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Metastudy of existing empirical data available to VOLANTE

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Reviewers: Theo Van Der Sluis
Dissemination:
Keywords: Case areas, empirical data
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1. Introduction

This report presents the results of a metastudy of existing empirical data available to VOLANTE. It is based on an overview of key characteristics of the seven areas proposed as VOLANTE case areas for work package 1 (Processes). The report is based on information supplied by the VOLANTE partners responsible for the different case areas and consists of: 1) a table summarizing key characteristics, 2) a thematic presentation of the case areas, and 3) The original descriptions submitted by each team, including references to key papers describing results of previous research in the case areas. It should be noted that these descriptions may refer to either a subarea or a larger region where the study area is located and where VOLANTE partners have carried out research previously.

2. Presentation of VOLANTE case areas

The VOLANTE project proposes to use existing data to the extent possible, to concentrate on refining existing knowledge rather than spend scarce resources on collecting similar information in new areas. The areas identified have therefore been subject to research by the partner institutions, in some cases for more than 5 decades (Săncuța), and valuable data is therefore available to VOLANTE. The areas each represent unique and important land change situations in Europe:

1. Roskilde Municipality (30 km from Copenhagen, Denmark): An intensive crop producing municipality undergoing rapid transformation due to its peri-urban location. Responsible partner: UCPH.

2. Reichraming municipality in LTSER platform Eisenwurzen, Alpine Region in Austria: A rural municipality with large percentage forest cover undergoing simultaneous land abandonment and agricultural intensification. Responsible partner: UNIKLU.

3. Săncuța municipality, located in the Inner Danube Delta wetland area in Southern Romania: a Natural Park/Ramsar site/Natura 2000 which has undergone large transformation over the past 5 decades. Current issues concern integrated nature protection / sustainable use. Responsible partner: UNIBUC.

4. Râtești municipality, Arges County, (part of Neajlov Catchment LTSER) Muntenia. South-central Romania. This area has experienced massive transformation since 1990 as a result of Post-socialist land use change processes. Responsible partner: UNIBUC.

5. Aegean Islands, Greece, focusing on the Southeastern part of the island of Lesvos, which is strongly affected by especially tourism and the associated functions and lifestyles. This case has been the focus of two previous studies (Aegean1 and Aegean2). Responsible partner: Aegean.

6. West Mediterranean agricultural landscape. Portofino regional park (30 km from Genova, Italy). A case of a valuable landscape undergoing transformation as a result of abandonment of traditional agriculture, forestry and tourism development. Responsible partner: ALTERRA.

