community could ripple down into another, crossing jurisdictional boundaries. In periods of homeostasis, flood risk was relatively predictable and distributions of resources and power relatively stable in the fens. Different interests and inequalities existed, but conflict and disruption were contained – if not always resolved – within a broad consensus about priorities and processes.²⁹

This ‘zone of stability’ might be disrupted by unexpected flood events: occurring more frequently, at a larger scale, or at unusual times or places. The causes could be natural or human, or a hybrid of both. Climatic disturbances contributed to bad weather and some extreme floods across the North Sea basin in the sixteenth century, while neglect of existing infrastructure may have worsened conditions in the English fens.³⁰ This picture is complicated, however, by new ideas and practices of agricultural improvement, which promoted farming techniques and patterns of ownership that maximised productivity and profit.³¹ Changing visions of land use altered understandings of flooding, and the aims of water management. By designating the fens as a disastrous environment – in which floods threatened to overwhelm traditional systems of management – opportunities were opened up for centrally-driven interventions. High-capital investment in new hydraulic infrastructure, backed by the state, sought to transform wetlands at a large scale and rapid pace. These projects also reframed the scale at which society’s resilience was defined, promising to create privately-owned and intensively cultivated land to provide food, work, and profit for the nation. Such schemes displaced the local politics of subsistence that had shaped collective access to wetland commons and upended consensus around priorities and processes of water management. Large-scale, top-down hydraulic schemes redistributed resources and risk,

²⁸ Greg Bankoff, ‘Cultures of Coping: Adaptation to Hazard and Living with Disaster in the Philippines’, *Philippine Sociological Review* 51 (2003), pp. 1–16; John Emrys Morgan, ‘Flooding in early modern England: Cultures of coping in Gloucestershire and Lincolnshire’ (PhD Thesis: University of Warwick, 2015).

²⁹ Milja van Tielhof, ‘Forced solidarity: maintenance of coastal defences along the North Sea coast in the early modern period’, *Environment and History* 21 (2015), pp. 319–50.

³⁰ James A. Galloway, ‘Coastal flooding and socioeconomic change in eastern England in the later Middle Ages’, *Environment and History* 19 (2013), pp. 173–207; Greg Bankoff, ‘The “English lowlands” and the North Sea basin system: a history of shared risk’, *Environment and History* 19 (2013), pp. 3–37, 26–7; Eric H. Ash, *The draining of the fens: projectors, popular politics, and state building in early modern England* (Baltimore, Md.: Johns Hopkins University Press, 2017), esp. pp. 28–9, 45–7.

³¹ Paul Warde, ‘The idea of improvement, c.1520–1700’, in *Custom, improvement and the landscape in early modern Britain*, ed. R. W. Hoyle (Farnham: Ashgate, 2011), pp. 127–48.

generating a polarised environmental politics in which drainage in one place resulted in drowning elsewhere and one group's property rights led to others' dispossession.

Eline Lathouwers:

Valley dwellers and landowners adapted and developed strategies to deal with the fickle water. For the better part of the modern period, harnessing the river to guide the river water to the sea as quickly as possible was the main flood risk management strategy and one that made societies less vulnerable - or so it was perceived. Thus, at least to some extent, people's resilience was and still is - especially since we started building houses in floodplains - at the mercy of policy makers. In the twentieth century, multiple governmental agencies with their own powers and objectives, largely depending on the (non)-navigability of a river, were in charge of river control. In the Demer basin, the Rural Water Service (*Landelijke Waterdienst*) was most powerful from the 1950s to the 1970s: they set out to drain wet valley grounds to turn them into more profitable arable land. While seeking cooperation with local water boards (*Wateringen*), they favoured farmers in the area, but failed to meet demands from environmental action groups.

