

## **Drainage and risk (Poldercapitalism). A micro-analysis of financial, agricultural and environmental risk in early modern drainage projects. Test-case: Kallo-polder, Flanders, 1649-1662**

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### I.

In the history of the coastal lowlands surrounding the North Sea risk is a central concept that pervades both society, culture and landscape. Over the past few years environmental historians like Petra Van Dam, Franz Mauelshagen and most recently Greg Bankoff have analysed how the permanent threat of flooding and disaster in these regions has generated specific institutions, technologies and coping mechanisms that are often highly resembling from one part of the North Sea Area to another.<sup>1</sup> Not only coastal wetlands lived in the constant fear of dike breaches and storm flooding from the sea, but they also hosted rivers and river estuaries frequently experiencing peak discharges from the inland. Furthermore, the intentional inundation of coastal wetlands for military purposes was increasingly practiced from the later Middle Ages onwards.<sup>2</sup> According to Bankoff the coastal lowlands can hence be labeled ‘risk societies’, because their inhabitants in one way or another had to accept the risk of flooding as a ‘frequent life experience’ and continuously tried to adapt both landscape and society to accommodate this risk as good as possible.<sup>3</sup> The risk may be permanent, but the way of accommodating risk could be highly variable. In economic and agricultural history, the attitude towards risk is often singled out as a major element distinguishing peasant societies from capitalist societies. Following the 1976 article of D. McCloskey on the inherent risk aversion of peasants in an open field agriculture, there has been a lot of debate on the extent to which peasant smallholders were invariably trying to avoid risk as much possible in order to safeguard the survival of the family, by diversifying income, crops and plots, and by preferring stable but low income to higher but less certain profit.<sup>4</sup> Irrespective whether one

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<sup>1</sup> G. Bankoff, ‘The “English Lowlands” and the North Sea Basin system: a history of shared risk’, *Environment and History* 19 (2013), 3-37; P.J.E.M. van Dam, ‘Denken over natuurrampen, overstromingen en de amfibische cultuur’, *Tijdschrift voor waterstaatsgeschiedenis*, 21 (2012), 1-2, 1-10; F. Mauelshagen, ‘Flood Disasters and Political Culture at the German North Sea Coast: A Long-term Historical Perspective’, *Historical Social Research*, 32 (2007) 3, 133-144.

<sup>2</sup> De Kraker, Flood Events XXX.

<sup>3</sup> Bankoff, English Lowlands, 19.

<sup>4</sup> McCloskey, Donald. “English Open Fields as Behavior Towards Risk.” *Research in Economic History* 1 (Fall 1976): 124–70 and D. McCloskey, “The Prudent Peasant: New Findings on Open Fields.” *Economic History Review*, 51, no. 2 (June 1991): 343–55; See also XXX.

adheres to the ‘prudent peasant’ theory, it is clear that the transition to capitalist agriculture is paralleled by an increase in the taking of risk. Responding to market opportunities or forced by competition for land, farmers were increasingly tempted to specialize, innovate and experiment in order to maximize the profitability of their farm.<sup>5</sup>

So far, the debates on the variable role of risk in agricultural history seem difficult to match with the ‘permanence’ of risk, advanced by environmental historians of the coastal lowlands. By stressing the physical origins of the flood risks, environmental historians tend to downplay fundamental differences in the way environmental risk was constructed by different social groups in different social contexts.<sup>6</sup> For agricultural historians on the other hand, the specific physical environment of the coastal lowlands, including the occurrence of flooding, is mostly analyzed as an exogenous factor which impacts land use and productivity, but risk itself is not singled out as an element that distinguishes coastal farming systems from inland farming systems.<sup>7</sup> In this article an effort is made to integrate both perspectives on the role of risk in coastal society, by focusing on the highly innovative ways of risk management that characterized the centralised drainage projects spreading over the North Sea Area in the Early Modern period. As we will argue, centralised drainage introduced a profoundly different way of dealing with risk, as drainers no longer tried to adapt to risk, but used technology, institutions, and power to control and manipulate risk. Drawing on century-long experiences of risk coping in international trade, drainers turned risk into a commodity the cost of which could be externalized to other groups or future generations. As such drainage introduced the modern way of risk management in coastal society, combining inherently high risks with maximal efforts to control this risk.

## II.

In the seventeenth and eighteenth century, enormous amounts of money were allocated to large-scale drainage and embankment projects in the vast coastal marshlands of England, France, Northern Germany and the Low Countries.<sup>8</sup> In many of these projects, both the incentive and the capital came from upper-class investors, many of them belonging to merchant or state elites, and as such experienced in funding risky trade and shipping

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<sup>5</sup> Brenner XXX.

<sup>6</sup> Bankoff, *English Lowlands*: 34.

<sup>7</sup> For an overview, see the forthcoming volume on *Land Use and Productivity* in the series *Rural Economy and Society*, published by Brepols Publishers (Turnhout).

<sup>8</sup> A general overview is given by S. Ciriaco, *Building on water. Venice, Holland and the construction of the European landscape in Early Modern Times* (2006), esp. 194-250.

operations. In line with the latter activities, investment in drainage projects was a risky undertaking in many ways. We already mentioned the constant environmental risk of flooding, inherent to the nature of coastal wetlands. Whereas the local population was both physically and materially endangered by flooding, the absentee investors/landowners mainly suffered in their pockets. They saw their prospects of good profits and high return on investment diminishing, and costs for dike repair increasing. In addition to and intertwined with flood risks, free-riding landowners not willing to pay their land tax to the water management organization could endanger the quality of the water control system and cause a financial hangover for the well-contributing landowners (since the latter often had to pay more than required to fill the gap). The problems of tax payment sometimes ended in deficient maintenance and hence enhanced flood risks.<sup>9</sup> Thirdly, every drainage project entailed a redistribution of property rights, often to the disadvantage of the local population. As a consequence, local resistance to drainage was often very high, and could endanger projects, especially when intertwined with other causes of political discontent.<sup>10</sup> At the end of the reign of Charles I of England (1626-1649) for instance, the massive drainage projects in the Fens, part of them coordinated by the Dutch engineer Cornelius Vermuyden, and (partly) financed by Dutch capital, became profoundly entangled in the violent political conflicts leading to the English Civil War (1642-1651).<sup>11</sup> Finally, the actual pay-off for the drainers only occurred after the finishing of the drainage or embankment project. The return on investment primarily depended on the agricultural output and at the very start of the drainage project, the future yields of the newly reclaimed lands were highly uncertain.<sup>12</sup> As such every drainage project had to deal with significant degrees of financial, environmental, political and agricultural risk. Both the high amount of capital input and the high degree of risk involved in land reclamation are considered important elements in the further agricultural evolution of the coastal wetlands as well. As Salvatore Ciriaco puts it, it cannot be a coincidence that ‘the

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<sup>9</sup> On deficient water tax payment, see M.A. Knittl, ‘The design for the initial drainage of the Great Level of the Fens: an historical whodunit in three parts’, *Agricultural Hist. Rev.* 55 (2007), pp. 48-49; P.J. van Cruyningen, ‘Environmental disaster, changing property relations and water management in the southwest of the Netherlands, c. 1500-1700’, conference paper 9<sup>th</sup> ESSHC Glasgow, 11-14 April 2012.

<sup>10</sup> T. Soens, ‘Capitalisme, institutions et conflits hydrauliques autour de la Mer du Nord (XIII<sup>e</sup>-XVIII<sup>e</sup> siècle)’, in P. Fournier and S. Lavaud (eds), *Eaux et conflits dans l’Europe médiévale et moderne*, Flaran (2012), pp. 149-171

<sup>11</sup> K. Lindley, *Fenland riots and the English Revolution*, London, 1982; M.E. Kennedy, ‘Charles I and local government: the draining of the East and West Fens’, *Albion: a quarterly journal concerned with British studies* 15 (1983), p. 26; a more nuanced analysis of the resistance to fen drainage in: H. Falvey, *Custom, resistance and politics: local experiences of improvement in early modern England*. Unpublished PhD University of Warwick (2012).

<sup>12</sup> H. van Zwet, *Lofwaardighe dijckagies en miserabele polders. Een financiële analyse van landaanwinningsprojecten in Hollands Noorderkwartier, 1597-1643* (2009), pp. 331-389 on the highly divergent returns in several polders in northern Holland.

capitalist surge in English agriculture came in precisely the same decades as the major fen drainage projects.’ With drainage usually came a new way of organising agriculture based on the collaboration of absentee landowners and large tenant farmers, which often proved an ideal breeding ground for the development of agrarian capitalism, with risk taking, competition and capital intensification rewarded by a gradual increase in agricultural productivity.<sup>13</sup>

*Risk* and the management of risk hence turns out to be a central element in the history of wetland reclamation in general, and the ‘grand’ drainage projects of the early modern period in particular. However, the historiography on drainage projects paid only scarce attention to the funding of these projects. Most recent research on drainage concentrates on landscape formation or the technological, agricultural or socio-political impact of drainage.<sup>14</sup> The focus on the outline of the entrepreneurial and rectilinear ‘renaissance-style’ polders, the windmill and sluice drainage technology, land improvement and changing property relations, and hydraulic conflicts between drainers and inhabitants of the area or amongst the drainers themselves paradoxically outshined the main purpose of drainage projects: to make the investors’ money work in these risky settings.

Financial analyses of individual drainage projects are still very scarce.<sup>15</sup> Moreover, a lot of the investigation tends to concentrate only on the major undertakings of famous engineers and great adventurers, such as the already mentioned Cornelius Vermuyden in the English Fens; Jan Adriaanszoon Leeghwater in the marsh regions of Schleswig-Holstein in northern Germany or Jan van Ens and Jean Hoeufft in the Poitou and Charente region in France. The bulk of wetland drainage stayed in the background, completed by less known consortia of engineers and investors. Their motives and the success or failure of their investment remains fairly hypothetically: only few attempts has been taken to – quantitatively - assess the degree of risk ran by the investors, the investment strategies of individual stakeholders, or the actual return on investment. These investment strategies might have been very diverse, as recent literature on drainage emphasis the multiformity of interests and

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<sup>13</sup> Ciriaco, *Building*, pp. 7, 236-243, citation p. 243. Whether or not land drainage invariably turned to an increase in agricultural output, still remains subject to a lot of debate, e.g. Gritt, A. XXX.

