

Mechanisms in recent landscape transformation

M. Antrop & V. Van Eetvelde

Department of Geography, Ghent University, Belgium

Abstract

Change is an essential property of landscape. The continuous interaction between natural processes and human activities defines different landscape dynamics. The general driving forces are well known, as well as the general trends of contemporary landscape transformation. Increased demand on mobility, industrialisation and urbanisation are related and processes that are mainly driven by global economical forces. They cause a polarisation of geographical space in more intensively used core areas and vast areas of marginalisation and even land abandonment. Landscape changes accordingly. However, at the local level the response to these forces can be very different. Based on detailed case studies in different rural areas in Europe, mechanisms of transformation could be recognised. They relate to functional changes in the land use, mainly caused by actors who possess the spatial competence, i.e. the landowners, and rarely planned, gradually and stepwise causing a structural transformation of the landscape. Examples of changing farming practices and residential housing are discussed briefly.

Keywords: landscape change, processes, sustainability, local scale.

1 Introduction

This paper describes some actual processes that change landscapes at the local scale. Change is considered as an essential property of landscape dynamics. This is also a basic element in the definition of landscape in the European Landscape Convention by the Council of Europe [1].

“‘Landscape’ means an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors” (Chapter I, article 1).



The continuous interaction is expressed in changing landscape structure and spatial patterns caused by a wide variety of processes. The interaction between spatial structure and processes forms one of the basic paradigms of landscape ecology as formulated by Forman and Godron [2]. Many landscape ecological studies focus upon the relationship between spatial patterns and processes of flows of nutrients, matter and energy using landscape metrics as a tool to describe and quantify these changes. However, landscapes metrics are difficult to relate to processes and mechanisms that cause the changing patterns [3–5].

For landscapes in the Western world, environmental changes increased in speed and magnitude since the revolutions age, in particular since the 18th and 19th century [6]. Landscape transformations are the expression of increasingly complex processes in our environment and society. These changes became seen as a threat as expressed in the first EEA-report on the assessment of Europe's environment [7]. This threat goes beyond environmental issues of quality and sustainability; it affects also existential values such as the ones expressed by diversity and identity, loss of character and heritage [8, 9]. Actual changes wipe away history as it is conserved in our landscapes as a palimpsest [10, 11]. The growing interest in studying landscape changes and its historical development is the result. New concepts such as time depth, landscape path and landscape trajectory analysis emerge [12, 13].

The general trend of the actual landscape transformation is well known, at least in the Western world. It is a polarisation between more intensive use of the land in small areas of concentration and extensive use of vast areas that become marginalised [14]. Concentration of people and activities occurs in relatively small areas, often situated geographically in well accessible sites such as river estuaries and deltas. Important processes are urbanisation and industrialisation accompanied by severe fragmentation by transport infrastructure. Landscapes become embedded in urban networks and become increasingly multifunctional. Traditional qualities and practices are replaced by new ones which are highly dependent on processes of globalisation. On the other hand, vast areas become almost abandoned. Land use is marginalised, forest takes over and the landscape is rewilding [15].

Driving forces of landscape change are mobility, industrialisation, urbanisation and globalisation and these are all economically and politically driven [16]. To these the uncontrolled factor of calamities should be added. Unexpected disasters have increasingly higher impacts in the areas of concentration [17].

Nevertheless, on the local level these driving forces initiate or affect a great variety of processes of change that are not yet fully inventoried and understood. Also, different dimensions of landscape change and different competences of the actors should be understood in order to handle and manage change in policy. One process at the global scale may initiate or control different responses at the local scale, as is summarised in figure 1. We call these local responses mechanisms of landscape transformation. Only some examples studied in various landscapes will be discussed here. They are all related to the driving force of urbanisation and its impact on land use change in the countryside. Many

