

1. Rural history and the environment

A survey of the relationship between property rights, social structures and sustainability of land use

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I. The environmental branch of rural history

In recent decades, scientific interest in the interaction between people and the environment has been growing, not least because of acute environmental problems. Besides the research into the present interaction, this has also fostered research into its historical dimension and has given rise to a new academic strand. Environmental history emerged as a separate discipline from the late 1960s and interest in it continues to grow (McNeill, 2003: 15-21), although perhaps still not as much as it should, in view of its relevance. The field of environmental history studies the historical relation between people and nature in both directions: how did nature in the past influence people and how did people influence nature and natural resources? Environmental history studies *inter alia* if, when and how humans did or did not take care of the sustainability of natural resources, and when and how catastrophes and changes or depletion of resources occurred. Nevertheless, it is quite surprising that few studies in the field of environmental history investigate the causes and explanations of environmental changes and environmental catastrophes. Indeed, too many studies are just descriptive or give only superficial explanations, or they restrict their focus to natural causes, such as climatic change.

The sphere of explanation of environmental changes and events is largely left to the natural sciences. If the human element is included in looking for explanations, this is mostly left to philosophers and sociologists who try to explain people's behaviour in relation to landscapes, resources and nature in general. These studies, on the other hand, often do not place developments accurately in the historical context, frequently put

forward ideas which are not sufficiently tested by historical data, and seldom use the opportunities offered by history as a laboratory for testing new ideas in the field. Conversely, as correctly observed by Warde and Sörlin (2007), historians do not make enough use of theoretical models from other disciplines such as anthropology and sociology. This prevents environmental history from becoming more “scientific” and relevant, and is perhaps one of the reasons why the field has been less active and important than might have been expected. Similar problems apply to the now popular field of disaster studies. These to a large extent also deal with the relationship between humans and the environment, but focus more on the extreme events, where hazards or disasters threaten or strike societies (e.g. Blaikie, 1997; Bankoff, 2003). Natural hazards can result from exceptional events, including volcanic eruptions or earthquakes, but also from more common threats like floods. However, threats can also result from increasing tensions between humans and the use of natural resources, as is the case with erosion, for instance. Further, events which at first sight are exceptional and exogenous, like an earthquake, can have a highly diverse impact, a diversity directly linked with the ways in which humans have used the environment where the earthquake takes place and the tensions and risks inherent in this use.

Economists and geographers increasingly suggest that wealth, knowledge and technology in themselves do not determine the diversity of impacts. Instead, it is rather the institutional framework that guarantees the use of this wealth, knowledge and technology in a way that makes (or does not make) a long-run contribution to a society’s resilience (pioneering work by Ostrom, 1990). Sociologists, within the new sub-fields of disaster sociology and environmental sociology, and scholars in development studies, have even more clearly entered this line of thinking and have come to study disasters more as social rather than physical-natural occurrences, reflecting the institutional organization and inequalities inherent in society (Tierney, 2007; an early example: Blaikie et al., 1997). Some societies therefore are more vulnerable than others, and the investigation of this vulnerability poses questions similar to those posed in the field of environmental history more generally.

However, in dealing with the topic of historical hazards and disasters, historians have again restricted themselves mainly to a descriptive approach, concentrating on reconstructing the events and their direct effects. And although the history of disasters

is now developing into a serious and thriving sub-field of history, the work still tends to be highly descriptive in nature and most historical studies continue to treat disasters as separate events (Lübken & Mauch, 2011). Gerrit Jan Schenk and others are in the course of remedying this in one important aspect, namely the perception of disasters and the way cultures cope with them, building on the pioneering work on the human need for reassurance by Jean Delumeau, for instance (Schenk, 2007). This is where historical disaster research has made most progress in recent years and has worked most systematically. However, historical research looking not at the perception but at the causes of disasters, and trying to find the underlying patterns and understand why some societies are successful in preventing disaster or recovering quickly, and others are not, has been much more limited.

Conversely, the many relevant studies in sociology, economics and human geography in the field of disaster studies and vulnerability have not yet begun to utilize the research opportunities offered by history most notably the opportunity for a long-run, systematic analysis. However, such a historical analysis would make it possible to replace studies of separate events with a more structured investigation and would offer an analysis of the role of the various factors in the long run, which is particularly vital in this field where changes are often slow and protracted. It would also use the great opportunities history offers for a comparative analysis. When examining the historical cases one is struck by the differences in the impact of shocks and the responses, offering ample material for comparison. Notwithstanding the many valuable studies – especially in the investigation of separate historical cases – the use of the historical dimension for a systematic, comparative analysis is largely missing.

This book seeks to make a contribution – albeit a modest one – in filling this lacuna, by discussing various cases of the relationship between ecology and society in fragile environments of the past.

This introduction first offers a succinct survey of the environmental risks and the margins of agrarian production in the past (section 2) and next it focuses on these margins in fragile environments (section 3). Rural land use in these environments was endangered either because of excess water as a result of river floods or storm surges of the sea, or because of too little water. In other cases, their mountainous location or poor

soils created a kind of inherent vulnerability. Because of the difficult circumstances, these areas allow a test to be made at the extreme margin, where the relationship between mankind and ecology is most fragile. As argued in section 4, a major element in better understanding the ways in which rural societies have dealt with the fragility of their environments, and their different degrees of success, is the investigation of the property rights to the land and their exact formulation. Next, section 5 discusses how the formulation of these property rights, and their effects, in turn, can only be explained when placed in their social context and investigated in the long run. We argue that this should be a main research agenda for the field in the coming years.

II. The ecological margins of agrarian production in past societies

Environmental history is logically to a large extent linked with economic history since economics can be defined as the study of efficiency in the use of resources which determines the wealth of human communities (Persson, 2010: 1). In agricultural economies, land was the most important resource. If we disregard in this context the use of rural resources for industrial production and the extraction of minerals (such as ore digging and mining) and focus here solely on the relation between natural resources and rural land in agricultural production, the relation between people and natural resources, and the use of these resources, is determined by ecological constraints.

