Environmental histories: the long-term interaction of society and nature in three Austrian villages

Project Group Environmental History[1]

Umweltgeschichte – Eine Langzeitbetrachtung von Gesellschaft und Natur in drei österreichischen Dörfern

1. Introduction

1.1 Framing the problem

Both nature and man have a history. These histories have long been told separately, within the realm of different disciplines. But nature and man actually have a history in common. The spheres of human society and natural systems, such as landscapes, are intertwined in a process of long-term interaction (WINIWARTER, 1998; MORAN et al., 1986). Neither does man shape the universe nor is man entirely shaped by the universe. Both seem to have a high degree of freedom within their entities. The interactions, however, are manifold and important for both human and natural development in the future. Asking the question of "sustainable development" in the context of landscape evolution over time can offer fresh perspectives, even if the idea of sustainable development might have its shortcomings. In effect, one ask, if societies can learn from the past to shape a better future. Societies, as it were, cannot learn, but actors in a society as individuals can definitely learn (FISCHER-KOWALSKI and WEISZ, 1998). Therefore telling the story of man's shared past with the environment has something to offer for the "sustainable development"-discussion. The present can-

Zusammenfassung

Die gemeinsame Geschichte von Landschaft und Gesellschaft wurde am Beispiel dreier österreichischer Dörfer über einen langen Zeitraum untersucht, von der mittelalterlichen Rodung bis zur Gegenwart. Theoretische Überlegungen zum gesellschaftlichen Stoffwechsel und zur Kolonisierung von Natur bildeten den gemeinsamen Ausgangspunkt. Die interdisziplinäre Untersuchung basierte auf einem dreigeteilten Modell der Wechselwirkungen zwischen Produktion, Population und Agrarökosystem, d. h. der Landschaft. Aus der breiten Palette an Ergebnissen werden die mittelalterliche Rodung, die Steuerregelungen des 19. Jahrhunderts und der demographische Übergang auf lokalem Niveau herausgegriffen und kurz vorgestellt. Die Relevanz der Untersuchungen für nachhaltige Regionalentwicklung wird diskutiert.

Schlagworte: Umweltgeschichte, Landschaftsentwicklung, nachhaltige Regionalentwicklung, mittelalterliche Landnutzung, interdisziplinäre Forschung.

Summary

The environmental histories of three Austrian villages were investigated over an extended time period, from the medieval land clearing to the present. Theoretical considerations on social metabolism and colonization of nature were used as a common starting point. The interdisciplinary investigation was based on a threepartite model of the interaction of population, production system and the local agro-ecological system. From the broad range of results, the medieval land clearance, land taxes in the 19th century and the demographic transition on the local level are presented briefly. The relevance for regional sustainable development is discussed.

Key words: Environmental History, Landscape Development, Sustainability, Medieval Land Use, Interdisciplinary Research.

not be understood without an understanding of the past, nor can the future be anticipated without an understanding of the present. We need to be aware of the past to actively shape the future.

The investigation of historical development of interactions between society and nature reported below was situated on the material level. Other levels would have been possible for such a historical study: political institutions and their interplay or the level of ideology, perception or images of landscapes, the realms of more traditional historical investigations. Choosing material interactions as study focus sets our research in the broader context of Environmental History or Environmental Anthropology. The project was carried out in close co-operation of three disciplines in a team of nine researchers.

1.2 Historical development of interactions between society and nature

Within the project "Historical development of interactions between society and nature" we tested the hypothesis that different natural surroundings bring forth different means of social organization of the agricultural production and these in turn shape landscapes that are distinctively different (For details on the project, see PROJEKTGRUPPE UMWELTGESCHICHTE, 2000). Their properties are described and analyzed for questions of long-term change and stability, for reactions to environmental and social challenges and for their general economic and ecological viability.

Three sample areas representing a wide variety of natural surroundings were chosen for the study (Location given in Fig. 1). An alpine valley, a granitic plateau and the hilly countryside along a tributary of the river Danube were the areas under investigation. The villages under investigation were Großarl, Voitsau and Theyern, respectively. An overview of natural conditions is given in Table 1.

