# 7. The Low Countries, 1000-1750

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## 7.1 Land use and productivity in context

*Population and urbanisation*

Around 1470, the population of the Low Countries as a whole is estimated to have consisted of about 2.5 million people, with more than half of them living in the most densely populated and urbanised principalities of Flanders (730,000 including Walloon Flanders in 1469), Brabant (410,000) and Holland (270,000 in 1514). In the south of Holland 50 per cent or more of the population already lived in cities. Rural population densities also varied widely, from five inhabitants per square kilometre in the rural principality of Luxembourg to 40 or more in inland Flanders and Holland (Blockmans et al., 1980; Devos et al., 2011).

As in the rest of Europe, the population around 1300 must have been higher. In general, the demographic impact of the late medieval crisis had been relatively mild in most parts of the Low Countries, especially in those areas which had evolved or were evolving towards a so-called commercial subsistence economy (see below). Demographically the Low Countries reached rock bottom in the decades around 1400. In the last decade of the fifteenth century, recovery was stopped by warfare in many regions. This entailed that, despite the relatively mild character of the 'crisis', population recovery began late (as in England) compared to many other areas of Europe.

Despite these nuances, the demographic and occupational consequences of 'the late medieval crisis' can still be seen as relatively particular. Today we know that the reason for this 'different' late medieval demographic pattern in the Low Countries cannot be attributed to epidemiological reasons: neither the Black Death of 1348 nor its endemic recurrences afterwards spared the area (Thoen and Devos, 1999). As we will see below, structural reasons explain why some regions within the Low Countries saw a dramatic decrease in population in the later Middle Ages while others did not.

At the end of the fifteenth century, population started to increase, and this was again most pronounced in the peasant areas. From the 1560s on the religious wars stopped the trend brutally. It was a disastrous period, especially for the southern part of the Low Countries. Many people from the south fled towards the northern Netherlands for religious reasons. In the South, the population only recovered from the 1620s until about 1660. In the last part of the seventeenth century, French invasions structurally disrupted society again and together with diseases and dearth provoked a downward demographic evolution that lasted till well into the eighteenth century and ended in a slow recovery between 1710 and 1760.

In many areas of the newly formed state in the north, the Dutch Republic, things proceeded differently. The population increased in the towns as well as in the countryside during the 'Golden Age' of the sixteenth and seventeenth centuries, before stagnating again until well in the eighteenth century. Regional divergences were, however, important. In the regions occupied by commercial farmers in Holland, rural population densities reached 60 to 80 inhabitants per square kilometre around 1600 against only 25 in the Guelders River Area, a region of early capitalist farming (Van Bavel, 2010: 283-84). After 1600, rural population growth in the maritime provinces only continued - albeit more slowly - in some areas, like the Zaan region, which embarked on a proto-industrial trajectory not dissimilar to what had happened in inland Flanders (Van der Woude,

1972). In the inland – sandy – areas of the Republic, the population boom of the Golden Age was less pronounced, but so was the stagnation after 1650. In some areas like Twente, where rural textile industries increasingly gained importance, population growth even accelerated in the late seventeenth century (Trompetter, 1997). In the eighteenth century, and in some areas even earlier, a de-urbanisation process took place, increasing the population pressure on the countryside (Brusse and Mijnhardt, 2011)

In regions where a transition took place to a more commercial farming system (with a more polarised society) in the course of the Early Modern Period, the evolution was paralleled by stagnation or even decline in population levels (Guelders River Area, parts of Zeeland, coastal Flanders, Groningen and Friesland) since rural labour was driven to neighbouring areas. Only in areas with a 'dual economy', where large farms could develop together with proto-industrial smallholders - as was the case in the early modern Groninger Oldambt – depopulation was less pronounced (Curtis, 2014).

## *Climate and environment*

Broadly speaking, one can discern in the Low Countries three areas with completely different soil conditions (see also Vos, 2011). The *first* area is the most southern area, the 'higher Belgian area' situated in current Wallonia, including the Famenne, the Ardennes and the Gaume. The Ardennes region can be characterised as a rather rough but not very high mountain massif. North of that line one can discern *a second* area, which we will call the 'inland part of the Low Countries'. Indeed, in large parts of lower and middle Belgium and in the eastern part of the Netherlands, sandy and loamy sands that originated in the Quarternary period, are the most common soils. These soils differ from the heavier sandy soils found in large parts of the provinces of East and West Flanders, North-Brabant, Limburg, Gelderland, Overijssel and Drenthe, form the very light sandy soils of the Campine area and the Veluwe and from the more heavy loamy soils southwards (Brabant, Hainault, Hesbaye, Pays de Herve). Finally, the western and northern parts of Belgium and the Netherlands consist of low-lying coastal wetlands. From c. 7000 years ago, when the rise in sea level was slowing down, a coastal barrier of sand dunes developed. Behind the dunes a huge, swampy peat area was formed. Later, part of this peat was flooded and covered by marine sediments (mostly clay). During the historical period much of the remaining, uncovered peat was drained and exploited for fuel (see below). In other areas the peat simply oxidised after land reclamation. Only in parts of Holland, Guelders, Drenthe, Friesland and Groningen did 'open' peat soils subsist after the medieval period. Water is omnipresent in the Low Countries, both due to the long and fragmented coastline and to the presence of important rivers with large delta areas (especially the Scheldt, Meuse and Rhine). In the coastal and river areas, drainage of inland water and protection from flooding permanently challenged human occupation of the area.

For the Low Countries, we have a reasonable amount of data about the so-called 'Medieval Warm Period' and about the transition to the 'Little ice Age' that followed (Buisman, 1996-2006). The direct link between climate variation and changes in agriculture remains difficult to establish, however. Can we link the widespread plantation of vineyards during the Classic Middle Ages - when even in Flanders every lord possessed his own vineyard - to the Medieval Warm Period? Or was the growing of vineyards in these northern regions just linked to displays of status on the part of feudal lords? The impact of the Little Ice Age on agriculture and food supply also seems difficult to measure. Harvests tolerate colder periods quite well. More important was a society's ability to prevent and deal with the short-term consequences of bad harvests due to extreme weather conditions. In 1315-17 the failure of two subsequent harvests

due to extraordinarily heavy rainfall, also in many other parts of Europe, caused massive dearth and has sometimes been described as the first 'natural disaster' of more than regional significance in medieval Europe. But even in the case of this 'Great Famine', the harvest failure was at least co-produced by other elements, such as warfare, disruptions in interregional trade and social conflicts, which might explain why the regional impact was different (Slavin, 2014 and for Flanders, Geens, 2014). In other periods as well, climate conditions particularly disturbed agricultural and everyday life when they were accompanied by other negative circumstances like war (for instance in the late fifteenth and in the second half of the seventeenth centuries). A comparison with the agricultural output for the eighteenth century, for which the first instrumental data is available, seems to support the impression that harvest failures became less frequent.

*Property and power structures in relation with the size of holdings*

During the Carolingian and post-Carolingian periods, in regions with ample quantities of land to reclaim and a weak manorial tradition, the position of peasants tended to be strong from the beginning. The disturbance of lordship during the Viking invasions might have further increased this autonomy. This was first of all the case in most coastal areas of the Low Countries. The weakness of the nobility contributed to a society which was not egalitarian in a socio-economic way (as differences in wealth between peasants could be substantial), but did guarantee a basic access to both economic subsistence and local government for most of the land-owning peasants. The absence of a substantial lordly class, however, was not an exclusive characteristic of the coastal areas. It existed as well in parts of the more inland and sandy areas in the current eastern part of the Netherlands (Drenthe, Overijssel, Gelderland, parts of Brabant and Limburg). Here, communities of peasants (organised in 'markegenootschappen' or 'meenten' or 'maalschappen') controlled an important part of the village land, at least from the thirteenth century onwards (Hoppenbrouwers, 2002: 92-93). These peasant societies were responsible for the good governance of common fields and common wastelands as well as for a properly functioning and often long lasting infield-outfield system (see for details and literature: van Bavel, van Cruyingen and Thoen, 2010).

The presence of a lordly class (of nobles and the church) and a manorial organisation was much more common in the south of the Low Countries. It is probable that many of these areas were already rather densely populated since the Carolingian period. Population growth, internal competition within the lordly class, the rise of urban markets and the decline of demesne agriculture from the eleventh to thirteenth centuries favoured the conversion of labour duties and payments in kind to money rents. As a result of this evolution the juridical independence and the property rights of the peasant population increased in these regions as well. Furthermore, from the twelfth and thirteenth centuries on, many territorial princes tried to limit the judicial power of the local lords taking back the 'higher' and the 'middle' judicial power, and, as a consequence also lowering the income basis of the local lords (Thoen, 1988; Van Uytven, 1976). A real 'competition' between the lords was often the consequence: attracting as many people as possible via privileges and low rents.

Even in areas where the juridical power of lords subsisted, the later Middle Ages and the rest of the Ancien Régime saw an evolution towards more secure property rights for peasants. In inland Flanders, lords and urban patricians created large *curtes* or farms, which coexisted with the majority of smallholding peasants (see below). These labour relations actually supported the peasant survival structures as peasant holdings (often between 0.5 and 3 hectares) became too small as a base for subsistence. Thus, in many

parts of the Low Countries, peasant property remained relatively important even when, from c. 1300 on, lease holding became more widespread.

It is, however, notable that the opposite evolution happened in the coastal areas. Coastal peasants progressively lost their property rights, first in coastal Flanders and the Guelders River Area (fourteenth to fifteenth centuries) and later in Holland, Groningen, Friesland and Zeeland (sixteenth to seventeenth centuries). Those who could survive had to lease land from absentee landowners, often far removed, who were able to buy any vacant land in this unstable society. Engrossment resulted in a majority of middle-sized to larger, mostly isolated farms and a polarised society with relatively high mortality rates (van Bavel, 2002).