Key characteristic of the case areas are summarized in Table 1.
<p>| Location/ Land Management situation addressed by case study | Responsible VOLANTE partner | Year of study | Purpose | Spatial unit/area and population Protected area (ha or %) | Data source/type | No. and types of respondents involved | Questions on temporal scale? | Addresses: | 1. Intensification 2. Extensification 3. Land use change |
|-----------------------------------------------------------|-----------------------------|---------------|---------|----------------------------------------------------------|-----------------|--------------------------------------|-----------------------------|--------------------------|
| 1. Roskilde municipality. Peri-urban area near Copenhagen, Denmark | UCPH | 2003 | Assess status, recent changes and future strategies for agricultural properties in peri-urban setting | Roskilde Municipality (30 km from Copenhagen). Area: 211 km² Pop: 82,000 Conservation order: 6% Natura 2000: 5% National nature protection: 6% | - Questionnaire survey: data in Access database - GIS data: IACS data, cadastral information | 125 owners of agricultural properties | Yes, changes in land use, production strategy, etc. 10 year back &amp; ahead | Future: model based scenarios on land use change, production strategy and substance flows (N and C) for 2025 Past: data on population, farms, land use, harvest and livestock for single years until 1830 | 1, 2 and 3 |
| 2. Reichraming municipality, LTSER platform Eisenwurzen, Alpine Region in Austria | UNIKL | 2005-2007 | Development of an integrated socio-ecological model (agent-based and stock-flow model) to analyse future developments of land use (agriculture and forestry), socioeconomic parameters and substance flows based on data and interviews; | Reichraming, municipality in Upper Austria (LTSER region Eisenwurzen). Area: 100 km² Pop: 1,800 National Park: 33% | - Questionnaire survey: data in Access database - Interviews, workshops and focus groups - GIS data: statistical data, cadastral information | around 60 farmers, around 10 other representatives of the municipality | Future: model based scenarios on land use change, production strategy and substance flows (N and C) for 2025 Past: data on population, farms, land use, harvest and livestock for single years until 1830 | 1, 2 and 3 |</p>
<table>
<thead>
<tr>
<th>Location/ Land Management situation addressed by case study</th>
<th>Responsible VOLANTE partner</th>
<th>Year of study</th>
<th>Purpose</th>
<th>Spatial unit/area and population</th>
<th>Data source/type</th>
<th>No. and types of respondents involved</th>
<th>Questions on temporal scale?</th>
<th>Addresses:</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. Stâncuța municipality, Romania. Natural Park/Ramsar site/Natura 2000 wetland area</td>
<td>UNIBUC</td>
<td>Ongoing since 1950</td>
<td>Analysis of hydrological, chemical and physical status of Danube River and Deltas. Since 2000: structure of social capital; social capacity; monetary valuation of significant changes in key biodiversity and ecosystem services.</td>
<td>Stâncuța municipality, Inner Danube Delta LTSER</td>
<td>- Questionnaire survey and interviews: data in Excel database - GIS data: Topo-maps, aerial photo 1990 – 2010 census data</td>
<td>3 group interviews (18 primary and secondary stakeholders), - Individual interviews: 26 farmers, - 1 municipality questionnaire</td>
<td>analysis of land cover change 1900-2000</td>
<td>1, 2 and 3</td>
</tr>
<tr>
<td>Location/ Land Management situation</td>
<td>Responsible VOLANTE partner</td>
<td>Year of study</td>
<td>Purpose</td>
<td>Spatial unit/area and population</td>
<td>Data source/type</td>
<td>No. and types of respondents involved</td>
<td>Questions on temporal scale?</td>
<td>Addresses:</td>
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<td>5. SE part of Lesvos, Greece. Impact of tourism on Mediterranean Islands,</td>
<td>Aegean</td>
<td>1. 2009 2. 2010</td>
<td>1. Development of a cross-border plan for cultural tourism cooperation and partnership 2. Assessing local populations’ landscape conscience (comparison between rural and urban populations)</td>
<td>1. Comparison of Mitilene, Lesvos (Greece) and Ayvalik (Turkey) 2. Comparison between Lesvos and Arcadia (Prefecture in Peloponnese) Area: 115 km² Pop: 40,000 Natura 2000: 5.5% landscapes of special beauty: 0.5%</td>
<td>1. Questionnaire survey, data in SPSS; GIS data 2. Questionnaire survey, data in SPSS</td>
<td>1. Ayvalik (Turkey): 415 questionnaires, Mytilene (Greece): 326 questionnaires. 2. 84 respondents for Lesvos, 85 respondents for Arcadia.</td>
<td>1. 2000’s, looking both back and forward in time. 2. 2010, looking both back and forward in time.</td>
<td>1. 1 and 2 (3) 2. 1, 2 and 3</td>
</tr>
<tr>
<td>6. Portofino, West Mediterranean agricultural landscape (Italy)</td>
<td>ALTERRA</td>
<td>1999-2003</td>
<td>Assess changes and future strategies for valuable landscape</td>
<td>Portofino regional park (30 km from Genova). 3 municipalities: Area: 20 km² Pop.: 18,000 Regional Nature Park: 100%</td>
<td>Questionnaire survey: - GIS data, cadastral information</td>
<td>20?</td>
<td>Yes, changes in land use, production strategy, etc. 30 year back &amp; ahead</td>
<td>1, 2 and 3</td>
</tr>
<tr>
<td>7. Heerde municipality, IJssel Valley; Agricultural landscape under urban pressure (The Netherlands)</td>
<td>ALTERRA</td>
<td>2003-2004</td>
<td>Assess landscape change based on topo maps &amp; remote sensing.</td>
<td>Heerde municipality. Area: 80 km² Pop.: 18,000 Natura 2000+ Nat. Landscape Veluwe’ + Nat. Ecological Network+ Nat. monument: 80%</td>
<td>Topo Maps 1900, 1950, 1980, 1990, aerial photographs</td>
<td>-</td>
<td>Yes, changes in land use and landscape over 100 years</td>
<td>1, 2 and 3</td>
</tr>
</tbody>
</table>
3. Objectives/Land Management situation addressed by case study

The land management situation addressed by each case study is complex, representing simultaneous processes of intensification and extensification of land use. An urban-rural gradient is present: Roskilde is located in a metropolitan region and experiences heavy pressure. Heerde is subject to some of the same dynamics due to urbanisation. Reichraming and Rătești are located in remote rural settings and land abandonment and afforestation prevail. The Aegean islands (Aegean1 and Aegean2) undergo a rapid physical as well as socio-economic transformation, due to various forms of tourism, and thus represent a different setting from the other cases. Stâncuța has undergone massive transformation during the past five decades and is today characterized by conservation interests as well as production interests. Portofino is a valuable cultural landscape which has been protected as a Regional Nature Park since 1977 and exemplifies an area with strong conservation interests but under pressure from tourism development.

4. Socio-economic data

All studies contain varying degrees of socio-economic information. In Aegean2, Roskilde, Reichraming and Stâncuța residents, landowners, decision makers and other stakeholders were the focus of the study, in order to learn about land use decision making (Roskilde and Reichraming) or landscape perception (Aegean2 and Stâncuța). In Rătești, land owners were mostly used to supply information on land use.