<sup>14</sup> On landscape formation: Bankoff, “English Lowlands”, p. 5; W. Reh, C. Steenbergen and D. Aten, *Sea of land. The polder as an experimental atlas of Dutch landscape architecture* (2007); on drainage technology: A. Gritt, ‘Making good land from bad: the drainage of West Lancashire, c. 1650-1850’, *Rural Hist.* 19 (2008), pp. 1-27; Ciriaco, *Building*, pp. 246-247; on agricultural benefits: J. Thirsk, ‘The Isle of Axholme before Vermuyden’, *AgHR* 1 (1953), p. 28; on conflicts: T. Soens, ‘Capitalisme’; R. Morera, *L’assèchement des marais en France au XVIIe siècle* (2011), Gritt, ‘Good land’, pp. 9-10.

<sup>15</sup> Few attempts for Holland by van Zwet, *Landaanwinningsprojecten* and S. Zeischka, XXX.

stakeholders involved in drainage and the necessity of a firm embedding in local society, which implies the involvement of quite a lot of local power elites as well.<sup>16</sup>

Precisely this need for a broader participation acts as a trigger for considering the risk profile of investments in drainage projects. A multitude of actors and hence financial strategies were involved and the strength of these projects just depended on the capacity of mobilising a lot of capital from many different participants. The capital of the big investors was often wrapped up in a quite broad investment (with lots of smaller partakers). Spreading of risks and risk management were of crucial importance for the success of the investment. In this article, we argue that projects of land reclamation were examples of clever risk assessment: a sort of mixture between speculation – inherent to this kind of investments, given the uncontrollable context factors and the highly fluctuated results – and limitation of risks – attempts to transform an essential speculative undertaking into a (more) secure investment. In order to pursue the apparently mutually exclusive goals of speculation and security on investment, the larger investors in particular did not hesitate to transfer part of the risk to smaller proprietors and investors. As we will see, they managed to do so thanks to an institutional setting which – increasingly – favoured their interests. This permanent balancing and sharing of risks might have had important consequences for the further agricultural development of the newly reclaimed lands. On the one hand, the many possibilities of risk insurance might have favoured further investment in wetland agriculture, but on the other hand too much risk-aversion on the part of the larger landowners might have stimulated rent-seeking behaviour, with landowners trying to regain their initial investment as quickly as possible. When rents became too high, they might have obstructed further productive investment by the farming population, hence impeding instead of accelerating the progression of agricultural development in the newly drained areas.

An in-depth analysis of the risk profile of early modern drainage projects, depends on the availability of detailed data on both the capital flows involved, the social profile of investors, their return on investment and the length of their engagement (i.e. short-term speculation or long-term investment). In the rest of this article we will hence concentrate on one representative drainage project in the Flemish coastal wetlands: the Kallo-polder on the left-bank of the river Scheldt near Antwerp. For this drainage and embankment-project, realised between 1649 and 1653, almost the entire administration, book-keeping and

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<sup>16</sup> For England: Knittl, ‘Great Level’; Germany: M.L. Allemeyer, *“Kein Land ohne Deich...!” Lebenswelten einer Küstengesellschaft in der Frühen Neuzeit* (2006); France: Morera, *L’assèchement*, northern Holland: van Zwet, *Landaanwinningprojecten*.

correspondence has been preserved. We can retrace the financing of the whole embankment through the levying of land taxes – called *geschoten* – and loans, and reconstruct at least part of the decision process that preceded every major stage in the project. What is really exceptional however, is the opportunity to gain a unique insight into the real crop yields just after reclamation, because the newly drained polder was initially directly exploited by proprietors and land claimants. This provided us with bookkeeping documents in which crop yields and values beside costs for ploughing and sowing seed were recorded.<sup>17</sup> For an assessment of risk management in early modern wetland drainage, Kallopolder also is an excellent case-study because odds were against the success of the enterprise. As we will see below, the newly constructed dike broke soon after its completion, leading to the flooding of the polder and high extra costs. Furthermore, whereas the project was planned in a period of bountiful harvests, the first harvests in the newly drained polder were particularly low/highly variable. Even then the enterprise became a financial success for the initiators of the project, demonstrating their extreme ability to control risk.

**Figure 1: the Kallo-polder in Flanders: location.**

III.

In the high and later Middle Ages economic activity in the research area was dominated by large-scale commercial peat digging, stimulated by the local lords of Beveren and from 1334 onwards, by the counts of Flanders, who took over the local *seigneurie* and integrated it in their domain. As everywhere in the North Sea Area, intensive peat cutting brought about the undesirable environmental side effect of lowering soil levels and increasing drainage problems.<sup>18</sup> As a result the area became subject to regular flooding, and part of the area was covered by estuarine sediments from the river Scheldt. In 1431 the marshes were sold by the duke of Burgundy and count of Flanders Philip the Good, pressed by a growing need for cash to fund war. The sale of the marshes cleared the way for the embankment of the *polders* Haendorp, Sint-Niklaas and Sint-Anna, together forming the future area of the Kallo polder. Renewed flooding would follow in the sixteenth century. Right at the start of the Siege of Antwerp by the Spanish army of Alexander Farnese in 1583, the three polders were inundated by the defendants of Antwerp and they remained flooded for many decades until the Peace

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<sup>17</sup> State Archives Beveren (further SAB), Polder archive Kallo (further mentioned through the access code P27).

<sup>18</sup> P. van Dam, *Vissen in veenmeren. De sluisvisserij op aal tussen Haarlem en Amsterdam en de ecologische transformatie in Rijnland 1440-1530* (1998), pp. 58-70; Fens and Bogs in the Netherlands XXX..

Treaty of Münster (1648) which officially ended the war between the Spanish Habsburg empire and the newly created Dutch Republic. Kallo remained in the Spanish part of the Low Countries, and on September 2<sup>nd</sup> 1649, Philip IV of Spain issued an ‘octrooi’ (licence or patent) granting a company of investors, headed by the Jan Baptiste Cachiopin de Laredo, lord of Kallo, the legal permission to re-embank and drain the flooded lands.<sup>19</sup> The reclamation was finished in 1652 and already in the years 1653 and 1654, the landowners and claimants could gather in the crops.<sup>20</sup> By the middle of the seventeenth century, the granting of a royal licence at the start of a drainage project was a well-rooted practice all-over the North Sea Area. Its precise history is yet to be established, but in the Low Countries the first ‘octrooien’ appeared in the course of the fifteenth century, with predecessors dating back to the late fourteenth century. The royal or princely interference was based on their claim to waste or vacant land. When a coastal wetland was flooded it was deemed abandoned by its former owners, and its ownership was transferred to the sovereign who subsequently granted it to investors.<sup>21</sup> Apart from this transfer of property rights, the octrooi also arranged regulated the organisation of drainage and water management (by establishing a ‘polder board’ or ‘dike board’, financing its activities through the levy of a land tax or *scot*), and, from the late fifteenth century onwards, a freedom of tax. The ‘octrooi’ of Kallo-polder mentioned a complete tax exemption for a period of 36 years, starting at the first harvest. Part of the ordinary taxes – an indirect tax (excise) of one guilders (fl.) on every ton of beer; and six fl. on every *ame* of wine, were transferred to the dike board to be spend on drainage and diking. Because these excises were paid by the inhabitants of the newly drained ‘polder’ as well as by the labourers working in the polder, such concession of excise taxes to the landowners transferred part of the cost of drainage from the landowners to the labourers and inhabitants. Equally important was the threshold of 30 *gemeten* (about 13 hectares) of landed property needed for an investor to become involved in the decision making process, as part of the general assembly of landowners. Such restrictions did not exist in the medieval period, but were gradually introduced in the course of the sixteenth or seventeenth century, to limit access

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<sup>19</sup> Published by G. WOLTERS, Recueil de lois, arrêtés, règlements etc. concernant l’administration des eaux et polders de la Flandre orientale, tome 2 polders et wateringues, Gent, 1869, 166-174, see also P. De Graef, ‘Moeilijke beginjaren van een polder. Indijking en rechtstreekse exploitatie van Kallopolder (1649-1654)’, *Land van Beveren*, 2012, XXX.

<sup>20</sup> De Graef, ‘Beginjaren’.

<sup>21</sup> On the medieval origins of the octrooi, see Soens, ‘Dijkenbouwers’, 334-337 and D. Tys, (2005) ‘Landscape, settlement and dike building in coastal Flanders in relation to the political strategy of the counts of Flanders, 900-1200’, Mamoun Fansa (ed.), *Kulturlandschaft Marsch – Natur, Geschichte, Gegenwart*, Oldenburg, pp. 106-126: recent article of van Cruyningen or Van Tielhof XXX.

to the decision making process - and hence control over the investments - to the larger landowners – the ‘grote gelanden’.<sup>22</sup>

The ‘adventurers’ had to collect a large sum of capital in order to finance the drainage project. In comparison with the embankment of several polders in Zeeland-Flanders in the same period, the drainage of the polder of Kallo can be considered as a very expensive undertaking. In the general polder accounts, the highest expenses were recorded for the years 1650 to 1652, so that the actual dike works must have been executed in this period. Together with the expenditure for interests and brokerage, the total cost of embanking this 1512 ha large area ran to 111,668 Flemish pounds (lb) *groten* (or 671,328 guilders). Per hectare of land this equalled 74 lb *groten* (or 444 guilders). Converted into silver, the directors of the Kallo-drainage polder project hence controlled a budget worth the equivalent of 6.6 tons of silver<sup>23</sup>, which undeniably provided them with a lot of financial responsibility and power.