By analyzing the complex interaction of population, production and landscape in these villages over time we tried to understand the differences in evolving patterns as well as their similarities. We focused on pre-industrial times, our main analysis was done in early modern Austria, the early decades of the 19th century were our starting point, from which we moved backwards in time.

1.3 Methods

Present day vegetation cover, aerial photography and maps dating from the 18th century onwards are used to gather as many data for landscape development as possible. To connect old and new maps we used the first accurate map ever made in Austria, the cadastral maps of the 1820ies as a starting point. A geographic information system (GIS: ARC/INFO) was used for conjectures.

For societal development tax and fee data on the level of single households are available enabling a connection to be made with landscape data on the plot level. Economic sources and normative ones (laws and other regulations) were used to gather material on the production system, its evolution over time and the interventions that were made to improve the economic benefits exacted from the landscape. To improve benefits in this context does not necessarily mean to increase or maximize yield. It can just as well mean decreasing risk (SIEFERLE and MÜLLER-HEROLD, 1996).

The human population cultivating and shaping the land is the main mediator between landscape and society. One needs to know how many people of which age and gender were present, how the population in general and how their social structure developed over time. Phases of changing population size have to be analyzed for cause-effect relations with changes in the village ecosystems or changes in the political realm of the production system. Parish registers are used to gather data about the population.

These studies are situated on the micro-level of the village. Such questions cannot be confined to the village level.

Table 1: Conditions in the study areas
Tabelle 1: Naturräumliche Bedingungen und dominante Landnutzung in den Untersuchungsgebieten

Location	Height (m.a.s.l.)	Characteristics	Geology	Land-Use
Großarl	1300–2000	Postglacial u-shaped valleys, Alpine climate	Phyllitic rock	Animal husbandry, Alpine Pasture
Voitsau	600–800	Hilly plateau, Middle-European climate	Granite, Gneiss	Cereal production
Theyern	300–350	Subalpine lowland, moderate Alpine climate	Conglomerate, Loess Cover	Cereal production, mixed farming