More specifically:

Roskilde contained socio-economic data collected as questionnaire data (in the form of quantitative data (coded responses to questions, statements, preferences)) or quantitative information (areas, ages, household size, etc). In addition, informant interviews had been conducted with selected respondents, who represented typical or unique conditions (eg. The largest land owner, hobby farmers, multifunctional farmers), which trace the history of the present owners decisions regarding farm structure changes. This information is available in database format (questionnaire data) and text (interviews).

Reichraming collected information on 60 land owners’ decision process in order to establish parameters for an agent-based model. The fine tuning of the model was done in a participatory process, which confronted farmers with various model responses to their inputs and through this forced them to reflect on the accuracy of their input.

Rătești : land use data collected by participatory mapping.

In Stâncuța group interviews with primary stakeholders (residents: landowners, fishermen, teachers, municipality employees) and secondary stakeholders (representatives of Small Island of Braila Natural Park administration, Natural History Museum, Braila Ecological Research Center) were conducted in order to identify key concepts in relation to biodiversity management. Quantitative information is available from interviews with individuals land owners and questionnaires addressed to the municipality.
In *Aegean2*, the research focus was people’s perception of landscapes and the development of planning policies, hence a strong emphasis on socio-economic information. These case studies relied on questionnaire surveys and interviews and data is available in SPSS databases.

**Portofino:** Land use maps were prepared for different periods, from 1936 onwards until present. In depth interviews were held with some 15 farmers on observed landscape and land use changes (over the past 50 years), as well as their relations with the Regional Park. Detailed land use data is available, both aerial photographs and maps in GIS.

**Heerde:** Socio-economic data is available from the national farm statistics, a database with detailed socio-economic data at LEI agricultural economic institute. It contains data for each farm on land use, land ownership, farm labour, livestock numbers etcetera. Detailed land use data is available, both as aerial photographs and maps in GIS.

Table 2 summarizes the availability of key socio-economic information in the study areas (green color). The table reveals that a lot of common data is available in all case areas, especially concerning descriptive parameters (land owner age, gender, education, etc). A lot of common information is also available concerning land owners motives for changes of property size and landscape changes (*Roskilde, Reichraming, Aegean 2 and Portofino*). Moreover, *Roskilde* and *Reichraming* share almost identical types of information on most other issues.

Respondents in *Rătești* and *Stăncuța*, were anonymous, and it is therefore not possible to relate parameters on the level of an individual. The same is true for statistical data for *Heerde*, as well as the interviews with farmers in *Portofino*. 
Table 2. Existing socio-economic information in VOLANTE case areas.

<table>
<thead>
<tr>
<th>Data availability (1: yes, 0: no)</th>
<th>Roskilde, DK</th>
<th>Reichraming, AU</th>
<th>Răşetic, Neajlov, RO *</th>
<th>Stâncuța, IDD, RO *</th>
<th>Lesvos, Aegean 1, GR.</th>
<th>Lesvos, Aegean 2, GR.</th>
<th>Heerde, NL #</th>
<th>Porto-fino, IT ##</th>
</tr>
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</table>

**Land owner characteristics**

<table>
<thead>
<tr>
<th>Age</th>
<th>Gender</th>
<th>Family status</th>
<th>Years of ownership</th>
<th>Education</th>
<th>Employment status (full-time, hobby farmer, retired)</th>
<th>Annual income</th>
<th>% Of annual income from property activities</th>
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<td>1</td>
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**Property characteristics**

<table>
<thead>
<tr>
<th>Size</th>
<th>Change of size during past 10 years</th>
<th>Land cover classes (forest, agriculture, other) (ha)</th>
<th>Ownership status (owned, rented, other) (ha)</th>
<th>Investments made in buildings (type, already done or planned)</th>
<th>Types of manpower working on property (AWU, owner, employed, temporary, etc)</th>
<th>Status at time of purchase (eg. Full-time, part-time, hobby farm)</th>
<th>Expected status in 5 years (eg. Full-time, part-time, hobby farm)</th>
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<td><strong>Arable production</strong></td>
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<tr>
<td>Land use types (crops, permanent grass, fallow) (ha)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
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<tr>
<td><strong>Animal production</strong></td>
<td></td>
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<tr>
<td>Types and number of animals in 2003</td>
<td>1</td>
<td>1 (2006)</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Types and number of animals in 1994</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
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<tr>
<td><strong>Other economic activities on property</strong></td>
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<tr>
<td>Type and persons involved (eg. Owner or other person)</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
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<tr>
<td>Duration</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
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<tr>
<td>Influence on decision to buy property?</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
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<td>0</td>
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<tr>
<td><strong>Recreational use of property</strong></td>
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<tr>
<td>Owners’ recreational use of property</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
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<tr>
<td>Others recreational use of property</td>
<td>1</td>
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<td><strong>Land owner decisions</strong></td>
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<tr>
<td>Reason for purchase of property (eg. Production reasons, residential reasons, green values)</td>
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<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Reasons for change/stability of size of property, arable and animal production (eg. Economy, health, change of occupational status)</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
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<td>0</td>
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<tr>
<td>Reasons for landscape changes (removal, planting, intensification, extensification) (eg. Buying or selling cattle, improve hunting or green values)</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
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<tr>
<td>Reasons for entering into/refusing various subsidy schemes (eg. Heavy paperwork, too little payment, enthusiastic nature lover)</td>
<td>1</td>
<td>1</td>
<td>0</td>
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<td>1</td>
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* the data sets are statistical estimates, developed on: a) data from National Statistic Institute; b) previous questionnaires for the area (from past projects). The data set is not linked with cadastral maps.