The drainage of the Zeeland-Flemish Generale Prins Willempolder, the Zaamslagpolder and the Beostenblij-Benoorden, all three embanked between 1650 and 1655, was less expensive than the project in Kallo and cost respectively 204, 245 and 301 guilders per ha, whereas the Bewestereede only demanded 112 guilders per ha.<sup>24</sup> Although the Kallo project was technically rather comparable with the embankments in Zeeland-Flanders, the cost of drainage resembled the higher expenditure for reclamation of the lakes in northern Holland. The reclamation of the Beemster (1612) was the cheapest (260 guilders per ha), but that of the Starnmeer (1643) peaked at 1059 guilders per ha, while the costs of the Purmer (1622), the Wijde Wormer (1626), the Heerhugowaard (1631) and the Schermer (1635) varied in between. Lake reclamations were normally more expensive, because they necessitated the construction of series of mills to drain the lakes. This was not necessary when draining most coastal marshes where gravitation drainage through waterways and sluices was sufficient.<sup>25</sup>

**Table 1:** Costs of 17<sup>th</sup>-century drainage projects in Flanders and Holland

	<b>Polder</b>	<b>Year of drainage</b>	<b>Total land area (hectares)</b>	<b>Costs per hectare (guilders)</b>

<sup>22</sup> Soens, ‘threatened by the sea’, pp. 106-107; G. Van de Ven, *Man-made Lowlands. History of water management and land reclamation in the Netherlands*, (Utrecht, 2004): 116-118.

<sup>23</sup> In 1650 1 fl equalled 9.8 gram of silver: J.L. Van Zanden, ‘The prices of the most important consumer goods, and indices of wages and the cost of living in the western part of the Netherlands, 1450-1800’, <http://www.iisg.nl/hpw/brenv.php> (accessed 24/01/2013).

<sup>24</sup> Van Cruyningen, ‘Profits’, p. 139.

<sup>25</sup> Van Zwet, *landaanwinningsprojecten*, pp. 245; 305-306; van Cruyningen, ‘Profits’, p. 128; Bicker Caarten XXX.

<b>Zeeland- Flanders</b>	Bewestereede	1650	1,963	112
	Generale Prins Willempolder	1650-54	3,275	204
	Zaamslagpolder	1650	1,769	245
	Beoostenblij-Benoorden	1653-55	977	301
<b>Lake reclamation in northern Holland</b>	Beemster	1612	7,100	260
	Purmer	1622	2,756	334
	Wijde Wormer	1626	1,620	351
	Heerhugowaard	1631	3,500	351
	Schermer	1635	4,770	534
	Starnmeer	1643	627	1059
<b>Land of Waas</b>	Polder of Doel	1613-14	1,085	108
	Polder of Kallo	1649-52	1,512	444

*Source: van Cruyningen, 'Profits', p. 139; van Zwet, Landaanwinningsprojecten, 245.*

To gather the necessary funds, the adventurers opened participation in, and hence funding of the project to those people who claimed rights to the lands, because their ancestors had lived there or possessed land before the inundations. These claims were investigated and if they were not recognised afterwards, the contributed money was paid back to the claimants. So the investment in the polder of Kallo was carried by big investors on the one hand – contributing a lot of capital and correspondingly receiving a large property share – and smaller, mainly local, participants on the other. The latter not only provided a substantial part of the capital, but also guaranteed at least some local support and acceptance of the project (see above). Indeed, when analysing the place of residence of the participants, we notice that 7 out of 16 (or about 44%) of the large participants – acquiring more than 25 hectares of land each - were living in the city (from nearby Antwerp, but also from Malines, Ghent, Brussels and Bruges), whereas only 2 out of 16 (or about 13%) were locals. The two principal investors – Jan-Baptiste Cachiopin de Laredo (130 ha) and Jan Bollaert (91 ha) – were also urban dwellers. Cachiopin (d. 1662) offers an interesting example of the type of large investor taking the lead of drainage projects in the early modern period.<sup>26</sup> The Cachiopin family was a merchant family from Spain settled in Antwerp since the middle of the sixteenth century. But in the 1650s, the Cachiopin were more than just ordinary Antwerp merchants: Jean-Baptiste was knighted, and his investment in the Kallo-polder project made part of a concentrated effort to acquire land in the Waasland polder region, which was carefully prepared from 1642

<sup>26</sup> Most of the information below comes from his post mortem inventory.

onwards by the buying of already drained land in the region, rights to flooded land and the seigneurial rights of Kallo, acquired in January 1647 at a moment the region was still flooded. The merchant Cachiopin hence had become lord of water and mud, but would turn this into his advantage, by starting the drainage operation. Famous artists like Anthony Van Dijck and Pieter Paul Rubens painted portraits of the Cachiopin family, the Rubens one hanging in the house of Jean-Baptiste at the moment of his death. Most significantly his post-mortem inventory also listed a big painting with the drainage of Kallo.<sup>27</sup>



Figure: portrait of XXX Cachiopin by Rubens (and/or Van Dijck).

A great share of the small participants (17 out of 58, or 29%), with a property share not more than 10 ha, lived in the local region of the Land of Waas, like probably a good deal of small participants of which we lack information concerning their place of origin (i.e. 32 unknown cases out of 58, or 55%). More than half of the investors in the 10-25 ha class (9 out of 16, or 56%) also lived in a city:

**Table 2: place of residence of the investors-landowners, 1649-1662**

<sup>27</sup> *In de voorcamer: 'een groote schilderije wesende Callo ingedijckt'*. The painting of *Jiacoimo The Cachiopin* by Rubens is hanging in the office ('comptoir'). Giacomo (d. 1642) and Thomas Cachiopin were well-known art-lovers (Timmermans XXX). We did not find any reference to a portrait of his by Rubens.

		Property category					Total
		0-5 ha	5-10 ha	10-25 ha	25-75 ha	>75 ha	
Place of residence	Large cities (Antwerp, Brussels, Ghent, Malines and Bruges)	3	4	9	5	2	<b>23</b>
	Land of Waas	13	4	4	2	0	<b>23</b>
	Republic	0	2	0	2	0	<b>4</b>
	Rest	0	0	1	1	0	<b>2</b>
	Unknown	21	11	2	4	0	<b>38</b>
<b>Total</b>		<b>37</b>	<b>21</b>	<b>16</b>	<b>14</b>	<b>2</b>	<b>90</b>

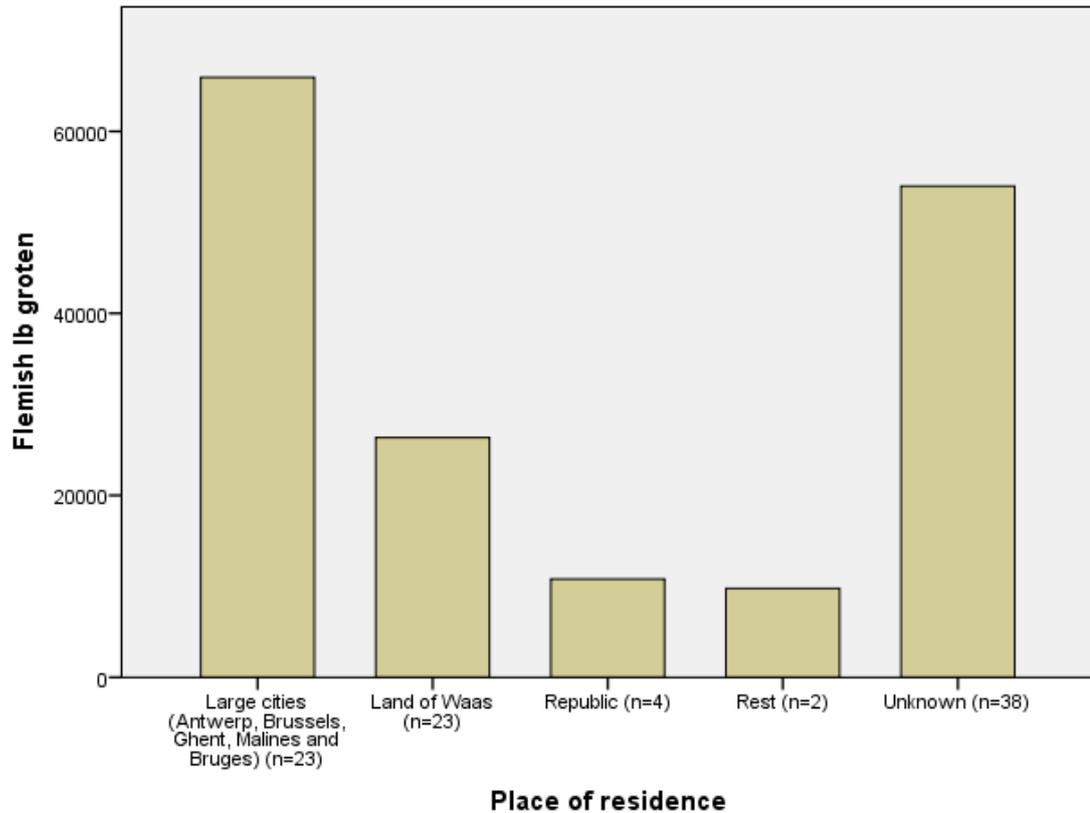
Source: SAB, P27, no 731.

When we consider the total water tax payments in the period 1649-1662, the largest share of the capital was furnished by urban landowners, though the contribution of local participants should not be underestimated:<sup>28</sup>

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<sup>28</sup> On the importance of urban capital in early modern drainage projects: C. Dekker and R. Baetens, *Geld in het water: Antwerps en Mechels kapitaal in Zuid-Beveland na de stormvloed in de 16e eeuw* (2010); van Cruyningen, 'Environmental disaster', pp. 1-12.