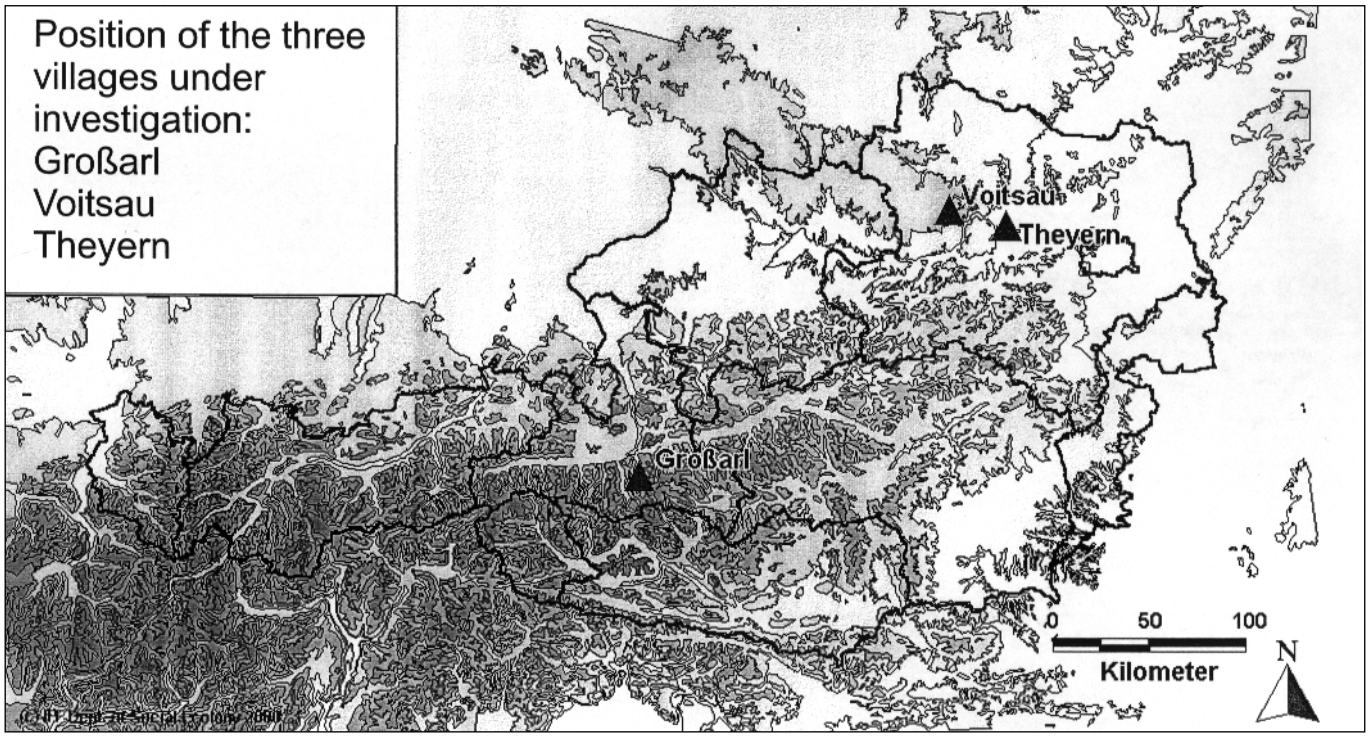

Figure 1: Physical Map of present day Austria
Abbildung 1: Physische Karte des heutigen Österreich

A further understanding of the development patterns also on the meso-level, at least on the regional level, which has gained so much importance as target area for planning processes over the last years, is sought by comparison of the three study areas.

To do village studies covering the entire Austrian territory is not only impracticable but merely impossible, as archival material is only seldom available in the quality and density needed to foster micro-level understanding. If one can develop a concept of indicators for the historical development of regions one could broaden the understanding even if archival sources are unavailable. Theoretical considerations about the feasibility and needed quality assurance for the use of indicators form an important part of efforts to that end.

2. Theoretical considerations

2.1 Culture – Society – Nature

"Cultural Landscapes" (this term was used in the title of the entire research program) tend to be an elusive subject for research: What does "landscape", what does "culture" actually mean? In our historical approach we did neither question nor use the term "landscape" other than to describe the general surroundings of our study areas. Whereas we are aware of the discussion of this term within and beyond geography (see for a potentially useful use of the term e.g. OLWIG, 1996) we decided to define "cultural landscapes" as the product of the interaction of society and nature.

Among others, Rolf Peter SIEFERLE (1997) has suggested to define culture as follows: Cultures are symbolic systems with an immaterial internal logic. This highly abstract definition enables us to subsume e.g. language, buildings, law, tools, customs and artwork of all kinds, given that their development follows rules devised within the cultural realm and only applicable there. There is no direct connection between culture and nature. But cultures cannot exist without a material substrate or carrier for their symbolic systems. The carriers for the symbolic systems are human beings, and it is their sustenance by means of natural processes that is a limitation for cultural symbolism. The symbols always need a material carrier, who needs to eat and drink, find shelter and be able to reproduce. This very short statement is not to deny the abundant literature on the terminology of culture. For a system's level approach as suggested here it seems sufficient, however. Cultural

landscapes are a product of the interaction between symbolic and material systems. Societies and nature interact. The theoretical concepts have been laid out in detail by FISCHER-KOWALSKI and WEISZ (1998).

