

# Flood Security in the Medieval and Early Modern North Sea Area: A Question of Entitlement?

TIM SOENS

*Department of History  
University of Antwerp  
Prinsstraat 13 (D313), B-2000 Antwerp, Belgium  
Email: tim.soens@ua.ac.be*

## ABSTRACT

Starting in the later Middle Ages, the coastal wetlands along the southern North Sea area were increasingly hit by a series of catastrophic storm surges. Deeply rooted in the collective memory of coastal society, these flood disasters are mostly discussed as products of meteorological disturbances, environmental vulnerability or technological failure. In this article, an alternative reading is proposed, drawing attention to massive distortions in the social allocation of flood protection in the later Middle Ages, which help to explain the increased frequency of storm disasters. Building on Amartya Sen's original entitlement approach, it is argued that the right of coastal peasants to flood security often witnessed severe setbacks preceding many flood disasters, caused by adverse economic conditions, but also by an increasing violation of their entitlement to flood protection mainly by non-peasant groups, backed by an expanding state power.

## KEYWORDS

Environmental disaster, water management, flood risk, entitlement

## INTRODUCTION: EXPLAINING THE *AGE OF STORMS* IN THE LATER MIDDLE AGES

All over the North Sea Area the later Middle Ages saw repeated flood disasters and massive land losses in coastal wetlands: in England, the Low Countries, Northern Germany and Southern Scandinavia thousands of hectares of reclaimed land and hundreds of villages were lost to the sea. For instance, in the Scheldt Estuary in the present-day province of Zeeland (The Netherlands),

more than 110 medieval villages were permanently lost between the later thirteenth and the early seventeenth century. And on a single island off the west coast of Schleswig-Holstein in Northern Germany – the island of Strand - more than twenty villages disappeared, including the commercial center of Rungholt, some of them during the so-called Second Marcellus Flood of January 1362 and then the rest in the Burchardi Flood of October 1634. In the last decade, research into historical flood disasters has become increasingly popular, not least because of the general surge in scientific and public interest in all kinds of environmental risks that might be climate-related. Historical enquiries have the advantage of offering a long-term perspective on both the occurrence and the impact of flood disasters, which always turn out to be the product of a complex interaction of environmental and social factors.<sup>1</sup>

The idea of an ‘Age of Storms’ in the later Middle Ages was already well rooted in historiography in the 1970s and 1980s, based on early research on extreme weather conditions by, for instance, H.H. Lamb, E. Le Roy Ladurie and M.K.E. Gottschalk.<sup>2</sup> Disastrous North Sea Storms are usually produced by Atlantic depressions North of Scotland, which subsequently move south to the narrow southern part of the North Sea. The wind sweeps up the water, which, combined with high tide, can produce extreme high water and catastrophic flooding.<sup>3</sup> In the 1980s an increased frequency of such storm activity during the Later Middle Ages was attributed to the colder and windier climate at the end of the so-called Medieval Warm Period, and to the coldest periods of the Little Ice Age that followed.<sup>4</sup> The increased frequency of such storms might have exacerbated periods of economic and demographic downturn, like the crisis of the fourteenth century, as already put forward for England by M.

- 
1. To cite but a few recent examples: F. Mauelshagen, ‘Flood disasters and political culture at the German North Sea coast: a long term historical perspective’, *Historical Social Research* **32** (2007): 133–44; R. Brázdil, Z.W. Kundzewicz and G. Benito, ‘Historical hydrology for studying flood risk in Europe’, *Hydrological Sciences Journal* **51**(2006): 739–764. Floods are also frequently discussed in broader historical literature on natural disaster, see for instance the recent special issue of *Environment and History*, introduced by U. Luebken and C. Mauch, ‘Uncertain Environments: Natural Hazards, Risk and Insurance in Historical Perspective’, *Environment and History* **17** (2011): 1–12.
  2. H.H. Lamb, *Climate: Present, Past and Future* (London, 1972–77); M.K.E. Gottschalk, *Storm Surges and River Floods in the Netherlands* (Assen, 1971–1977); E. Le Roy Ladurie, *Histoire du climat depuis l’an mil* (Paris: Flammarion, 1967). As for Le Roy Ladurie, he has recently taken up the issue again, in his *Histoire humaine et comparée du climat* (Paris: Fayard, 2004).
  3. J. A. Galloway, ‘Storm flooding, coastal defense and land use around the Thames estuary and tidal river c.1250–1450’, *Journal of Medieval History* **35** (2009): 173–74.
  4. H.H. Lamb, ‘Some studies of the Little Ice Age of recent centuries’, in N.A. Mörner and W. Karlin (eds.) *Climatic Changes on a Yearly to Millennial Basis* (Dordrecht: Reidel, 1984), esp. pp. 309–311; H.H. Lamb and K. Frydendahl, *Historic Storms of the North Sea, British Isles, and Northwest Europe* (Cambridge, 1991).

## FLOOD SECURITY

Bailey in 1991.<sup>5</sup> Both from a social and environmental point of view, coastal wetlands in the later Middle Ages had become particularly vulnerable to storm flooding. In most coastal saltmarshes or freshwater peat marshes around the North Sea Area, an intensification of human occupation is already visible before AD 1000. At first occupation was concentrated on natural or artificial earth mounds (*terps*), but in the tenth and eleventh century AD (late Saxon period in England), *terps* increasingly gave way to permanent embankment and a more intensive land-use, mainly for arable farming, with settlement leaving the *terps* and spreading on the wetlands (*Flachsiedlungen* in German). Especially in regions where peat was found either at the surface or in the subsoil, two or three centuries of intensive drainage and exploitation for cereal cultivation resulted in soil compaction, and the shrinking of the peat. As land was getting lower, the environmental vulnerability had increased; even more so because the flood-water was increasingly constrained to ever smaller tidal channels. Because of embankment and the damming of secondary channels the storage capacity needed to accommodate excess flood-water had been reduced considerably. As a result, by AD 1300 coastal wetlands all over the North Sea area were highly vulnerable to flood disasters.<sup>6</sup>

This increasingly well-established socio-environmental narrative provides a plausible explanation for the occurrence of so many flood disasters all over the North Sea area in the later Middle Ages. It considers these disasters as an indirect, long-term consequence of human action, which triggered a complex chain of environmental reactions, eventually and almost inevitably leading to flooding. This narrative also introduced a certain degree of defeatism in historical studies on flooding, which increasingly concentrated on studying ‘cultures of risk and coping’, in other words studying how human society has adapted to this increased risk of flooding.<sup>7</sup> Petra Van Dam for instance has characterised the Netherlands as an ‘amphibious society’, which very flexibly adapted to

- 
5. M. Bailey, ‘Per impetum maris: natural disaster and economic decline in eastern England, 1275–1350’, in B.M.S. Campbell (ed.) *Before the Black Death. Studies in the ‘Crisis’ of the Early Fourteenth Century* (Manchester: Manchester University Press, 1991), pp. 184–208.
  6. S. Rippon, ‘Adaptation to a changing environment: the response of marshland communities to the late medieval “crisis”’, *Journal of Wetland Archaeology* 1 (2001): 15–40; D. Meier, ‘Man and environment in the marsh area of Schleswig-Holstein from Roman until late Medieval times’ *Quaternary International* 112 (2004): 55–70; E. Thoen, G. Borger, A. de Kraker, T. Soens, D. Tys, H. Weerts and L. Vervaet (eds.) *Landscapes or Seascapes? The History of the Coastal Environment in the North Sea Area Reconsidered* (Turnhout: Brepols, forthcoming).
  7. Very strong in recent German historiography on flood disasters; see for instance Maelshagen, ‘Flood disasters’ and M.L. Allemeyer, *Kein land ohne Deich. Lebenswelten einer Küstengesellschaft in der Frühen Neuzeit* (Göttingen: Vandenhoeck & Ruprecht, 2006). See also the work of Greg Bankoff on the Philippines, e.g. G. Bankoff, ‘Cultures of Disaster, Cultures of Coping: Hazard as a Frequent Life Experience in the Philippines, 1600–2000’, in Christof Mauch and Christian Pfister (eds.) *Natural Disasters, Cultural Responses: Case Studies Toward a Global Environmental History* (Lanham: Lexington Books, 2009), pp. 265–284.

flooding, by choosing living spots on higher places; by building shelter places to evacuate cattle; by the general spread of boats to transport people and cattle; and by subdividing polders into compartments, which limits the flooding.<sup>8</sup>