** general information available, all the private properties are, as years of ownership, later than 1991.

*** we have information about the economic activities from the area, not directly link with a specific property.

# Netherlands, IJssel Valley
The Socio-economic information will be collected, some is already available through our partner LEI, Agric Economical Institute. Specific farm data exists, e.g. on type of farm holdings, average size of farm holdings etcetera.

### Portofino Regional Park, Italy:
On socio-economy: there are some 15 in-depth interviews with farmers, on their land, land use. The history of land use (before WW2) was also assessed. A compiled report based on interviews conducted in 2000 or 2001 contains valuable information. Anonymous interviews were conducted with elderly farmers who knew the history of the area. Acquiring additional information from them may be difficult. Young people stopped farming because of urbanisation, recreation development and abandonment of farms on these steep slopes.
5. Size, spatial scale and population

The size of the case studies is quite uniform and varies from 20 km² to 200 km², thus all areas are relatively small areas. It is worth noting that Stâncuţa, Reichraming and Râteşti are embedded in larger LTSER areas which measure more than 3000 km², thus presumably providing some opportunity for upscaling of results or referring them to another spatial scale. The size of the VOLANTE study areas will be an issue to determine and will depend on many factors: existing data, data needs, need for sufficiently large area.

The spatial scale varies for each study area. Not only as a function of its area, but even between the data types used. For example, in Roskilde and Reichraming spatial information exists on the individual/household level (concerning decision making), plot/field level (land use). This is not the case in several of the other areas, where it is not possible to link land spatial information with a specific household (Portofino, Stâncuţa and Râteşti).

The population of the study areas varies considerably from 1,800 (Reichraming) to more than 80,000 inhabitants (Roskilde).

6. Land use data

Land use data originates from a variety of sources and is available at different spatial scales and varying degrees of detail. In some cases primary sources were used (satellite or aerial photos) to produce original maps while in other cases, secondary sources (topographical maps) were used. It is positive, that in all cases spatial data is available in a digital format.

Roskilde contains information on land use in 2002 based on IACS¹ data for the municipality as well as land owners information in questionnaires. It is most detailed concerning agricultural land use (crop type) whereas other types of land cover are described in less detail (eg there is only one category of forest). The information is available in GIS format (ArcMap), along with cadastral maps and digital maps showing designated areas (Natura 2000, water protection areas, etc). The mapping scale varies from 1:10,000 to 1:50,000. Updated maps can be produced relatively easy.


Stâncuţa: land cover and protected area information available in GIS format (ARCmap), derived from topographic maps 1:25000 (1979), 1:100 000 (1900, 1996) and aerial photos (2003), CORINE 1990 and 2000 maps. Land use data based on census data (1990 – 2010).

¹ The EU Integrated Administration and Control System used for handling farmers application for agricultural subsidies
Roskilde and Reichraming used GIS data: statistical data, cadastral information

Portofino: Both colour composite images and false colour images are available. Land use maps based on aerial photographs were prepared for several periods: 1936, 1954, 1974, 1991 and 2000. Besides, extensive historical research was done, with qualitative descriptions (detailed) from the middle ages onward. Quantitative data is available on land use change from 1936 till the year 2000. The landscape change was studied in detail, i.e. changes in attributes like vegetation, farming area, historical terraces, parcel size, drainage pattern etcetera.

Heerde: Aerial photographs are available, as well as topographical maps scale 1:10.000 for the periods from 1970, 1980, 1990, 2000 and 2009. Aerial photographs can be obtained from World War II onwards.

The table below shows the environmental zone of where each case study is located. It shows that the case studies represent quite a good coverage of Europe. Further, main land use types are shown for each case study area.2

Table 2: Presence of land use types (2nd tier) in VOLANTE case study areas (preliminary classification)
Source: (Mücher et al, 2010 (see footnote)).