Society is a difficult term just as well. What is a society? We use a definition suggested by FISCHER-KOWALSKI and HABERL (1997): Societies are a combination of the symbolic culture and its material carriers. The most important material part of society therefore is the population itself, plus domesticated animals and artefacts such as buildings. Hence, cultural landscapes can be viewed as a platform for the interaction of societies and nature. They are at the same time the result of such interactions. When talking so much about culture, it seems necessary to define "nature" (as opposed to culture) to understand the material interactions. It surely sounds audacious, but if one can confine himself to a vantage point from within society it is not necessary to define "nature". Because from inside society the distinction can easily be made: Anything which does not belong to society is nature by definition. There are clearly problems involved in this, as one has to define what makes a phenomenon "belong to culture" but e.g. property rights can serve as a fairly good indicator for the distinction. Human beings are part of culture as well as of nature – therefore to our view human exemptionalism is not a useful concept. Declaring humans as being – by virtue of their cultural capacities – to some degree exempt of the laws of nature is a commonly encountered but misleading view (HERRMANN, 1996). Whereas humans are fundamentally different from other parts of nature, they are nevertheless part of it, and natural (also biological) laws do apply to them. The distinction made between nature and culture is not a spatial differentiation but an analytical distinction made under functional criteria. This very short theoretical introduction can only suffice to convey the principal idea. The model of society-nature interactions as being mediated by human beings was the basic concept applied in historical, demographic and vegetation ecology parts of the study. It served as a springboard for discussion and as a main means for the development of the village level interaction model presented below.

2.2 Metabolism and Colonization as two ways of interaction

For the historical investigation we used two important derivatives from the culture-population-nature interaction concept outlined above:

1. Societies do have a metabolism just like organisms. They have an intake of materials (air, water, gravel, ores and mineral oil to name but a few), they process these materials, change them into material components of society (e.g. as buildings) and dismiss of the resulting useless remains by putting them back to nature as emissions and wastes.
2. Societies have a second way of interacting with nature: They purposefully undertake interventions into nature, these have been termed "colonizing interventions into natural systems". Such actions are undertaken in order to change natural systems into a state more useful for society than the natural one. Agriculture is the prototype of all such colonizing interventions. Natural systems usually will not stay in the changed status unless continuous labor input keeps them in this altered, colonized way. If societies colonize nature, the result is labor.

One has to bear in mind that the development of cultural landscapes is based on material interactions and thus is based on societal metabolism and colonization as the two forms of interaction. Building and agriculture are two prominent examples.

2.3 From theory to practical application

The level of material interactions, the level of agricultural cultivation was chosen as the level of analysis. For the three villages, interaction on this level is mainly through cultivation or agricultural production in general. The interactions are supported by a symbolic system that produces the rules for interaction such as agricultural theory or folklore. On the other hand, feedback loops between the natural and the cultural system connect the two. Nutritional status and thus health of the population is one of these feedback loops. Concentrating on the level of agricultural interaction still leaves many possibilities for investigation. The single homestead, the smallest independent economic unit of the agricultural society was chosen as main point of reference. As many data as possible were organized such as to make the single unit the main unit of analysis. The level one step larger that can be reached when starting bottom up from the single farmstead is the level of the village. All interactions between the three main subsystems population – production – and agro-ecosystem which are identified in the model on the village level are shown in figure 2.