Although this historical narrative accepts the important role of human intervention in explaining the long-term causes of the massive land losses all over the North Sea Area, it turns attention away from the direct human agency in the origins of flood disasters. As far as we know, late medieval people were not aware of the precise environmental dynamics caused by the shrinking of the peat, although they did notice that drainage of peat areas was increasingly difficult. The causal chain between human agency and flooding hence seems a long and complex one, beyond human comprehension and devoid of the possibility to actively intervene in this process. However, the flooding of environmentally vulnerable areas was never inescapable. The best-known example is the Central Holland-Utrecht peatland area, a huge peat bog area, intensively reclaimed and drained from the eleventh century onwards and indeed by the fourteenth century too low and too wet to produce much in the way of bread grains. However, most of the area was never flooded. Instead careful water management enabled a successful economic reconversion to dairy farming combined with peat dredging below the water table.<sup>9</sup> Current research, most recently by Milja Van Tielhof and Petra Van Dam emphasises that the ultimate decline of the area, and the flooding of much of it through the expansion of huge inner lakes (the Haarlemmermeer being the best known), only really became problematic in the later seventeenth century, at a moment when Holland faced severe economic recession.<sup>10</sup> Between environmental vulnerability and flooding there is a lot of human agency, there are institutions and techniques that limit the risk of inundation and that foster or hamper the resilience of coastal wetlands. (Uncontrolled) flooding only takes place at the moment these human counter-measures become ineffective.

In this article, I want to propose an alternative scheme to explain spatio-temporal variations in storm flooding. My argument starts from an anomaly in the human reaction to flood disasters in the later Middle Ages, which has recently been detected for coastal Flanders and is now being confirmed for other regions in the North Sea Area as well. Whereas the frequency of storm flooding remained high throughout the period, the human countermeasures were highly variable and show a pronounced decline in the fifteenth and sixteenth centuries. To explain this anomaly, Amartya Sen's concept of 'entitlement',

8. See the inaugural speech of Petra Van Dam as Professor of Water History in Amsterdam in 2010: P. Van Dam, *De amfibische cultuur: een visie op watersnoodrampen, oratie, Vrije Universiteit, Amsterdam, 29 oktober 2010* (Amsterdam: 2010), online: <http://hdl.handle.net/1871/18457>

9. B. van Bavel and J.L. van Zanden, 'The jump-start of the Holland economy during the late-medieval crisis, c. 1350–c.1500', *Economic History Review* 57 (2004): 503–532.

10. M. van Tielhof and P. van Dam, *Waterstaat in Stedenland. Het Hoogheemraadschap van Rijnland voor 1857* (Utrecht: Matrijs, 2006), pp. 210–239.

## FLOOD SECURITY

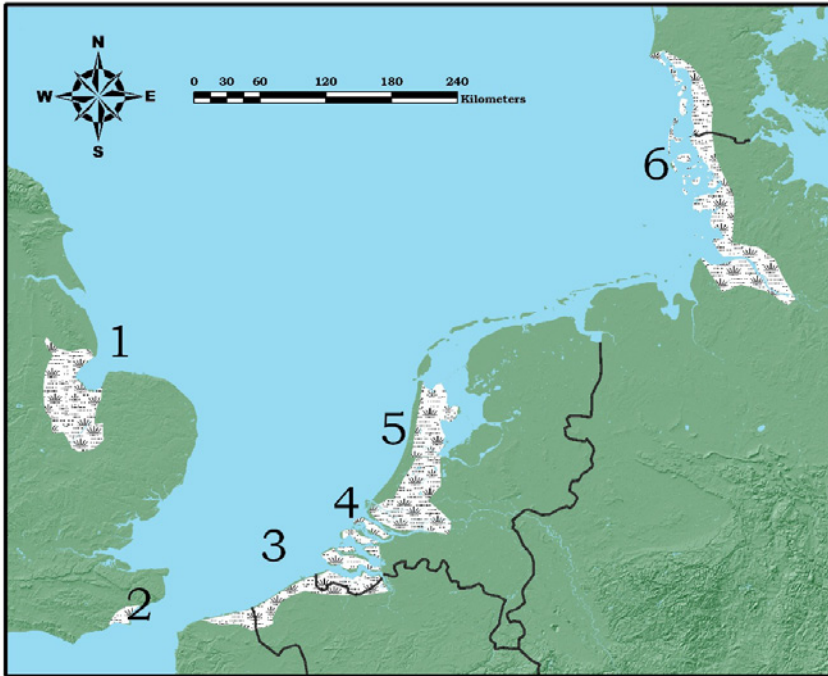


Figure 1. Coastal wetlands discussed in the text: 1. East Anglian Fenlands; 2. Romney Marsh; 3. Coastal Flanders; 4. the Zeeland Islands; 5. the Holland-Utrecht peat Area; and 6. North Frisia (in the North) and the Elbe marshes (in the South).

developed in the 1970s for the study of famine disasters, will be used.<sup>11</sup> Sen argued that most historical famines were not caused by an overall decline of food availability but by (disastrous) declines in the legal rights to food enjoyed by particular groups in society. In this article I will argue that a similar decline in entitlement must be taken into account when studying the late medieval Age of Storms, and probably many other examples of historical flood disasters as well. Using examples from Flanders, Southern England, Holland and Northern Germany, an attempt will be made to prove that the massive increase in storm flooding in the later Middle Ages was *not only* the result of an overall decline in *flood protection availability* – caused by long-term environmental problems

11. Notably in Amartya Sen, *Poverty and Famines: An Essay on Entitlements and Deprivation* (Oxford: Clarendon Press, 1982). For an introduction to Sen's entitlement concept, we are indebted to the concise critical introduction in S. Devereux, 'Sen's entitlement approach: critiques and counter-critiques', in *id.* (ed.) *The New Famines. Why Famines Persist in an Era of Globalization* (London: Routledge, 2007), pp. 66–89.

or insufficient technology – but to an important extent also of declining *entitlement to flood protection* by specific groups preceding the disaster. Before doing so however, it is first necessary to discuss Sen's entitlement theory and its possible application to flood disasters.

## STORM DISASTERS AND FLOOD PROTECTION

Precise regional chronologies of storm activity are still only available for some regions in the North Sea Area, the most elaborate ones to be found in the studies of M.K.E. Gottschalk and J. Buisman on the Low Countries. Even their work however, has yet to be refined on a sub-regional level of analysis, for instance on the scale of individual river estuaries.<sup>12</sup> Reconstructing storm activity in the period before the start of instrumental observations (for most regions in the eighteenth century AD) remains very difficult, as it has to rely exclusively on documentary proxies, which invariably deal with the impact of storms rather than their incidence. In contrast to data on temperature and humidity, storm reconstructions cannot be compared to physical proxies like tree rings or ice cores, which makes the documentary record all the more valuable but also difficult to interpret.<sup>13</sup> Indices of storm activity based on documentary sources should be understood as indices of storm damage or storm disasters. And in contrast to the storm itself, the storm disaster is always co-produced by human agency, and hence dependent on spatio-temporal variations in resilience to flood disaster. An 'Age of Storm Disasters' is not necessarily the result of an Age of Storms.<sup>14</sup>

For the late medieval Age of Storms this becomes clear when linking storm flooding, as recorded in historical sources, to the investment of money in flood protection, which is indicative of human attempts to prevent storm flooding or mitigate its impact. For Coastal Flanders, it has recently become possible to reconstruct the total financial investment in flood protection and drainage and compare this investment with the number of flood disasters.<sup>15</sup> For some parts of coastal Flanders, a serial analysis was even possible from the late thirteenth century onwards, mainly because all maintenance and repair works were

12. The most elaborate series exists for the Netherlands, with the databases of Gottschalk, *Storm surges*, supplemented by J. Buisman, *Duizend jaar weer, wind en water in de Lage Landen* (Franeker: Van Wijnen, 1995–2006)
13. R. Brazdil, D. Wheeler and C. Pfister, 'European climate of the past 500 years based on documentary and instrumental data', *Climatic Change* **101** (2010): 1–6. For a recent reconstruction of storm activity in an inland European region, based on historical evidence, see L. Litzenburger, *La vulnérabilité urbaine: Metz et son climat à la fin du Moyen-Âge* (Lyon, 2011), pp. 289–305.
14. A.M.J. de Kraker, 'Flood events in the southwestern Netherlands and coastal Belgium, 1400–1953', *Hydrological Sciences Journal* **51** (2006): 913–929
15. T. Soens, 'Floods and money. Funding drainage and flood control in coastal Flanders (13th–16th centuries)', *Continuity and Change* **26** (2011): 333–365.