<table>
<thead>
<tr>
<th>Environmental Zone</th>
<th>Roskilde, DK</th>
<th>Reichraming, AU</th>
<th>Stancuta, RO</th>
<th>Ratesti, RO</th>
<th>Lesvos, GR</th>
<th>Portofino, I</th>
<th>Heerde, NL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban sealed</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Urban mixed</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Urban recreation</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Crops</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Woody crops</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
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<tr>
<td>Waterways</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
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<tr>
<td>Wetlands</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Coastal</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Geomorphologic features</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Grasslands</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Native grasslands</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Heathland</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Scrub</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Forest</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Woody landscape elements</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
<tr>
<td>Stone walls &amp; terraces</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>

7. Modelling/Scenario-building

Three of the studies included scenario building in the studies.

*Reichraming* used the integrated socio-ecological model SERD (Simulation of Ecological Compatibility of Regional Development) that was developed for the municipality of Reichraming in a participative two-year process involving local stakeholders. The model was used to model land use changes using 4 different scenarios:

- The REF scenario assumed that the conditions of 2006 remain constant over the 30 years of the simulation period. It was used as a baseline with which trajectories in other scenario runs were compared.

- In simulating the TREND scenario we assumed a doubling of agricultural prices over the 2006 level as well as strongly improved conditions for use and production of bio-energy. Agricultural subsidies and EU subsidies for the municipality as well as internal strategies and behaviour remained unchanged. Thus, the TREND scenario simulated the impact of global improvements in terms of agricultural prices and bio-energy on a region dominated by agriculture and forestry such as Reichraming.

- The GLOB scenario assumed a wide-spread adoption of neo-liberal economic policies with unlimited availability of natural resources; that is, a drop of agricultural prices and an abandonment of agricultural subsidies. In this scenario we assumed that prices for agricultural products drop to 50% of their 2006 value. Agricultural subsidies and national-level subsidies for the municipality were cancelled and global conditions for bio-energy became less favourable, either due to falling fossil fuel prices or a cessation of climate policies or both. In addition to these external framework conditions, the behaviour of agents changed to a minimum willingness for co-operation on the municipality level as well as on the farm level and to a preference for shifting to alternative strategies in the agricultural sector such as direct marketing.

- The “local and regional policy” (LOC) scenario assumed that the external trends developed in a similar way to those in the GLOB scenario, but that local and regional stakeholders (above all, municipal and provincial policy-makers) would implement innovative strategies to try and counteract these conditions.

In *Stăncuța*, 3 scenarios have been proposed, which will improve ecological conditions (and total economic value (TEV) in the Lower Danube Wetland System (LDWS)).

- The first scenario is based on rehabilitation of the existing defence system against flooding and the facilities (e.g. irrigation and draining systems) for practicing intensive agriculture. In fact this scenario proposes maintenance of current composition and structural configuration of the LDWS. It is obvious that the promoters and supporters of this scenario take into consideration only the short term benefits and neglect long term negative cumulative externalities.
• The second scenario proposes: i) restoration of 800 km² of wetlands; ii) rehabilitation of the defence system and infrastructure for intensive agriculture (monofunctional agro-systems) and; iii) maintaining the surface of polders (45%) above structural threshold (~36%) which means preservation of the current functional regime, vulnerability and costs.

• The third scenario proposes: i) restoration of 2200 km² former wetlands in order to bring the share of agricultural polders to 32% which is considered to be below the sustainable structural threshold (~ 36%); ii) rehabilitation of the protection system for the remaining agricultural polders, and iii) implementation of multifunctional farming systems, which rise TEV up to 1750 USD/ha/year, starting from ~1100 USD/ha/year in the case of intensive and monofunctional farming system.

**Portofino:** Four exploratory scenarios for future land use were developed, which describe the outcome for farming, the landscape and biodiversity under different choices and economical regimes. The scenario’s are qualitative and meant for management purposes. The development scenarios were based on specific choices and its consequences for economical development and landscape and biodiversity. They are partly based on autonomous developments, land use change (decline of agriculture, urbanization, tourism) and land degradation (landslides, erosion, wildfires, floods, pollution). Based on these processes landscape trends are defined which results in the following scenarios:

- The modern economical landscape
- The arcadic landscape
- The natural landscape
- The rural restoration landscape

**Heerde:** No modeling was done.

### 8. Temporal scale

All studies incorporate a temporal element, varying from a 10 years timespan back and forward in time (Land owner information in **Roskilde**) to much longer durations (scenario forecasts of 30 years in **Reichraming**).

### 9. Integration of socio-economic data and biophysical data

Since one of the core VOLANTE objectives is to analyse landscape changes as a result of socio-economic and biophysical system interaction, it is relevant to identify to what extent this approach has already been adopted in the seven case areas.
The three LTSER areas (Stâncuța, Reichraming and Râtești) all have socio-economic and biophysical system interaction as important objectives and employ specific methodological approaches to analyse past and/or future land use changes. Roskilde and Aegean have their focus on the socio-economic environment, seeking to describe landscape perception and preferences (Aegean) or land owners decision-making process (Roskilde). Both of these studies deal with the biophysical environment in a more indirect manner.