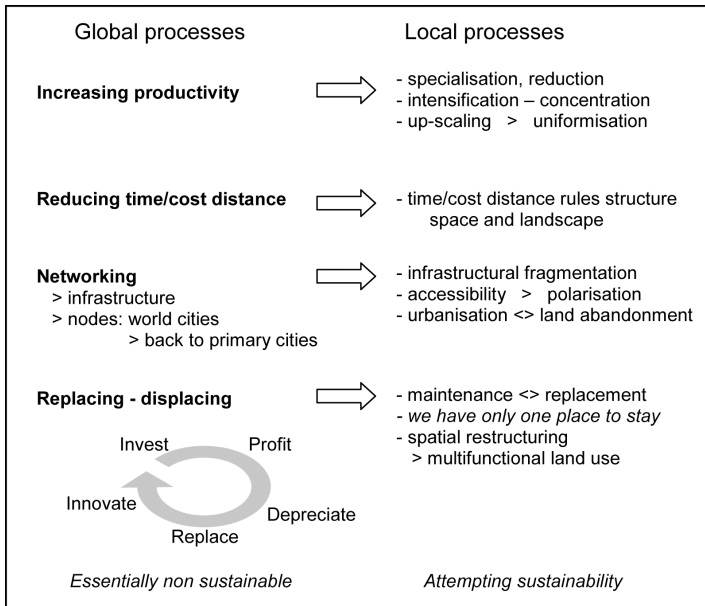


Figure 1: Some examples of processes at the global scale and local mechanisms of landscape transformation they initiate.

other mechanisms can be found, i.e. in relation to accessibility and mobility, but these will not be discussed here.

2 Dimensions of change

Change is the difference of the state of an object, place or area between at least two moments in time. To recognise change the states at the different moments must be recorded and described. Most often the state is described by (topographical) maps and the time interval between two map editions defines the temporal resolution. Changes that occur in a reversible way between two recording moments (such as reforestation and clearing) or are not recorded can not be recognised as such on a time series of maps. Also the difference in state must be large enough to be noticeable (fig.2).

Table 1 summarizes six dimensions that can be recognised when dealing with change [6]. Magnitude expresses the amount of change and can refer to the spatial extent or to the nature of the object or features that change. The speed defines the distinction between gradual evolution or abrupt catastrophic events. The frequency is the number of events causing change in a longer time interval. Often is used as a criterion to consider the event as ‘normal’ or ‘exceptional’. Some changes are reversible and cyclic in nature, while others are irreversible. A chain of irreversible changes makes history. Finally, the impact of change can be very different. Catastrophic events for example often change everything, but

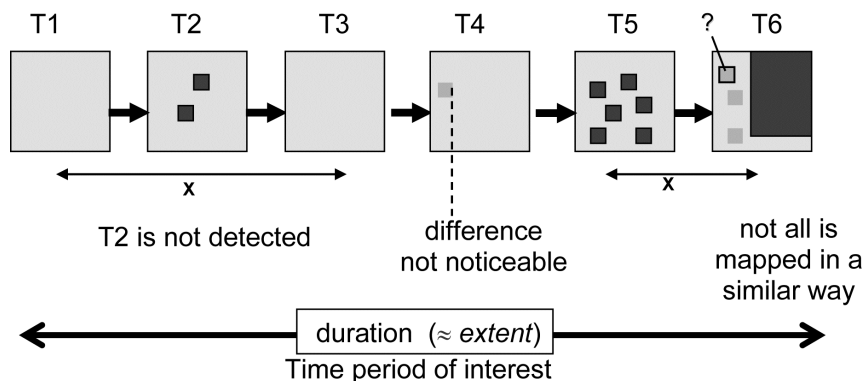


Figure 2: Elements in studying landscape changes.

Table 1: Dimensions of change.

Magnitude	- area, spatial extent - nature, affected features
Speed	- gradual evolution - catastrophic event
Frequency	- regular, common, 'normal' - exceptional
Reversibility	- cyclic - irreversible => history
Impact of change	- everything changes; - some specific features change
Cause	- nature - human - combined

other changes only affect some specific features such as land cover or crops to grow, while field and settlement pattern remain stable. Finally, it is useful to distinguish the causes of the change, although most changes are caused by the combined action of natural and human factors nowadays.