Governments set up relief systems, commissioned river improvement works or appointed a scientific committee to solve a water problem. The latter also happened after the floods of 1891 and 1906 had damaged the city of Leuven and left countless, predominantly poor people of lower social class and income, homeless. Apart from incriminating the upstream city of Waver for not having cleaned the riverbeds sufficiently, the committee recommended that excess water be diverted to pastures and farmland in the future. It is meaningful to consider the socio-economic background of victims, as well as the resources at their disposal. Regarding late twentieth-century disasters, historians are privileged as they can organise in-depth interviews with survivors, local politicians or emergency personnel present at the scene. What made one community more resilient than another? In addition, discourse analysis techniques could be applied to study how a disaster and subsequent coping mechanisms were represented in the media.

Petra van Dam:

Unfortunately, the lessons drawn from the flood examples, seem valid for the current climate change too. Affluent people have more means to adapt their homes and neighbourhoods to cluster showers or to periods of drought and shortage of drinking water. One historical development might console us. Modern states are much better organised and richer than early-modern ones. So they could have more means to subsidise vulnerable groups and companies to adapt to changing environmental circumstances and promote the much-desired transitions. However, social inequality is now globalised. The benevolent role of the state applies far less to the non-Western world and that is where the big challenges of the future lie.



J. Asselijn, The breakthrough of the Sint Anthonisdijk near Amsterdam (1651). Rijksmuseum Amsterdam.

In the Low Countries, institutions of water management and their archives have shaped our historical perspective. How do available sources determine the way we think about resilience?

Elly Robson:

Historians of the Low Countries have examined institutions of water management to trace how changing configurations of land ownership and political power altered sustainability and the social distribution of risk in ‘fragile’ coastal and wetland communities.³² In England, sewer commissions performed a similar role, but their records have – until recently – received far less sustained attention from scholars.³³ Of medieval origin, sewer commissions were initially occasional: much water management took place at a local level, on the basis of oral custom and knowledge, with sewer commissions providing regional oversight at times of crisis. Sewer commissions’ function and powers evolved significantly across the early modern period, especially in concert with seventeenth-century drainage projects, when sewer commissions became permanent institutions with a remit to institute and maintain new hydraulic infrastructure.³⁴ These changes could be interpreted as a consequence of local communities’ failure to cope with social and environmental change, requiring a transformational shift toward new, regional systems of water management. Alternatively, they might be read as a signifier of the institutional resilience and adaptive capacity of sewer commissions. Sewer commissions’ minute books after drainage, however, suggest that they often struggled to enforce taxes, maintain infrastructure, prevent infringements, or avert floods. In addition, groups of landed elites with conflicting interests attempted to gain control of the sewer commission, leading to a highly factional politics. The apparent stability of this institution therefore concealed significant changes and conflicts.

Sewer commission records offer a highly institutionalised perspective, revealing only a fragment of the wider environmental politics that emerged during this period of rapid and contested change in the English fens. Other sources illuminate how the negotiation of flow took place, affording greater social depth beyond formal institutions of water management. Repeated petitions from freshly-flooded riverside communities, for instance, directly addressed central authorities to seek redress. Meanwhile, central records of litigation and riot reveal how fen commoners sought to defend their rights to land and water, rejecting the legitimacy of new changes outright. In 1642, for instance, armed commoners from Epworth Manor in the northern fens seized control of new floodgates and reversed their usual management,

³² Tim Soens, ‘The social distribution of land and flood risk along the North Sea coast’, in *Rural societies and environments at risk: ecology, property rights and social organisation in fragile areas*, eds. Bas van Bavel and Erik Thoen (Turnhout: Brepols, 2013), pp. 147-79.

³³ H. G. Richardson, ‘The early history of commissioners of the sewers’ *English Historical Review* 34 (1919), 385-93; ‘The court of sewers’ in Sidney Webb and Beatrice Webb, *English local government: vol. 4: statutory authorities for special purposes* (London: 1922), 13-106; John Emrys Morgan, ‘The micro-politics of water management in early modern England: regulation and representation in commissions of sewers’, *Environment and History* 23 (2017), pp. 409-30.