The ecological margins are agricultural *production margins* on a given amount of land or in a given area. Technically, this boundary of production is bounded by natural elements and by the limits on the amount of land that could be used, colonized and/or reclaimed for agricultural production – in other words, by the limits of the production factor ‘land’. Indeed, the available land was limited and subject to diminishing returns. This is what could be called in a ricardian-malthusian way the ‘extensive margin of cultivation’ (a clear discussion of this concept: Hatcher & Bailey, 2001: 33-38). Next to the ‘extensive margin of cultivation’, there is the ‘intensive margin of cultivation’, that is, the limit of land productivity caused by ‘intensification’ of rural techniques (Ibid.: 38-43). Intensification is the process of increasing physical productivity of the surface area by way of raising input of the other two production factors, namely labour and capital. The increase of the labour input was actually the

major way of intensification in the Ancien Regime. Social and economic limits, however, determined the use of this production factor, since, after a while, increasing labour input would lead to a huge decline in labour productivity. The loss of labour productivity in agriculture only stopped the increase in labour input if there were opportunity costs to labour in the economic system, or if the main source of labour input was wage labour since wages are elastic to decreasing labour productivity. If neither applied, labour input tended to grow to the limit of its “physical margin”.

So, labour input had its social margins - which became operative through declining monetary profits or rising opportunity costs most particularly -, but also its ‘physical’ margins, reached when it could hardly be driven upwards any further. Before the introduction of ‘scientific agriculture’ in the nineteenth century, the production factor capital was actually, in terms of ‘production margin’, the major limit, since technical improvements were too small to fundamentally increase production capacity of the surface area. Indeed, a huge change occurred in this respect with the introduction of ‘scientific agriculture’, when scientifically based technical improvements drastically changed the production margins. Before that period, technical improvements were actually triggered by learning by doing, and they could not be pushed to a very high level. During the Ancien Regime, and before, practical knowledge to manipulate nature was at the heart of the ‘physical’ production margins.

The scope for technical improvements to increase physical production of the surface area was, and is, mostly ‘technically’ determined by many elements. Most important are, among others, the following aspects which are determined by the amount of capital input, the efficiency in using this capital, and the labour input and labour efficiency:

- The most important capital in preindustrial society was manure. A structural shortage of manure was one of the major problems in many rural societies in pre-industrial times. In areas where manure was not, or not yet, a commodity, a good balance between cattle and arable was therefore necessary (For detail on this point, see Morell, this volume). Population pressure, income changes, or land division and reclamation could cause the necessary balance between arable land and the number of manure producing cattle to be broken. In the pre-industrial period, various methods of

solving this problem were attempted. A first method was via the introduction of an ‘infield-outfield’ system – with the manure concentrated on the infields – or via a larger ‘open field’ system. Later, the introduction in the crop rotations of fodder plants with a nitrogen increasing effect on the soils, such as legumes and tuberous plants, helped to solve this problem, and this solution was adopted from the Middle Ages onwards in some areas (e.g. in Flanders, Thoen, 1997). From the seventeenth century in England, and also elsewhere, clover or lucerne was introduced in the crop rotations (see e.g. Shiel, 1991: 55 and Grigg, 1992). Another solution was the large scale use of urban produced manure in extended areas around big towns, a solution open especially to larger farmers with capital available. Horse dung from Paris and Versailles, for instance, was used in the eighteenth century as a return load of the straws and oats carried to the cities for horse fodder, a successful strategy used by large farmers in the Ile de France which allowed them to specialize further in commercial arable farming and drive up productivity (Moriceau, 1994: 660-661).

- In relation to the lack of manure, in pre-industrial societies, it was necessary for agricultural land to repose to give it the opportunity to recuperate physically. However, a major increase of productivity could be achieved if the land needed to repose (via the use of fallow land or via up and down husbandry) could be minimized without a loss of production capacity. Such intensive crop rotation systems mostly included fodder crops. These crops in their turn made it possible to retain the number of cattle and therefore did not cause a shortage of manure; on the contrary: the balance arable-cattle could mostly be influenced positively and stable feeding often caused the increase of manure, sometimes via the introduction of the practice of sod-manuring. Moreover, as mentioned, the cultivation of these plants in itself could reduce the exhaustive effect of arable farming.

- The moisture in the soil was one of the major problems of agriculture as well. Resolving the ‘water’ problems of the soils improved crop yields. The solution for excess water was to use labour intensive or capital intensive drainage techniques. This was especially important in Northern and Northwestern Europe, which have high rainfalls. A well known solution is the ridge and furrow system using a pattern of rather broad ridges and troughs, which was very common in England and Ireland in the Middle Ages due to single sided ploughing. It originated in the late Roman period but

only became very common in the Middle Ages (Pounds, 1973). In Flanders, from the late Middle Ages on, the system of narrow and very temporary ridges ('raised bed cultivation', made with double sided ploughs or the spade) had the advantage that the troughs in between could be used for weeding (Thoen, 1997). In coastal areas, keeping the water beyond the cultivated land was a major problem. The construction of dikes and sluices was necessary, a technique which was already known in the Roman period but became widespread in the Middle Ages, although in the long run the use of these techniques could lead to environmental problems (see below and the papers of Soens and van Cruyningen, this volume; see also Thoen et al. 2012). In the same areas the drainage techniques were gradually improved, e.g. via the spread of the wind water mills for drainage in Holland and coastal Flanders, especially since the sixteenth century (van Dam, 2002).

- Shortages of water on the other hand could be solved via irrigation, which was especially important in the Mediterranean area in antiquity. Irrigation techniques were already often also successfully used by small peasant societies. Even the well-known irrigation techniques, including those implemented by the Arabs in Southern Spain, were mostly not the result of large scale agriculture but rather they were accomplished by small peasant societies (Retamero, 2008).

- The intensification of tillage was perhaps the most important way of increasing agricultural productivity in pre-industrial societies. Weeding was especially important. Intensive weeding was only possible if a sufficient number of hands were available, as was the case in Flanders, for example. Since the late Middle Ages, cereals were sown there in rows to increase productivity (Thoen, 1997). This caused an increased growth of weeds and thus needed a great deal of weeding, which however could be managed within the context of the small holdings and labour surpluses in this area. Although the sandy-loamy soils in inland Flanders were not inherently fertile, perhaps even the opposite, this became the region with probably the highest physical yields per surface area of all of Europe, albeit at the cost of low labour productivity (Thoen, 1997).