3 Actors and their competences

Landscape is the appearance of a part of the land characterised by a specific form of organisation by humans [18]. The real action takes place in the land, in particular in land use changes. The basic question here is who has the competence and authority in making land use changes? Hägerstrand [19] defined three forms or scales in this competence. The land owner (private or public) competence is the only one who is capable to make real, material and tangible changes. He owns the territorial competence as Hägerstrand formulated it. The second form is the spatial competence which has an indirect, more regulating

power on land use changes. It belong to municipalities, local management boards and planning authorities or higher administrative or policy levels. The spatial competence may be organised in two ways: (1) functional specialisation which is reflected in a sector-based policy and authority, and (2) geographical integration the competences in a territory.

One of the main problems in contemporary landscape planning and management is the high number of actors that have territorial competence. Many of the traditional landscapes in the countryside are the result of initiatives of a rather restricted number of land owners in the past [20]. Democratisation in the 20th century leads to an increase of small landownership, resulting in many non-concerted small land use changes. Cumulative they cause a more chaotic change of the landscape, not always clearly planned and referred to as autonomic development. Liberalism and free market ideologies stimulate these processes.

4 Mechanisms of landscape change at the local level

The mechanisms of landscape change at the local level discussed below were all observed in cases studies of village territories. A village with its surrounding territory is considered as a building block or module of the landscape. Historical studies showed how the landscape was organised around the settlement [21, 22]. In traditional landscapes of the European culture a centre-periphery zoning in infields and outfields developed which still can be recognised in many cases. From the 17th century on common land was gradually privatised, as for example by the enclosure movement, creating new landscape pattern. Also, the settlement site was chosen in such way that it controls – partially visually – its territory [23]. The landscape zoning models, such as infield-outfield or hortus-ager-saltus-silva, were used a models to compare traditionally developed landscape patterns to contemporary patterns and detect mechanisms of change [24, 25].

4.1 Farming inside-out

Upscaling of agriculture results in less but bigger farms. In traditional agrarian villages farms were often concentrated in the village centre, where extending farm buildings is difficult. In addition, planning rules that attempt to conserve or protect the rural character of villages often oppose against large scale transformations in modern purely functional architectural style. Consequently, farms are abandoned in the village centre and become transformed into (secondary) residences. Active farms develop or relocate outside the village, often in the periphery and amidst the fields to labour.

A good example is the village of Mont-Gauthier situated in the Famenne region in Wallonia (Belgium). It was a typical agrarian street-village of farms, which were rebuild with bricks only at the end of the 19th century. Most of them, in particular the smaller ones, were transformed into residential housing during the last decades. The still active farms are the larger ones situated at the periphery of the village.



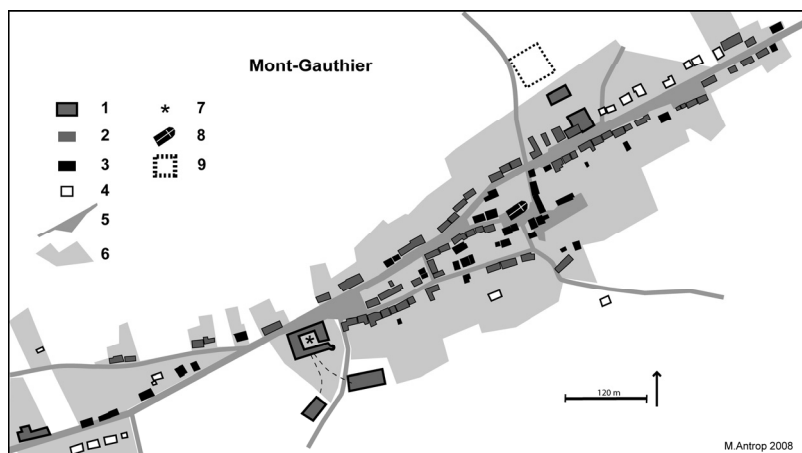


Figure 3: Example of the 'farming inside-out' mechanism in the village Mont-Gauthier. 1: active and expanding farms, 2: former farms transformed into residence, 3: other old buildings, 4: new housing, 5 streets and squares, 6: gardens and orchards, 7 castle-farm, 8: church, 9: graveyard.