### *The result: different farming structures and strategies according to period and area*

A number of farming systems - 'social agro-systems' (Thoen, 2004) - can be distinguished in the Low Countries from the later Middle Ages onwards. Van Bavel (2010: 17-27) discerned from 20 to 25 such regions, which can be regrouped in three categories: the subsistence systems, the commercial business economies managed by farmers and the commercial economies with large owner involvement. In *subsistence farming* the continuity of the family (or household) was the primary goal of production (as contrasted with the survival of the farm in a commercial economy). Subdivision of holdings, as well as non-specialised production of both agricultural and non-agricultural goods, were common. Within these subsistence economies, we can distinguish between 'subsistence farming with common waste' and commercialised subsistence farming. The first type had been very wide-spread in the Early Middle Ages, sometimes co-existing with owner-driven commercial farming (see Devroey and Nissen Jaubert, this volume). From the twelfth- and thirteenth centuries onwards, the commons disappeared in some regions, and intensification became imperative. On the other hand, in some regions (Drenthe, the Campine area, the Ardennes) the persistence of large stretches of common 'outfields' (heathlands, woods etc.) until the nineteenth century seems to have favoured the longevity of subsistence farming. The size of the holdings – mostly owner occupied - was very different from one area to another, but larger holdings of more than ten hectares were scarce and fragmentation of holdings was common (Bieleman, 2010; Van Onacker, 2014).

Without commons, the pressure on survival was greater and society was organised in a different way. Typical for subsistence economies without commons is the growing importance of (commodity) markets and proto-industrialisation, which allowed further subdivision of holdings and larger population densities. In inland Flanders, such a 'commercial subsistence economy' only collapsed in the wake of the 'potato crisis' in the middle of the nineteenth century. Within this region a 'convivium' of the smaller holdings (mostly smaller than three to five hectares) with a small number of larger middle-sized farms (from 20 to 100 hectares; often between two and five per village) came into existence. Capital (horses, mills, ploughs) was exchanged for labour on the larger farms (Lambrecht, 2003; Vermoesen, 2011). Apart from the inland part of Flanders, similar social agro-systems can be found in large parts of the Pays de Herve (at least until the sixteenth century) and in the south of Limburg, where small, intensively cultivated small holdings of a few hectares were prevalent during the whole Ancien Régime (Servais, 1982). In other areas larger farms were almost absent which resulted in peasant holdings which were a bit larger and a bit more specialised. This was the case between the fourteenth and the sixteenth centuries in the Flemish Land van Waas (Ronsijn, 2014), which specialised in flax production, and the Holland peat districts (van Bavel and van Zanden, 2004).

Some areas in the Low Countries developed more commercially oriented farming methods at some point. These were mostly regions where large landownership had been important already in the Early Middle Ages (for instance the Guelders River Area: Van Bavel, 1999), or where it became important in the later Middle Ages (e.g. coastal Flanders and Zeeland: Soens, 2009; Dombrecht, 2014 and Van Cruyningen, 2000). In these regions short-term leasehold became the dominant way of tenure. Peasant property disappeared. Most of the commercial decisions were made by the farmers and not by the landowners. Advantages of scale often required the engrossments of the holdings. Splitting up the farm among the family members would cause bankruptcy. These systems often saw an increase in the productivity of labour, but total output sometimes stagnated or declined. In some regions of commercial farming, production specialised in one activity, such as cattle breeding on the Frisian grassland districts from the sixteenth century onwards. In most areas, however, cattle breeding went hand in hand with arable farming to reduce risks and, especially, to provide the necessary manure. In some cases, in the seventeenth and eighteenth centuries, a legal system developed which protected the legal claims of the tenant farmers on their tenant farm and hampered the free market competition between farms. In parts of Groningen in the eigtheenth century, the so-called *beklemrecht* endowed tenant farmers with a hereditary claim on their farm (Paping, 1995; Curtis, 2014: 191-193).

Finally, we can distinguish systems where the landowners (and not the farmers) encouraged specialisation. First of all, this was the case in regions where large farms that were directly managed were prevalent (often in co-existence with a smallholding peasant economy). This situation was typical for the High and Classic Middle Ages, at least in those areas where manorialism and the classic 'demesne' economy came into development as in the Meuse Valley, the Ardennes or the Guelders River Area. Early medieval demesnes are no longer thought to have been isolated from the markets (see Devroey and Nissen Jaubert, this volume). The larger demesnes were often forced into a degree of specialisation. For reasons of provisioning as well as for bringing surpluses to the markets, the large landowners often bought different demesnes spread over large areas. Some aspects of this kind of *owner-driven agricultural specialisation* survived in the later Middle Ages in the form of cattle-lease contracts, a specific type of sharecropping, which was quite common from the thirteenth century onwards in some areas of Hainault and later in other parts of Brabant and Wallonia (Verriest, 1956). Another type of owner-driven large farming consisted of villages dominated by one or a few mostly very large farms. Although they were generally leased out from the later Middle Ages onwards, the landlords remained closely involved in the management of the farm. Often these farms relied on wage earners who lived in as in the Hesbaye and the Condroz. As yet hardly studied, it is, however, likely that these agro-systems were not that commercial, since competition on the land market was absent and smaller farmers could profit from the abundant commons.

Lastly it should be mentioned that in most areas of the Low Countries sharecropping - *métayage* - disappeared over the course of the Middle Ages and was only temporarily implemented in periods of deep crisis (wars). However, in some areas it survived systematically for a much longer period of time. This was the case, for instance, in middle and south Limburg in the seventeenth and eighteenth centuries (Bieleman, 2010; Jansen, 1968; 1979) and on the sandy soils of the Veluwe and Utrecht for smaller plots of land, oriented towards the cultivation of tobacco (Bieleman, 2010). It was also still in use during the Early Modern Period in certain parts of Wallonia.

The social agro-systems presented above all generated different forms of land use and production systems. Within the limits of this chapter we will especially focus on the

two most contrasting agro-systems: the (commercial) peasant economies on the one hand and the commercial business economies on the other.

## 7.2 Land use 1000-1500

Apart from the coastal plains, in most parts of the Low Countries the basic features of human land use, - including settlement patterns, field systems, crop choices and the rural landscape, - had come into existence at a relatively early stage, in any case before 1250. At that time, many parts of the Low Countries were already characterised by a majority of small-holdings and a land use which can be described as intensive. In most of these areas there were no radical changes in the human use of the environment during the following centuries. As a consequence the 'Great Reclamation Period', during which these features were established, demands special attention. Nevertheless, we do not find many models in the literature to explain why the Low Countries was so comprehensively reclaimed in the period before 1300, apart from simple explanations such as the proximity of the sea and the deltas of the rivers Rhine, Meuse and Scheldt, as well as the dynamics generated by the urbanisation process itself. A lacuna in such explanations is the quite exclusive political situation, which might explain the taking-off of both the rural and the urban economies of the Low Countries. It is likely that the first fundamental changes in land use - in relation to an owner-driven, semi-commercial system - took place in the eastern part of the Rhine and Meuse area during the Early Middle Ages (see Devroey and Nissen-Jaubert, this volume) which was not by coincidence the area where the political elite of the Carolingian empire was resident and where they established richly endowed monasteries. In the post-Carolingian period the political power balance shifted towards the borders of the North Sea Area. In Flanders, the demand created by a wealthy nobility headed by a powerful count stimulated an increase of agricultural production and a certain regional specialisation already before the eleventh century (Thoen, 1997).

### *Land clearances, settlements and the role of lords and peasants*

Most authors nowadays see the Carolingian period as a period of economic development (Devroey and Nissen Jaubert, this volume). This resulted in certain areas being subject to rather intensive occupation and reclamation. As mentioned, especially in the area between the river Rhine and the Parisian area, there is clear evidence of land reclamations for that period.

However, especially since the second half of the eleventh century, population growth encouraged land reclamation at an accelerated pace. Verhulst (1977; 1980) discerned three stages. In the first stage, in the eighth and ninth centuries and continuing into the tenth to eleventh centuries, reclamation happened in a relatively spontaneous and unorganised way. From the last decades of the eleventh until the first half of the thirteenth centuries land was reclaimed more systematically. A clear indication is the increasing number of independent parishes. Most of the villages in existence today found their origin in that period. Probably the most important landscape changes before the nineteenth century occurred then. The last stage of reclamations took place from the thirteenth century on: more marginal lands were brought under the plough though sometimes the reclamations had to be given up again after some decades. This is what happened in some villages to the south of Ghent as well as in the so-called *veld*-region near Bruges.

Of course, the chronology of the 'Great Reclamation Period' varies from region to region. Over the past years traditional views on the initiators of land clearances have

been challenged. Lords and peasants often had a joint interest in reclamations. Peasants infringed on the wasteland in order to add small pieces of land to their holdings. Lords allowed and even encouraged these practices in exchange for cash fines or rents (Thoen, 1997). Lordly and monastic reclamations are often better documented than peasant and lay lord initiatives and, as a consequence, have often been overrated in the past. In fact, many would-be 'reclamations' by large landowners – churches as well as lay lords – resulting in the setting up of large farm holdings, had been used by independent peasants before their 'reclamation'. Each of the 180 estates of the ancient abbey of Lobbes, for instance, had already been reclaimed and cultivated before its donation to the abbey. The same even holds true for the 'champions' of monastic reclamation: the Cistercian abbeys. Although some new Cistercian foundations were indeed founded in remote and less cultivated areas, most of them were not. In Brabant too, important abbeys like Affligem and Villers founded large rural exploitations, but, once again, these were not mere centres of reclamation but rather centres of exploitation of previously reclaimed lands that had been rearranged by the abbeys (Steurs, 1993).