- As a result of economic changes such as the growing market demand, better transport facilities or changes in property regimes, from the late Middle Ages in some areas peasants developed into farmers who partly shifted their diverse, mainly subsistence-

oriented production to a few more specialized crops. This specialization could result in both higher labour productivity and increased physical productivity as well, especially when farmers concentrated on those crops which were better suited to the soil conditions and the social agrosystem of the region in question.

- Increased land and labour productivity could also be achieved by selecting enhanced varieties of seeds and seedlings. An example of this is the improvement of the quality of the grain in the early modern Languedoc via selection and foreign import of seeds (Le Roy Ladurie, 1990).

- The construction of terraces with stones or hedges (Baudry and Perichon, 2007: 25-27) was a way of integrating poor soils on hillsides, which formerly were virtually unproductive, into more intensive agriculture systems, for instance for vine growing. Stone terraces, for instance, were used in the Catalan hills in the mid-nineteenth century, in a context of mounting population pressure. The building of these terraces required huge labour inputs: ten-thousands of working days per village were devoted to this task (Garrabou et al., 2010).

- Protection of the land against negative effects of over- intensive tillage or erosion (e.g. preventive protection by better ploughing methods or reforestation, protection of fields with hedges and other boundaries).

A major acceleration in technical knowledge took place in the nineteenth century, with the 'green revolution' and the rise of 'scientific agriculture', as artificial, chemical fertilizers and herbicides, and mechanization were introduced (an overview of this 'transition' in: Grigg, 1992; compare also Morell, this volume, where this stage corresponds with the fifth evolution stage in the Emanuelsson model). Prevention or control of plant diseases, especially since the late nineteenth century, increased productivity. However, it hardly needs to be remarked that the use of herbicides later became an environmental problem in itself. In this period also new techniques were introduced in irrigation and water management (examples from Hungary: Vari, this volume).

The ‘intensive margins of cultivation’ could be pushed up, as never before in history. One of the early examples is England, where wheat yields increased from less than 20 hl per hectare at the beginning of the nineteenth century to almost 30 hl at the beginning of the twentieth (Beckett & Turner, 2011). In Belgium, too, the rise in land productivity in this period was unprecedented. In 1880 the average yields per ha for wheat were 1,635 tons there. In 1984, this had increased to 6,332 tons per ha. For potatoes the figures were 10,504 and 34,649 tons respectively (Blomme, 1992). As mentioned, this was largely due to the use of artificial fertilizers. In 1910 in Belgium 36 kg artificial fertilizers per hectare were used; in 1950 the amount had already increased to 176 kg (Blomme, 1992). In most countries, however, chemical fertilizers only really overtook natural manure (which of course kept a certain importance) as a source of nutrients in the second half of the twentieth century (Grigg, 1992: 41-42).

In recent decades, new species of plants have also been introduced that are more resistant to insects and climate conditions; an example is the mixture between rye and wheat called ‘triticale’ (Stallknecht et al. 1996). Combined with improvements in the physical infrastructure, including bigger irrigation works, and with new equipment and mechanization, these advances could push up physical outputs even in very difficult environments, as in Aragon, a very dry and mostly mountainous area, and already at an early date. There, physical output and output per hectare were substantially increased in the period 1880-1920, although capital investments – and therefore output – declined again in the subsequent decades, as a result of the decline in prices and profitability of agriculture (Pinilla & Clar, 2011). This case shows that, although rises in output were general, the chronology per region differs and the development was not always an unilinear one.

In fragile environments like these, but also more generally, the output rise after some time was halted also because new margins were reached, either by exceeding the local ‘ecological’ carrying capacity or by not investing enough in ecological protection measures, as we will see below.

The preceding remarks already hint at a logical extension of the Malthusian model, which is an ‘environmental model’ in the narrow sense of the word. A broader approach would stress that these ‘Malthusian margins’ are determined by nature in

relation to human knowledge but also by the human input in the production process and the social organization of the production process as a whole, including the property and market structures and their distributive effects, as we will see more in detail below. History teaches that the natural ‘Malthusian’ margin was, despite the knowledge of the above mentioned techniques, very seldom reached. Regional and temporal differences were huge. Since indeed all this is to a large extent regionally different and linked to the way people organize their survival, we could say that this limit or margin is determined not only by nature, but also by the social organization of rural production, the ‘social agro-system’, which includes the organization of property rights and land use, the distribution of these rights and the organization of exchange in the region in question (Thoen, 2004; van Bavel, 2010: *passim*). Changes in this social and institutional context in which production is embedded, can increase or lower the production margins. We will come back to this issue in later sections of this introduction.

Firstly, we would like to note here that also long before the ‘new agriculture’ or the ‘green revolution’ of the nineteenth century, in certain social and production conditions, production could exceed the local ‘ecological’ carrying capacity and lead to diminishing returns. Even apart from falling labour productivity, this could lead to falling land productivity in some over-exploited parts of the cultivated area. As Mc Neill mentions, this phenomenon is called by ecologists ‘overshoot’, that is, an excess of land use over the carrying capacity with negative physical productivity effects (Mc Neill, 1992: 3 ff.). In many areas and periods such ‘overshoot’ was temporary. These gentle and favourable environments can therefore be considered as more or less sustainable, since resources can recover or be easily replenished. Still, we must consider that, according to some estimates, 40 per cent of the agricultural land in the world is currently subject to erosion (Ponting, 2007). This degenerative process was more limited in the past, but by no means absent, even in less harsh environments. An example is the degeneration of the open fields in Drenthe during the nineteenth century (Bieleman, 1997). Since prehistoric times, a well-known long term problem of societies in hot environments has been the slow salinization process via irrigation (Mannion, 1997: 225-231). By using the water from creeks and tidal canals for irrigation, a small but cumulative amount of salt reached the cultivated lands, which eventually decreased the yields in the long term. Today, and especially since the 1960s, agriculture in favourable, gentle areas also causes external environmental costs, that is, costs which

are not directly measured within a particular production process (Tietenberg, 2006: 59 ff.), as in some areas via soil and water pollution due to excessive manuring, but also caused by industrial pollution or that caused by traffic or technological disasters.