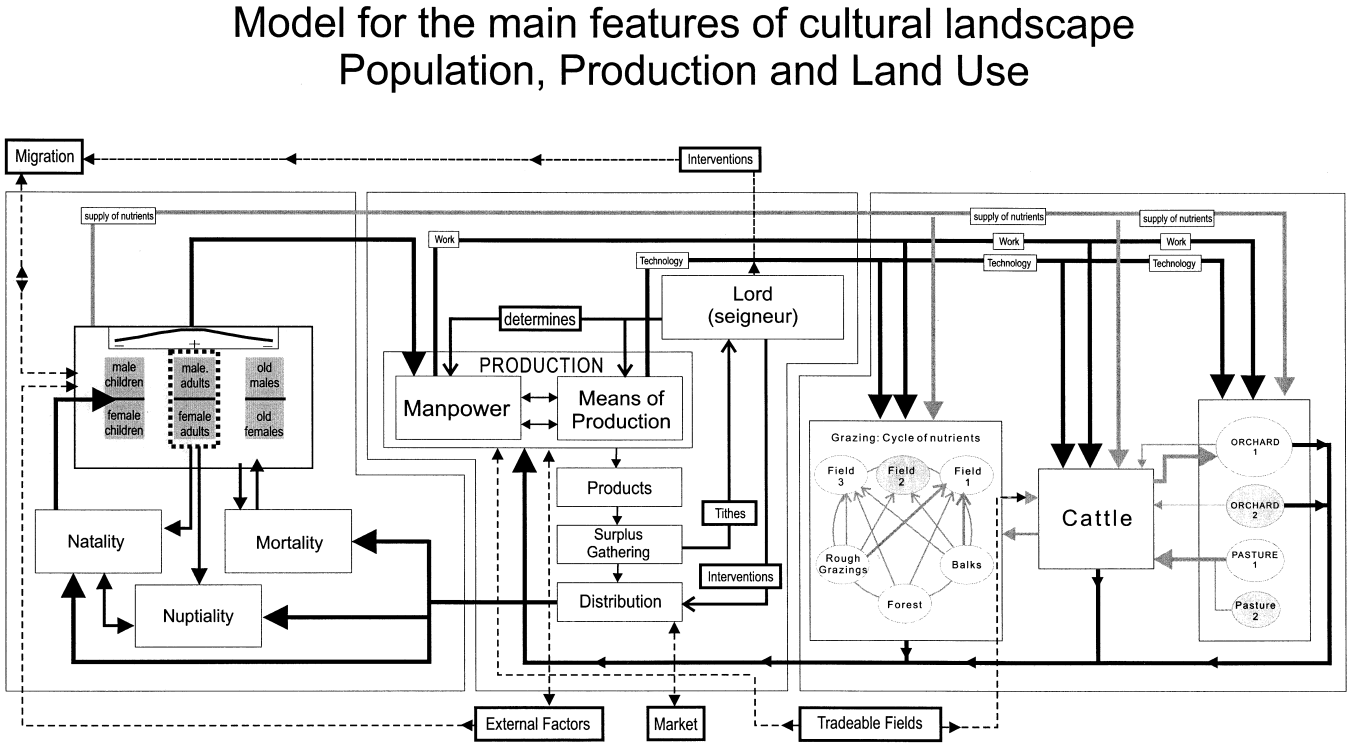

Figure 2: Systematic model of interactions
Abbildung 2: Systemisches Interaktionsmodell

The tripartite model given in Figure 2 renders the integration of the three subsystems (Population, Production and Agro-ecosystem) clearly visible. It depicts an ideal type, applies to all three study areas and is not used to make historical developments visible. In contrast to a wide range of existing model-like graphic representations the model uses only well defined interactions: Human labor, draught power (animals), use of products by human beings, internal flows of the agro-ecosystem (such as hay, litter, stubble, fodder etc.) nutrient transfers and seigneurial interventions. The agricultural production system is central to our research and is depicted also in the center of the model, with the main emphasis on the institutional structure of land-use. Under pre-industrial conditions in central Europe the seigneurial influence on the means of production is the greatest single determining factor of the production system. The local agricultural production with its intensity as to workload and its demand for human labor is highly dependent on the internal structure of the population and its development. Feudal lords could regulate marriages and migration and thus actively tried to influence the production system and the consumption. Both population and the demands of the seigneurie influenced the natural processes on which agriculture rested. The agro-ecosystem is depicted by means of showing the nutrient cycles and flows in this part of the model.

The model serves as a guideline for research. Nevertheless, the guideline on its own is not sufficient for the development of a research strategy. If models to describe interactions of society and nature are solely theoretical they cannot yield answers for concrete places and spaces with their – enormously different – respective development patterns. Information about specific places, e.g. an alpine valley or a plateau formed of granite rock is necessary as a toolkit for decisions about future developments. Natural sciences in particular need such "grounded data". The prime interest therefore was on data with a connection to the village, to a distinct part of its surroundings, if possible even to a single field. Therefore we proceeded to first look for cartographic material. The oldest maps that can be used after digitizing and geographical truthing date back to the 19th century. The maps were produced in a mammoth project covering the area of the Habsburg empire between 1820 and 1840. They were produced as a basis for land taxation.

