# *LANDSCAPE AND PUBLIC POLICIES : EVALUATION AND INDICES*

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Abstract:

Landscapes were initially understood as a materiality, and gradually became a social and historical object. Today, landscape belongs to the field of public policies and citizenship. In this way, landscape can be considered as a subject for territorial intelligence, including the governance concept, and public policies actions. In this general frame, we have to focus on the links between landscape and public policies, and on their evaluation.

Keywords: landscape, evaluation, territorial intelligence, public policies

## INTRODUCTION

Extensive development in landscape research occurred during previous years. Landscapes was initially understood as a materiality, associated with resources functions, and gradually became a social and historical object, combining statuses of representation and inheritance.
Today, landscape belongs to the field of public policies, citizenship and governance. In several european countries, legislative and statutory changes carry new practices in decision making about landscape, including public policies impacts and landscape evaluation ; furthermore, they try to involve and associate local populations. The European Landscape Convention (ELC) goes the same way.
Nowadays, research about landscape still works on landscape in itself, but also increases its focus in the manners landscapes are used, managed and claimed. This evolution lays in the new approaches of territory, considered not only as a part of space devolved to production and reproduction, but also as a inhabited space [FORTIN, (2008)]. In this way, landscape can be considered as a subject for territorial intelligence, including the governance concept, and public policies actions. In this general frame, we have to focus on the links between landscape and public policies, and on their evaluation. Many questions are standing. Should we first evaluate landscape, and proceed to a feed-back evaluation of public policies? Is it possible to build standard indicators for landscape evaluation, while landscape leads up to subjectivity, and is fully dynamic in space and time? If such indicators can be imagined, which methodology and which tools should be employed to develop them?
This paper addresses these questions. First, we will summarize the complex relationships between landscape and public policies, in order to propose ways to carry the evaluation. In a second part, we will focus on materials and methods used to produce standard indicators about landscape. Finally, we will discuss some results and advances.

## 1- LANDSCAPE AND PUBLIC POLICIES : A COMPLEX RELATION AND A CHALLENGE FOR EVALUATION

Visible landscape is an instable resultant of several processes. Some of them are extern consequences from decisions and some others are linked with explicit protection, management or planing goals, as it is said by the ELC. Inside those processes, public policies with or without landscape skills (but nevertheless with landscape impact) have a particular status. They are included, at least a little, in a territorial view. This means that they are supposed to be an expression of the community interest, who is attempting to be more and more prospective and more and more involved with citizenship. They are also a kind of mirror of the society where they are running.

Public policies have not necessary a landscape purpose, and pertain to sector strategy, such as economy, equipment, health, etc.. When they have deliberately a landscape stake, their tasks are often to correct some bad effects of other policies, to prevent them or sometime to repair a spoiled landscape. In fact, there is a continuous range of public policies, from those totally irrelevant to landscape to those with landscape skills and, one step forward, those which are devoted to landscape. In order to avoid any misunderstanding, it is important to mention that private decisions could also have a landscape interest, like tourism and leisure companies or highway administrators.

If public policies are for now in the depth of landscape reflexions, it is because they are precisely in the depth of citizenship and, more and more, they have to justify themselves in bringing visible results and well-managed budget. In 1998, the french ecological and sustainable development ministry launched a research program called “Public policies and landscape: analyzis, evaluation, comparison”. The foreword stated that the goal was to answer the need of methodological innovation for evaluation. It also aimed at meeting the scientific community around this complex and quite new subject, which brings several subjective parameters, difficult to measure and even more to quantify. This program stated as a paradox, trying to resolve stakes which are considered as almost insuperable.
However, there are a lot of difficulties, and subjectivity is probably not the biggest one, as we will see later. We will not detail an exhaustive list of them, but it would be interesting to formulate some as the basement for our reflexion.

One of the most important is the landscape territorial definition. Landscape is not only famous landscapes viewed from an identified place, but daily landscapes viewed from everywhere, composed by a succession of

grounds. Landscape is perception and representation dependent, so we risk to favor some types of users, sights and practices in our method choices for this evaluation exercise.

The causality question is almost awkward if we are interested in public policies landscape effects. Indeed, there is a time between a policy decision and its effect on land, and this poses problems. First, we have to bridge this gap and to find a solution to hang on a policy to its effects. Moreover, how can we assign an effect to a policy while several policies (from different decision scales) are running on a same area and necessarily have interactions between them?