Deforestation, which happened on a huge scale since humans became sedentary, but especially during Antiquity as well as the high Middle Ages and the early modern period, was actually the most important form of changing the ‘extensive margins’ of rural production. Deforestation may have caused a lot of ‘external’ environmental costs (perhaps better described as costs in external areas) in the past, some of which may even have become quasi-permanent.

External costs may in several cases have been so huge that they have caused a permanent lowering of the production margins in certain ‘external’ areas. Deforestation in hilly areas with stream valleys was, and is, causing dehydration in the higher areas with potential and often intensive erosion as a consequence, and at the same time a hydration of the stream valleys, which could have double effects on agriculture: positive in the valleys when this phenomenon caused e.g. more natural, but in a preindustrial society very valuable meadowlands, and negative effects due to erosion, dehydration and washed away upper soils. On a bigger geographical scale, there is still a major debate taking place on the impact of environmental changes especially due to deforestation in many areas around the Mediterranean during Antiquity. Some ‘pessimists’ even see the environmental changes as a cause of the decline of Greek and Roman civilizations (Hughes, 1994: 194). Others, however, view these changes as not that negative (Montgomery, 2008).

III. The vulnerable ‘ecological margins’ of rural production in past fragile areas

Although even within rather ‘gentle’ areas the cultivation margins could be limited by damaged environments in the long run and by ‘external’ damage, in many of such favourable areas the temporary damage from ‘overshoot’ could be restored, sometimes even by improving the carrying capacity via new techniques.

In some marginal areas, the carrying capacity was equally only temporarily reduced, as was the case in the rough, hilly landscape of the 'garrigues' in the Languedoc during the seventeenth to nineteenth centuries (see Olivier, this volume). However, this was not at all the case in many other fragile areas such as coastal areas, river swamps, cold areas or hot and arid areas or slope areas or mountains that are, in most of the papers, at the core of this book. Here 'overshoot' often caused permanent damages, reducing the opportunities for future generations to produce at the same level, in other words, they permanently reduced the carrying capacity of an area or parts of it. The environmental disasters here were often dramatic, as in the Alentejo, in the south of Portugal, where over-intensive use of fragile, thin soils especially around the mid-twentieth century resulted in erosion and the carrying away of soils, leaving bare, infertile rock (Santos & Roxo, this volume). In extreme circumstances disasters could happen, people could be killed, and capital goods were destroyed (see many studies for Switzerland, e.g.: Pfister, 1999). The long term consequences are and were often even much more negative, as slopes could collapse, upper soils could be flushed away by inundations and storm surges or by extreme erosion. This damage was usually permanent, so it greatly reduced the fertility and carrying capacity of these areas fundamentally, and put severe pressure on the long term sustainability of land use in these areas.

There is more. Environmental changes of these rough or unfavourable areas often had, much more than in less harsh environments, an influence on other, neighbouring environments. These side-effects of increasing environmental 'external costs' were sometimes foreseen by a well organized society, but sometimes they were due to slow natural phenomena that were triggered unwittingly. For instance, it is argued that the rise of malaria in the eighteenth and nineteenth centuries rendered many lowlands in southern Europe uninhabitable, pushing people to the adjacent hilly areas and causing new environmental problems there, as happened in parts of southern Italy, Greece and Anatolia (Mc Neill, 1992: 350). Similar indirect effects can also be observed in coastal areas. According to natural scientists, it is likely that the medieval embankments with dikes built by the people living near the western arm of the Scheldt river in the Netherlands were indirectly co-responsible for higher tides and more inundations, causing a huge amount of permanently lost villages and fields in the later Middle Ages, which in the longer term reduced the extensive margins of cultivation

(see also Soens, this volume). This was caused by the fact that the ‘accommodation space’ became more limited in the river itself. On the other hand, under certain conditions, embankments and new dikes (increasing the margins of production) could in the longer run stimulate the formation of new alluvial deposits and therefore they might also increase the ‘extensive margins of cultivation’.

In the same coastal areas of the Low Countries environmental problems were also partly the result of a slow sinking of the surface area due to peat compaction beneath the surface; which was caused by intensive drainage works that were necessary for agriculture (an overview: van Dam, 2001, Thoen et al., 2012). The decline of peat lands, which was a result of this, advanced at a pace of some 1 meter per century, and could not possibly have been foreseen by the people originally undertaking the reclamation of these lands. The destruction of coastal barriers in the Low Countries leading to massive loss of land in the Middle Ages was also partly a result of salt winning and peat winning in the adjacent areas (van Dam, 1996; Soens, this volume; van Cruyningen, this volume). Another example of permanent external costs is the deforestation of the upland regions of Europe in the late Roman era, producing floods and silting up of river arms further downstream, as in the delta of the Rhine and Meuse in the Netherlands (Janssen, 1992).

In the literature we often find analyses of the short term dramatic events in these fragile areas. However, as noted above, many studies that focus on these events provide only summary descriptions and lack discussion of the deeper and more fundamental changes that underlie the episodic changes that are more apparent at first sight. Or they tend to focus on technological solutions to ecological threats. However, this approach has recently become discredited, since several recent events show that technology and wealth in themselves are not sufficient to prepare for hazardous events, to buffer their impact or to relieve tensions between economic activities and the environment. An example is Hurricane Katrina in 2005, which was not even very powerful, but had a devastating effect when hitting New Orleans. Although the poorer parts of the city in particular were hit badly, this disaster still took place in one of the wealthiest and technologically most advanced societies in the world, which proved unable to respond adequately (Hartman & Squires, 2006). More generally, trust in technology as the prime solution has waned in recent years, since it is increasingly clear that

technological solutions can also increase risks, as demonstrated by the growing number of technological disasters, the increasing negative externalities associated with modern production processes and also by the process of technological lock-in, by which technological adaptation to new and future hazards becomes hampered and the burden is shifted to future generations.

It is becoming ever clearer that in these ecological catastrophes human action has played a large or even determining part. Human action in turn is shaped to a large extent by the context in which people operate. In part this context is of an economic and demographic nature. Ecologists and environmental historians who focus on the long term causes of ecological problems often associate them with overuse due to overpopulation. Others set this in relation to the growth of market economies (such as Mc Neill, 1992: 2-9). However, the ways in which people use the land in vulnerable areas and respond to demographic and economic opportunities and challenges were, and are in their turn to a large extent dependent on the institutional and political context. What is necessary for environmental sustainability are social rules, institutional incentives for capital investments and rules for the maintenance of necessary infrastructures (slopes in mountain areas; locks and dikes in marine areas etc.), including their enforcement through formal mechanisms or social control. These rules play a huge role in such fragile environments, probably even more so than in less harsh ones.