**Graph 1: water taxes according to the place of residence of the investors-landowners, 1649-1662**

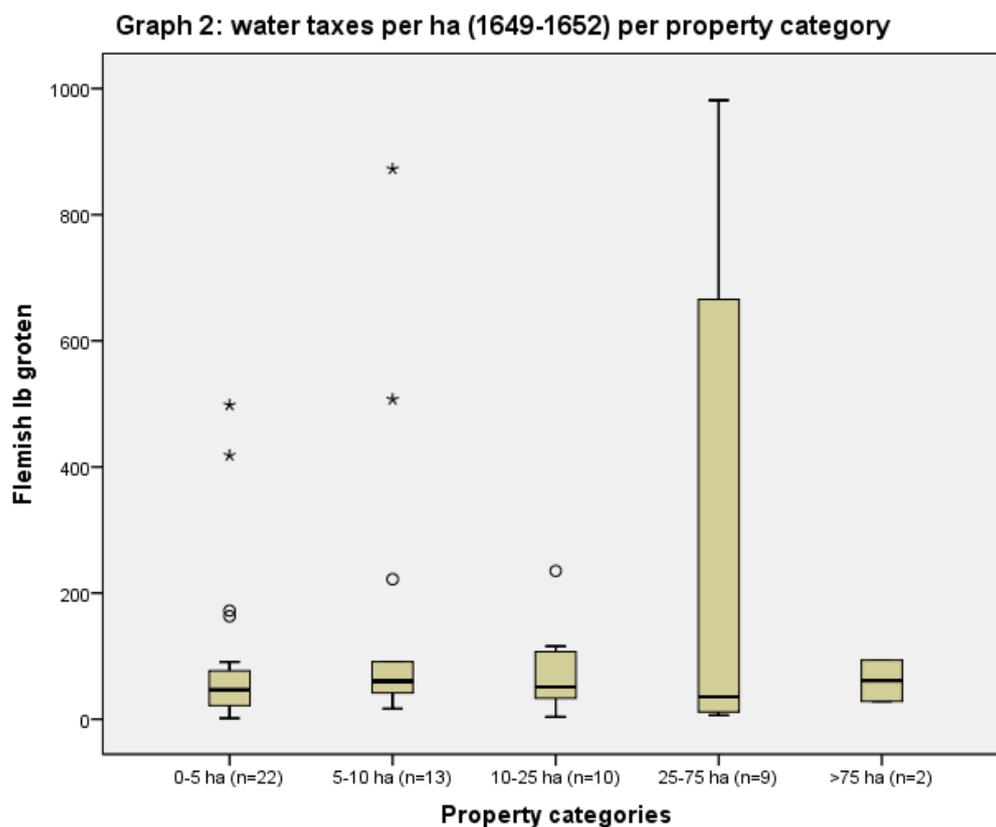


The small participants were only admitted when they could provide official titles supporting their claim to the land and, of course, if they proved able to pay the required contributions. In any case, the broad coalition of large and small investors acted as a mechanism for the spreading of risks and at the same time enabled the mobilisation of a large amount of capital that even surmounted the financial possibilities of the inner circle of big investors. The fact that the claimants without the necessary capital reserves were excluded from participation, was already a coverage against financial risks in itself.<sup>29</sup> However, this could not prevent financial difficulties during the first years of embankment and exploitation. In these years, the project suffered from deficient payment of contributions (*scot* taxes). Because of participants' impossibility (i.e. small ones not able to pay) or refusal (i.e. wealthy ones deciding to free-ride) to pay their contribution the whole enterprise as well as the individual participants ran a considerable **financial risk**.<sup>30</sup> However, some of the major investors (mostly in the 25-75 ha category) provided a sophisticated answer to this challenge,

<sup>29</sup> Also observed in other drainage projects: Soens, 'Capitalisme', p. 162; M.E. Kennedy, 'Charles I and local government: the draining of the East and West Fens', *Albion: a quarterly journal concerned with British studies* 15 (1983), p. 26; Dekker and Baetens, *Geld*, 155.

<sup>30</sup> See Knittl, 'Great Level', pp. 48-49.

in a way that turned risk into opportunity. They actually started to contribute higher amounts of money than officially required according to their share in the project. Especially the Antwerp investors George de Nollet and Pieter Melis, and the lord of Kercken did so in an almost systematic way. Whereas the required contribution totalled 74 Flemish lb. groten per hectare (see above), some of them contributed almost 1,000 Flemish lb. groten per hectare (Figure 2). By doing so they solved the project's problems of liquidity. They did so however, not because they feared the failure of the project, but because these 'excess' payments offered an attractive investment opportunity in itself: in fact the 'excess' payments were refunded by the community of landowners at a fairly high and fixed yearly interest rate of 6.25 to 8 %. As can be noticed on Figure 2, some of the smaller participants also invested more than their required share in the capital:



*Source: SAB, P27, no 224.*

For a minority of landowners, this financial construction offered an attractive additional investment opportunity. The bulk of smaller participants could not profit from this, and saw their contributions increased, because of the interest payments. Theoretically the latter had to be provided solely by those participants that had failed to pay up in full their share, but as many of them would renounce to their land, the burden of the restitution fell onto

the community of participants. The restitutions are a good example of clever financial risk management: the (big) participants converted the urgent need for financial means into their advantage and allowed themselves refunding on a short or longer term.<sup>31</sup>

Up till 1652, all participants together contributed 89,335 Flemish lb *groten* or 80% of the total of 111,668 lb *groten* needed for the embankment project. Apart from asking additional payments from benevolent participants, the polder board also had to resort to the capital market. In order to spread the high costs of more than 50,000 and 40,000 lb *groten* in 1650 and 1651 respectively over a longer period, the polder board contracted loans for the sum of 76,607 lb *groten* and in the subsequent years - until 1660 - additional loans of 10 to 15,000 lb *groten* per annum were negotiated. These official loans were apparently contracted at the Antwerp money market, but nevertheless, these were not impersonal loans granted by anonymous bankers, as they were negotiated personally by de Nollet and Cachiopin, the leading actors in the embankment project. In total the dike management obtained more money than necessary for the immediate costs, but we have to take into account the interests and restitutions on top of it. Since the extra inputs of big investors can also be considered as loans, the funding of the whole drainage operation relied heavily on borrowing. It was not unusual for Early Modern drainage projects to have recourse to the credit market. However, in Kallo this happened on a more than usual scale: contemporary lake drainage projects in northern Holland for instance only involved loans up to a few percentages of the total drainage costs.<sup>32</sup> In the polder of Kallo, we see an evolution towards a real consolidated debt, the liability for which fell on the community of participants. By doing so the polder board avoided the immediate requisitioning of higher contributions, and liquidity problems for some of the less fortunate participants. On the other hand, the overall cost of the project increased substantially, and some of the major participants clearly saw the credit operations also as an opportunity to increase their private financial gain, either acting as creditor themselves, or negotiating the loans on behalf of the polder board.

#### IV.

Part of the financial risk involved in drainage and embankment projects was due to uncertain environmental conditions. In the coastal wetlands, a severe winter storm could easily

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<sup>31</sup> Documents on the water taxes, extra inputs with the restitutions, loans and interests: SAB, P27, no 224; regulations concerning restitutions in the resolution books: SAB, P27, no 1, 5 April 1650; registers of those who paid more: SAB, P27, no 162-166.

<sup>32</sup> Van Zwet, *Landaanwinningsprojecten*, pp. 79, 147-151; M. van Tielhof, 'Financing water management in Rijnland, 1500-1800', in: O. Gelderblom (ed.), *The political economy of the Dutch Republic* (2009), pp. 215-218.

annihilate the year-long effort of the participants. Many newly reclaimed polders were in fact flooded again quite soon after their reclamation, probably because the newly constructed dikes were not yet settled or compacted enough, or were just located on a vulnerable spot. Such misfortune also struck the Kallo-polder. Shortly after the finalisation of the project, in November 1651, the polder was struck by a severe storm surge, which broke the newly constructed dike and flooded the land. The works were held up, resulting in pernicious financial consequences.<sup>33</sup> The renewed flooding also delayed the exploitation of the polder, and hence the first return on investment for the participants. The participants answered this environmental challenge by developing a sophisticated way of direct exploitation of the polder just after the (renewed) achievement of the embankment in 1653 and 1654, *‘in order to prevent losses and interests which one would have suffered if refraining from ploughing and sowing’*.<sup>34</sup> The only problem was that by the time the crops had to be sown, the different plots of land were not yet allotted to the rightful owners, due to the many disputes regarding property claims. The solution was that those owners and claimants who did pay their *geschot*, were allowed to start the cultivation of the land, thus disadvantaging deficient payers. To avoid yield losses and recover the costs as soon as possible, the polder was already ploughed and sown with barley and colza in 1652-53 and with barley, oats, colza and wheat in 1653-54. The costs of the cultivation along with the crop yields and values were meticulously registered in bookkeeping documents, because of the uncertainty concerning the land allotment to the different proprietors. Afterwards, it turned out that some landowners-exploiters did sow more than their actual allotted share. For this reason, and because of the huge variation in yields noticed (see below), a complex redistribution mechanism was developed, dividing the surplus of yields to the rightful landowners and repaying the exploiters’ expenses. In fact the exploitation method has to be situated somewhere in the midst of private and collective exploitation: landowners-exploiters were cultivating individual plots of land, but their output was totalized, and divided among the rightful landowners in each part of the polder. Interestingly the administrators used a double-entry bookkeeping system to handle the financial administration of the exploitation. In the seventeenth century this was still unusual in public finances in the Low Countries. Double-entry bookkeeping, originating in circles of Italian merchants in the later Middle Ages, still remained associated

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<sup>33</sup> Polder accounts on the repair works after the storm surge: SAB, P27, no 260; recorded for other polders as well: Dekker and Baetens, *Geld*, pp. 54-57; van Cruyningen, ‘Profits’, p. 126; A.M.J. de Kraker, ‘De ontwikkeling van het landschap’, in: M. Wilssens (ed.), *Singelberg: het kasteel en het land van Beveren* (2007), p. 38.