³⁴ Clive Holmes, ‘Statutory interpretation in the early seventeenth century: the courts, the council, and the commissioners of sewers’, in *Law and social change in British history*, eds. John Alexander Guy and H. G. Beale (London: Royal Historical Society, 1984), pp. 107-17.

opening them at high tide for a number of weeks to flood 8,000 acres of drained land and crops.³⁵ The commoners' strategies echo Yan Gao's observation that local activism was a driving force in ordering and reordering water systems.³⁶ They constituted their own form of resilience and suggest that, alongside Tim Soens' call to identify victims, we might also seek to identify agents.³⁷

Eline Lathouwers:

When investigating evolutions in water management, one soon turns to administrative, governmental sources that offer a better understanding of institutional changes and preceding negotiations. Ideally, archival sources that “offer a highly institutionalised perspective”, as Elly puts it, reveal how those institutions assessed risk, the vulnerability of which societal groups were prioritised if any, and most importantly how they defined resilience. For example, in the 1970s, plans were made to dredge and inundate part of the Demer floodplain to build a recreational park, including the creation of artificial lakes with watersports facilities and holiday accommodations. Apart from boosting the regional economy, the lakes would also serve as water reservoirs to buffer and temporarily store excess water, thereby making the area more resilient against high water. A technical report tells us exactly how planners envisioned this park and what kind of construction works had to be carried out. Yet, it does not reveal the opinions or resistance of valley landowners, nature movements or even ordinary people. Therefore, personal correspondence, ego documents or in-depth oral history interviews could offer us a new perspective, for example that of farmers whose lands would be inundated.

Furthermore, records can help us to problematize the survival strategies of water management institutions that are among the oldest in the Low Countries. An intriguing case in that respect are local water boards, called *Polders* (for tidal areas) or *Wateringen* (for river deltas) in Dutch. The latter were small territory-based associations between riparian landowners, who carried out irrigation and drainage works along smaller inland rivers and ditches to increase crop productivity. They levied annual taxes within their jurisdiction, for which they were held accountable by the Rural Water Service (*Landelijke Waterdienst*) and the province. Despite their modest set-up and limited financial resources, they changed local water management to protect arable land against high waters, in theory reducing the (economic) vulnerability of farmers in the area whose livelihood relied on a good harvest.

Petra van Dam:

I have used several types of institutional sources, including laws and rules, minutes of meetings, accounts, litigation, and correspondence and I agree with Eline and Elly they are very useful. It is important to combine different types originating from both below and above in order to study institutional change, like the communalisation I described above. For transitions from linear to circular building of

³⁵ Parliamentary Archive, London, HL/PO/JO/10/1/202, Affidavits of Edward Hill, husbandman of Santoft (Lincolnshire) and Jacob Vernoy, yeoman of Haxey parish in the Isle of Axholme (Lincolnshire) (10 February 1646).

³⁶ Yan Gao, “The Revolt of the Commons”: Resilience and Conflicts in the Water Management of the Jiangnan Plain in Late Imperial China’, *Resilience: A Journal of the Environmental Humanities* 3 (2015), pp. 34-70.

³⁷ Tim Soens, ‘Resilient Societies’, p. 148.

water infrastructure, questions about the material and economic aspects are essential and for that I use technical treaties, construction specifications, images of the objects, and reports of archaeological excavations.

Resilience is often defined as the ability to withstand sudden *external shocks*. However, in the context of today's ecological and climatic disturbances, humans are being recast not just as the recipients of these shocks, but also as their cause. Does this affect the way we should think about resilience?