Within the various social agrosystems or regions, elements like population density and market integration therefore interacted with, and were shaped by, the institutional-political organization of that area. In this organization, property rights play a primordial role. Human action was not arbitrary or coincidental, but shaped and directed by property arrangements, that is, the formulation of property rights and their social distribution. This decided whether or not investments were made, what type of investments were made, what goals the rural society in question wanted to achieve, and what priorities were set. Changes in the organization of property rights, and the use various people and groups made of these, can therefore very drastically change production margins and risks in land use, notwithstanding similarities and continuities in geographical, climatologic or technical respects (an example: van Bavel, 2002) In this book, we will focus especially on the importance of the organization of property

rights to land, and of the use of these rights by individuals and groups in maintaining, or not, the ecological and economic sustainability within these fragile environments.

IV. The environment and property rights

A main element in the analyses offered by the contributions to this volume is the property rights. Research into economic and social history in recent years has put forward property rights – particularly rights to land – as a main constituent of social structure and a main determinant of the development of rural economy and society. The social organization of production processes, the use and formation of the land, the cultural landscape and the environment were to a large extent shaped and directed by property arrangements. These were a major factor in the interaction between humans and environment. In trying to uncover causes and find explanations for environmental catastrophes and changes, one primary target in research, therefore, should be the specific arrangement of property rights, and especially those pertaining to land.

Sometimes property rights to land are approached in a narrow way, that is, as the right to sell, alienate and inherit land. Moreover, property rights are sometimes considered as an absolute, exclusive right that is either in the hands of private persons or of the state. Here, however, we will use the concept of property rights in a wider sense. Property rights are understood as the bundle of rights to land, such as the right of access, the right of sale and the right of inheritance, but also the right of use and the rights of profit, the rights of exclusion, the rights of management, and even the rights of prestige. These rights can be distributed between various persons and organizations (Congost & Santos, 2010: 15-23; Ostrom, 2009: 27-29). Even in market economies, several of these rights are partially or wholly in the hands of the state, as for instance by way of the strict zoning rules in many West European countries, or they are partly controlled by associations, and they are never fully exclusive or absolute. Furthermore, this approach requires the analysis of property and property rights as a set of social relations. These rights can be defined as the social legitimacy of specific kinds of actions performed with respect to specific assets, in this case land. This approach comes closer to reality and is more relevant to understanding different historical and present contexts than the simplistic bipartite property model.

The relationship between property rights in this wide sense and environmental changes has been discussed by economists. Many of them stress the advantages offered by exclusive, private property rights. For Tietenberg, for instance, efficient property rights must be exclusive, transferable and enforceable. According to him, “an owner of a resource with a well-defined property right has a powerful incentive to use that resource efficiently because a decline in value of that resource represents a personal loss.” (Tietenberg, 2006: 59 ff.). So, what matters according to many neo-classical economists in the relation between environmental problems and economics is the degree of private property. Within the subfield of ‘institutional economics’, the nature of property rights is being examined in order to assess how an efficient balance between pollution and production can be reached. In this debate, pollution as a form of ‘externality’ receives growing interest (Ibid.: passim). According to some members of the ‘institutional economics’ school, including one of the founding fathers of New Institutional Economics, Ronald Coase (1960), well-defined private property rights could contribute to ‘internalize’ ‘external’ environmental costs. In other words, private property rights provide the incentive to pay for sustaining the environment in which the property is situated. However, this efficiency is subjective and does not take long term consequences into account (e.g. Tietenberg, 2006: 78).

Further in environmental economics, a discipline that has become important within economics during the last decades, property rights are considered of major importance for explaining the current problematic relation between economy and environment. For instance, the discussion on the role of common property versus private property of resources is receiving a lot of attention. Meanwhile, the well known ‘Tragedy of the commons’ by Garret Hardin (1968), which suggests that common property rights lead to degradation of the natural resources, is at the core of many debates. However, others have contested his theory and argued that Hardin’s argument is actually about resource degradation because of open access and the absence of regulation, not because of common property as of itself (Ostrom, 1990). In her Nobel prize-winning studies, Ostrom shows how common property regimes can actually help in enforcing a sustainable use of natural resources, if regulation is well-defined, knowledge is available and interests of users can be aligned. So, within the economists’

circles as well, discussions about the role of property rights in sustainability are clearly on the academic agenda.

The same applies to current environmental debates in the economic, social and political arenas. In these debates property rights are a hot topic. This is understandable because current environmental debates are often linked to political and governmental policy and decision making, in which property rights figure prominently. The views expressed in this debate on the environmental effects of private property rights, or property arrangements in general, are strongly opposed. Right wing thinkers and politicians would stress the favourable effects of having exclusive, absolute property rights in the hands of individuals. This view is expressed, for instance, by the former candidate for the U.S. presidency, Ron Paul, a radical Republican.¹ For him, the more market and freedom there is, the more private property rights there are, the more environmental sustainability there will be. To quote him: “The key to sound environmental policy is respect for private property rights. The strict enforcement of property rights corrects environmental wrongs while increasing the cost of polluting.” Some environmental groups hold similar beliefs. Often, they point the finger at Eastern Europe and the former USSR and the pollution problems which happened there, blaming these on “wrong” property rights.

Other environmental organizations, especially those with a more leftist leaning, hold the opposite view and regard private property rights as negative for the environment.² Often the massive deforestation in the tropical rain forests is given as an example. In Brazil, as in many areas of Central America and in Asian countries such as Indonesia, a government policy of granting private property rights seems to a large extent to be responsible for the ongoing deforestation of the rainforests. Poor people were, and often are, the first reclaimers of land, who cut the trees and settled in the forests, and often later have to sell the land to large cattle breeders (infra). The forests are destroyed for ever, since rainforests have the feature that they recover very little (Mannion, 1997: 239 ff), and many would hold that private property rights play a crucial part in this process.