In fact, the whole concept of medieval 'land reclamation' needs to be reconsidered. In most parts of the Low Countries (and the rest of Europe), almost all the land had been used in one way or another from pre-Roman times on. What differed was the intensity of land use as well as the property rights to the land, especially with respect to the amount of common land. Land was normally only taken under the plough when it was privatised. Intensive animal breeding was likewise mostly practised on privatised land. Thus what is seen as 'reclamation' and 'colonisation', happened mostly hand in hand with privatisation and intensification, often also with deforestation. Reclamation usually went hand in hand with increased property rights for peasant smallholders, providing a stimulus for reclamations, but also with the creation of new large estates supporting the peasant economy with both capital and wage-earning opportunities.

In the coastal wetlands, dike building and land intensification already existed in the Roman period, but during the first millennium AD, settlement in the coastal wetlands had been mostly concentrated on *terps* (artificial dwelling mouths) or on the higher dune-lands, using summer dikes to enable animal husbandry and some types of arable farming in an otherwise 'open' landscape. Permanent embankment, in many regions accompanied by the shift of settlements from the terps and the dunes to the more flood-prone flatland (*Flachsiedlungen)* became increasingly popular from the eleventh century onwards. While fostering population growth and intensification of production (especially arable farming), embankment also increased the environmental vulnerability of the coastal eco-system, as the storage capacity for excess water (in case of flooding) was reduced and land subsidence occurred, especially in regions with a lot of peat in the subsoil (Soens, Tys and Thoen, 2014).

Just as in upland regions, the role of monasteries and other ecclesiastical landowners in coastal reclamation has been overrated (Mol, 2013). In the coastal wetlands, most embankments and drainage projects seem to have been initiated by peasants, often acting in close collaboration with territorial overlords (as owners or appropriators of the regalia rights on wildernesses). Only in the thirteenth century, did Cistercian and other monasteries become more actively involved in actual reclamation activities, especially in capital-intensive and technologically challenging projects such as dam building. Famous are the so-called *cope*-reclamations in the Holland-Utrecht peat area. The bishop of Utrecht, the count of Holland, later followed by minor lords, granted concessions of peatland to settlers in exchange for rent payment and the recognition of the landlord's supreme authority. The settlers enjoyed personal freedom, local autonomy and secure property rights on the peatland they reclaimed, often in plots with equal size and form, with the farm buildings concentrated along the road or ditch that served as

starting point for the reclamation (Van der Linden, 1956). From the late eleventh century on, these kinds of reclamation contracts between lords and settlers were 'exported' to other parts of western Europe (British Isles, Frisia, Northern Germany - Verhulst, 1977: 93-94). As in the inland part of the Low Countries, the great reclamation period thus stimulated a peasant-family oriented economy in the coastal wetlands, supported by only a few larger holdings. Only from the thirteenth century on did most coastal areas gradually evolve towards more farmer-driven commercial economies (see below).

### *Common wastelands*

Despite the high number of inhabitants in the Low Countries since the Middle Ages, common waste (and pasture) lands still played an important role in rural life until the nineteenth century. Woodlands, heath lands, peat bogs, grass lands and lower moor peats remained important resources for many peasant economies (Hoppenbrouwers, 2002: 91). They were used especially for pasture but also for wood collecting, sod manuring (in the so-called *es*-areas) and sometimes for peat digging and other activities such as hunting, bee keeping, charcoal production and even iron and brick making. Only in areas where most of the commons had already disappeared before the peasant economy and the resulting village communities had a chance to develop, did these commons no longer play a decisive part in the rural economy.

In areas with a stronger lordly class, as in the southern Walloon part of Belgium, the local lords governed the common rights in – a sometimes conflicting - dialogue with the peasants. In Brabant, for instance, around 1300 the duke sold a lot of the communal rights – most of which he and other landlords had usurped in the previous centuries - to peasant communities, usually in exchange for money and a yearly census, while at the same time organising the institutional framework of the commons (De Keyzer, 2014). In other parts of the Low Countries, the territorial overlords managed to get a tighter grip on the common rights over 'waste' land, based on their usurped royal rights to 'vacant' land (*bona vacantia)*. This process was most visible in the coastal areas where counts and bishops increasingly claimed ownership over saltmarshes and peatlands.

Only a small amount of medieval woodland survived in the Low Countries where it became in general less important between the thirteenth and eighteenth centuries than today. In the southern, Walloon, parts of Belgium, woods did retain their importance into the Early Modern Times, particularly in regions with rocky soils. Since the Middle Ages, lords kept part of the woodlands for hunting. Both private as well as communal woods were, again since the later Middle Ages but especially since the sixteenth century, also used for making iron using charcoal. Only when the production system of iron making changed in the course of the eighteenth century (when coke replaced charcoal), were the woods able to recover to a certain degree. A particular use of woodlands, which originated in the Middle Ages in many areas of Wallonia, was the so-called *essartage*. In this system, communities temporarily cleared part of their woodlands and used them for extensive grain cultivation (often oats) for a limited period of time (Pirotte, 1974).

In many other parts of the Low Countries woods had become very scarce since the Great Reclamation period. Around 1300, there were already fewer woodlands in Flanders than today (Tack, 1993). Many woods had been changed into arable or hay lands. However, while woodland was scarce in the inland areas, trees and living wood were not. Indeed, hedges and field walls were very common. In many areas the amount of open field was limited (see below), and *bocage* had been widespread since the thirteenth century. Bocage landscapes are usually associated with two types of farming systems. On the one hand, bocage could result from the shift towards a specialisation in cattle breeding. This 'Norman and Brittany' kind of bocage was typical for the Thiérache in

Southern Hainault and for the Pays de Herve since about the sixteenth century (Sivéry, 1977). In the central part of the former county of Flanders, however, bocage was part of the survival strategy of the commercial peasant society procuring the necessary fuel – and building materials - for survival. Where hay lands, wastes and woods were more common, open fields were more widespread and bocage was less important.

## *Expansion versus abandonment: the crisis of the later Middle Ages*

In general, the so-called 'crisis of the later Middle Ages' did not hit as many areas of the Low Countries as it did elsewhere. Sivéry (1977) used the expression of a 'particular Low Countries crisis model'. Only in the extreme south of the Low Countries (the Gaume region in Luxemburg) were a few villages abandoned (Noël, 1977) and in parts of Namur some arable fields were lost in a permanent way (Genicot, 1943-82). Elsewhere, lands were only left uncultivated for limited periods, mostly during and after wars (Thoen, 1981). Changes in land use included a switch towards more meadowlands for cattle breeding (Verriest, 1956; Genicot, 1943-82; Sivéry 1977) and – more seldom – to woodland. Even if population losses were very likely in many areas, especially since the last decades of the 14th century, the consequences for changes in land use were relatively mild.

However, in the coastal wetlands the situation was different. Parts of Zeeland Flanders, the Zeeland and South-Holland Islands, Friesland and Groningen seem to have suffered important population losses. Complete villages were permanently flooded by the sea and river estuaries and a large area of formerly intensively used lands were used from that period on only in a very extensive way. Even outside the danger zone many individual farms were abandoned (Verhaege, 1981; Soens, Tys and Thoen, 2014). As we will see below, this had little to do with the direct impact of mortality shocks, but much more with social and economic changes, including 'forced' commercialisation of the richer strata and pauperisation of the coastal peasant population. A similar evolution could be found in the Guelders River Area (van Bavel, 1999 and 2001). The central Holland-Utrecht peatlands in contrast did not suffer too much from *Wüstungen* in the later Middle Ages. Although arable farming declined drastically, the medieval peasant-oriented structures in this region survived relatively well, at least until the sixteenth and seventeenth centuries.

## *Urban demand and crop choices*

During the Great Reclamation Period (tenth to thirteenth centuries), the early urban growth in Flanders and Brabant probably stimulated the increase of arable farming (*Vergetreidung*) as grain remained the basic foodstuff for the expanding urban population. On the other hand, the urban textile industries needed wool and this was largely available thanks to the herds of sheep grazing both in the inland parts of the Low Countries and on the increased number of coastal saltmarshes, at least until the twelfth century. At first, the wool was processed on the spot, but from the tenth century on there is evidence for wool from the coastal plains being transported into cities like Bruges and Ghent. In the twelfth century, most salt marshes had been converted into arable land, and so imported – English - wool had to replace local production. In the southern part of Flanders and in Hainault, sheep farming gained in importance during the thirteenth century thanks to the booming textile industries of Lille, Valenciennes and Tournai (Verhulst, 1998). From the late medieval period on, the direct urban influence on rural land use was most visible in the increased importance of animal husbandry for meat or dairy production in peasant regions but especially in regions evolving towards commercial business farming (leading

to specialisation in cattle or dairy in some coastal regions like the region of Furnes in Flanders (Thoen and Soens, 2008). From the late medieval period onwards, there is evidence of the first oxen being imported from Denmark and Northern Germany into the Flemish and Brabantine cities, with a stop-over for fattening on the Frisian and Holland grasslands, a trade which would gain great importance in the Early Modern Period (Gijsbers, 1999). A change away from cereal cultivation was also made easier by the growing importance of international grain imports in this period, although we should not over-estimate the quantitative importance of these imports before the sixteenth century when the Baltic grain trade really took off (Van Tielhof, 2002). In the southern part of the Low Countries too, some – restricted - areas began to specialise in cattle breeding, and arable lands were enclosed to be used as permanent grassland. This was the case in the southwest of Hainault, or in the Pays de Herve. The latter region specialised in intensive dairy farming (cheese and butter) during the early modern period. The same was true in Holland where the peasants specialised in dairy production in the fourteenth to sixteenth centuries (cheese in the north, butter in the south – Bieleman, 2010). The ready availability of common land in the higher regions of southern Belgium was an incentive for urban elites to invest in large flocks of sheep leased out for grazing on the commons (*bail à cheptel* see also below). In the seventeenth century, rural authorities, fearing overexploitation by 'foreign animals' and the large-scale abandonment of arable farming for extensive pasture, tried to restrict these kinds of arrangements (Billen, 1975: 303 for the Condroz and Famenne).