Figure 4: View of Mont-Gauthier a traditional street village of farms, which all were transformed into residential housing (photo M. Antrop 2006).

4.2 Searching nice views

Traditional settlements often choose sites that were risk free, naturally well protected against dominating winds and rain and well exposed to the sun [26]. New residential housing often searches sites with vast, nice landscape views, such as exposed high slopes and ridges. These locations are often found along the viewsheds of village territories. Thus, new housing gradually starts dominating the landscape as a whole.

4.3 Forest takes over

Emigration of the countryside results in stepwise land abandonment and the introduction of more extensive forms of land use. The general result is one of





Figure 5: New residential housing prefers exposed sites with nice views, the traditional farm has a well protected site (Merckeghem, Northern France, photo M. Antrop 2006).

‘rewilding’ the landscape. Instead of abandoning fields, often trees are planted as a small profit on the long term is still expected. This process of reforestation results into a patchwork of small blocks of woodland and fields, which is called rather well as reforestation ‘en timbre poste’ in France. This is not a practice by professional foresters, but the result of non-concerted actions by individuals. The new forest thus created has little or no economical or ecological value. New lucrative trends are planting of christmas trees and changing to bioenergy crops.



Figure 6: The traditional open pasture land of the Margeride (France) is gradually filled with woodlots of all size and species (photo M. Antrop 2007).

These processes are most visible in mountain regions all over Europe [27, 28]. A good example is given by the Margeride, a mountainous region in the Central Massif in France. Granites form a dissected dome reaching up to 1500m. The region has a harsh continental climate. The traditional herding on vast open pasture land declined with the decreasing population. Today it is one of the least populated areas in France with population densities often less than 20 inh./km².

Land abandonment is characterised by gradually filling the pasture land with woodlots of all size and species, in particular conifers.

4.4 Functional urbanisation

Functional urbanisation is a first stage in the urbanisation of the rural countryside. It consists by replacing land use forms of professional farmers by forms introduced by hobby farmers or urbanites. Praestholm [29] called this 'urbanisation in disguise'. Others use terms as hortification and horsification of the landscape [30]. Very characteristic is the introduction of small gardens and pastures with a few horses, sheep or goats. Land cover inventory using aerial photography or remote sensing often do not distinguish such detailed differences in land use. Nevertheless, these can be considered as 'early warning' indicators of a countryside transformed by urbanisation processes.

4.5 Private greenways and corridors

Residential housing in the countryside consists mainly of free standing houses in small garden plots. Very appreciated is if the backyard can be extended visually into the surrounding undisturbed countryside. Private gardens are often managed as 'outdoor livings' managed in personal style and well screened of from the views of the neighbours. Private gardens connect spatially and form not intended, planned and managed ecological corridors.

In Flanders region (Belgium) the area covered by private gardens is estimated as almost 6% of the total territory. Due to the severe scattered urbanisation forming patches and ribbon building, private gardens must be considered as important spatial networks. Their landscape ecological meaning and value is however not yet understood as detailed inventory of garden types and practices used is still lacking.

5 Conclusions

Studying these examples of mechanisms of landscape transformation at the local level showed that most have multiple causes, are complex and related to changing life styles, in particular to processes of functional urbanisation of the countryside. These mechanisms result in new forms of multifunctional land use, which are rarely recorded in land use inventories. Many changes have a high frequency which is difficult to record in general surveys and makes detailed field monitoring necessary. Exploring and studying mechanisms of local landscape transformation are essential in understanding the dynamics of change and necessary for policy making.

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