¹ <http://www.ronpaulforcongress.com/html/environment.html>, accessed on 21 July 2008

² Compare the viewpoints of the more leftist World Rain Forest Movement with the ‘free market promoting’ viewpoints of the Australian ‘Property and Environment Research Centre’

The views expressed in the current debate on the environmental effects of private property rights, or property arrangements in general, are thus strongly opposed. A problem with these debates is that they are too politically inspired and ideologically coloured to be scientific. In a way this is comparable to the debate around 1800, in which political convictions and ideological assumptions played a bigger role than knowledge of the real effects of various property arrangements, such as with the negative views of liberal thinkers or reformers on communal property (Vivier, this volume). One of the roots of this problem is another lacuna in the current debate: the neglect of the historical dimension. Investigating historical cases and long-run developments would allow us to empirically test the effect of different arrangements. It would also allow us to assess the effects of changing external or semi-external forces, such as growing market demand, increasing population pressure or a changing composition of the economy. Instead of speculating, we should be able to compare, to analyse and to understand. Long term historical studies, therefore, could certainly contribute to this discussion.

V. The social context of property rights and how history can contribute

In view of the liveliness of the current debates, it is strange that there is so little interest in property rights among those who are studying the environment in historical perspective. The existing environmental-historical literature pays little attention to the relationship between property rights and the environment. In the recent book by one of the current icons of environmental history, J. Donald Hughes, *What is Environmental history?*, which summarizes the state of the art of the current position of environmental history (2006), there is no discussion of theories to explain environmental problems that take property as a significant variable, nor is the term property rights to be found in the index, although we find words such as “timber” and “pigs” there. Neither do we find such an entry in the interesting book by Ian Whyte, *World Without End? Environmental disaster and the Collapse of Empires* (2008).

See: <http://www.wrm.org.uy/> and <http://www.perc.org/index.php> (Both downloaded Sept. 2011)

Luckily, there are other interesting exceptions. The growth to maturity of the young discipline of environmental history seems to result in a greater interest in property rights and social factors in explaining the relations of people with their environment. It is perhaps not a coincidence that John F. Richards, who wrote the well known book *The Unending Frontier. An Environmental History of the Early Modern World* (2001a), is also the editor of a book on the subject which is titled *Land, Property and Environment* (2002). This book stresses that the relation between property rights and environment is a vital one, but also a complicated one, with no specific set of property rights being best able to protect the environment per se.

What little historical research there is on the environmental effects of property arrangements is mostly found in studies on the effects of colonization. This is probably because here changes in property arrangements are most dramatic and the effects highly apparent. In India, for example, the British colonization caused higher taxes which stimulated people to the rapid clearing of forests (Bhargava and Richards, 2002). Moreover, Richard Grove in his famous book *Green Imperialism* (1995) has shown how new property regimes in overseas colonies had huge ecological effects. On the island of St Helena in the seventeenth century, for instance, the influence of the colonists and the English East India Company, the resulting lack of clarity and the confusion between open access, existing common rights, new private property rights and semi-public rights, in combination with the extension of privately owned plantations, led to deforestation and an ecological disaster (Grove, 1995: 95-125).

The same diverse effects of different property regimes can also be found in Europe, although changes there were often slower and took several centuries to evolve. Environmental history delivers proof that forest clearances in Europe were stimulated already in the Middle Ages by strengthening the property rights of the peasants, just as it happens today in the rainforests. Indeed, low, even nominal customary rents were often used by large landowners, lords and princes to encourage reclamation and deforestation in the classic and later Middle Ages. So, the strengthening of property rights or more exclusive property rights in the hands of peasants here were changing the human-environment relationship to a large extent.

In some areas this triggered in the long term an opposite evolution. This was true in coastal Flanders, the Holland peat areas and later the north of Germany in the twelfth and thirteenth centuries. Here, from the high Middle Ages, people were pushed to colonize and reclaim the land via the allocation of property rights in exchange for low nominal rents (Van der Linden, 1956). However, as mentioned above, in these areas the reclamation process caused a huge environmental change, if not an environmental disaster. Because the reduction of accommodation space in the tidal canals made storm surges more dangerous, and because the peat area was sinking as a result of overdrainage, the construction of protective dikes against the sea became necessary and still much land was lost to the sea. In other coastal areas over-exploitation by peat digging resulted in the formation of huge, inland lakes.

In their turn, these ecological changes affected the prevailing property rights system again. The property rights of peasants were undermined now due to the increased environmental stress, the growing incidence of floods and the even higher water management costs. Smallholder peasants lost their property rights, or had to sell their property to larger landowners and farmers, and leasing systems became common. This form of undermining of peasant property rights again had profound environmental consequences. Because environmental sustainability was now the responsibility of non-residential large landowners who were more interested in short term gains, the environment was once more badly dealt with, since dikes and locks and water systems were not maintained well enough, resulting in frequent storm surges and land losses (Soens, this volume). This shows the ongoing interaction between ecological sustainability and property rights. It also shows that we cannot generalize or assume effects of the nature of property rights by itself. These effects can diverge. In early modern Holland and Zeeland, for instance, the system of private property rights to land offered entrepreneurs and investors a powerful incentive to reclaim land and force back the water (van Cruyningen, this volume). Here fairly exclusive property rights in private hands strengthened sustainability, which shows that there is more in the equation than the formulation of property rights alone.

In fact, parallels can be drawn with recent and even current developments in the tropical rainforests in the Americas and in Asia. There, cutting the woods was often initially encouraged by giving private property rights to peasant smallholders striving to

improve their position. They got plots of land to survive and often they obtained full property rights over that newly-reclaimed land. However, due to the specific structure of the soils of these old woodlands – only a very thin cultivable layer on top – in many cases the productivity of the land went down after a few years so that the peasants had to sell their lands to larger landowners, who changed the land use to extensive cattle ranching. Their large cattle ranches use the cattle for meat production, which is exported to international markets (Lutz, 1989: 312). The environmental degradation here started under the peasant smallholders, but continued when property rights were held by a new class of large landowners who did, and still do not care about this evolution (see e.g. Myers and Tucker, 1987; Lutz, 1989).