Portofino: In Portofino, the landscape system and land use interaction are the main objectives of the study and past and future land use changes have been analysed.

10. Land use trajectories and processes of change

Previous research in all case areas has analysed land use changes over short to long-term periods. Thus, valuable material is available concerning the types and extent of physical changes in the case areas. In addition, information has been compiled to explain the processes behind landscape changes, in particular the main actors involved, the driving forces and the actual processes which led to a certain landscape change. This information is explained in greater detail in VOLANTE Deliverable D1.1a, while this section presents an overview of the most important findings. The findings are summarized in Table 3.

Land use trajectories

The main landscape trends in the areas are very diverse. In the more mountainous or remote areas, land abandonment, in some case accompanied by natural expansion of forest, is occurring (Stâncuța, Râtești, Reichraming, Aegean and Portofino). In areas of intensive agriculture, the dominant trend may be increase of scale of production and intensification of cultivation of former meadows and wetlands (Stâncuța, Heerde) or stability (no change of land use), in some cases hiding a significant change in land owner composition from full time to part time farmers (Heerde, Roskilde, Portofino). The latter trend also characterizes some areas of marginal potential for agriculture, which are located close to urban areas offering other economic possibilities (Reichraming, Aegean). A conversion of land use from agriculture to urban occurs in several areas. In Roskilde, it follows clearly designated zonation boundaries while in Aegean it occurs on land owners own initiative and not always according to plans or building legislation. The improvement of nature is in some areas a result of land abandonment (Stâncuța, Râtești) while in other areas, it is the result of deliberate policy measures (afforestation programs, agro-environmental schemes, etc.) (Reichraming, Heerde, Roskilde, Portofino).

Main drivers of land use changes

Drivers of land use change are identified at both external (regional, national, international) level and internally in the areas (local community, land users). At the external level, agricultural market conditions have a strong impact on the viability of agriculture and hence on land use. It may lead to land abandonment, in areas where agricultural production has difficulties competing with other sources of income (Stâncuța, Râtești, Reichraming, Aegean and Portofino) or it may lead to a
specialized form of land use, eg. increase in maize production on former meadows (Heerde) or grass seed production on fertile soils (Roskilde). As such, the boundary conditions set by agricultural market conditions and policy measures, have an intensifying and extensifying effect in different contexts and a shift from agriculture to (semi-) urban functions (Roskilde, Heerde).

The designation of an area as a special landscape (National park, NATURA 2000, conservation order) normally has a stabilizing effect on land use changes. Subsidies may be available to preserve certain characteristics or legislation will simply incriminate land use changes (Stâncuța, Reichraming, Heerde and Portofino). In the socialist era, grand production plans (eg. drainage and creation of rice plantations) had quite the opposite, destructive impact on landscapes, especially as far as nature values is concerned (Stâncuța).

The change in land owner composition from full-time to part-time farmer carries a shift in preferences and priorities. The new owners often favor residential and recreational interests rather than agricultural production, which can manifest itself in a more diverse and nature friendly landscape with a range of urban-oriented activities (eg. “Horsiculture”) (Roskilde, Heerde).

Landscape change processes

Afforestation occurs in all case areas. It may involve the original land owner who benefits from subsidies to plant trees on fields (Roskilde). It may also be undertaken by public authorities following purchase of land (Stâncuța, Reichraming, Heerde). It may also occur as natural regrowth following land abandonment by the owners. In some cases, owners are not located on the property, and they either live in nearby towns (eg. owners of olive groves) (Aegean2, Portofino) or are absentee land owners who received land under the post-socialist privatization program but who are not farmers themselves or consider it too unprofitable at present (Stâncuța, Râțești). Land fragmentation may also be a result of post-socialist privatization program (Stâncuța, Râțești). Forest fires may have a devastating effect, especially in Mediterranean landscapes (Aegean2, Portofino). Intensification of land use was a characteristic of the socialist era (Stâncuța, Râțești) and is still occurring in several highly intensive case areas, leading to loss of small-scale landscape features and monofunctional landscapes (Roskilde, Heerde).