## FLOOD SECURITY

centralised by specialised local authorities – so-called *water boards* – which financed their activities by levying special land taxes ('scot' or 'geschot') to be paid by all landowners in their jurisdiction.<sup>16</sup> As similar organisations were gradually introduced all over the North Sea Area, comparable data might become available on other parts of the North Sea Area as well.

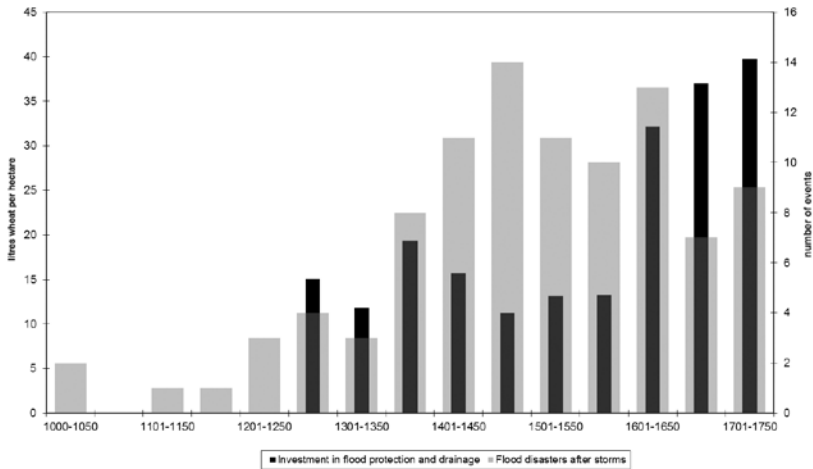


Figure 2. Flood disasters (after storm surges) compared to the financial investment in flood protection and drainage in the 'Blankenbergse watering' in Flanders (deflated to litre wheat per hectare), per 50-year period.<sup>17</sup>

Figure 2 compares the annual investment in flood protection and drainage in the Blankenbergse watering – a coastal area of approximately 16,000 hectares north of Bruges, in between the port cities of Ostend and Blankenberge – with the number of flood disasters after storm surges (hence excluding so-called 'strategic' flooding during military operations) in the South-Western

16. T. Soens, *De spade in de dijk? Waterbeheer en rurale samenleving in de Vlaamse kustvlakte (1280–1580)* (Gent: Academia Press, 2009), pp. 17–26; for a general introduction to the history of water boards in the Low Countries: G. Van de Ven (ed.) *Man-Made Low Lands: History of water management in the Netherlands* (Utrecht: Matrijs, 2004).

17. Sources: investments until 1580 based on Soens, 'Floods and Money', Appendix (data series of water taxes in the 'Blankenbergse Watering, 1280–1580'); for the period 1580–1750: Soens, *Spade in de dijk*, pp. 125–130, based on T. Faes, *De zeevering tussen Blankenberge en Oostende in de moderne tijd* (Gent: Unpublished MA Thesis Ghent University, 1966). Flood disasters based on the calendar of storm disasters in the South-Western Netherlands established by F.D. Zeiler and P. Vos, 'Overstromingsgeschiedenis van Zuidwest-Nederland. Interactie tussen natuurlijke en antropogene processen', *Grondboor en Hamer* (2008): 86–95, mainly based on the evidence assembled by Gottschalk, *Storm Surges* and Buisman, *Duizend jaar*.



Netherlands. Documentary evidence on flood disasters in the eleventh and twelfth centuries is poor, resulting in a clear underestimation of flooding in this early period. However, from the thirteenth century onwards, this part of Europe is particularly well documented through both narrative and administrative sources and the chance of under-registration of supra-local flood disasters drops significantly.<sup>18</sup> Hence, a higher frequency of flood disasters from the second half of the fourteenth to the first half of the seventeenth century AD still remains probable, just like the marked drop in storm flooding in the eighteenth century AD. Confronted with a higher frequency of storm flooding in the later Middle Ages, we would expect higher investments in flood protection and drainage. This however, is not what happened. In particular, the second half of the fifteenth and the sixteenth centuries stand out as periods of relatively low spending on flood protection and drainage – at least when deflating investment levels to cereals, which is necessary to undo the impact of coin debasement and inflation. A more detailed analysis for different parts of Flanders has shown that in some parts of Flanders stagnation and decline of flood protection investments already started by the 1390s. In other parts of coastal Flanders this decline occurred some decades later, but it can be noticed everywhere.<sup>19</sup> As a result, people were experiencing more flood disasters, but at the same time saving on investments in flood protection, which makes one doubt the nature of the causal chain linking the occurrence of storm flooding and the investment in flood protection. Interestingly, a comparable evolution has recently been noticed by James Galloway in the English Thames estuary. In the latter region, increased flooding problems in the fourteenth century were initially matched by a strong increase in both investments in the water control system and in the issuing of ‘commissions *de wallis et fossatis*’ (commissions of sewers) to supervise drainage and flood protection by the English crown. After 1370, however, activities regarding flood management declined, although the environmental problems did not.<sup>20</sup>

In the seventeenth and eighteenth centuries the trend was reversed, with significantly higher levels of investment (three times as much on average) and a marked decline in the frequency of storm flooding – as can be noticed in Figure 2. The higher the investments in flood protection, the less storm flooding, it seems. This sounds quite logical, but it has important consequences for

18. On a more local level, different chronologies can be established; see for instance De Kraker, ‘Flood events’ for the eastern part of Zeeland-Flanders in the fourteenth to sixteenth centuries. For a long-term analysis starting in the later Middle Ages we prefer to limit ourselves to the supra-local flood disasters, which are often documented by several independent sources and also made their way into narrative sources (chronicles). These supra-local floods affected larger parts of the population, and also are more likely to have influenced perceptions of and attitudes towards storm flooding.

19. Soens, ‘Floods and money’ discusses parallel series of data.

20. J.A. Galloway and J.S. Potts, ‘Marine flooding in the Thames Estuary and tidal river c.1250–1450: impact and response’, *Area* 39 (2007): 370–9; Galloway, ‘Storm flooding’: 171–88.



## FLOOD SECURITY

the study of extreme weather and ‘natural’ disaster in the past. Pre-modern variations in storm flooding seem more dependent on human agency than on any kind of medium-term meteorological or climatic change. That is not to say that climatic variability did not play any role in producing varying levels of flood disasters. Periods of prolonged bad weather conditions (as reflected in the increasingly accurate reconstructions of both temperature and precipitation), might have affected harvests, food and health conditions and hence the resilience of populations facing natural risks. As such climatic variation might have had an impact on the production of flood disasters, but in an indirect way. The evidence in Figure 2 also urges extreme prudence when using documentary sources not supported by other types of evidence – either instrumental observations or physical data – as proxy for the occurrence of extreme meteorological events. The index of storm flooding used in Figure 2 – composed by Vos and Zeiler and based on the extensive repertoires of Gottschalk and Buisman – is an excellent instrument to measure the disastrous impact of storms, but far less so to measure storm activity itself.