Many more historical examples are available of different outcomes with similar kinds of property rights arrangements. In order to understand such different outcomes, it is important to analyze who or which social groups of the society possessed these rights. Yet another example of this can be given for seventeenth and eighteenth century Provence in France. Here the privatization of the commons due to huge debts of the local communities caused an intensive activity of land reclamation in the commons, not taking care of the environmental sustainability of the reclaimed land (Pichard, 2001). It is clear that we cannot generalize. Undermining private property rights can have a negative effect on the environment, but strengthening these rights can do so as well. In the conclusion of his book *The unending Frontier*, John Richards underlines this when discussing property rights in the early modern period. Clear property rights can provide security for land managers by giving them and their heirs some assurance of return on their labour and investment and thus lead to sustainable land use, or these rights in a buoyant economy can be saleable at ever rising prices, leading to speculation, to the detriment of sustainability (Richards, 2001a: 621). As we will underline below, we have to look not only at the nature of the property rights themselves, but also and perhaps even more closely at the objectives and the economic strategies of those who hold these rights.

Thus, as stated, a simple interpretation of property rights by themselves cannot provide a full explanation of the outcome. Even though they form a main constituent, their effects can be understood only when placed in the wider context in which these rights are used and function. One of the aspects of this context is the economic one, for

instance whether or not developments take place in an upward cycle with rising profits. Another aspect is political organization, for instance the extent to which the central government exercises an influence on the use of these property rights, that is, holds a share of these rights.

The main aspect, however, is arguably the social context. The historical evidence demonstrates that property rights are in a constant flux and, more importantly perhaps, that their effect depends on the context in which they are used. In investigating their effects, property rights must be seen in the context of social structures. What persons or groups held the property rights in question? Who was using the rights and to what ends? What was their relative power in the existing social structure? Where was the decision making process located? This is the reason why social context forms a crucial aspect in the present volume. There is a constant shifting balance of power among those holding parts of the bundle of property rights (sale, usage, etc.), states and public authorities, various interest groups and communities, while interest groups affected by the externalities of the use of property rights also often exerted some influence, or tried to. The resulting power balance among competing actors decided the effects of the use of property rights. If one or two of these players take control over others, and are able to promote their private, short-run interests over general, long-run interests, the over-exploitation of resources can be or may have been the result.

This approach is not fully embedded in historical research yet. Although discussions on the importance of property rights have influenced economic history in recent years, the role of the social context of the arrangement of property rights is often neglected. This even despite the fact that, at a more general level, we have become increasingly aware that it also mattered who held these rights and to what end they used them. In this respect, social history can offer a valuable pendant to Institutional Economics. In the resulting analysis it could be investigated how specific arrangements of property rights – particularly rights to land – were directly linked to, and formed a main constituent of, social structure and whether and how, in turn, these social arrangements (rather than simply formal property rights regimes) formed a main determinant of the development of rural economy and society.

There is one strand of research where this interaction between property regimes, social context and sustainable outcomes, or lack thereof, is intensively discussed, however, and this is within the research into common property resources. Hardin's *The tragedy of the commons* is clearly taken into account in historical research, but more dominant in recent years became models such as those promoted by Ostrom's *Common pool resources*. Ostrom clearly calls for taking the overall social context of the commons into account (Ostrom, 1990). Still, the historians of the commons have their own networks, often linked to the sociological networks, and not have the needed impact on the historical discipline yet. Until recently, many studies of the commons which use these models or ideas have neglected history and have failed to take sufficient account of the changes in property rights and social contexts of the commons. Furthermore, most of the focus is on present use of forms of commons, including water, air or the internet. Attempts to analyse or compare commons in a historical perspective are far scarcer (examples: De Moor, 2002; Demélas & Vivier 2003). Moreover, even if these studies take the changing political and ideological context into account, or even put the emphasis on these changes and their effects on common property (see: Vivier, 1998; Serrano, 2005), there is often less attention to the effects of the changing common property regimes on the sustainability of land use. Linking up socio-political context, differences in property regimes and sustainability outcomes (an early example: Van Zanden, 1999), would be the next step in research. In the present volume, the long-run development of commons is dealt with in several chapters (Winchester; Vivier; Santos & Roxo, all in this volume), and these authors clearly do take the wider social and political context, the changes in this context and the effects on sustainability, into account.

The social component is vital, in order to better understand the formation of functioning of these institutional arrangements, as most notably property regimes. Institutions are perhaps in part formed in response to economic or ecological challenges, but they are also formed by social bargaining, and dictated by the interests of social groups and persons (Ogilvie, 2007) and their relative bargaining strengths and power resources. This means that they are not necessarily optimally efficient in a general way, but rather only for particular groups within society. This idea has been elaborated and tested recently, using the medieval history of the Low Countries for a long-run analysis (van Bavel, 2010). The evidence presented there suggests that

institutional innovation, and the emergence of a favourable institutional framework geared towards the general interest, is found in situations where a balance between social groups exists, and closed off when this balance is lost. In the latter case, dominant groups in society tend to shape or freeze institutions to continue serving their particular interests, even if this conflicts with more general or long-term interests or leads to economic decline or to increased vulnerability. In societies characterized by high inequality in particular the opportunities for the poorer segments to influence institutional arrangements will be slighter, and shocks will hit these segments relatively hard. Even minor shocks can push these vulnerable groups over the edge (Blaikie et al., 1997: 46-61).

These authors show how the relevant institutions, and their outcomes, are shaped by disparities in political power and property. This argument is stressed even more persuasively by Ted Steinberg in his *Acts of God* (Steinberg, 2000), where he forcefully – and polemically – argues that natural disasters in American history not only hit the poorer segments of the population disproportionately, but also were far more destructive than would have been necessary, as a result of institutions and decision-making skewed to the interests of the wealthy. These examples all show that, in order to increase our knowledge, we have to contextualize and “historicize” the relation between people, institutions and environment.