With a fair amount of patience one can work his or her way back through maps and cadastral evaluation registers

("Katatsteroperate"), which contain information on ownership and collected fees for each homestead and get back to medieval sources, the so-called "Urbare". They are ownership registers. In our case they date back to the early 14th century. In addition to fee data the registers sometimes contain additional information. This information is not suitable for the production of maps for land-use in the 14th century, but one can find information about the place of orchards and vineyards and about the kind of grain sown in the villages. Thus, one can get a picture of the overall layout of medieval agriculture in the respective regions. The data are even useful for an, if rudimentary, vegetation ecology analysis.

2.5 Homestead and village as focal points

The project consisted of three micro-studies in three villages. The homestead was used as the prime key to connect most of the collected data via relational databases. This enabled the investigation of the systematic relationships between population and production. Cluster analysis was used to analyze the systematic relations. We used hierarchical cluster analysis applying the centroid method with squared Euclidian distance. Geographical Information Systems (GIS: ARC/INFO) and relational databases were the most important technical aids. Despite all these technical tools one has always to view sources within the context of their original aims. Feudal administrators wrote down what was interesting to them, not what one would like to know today. The tax surveyors did the same, and so did the clergymen who wrote the parish registers. This has to be borne in mind. It is mainly landowners interests, and not the peasants' that are reflected in the archival collections.

3. Towards a common history of landscape and people: Points of departure for further study

3.1 Genesis of a Cultural Landscape

A cultural landscape in the making was found in one of the study regions, called "GRIE" in which the village of Voitsau is situated. There one can move back in time to the medieval clearing period, in which predominantly primeval landscapes were incorporated into agricultural society on an unprecedented scale. One can follow the battle for power between the feudal lords interested in the particular region. New clearings such as the one investigated made for high hopes but on the other hand called for large investments. The monastery of Goettweig and the margrave of Austria fought for the lead in this region over several decades. In the 12th century, as well as today, one needed to control the infrastructure of the administration to be able to execute power upon land. In the 12th century this infrastructure relied to a large extent on the local parish. In deciding which parish to install as a local center, Goettweig seems to have made the better decision: Their parish, a village called Kottes clearly has advantages with regard to terrain in comparison with Meisling, the parish village installed by the sovereign.

Bearing in mind the technical standards of the Middle Ages, it can be imagined that the clearing of land was a difficult and strenuous process. The resulting units are therefore relatively small. The cleared land is organized in villages and hamlets, which form a closely meshed network superimposed on the new territory. Those small settlements, although in relative vicinity, can be quite different with regard to their natural resources: They might e.g. lie on different soils and have different quality of water supply. Not all of these first stage settlements can survive as an economic unit of their own: Some have to be given up as an independent settlement and the cleared land is added as a reservoir of extensively used areas to a better faring village, furthering its resilience and profitability. Therefore we can conclude that the medieval landscape does indeed possess an internal dynamics of its own, resulting from land use rather than solely from political turmoil, catastrophes, force or other external factors, a facet that is lacking from the common perception of the Middle Ages (SONNLECHNER, 2000).

3.2 Processes of change: People and landscapes in development

The "Grie"-region can serve as an ideal case for the clearing phase and the subsequent changes in settlement pattern. Comparative studies of the clearing period in the three villages were not possible. But moving into the 17th century one can compare the three villages and see several differences: Theyern in one case suffers great damage and in the sources is called an "oede Brandstatt", meaning that it had all been burnt down and was left without peasants. Even the witty landlords seem temporarily to have lost track of the

ownership situation of the respective homesteads in Theyern. Several plots were disconnected from the homesteads and were afterwards given out under special lease, not connected to a specific place. Voitsau, in contrast, was never subject to such turbulence. The cadastral map of the 1820ies could be used almost unchanged to describe the ownership pattern for the fourteenth century. Later on, we find in Voitsau on a small, localized scale what has been discussed as a general pattern previously: The enclosure and partitioning of the commons takes place there in the 19th century and can be followed in detail. The partitioning of the so-called "Voitsau heath" is a perfect example for the mechanisms of such processes.