In the context of the ELC, it is important to consider the whole european landscape. This means to have a general method to study it, in order to compare the various situations and apply decisions in an homogeneous way. But the fact is that there are a lot of very different landscapes in Europe, different by their geographical, cultural and artistic contexts.

Landscape is an information source on its territory because it is composed by all the land components in interaction. Public policies take part in landscape. However it is difficult or nearly impossible to identify some landscape impact in the policies texts. Maybe it is more judicious to take the difficulty on the other side. Maybe it is not satisfactory to evaluate landscape on one hand and public policies on the other hand but better to start an evaluation by the landscape as DERRIOZ and LAQUES [DERRIOZ, (2004)] suggested. This brings our problematic: how to evaluate public policies by their covered landscapes?

The general methods to evaluate public policies have different steps, and propose coupled comparisons between those steps, as it is shown in figure 1. Usually, relations between public policies and landscape are studied through the impact of the first on the second. That means to compare directly developments and visible landscape, rendering only the human construction part of landscape and not the whole landscape. But if we put one-on-one the policies evaluation system and the landscape polysystem [WIEBER, (1985)], another way could be find. First, the two systems are linked by common components. The boxes “means & actions” and “results & development” are a projection of the anthropic elements, likewise the boxes “request & needs” and “policies & decisions” are a projection of the user system. Secondly, a comparison of natural (biotic and abiotic) and anthropic supplies could allow to evaluate public policies part in the landscape construction. At least, it is possible to evaluate and produce indicators on the visible landscape to define characteristics, as explained in the second chapter. It would be interesting to compare those results with policies choices, which enable an evaluation of public policies considering landscape.

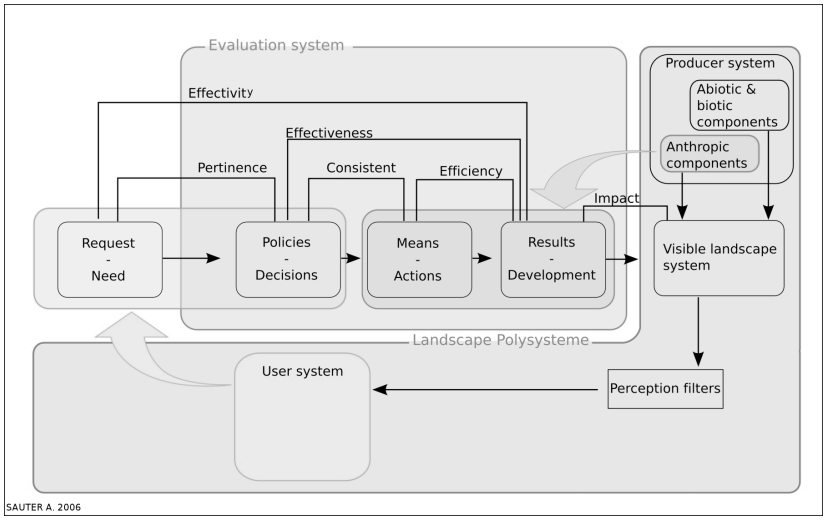

*Figure 1 : evaluating public policies by landscape*

Landscape is a complex study object, because of its several definitions and its subjective characteristics. Indeed, a scene could be considered beautiful for some people, and totally unpleasant for some other. The wind farms debate would be a good example. But if we attempt to carry a scientific research, we need to be as objective as possible. The ThéMA laboratory has, in this way, worked on a landscape definition which allows to study it before it goes through human perception filters, so that subjective effect will be reduced. The major result is the formalization of the landscape polysystem (figure 1 up). It is composed by three system boxes. First, the “producer system” which includes basic and dissociated processes building the landscape : tectonics, photosynthesis, human actions, etc.. This box feeds the “visible landscape system”, meaning objects of the landscape, distinguishing biotic and abiotic (trees, field, hills, etc.) from anthropic components (houses, roads,

etc.), and pictures created by the assembled objects from the “producer system”. For example, a foreground with fields and houses and a background with a wooded hill. Those pictures are analyzed by our eyes and associated with all our knowledge and feeling, represented by the “perception filters” box. Finally, pictures are translated in landscape (in the example a farming hilly inhabited countryside) and employed in the “user system” by people (land-manager, tourist, inhabitant, etc.). Our research team, focusing on a quantitative approach, works on “the visible landscape system”.