VI. The contribution of this volume

Research on the problems we have raised so far can be undertaken at different geographical levels. The studies on the ecological effects of new property regimes introduced by colonial powers in overseas areas show that one can investigate this relation even in a world history context. This rather new field, which is even younger than environmental history, has clearly incorporated this topic, as shown by the early, path-breaking studies by Grove (1995), Mc Neil (1992) and Richards (2001). One can also investigate this relationship in broad, almost polemical sweeps, as done by Steinberg (2000). In order to understand more precisely the causality paths and underlying mechanisms, however, we also need to investigate how this relationship worked at a more detailed level. An important task for the future is, therefore, the

investigation of the historical relationship between humans and the environment by way of regional or even local case studies. Placing this relationship in the context of their local or regional social agro-system, and using comparison as an analytical tool, will especially enhance our knowledge. A main focus in doing this, as argued above, should be the way in which this relationship was framed by the property arrangements, which in their turn should be interpreted as a part of the wider context of social relations.

Only in this way can history inform the current environmental discussions about the relation between humans, and nature and between environment and property rights in particular. There are few studies that work along these lines, such as the case study on the Catalan hills in the second half of the nineteenth century, which highlights the interaction between ecological vulnerability, property rights and the social context (Garrabou et al., 2010). Only through the formulation of property rights, tenancy regimes and marketing links, as the authors argue, can the land-use and environmental developments in this area be understood. Unfortunately, local-regional studies of this kind have been rare so far.

The present volume aims to investigate this relationship between people, social context, property rights and the sustainability of land use in several cases, all dealing with long-run developments. We focus here on a particular aspect of sustainability, namely that of rural production systems, and particularly their ecological component. Were societies able to continue to sustain their production systems or to adapt these systems within the ‘natural’ boundaries of production? Did this cause a change in production margins in a positive or in a negative way, via depletion of natural resources in the long run?

The authors are careful not to project current values to the past. Was deforestation in the Middle Ages, for instance, seen by contemporaries as negative? Most people in the Middle Ages certainly did not see deforestation as always negative – only when it threatened common interest or survival, or the wishes of certain interest groups, as in the protection of hunting rights for the king or nobility. Apart from that, deforestation was probably seen as a sign of progress and increasing use of the agrarian potential. Conversely, the giving up of agriculture in the *garrigues* of the Languedoc created room for a beautiful landscape, but it was accompanied by the loss of a

particular rural society and land-use in the region (Olivier, this volume). In these cases it cannot objectively be ascertained whether changes in land use or landscape were positive or negative, because this ultimately hinges on alternative ends. We can, however, in many cases show that there was concern for the future and with “sustainable development”, in the sense that natural resources must not be overexploited for economic reasons (see the huge criticism towards Hardin’s axiom on the commons; see Santos & Roxo; Vivier; Winchester; Morell, all in this volume). In other cases, actors were rather too optimistic and they overestimated the fertility and resilience of the soils, and changed the property regimes in order to allow for more intensive use, as it happened with the privatization of property rights in the early-twentieth century Alentejo (Santos & Roxo, this volume). This optimism proved wrong, with disastrous results for the soil fertility and sustainability of agriculture there.

This volume approaches the issues mentioned hereby investigating the interaction of property rights to land and environmental development. It investigates this interaction in a dual way, in both cases with a clear emphasis on the social component. Firstly, how did and how does the environment, and the way it is socially perceived, influence the organization and distribution of these property rights to land and their social management (see e.g. the chapter by Peder Dam)? Secondly, and more prominently in the volume, the authors investigate how the specific organization of these rights, i.e. their formulation and their social management, affected the environment, both in positive and negative ways. Most papers highlight other factors also, as relevant to the specific outcome. The paper by Mats Morell does not argue that changed property rights in Sweden were the ‘prime mover’ for change in the production margins, but does show that changed property rights under the influence of new market conditions clearly stimulated the further development of agriculture. Others, like Sylvain Olivier, would stress more the influence of population developments, but see this influence take shape in interaction with property regimes. Angus Winchester, in his long-run view of common property regimes in England, looks instead at the interplay of these property rights with local governance and cultural values, and places weight on informal institutions, including tradition and common sense.

All the authors, therefore, investigate the role of property rights and the importance of the social context, but apart from the social distribution of these rights as

a main element, they also emphasize other aspects of this social context, including political power, influence, norms and traditions, and beliefs held by the various segments of society. Furthermore, they show that this constellation of property rights and social context is effective only under specific external forces – the development of markets, economic trends, technological change or population movements, although the latter are in part also endogenous developments. One could say that the relationship between people and environment is determined by the way the prism of the property rights within their social context directs these external forces, with positive or negative effects.

We have investigated this particularly for the marginal areas of Northwestern, Southern and Central Europe. These are vulnerable areas, including coastal areas, river swamps, cold areas or hot and arid areas. The case studies therefore deal with the extreme margin, where the effect of social property arrangements on sustainability can be observed most clearly. The authors investigate how people, in their specific social organization, tried to cope with this fragility. They dealt with the problem how the specific organization of property rights to land, and the use of these rights by individuals and groups made it possible or not to sustain the use of this land ecologically and economically. This is a slow process, since both the ecological changes and challenges, and the institutional changes and effects, generally unfold only over a long period. In order to observe, analyse and explain the interaction between ecology and institutions, therefore, the long-term perspective is necessary. Short-term analysis leads to description and a focus on events, overlooking the deeper and more fundamental changes that underlie the episodic changes that are more apparent at first sight. Using a long-term perspective allows us to correct the unjustified focus on catastrophes and the neglect of much slower but more profound processes in this field. This is why most authors in this book have explicitly chosen to cover lengthy periods, sometimes of several centuries (Olivier, this volume; Dam, this volume) or even more than half a millennium (Winchester, this volume).

Perhaps it is too early to draw any firm conclusions from the material in this volume. Still, a preliminary survey shows that no single way of formulating property rights in itself guarantees sustainability: neither state rights, nor private rights exchanged via the market or common rights are favourable per se. Their long-term

effects depend on the exact formulation and the social context of the application and use of these rights, and the balances achieved between the various groups and interests/goals involved, including groups affected by the externalities of the use of these property rights. External effects, from outside the area itself, often had negative consequences. External effects are most difficult to control and the incentive to reduce externalities is small. Moreover, in cases where the formulation and use of property rights in an area is ruled by factors originating outside this area, because of external political considerations or the fact that landowners do not live within the area itself, negative effects often prevail. A balance of interests embedded within the area itself perhaps forms the best guarantee for ecological sustainability, to a greater extent than whether private, common or state property rights prevail.

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