In any case, it is clear by now that the history of the Late Medieval Age of Storms cannot be reduced to a story of long-run environmental deterioration, accelerated by episodes of climatic instability. There is increasing evidence that the failing allocation of resources to counter flood risk is an important issue in the ‘hidden’ history of the Age of Storms. In the rest of this article the nature and the effect of these allocation mechanisms in the wake of the Age of Storms will be examined. To frame this analysis, the concept of ‘entitlement failure’ as originally developed by Amartya Sen will be used

## ENTITLEMENT AND DISASTER

The empirical evidence for Sen’s theory of entitlement – for which he won the Nobel Prize in Economic Sciences in 1998 – was mainly based on his study of the great Bengal Famine of 1943–44. According to Sen, the Bengal famine – like many or perhaps all famines – was not caused by an overall lack of food, resulting from a serious downturn in food production. Rather than a general decline in food availability, inequalities and shortcomings in the social distribution of food command or entitlement might offer better explanations for famine. Entitlement is defined by Sen as the ‘the legally and socially sanctioned right to a set of assets or resources’.<sup>21</sup> The food entitlement of a person hence is said to be the ‘set of alternative commodity bundles that a person can command in a society using the totality of rights and opportunities that he or she faces’.<sup>22</sup> Famine occurs when a group faces simultaneously catastrophic declines in their entitlements, being the combination of their access to

21. J. Dreze and A. Sen, *Hunger and Public Action* (Oxford, 1989), pp. 9–12.

22. A. Sen, *Resources, Values and Development* (Oxford: Basil Blackwell, 1984), p. 497.

food, through direct production, through trade, their own labour, inheritances or transfers from other people. Such decline could for instance occur when another group acquires superior access to the same resources.<sup>23</sup>

Sen's theory has been highly successful in disaster studies.<sup>24</sup> It helps to emphasise the (social) selectivity of the impact of disaster on different people within one and the same region, making a distinction between the production of risk on the one hand and the vulnerability and entitlement of certain groups on the other. According to Sen, not 'How many died?' but 'Who died, where, and why?' should be the first question in disaster analysis.<sup>25</sup> But Sen's approach to disaster has also been criticised. First of all, recent studies on present-day and historical famines – including Sen's Great Bengal Famine of 1943–44 – once again put more emphasis on 'absolute shortfalls in food supplies', instead of pointing to failing social allocation mechanisms. Sen's approach is believed to underplay environmental and physical risks.<sup>26</sup> On the other hand, Sen has also been criticised because of his belief in the market as an efficient allocator of resources (provided that governments guarantee free and open markets), most clearly in his recent work.<sup>27</sup> On a methodological level, it has been argued that an entitlement approach might be even inapplicable in conditions where the relationship between individuals and resources is primarily mediated by (non-market) institutions. Finally, when examining historical cases, it seems that in many cases where entitlement mattered in explaining for instance a food crisis, the problem lay not so much in the legal rights to resources, but rather in the violation of these legal rights, for instance in the case of famine when food was requisitioned, raided or forcefully appropriated. In Sen's terminology these could be labeled 'extra entitlement failures'.<sup>28</sup>

Entitlement will seldom offer a sufficient base to explain environmental disasters on its own. The physical production of environmental hazards must be taken into account as well. Centuries of (over-) intensive exploitation, subsidence and shrinking of peat soils, and the dramatic reduction of storage

- 
23. Devereux, 'Sen's entitlement approach', p. 497; for a historical case study illustrating the latter point, see R. Rempel, "'Not a cloth giver": entitlement, hunger and illicit transfers on the Emin Pasha Relief Expedition, 1886–1890', *International Journal of African Historical Studies* 39 (2006): 1–47.
24. C. O'Grada, "'Sufficiency and sufficiency and sufficiency": revisiting the Bengal Famine of 1943–44', *UCD Centre for Economic Research Working Paper Series 10 21* (2010), available on-line: <http://hdl.handle.net/10197/2655>. See also his *Famine: a short history* (Princeton: Princeton University Press, 2009); R. Hoyle, 'Famine as agricultural catastrophe: the crisis of 1622–4 in east Lancashire', *Economic History Review* 63 (2010): 974–1002.
25. The assessment below is mainly based on Devereux, 'Sen's entitlement approach' and M.S. Peacock, 'Starvation and Social Class: Amartya Sen on Markets and Famines', *Review of Political Economy* 22 (2010), 57–73; B. Reilly, *Disaster and Human History. Case Studies in Nature, Society and Catastrophe*, (Jefferson-London: McFarland, 2009), pp. 257–258.
26. For instance by W.N. Adger, 'Vulnerability', *Global Environmental Change* 16 (2006): 270.
27. A. Sen, 'Uses and abuses of Adam Smith', *History of Political Economy* 43 (2011): 257–271.
28. E.g. Rempel, 'Not a cloth giver'.

## FLOOD SECURITY

capacity, made coastal wetlands in the late medieval North Sea area vulnerable to flood disasters. But, as will be argued, many historical flood disasters were *also* failures of entitlement. Preceding flood disasters, coastal populations often witnessed dramatic declines in their capability of acquiring a sufficient level of flood security. In the period investigated – the later Middle Ages – flood security along the North Sea coasts had increasingly to be acquired on the market, with coastal communities buying labour, technology, expertise and raw materials at prevailing market conditions. What Sen labels ‘market entitlement failures’ occurred when the commodity bundles commanded by the coastal population were no longer sufficient to acquire reasonable levels of labour, technology and materials and, as we will see, this was increasingly the case in the later Middle Ages. However, not all flood disasters can be attributed to such ‘market entitlement failures’. In some cases, one could speak of ‘direct entitlement failures’, for instance when communities just lacked the necessary manpower to maintain their flood control system. Even more important were the instances where coastal communities might have been able to buy flood protection at the market, but were no longer allowed to do so, as a result of what could be called ‘extra entitlement failures’, for instance due to the fact that existing institutional arrangements were increasingly violated, thereby depriving coastal communities of the possibility to assure flood protection, even if they had the economic means to do so.

In what follows, it is hoped to demonstrate the usefulness of applying the concept of ‘entitlement’ to historical flood disasters. Looking at the entitlement to flood protection during major storm surges not only helps to understand why some groups were hit disproportionately *after* the flooding, but when the failing entitlement occurred on a large scale and over a longer period of time *before* the flood disaster, it might also help to explain the very incidence of the disaster, in this case the storm flooding.

## PEASANT SMALLHOLDING AND THE DIRECT PRODUCTION OF FLOOD PROTECTION.

From England to the Low Countries and Northern Germany, the medieval coastal wetlands in the North Sea area can be labeled peasant economies, with a majority of peasant smallholders enjoying secure tenure on their holdings. They usually practised a form of mixed farming, often combined with, for instance, fishing, reed cutting or forms of small-scale proto-industrial production (for instance textile production in Flanders) and were further characterised by a large degree of personal freedom, largely untouched by the feudal revolution of the tenth and eleventh centuries, and an increasing commercial demand

for the coastlands' products – especially wool – by the developing towns.<sup>29</sup> These were not egalitarian societies: by actively participating in markets, some coastal peasants could acquire significant wealth and some families dominated villages for centuries (for instance in the coastal marshes of Northern Germany, a peasant oligarchy of *Häuptlinge* (chiefs, East-Frisia) or '*Geschlechter*' (hierarchical family networks, Dithmarschen) dominated society).<sup>30</sup> But in contrast to later periods, the medieval coastal wetlands supported a surprisingly high population density: Romney Marsh in Southern England for instance, was one of the most populated areas of southern England, before turning into one of the most desolate in the early modern period.<sup>31</sup>

In these coastal societies, flood protection was initially produced directly and based on institutions that were once again very similar from one part of the North Sea Area to another. The infrastructure – sea walls, drains and ditches – was as much as possible allotted to individual landowners, who each year had to maintain their part of the dikes and ditches, according to the size of each holding (*met met ghelike* in Flanders – *deimath deimaths ghelike* in North Frisia). On dikes, small posts often indicated the different lots. The crucial element in this early organisation of flood protection and drainage was the inspection of the works. This inspection was performed by local 'witnesses' or aldermen, summoned by a representative of the lord, urging all landowners to fulfil their maintenance duties. In Romney Marsh, this inspection was – at least from 1252 on – the task of 24 officials known as *jurats*, who were elected by the people – presumably the landholders – of the marsh and summoned by a separate bailiff. This *Kabeldeich* system as it is called in Northern Germany survived in some areas well into the seventeenth or eighteenth centuries.<sup>32</sup>

In such conditions, flood protection was mainly produced directly by the inhabitants, investing huge amounts of their own labour in the maintenance of the dike. This kind of organisation was perfectly adapted to the needs of a predominantly peasant society where labour was abundant and cheap. Peasant households could easily devote part of their (seasonal) spare labour to maintenance and repair activities on dikes and ditches. In emergency situations as well, the *dijkwere* – an extension of the old-Germanic *Lantwere* – enforced the rapid mobilisation of workers, obliging all inhabitants of a district to attend

29. Thoen *et al.* *Landscapes or Seascapes*; T. Soens, 'Threatened by the sea, condemned by man? Flood risk and environmental inequalities along the North Sea Coast (1200–1800 AD)', in G. Massard-Guilbaud and R. Rodger (eds.) *Environmental and Social Inequalities in the City. Historical Perspectives* (Cambridge: White Horse Press, 2011), pp. 91–111.