Elly Robson:

At first glance, the degradation or renewal of a resource is an anthropogenic process that takes place across long periods, whereas the shocks that test social resilience tend to be conceived of as natural in origin and rapid in effect. However, ecologists and historians have emphasised that the processes that make ecological events detrimental to human societies, and the recovery and adaptations that take place in their wake, are often more gradual.³⁸ Rob Nixon has written of 'slow violence', occurring 'out of sight, a violence of delayed destruction that is dispersed across time and space, an attritional violence that is typically not viewed as violence at all'.³⁹ Typical examples of slow violence include anthropogenic pollution or climate change. While the accelerated nature of flood disaster does not appear to fit this mould, we can only understand why an ecological event becomes disastrous by examining the institutions, ideas, and inequalities that shape risk, vulnerability, and resilience over longer periods. The structures of social, economic, and political power that govern which resources are sustained and who can access them, also determine which resources or infrastructure are prioritised for protection, who is placed at risk, and who has access to resources to recover.

By applying resilience to understand how human societies respond to environmental disturbances, we can lose sight of how human societies have often caused shocks to ecosystems through resource management, to which flora, fauna, and water (and, ultimately, also humans) must adapt. For example, ambitious drainage schemes sought to dramatically alter wetlands in seventeenth-century England; many species of birds, fish, and wetland grasses lost their habitat, while local economies that relied on these common resources were disrupted. This reduction in biodiversity was not understood as an 'unsustainable' act by drainers and their allies, however. They sought to create, improve, and sustain a new resource – dry land – as a basis for high-intensity arable agriculture. Socio-ecological perspectives invite us to think about the 'interlinked and interdependent' networks in which humans are imbricated –

³⁸ Bruce M. S. Campbell, *The Great Transition: Climate, Disease and Society in the Late-Medieval World* (Cambridge, 2016); Brian Walker et al., 'Resilience, Adaptability and Transformability in Social-ecological Systems', *Ecology and Society* 9 (2004).

³⁹ Rob Nixon, *Slow violence and the environmentalism of the poor* (Cambridge, Massachusetts: Harvard University Press, 2011).

both with one another, and at the threshold between the human and non-human – which involve reciprocal action and adaptation, and can contain conflicting interests or mutual benefit.⁴⁰ As historical processes, both resilience and sustainability have been socially differentiated, politically disputed, and highly contingent in terms of their ecological impact.

What interdisciplinary dialogues are opened up by a focus on resilience? And what role can historians play in this dialogue?

Petra van Dam:

I do not expect that I can provide concrete solutions in order to develop into a more sustainable economy. However, I do believe that my historical examples can inspire politicians, engineers, consumers and other decision makers. They can learn that in the past we lived in different regimes, more circular, more organic, more sustainable if one likes, so we can do that again, but of course with modern means because our knowledge has much increased and has more potential to develop quickly than in the past. In sum, essentially, I expect that people can learn from historians that society can change, because it always has and that applies also to our dealing with water.

Tim Soens:

Taking into account the criticisms formulated above, historians can and should embrace resilience as a concept which allows to study environmental variability, as well as how humans have coped (or not) with variability in different contexts. More precisely, historians can develop at least two types of narratives which are both valuable in present-day discussions on environmental policy and climate adaptation. On the one hand, historians can show how the idea of ‘resilience’ – or its past equivalents — has been used and abused in water management to implement changes from above and outside. The ‘failure to adapt’ has been frequently invoked as an argument to promote technological or institutional change. Historical analysis can reveal the interests at stake, and those of particular actors served by the ‘resilience discourse’. For example, when the abbess of Barking decided not to re-embank her abbey’s flooded lands along the Thames in the late fourteenth century, opting instead to exploit these lands as fishing grounds, this was an ‘entirely rational [...] accommodation to new socio-economic and environmental realities’ as James Galloway has labelled it, but at the same time the tenants of the abbey in the area were forced to abandon their flooded lands and therefore their livelihoods.⁴¹ Similarly, present-day projects of wetland restoration along rivers and coasts evict farmers to allow ‘adaptation’ to climate

⁴⁰ Raven Cretney, ‘Resilience for Whom? Emerging Critical Geographies of Socio-ecological Resilience’, *Geography Compass* 8 (2014), pp. 627-640; 628-9.