Landscapes are in some ways easier to tackle than people. There are almost no data about single (peasant) persons prior to the 17th century. Only then parish registers listing births, deaths and marriages were started. One of the linkage periods of our project thus started at that time: From this period onwards we could also fill the demographic part of our model (see Fig. 2) with data.

This enables to follow changes in the system, looking at the feedback loops between the three subdivided parts. Differences between villages then become apparent:

In Theyern a greater percentage of small holdings can be found in comparison with the other two villages. In conjunction with this, life expectancy on the average is lower in Theyern. The overall natural surroundings do not play a dominant role in this difference: It is rather the poor smallholders that live a shorter life. Having said that it remains open for discussion if the holding size is causally related to the natural circumstances, but this question has not been investigated.

Demographic variables, however has been given detailed attention. On the village level a relatively stable population size is a necessary prerequisite, as villages cannot grow indefinitely in their limited space. A stable population can be achieved by different means. In Großarl migration plays a more important role in stabilizing the numbers than in Theyern or even Voitsau, whose peasants must have managed to control population increase locally – or were subject to more efficient interventions by their seigneurs. As yet, this difference has not been investigated in detail.

Demographers distinguish between epidemic and subsistence crises of the population. The nutritional status is a point of reference in this respect. In addition to data on agricultural operations and the ecosystem, important information about such issues can be gathered in the so called evaluation registers ("Katasteroperate") of the cadastral mapping of the 19th century. We can shed some light on the phenomenon known as the "demographic transition": Stripped to its essentials it is the theory that societies progress from a pre-modern regime of high fertility and high mortality to a modern regime of low fertility and low mortality (NOTESTEIN, 1956; SCHMIDT, 1984; WOODS, 1986). The rather dramatic change to the better of the nutritional status of the population in the 19th century can be attributed to several factors: First, the introduction of new species such as the potato has to be mentioned. The sowing of nitrogen-fixating species on the fallow land within the three-field-rotation system helped restore nitrogen to the degraded land. In connection with feeding of animals in the stables all year round which greatly increased efficiency of manure collection the green manuring resulted in a much better management of nutrients and thus in greater yields. Purposive interventions by the feudal lords and the emerging absolutist state resulted in an increased birth rate and at the same time diminished mortality. These two factors yielded an increase in population, which is part of the demographic transition. The data for the three villages all follow the same pattern: Both birth and death rates stabilize on a much lower level after the transition period.

Cadastral evaluation registers were also the main source for an economic perspective on the agricultural regimes of the 19th century. These sources enabled a detailed description of the agricultural system with respect to fields, meadows, pastures, alpine pastures and special cultures such as orchards. This enabled a connection to the history of landscape elements, especially for hedgerows and field margins. In connection with the analysis of aerial photographs which date back to the 1950ies and a mapping of small landscape structures we can follow the development over a period of more than 200 years.

Information on this level of spatial precision cannot be extracted from the medieval land registers mentioned above. To enable a long term perspective with regard to landscape elements we used yet another type of sources, custumals (so-called "Weistümer" or "Taidinge"), which contain regulations about the environment. They lack connection with single pieces of land, but enable an overall picture, including details on path types and path maintenance, fences and interstices, which are not documented elsewhere. Some of these interstices still exist today, such as tree-rows and small wooded patches within the fields. From these sources we learn how much labor was necessary to maintain the needed infrastructure. We see how much communication and information was necessary to work jointly

as a whole village within the three-field rotation system. The custumals again point to the interaction between agricultural system, population dynamics and social organization (WINIWARTER, 1999). Due to the nature of such sources, which are normative, legal texts that do not directly reflect practices the custumals can be used rather to establish general patters of agricultural production rather than its local form.