## *Field systems: open fields and the collective organisation of land use*

A communal organisation of agriculture with open fields originated when peasants lacked the capital for the individual cultivation of cereals. Shortage of capital mostly resulted in the division of a village's land into one (or more) intensively used, ploughed and manured 'infields' and a more extensive 'outfield'. Contrary to the 'outfield', the 'infield' was often used in a collective way by a community of peasants. The infields were open to facilitating collective farming. If open fields were worked collectively ('common fields'), they were usually subordinated to *Flurzwang* (a topographically compulsory crop rotation). Infield-outfield and compulsory open-field systems were typical for the sandy and higher areas of the Low Countries, although there is a huge difference in chronology and importance according to the region.

In the former county of Flanders, open-field-infields were called *kouters*. These were rather small areas of 'micro open-field', normally between 15 and 80 hectares. Here, the infield-outfield system disappeared at an early stage, probably in the course of the thirteenth century. Although infields were normally used in a communal way, here, as in many parts of France, the oldest infields known were found on the large early medieval demesnes where the demesne land was split up into an 'infield' (the demesne *culturae* or *hofkouters*) and an 'outfield'. After 1000, in almost each village community, the lands most suitable for arable farming were concentrated on micro open-fields too and were called (village) *culturae / dorpskouters*. The land in the *kouter* was owned privately but the tillage and harvest works were operated collectively by small farmers with *Flurzwang*. Some of these *kouters* dated back to old demesne lands from the High Middle Ages, but often they were newly reclaimed in this period (Thoen, 2011; Verhulst, 2001). In some areas the development of *kouters* was preceded by smaller, early medieval infields (*akkers* – often measuring only a few hectares each). In many villages only one larger '*kouter*' developed, although in the southern part of Flanders, two additional '*kouters*' were created in the eleventh and twelfth centuries, probably in relation to the generalisation of the topographical three-course rotation. In Flanders, this strict application of the common

field system disappeared from the thirteenth century onwards, due to intensification and the abolishment of fallow. The open *kouters* often remained visible in the landscape until well into the eighteenth century, as islands of open-field in a sea of *bocage*.

However, certain forms of *Flurzwang* survived longer. In the Land of Aalst and parts of southern Brabant (Thoen, 1988)) as well as in French Flanders (Derville, 1989), from the thirteenth to sixteenth centuries *Flurzwang* spread over almost the entire part of the village which was used for arable cultivation. Apart from the meadowlands and the woods, the complete village was organised according to a 'patchwork' of micro open-fields, each individually organised with a collective field system. However, each 'patch' was cultivated by different peasants and respected the crop rotation system. It is likely that a similar system was applied in parts of Hainault as well - contrary to what has been written by Sivéry (1977) who still thought that the whole village was divided into three almost equal parts. However, this kind of *Flurzwang* did not hinder intensification, as a three-course rotation system was not at all obligatory within each field and fallow was reduced to a minority of the 'patches'.

A strong communal development existed in the so-called *es*-villages of Drenthe, large parts of Overijssel, the Westerwolde parts of Gelderland (Achterhoek), as well as in the sandy parts of Utrecht and the Gooi region (Bieleman, 2010; Kos, 2010). Here, the infields open-fields for arable farming were called *es* or in some regios *eng*, *enk, gaasten* or *geesten* (Bieleman, 1992: 77). In Brabant they were called *velden* or *akkers*. Farming practices on the infield and the use of the extensive outfield were strictly regulated. *Flurzwang* on the infields was common. The outfield was used for sheep grazing and the cutting of *plaggen* (hay or other sods), both of which were necessary to manure the *es* (Spek, 2004). Although the origin of many *essen* goes back to smaller *Blokflur* parcels dating back to the early and classic Middle Ages, they really only developed in the later Middle Ages and were enlarged in the Early Modern period.

In the higher parts of southern Belgium, open fields with *Flurzwang* were common as well. Sometimes even the whole arable area seems to have been divided into an open-field which followed a three-course rotation system and which survived until the end of the Old Regime. This was the case in some villages of the *Terre de Durbuy*. Here, in the eighteenth century the arable land was still divided into three *soles* with a changing three-course rotation system. It is typical that there was also a strict regulation of other communal practices such as wood-cutting. At the same time, every year, part of the common waste land was allocated to the inhabitants to cultivate temporarily (*sarts*) (Pirotte, 1974: 141-143).

In the coastal wetlands of the Low Countries, farming was more individually organised, despite the resilience of some common practices such as the right to collect wasted seed on the fields. However, with regard to water management, communal institutions had been developed. At first, the maintenance of drains, dikes and sluices was allocated as much as possible to individual peasant landowners and the quality of the maintenance was controlled by the local administration (aldermen or *heemraden* summoned by a representative of the local lord). Already in the twelfth century, some vital parts of the water control system required a more regional coordination. For the maintenance of large sluice complexes - such as those on the Rhine near Wijk (mentioned in 1122) or at Zwammerdam (1165) - peasant communities, backed up by the overlord, developed institutional arrangements allowing them to share maintenance among the participating communities and to choose specific judges *(hoogheemraden)* in order to inspect and control the quality of the maintenance. From the late thirteenth century onwards, water boards (*waterschappen, wateringues*) increasingly centralised the maintenance and repair of dikes and ditches, levying a land tax instead of mobilising labour. This happened first in coastal Flanders and subsequently spread to other parts of

the coastal Low Countries (Soens, 2009; Van Dam and Van Tielhof, 2006). In the peat areas of the northern Low Countries many local water boards – *windmill polders* - came into existence, first in the fifteenth century, and, at an accelerated rate, from the late sixteenth century on, when polder mills were constructed in order to drain areas lying below the water table that could no longer be drained in a natural way.

## *Landscape and environmental impact: the risks of overexploitation*

Already before 1000 AD the intensification of agriculture had greatly affected the 'natural' environment. In the Low Countries, many examples are known of very intensive pork breeding in forests and woodlands in the ninth and tenth centuries, as well in the Ardennes region and in the forests of Flanders. Due to overexploitation, many woodlands subsequently turned into heathlands. The early and intense deforestation which characterises most of the sandy, inland part of the Low Countries, undoubtedly had negative consequences on biodiversity as well. This, however, is very difficult to grasp. In any case, from the twelfth century onwards, woods in the inland Low Countries were no longer sufficient for supporting the breeding of large herds of pigs (Tack, 1993; Thoen and Soens, 2008). In the *civilisations du bois* of the higher Belgian area, the availability of wood remained much more extensive. However, already in the High Middle Ages, intensive pasturing and wood-cutting had turned many forests into 'wasteland' (*bruyères, landes, waréchaix*). In many cases these were the lands that were reclaimed during the Great Reclamations of the twelfth and thirteenth centuries. The remaining forests were rapidly 'protected' by the lordly class, mainly to preserve their hunting facilities.

In the coastal wetlands intensification of land use through drainage and embankment not only created a truly anthropogenic landscape but also seriously increased environmental risk. Whereas the less intensive land use of the Early and High Middle Ages could cope with longer periods of inundation during wintertime, this was no longer the case once the land was permanently embanked and desalinated for arable farming and human settlement (Borger, 2005; Soens, Tys and Thoen, 2014).

From the 1280s on, more and more damaging storm surges battered the coastal wetlands all over the North Sea Area. In the Dutch part of the Scheldt estuary alone more than 115 villages were flooded and abandoned before 1600, some of them following storm surges, others after 'strategic' inundations during periods of warfare. Although it is sometimes difficult to see whether a village was deserted or just relocated to safer ground, it is clear that many coastal areas were extremely vulnerable to flooding from the thirteenth century onwards. The explanation is partly found in the reclamation process itself (the disappearance of 'buffers' to cope with excess flood water), partly also in the progressive degradation of coastal dune barriers due to overexploitation (through grazing, land traffic and the construction of rabbit warrens) (Beekman, 2007). The economic and political difficulties witnessed by the free peasant populations of the coastal areas in the later Middle Ages also played an important role, as peasants increasingly lacked the capability of organising flood protection in a way which suited their survival strategies (Soens, 2013).

Particularly important in our understanding of the environmental problems of the coastal wetlands was the reclamation of the peat lands (Borger 1992; Henderikx 1989). We know that around 800 still about half of the (northern) Netherlands was covered with peat (Vos, 2011: 66-68). The increased activity of men changed the stability of this eco-system. The peat area was drained and converted to arable land. This caused shrinking of the peat and a lowering of the surface level. By the fourteenth century, many peat lands

in the central Holland-Utrecht peat districts became too wet to cultivate grain (Van Dam, 2000).

## 7.3 Productivity and regional variations 1000-1500

As we have seen above, in the rather small territory of the Low Countries, rural production was organised in a very different way from one area to another and from one peasant or farmer to another. Also, within one and the same 'social agro-system', production could significantly evolve over time. Moreover, many regions have not yet been studied in detail, sometimes because data is scarce. As a consequence, it is not an easy task to analyse production methods in relation to these divergences or changes in social agro-systems. Based on the existing literature, we can, however, give an idea of agrarian productivity for some prototype-regions.