⁴¹ James A. Galloway, ‘Tempests of weather and great abundance of water’: the flooding of the Barking marshes in the later middle ages. In M. Davies and J. Galloway (Eds.), *London and Beyond. Essays in honour of Derek Keene*, p. 83.

change. Almost every drainage project in history has been motivated by pointing at the apparent inability of local populations to cope with excess waters, endangering not only their own health and income, but also the nation's 'health and wealth'. Resilience is a social battlefield, as has been noted.

At the same time, historians can also reveal alternatives, situations in which permanent environmental variability was the starting point, and human livelihoods were designed to take it into account. Apart from the amphibious strategies discussed by Petra van Dam, a permanent 'adaptive disposition' was a fundamental feature of many riverine or coastal communities in the past. Before 1000 CE so-called 'terp communities' could be found all over the North Sea coastal areas. From their living places on natural or artificial elevations, the wetlands could be used in an optimal way while still allowing for the landscape to be permanently reworked by the water. Even in subsequent centuries, when the coastal wetlands were transformed through permanent dikes, coastal peasantries often pursued livelihoods which combined dryland farming and wetland activities (fishing, boat transport, peat cutting, salt making etc.). Moreover, the landscape was arranged to accommodate recurrent winter floods. What is interesting is not only the way in which such adaptive living conditions worked, but also how and when they disappeared.⁴²

Conversely, environmental and water historians can learn a lot from other disciplines studying social and environmental adaptation processes in wetlands. The advantage of systemic approaches to adaptation is that they show how even minor changes in one element of the system impact all the others. Environmental scientists can use field experiments to investigate this, while historians bring in experiences from 'real' disasters. To cite but one example: with a multidisciplinary team of historians, geographers and hydrologists, we recently tested the impact of saltmarsh buffers in front of seawalls on storm waves in the Wadden Sea Area. The experimental measurements on the 'wad' in Groningen perfectly confirmed the observations made by a cartographer during the Christmas Flood of 1717, but also explained *why* saltmarshes made such a difference in this area (notably by reducing maximum wave heights), something which the historical sources do not tell us.⁴³ In coastal and riverine wetlands, multidisciplinary research on 'traditional' and 'modern' adaptive strategies clearly is the way forward.

At the same time, we should be careful not to overestimate the potential of 'traditional' coping strategies in the twenty-first century. Even in regions where traditional know-how on how to deal with natural variability and hazards is still widespread, this knowledge often proves of little practical value, as both the societal and the environmental or climatic pressures have increased to the extent that 'old' coping mechanisms are simply overwhelmed.⁴⁴

⁴² Tim Soens, 'Eessor et déclin d'une paysannerie maritime. La Pluriactivité dans les sociétés littorales du XIe au XVIe siècle autour de la mer du Nord', in: Jean-Luc Sarrazin and Thierry Sauzeau (eds.), *Le paysan et la mer. Ruralités littorales et maritimes en Europe du Moyen Âge à L'Époque Moderne. Actes des XXXIXe journées internationale d'histoire de Flaran, 13 et 14 octobre 2017* (Toulouse : Presses Universitaires du Midi, 2019), pp. 105-126.

⁴³ Zhenchang Zhu, Vincent Vuik, Paul J. Visser, Tim Soens et al. 'Historic storms and the hidden value of coastal wetlands for nature-based flood defence', *Nature Sustainability* 3, 2020, pp. 853–862, <https://doi.org/10.1038/s41893-020-0556-z>.

⁴⁴ Lauri Johannes Hooli, 'Resilience of the poorest: coping strategies and indigenous knowledge of living with the floods in Northern Namibia,' *Regional Environmental Change*, 16 (2016), pp. 695-707.