Going back from the general to the particular place, the cadastral evaluation documents offered insights into the beginning of state agricultural policies. Estimates of land value were made according to a detailed "instruction", and normally the data collected from the peasants were used for tax assessment. The necessary labor on each parcel – the main reason for deduction of land value – was investigated via interviewing the peasants. For the better plots the estimated workload was used to calculate the "internal cultivation costs", which were then deducted from the income – and thus the taxes – of the respective parcel. For marginal land, however, the labor estimate was recorded but not used for the calculation. Taxes were assessed strictly on the basis of the "instruction". The system was aimed at the marginal plots in each land use class (fields, meadows, alps, etc.). The instruction underestimated labor, therefore the deduction from the income was low compared to real costs for marginal plots, which resulted in a relatively higher tax load on such parcels. Thus people were actively discouraged to cultivate such plots by means of imposing disproportional high taxes on them. Taxes were thus used as a regulatory principle of land-use, much as they are used nowadays.

This strategy of the 19th century might have a long term effect. The project's time frame was from the Middle Ages until present. Investigating present day land-use patterns one finds dominant process, which is often called "segregation": Whereas the use of high quality land is intensified, low quality land is no longer used, not even extensively. Aerial photography was used to detect the recent effects of land consolidation – a strategy of intensification on good land – on the amount and spatial patterns of small landscape structures. This enables researchers to analyze the ecological effects of such measures with greater accuracy than has been possible so far. Landscape elements, in particular those that persist over long time spans, have to be investigated for their relevance both in ecological and in social perspective. Persistent landscape elements are defined as those that survive a major transformation in land use patterns.

The definition of 'functional' versus 'residual' landscape elements rests on an investigation of land-use i.e. the agricultural system, and thus on a social phenomenon. To investigate the persistence of landscape elements, a major social transformation has to be studied on the local level. Emphasis in this respect is on the local level of investigation, because social transformation is usually described as a large scale far-reaching phenomenon without paying much attention to its different local causes and effects.

All the examples presented should serve to show that historical and ecological processes are closely interwoven in the landscape. Although the project was developed from a purely scientific interest, it proved to be a valuable starting point for applied questions as well. The historical dimension of processes in the landscape can be used in different contexts, and our data should be a starting point for further applications.

4. What can environmental history offer for a sustainable development of Austrian Cultural Landscapes?

Having a history means to have an identity. Village histories are often only weakly connected to the environment and ancestral research does give people a personal history at best. The story we can offer does connect people to the land and, even more important, the story is a collective one, not a personal one, therefore it offers collective environmental identity. This is valuable in times of rural crisis, such as experienced today. The landscape and its elements have their own history. It has never been researched so far as part of the history of interaction between people and their environment. Landscapes have often been solely a part of natural history, a-historical in a social science perspective, perhaps with the sole exception of local lore for specific ("sacred", or "haunted") places. By showing that the landscape is a product of a long (hi)story between humans and their lands we create not only identity, but a sense of value. If our knowledge is applied locally, things should, however subtle, change in the three villages under investigation, they could change for the better, as we believe.

History offers additional forms of experience and experiment. Our research opens the possibility to look for patterns of interaction not just on a theoretical level but at a specific place and time. This can teach a lesson about the consequences of human action versus the land. Experiences cannot be told, and history cannot teach a lesson for those who try to use it like a computer manual. But the history of agriculture prior to the advent of mineral fertilizer and

diesel engines is a look back into a sustainable future. The lesson taught is simple, but important: Our relationship to nature does influence social relations. This lesson can be brought to people in a very practical and concrete way by means of the experimental station of human creativity, i.e. history.

Finally, let us consider the landscape, focussing for once not on the interactions but on one of the entities involved. Protection of landscapes involves decision making. Today this kind of decision making is mainly informed by ecological reasoning. Understanding the locally distinct and unique patterns of land-use history leads to the incorporation of historical reasoning in such decision processes. Asking questions about the "natural" subsequently changes into asking questions about the co-evolution of nature and culture, which is to be seen in the landscape that evolved from the local set of parameters.

Much of what has been said points to the value of differences. This point finally is stressed again: Environmental histories, land-use histories are as unique as people or scenery. It is important to incorporate such histories into our symbolic, cultural inventory, because, as was mentioned in the very beginning of this short report, the rules for the game with nature are defined within culture. By giving present day Austrian culture localized land-use histories we foster a sustainable future for Austria's cultural landscapes.

Note

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