*Yields*

Table 7.1 summarises data about medieval crop yields in the Low Countries. In general the yields are relatively high compared to elsewhere, such as England and France. Yields of more than 2000 litre per ha for bread cereals were not exceptional. Comparing the yields with the sowing seed, yield ratios of more than 10 are normal. In fact, if we compare with later periods, late medieval yields are as high as yields in the early 18th century. In coastal regions, 14th century yields were often not matched again until the 19th century (see for instance the high oats yields in the Guelders River Area in 1360-89). There were, however, huge regional and temporal differences and yields per ha which are not contextualised are not very informative on the degree of intensification. Yields on intensively cultivated peasant-holdings were higher than yields on large farms, which might explain in part the low yields on the Bruges-sample (which come from a larger hospital farm in the coastal region). Crop rotations should also be integrated into the data interpretation since the cultivation of winter cereals after (long) fallow always resulted in higher yields, although the net yields should actually be divided by two since the fallow gave no yields. The degree of manure should be taken into account as well.

**Table 7.1 Cop yields before 1550**

| Period | gross yields (litres per hectare) | sowing-seed (litres per hectare) | net yield (litres per hectare) |
|---|---|---|---|
| Inland Flanders (Oudenaarde): rye (predominantly) or maslin | | | |
| 1410-1449 | 1719 | 160 | 1559 |
| 1454-1494 | 1450 | 160 or 100 | 1290 or 1350 |
| 1501-1519 | 1620 | 100 | 1510 |
| 1520-1539 | 1262 | 100 | 1162 |
| 1541-1566 | 1416 | 90 | 1326 |
| Inland Flanders (Oudenaarde): Wheat | | | |
| 1462-79 | 1758 | About 160 | 1598 |
| 1511-1535 | 1540 | 100 | 1440 |
| 1540-1566 | 1221 | 90 | 1131 |
| Inland Flanders (Oudenaarde): Oats | | | |
| 1435-36 | 1698 | ? | - |
| 1459-92 | 2080 | ? | - |

| | | | |
|---|---|---|---|
| 1510-1539 | 3415 | ? | - |
| 1540-1566 | 2553 | ? | - |
| Coastal Flanders: rye and wheat | | | |
| 1359-1367 | 1120 (rye) | 175 | 945 |
| 1359-1390 | 1112-1229 (wheat) | 260/270 | 849-955 |
| Guelders River Area (Culemborg): Oats | | | |
| 1360-1389 | 3900 | | |
| 1390-1409 | 3000 | | |
| 1410-1429 | 3200 | | |
| 1430-1459 | 3300 | | |
| 1460-1499 | 3200 | | |
| Northern France (around Lille): wheat | | | |
| 1285-1356 | 2040 | 180 | 1860 |
| 1358-1381 | 2380 | 220 | 2160 |
| 1400-1446 | 2020 | 180 | 1840 |
| 1450-1470 | 2210 | 200 | 2010 |
| 1530-1541 | 1980 | 180 | 1800 |
| Hainault (Onnaing): wheat | | | |
| 1420 | 2110 | | |
| 1450 | 1940 | | |
| 1500 | 1840 | | |
| 1550 | 1830 | | |

Sources: Flanders: Thoen, 1988 and Dejongh and Thoen, 1999; Guelders River Area: Van Bavel, 1999; Northern France: Derville, 1976 (see also the net yields in Table 5.1, this volume); Hainault: Béaur, 1999, based on Morineau, 1971.

### *Crop rotations and techniques at the farm level*

We have a rather clear picture of the agricultural practices in the 'commercial peasant economy' of inland Flanders. The thirteenth century must have witnessed an important shift in cultivation methods when society contained more and more small peasants. Connected to this, convertible husbandry and the use of (long) fallow must have been clearly reduced from that time. The differences between the 'infields' (*kouters*, see above) and the 'outfields' were reduced as well. In Flanders one could even more easily experiment with new farming methods on the outfields where compulsory 'three-course rotations' were not enforced. It is nevertheless a misunderstanding to think that 'long fallow' and *dries* (land temporarily used as pastureland) disappeared in the period under consideration. Interestingly, the average amount of (long) fallow often increased in periods when the total size of arable land expanded, because the newly 'reclaimed' lands on poorer soils required more fallow and *dries*. Table 7.2 shows such an increase of 'fallow' and *dries* in the first half of the sixteenth century, a period during which population and arable land were increasing.

**Table 7.2 The share of fallow and 'dries' on small peasant holdings in the 'Kasselrij Audenarde', based on lease contracts of small plots of land**

| Period | % winter cereals after fallow | % *dries* land |
|---|---|---|
| 1397-1409 | 41 | 4.9 |
| 1410-1419 | 33 | 1 |
| 1420-1429 | 25 | 3.1 |

| | | |
|---|---|---|
| 1430-1443 | 44 | 6.3 |
| …. | | |
| 1460-1472 | 54 | 11.3 |
| … | | |
| 1562-1567 | 59 | 13.2 |

Source: Thoen, 1988, II, 749 and 757; Thoen, 1999: 39

It is clear that smallholdings were the first to give up the use of (long) fallow. The larger holdings in inland Flanders first switched to four crop rotations (with so-called *stoppelkoren* or 'rye after rye') in the fourteenth century, only to abandon long fallow completely in the seventeenth century (Thoen, 1997) (see below). This can explain why yields in inland Flanders (Table 7.1 - based on a regional spread of probate inventories), were going down in the sixteenth century. Total production went up in that period, however, due to intensification of production. When, from the thirteenth century on, inland Flanders evolved towards a subsistence economy of smallholding peasants, agricultural specialisation diminished to a certain extent. The common bread crop in inland Flanders was rye, but wheat and maslin were not uncommon either, especially on slightly heavier soils. Oats were the most important spring crops. Legumes were rather scarce. It was typical, however, to have a great variety of crops. With holdings getting smaller, Flemish peasants increasingly felt the need for additional income. Apart from engaging in proto-industrial activities (linen, flax), they also started to cultivate a number of 'industrial' crops, which were in strong demand from the urban textile industries. Dye plants, in inland Flanders especially woad or welt, were particularly widespread (Thoen, 1988). Following the expansion of flax cultivation, which supplied the booming rural linen industry from the fourteenth century onwards, they probably lost importance. Turnips in turn were sown from the thirteenth century on to produce oil (rapeseed oil). At that time, they were mostly sown together with the spring grains in three-course rotations. The turnip was highly multifunctional and hence useful in a peasant economy: from the beginning of the fifteenth century, turnips were also sown for their tubers, intended for human consumption, a practice which would continue to gain popularity among smallholders in the sixteenth century. In turn, their use as green fodder crop (especially when densely sown on the fallow), and hence a sign of agricultural intensification, is now thought unlikely to have started before the end of the fifteenth century, when it became common practice on larger farms (Thoen, 1997: 79). The intensive character of Flemish husbandry is reflected in its use of fertiliser. This does not imply, however, that the fields of the smallholdings were manured every year. The high degree of manuring had an especially positive effect on the yields of oats (see table 7.1, in both Flanders and neighbouring regions), which were extremely high on lands which had been fertilised with manure even two years before. In this peasant economy the market value of the lush oats harvests were almost as high as the harvests of winter cereals! Urban manure – 'night-soil' from the towns – also gained in importance, but only the more well-to-do peasants could afford it at this time.

In the Holland-Utrecht peat area, the cultivation of bread cereals on peat lands became increasingly difficult in the course of the fourteenth century. Here, peasant smallholders had to reorient their production towards stock breeding and dairy farming, which implied an increased market dependence both for the sale of the milk, cheese, butter and meat they produced and for the bread cereals they had to buy. As animal farming could not guarantee a year-round employment, other activities such as cutting and dredging of the peat offered an additional income, and so did maintenance works on dikes and ditches, fishing or ship-construction. This combination of activities allowed

peasants to hold on to their landed property, at least until the sixteenth or early seventeenth centuries. When looking for the origins of Holland's spectacular economic growth in the Golden Age, the environmental problems in the peat area must certainly be taken into account, combined with the flexibility of the peasant strategies (van Bavel and van Zanden, 2005).

The most important 'technical' feature of the (commercial) peasant economy remained the high labour input from all members of the peasant household. It resulted in an overall low productivity of labour (see below). By contrast, in some coastal areas, a more specialised and less labour-intensive agriculture developed (van Bavel, 1999; Dombrecht, 2014), although some labour-intensive techniques continued to be applied since they were 'inherited' from the former 'medieval' peasant economies. Typical for the coastal areas also was the great importance of legumes in crop rotations. Legumes had huge advantages as fodder crop and could eliminate fallow (Thoen, 1997).

## 7.4 Land Use 1500-1750

### *Land 'clearances' in commercialised coastal areas*

During the sixteenth and seventeenth centuries – the Golden Age of the Dutch Republic - the amount of land under cultivation in the northern Netherlands increased. In the inland parts of the Republic, where infield-outfield systems had survived, the infields increased in size (for instance in Drenthe: Spek, 2004). The coastal areas witnessed massive embankment projects, for instance in Zeeland or in the Dollard-region in Groningen. These projects involved a lot of capital raised through 'companies', associating urban merchants and local landowning elites (Van Cruyningen, 2014). Just like their medieval predecessors, early modern reclamation projects cannot be conceived as entirely new reclamations. Rather, land-use was intensified (again) after a period of more extensive land-use, often overruling local property rights.

In the peat areas the use of drainage windmills expanded and in the sixteenth century complex systems of windmills allowed the drainage of large peat lakes (the so-called *Droogmakerijen*) (Van Dam, 2003). Between 1500 and 1800 86 lakes with a total surface area of more than 40,000 hectares were drained in the northern Netherlands, 69 of them situated in North-Holland (Van der Woude, 1972).