<sup>34</sup> SAB, P27, no 1, resolution May 1652: our translation of *‘om te verhueden de schaden en intresten diemen daerdoore bij het naerlaten vande labeure ende besayinghe soude hebben comen te lijden’*.

with international trade and merchant families. Whether double-entry bookkeeping was more efficient for a purpose like this can be doubted. In fact, there is even doubt whether double-entry bookkeeping was more efficient whatsoever.<sup>35</sup> That the directors of the Kallo-polder decided to use double-entry bookkeeping, most of all informs us of their intended audience: the *haute finance* in the cities of Antwerp, Ghent and Brussels. The use of double-entry bookkeeping must also have complicated control of the accounts by less experienced landowners.

Newly reclaimed clay polders were reputed highly fertile. In Kallo-polder, typically high amounts of crop produce could be gathered in.<sup>36</sup> Yields of barley reaching more than 35 hl/ha are very comparable with those in the nearby Zeeland polders, where barley yields of 40 hl/ha were not exceptional. Also in the old polders of the Flemish district of Furnes, barley yielded on average 28 hl/ha in the period 1618-44 with peak values of 48 hl/ha (1638).<sup>37</sup> Oats brought forth 25 hl on average, which is in line with observations of 29 hl/ha in the Furnes polders over the years 1617-1643.<sup>38</sup> In 1653, a mean harvest of 18 hl of colza per hectare is close to the estimations of Lindemans and Priester arguing that coleseed could produce approximately 20 hl/ha.<sup>39</sup>

Yet, the agricultural enterprise in the first two years after the embankment cannot be judged as an entire success story, since crop yields were highly variable, as graphs 3a and 3b indicate.<sup>40</sup> Especially the box plots of barley show a great dispersion around the median value, which indicates yields fluctuating roughly between 10 and 40 hl/ha. An interquartile range (i.e. the difference between the 75%- and 25%-level of the data sample, demarcating the edges of the boxes) of more than 12 hl/ha for oats and colza also denotes the high variability of yields in the case of these crops. With 11 hl/ha on average, the harvest of coleseed for the year 1654 was disappointing and stood in sharp contrast with the good one of the previous

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<sup>35</sup> Yamey, B. S. (2005). "The Historical Significance of Double-entry Bookkeeping: Some Non-Sombartian Claims." *Accounting, Business & Financial History* 15(1): 77-88. For the Southern Low Countries, the older work of Raymond De Roover (notably *Money, banking and credit in mediaeval Bruges: Italian merchant bankers, lombards and money-changers* (Cambridge 1948) and Wilfried Brulez, *De firma Della Faille en de internationale handel van de Vlaamse firma's in de zestiende eeuw* (Brussel, 1959) is currently being revised by Botho Verbist (University of Antwerp, Belgium) in this regard.

<sup>36</sup> The following data on crop yields in Kallo-polder were gathered from: SAB, P27, no 745.

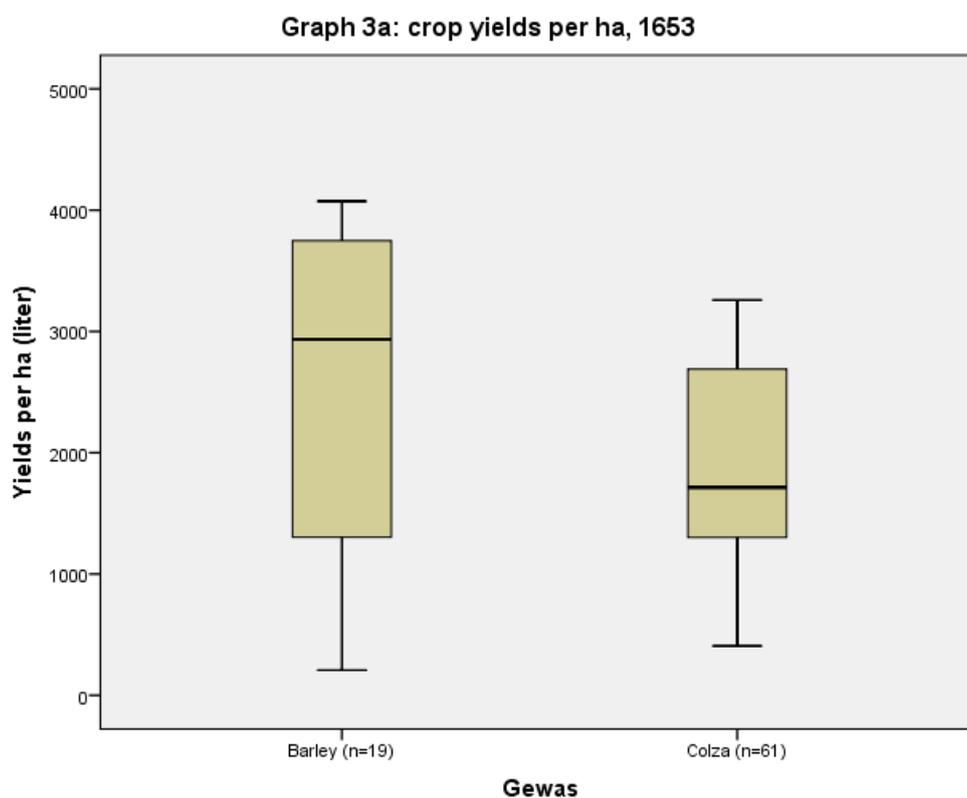
<sup>37</sup> P. Priester, 'Wheat yields in Zeeland from c.1585-1995', in: B.J.P. van Bavel and Erik Thoen, *Land productivity and agro-systems in the North Sea area. Middle Ages – 20<sup>th</sup> century. Elements for comparison*, Corn 2, Turnhout, 312; P. Vandewalle: 'Cereal production in the area of Veurne in the first half of the seventeenth century', in: A. Verhulst and C. Vandenbroeke (eds.), *Agricultural productivity in Flanders and Brabant, 14<sup>th</sup>-18<sup>th</sup> century*, Ghent, 1978, 371.

<sup>38</sup> Vandewalle, 'Cereal production', XXX.

<sup>39</sup> Priester, 'Wheat yields', 312; Lindemans, *Geschiedenis*, vol. 2, 271-272.

<sup>40</sup> In northern Holland van Zwet also recorded varying yields: van Zwet, *Landaanwinningsprojecten*, pp. 331-389.

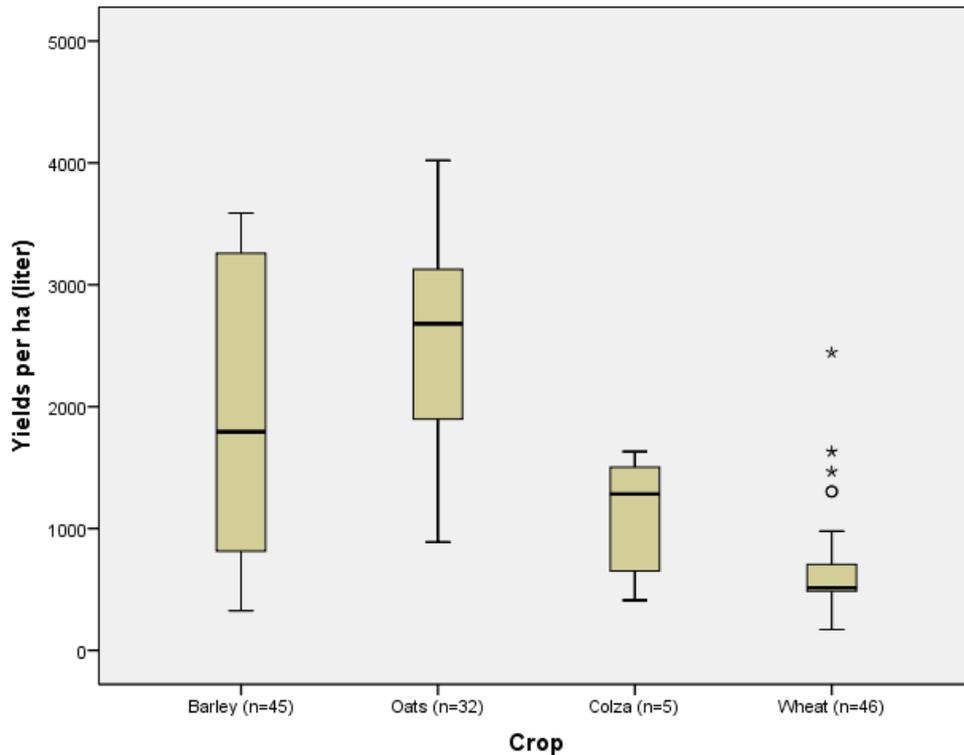
year. The picture tends to be worse when considering wheat yields. The Zeeland and Zeeland-Flemish polder farms were mostly able to record wheat yields of 15 to 20 hl/ha,<sup>41</sup> while in most of the Kallo-polder wheat produce was below 10 hl/ha, with only a few exceptions. In the case of wheat production, yields in the newly embanked Kallo-polder were substandard, whereas the mean yields of barley, oats and – at least for the year 1653 – colza were in line with normal harvest data for similar agricultural settings. Nevertheless, a great variability came to the front with regard to the produce of these three crops in the first two harvest years.



*Source: SAB, P27, no 745.*

<sup>41</sup> Priester, 'Wheat yields', 318-320.

Graph 3b: crop yields per ha, 1654



Source: SAB, P27, no 745.