## 2. METHODS AND MATERIAL

Working on the visible landscape also means to take it as the human eyes do. The most traditional material (and results as well) of geographers is map. Those documents offers a global and synoptic view of a land, as we can see it by plane. But this is not really the way we are used to see the landscape. Landscape, as we see it daily, is a tangential view on the earth surface. It means that objects and relief create masks, which change with the point of view. For example, a grove along a path could hide some houses, but if we walk ten more meters and pass the grove, the same houses will probably be visible. So, it seems to be necessary to adopt a tangential view in our landscape study, and prepare data to reach it. In fact, we have to pass from a 2D representation to a 3D representation which recreates the scenic volume of the landscape: depth, width and height.

Landscape, in a very simplified way (and as we considered it in “the visible landscape system”), consists of a modeled surface covered by a land-use. These components will be our basic needed material to study the landscape scene, represented by three types of sources:

- land-use , whose representation and modeling can be derived from satellite and aerial images, or specific databases with categorical description ( forest, constructions, roads, farmland, etc.) like the European Corine Land Cover database ;
- Digital Terrain Model (DTM), which is a raster matrix of altitudes calculated by aerial or satellite images or derived from other sources. This data provides a wide range of information on landscape structures and properties like slope, orientation, solar incidence, etc. Mainly, DTM will be used to provide data about the “skeleton” of scenery: the viewshed is mainly designed by topography. DTM can also be combined with the land-use data to create a Digital Elevation Model (DEM), which integers both ground level and objects elevation ;
- specific databases on roads or high-voltage lines, which have only a few holds on the ground. This would complete the land-use databases.

Those data are used in GIS (geographic information system) to get benefits from their capability, like data crossing, index calculating or visibility analysis. We use cellular models rather than vectorial models in order to produce full quantitative results. By crossing the input data and simulating a human view from a point, it is possible to design the landscape scene and then analyze it through three mains indicators:

- view extent, measuring the area seen from each point of view (in m² or ha.), and giving informations on what can I see from this point ;
- view submission, measuring the area from which one point can be seen (in m² or ha.) ;
- landscape aspect, measuring the different contents taken in the viewshed (hectares of forest, field, building, etc.)

Besides a geographic categorization of visible landscape components by biotic, abiotic and anthropic features, it is interesting to build a categorization taking into account the scenery structure, more representative to illustrate the visible landscape. GIS allows us to calculate and identify several appearance features and data :

- potential masks : each object has its own height and can be a curtain for view axes (forest, building, etc.) ;
- flat lands : contrary to masks, those objects do not have volume and directly cover the relief (field, road, river, etc.) ;
- topography : it builds the basic volume data ;
- spatial extent : surface under the look, in hectares or m² ;
- depth : rendering the range of field of vision, from the foreground to the background.

This approach has already been used in several studies and gets benefits from a twenty years experience, improved and adjusted trough time and computer capability developments. By its objectives and globals skills, it takes a real place in territorial intelligence questions, from the first study on high-voltage lines integration

[Brossard (1995)] to actual evaluation needs.

## 3. SOME RESULTS AND DISCUSSION

### 3.1 Measuring scenery dynamics of over 20 years in an urban area

We are starting a study on landscape evolutions in an urban area in the north of Franche-Comté, France. The aim is to compare these evolutions to the urban planning documents. From 1986 to 2007, we have to recognize which landscapes could be seen and how they changed. The example shown in figure 2 concerns the view extent, calculated in a systematic approach simulating an observer each 10 meters. The comparison with 2007 results will allow us to measure the opening or closing dynamics in scenery. These measures will be overlaid with urban planning maps in order to estimate the relationship between planning decisions and landscape evolutions.