Main actors

Private land owners, who live on the property and use it for production or pleasure are important actors in all areas. They may be full-time or part-time farmers. In addition, public authorities are also land owners or managers in all areas. Entrepreneurs/investors with non-agricultural interests are found in some areas, as are legal entities: (bequests, charities and the Church) (Aegean2). NGO’s, special interest organisations or cultural institutions are especially important in areas with high-profile landscape designations, such as national parks (Portofino, Heerde).
<table>
<thead>
<tr>
<th>Case area</th>
<th>Land use trajectories (what main land use changes are occurring?)</th>
<th>What are the main drivers of land use changes? (can also include external factors)</th>
<th>Processes: how do these changes occur (sale of land, conversion of land use, exodus of inhabitants, urbanisation, afforestation, etc)?</th>
<th>Who are main land actors (primary stakeholders: owners/users?)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Roskilde municipality, peri-urban area near Copenhagen, Denmark</td>
<td>● Overall trend: Stability  ● Afforestation on small areas  ● Increase in grassland  ● More nature on farmland  ● Gravel extraction</td>
<td>● Poor agricultural economy and increase of scale and urbanisation of peri-urban areas lead to more part-time and fewer full time farmers  ● Afforestation program offers incentives (as does agri-environmental schemes)  ● Public authorities increase forest area to protect drinking water and improve recreational use  ● Increased number of part-time farms: higher demand for nature amenities and less interest in traditional agricultural land use  ● High demand for gravel from rich deposits</td>
<td>● Afforestation on privately owned land and by public authorities on  ● Part-time/ hobby farmers: lease land to Full-time farmers and extensify land use to increase nature on farm land.  ● Mineral extraction on permits for certain areas,  ○ Regional and municipal plans for recreational use of areas afterwards</td>
<td>● Full-time farmers: continue intensive farming  ● Part-time/hobby farmers: lease land to full-time farmers  ● Municipality and public utilities companies: partners in afforestation projects  ● Mineral extraction on permit</td>
</tr>
<tr>
<td>2. Reichraming, LTSER platform Eisenwurzen, Alpine Region in Austria</td>
<td>● Afforestation  ● Growth in extensively managed grassland  ● Reduction in arable land</td>
<td>● Agricultural commodity prices  ● EU policies and subsidies  ● High production costs  ● Desire for high/modern living standard  ● Marginalized rural area  ○ Declining agriculture  ○ Low incomes</td>
<td>● Federal state forest agency buys land for afforestation  ● Change from traditional to new, less labour intensive farming type  ● Availability of nearby jobs allows for continued (part-time) agricultural production</td>
<td>● private households, (mainly milk-producing farms)  ● Many part-time farmers  ● Federal state forest agency</td>
</tr>
<tr>
<td>Case area</td>
<td>Land use trajectories (what main land use changes are occurring?)</td>
<td>What are the main drivers of land use changes? (can also include external factors)</td>
<td>Processes: how do these changes occur?</td>
<td>Who are main land actors (primary stakeholders: owners/users?)</td>
</tr>
<tr>
<td>-----------</td>
<td>---------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>----------------------------------------</td>
<td>---------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| 4. Rătești municipality. Post-socialist land use change in southern Romania |  - Land abandonment  
  - 1991 to 1994: conversion of arable land to pasture  
  - 2001: disuse of 600 ha of pastures  
  - Starting 2009: mineral exploitation on 370 ha, Argeș river banks in Rătești  
  - Since early 1990s: forest area grew with 150 ha  
  - Since early 1990s: built up area grew with 50 ha. |  - Post-socialist break-down of agricultural structures causes conversion of 100 ha of arable land into grazing land and land abandonment.  
  - The ownership transfer of 600 ha of pastures (former collective agricultural land) to local municipality leads to present disuse.  
  - Demand for building material prompts issue of license for gravel extraction.  
  - Concern for nature causes afforestation.  
  - Demand for housing and industry leads to increase in built up area. |  - Land fragmentation and abandonment of agricultural land following land restitution  
  - Ownership transfer  
  - Afforestation following management plan of the forest fund. |  - Big farmers  
  - Small scale farmers  
  - SDA: 136 ha arable land  
  - National Forest Administration: 467 ha  
  - Local municipality  
  - Gravel extraction company |
| 5. Impact of tourism on Mediterranean Islands, SE part of Lesvos, Greece |  - Construction of tourism infrastructure  
  - decrease in rangeland  
  - decrease in built-up area (by 240 ha), mines, dump and construction sites (by 150 ha),  
  - Increase in forest  
  - Increase in cultivated land |  - Incentives for change in the management of agricultural land  
  - Financial attractiveness of second-home residences in the countryside and incentives for rural tourism infrastructure leading to unplanned residential sprawl  
  - Aging population  
  - implementation of new administrative plan  
  - the non-compliance with building regulations and terms and rules by certain authorities, entities and businesses |  - Land transactions  
  - Land conversion  
  - Urbanization  
  - Rangeland abandonment and conversion into forest land or cultivated land  
  - Forest fires |  - a) full-time farmers  
  - b) part-time/hobby farmers  
  - economically active or inactive population (rentiers),  
  - entrepreneurs/investors  
  - legal entities: a) bequests, b) charities and c) the Church.  
  - State (army, forestry adm.)  
  - Local government |
| 6. Portofino, West Mediterranean agricultural landscape (Italy) |  - marginalisation and abandonment of agricultural land  
  - urbanisation |  - Iconic fame  
  - Tourism and recreation  
  - Urban development  
  - decline of agriculture  
  - EU agro-environmental measures |  - land degradation (pollution, wildfires, erosion)  
  - growing touristic demands  
  - urban pressure of a nearby city  
  - nature conservation and protection by Regional Park |  - Farmers  
  - Land developers  
  - Tourism sector  
  - Italian State  
  - Regione Liguria  
  - Regional Park |
| Case area | Land use trajectories  
(what main land use changes are occurring?) | What are the main drivers of land use changes?  
(can also include external factors) | Processes: how do these changes occur? | Who are main land actors  
(primary stakeholders: owners/users?) |
|---|---|---|---|---|
| **7. Heerde municipality, IJssel Valley: Agricultural landscape under urban pressure (NL)** | • Maize area increases  
• Forests: stable area, increasingly diverse  
• Meadows converted to maize fields  
• Reduction in landscape grain size  
• Nature restoration  
  o Ecological network  
  o Natura 2000 | • Lower agricultural commodity prices  
• EU policies and subsidies  
• High production costs  
• Increased urban demand for recreational services (Horseriding) | • Sale of land leads to:  
  o Increase in farm size  
  o Increases urbanisation (changed land owner composition and land use)  
• Improved drainage allows cultivation of meadows  
• Increase in field and farm size  
• Reduction of hedgerows and field boundaries | • State Forestry Department  
• Dutch National Trust (Natuurmonumenten)  
• Provincial conservation society  
• Ministry of Defense  
• Water Affairs  
• Estate owners  
• Farmers |
11. Case study descriptions submitted by responsible VOLANTE partners