The low yields of wheat and the plots of land with barley, oats and colza yielding less than average numbers of produce cannot be attributed to the overall level of cereal production: the cereal harvests were rather good in these years, in any case better than in the preceding years. This resulted in rather low prices, once again troubling the return on investment of the drainage project. A reason for the low wheat yields and the highly variable produce of the other crops in the Kallo-polder cannot be found in the sources, though we can set up three strong hypotheses: an extensive way of farming the land, differences in soil composition and structure, and the cultivation of the polder that started too early. From the accounts of 1653 and 1654 it can be calculated that approximately 160 l of barley; 230 l of oats; and 300 l of wheat were sown per ha. Especially the amounts of sowing seed for wheat seem to be rather high compared with other areas of large-scale commercial ‘polder’ agriculture, certainly more than the level of 200 l/ha recorded for wheat production in the Zeeland and Furnes polders.<sup>42</sup> The small farmers in the so-called ‘Flemish Husbandry’ region of inland Flanders, used as little as 100 l. of wheat per hectare, but they compensated this by a huge labour input, which resulted in extremely high yield ratios (due to the low amount of

<sup>42</sup> Priester, ‘Wheat yields’, 318; Vandewalle, XXX.

sowing seed compared to high gross yields).<sup>43</sup> Although Zeeland Flanders was a polder region with large-scale and market-oriented exploitations, farmers paid a lot of attention to intensive weed control and hired extra labourers in the spring for that matter.<sup>44</sup> The landowners-exploiters of the Kallo-polder adopted higher seed ratios than the small-scale Flemish Husbandry and probably even higher ratios than in the polders of Zeeland and Furnes, but farmed their land in such an extensive way that at some parcels of land weeds must have been able to grow rampant and overrun the crops, hence leading to lower crop yields.

Landowners involved in the direct exploitation received about 337 *stuiver* (17 fl.) per hectare as compensation for the cultivation (i.e. *labeur* which involved ploughing and preparing the land to be sown). When considering the price of this *labeur* in a manual for appraisers in the district of *the Oudburg* in the vicinity of Ghent around 1671, 108 *stuiver* (5,4 fl.) was the cost of one time ploughing and harrowing one hectare of land, which is approximately one third of the total compensation. Whether the fields were ploughed and harrowed more than once so that the remaining money should also have been compensation for these activities or whether the other two thirds of the 337 *stuiver* were paid as compensation for harvesting the crops and perhaps for some minimum weeding activity remains unclear. In any case, the landowners-exploiters received 337 *stuiver* for cultivating the land. Around 1650, a non-skilled labourer in Flanders earned about 13 *stuiver* per day.<sup>45</sup> As a result the landowners had been paid the equivalent of 26 days of labour per hectare, which is very little. For another coastal wetland region within the Low Countries – the Guelders River Area – Bas van Bavel estimated that labour input per hectare oscillated between 50 days on the very large farms to perhaps 225 days on the smallest farms (below four hectares).<sup>46</sup> As a result, we can conclude that the exploitation of the Kallo-polder in the first years of its modern existence was very extensive, which might explain the high variability of crop yields.. Because of this extensive way of farming, most probably without sufficient weed control, weeds had more chances and perhaps overgrow the crops , hence affecting the grow pattern of the crops in a negative way. In northern Holland for instance, some reclaimed lands had to deal with the heavy cat's tail grass, especially harmful to cattle.<sup>47</sup> Without labour-intensive weed control, yields might be low.

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<sup>43</sup> E. Thoen and T. Soens, 'The Low Countries', in: *ibidem*, *Land Use and Productivity*, forthcoming.

<sup>44</sup> Van Cruyningen, *Behoudend maar buigzaam*, 176-177.

<sup>45</sup> Vandenbroeke, *Werkinstrumenten*, p. 168.

<sup>46</sup> B. Van Bavel, 'Rural Wage Labour' XXX , p.47. Van Bavel uses man-years, which we converted to man-days through multiplication by 250.

<sup>47</sup> Van Zwet, *landaanwinningsprojecten*,

Differences in the soil composition (from wet sandy loam to humid and wet heavy clay) can also offer an explanation for the big fluctuations in the yields, but not for the overall low level of wheat produce. Besides the extensive farming practices, the very early started cultivation must have been of overriding importance in this matter. Decades of inundations not only left behind a fertile clay layer, but also salt. When one began to plough and sow the saline soils, the soil structure could be harmed and negative consequences be encountered through disappointing yields. It turned out for the better to wait a couple of years before sowing, so that rain and snow could wash away the salt. In line with this, supervisor Grosfils of the nearby polder of Nieuw-Arenberg (drainage completed in 1784) advised to postpone cultivation until the polder was desalinated.<sup>48</sup> In our polder, cultivation started very quickly after the embankment and it is quite ironic that the direct exploitation format – set up to avoid losses – eventually led to highly variable yields. Colza and barley are crops that are most able to endure some salinity in the soil and were therefore the first crops to be sown in newly embanked regions, whereas saline soils are far more harmful to wheat, which might be put forward as an explanation for the overall low yields of this crop.<sup>49</sup> On the other hand, the extensive kind of cultivation might have been exactly the right thing to do, especially as grain prices in these years were low and labour relatively expensive. In the subsequent decades – in the middle of the famous ‘agricultural crisis of the 17<sup>th</sup> century’ - a similar combination of relatively low grain prices and high labour costs, would cause serious financial trouble for several middle-sized farms all over the North Sea area<sup>50</sup>. With a minimum of costs and an extensive sort of cultivation the landowners-exploiters of the Kallo-polder still managed to realise profits, as the profits were still (a little bit) higher than the costs of the exploitation. From the point of view of the landowners, extensification might have been a ‘prudent’ choice.

The **agricultural risk** of highly variable and low yields and returns was tackled by risk-limiting distribution mechanisms. This mechanism provided the fair distribution of the crop values among the different landowners – according to their property share – within each part of the polder (i.e. the former polders of Haendorp and Sint-Niklaas and seven large plots or *kavels* of the old polder of Sint-Anna). So the differences between the several constituent parts of the polder remained, but were equated within these parts. Moreover, some

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<sup>48</sup> On soil salinity: P. Priester, *Geschiedenis van de Zeeuwse landbouw, circa 1600-1910* (1998), pp. 37-41; General State Archives Brussels, Familiefonds Arenberg, S2991.

<sup>49</sup> Priester, *Geschiedenis*, 37-41.

<sup>50</sup> Especially in the period 1666-1695 – decades of ‘agricultural crisis’ (although in particular for the larger farms, and less for the wage-earning part of the population). For France, see G. Duby and A. Wallon (eds.), *Histoire de la France Rurale II. L’âge classique des paysans, 1340-1789*, Tours, 1965, pp. 261-275.

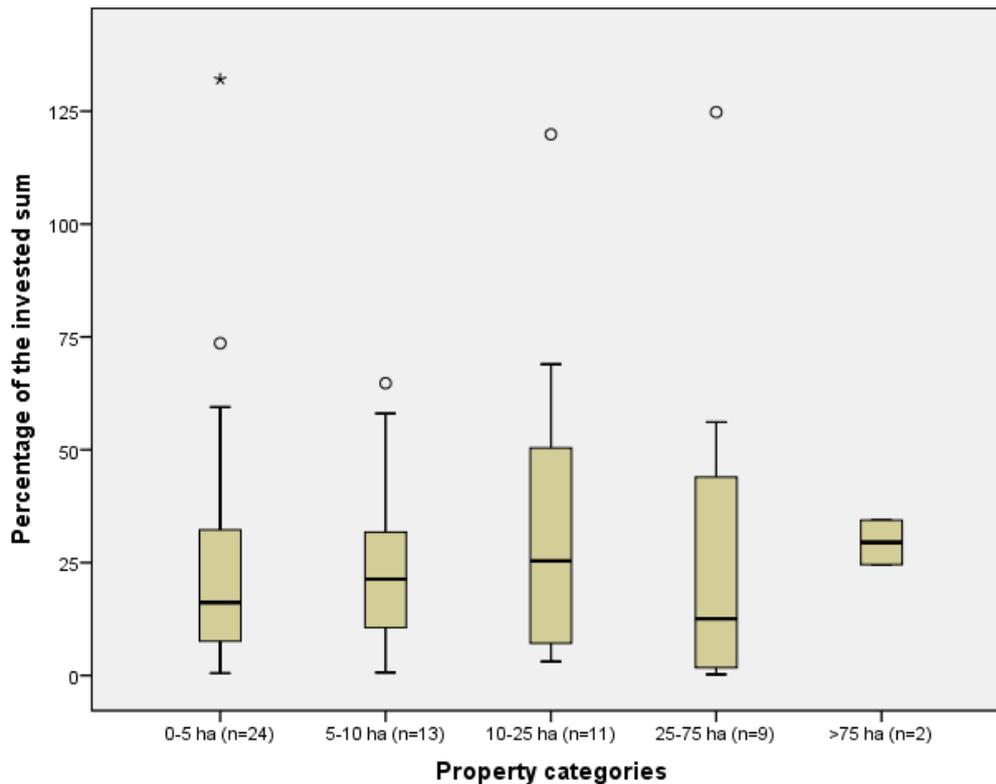
landowners received an extra sum by way of compensation for 'bad labour'. Probably the cultivation of the worst fields was meant, where levelling works needed to be done and where soil structure was harmed. Both the big and the small landowners benefited from this distribution mechanism. It was only detrimental to those landowners-exploiters obtaining the highest yields per hectare. This measure can be seen as an attempt to hold the small and middle class proprietors too on board. Buying the crops of the years of direct exploitation was an additional opportunity for some landowners. The crops were bought by 65 crop buyers. Among these buyers were 7 landowners and 11 landowners-exploiters of all property categories. They cashed in twice: besides a compensation for the cultivation of extra lands (cf supra) and the payment of the crop values of their own estates, they bought crops to resell them on the market. Doing so, risks were again channelled, at least for those who were able and chose to participate in this system.<sup>51</sup>

When considering **the return on investment** of the whole drainage project, we can state that it differed for the several investors. Those who contributed more than required (especially the large landowners) did not only benefit from the first harvests, they could also claim a fair restitution (including an interest of 6.25 to 8% and calculation of these interests based on capitalisation). This could result in good profits. The landowners who only paid the necessary *geschoten*, could only gain profits of the crops (which were highly varying). When we take into account the contributed water taxes from the start of the embankment to 1654 inclusive and weigh the sum of the crop values of 1653-54 against these invested sums, we can see that the return on investment was highly variable for the different investors-landowners (Graph 4).