30. D. Meier, *Die Nordseeküste. Geschichte einer Landschaft* (Heide: Boyens, 2006), pp. 89–94.

31. J. Eddison, *Romney Marsh. Survival on a Frontier* (Stroud, 2000).

32. Eddison, *Romney Marsh*, pp. 86–87; E. Feikes, *Die geschichtliche Entwicklung der Deichlast in Nordfriesland* (Breslau, 1931). On similar systems in the Netherlands and their decline: A. Fransen, 'Sharing the responsibility of ecological change : the case of the Diemerdijk, 1670–1770', *Jaarboek voor Ecologische Geschiedenis* (2006): 143–173 and Soens, *Spade in de dijk*, pp. 113–115.

## FLOOD SECURITY

the dikes in order to counter the imminent dangers of the sea. So-called direct entitlement failures could occur, when the labour force to maintain dikes in a proper way was simply missing. Most examples to be found in literature concern the impact of the Black Death in 1348–49. It has been suggested for instance that the big flood disaster which hit North Frisia in 1362 was at least partly caused by a setback in dike maintenance due to a lack of manpower because of Black Death mortality.<sup>33</sup> New evidence for Southern Sweden, also revealed huge flood problems in the immediate wake of the Black Death.<sup>34</sup> The causal chain between population decline, lack of maintenance and flooding however remains difficult to establish. Whether the immediate demographic impact of the Black Death was more or less severe in coastal wetlands compared to other regions of medieval Europe, is still unclear. Late fourteenth century land registers in coastal Flanders; early fifteenth century *post mortem* transactions in Romney Marsh; and North Frisian tax lists for the middle of that century<sup>35</sup> indicate coastal wetlands that remained highly populated, or at least seem to have recovered rather easily after the Black Death. Only in the course of the fifteenth century, did some coastal areas (like coastal Flanders or Romney Marsh) seem to embark on a long-run road to depopulation, turning lack of manpower into a structural problem. But at that time the manpower that was lacking on the spot could theoretically be acquired from elsewhere. As will be shown in the next section, direct and local production of flood protection was gradually replaced by its acquisition at an increasingly interregional market.

## THE MONETARISATION OF FLOOD PROTECTION AND MARKET ENTITLEMENT FAILURES

From the thirteenth century onwards, the execution of maintenance and repair works ceased to rely on customary maintenance duties, which had been common all over Europe at that time. Instead these works were operated by the water boards mentioned above. These water boards increasingly ‘bought’ flood protection at the market, first of all by hiring teams of dike labourers at market rates instead of relying on the local population.<sup>36</sup> Petra Van Dam has studied the recruitment of labourers employed for the repair of the Spaarndammer

33. Maelshagen, ‘Flood disasters’: 135–136.

34. J. Myrdal, ‘Scandinavia’, in H. Kitsikopoulos (ed.) *Agrarian Change and Crisis in Europe, 1200–1500* (New York-London: Routledge, 2012), p. 227.

35. U. Timmermann, *Die älteste Steuerliste Nordfrieslands* (Groningen: 1977); S. Sweetinburgh, ‘Land holding and the land market in a 15th century peasant community: Appledore, 1400–1470’, in A.J. Long, S. Hipkin and H. Clarke (eds.) *Romney Marsh: Coastal and Landscape Change Through the Ages* (Oxford: Oxford University Press, 2002), pp. 140–156; Soens, *Spade in de Dijk*, pp. 74–82.

36. Soens, ‘Floods and money’.

dijk in Central Holland (the main sea-wall between the cities of Haarlem and Amsterdam, protecting the Rijnland area from the water of the IJ) after it had been broken around 1500. On this occasion, thousands of labourers were recruited from all over Holland, although with clear regional concentrations, possibly indicating the start of a specialisation in dike works by some villages or regions. They were paid by taxes levied on the landowners of the Rijnland area.<sup>37</sup> This evolution towards market-dependency with regard to flood protection was a gradual and regionally divergent one, but by the sixteenth century it can be found in most coastal wetlands of the North Sea Area. In seventeenth century Northern Germany, dike labour was labelled 'Koyerarbeit', named after the carts (*Koyerkarren*) used for diking. Dike labourers were paid by the piece – in their case the amount of earth used in diking, at rates negotiated at the outset of the work. In many cases, dike labourers involved in major diking works were foreigners recruited in the Netherlands. They usually enjoyed a particularly bad reputation, not least because of their willingness to engage in collective strikes, when landowners or the water board failed to pay them in due time, or when labour-scarcity induced them to ask for higher wages. The local population even introduced a specific word for these strikes: 'Lawai' – a Dutch word which in this context means 'turmoil'. In his study of the Flood of 1717, M. Jakubowski-Tiessen recorded many of these strikes, some of them turning into larger riots, which reputedly hampered the repair works after the flood.<sup>38</sup>

There also was an increasing tendency to entrust more difficult works to (self-declared) drainage experts and to turn to more capital intensive technologies. This implies for instance the use of stone to reinforce dikes (which was quite expensive, due to high transport costs, as the coastal wetlands were devoid of natural stone). Drainage mills provide another example, as these introduce an important degree of technological path dependency in coping with excess water: once one region uses mills to enable deeper drainage, neighbouring regions will eventually be forced to adopt mills too (as they receive more water). Furthermore, deeper drainage fosters the process of soil compaction, so ever more powerful mills (or series of mills) were needed to ensure the same quality of drainage.<sup>39</sup>

The more dike labour was professionalised and capital-intensive technologies were applied, the less coastal peasants saw an opportunity to recover

37. P. van Dam, 'Digging for a dike. Holland's labour market ca. 1510', in P. Hoppenbrouwers and J.L. van Zanden (eds.) *Peasants into Farmers? The Transformation of Rural Economy and Society in the Low Countries (Middle Ages–19th century) in Light of the Brenner Debate* (Turnhout: Brepols, 2001), pp. 220–255.

38. M. Jakubowski-Tiessen, *Sturmflut 1717. Die Bewältigung einer Naturkatastrophe in der Frühen Neuzeit* (München: R. Oldenbourg Verlag, 1992), pp. 256–264.

39. Van de Ven, *Man-made Lowlands*, pp. 122–142; P. van Dam, 'Ecological challenges, technological innovations. The modernization of sluice building in Holland, 1300–1500', *Technology and Culture* 43 (2002): 500–520.



## FLOOD SECURITY

part of the necessary investment through their own engagement in dike labour. In the new situation, entitlement to flood protection depended on whether as an individual landholder or a community you could command ‘sufficient commodity bundles’ to buy enough flood protection. From the data on annual investment in the Flemish ‘Blankenbergse Watering’ discussed above (Figure 2), it can be calculated that in this particular area, the average cost of flood protection and drainage amounted to about 10 to 20 litres of wheat per hectare. This does not seem particularly high, but we must be aware that the ‘Blankenbergse watering’ was a relatively ‘safe’ area. In parts of coastal Flanders that were more exposed to the sea, the costs of flood protection were on average three times higher, which implied a much higher burden on the income of the coastal inhabitants.<sup>40</sup> Market entitlement failures could now occur when prices for agricultural products were either exceptionally high or low. The Great Famine of 1315–1317 offers a good example of the former situation. Whereas the nominal budget of the aforementioned Blankenbergse Watering amounted to £108.8 *groten* Flemish, it dropped to £26.2 and £26.9 *groten* Flemish in 1316 and 1317 respectively.<sup>41</sup> This was the lowest level since the beginning of the fourteenth century, and never again would investments be so low, with the exception of some periods of civil war (see below). We can question whether the local population was able to afford even the modest investments required in 1316 and 1317 (which converted into cereals corresponded to 3 to 4 litres of wheat per hectare of land). Many Flemish smallholders might have suffered market entitlement failures during the Great Famine, not only with regard to food provisioning, but also to flood protection. When speaking of failures in entitlement to flood protection in the wake of the Great Famine, we must realise that such failure was not due to an overall lack of resources. A big landowner like St. John’s hospital in Bruges also saw a drop in its total spending on flood protection and drainage, diminishing from £194 *paiement* in 1315 to £84 *paiement* and £108 *paiement* in 1316 and 1317 respectively, for the entirety of its coastal estates (the average for the first quarter of the fourteenth century amounted to £172 *paiement*). Total expenditure of the hospital in 1316 was about £15,000 *paiement*, which makes the expenses on flood protection look almost ridiculously low.<sup>42</sup> During the Great Famine large absentee landowners like St. John’s hospital also saved on flood protection although theoretically they could have afforded higher levels of flood security. However, such landowners had neither the intention nor any incentive to support a peasant population which in 1316–17 had to prioritise more

40. Soens, ‘Floods and Money’: 339–340.

41. No accounts of the Blankenbergse water board have been preserved for this period. The budget has been estimated based on the water taxes that were levied in these years (the latter were retrieved in the annual accounts of St John’s hospital in Bruges, Archives of the Public Welfare (OCMW), Sint-Janshospitaal, G30-G45).