Many of the lakes drained by windmills in the Early Modern Dutch Republic had their origin in the dredging of peat underneath the water level. Although destructive for the landscape, peat-digging activities (both dredging and digging) continued in the Early Modern period. In seventeenth century Holland they even accelerated in order to meet the fuel demands of the new urban industries. As long as the peasant economy in the region remained vital, the destruction of the landscape was limited, because peasant farmers devoted only parts of their land to peat digging, retaining the rest of it for cattle breeding. When the rural economy in Holland became more and more depressed from the late seventeenth century on, this type of mixed smallholding was gradually abandoned and more and more land was devoted to intensive peat reclamation, leading to an increase in land losses and drainage problems in the eighteenth century (Van Dam and Van Tielhof, 2006: 253-256).

Contrary to the western part of the Netherlands, where peat digging was very popular for fuel and salt making already in the medieval period, in the eastern part of the Netherlands intensive reclamation of peat only started from the middle of the sixteenth century on. At that period peat had become scarce in Flanders and parts of Brabant and the demand was high enough to compensate for the higher transport costs and

investments in infrastructure needed to start peat exploitation in more distant regions like Gelderland, Friesland, Groningen and Drenthe (Stol, 1992).

*The resilience of common "waste"-land and common practices within inland peasant societies.*

Even in the early nineteenth century, there were still many common 'wastelands' left, mostly in the less commercial but peasant-oriented areas of the Low Countries, as can be seen in Table 7.3.

**Table 7.3 Share of wastelands in 1833-1834 per province (% of total land)**

| | | | |
|---|---|---|---|
| Antwerp | 28 | Groningen | 17 |
| Brabant | 0.5 | Friesland | 12 |
| Limburg | 32 | Drenthe | 69 |
| East Flanders | 0.3 | Overijssel | 46 |
| West Flanders | 1.6 | Gelderland | 33 |
| Hainaut | 1 | Utrecht | 12 |
| Liège | 5 | North-Holland | 15 |
| Luxembourg | 32 | South-Holland | 5 |
| Namur | 14 | Zeeland | 10 |
| | | North Brabant | 37 |
| | | Limbourg | 32 |
| Total Southern Netherlands | 13 | Total Northern Netherlands | 28 |

Sources: Hoppenbrouwers, 2002: 89 and Dejongh, 1996: 36

For the Early Modern Period, we are well informed on the communal management of the commons. Although most regions with common lands can be characterised as peasant subsistence economies, important institutional divergences persisted both in the management of, and the access to, the wastelands (De Moor *et al.,* 2002). In the eastern part of the northern Netherlands, separate *markegenootschappen*, *meenten* or *maalschappen* regulated the use of the commons. More important, access to the commons could be based on the possession of so-called *waardelen* (shares in land use), which were unequally distributed among the peasants (Hoppenbrouwers, 2002: 102). In other regions such as the Campine area in Brabant, access to the commons remained theoretically open to all villagers, although in practice the benefits enjoyed from access to the common were unequal, as the poorest villagers only used the common heathlands for the cutting of sods, whereas their more well-to-do neighbours also grazed their flocks of sheep on it (De Keyzer, 2014).

The general resilience of commons in part of the Low Countries did not exclude infringements with respect to the commons. In some areas (notably parts of the Ardennes and Namur) the nobility was strong enough to enclose part of the commons and woods for private hunting and, increasingly, for commercial timber production. Moreover, already in the later Middle Ages, some commons had been sold or leased out by village communities in need of money. This intensified in periods of war and high taxation in the sixteenth and early seventeenth centuries. Capitalist farmers bought or leased these former commons and used them for extensive pasturing (Billen, 1975: 306).

Other types of collective land use survived as well. In many areas where open-fields with *Flurzwang* still existed (parts of loamy areas in Flanders and Brabant, many Walloon areas in the higher part of Belgium), so called *vaine pâture* continued to exist as well. Extensive pasturing after the harvest on the fields – mainly of sheep – remained

the most important way of manuring the fields. In Drenthe, pasturing the *essen* (infields) remained common practice in the seventeenth and eighteenth centuries (Bieleman, 2010). In some regions like Hesbaye, not just the stubbles after the harvest, but also the young cereals in springtime were grazed well into the eighteenth century (Billen, 1975: 300).

*The dangers created by overexploitation of peat lands and forests and the degradation of land.*

Early Modern Europe experienced growing fears of a lack of resources - in the first place wood. A fear of 'timber famine' was clearly present in the urban core of the Low Countries, where forests and woodlands had been scarce since the thirteenth century. In the later Middle Ages, construction wood was increasingly imported from northern Europe and peat substituted wood as the main source of energy in the towns. By the sixteenth century, however, peat reserves in Flanders, Brabant and Holland became exhausted (Leenders, 1989; Augustyn, 1999). This led to new peat reclamations in the eastern provinces of the Republic and it introduced favourable conditions for reforestation. The first reforestation initiatives already took place in the sixteenth century, for instance in the Meetjesland in the north of Flanders. They became more widespread during the seventeenth and eighteenth centuries, increasingly favouring pine trees.

In the upland woodlands in the south of Belgium, evidence for degradation and efforts to overcome it also multiplied in the course of the Early Modern Period. From the sixteenth century on, renewed forest reclamation for industrial purposes (charcoal) posed a new threat to the forests and led to renewed protection measures. It must be stressed that this Early Modern timber famine and the debates it provoked were mostly based on elite perceptions and the needs of the urban economy. They often did not reflect any real shortage of wood in the rural economy. In inland Flanders for instance, fields were bordered with ever larger and thicker hedgerows and large areas were turned into a *bocage*-like landscape, supplying ample fuel and construction wood (Tack, 1993).

Environmental degradation (real or perceived) also became an issue outside the forests. For the seventeenth and eighteenth centuries, there is more and more evidence that sand drifts and erosion occurred on the infields of the Campine area and on the *essen* in Drenthe (see Bieleman, 1987; Spek, 2004; Bastiaens and Verbruggen, 1996). However, the only regions where the physical environment constituted a real hazard for the inhabitants were the coastal wetlands. By the seventeenth century most of the coastal economies were highly commercialised 'capitalist' societies. Flooding, however, remained a problem and even intensified in some regions (see the tremendous impact of the Christmas flood of 1717 in Groningen or the river floods in the Dutch River Area). Others – like Zeeland – seemed more successful in reducing their vulnerability to flood disasters, which might be linked to higher levels of investment in flood protection in the eighteenth century (itself a consequence of state intervention and a renewed 'social balance' between wealthy farmers and landowners) (Soens, 2009 and 2011; Van Cruyingen, 2014).

## 7.5 Productivity 1500-1750

For the Early Modern Period, the evidence concerning agricultural productivity is growing, although reliable and serial data on yields often remain surprisingly scarce for many regions. In what follows we will not only analyse the evolving agricultural output, but also demonstrate that output numbers always need to be contextualised within the regional social-agro-system. In order to do so, we will start with the best-documented

agro-system, the inland Flanders 'commercial subsistence economy', and subsequently compare it with other agro-systems.

*Yields*

In the 'commercial' subsistence economy of inland-Flanders, average yields of 1300-1800 litres per hectare for rye - the main staple food - can be considered as normal until about 1750 (see Table 7.4). Subsequently, there was a gradual increase towards about 2000-2500 litres per ha.

**Table 7.4 Yields of rye in the commercial survival area of the Land van Aalst, seventeenth-nineteenth centuries (Inland Flanders)**

| period | gross yields (litres per hectare) | sowing seed (litres per hectare) | net yields (litres per hectare) |
|---|---|---|---|
| 1626-1635 | 1437 | | |
| 1631-1640 | 1932 | | |
| 1641-1650 | 1423 | | |
| 1651-1655 | 1603 | 103 | 1500 |
| 1656-1665 | 1729 | | 1626 |
| 1666-1675 | 1525 | | 1422 |
| 1676-1685 | 1622 | | 1519 |
| 1686-1695 | 1370 | | 1267 |
| 1696-1705 | 1594 | 113 | 1481 |
| 1706-1715 | 1499 | | 1386 |
| 1716-1725 | 1959 | | 1846 |
| 1726-1735 | 1993 | | 1880 |
| 1736-1745 | 1973 | | 1860 |
| 1746-1755 | 1876 | | 1763 |
| 1756-1765 | 1842 | 165 ('corn') | 1677 |
| 1766-1775 | 1887 | | 1722 |
| 1776-1785 | 2150 | | 1985 |
| 1786-1795 | 1719 | | 1554 |
| | | | |
| 1805-1815 | 1810 | 167 | 1643 |
| 1812-1825 | 2051 | | 1884 |
| | | | |
| 1830-1845 | 2025 | | 1858 |
| 1846-1855 | 2300 | 173 | 2127 |
| 1851-1860 | 2530 | | 2357 |
| 1856-1865 | 2840 | | 2667 |
| 1861-1870 | 3000 | | 2827 |
| | | | |

Sources: Vandenbroeke and Vanderpijpen, 1978: 166 and Van Isterdael, 1983: 153-155; census data for the nineteenth century.