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<sup>51</sup> On the distribution of the crop values: SAB, P27, no 745; on crop purchases: SAB, P27, no 752.

Graph 4: return on investment of the first years' exploitation, 1653-1654



Source: SAB, P27, no 224 and SAB, P27, no 745.

Three landowners managed to get back more than their contributed money, whereas eighteen contributors received less than 10% of their invested sum (although this picture is a little distorted, because a few landowners contributed more than required, which negatively influenced their percentage of return, while they were indeed paid back with a fair interest). On average the investors-landowners gained a return of 16% on their investment after the first years' exploitation, which is rather high, given the variable crop yields. The first year lease revenues of the drained lake of Capestang in the south of France entailed a return of 3000 to 5000 lb *tournois* or between 26 and 44% of the invested sum, though an overstatement according to Raphael Morera. In the reclamation projects in northern Holland, the return on investment (calculated on the basis of lease prices and land prices) varied between the different polders, reaching returns of 1 to 2% up to 7 to 11% a year quickly or rather slowly after the drainage.<sup>52</sup> In this respect, the situation in the polder of Kallo can be seen comparable to the not always rose-coloured levels of return in Holland, but there existed a big difference between them: the landowners in Kallo had to carry a huge consolidated debt with

<sup>52</sup> France: Morera, *L'assèchement*, p. 214; northern Holland: van Zwet, *Landaanwinningsprojecten*, pp. 331-389.

them, which was once to be paid back by the landowners' contributions. Very soon after the embankment, several – often smaller – investors together with the deficient contributors had to sell or abandon their lands whether or not by order of the dike board, a situation the bigger landowners initially could benefit from, hence enlarging their estates. Dike law in Flanders prescribed that any landowner unable or unwilling to pay for the upkeep of the dikes could abandon his land (the so-called 'spadesteken' or 'spaderecht'). Similar arrangements existed elsewhere in the Low Countries and in Northern Germany too.<sup>53</sup> England's marshland customary law also prescribed that 'the Commissioners of Sewers could, as a last resort, sell the land of a person who couldn't or wouldn't pay a sewer rate'.<sup>54</sup> So in Kallo land sales followed in 1656 and 1659 where the largest proprietors George de Nollet, Jan Bollaert and Pieter Melis – all three from Antwerp – acquired 32, 33 and 72 ha respectively. These newly bought lands were exempted from the earlier unpaid water taxes whereas the *geschoten* of the other lands were split up in two sorts: one *geschot* used for dike and sluice maintenance and the other for paying back the old debts and interests.<sup>55</sup>

Furthermore we have to consider that the actual pay-off for the investors not only occurred during the years of direct exploitation, but also and foremost throughout the years afterwards when the lands were sold or leased out. Quite soon after 1654 the crop yields must have stabilised around the higher average yields. Some wheat yield indications could be calculated on the basis of probate inventories of the late 17<sup>th</sup> and early 18<sup>th</sup> centuries, pointing out a mean produce of 14 hl/ha. The high level of lease prices (see below) is also a strong sign of higher yields, which positively impacted the returns for the investors. The agricultural census of 1846 – when chemical fertiliser had yet to be introduced and agriculture still like the one of the *ancien regime* – registered yields in Kallo in normal years of 23 hl of wheat, 35 hl of barley, 45 hl of oats and 22 hl of colza per hectare – very comparable to the yields Priester observed for Zeeland (cf supra).<sup>56</sup>

### III

On the long run too, this polder area had to deal with a further and even more far-reaching limitation of risks on the part of the absentee landowners. As mentioned before, many coastal

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<sup>53</sup> Soens, 'Flood Security', pp. 227-228.

<sup>54</sup> Knittl, 'Great Level', p. 49.

<sup>55</sup> SAB, P27, no 733.

<sup>56</sup> Late 17<sup>th</sup> and early 18<sup>th</sup> century level of lease prices and yield indications: P. De Graef, *Polderpioniers in de 'nieuwe dijckagie van Calloo'. Marktgerichtheid en risicobereidheid van de eerste generatie landbouwers in Kallopolder, ca. 1665-ca. 1710*, unpublished master thesis (2011) based on probate inventories: SAB, Archive of the old municipality of Kallo (further GO18), no 79-83; *Agriculture: recensement général, 15 octobre 1846* (1850).

wetlands or ‘polder’ areas in the Low Countries were among the first regions in Europe where proper capitalist social relations, characterised by the triple division of society in (absentee) landowners, leasehold farmers and landless labourers, came into existence.<sup>57</sup> In Kallo-polder as well, short-term leasehold became the predominant way of tenure, and as we have seen many landowners were absentee urban or noble landlords. The symbiotic relationship of landlords and farmers in such a system could generate sustained economic growth, with farmers competing for leasehold, and hence investing in cost-saving farming techniques, and landlords offering financial backing to the farmers in case of misfortune.

The type of agrarian capitalism that developed in Kallo-polder presents some of the features of this classic model, but not all. Most importantly, not all investors-landlords developed a long-term commitment to the ‘polder’: they sometimes preferred to cash in rapidly by selling their land shortly after the embankment was finished. Landowners who were not inclined to invest for the long haul, sold their properties after a while (mostly after a storm surge and flooding as the ones in 1661 and 1682 in the polder of Kallo).<sup>58</sup> The register of the (obligated) land sales of deficient contributors recorded land prices of 50 sold properties varying by and large between 83 and 133 Flemish lb *groten*/ha (i.e. 500 and 800 guilders/ha).<sup>59</sup> After profiting from the first years of exploitation – with their returns estimated above at about 8% a year – these landlords might have quit once facing new costs, while recovering at minimum their initial investment (the embankment cost of 444 guilders/ha) or realising a nice surplus-value. The wide range in the land value was probably mostly affected by the soil quality, with clay soils much higher valued than sand soils. In the Arenberg-polders north of Kallo, lease-prices in the 19<sup>th</sup> century were 40 to 70% higher for clay soils compared to sand soils.<sup>60</sup> As mentioned before land value related to soil quality was one of the most speculative risks involved in drainage projects. On its own, it’s not that exceptional that part of the landowners opted to quit at an early stage. Baars and Van Cruyningen found the same difference between long-term and short-term commitment in other early modern drainage projects in the Low Countries as well.<sup>61</sup>

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<sup>57</sup> See the overview in Van Bavel, *Manors and Markets*, XXX and Thoen and Van Bavel, in Van Bavel and Hoyle XXX; Soens and Thoen ‘leasehold’ XXX

<sup>58</sup> Morera, *L’assèchement*, pp. 196-197; van Cruyningen, ‘Environmental disaster’, p. 1.

<sup>59</sup> SAB, P27, nr. 733.

<sup>60</sup> Data kindly provided by I. Jongepier, who is currently preparing a PhD on the landscape and environmental history of these polders at the University of Antwerp. Similar differences have been found by C. Baars, *Beijerlanden*, pp. 111-113; van Zwet, *Landaanwinningsprojecten*, pp. 389-402; van Cruyningen, *Behoudend*, XXX

<sup>61</sup> Cf short- and long-term investment in the Beijerlanden (southern Holland): C. Baars, *De geschiedenis van de landbouw in de Beijerlanden* (1973), 109; in Zeeland-Flanders: van Cruyningen, ‘Profits’, 135.

Those landlords that developed a long-term commitment to the Kallo-polder, often tried to obtain lease prices as high as possible, the equivalent of 4 to 6 hl of wheat per hectare, which is almost twice the average height in the nearby Zeeland polder area). The high lease prices hence turned into a heavy burden for the farmers, to the extent that they hampered rather than stimulated competition for land, and might have impeded farmer-investments in the farms.

In many cases the tenant farmers had to raise (part of) their own farm buildings without financial interference of the landowner, who limited himself to constructing the impressive but wooden polder barn, the most characteristic feature of polder architecture:

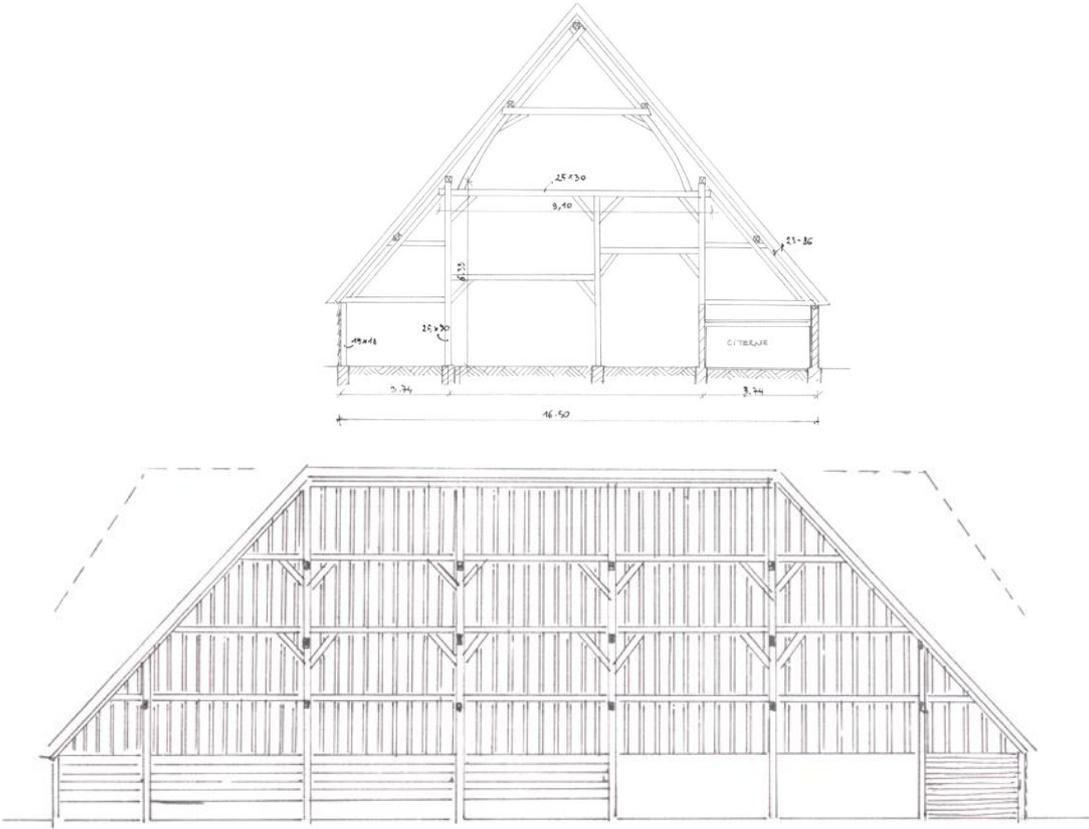




Figure: above: reconstruction of a polder ‘barn’ erected in the newly embanked polder of Arenberg near Kallo in 1691, on behalf of the Antwerp merchant Jan-Baptiste Van Praet (design Ewald Wauters, Wauters, Soens et al. ‘Ruraal Erfgoed 2013’); below: traditional barn from Kallopolder c. 1970 (demolished).

Farmers often build the rest of the farm buildings themselves, and were often allowed to obtain some kind of property rights to these buildings and the land on which they stood: in this polder region, a particular type of hereditary tenure for farmsteads was developed, and survived into the 19<sup>th</sup> century.<sup>62</sup> With landlords investing relatively limited in farm buildings apart from the barn, a significant part of the risk, especially the ever-threatening environmental risk of flooding, was passed to the tenant farmer. A capitalistic attitude of cooperation between absentee landlord and tenant, resulting in good conditions for productivity enhancement, didn’t break through in our area.<sup>63</sup>

When part of the large absentee landowners quitted, part of their land was bought by other landlords, but part of it also went to the tenant farmers. Considering the distribution of holdings in the polder of Kallo from 1653 to the 1690s (table 2), we can see that the low and middle categories came to the front from the 1660s onwards, after a dip in the mid-1650s.

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<sup>62</sup> Tijd-schrift artikel?

<sup>63</sup> De Graef, *Polderpioniers*.

This reshuffle is to a great extent the result of a class of local farmers being able to buy land of those landowners who sold (a part of) their properties. Together with the land, the landowners passed on the risks involved in polder agriculture to the local farmers. On the other hand, the farmers could benefit from the full profits of their acquired holdings without having to pay high lease prices. A category of owner-occupiers came about who farmed their own holdings, the size of which running up from 40% to even 70% of their total cultivated acreage. Jan Nuyens was such a typical large-holding farmer. He managed to build up a substantial landed property over a period of thirty years through a market oriented and risk taking farm strategy in combination with successful marriages (in financial respect), finally culminating in the purchase of the ‘Blue Farm’ of around 58 hectares large.<sup>64</sup>

**Table 2: property share of the different property categories in the polder of Kallo, 1653-1690s**

	Property category					Total	
	0-5 ha	5-10 ha	10-25 ha	25-75 ha	>75 ha		
Year	1653	13.102	19.828	12.612	21.048	33.412	<b>100</b>
	1655	8.231	10.856	16.96	35.103	28.851	<b>100</b>
	1661	8.678	11.154	21.093	41.184	17.892	<b>100</b>
	1690s	18.41	10.108	20.825	29.13	21.527	<b>100</b>

Source: SAB, P27, no 176, 722, 723, 58-70.

This group of farmers thus succeeded to combine the enlargement of their acreage with strong property rights. These large farmers bear a close resemblance to *yeomen farmers* in some English regions from the 15<sup>th</sup> century onwards who were able to accumulate a lot of farmland through a system of *copyhold* that endowed them with firm rights to the land. In the Beijerlanden and in the Wadden Sea coastal marshes a group of farmers also managed to acquire a lot of landed property in the course of the 17<sup>th</sup> century. In the Zeeland-Flemish polders, the breakthrough of large-holdings followed with a delay in the 18<sup>th</sup> century. Lease prices stayed low in this region and the burden of water taxes increased while the agricultural depression still dragged on. As a consequence, many landowners sold their land to wealthy farmers.<sup>65</sup> These large-holding farmers were part of the local elites, as such not only

<sup>64</sup> De Graef, *Polderpioniers*, pp. 7-11.

<sup>65</sup> England: J. Whittle, *The development of agrarian capitalism. Land and labour in Norfolk, 1440-1580* (2000), pp.167-177; R. Allen, *Enclosure and the yeoman: the agrarian developments of the South Midlands, 1450-1850* (1992), pp. 66-77; Beijerlanden: Baars, *Beijerlanden*, pp. 106-107; Wadden Sea: O. Knottnerus, ‘Yeomen and

possessing lots of land, but also being active on the credit market (as borrowers as well as lenders of money) and holding administrative functions in the village community and the polder management.<sup>66</sup>

As the absentee landowners left the construction of farms mostly to their tenants and demanded high lease prices or either sold their properties to a class of farmers with *yeoman*-characteristics and influence in the dike board, the burden of the risks were shifted on to the local community. The agricultural development in the polder of Kallo as well as in the other polders of the Land of Waas did have typical features of a progressive agriculture (market oriented arable production with specialisation in the cultivation of barley, recourse to the capital market to invest in their farms and to the labour market for hiring seasonal workers, introduction of soil improving clover in their rotation scheme, etc.), but an cooperative, risk-backing and investment-stimulating attitude on the part of the absentee landowners was missing, and so was a strongly competitive market for leasehold.<sup>67</sup>

#### IV

Investing in drainage and embankment projects was not the kind of safe financial strategy usually associated with the acquisition of landed property. Previous work on large-scale drainage projects in 17<sup>th</sup> and 18<sup>th</sup> century England, France, the Low Countries, Germany and the Baltic area already revealed the huge sums of money and the international financial operations involved in such projects, as well as the considerable degree of risk exemplified by notorious stories of bankruptcies and failures of drainage projects. However, much of the complexity of the financial transactions and the risk strategies involved in drainage operations remained hidden. Using a micro-perspective focused on one single drainage project in 17<sup>th</sup> century Flanders, we could reveal in detail the strategies of investors-landowners, and demonstrate how they were able to keep the balance between **risk taking** (in environmental, agricultural and financial respect) and **risk management, assessment and mitigation**. In the first place, the whole drainage project was enclosed in one big investment with many participants. This had the advantage of risk spreading and the possibility to collect a lot of capital. Secondly, the agricultural uncertainty concerning crop yields could be overcome through a complex distribution mechanism, effectively allocating the returns of the first years'

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farmers in the Wadden Sea coastal marshes, c. 1500-c. 1900', XXX; Zeeland-Flanders: van Cruyningen, 'Environmental disaster', pp. 10-11.

<sup>66</sup> De Graef, *Polderpioniers*, pp. 31-32.

<sup>67</sup> T. Soens, P. De Graef, H. Masure and I. Jongepier, 'Boerenrepubliek in een heerlijk landschap? Een nieuwe kijk op de Wase polders als landschap en bestuur', in: *Van brouck tot dyckagie: vijf eeuwen Wase polders* (2012), forthcoming.

exploitation among the different landowners(-exploiters) according to their property share in the several constituent parts of the polder. Finally, there were – in some respects socially distorted – mechanisms at work for the channelling of risks. The application of restitutions is such a measure. The landowners who paid more water taxes than they had to, were refunded sooner or later with a fair interest and a year after year capitalisation. Of course, the upper-layer investors profited the most from this arrangement. Furthermore, the deficient contributors had to abandon their lands after a couple of warnings and reminders. These lands were then sold by the dike board. The small participants who couldn't pay their water taxes, carried the can, whereas the large investors-landowners who bought these lands, didn't even have to recompense the previous contributions due and hence benefited from this situation. The fact that many smaller participants had to give up during or soon after the embankment and that claimants without capital reserves were not allowed to participate is a final example of the socially distorted effects of this and also of many other drainage projects.

The risk-mitigating attitude of the investors-landowners exerted an influence on the organisation of agriculture in this region in the long term. A full-blown agrarian capitalism in which productivity enhancement resulted from mutual efforts by both tenant farmer and absentee landlord never came into existence in our area. In the polder of Kallo, as in the other polders of the Land of Waas, a form of agriculture developed in which the burden of the agricultural, environmental and even the financial risks were carried by the farmers themselves (either tenant farmers or large-holding farmers). Finally, we have to stress that no single risk-strategy existed among the participants in a drainage project. The combination of high risk-taking and at the same time backing this risk by employing all legal and probably also many illegal ways to shift risk to other participants, characterised the leading group of investors – the Cachiopins and Melis's of our case-study - but probably far less, the rank and file of the smaller urban investors, who might have hoped for a high-yielding investment in land, - or the prospective farmer, who bought land in the newly drained polder to build a future for his family. Nevertheless, the kind of speculative but at the same time controlled risk-taking that ensured the success of the Kallo-polder drainage project and many other similar projects all over the North Sea Area, might be illustrative for the way early modern financial instruments developed in merchant capitalism had a profound impact on rural economy and society.<sup>68</sup>

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<sup>68</sup> Compare Mathias, P., *Strategies for Reducing Risk by Entrepreneurs in the Early Modern Period*, Lesger, C., and Noordegraaf, L. (eds.), *Entrepreneurs and Entrepreneurship in Early Modern Times* (The Hague, 1995), pp. 5-24; Gelderblom XXX?