42. *Ibidem*.



vital needs than flood protection. In Sen's terminology we could label this a 'market entitlement failure', as the increased flood risk was not caused by a general shortage of resources but by an insufficient command of (marketable) resources by a significant part of society.

Failure of entitlement to flood protection also occurred in times of economic recession. Over the years 1440–1465, prices for agricultural products in Flanders were depressed and other sectors in the Flemish rural economy also witnessed severe setbacks.<sup>43</sup> Such adverse market conditions clearly created a downward pressure on investment in flood protection and in these decades several Flemish water boards experimented with the outsourcing of their entire water control system, engaging contractors to ensure the maintenance of flood protection and drainage for several years at a fixed and low rate, in an explicit effort to cut costs.<sup>44</sup> But to what extent can we speak of a declining entitlement to flood protection due to depressed prices in mid-fifteenth century Flanders? The answer to this question depends on the social group focused on. Large landowners – who were increasingly important in coastal Flanders in this period – actively compensated for the depressed agricultural prices through scale enlargement and saved on labour costs by turning from arable farming to animal husbandry.<sup>45</sup> From their perspective, we cannot speak of entitlement failures but rather of a market-induced strategy to cut expenses on flood protection. In the same period, full-time wage labourers witnessed an increase in purchasing power due to low grain prices. Their entitlement to flood protection however did not depend on market conditions, as they did not contribute to the flood protection system, which was entirely based on land-ownership. For the majority of family holdings – mostly between two and five hectares – depressed grain prices could have been more problematic. These farms, which were omnipresent in the coastal plains until the fifteenth century, depended on the sale of small surpluses to pay taxes, tithes and rents and to afford the cost of flood protection. A sustained period of low grain prices could negatively affect their entitlement to flood protection.

From this analysis it becomes clear that adverse market conditions did not necessarily equal 'failure of entitlement'. Sometimes stakeholders in coastal society opted to reduce the level of protection when prices failed, notwithstanding their theoretical ability to command sufficient commodity bundles to ensure a higher level of flood protection. The latter can be noticed in

43. E. Thoen, *Landbouweconomie en bevolking in Vlaanderen gedurende de late Middeleeuwen en het begin van de Moderne Tijden. Test-regio: de kasselrijen van Oudenaarde en Aalst* (Gent: Belgisch Centrum voor Landelijke Geschiedenis, 1988), pp. 1031–1033.

44. Soens, 'Floods and Money': 344–345.

45. E. Thoen and T. Soens, 'Elevage, prés et pâturage dans le comté de Flandre au Moyen Age et au début des Temps Modernes. Les liens avec l'économie rurale régionale', in F. Brumont (ed.) *Prés et pâtures en Europe Occidentale 28e Journées Internationales d'Histoire de l'abbaye de Flaran, 15–16 septembre 2006*, (Toulouse : Presses universitaires du Mirail, 2008), pp. 79–100.

## FLOOD SECURITY

seventeenth and eighteenth century Romney Marsh in Southern England. By that time this area had specialised in extensive sheep breeding, dominated by so-called ‘gentlemen-graziers’. Their investments in flood protection tended to follow the wool prices. While wool prices were rising from the 1580s until the 1620s, so called ‘wall scots’ – taxes for the maintenance of the sea-walls – could triple (from an average of ca. 10 to an average of ca. 30 pence per acre). To these numbers, one should add an additional scot for the maintenance of the drainage system, on average 10 pence per acre in the 1630s. The depression of wool prices that followed first resulted in stagnation of the wall scots and from the 1660s onwards in a pronounced downward evolution. In the 1680s the wall scots had reached the bottom level of 10 to 15 pence per acre.<sup>46</sup> The level of flood protection declined and higher flood risks were accepted, but it would be mistaken to call this a failure of entitlement to flood protection, as the ‘gentlemen-graziers’ of Romney Marsh remained an upper class in society, well capable of assuring higher levels of flood protection, but for economic reasons no longer interested in doing so.

Entitlement failures occurred in particular at moments when the opportunities for coastal peasants to buy sufficient amounts of flood protection were especially limited. This was most of all the case in times of war: quite a lot of – but not all – major flood disasters clearly occurred in or shortly after major periods of war. War not only endangered flood protection directly, by destroying sea-walls or locks in order to provoke military inundations, a practice well known in coastal wetlands by the later Middle Ages: the siege of Antwerp in 1583–85 is a good example, with both opponents deliberately flooding many coastal wetlands along the river Scheldt.<sup>47</sup> It also produced entitlement failure in a more indirect way. In the 1620s Northern Germany became the main theatre of war in the struggle between Imperial, Danish and later Swedish troops involved in the Eighty Years War. On the Island of Strand for instance, high military activity was recorded in 1627–29, resulting in an enormous burden on the local population, both through taxation, through contributions for the lodging and feeding of the armies and through the disturbance of agricultural production. These years of heavy warfare seriously hampered the proper maintenance of the dikes and diminished the capability of the local population to afford a sufficient amount of flood protection. The disastrous impact of the

46. S. Hipkin, ‘Tenant farming and short-term leasing on Romney Marsh, 1587–1705’, *Economic History Review* 53 (2000): 669–670; see also his ‘The worlds of Daniel Langdon: public office and private enterprise in the Romney Marsh Region in the early 18th century’, in A.J. Long, S. Hipkin and H. Clarke (eds.) *Romney Marsh: Coastal and Landscape Change Through the Ages* (Oxford: Oxford University Committee for Archaeology, 2002), pp. 173–189.

47. A. de Kraker, ‘Zeeuws-Vlaanderen als strategisch manipuleerbaar landschap’, *NEHA Jaarboek voor economische, bedrijfs-en techniekgeschiedenis* 65 (2002): 32–48

Burchardi flood of 1634 can only be understood when taking into account this considerable decline in flood protection entitlement caused by war.<sup>48</sup>

A similar causal chain of events can be noticed in coastal Flanders as well during the last quarter of the fifteenth century. From 1473 to 1494 this region witnessed one of the most prolonged and destructive episodes of warfare in its medieval history.<sup>49</sup> During the 1470s, with the expansionist warfare of duke Charles of Burgundy, the impact of war was still indirect, mainly operating through dramatic increases in state taxation. From 1482 till 1485 and again from 1488 till 1492 the theatre of war shifted to Flanders itself. During these years urban militias and princely armies wreaked havoc on the countryside. In this same period repeated flood disasters struck coastal Flanders, most notably the so-called Cosmas and Damianus flood in 1477; and repeated storm flooding in the years 1480–83 and again from 1491 to 1494. Especially in the last episode of war (between 1488 and 1492) and its aftermath, we see a direct interplay between warfare, failing maintenance of flood protection and repeated storm flooding. Dikes were left unmaintained for years, as the coastal population had fled the area or no longer had the ability to pay for the water taxes as their lands and harvests had been destroyed. More well-to-do landowners like the St John's hospital in Bruges, although theoretically still commanding sufficient resources to pay their share, also defaulted on a large scale.<sup>50</sup> Several sluices were intentionally destroyed in the course of the war and the dike bursts caused by them were aggravated by successive storms. Whether these clusters of smaller and larger flood disasters in the years 1480–83 and 1491–94 had anything to do with episodes of increased storm frequency on the North Sea can be doubted. Many of them were probably 'ordinary' winter storms which now turned into flood disasters as the resilience of coastal society was lower than ever before. In the Braakman-district in the North of Flanders, a new tidal area of c. 11 to 13,000 hectares was created.<sup>51</sup> Can we call this the result of market entitlement failures? Of course many coastal peasants no longer had the financial wherewithal to pay for the flood protection, but above all it was

48. Meier, *Nordseeküste*, pp. 134–142; B. Hinrichs, A. Panten and G. Riecken, *Flutkatastrophe 1634. Natur, Geschichte, Dichtung* (Neumünster, 1991).