**Table 7.5 Yields of wheat in the commercial survival area of the 'Land Van Aalst', seventeenth-nineteenth centuries.**

| period | gross yields (litres per | sowing seed (litres per | net yields (litres per |
|---|---|---|---|

| | hectare) | hectare) | hectare) |
|---|---|---|---|
| 1601-1650 | (1320) | 103 | 1217 |
| 1651-1700 | 1118 | 103 | 1015 |
| 1701-1750 | 1305 | 132 | 1173 |
| 1751-1795 | 1468 | 167 | 1301 |

Sources: Vandenbroeke, 1978, 388 ; Van Isterdael, 1983, 153-156

Whereas the estimates in Table 7.4 and 7.5, based on probate inventories, mostly stress the high level of yields already achieved by the early eighteenth century, data based on tithe receipts tend to show more of an increase in 'total' cereal production after 1750 (often up to twenty per cent or more, see Dejongh and Thoen, 1999: 44 and Dejongh, 1999). This was due to the extension of arable acreage, the decline in fallow and the switch towards more expensive cereals (wheat instead of rye). However, these increasing production results must not be overestimated. Indeed, the production increase after 1750 mostly did not follow the much more important rural population increase from the second half of the eighteenth century on, one that was stimulated by increasing employment possibilities in rural proto-industrial activities and by lower mortality rates. However, the success of this 'Flemish husbandry' mentioned above, did not stem so much from the average yield per hectare sown with cereals and from the results of 'total' production, as from 'labour-intensive techniques' such as diminishing the amount of fallow, the low amount of sowing seed used and the growing cultivation of fodder crops to maximise production. This was only possible thanks to a very high labour input. The whole family worked in the fields in the most intensive way: digging the land as much as possible (in the eighteenth century about thirty per cent of the land was cultivated with spades instead of ploughs), weeding, manuring, sowing in rows and optimising drainage conditions by constructing (temporary) *billons*. This resulted in a low labour productivity combined with a high physical productivity on small plots of land (Thoen, 2001). The fact that most peasants took extremely good care of their fields impressed many foreign agronomists from the seventeenth century onwards.

Comparing the yields of cereals in inland Flanders with those in more commercialised social agro-systems is not easy, since crop choices, farm practices and labour input were completely different. Regions that witnessed a transition towards large-scale tenant farming often saw a reduction of crop yields per hectare, mainly as a result of the reduction of labour-inputs (see the reduction in crop yields of oats in the Guelders River Area discussed above). In some commercialising regions, the drop in yields was less pronounced, due to the survival of farming techniques dating back to the previous period of small-scale peasant farming. In the eighteenth century polder areas of Zeeland Flanders yields of wheat exceeded 2,000 litres per hectare and those of barley even 5,000 litres. Among other things, the reduction of labour costs was realised through the use of relatively high amounts of sowing seed (reducing both the costs of seeding and of weed control).

**Table 7.6: Yields of cereals (litres per hectare) in coastal areas of the Low Countries**

| period | wheat | Barley | oats | rye* | beans* | coleseed | sowing seed (wheat) |
|---|---|---|---|---|---|---|---|
| Furnes Polder region (sixteenth and seventeenth centuries) | | | | | | | |
| 1550-84 | 1000 | | | | | | |
| 1615-19 | 1122 | 2595 | 2280 | 2034 | 1407 | | c. 230 |
| 1620-24 | 1113 | 2764 | 3636 | | 1195 | | c. 200 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 1625-29 | 1087 | 3186 | 2349 | 1703 | 1045 | | Id. |
| 1630-34 | 1001 | 2135 | 2835 | | | | Id. |
| 1635-39 | 1139 | 3041 | 3138 | | 2515 | | Id. |
| 1640-44 | 1181 | 2728 | 3059 | | 1231 | | Id. |
| Zeeland Flanders | | | | | | | |
| c. 1600-c. 1800 | 1500-2000 | | | | | | c. 200 |
| 1784-89 | 2500 | 5600 | | | | 2200 | c.200 |
| 1790-99 | 2390 | 6180 | | | | 2875 | c.200 |

Sources: Vandewalle, 1979: 369-374; Van Cruyningen, 2000: 426 and Priester, 1999: 318 (* data for rye and beans based on a limited number of observations)

On the sandy *essen* or infields of Drenthe, the most important crops were rye and barley. Yields seem to have been rather low in the seventeenth and eighteenth centuries, averaging about 1000 to 1200 litres per hectare. Furthermore, only a yield ratio of 1:3 or 1:4 was reached, which is as low as in the Early Middle Ages (Bieleman, 1987). Drenthe can be classified as a 'subsistence economy', disposing of ample commons compensating for the limited cereal production. Nevertheless, some regions with a similar agro-system did manage to boost their cereal production. This was the case in the Belgian Campine Area, which had 60 to 70 per cent of common wasteland until the nineteenth century, but engaged in a more intensive cultivation on the infields (see below).

In the Limburg Loess area, where sharecropping remained widespread, the seventeenth and eighteenth centuries witnessed a rise in physical yields, with average oats yields, for instance, increasing from 1700 litres per hectare in 1660-1744 to 2200 in 1740-99 (van Bavel, 1999: 102, based on Jansen, 1979). This was due to capital investment by landlords, improvements in manuring and a more intensive cultivation of the soil. As fallow diminished (from about 20 to 30 per cent around 1650 to 10 per cent a hundred years later), and the arable acreage was expanding as well, Jansen (1979) argued for a twofold increase in arable output from 1650 to 1800, based on his study of tithes receipts. The evolution of cereal output in Limburg (and Zeeland) contrasted with many other regions in the northern Netherlands, where both yields per area sown and total cereal output stagnated in the eighteenth century (van Bavel, 1999: 87-89). Nevertheless, even the Limburg yields did not match those achieved by the smallholders in inland Flanders (Table 7.7).

**Table 7.7: gross yields of cereals around 1740 in the south of (Dutch) Limburg near Maastricht**

| | kilogram per hectare (min) | kilogram per hectare (max) | litres per hectare (min) | litres per hectare (max) |
|---|---|---|---|---|
| wheat | 950 | 1100 | 1266.7 | 1466.7 |
| barley | 1200 | 1500 | 2000.0 | 2500.0 |
| oats | 800 | 1100 | 1739.1 | 2391.3 |
| rye | 900 | 1100 | 1285.7 | 1571.4 |

Sources: Jansen, 1968: 86; Bieleman, 2010

As mentioned above, yields alone are insufficient to appreciate the production capacity of an area. Crop rotations and farming practices must be taken into account.

*Crop rotations*

From the seventeenth century on, and partly already since the late sixteenth century, the variety of cultivated crops increased compared to the previous period. As a consequence, bread cereals declined in percentage although not in actual acreage. In the second half of the eighteenth century wheat gained in importance at the expense of rye and in some areas of spelt (Bieleman, 2010 for the Limburg Loess area). The decreasing number of harvest failures was certainly (partly) responsible for this evolution.

In the sixteenth to seventeenth centuries, buckwheat, which was no longer frequently sown in the later Middle Ages, returned as an important spring cereal in the sandy areas (and probably also on recently reclaimed lands). It was mostly a fodder crop. In the course of the eighteenth century it lost importance again though other fodder crops became much more significant for Belgian, especially Flemish, agriculture. Especially clover became one of the most innovative crops. It was probably introduced in agriculture in the sixteenth century, but is only mentioned in the sources since the third decade of the seventeenth century (Vandewalle, 1986: 210) when the consequences of the religious wars had been overcome and when the intensification process expanded again in the most densely populated areas. The crop was first sown on the former *dries* lands (see above) and used for pasture. Especially since the second decade of the eighteenth century it became part of 'normal' crop rotations, mostly sown as 'undercrop' in winter cereals. Being a fodder crop, clover favoured stable manuring and, due to its favourable impact on soil conditions, it allowed (as legumes and turnips did earlier) the gradual disappearance of fallow in the crop rotations. Moreover, by stimulating cattle production, it also improved the production of meat and milk. While in 1620 in the Land van Aalst, about 30 per cent of the land was still fallow land, this diminished to 20 per cent in 1720 and only 2 per cent in 1780. On the other hand, fodder crops (especially clover) increased from about 5 per cent in 1620 to 20 per cent in 1720 and above 30 per cent in 1780 (Van Isterdael, 1987). The link between both phenomena is clear (Dejongh and Thoen, 1999: 50).

Although catch crops, grown simultaneously with the main crop, were known in the Middle Ages (see above), they gained importance in the course of the eighteenth century. By the middle of the nineteenth century about 25 per cent of the amount of arable land in East and West Flanders was sown with catch crops (mostly rapes). It is also likely that rapes were more and more used as fodder crops instead of for human consumption. As an industrial crop for seed production to make oil, turnips were already mostly replaced by coleseed in the sixteenth century and this latter became an important crop with high yields (Lindemans, 1952: II, 270 ff.). Other industrial crops such as henna, tobacco (areas of Geraardsbergen, along the southern part of the Lys river, north of Hainault) gained importance in the course of the eighteenth century.

One of the most important changes in farming practices during the eighteenth century was certainly the introduction of the potato (Vandenbroeke, 1992). The potato plant had been introduced as a field crop from the end of the seventeenth century, in the coastal regions, Luxembourg and Liège. In inland Flanders and the Campine area the subsistence crises of 1709 and 1770-72 respectively favoured its introduction. It was only in the last quarter of the eighteenth century that it became prevalent (see Segers and Karel, this volume).

In peasant economies with common lands, the symbiosis between an extensive outfield and a smaller infield determined the agricultural practices of the peasants who were mostly smallholders. The well-fertilised 'infield' was often only a 'fraction' of the total amount of land, although it could be subject to both modest expansion and gradual intensification in the Early Modern Period. As Spek (2004: 608ff) demonstrated, crop rotations were not as permanent on these infields as often thought: rather than subject to

an 'eternal rye' cultivation, rye was combined with eg. barley and fallow. In the less intensively used areas, a kind of 'up-and-down-husbandry' (*dries* farming) was often practised: temporary ploughed fields were also used for grazing. The real outfields were used for extensive pasture, peat and wood provisioning, as well as for collecting sods used to mix with stable manure. This latter practice of 'sod manuring' (sods taken from the outfield and mixed with stable manure put on the infield) has also often been overestimated in the literature and probably only gained prominence in the sixteenth to eighteenth centuries (Spek, 2004: 658 ff).

