

## **A VISTA to whom: Assessing vulnerability in traditional agricultural landscapes**

Jacqueline de Chazal

The VISTA project is an EU 5<sup>th</sup> framework project, which aims to assess the vulnerability of traditional agricultural landscapes. Sandra Lavorel is the supervisor of this project, Jacqueline de Chazal is working on the conceptual framework for the social part of the study, and Fabien Quétier is focussing on a specific region in the French Alps.

### **The context: marginal agricultural areas**

Traditional agricultural landscapes (TALs) can be defined as 'landscapes developed by farmers between the Iron Age and the 19th century, primarily representing low intensity mixed agricultural systems integrating pasture, extensive grazing lands and forests'. These landscapes are typically species rich and are considered to have a high conservation value. As they are becoming rare due to global change, and land use change specifically, they are subject of study in this project.

Land use change in TALs has ecological consequences (changes in plants and animal diversity and change in ecosystem functioning) as well as societal consequences (change in ecosystem functions).

### **Vulnerability assessment**

VISTA aims to compile an integrated assessment of the vulnerability of European traditional agro-pastoral landscapes to land use change that will assist land managers and regional policy makers towards sustainable development. To do so, 11 study sites are selected across France, U.K, Germany, Sweden, Portugal, Greece, Norway, Czech Republic and Israel.

Vulnerability is defined as a function of exposure, sensitivity and adaptive capacity. Vulnerability is assessed by 'comparing the collective degree of acceptability of change in full set of ecosystem services, as a response to exposure, by all beneficiaries'. 'Acceptability' is the beneficiaries' judgement about changes in ecosystem services as a response to exposure. 'Beneficiaries' are the so called stakeholders, who have an interest in the ecosystem services provided. The vulnerability is assessed within site, across scenario as well as across site, within scenario.

### **VISTA approach**

In the VISTA approach, Plant Functional Traits (PFTs) are taken as indicators of prospective ecosystem change. Plant functional groups are groups of species with a similar response to environmental conditions and/or similar effects on ecosystem functioning, and the classification is based on shared biological characteristics.

The scenarios of global change are based on the SRES scenarios. These scenarios are downscaled to achieve regional scenarios. Maps of future land use are made for the regions for the four different SRES scenarios.

The methodology to analyze the indicators is a combination of field studies, landscape modeling and agent based modeling. Social surveys are held to identify beneficiaries and associated ecosystem services, and evaluate 'acceptability'.

These plant functional traits, ecosystem attributes (structural processes and functioning of ecosystems), ecosystem services, and their beneficiaries can be structured in five matrices.

- Matrix BF-ES : Identified beneficiaries and associated ecosystem services
- Matrix FT-EA : Plant Functional Traits and ecosystem attributes
- Matrix EA-ES : Ecosystem attributes and ecosystem services
- Matrix EF-ES (BF): Beneficiaries' perceptions of links between ecosystem attributes and ecosystem services
- Acceptability cube : Evaluation of changes in ecosystem services by all beneficiaries for each scenario

In matrix BF-ES for example, the ecosystem services are linked with the beneficiaries, and for each beneficiary it is shown whether it has a negative, positive or neutral interest in this specific ecosystem service. This perceived interest is compared with matrix BF-ES (BF), which is composed of the results out of the social survey. All beneficiaries have different views and different interest, so there will always be debate about what the exact value of an ecosystem service is. The social survey should be able to capture some of this uncertainty.

When all matrices are combined, an acceptability cube can be constructed. For each scenario it is questioned if the change of an ecosystem service is acceptable for a beneficiary. Within the matrix, there will be a certain number of 'yes' and a certain number of 'no'. The percentage of 'yes' is taken as a measure of this specific site, for a certain scenario. This percentage of acceptability can be compared with another site. In this way you can compare the vulnerability of two different sites. The acceptability can also be compared with another scenario. This is a way to compare the vulnerability of various scenarios.

### **An example**

One of the regions is the Col du Lauturet, in the southern Alps of France. The land use can be divided in a pre-war and a post-war period. Before the war the region had a self-sufficient diverse agricultural system. The lower slopes were cultivated, the middle slopes were used for hay making and the higher slopes were used for grazing. Because of overuse there was deforestation.

In the post-war phase a rural exodus started, which caused land abandonment. Now agriculture is mainly 'subsidy farming' (cattle, sheep and hay making). Agriculture is intensified and there is a shift in stratification of land use. The higher slopes are not used anymore, the middle slopes are used for grazing and the lower slopes are used for hay making. Tourism is now the main economic activity in the region. The area became an area of conservation interest, as there is a high species diversity in the pastures.

The 'authentic rural experience' is very important in the region. In the ATEAM land use scenario based on SRES A1, half of European agricultural land is not needed anymore, and land cover/land use will therefore change. This regional study shows though, that the

agricultural land is valued and the region doesn't want to lose its landscape. During the excursion we also got to know about the efforts done in the Haute-Provence to conserve its open landscape. This shows that it is very important to do social surveys, so the regional interests can be evaluated. The vulnerability of a region depends on the interests of the 'beneficiaries'.

### **Conceptual framework in progress**

There is still a lot of work to be done, so no final results can be shown yet. Dummy values are used to show the conceptual framework for the vulnerability assessment.

A spiderweb can be made with six ecosystem services at the corners. One web is made of the present condition of the ecosystem services. For each of the four scenarios a web can be made which shows the changes in ecosystem services in 2100.

The next step is to construct a BF-ES matrix, which shows if a certain change is acceptable for each beneficiary or not. The decrease of sheep grazing in an A1 scenario is not acceptable for the farmer, while a skier doesn't care, so it is acceptable. In a B2 scenario sheep grazing is not decreasing, so it is acceptable for the farmer. When all matrices are constructed, the acceptability cubes can be made, to compare the vulnerability between sites and scenarios.

A discussion starts about the acceptability of changes in ecosystem services for the different beneficiaries. A lot of people do not agree with the values given. It proves that everybody has a different view on the valuation of ecosystem services and there will be an ongoing debate about this.

Jacqui and colleagues still have to think about how to aggregate the signs in the matrices (now the % of 'yes', but isn't this too simple?), what kind of valuation will be given (+ and -, or 1-5), the number of beneficiaries taking part in the social surveys (what is representative?), and how to relate the outcomes of the social surveys to the experimentally derived indicators.

### **Preliminary conclusions**

The TALs are more vulnerable if they are abandoned than when the traditional land use is being maintained. This implies that future management and policy have to focus on agri-pastoral use, as it is the corner stone of the region. This accounts for the inhabitants itself, as well as all the tourists, who value this open landscape.

Pytrik Reidsma