49. J. Haemers, *For the Common Good: State Power and Urban Revolts in the Reign of Mary of Burgundy (1477–1482)* (Turnhout: Brepols, 2009); J. Haemers and J. Dumolyn, 'Patterns of urban rebellion in medieval Flanders', *Journal of Medieval History* 31 (2005): 369–393; E. Thoen, 'Warfare and the Countryside: Social and Economic Aspects of the Military Destruction in Flanders during the Late Middle Ages and the Early Modern Period', *Acta Historiae Neerlandicae. The Low Countries History Yearbook* 13 (1991): 25–38.

50. Bruges, Archives of the Public Welfare (OCMW), Sint-Janshopsitaal, G 210: account of 1491–1492, f°49r–50v. Most water taxes were left unpaid. In May 1492 the clerk of the St John's hospital in Bruges warned his superiors for the huge arrears in water taxes, accumulated over the past years.

51. A. de Kraker, *Landschap uit balans. De invloed van de natuur, de economie en de politiek op de ontwikkeling van het landschap in de Vier Ambachten en het Land van Saeftinghe tussen 1488 en 1609* (Utrecht: Matrijs, 1997).

## FLOOD SECURITY

not the market but warfare itself that brutally violated the normal procedures of flood protection.

## EXTRA-ENTITLEMENT FAILURES: THE VIOLATION OF FLOOD PROTECTION ENTITLEMENT

The many instances of flood disasters occurring in times of warfare already indicate that entitlement problems were caused not only by a deteriorating exchange position in exchange relations, but also, and perhaps most of all, by infringements of entitlement rules that inhibited or hampered the legal rights of coastal inhabitants to flood protection.

A clear example of violation of entitlement rules, can be found in sixteenth century Butjadingen, in north-western Germany. In this region, medieval dike maintenance was partly funded by the proceedings of the '*Gemeinland*', the common (waste) lands managed by local communities and / or the village church. In the sixteenth century, a combination of the territorial incorporation of this region by the count Oldenburg and the Reformation resulted in the abolition of this common land, which at the same time undermined the funding of flood protection.<sup>52</sup> On a much wider scale, coastal communities all over the North Sea Area gradually lost their rights to newly deposited alluvial lands in front of the sea-walls. Not only was this a serious economic blow to coastal communities, as the outer marshes were valuable pasture grounds, but the outer marshes also were a 'free' source of earth and sods to strengthen sea-walls. Finally, the existence of extended 'intertidal' areas in front of sea-walls is today still considered of major importance in enhancing resilience to flooding and more and more projects aim to restore intertidal areas in front of sea-walls or in estuaries through what is called 'managed realignment'.<sup>53</sup> Conversely, the embankment of these outer marshes inevitably led to a reduction in storage capacity of (excess) flood-water. Fierce juridical debates on the ownership of outer marshes arose between landowners in embanked areas on the one hand and territorial lords on the other. The latter – or juridical advisors in their name – claimed ownership of the outer marshes which they considered *bona vacantia* – uncultivated, wild or 'vacant' land. In coastal Flanders such debates and princely usurpations were already frequent in the thirteenth

52. R. Krämer, 'Historisch-geographische Untersuchungen zur Kulturlandschaftsentwicklung in Butjadingen mit besonderer Berücksichtigung des mittelalterlichen Markortes Langwarden', *Probleme der Küstenforschung im Südlichen Norseegebiet* 15 (1984): 93.

53. An overview in I. Townend, C. Scott and M. Dixon, 'Managed Realignment: A Coastal Flood Management Strategy', in G. Pender and H. Faulkner (eds.) *Flood Risk Science and Management* (Oxford: Wiley-Blackwell, 2010).

century. In Schleswig-Holstein, the so-called *Anwachsregal* (literally ‘royal right to accretions’) was first formulated by the dukes of Gottorf in 1612.<sup>54</sup>

This right to *bona vacantia* also played an important part in what was probably the largest violation of entitlement rules in the history of flood disaster. According to the prevailing dike laws all over the North Sea Area, owners who were no longer willing or able to participate to the maintenance of flood protection had the right to renounce their land. The land was taken over by fellow-villagers willing to perform the connected maintenance duties (or, later, willing to pay the taxes due).<sup>55</sup> This right to ‘abandon’ ensured the uninterrupted continuity of flood protection. Starting in the thirteenth century territorial lords in the North Sea Area, ‘discovered’ that such abandoned lands could be considered as vacant too and hence fell into their hands. Already in 1292 the count of Flanders spoke of land ‘*quasdam ad nos ob defectum dicationis secundum legem patrie devolutas*’ (literally: land that we received according to dike law due to default in diking).<sup>56</sup> This was not a neutral nor an uncontested move: in Eiderstedt, North-Frisia, the *staller* or representative of the duke of Schleswig-Gottorf had to force village councillors to concede this ducal infringement on customary law. The village councillors considered this a novelty, and resisted, but eventually had to give in partially.<sup>57</sup> The princely usurpation of ‘vacant’ land would be of great importance in the future history of the coastal wetlands, as it was based on this right that the kings and princes of Europe in the Early Modern Period could grant embankment and drainage licenses to drainage companies, and urban or noble entrepreneurs, rewarding their investment with land that had been abandoned by its former owners.<sup>58</sup>

54. D. Tys, ‘Landscape, settlement and dike building in coastal Flanders in relation to the political strategy of the counts of Flanders, 900–1200’, in M. Fansa (ed.) *Kulturlandschaft Marsch - Natur, Geschichte, Gegenwart* (Oldenburg, 2005), pp. 106–126; Allemeyer, *Kein Land ohne Deich*, pp. 137–154.

55. See for instance the dike law of Eiderstedt, North-Frisia, 1525: ‘Dat ein ider schal sinen dick maken, dar he sin land hefft, wenn dar ein is. De sinen dick nicht maken will edder kan, wor he Land hefft, de schal den Ruffel up den Dick steken...’ (literally: everybody shall contribute to dike maintenance where he has land. If anyone is unwilling or incapable of maintaining his dike, he shall put his spade in the dike). A. Panten (ed.) *Unbekannte rechtsquellen des 15. Und 16. Jahrhunderts aus Nordfriesland* (Langenhorn, 1976). The ‘planting’ of the spade (‘Ruffel’) symbolises the renunciation of the land. Similar regulation is found all over the North Sea area. For Flanders, see Soens, *Spade in de dijk*, pp. 223–226.

56. Charter of count Guy of Flanders to the Abbey Our Lady of the Dunes, 23th of April 1292, ed. F. Van de Putte, *Cronica et Cartularium monasterii de Dunis* (Brugge, 1864), p. 219 (nr. CXIV).

57. The village councillors eventually gave in (partially) and added the following sentence to the rule mentioned in note 55: ‘... und willen sine Frunde den Ruffle nicht theen, denne schal den Ruffel de Herschop tehen’ (when his friends are unwilling to accept the spade, then the Lord shall accept the spade) (Panten, *Unbekannte Rechtsquellen*) Again, the acceptance of the spade (Ruffel) symbolises the transfer of the land to the new owner.

58. A synthesis is offered by S. Ciriaco, *Building on water. Venice, Holland and the Construction of the European landscape in Early Modern Times* (New York: Berghahn, 2006), pp. 194–211.