### *Intensification before 1750 in the peasant areas: a matter of labour inputs?*

If smallholders in the peasant economy of the inland Flemish area managed to achieve a certain degree of intensification of agricultural production already before 1750, this was in the first place due to a rise in the labour input. The entire peasant household was involved in getting the most out of their micro-holding. Spade cultivation, seeding crops on rows, optimising drainage by constructing elevated 'lazy beds', intensive weed control, were highly labour-intensive practices which helped to increase physical yields (see above). Furthermore, peasant smallholders supplied cheap labour to the few larger farmers, and in return hired capital goods (for instance horses for ploughing or transport services) (Lambrecht, 2003). Active participation in proto-industry (mostly linen weaving) generated income, part of which was in turn reinvested in the purchase of off-farm manure (mostly urban manure) (De Graef and Soens, 2014). All this resulted neither in an 'agricultural revolution' nor in a long-term stability of physical productivity, but rather in a gradual evolution throughout the period 1300-1800, including periods of acceleration, as in much of the eighteenth century.

In agro-systems where commons remained available, the incentives for intensification were mostly limited. Although the market was not absent in this kind of agro-system (Bieleman, 1987), the fragmentation of holdings, the relative absence of larger holdings and the presence of the commons seldom stimulated intensification of rural techniques. Regional variation, however, did exist, even between agro-systems that were very similar. Thus, in contrast to Drenthe where yields remained low (see above), the infields in the Campine area must have developed - in the eighteenth century - towards more intensively cultivated open-fields (Thoen and Vanhaute, 1999) where even industrial crops (coleseed and fodder crops (clover and *spurrie*) were cultivated on a relative large scale (although less intensively compared to East and West Flanders). However, the amount of arable land remained small and the waste- and wood- and pasturelands continued to be more important, allowing these villages to reach a high cattle/arable ratio. A similar increase in productivity is likely in the loessial and sandy soils of Limburg (see above). Increases in yields of oats are mostly an indication of more intensive manuring since, during the Old Regime, oats were not directly manured for the most part. While horses were more common, in some areas such as eastern Brabant and the Campine oxen were still used as draught animals until far into the nineteenth century (Bieleman, 1999: 185; Van Onacker, 2013; Lindemans, 1952).

### *Specialisation and cost reduction in the commercially-oriented regions*

As noted above, in general, complete specialisation in one or two cereal products, meat or dairy, was rare because of the risks it brought about, and, in the case of cereal production, because of the need for manure, which forced farmers to have at least some cattle. In the Frisian Clay districts, for instance, we see the development of a clear specialisation of some districts in cereals and others in animal husbandry in the course of

the seventeenth and eighteenth centuries, though farms in all districts always remained involved in both activities (Bieleman, 2010). An increased market-orientation and specialisation did not always go hand in hand with an increased physical productivity. This is what we see in many coastal agro-systems which made the transition towards large-scale tenant farming, as also in parts of Brabant and the Hesbay, where large farms of the seventeenth century turned to extensive cultivation of barley for the urban brewing industries.

While the commercial peasant economies were using as much (family) labour as possible, survival of the farms in the commercial areas was largely based on saving labour costs. Engrossment of farms, creating economies of scale, was one way to do so. When the economy of the Republic went into decline after 1650, dairy regions in Holland and Friesland tried to cut costs, to some extent using labour-saving technologies but mainly by turning towards more extensive ways of farming on larger farms, including increasing the number of sheep (Bieleman, 2010). Secondly, they attracted cheap labour via (often temporary) wage earners who were sometimes systematically 'imported' from other regions (Devos et al., 2011: 173). From the sixteenth century, especially female workers were very much wanted for harvesting since their wages were much lower than the wages of their male colleagues. This is probably the main reason why the coastal areas continued to use the sickle as a harvesting instrument until well into the nineteenth century, whereas neighbouring peasant regions had switched to the small scythe (*pik* or *zicht*) as a harvest instrument from the fourteenth century on. The latter instrument had the advantage of cutting the stalks lower, at ground level (thus giving more straw for stable breeding) and allowed one to work much faster. Harvesting faster on their owner-occupied smallholdings gave them more time to work on the larger farms in the neighbourhood in order to increase their rather meagre income.

To a lesser extent, the use of labour-saving instruments could also save costs. This is why in Holland from the seventeenth century on, horse-driven mills were used for churning, why the fanning mill and the roller were used in Zealand Flanders from about 1700 and why workers started to use the threshing roller in Groningen and Friesland from about 1700 on. In the eighteenth century many regions also saw improvements in agricultural tools. The so-called Brabantine heavy plough with concave ploughshare became a common instrument for use in the heavy clay and loamy soils of the Low Countries.

One can question the extent to which increased capital investment by landlords fostered agricultural productivity. In the share-cropping system of the Limburg Loess area, investments in farm buildings and equipment by landlords helped to realise higher yields (see Table 7.7) but they still lagged behind the achievements of the inland Flanders smallholders, which makes us question all-too-optimistic views of the 'joint-venture' between landlords and farmers. In many cases, owner-investments helped to reduce risks, for both parties. This can be seen as well in regions like Hesbaye and the Condroz and parts of Namur, where a few large (to giant) tenant farms dominated the village. Here as well, eighteenth century landlords invested considerably in farm buildings and eg. enhanced ploughs. However, the absence of real competition between farmers, as well as the mutual dependencies between farmers and owners (symbolised by credit relations and payments in kind), neither stimulated risk-taking nor necessitated productivity gains. An important form of capital investment in agriculture took place in the form of drainage and embankment projects in the coastal wetlands. Only from the second half of the seventeenth century onwards, however, were landlords in regions of capitalist farming prepared to invest more than five to ten per cent of their rental income in flood protection, resulting in a structural decline in the number of flood disasters (Soens, 2011; Van Cruyningen, 2014).

Throughout the eighteenth century regions specialising in animal husbandry were haunted by cattle plague or rinderpest, a viral infection involving high fever and abscesses on the mouth, gullet, stomach and intestines. In the southern Low Countries, the first outburst occurred around 1682. In the eighteenth century, serious outbursts struck again in 1713, 1744, 1755-57 and 1769-74 (de Herdt, 1970; van Roosbroeck, 2015). In many regions the epidemic of 1769-74 was the first to see a coordinated intervention by state authorities, based on massive and preventive slaughter.

## 7.6 To conclude

The pre-modern Low Countries witnessed a huge diversity in land use and agricultural techniques, which stand in close relation to the particularity of the regional 'social agro-systems' we identified. It is important to take into account that these regional agro-systems evolved over time: whereas in some regions the subsistence-based character of the rural economy became more pronounced in the course of the Late Medieval and Early Modern periods, in other areas a peasant smallholding economy made the transition towards a more commercially oriented, 'capitalist' tenant farming economy. The market was omnipresent in the whole of the Low Countries throughout this period. But the way peasants and farmers reacted to market opportunities depended on the prevailing social conditions which were highly divergent from region to region. The nature of the incentives to switch towards a more commercial agro-system are still highly debated. In the coastal regions of the Low Countries, the unviability of peasant smallholdings, - due to increased environmental stress or the burden of taxation, to the economies of scale achieved by larger tenant farms, clear and marketable property rights to land and the supply of cheap labour in neighbouring regions, - contributed to a higher degree of market dependence in the Early Modern period. Apart from changes, we also noticed the importance of path dependency, both with regard to land use and production methods. Time-honoured regional traditions might explain why diverging production methods persisted even in regions where environmental and social conditions were quite similar, for instance in coastal Flanders and the Guelders River Area, or on the Drenthe and Campine sand grounds.

The agricultural achievements of the pre-modern Low Countries must not be overestimated. They were not the result of some 'technical wonder' or 'agricultural revolution'. In the peasant-oriented areas like inland Flanders, they resulted first of all from a tremendous labour input per unit of arable land. Labour productivity was low due to the high population pressure and there was in most areas of the Low countries a constant struggle to cope with lower labour productivity which in turn stimulated the increase of new (labour-intensive) techniques that were, in the final analysis, limited in their effectiveness due to ecological and technical constraints. In more commercial regions, engrossment of farms and labour-saving technologies helped to overcome the pitfalls of declining labour productivity. During the early modern period, some parts of Holland and the maritime provinces of the northern Netherlands might have succeeded - to a certain extent - in realising an increase of both labour and land productivity, which in turn might have paved the way for the success of Dutch agriculture from the late nineteenth century on (see Segers and Karel, this volume). In most cases, however, increased labour productivity was realised through more extensive ways of farming and a decline in total output. As such, a real 'agricultural revolution' did not happen in these regions either. Even though the Low Countries were densely populated by pre-modern standards, many regions still disposed of a lot of 'wastelands' in 1750, a potential for agriculture that would only be realised in the nineteenth century (albeit at an impressive social and environmental cost, see Segers and Karel, this volume).

Nevertheless, it is clear that the medieval and early modern peasant societies of the Low Countries were not free from overexploitation and on several occasions exceeded the capacity of their natural environment. This was true for the coastal areas as well as in the inland parts of the Low Countries. However, the coastal area suffered much more from human-induced environmental problems. The foundations of the long-lasting environmental problems of the coastal area were laid in the period of economic and demographic growth of the eleventh to thirteenth centuries, when coastal marshes were drained and embanked on a massive scale, a process that was to a large extent supported by the coastal peasant populations. The destruction of the medieval peasant smallholding systems in the coastal plains and their subsequent replacement by 'capitalist' tenant farms initially accelerated the environmental problems even further. In many cases only a renewed 'social equilibrium' between all major stakeholders (in the coastal wetlands supported by a larger degree of state interference), led to a consolidation of environmental conditions and a reduction of environmental risk, both to the benefit of agricultural production.

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