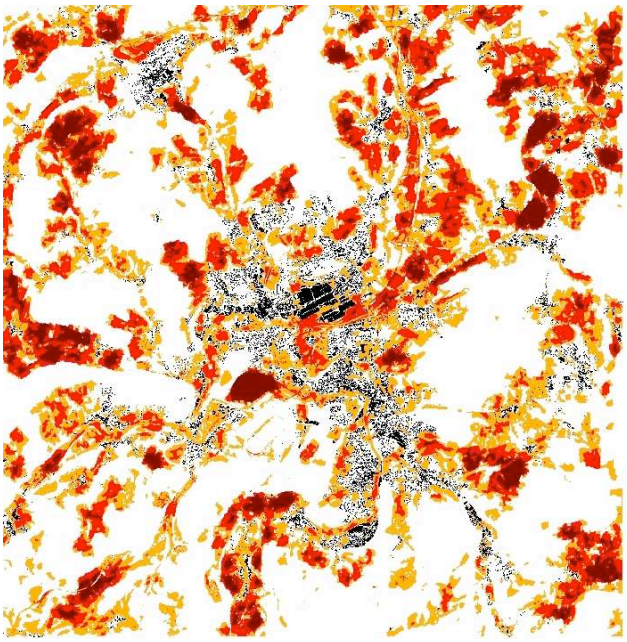

*Figure 2 : the global view extent value. Red area represent high view extent, and white represent blind area*

This map (figure 2) presents a locality with a "short" landscape : view extent values remain poor. Sceneries are limited to foreground (because of topography and forest cover conjunctions) with rare points of view reaching far backgrounds on wide surfaces. This locality is urban developed, but the main part of its landscape is countryside looking, composed by agricultural fields in valleys and forests on hilltops.
At the first steps of this study, we can notice that the previous public policies in urban development did not built a true urban landscape: the main role in landscape production is held by agricultural reorganizations and natural conquest by forest on slopes.

### 3.2 The fringes around Paris and Ile-de-France

Transformations in landscape are often illustrated by photos taken at different dates from the same point and view angle. This couple "before" and "after" gives us a physionomy of the landscape at a moment, without perception filters or personal remains. But this approach is difficult to run on a large area, and the appreciation of changes is mainly subjective. A study as been carried to measure landscape evolutions of the fringes around Paris and Ile-de-France for 1987, 1992, and 1997. GIS has been used to allow an exhaustive coverage of the study area, which is about 28000 Km² and draws a 35 to 70 km irregular belt around Ile-de-France.

Transformations in landscape depend on components creation or destruction, bringing masks or opening viewsheds. At first, these transformations need to be identified considering the scenery volume (depth, width and height), and then described in visible or hidden objects. Two questions can summarize the aim of the study: could we see more or less landscapes, and could we see identical or different landscapes?

We will not present the whole results of the study in this paper, you will find part of them in the recent book: *Paysage et Information géographique* [TOURNEUX, (2008)]. But it is interesting to know that in 10 years, the main change in the landscape is an artificialization of the view (vs. natural components). Non-urban artificial components have taken more importance in the landscape, either by enlargement of existing patches or colonization of new patches. It is also interesting to note that those fringes combine several paradoxes. First, it is not a important wooded area but trees are almost always present in landscape. It is also an area with few build patches but nevertheless very present in sceneries. At least, and despite the polarization of Paris, the landscape remains mainly rural.

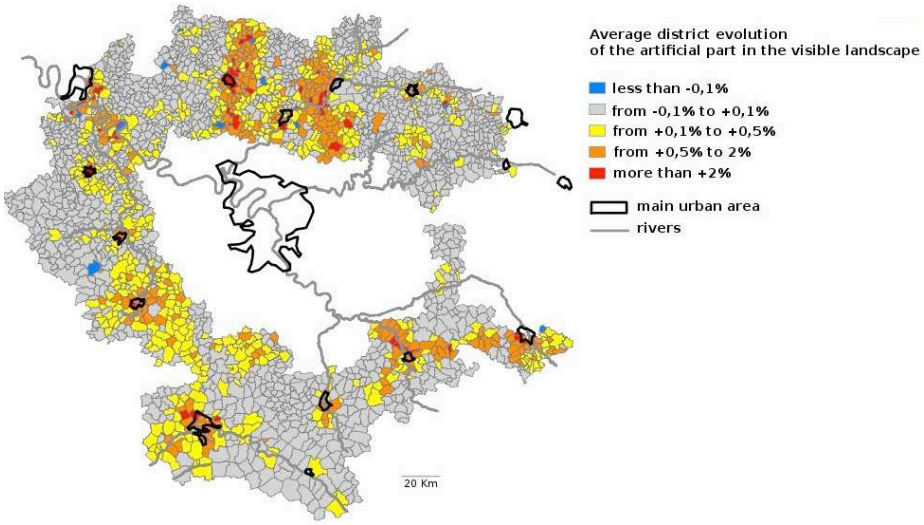


*Figure 3 : Average district evolution of the artificial part in the visible landscape*