## FLOOD SECURITY

Although these princely initiatives were legitimised by the need to bring in fresh capital in order to assure flood protection, from the perspective of the coastal population they often had the opposite result, namely a declining entitlement to flood protection. On the one hand, outsiders acquiring land in old medieval embankments, were not always interested in continuing the labour-intensive mixed farming that characterised the medieval coastal landscape. In large stretches of the North Sea wetlands, they turned to commercial stock breeding, which could be done with a much lower degree of flood protection than intensive arable farming.<sup>59</sup> Even more important – and more cynical – it became tempting for state administrators and capitalist entrepreneurs to foster the flooding of old medieval embankments, in order to expropriate the original population and create space for new, rational ‘Polders’ (*Köge* in Northern Germany) suited for commercial agriculture. Investors might also hope that flooding and renewed sedimentation of the area would increase the fertility of the land. The high yields of newly embanked polders – on the spot of flooded medieval ones – acquired a mythical and often exaggerated reputation in the course of the Early Modern Period.<sup>60</sup> Of course, local populations tried to counteract these clear violations of entitlement (to land *and* to flood protection). They petitioned their princes to prevent the transfer of land to foreigners and warned that with the exodus of the local population, local working force and traditional environmental knowledge perished.<sup>61</sup> Such petitions were mostly in vain. In his chronicle of North Frisia (Schleswig-Holstein, Germany), Anton Heimreich, the former vicar of the parish of Nordstrand remembers how he had been instructed after the flood disaster of 1634 to inform the survivors gathered in the local church, that their land was forfeit, as they were not able to ensure the repair of the dikes. And, he said, his fellow-villagers wept ‘*bittere zahren*’ (bitter tears) when he made this announcement.<sup>62</sup>

Entitlement to flood protection also implies being legally capable of ensuring a sufficient degree of flood protection. By the later Middle Ages, many coastal inhabitants had lost this legal capability. Medieval flood protection was based on the simple premise that all who were threatened by the water had to be involved in the flood protection. This was less and less the case. Local stakeholders were no longer entitled to flood protection, not so much because

- 
59. For instance in sixteenth-century Butjadingen: J. Ey, ‘Late medieval and early modern reclamation: the role of the state and of village communities. A case study of the North-Western Weser Marshes under the counts of Oldenburg’, in H.J. Nitz (ed.) *The Medieval and Early Modern Rural Landscape of Europe under the impact of the commercial economy* (Göttingen, 1987), p. 215.
60. P.J. van Cruyningen, ‘Profits and risks in drainage projects in Staats-Vlaanderen, c. 1590–1665’, *Jaarboek voor Ecologische Geschiedenis* (2005): 123–142.
61. M. L. Allemeyer, ‘The World According to Harro. Mentalities, Politics and Social Relations in an Early Modern Coastal Society’, *German Historical Institute Bulletin Supplement* (2006): 60–62.
62. A. Heimreich, *Nord-Fresische Chronick*, Schleswig 1666 (ed. N. Falck, Tondern, 1819).



they commanded insufficient resources, but because they were increasingly less capable of ensuring flood protection in a way that was suitable and affordable for them, for instance through the direct supply of labour rather than cash money and through community responsibility rather than state supervision. Early Modern flood protection and drainage often seem haunted by a never-ending series of law suits and conflicts, opposing smallholders and large farmers, foreign investors and local village councils, state officials and local communities. Early Modern state officials – and modern historians alike – have often denounced the conservatism and stubbornness of coastal populations resisting improvements like centralised maintenance, new technologies and regional solidarity.<sup>63</sup> It can be argued, however, that these conflicts and their disastrous impact on flood protection, resulted at least partially from the continuous violation of entitlement rules from the later Middle Ages onwards. In the new drainage projects of the Early Modern Period, vital decisions were made by outsiders. After the announcement of vicar Heimreich on the Island of Nordstrand in 1634, the next general assembly of landowners to decide on the organisation of flood protection took place in Amsterdam, 500 kilometers away from the island. It can be doubted whether many North Frisians attended this meeting.<sup>64</sup>

## CONCLUSION

By AD 1300 the coastal wetlands of the North Sea Area had become environmentally vulnerable, and prone to storm flooding, as a result of a process which started with the permanent embankment of the area some three centuries earlier. Whether or not the ‘Age of Storm Disasters’ that followed was actually accelerated by an increased storminess over the North Sea, as a result of increased climatic instability, remains difficult to establish, as historical sources only inform us about the impact of storms and seldom their incidence.<sup>65</sup> Though fundamental to our understanding of natural disaster, these environmental processes are themselves insufficient to explain why, in the later Middle Ages, such prolonged and intensive sequences of flood disasters occurred all over the North Sea area. As argued in this article, significant changes in the allocation of resources for flood protection occurred in the later Middle Ages, which fundamentally affected not only the impact of flood disaster, but also its

63. Allemeyer, *Kein Land ohne Deich*, passim; and several contributions in P. Fournier and S. Lavaud (eds.) *Eaux et conflits dans l'Europe médiévale et moderne. Actes des XXXIIes Journées Internationales d'Histoire de l'Abbaye de Flaran 8 et 9 octobre 2010* (Toulouse : Presses universitaires du Mirail, 2011).

64. K. Kuenz, *Nordstrand nach 1634: die wiedereingedeichte Nordfriesische Insel* (Singen am Hohentwiel, 1978), pp. 209–230.

65. See the contribution of Adriaan de Kraker to this issue.



## FLOOD SECURITY

production. As a result, human agency in the occurrence of storm flooding was more important than often recognised.

In order to understand these changing allocations of resources for flood protection, the concept of entitlement, as developed by Amartya Sen in his study of famine, was applied to flood protection. Entitlement to flood protection is defined here as the capability of individuals or groups to allocate commodity bundles under their command to flood protection. Preceding major flood disasters, it was noticed that there were important failures of entitlement, which were never universal but primarily affected the well-defined group of coastal smallholders, which until the fifteenth century dominated coastal wetlands all over the North Sea Area. Three categories of entitlement failure could be distinguished. First, as long as the organisation of flood protection was primarily based on direct production by local inhabitants, entitlement failure occurred when dramatic declines in the availability of manpower occurred, which might explain some major flood episodes in the immediate post-Black Death period. Secondly, by that time flood protection in many regions was increasingly converted into a resource that had to be acquired at markets, so the exchange position of coastal inhabitants became important. Short- and medium-term economic crises could cause failures of exchange or market entitlement, as coastal inhabitants commanded insufficient resources that could be allocated to flood protection. We should be careful however not to overstretch the concept of 'market entitlement failure'. In many cases, coastal inhabitants might have commanded sufficient resources (especially labour), but were unable to fully deploy them, as elite groups might have restricted the allocation of resources to flood protection for strategic regions (cost/benefit calculations). As a result, a third category of entitlement failures might have been the most important in our understanding of pre-modern flood security: failures caused by the violation of entitlement rules. Basic entitlement rules such as the direct commitment to the organisation of flood protection by those most affected by possible flooding, were increasingly violated by non-local elite groups – foreign investors and absentee landowners, irrespective of whether they belonged to the urban merchant elite, the landed nobility or, increasingly, the new elite of state officials. In the words of Sen, the latter groups developed 'superior entitlement' to flood protection, which led to a reallocation of resources from flood protection of existing lands to new drainage and embankment projects. Inhabitants of the coastal area proved less and less able to organise flood protection in a way they could afford.

Studying the entitlement to flood protection mainly helps to explain which groups suffered most from flooding and why these groups were unable to ensure a higher degree of flood security. Whether these declining entitlements to flood protection also contributed to a higher frequency of storm disasters, cannot be positively proved. In many cases however, we can speak of strong circumstantial evidence, with major episodes of storm flooding *preceded*

by major failures of entitlement enjoyed by large parts of the coastal population, caused by adverse market conditions, but even more by warfare and the large-scale violation of entitlement rules. As such it can be concluded that flood disasters certainly were an important agent of change in the pre-modern North Sea Area. However, the agency of flood disasters was not so much an exogenous, 'natural' one, but rather endogenous, deeply embedded in human activities.

#### ACKNOWLEDGEMENTS:

First drafts of this paper were presented at the Anglo-American Conference in July 2010 in London; at a meeting of the *Réseau Universitaire de Chercheurs en Histoire Environnementale (RUCHE)* in Paris in December 2011 and at the *Climate, Environment, Settlement and Society. Changing historic patterns in Ireland* conference organised by the Group for the Study of Irish Historic Settlement and Irish Environmental History Network in Dublin in February 2012. I am most indebted to the organisers of and participants in these conferences for providing me with valuable remarks. In particular I am very grateful to Jim Galloway, Adrie de Kraker, Geneviève Massard-Guilbaud and Stéphane Frioux, and to the two anonymous referees of *Environment and History*, who through their comments and suggestions improved the argument developed in this article. This article also profited from a research stay at the Nord-Friisk Instituut in Bredstedt (Schleswig-Holstein, Germany), made possible thanks to a combined FWO-short research stay grant and a grant from the University of Antwerp ('Deutschlandjahr'). Thomas Steensen, Fiete Pingel and Albert Panten from the Nord Friisk Instituut as well as Dirk Meier supplied me with invaluable information on landscape, embankment and society in medieval and early modern Schleswig-Holstein. Finally, this article is hugely inspired by Erik Thoen from Ghent University (Belgium), who is one of the pioneers in the combined study of economic and environmental history.