The map in figure 3 shows the evolution of artificial components in the visible landscape between 1987 and 1997, this measure being summarized by administrative boundaries. We can notice that this artificialization is location dependent: large areas are not concerned while some other are more dynamic, drawing features in patches or axes. But overall, we have to notice that the value of evolution ratio remains very low, most of the positive values are under 0.5%...which is the signature of a very steady landscape!

3.3 Measuring the economic price of landscape figure 4 : Prices disparity inside a village (Théma-INRA Cesaer)

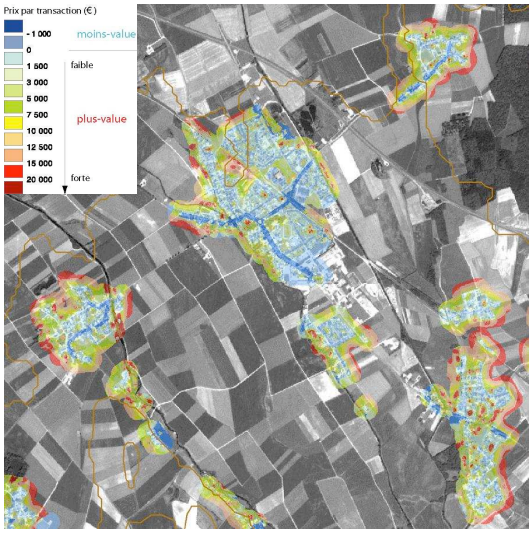


*Illustration 1: Figure 4 : Prices disparity inside a village (Théma-INRA Cesaer)*

Landscape takes part in decisions about our spatial practices, such as tourism or residential choices. It is a fact that, in a hotel, a room with a view on the sea is more expansive than the same room with a view on the car-park. This simple observation seems to give a price for the landscape, in the example the seashore. This hypothesis was the base of a recent research [CAVAILHES, (2006)], led with economists, around Dijon, Burgundy. We carried a geographic and economic evaluation of landscape, through a double question: Does the landscape have a price, and how can we measure it ? As the landscape visible from properties seems to contribute to their value, the value of landscape could be determined by the selling prices of properties, which also depends on other factors. The stake is, first, to measure visible landscape qualities by an objective approach, and then to measure the part of them in selling prices through the economic method of hedonistic prices.

The main conclusions of the study show that the landscape has a price. The average is 2500€, which represent 2.3% of the average houses selling price. It is a low price, positive or negative, and very spatialy dependent. The main reason of an expensive landscape is not a wide landscape (foreground is the most important), but seems to be a short landscape which hide the houses. In fact, it seems to be more important for householders to not be seen by the neighborhood rather than to see a landscape. For example, in the foreground (0-70 meters), broad leaved trees bring +27% to the selling price whereas roads depreciate it for 13%. The map in figure 4 illustrates the prices accorded to the landscape in a village in the Saône plain. We can see a price disparity inside the village itself. The roads proximity is perceived as a depreciation whereas agricultural contacts are considered as a capital gain.

## CONCLUSION

Landscape is now clearly recognized as an essential component for town and country planning. More than remarkable sites and beautiful panorama, landscape is considered as the living environment, including ordinary landscapes where people live daily, and where economic activities are made. It stands as a reason to integrate the landscape in actions of territorial intelligence and governance, including at once concepts of citizenship, sustainable development and ecologic and cultural heritage.
Our approach on the landscape measure and the production of quantitative indicators allows, as we saw it, to carry a real evaluation of public policies. Entering with the landscape first enable a global feedback on development, more than impact studies. Working on the visible landscape, as a mirror of the locality it covers, provides a follow-up, and brings helpful decision elements for new landscape public policies (and planning documents) in terms of management, protection or planning as it is said by the ELC.

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