1. Roskilde municipality, Denmark. Responsible partner: UCPH. Submitted by Søren Bech Pilgaard Kristensen, UCPH.

Roskilde municipality area is located 30 km west of Copenhagen and is part of the greater Copenhagen metropolitan area. It was created in 2007 as a merger between 3 municipalities, as a part of an administrative reform which reduced the number of municipalities in Denmark from 275 to 98. The main city, Roskilde, has a population of 47,000 inhabitants and it is the 10th largest city in Denmark. It is a University city (Roskilde University Center) and a regional center and has served as a central transport hub for centuries due to its strategic location. The total population of Roskilde municipality is 82,000 inhabitants, of which 6% is living in rural areas. It covers an area of 211 square kilometers. The new municipality incorporates Gundsø municipality, which has been subject to research on land use changes and land owner decisions by the Department of Geography and Geology, University of Copenhagen. Roskilde municipality has been suggested as a case area to study rural areas located in a peri-urban setting, subject to heavy pressure for land conversion to non-agricultural activities and undergoing a socio-economic transformation as former farms are converted to residences for newcomers.

Land management situation

The land management situation in Roskilde municipality can be described as an agricultural area undergoing transformation due to its peri-urban location. The location of Roskilde municipality, within greater Copenhagen metropolitan area and with several urban centers within the municipality itself, means that there is high demand for land for urban expansion and conversion of land use from agricultural production to residential, recreational and industrial purposes. While agriculture has been the main land use for centuries, it has been increasingly under pressure over the past 5 decades, as the number of farms and farmers has decreased. In contrast, the advantageous location in the vicinity of large urban centers has led to the conversion of many farms from full-time to hobby farms as well as the growth of several non-traditional economic activities on agricultural properties.

Land use

Farmland is the most important land use and covers about 2/3 of the municipal area, which is close to the national average (Figure 1). Cities and other urban areas occupy a large proportion (18.6%) of the municipality and infrastructure (including Roskilde Airport) also covers significant areas (4.6%).

Nature areas, on the other hand, are quite limited. Forests only cover a small area (2.3% vs 12% nationally) and wetlands cover nearly 4%. The small areas reflect the favorable conditions for arable agriculture, which led to the creation of an intensively cultivated landscape. Other natural areas cover 3.4% and primarily comprise open water surfaces, grasslands and permanent pasture but
also plant nurseries. Large deposits of sand and gravel led to a significant quarry industry, and areas of mining and digging cover more than 1.5% of municipal area. Most of these areas have been transformed into recreational areas when raw material extraction ceased.

Figure 1. Land cover in Roskilde municipality. Source: Corine Land Cover 2006 data.

Planning

The key planning institution is the municipality, which is responsible for most aspects of physical planning. The key planning instrument governing physical planning at the landscape scale is the zonation of Denmark into three zones: an urban, rural and summer cottage zone, according to the Zonation Act (Zoneloven, now part of the Planning Act). Together with planning themes in the municipality plan, the zonation forms the basis for administrative day-to-day decisions on spatial regulation. As a general rule, urban development (housing, industry, institutions) can only take place in urban zones (6% of the national area). Summer cottage areas are restricted to summer cottage zones (1% of national area), to prevent built-up areas along coastlines. In the rural zone (93% of the national area), only the construction of buildings and changes of land use related to
agriculture or forestry is generally allowed without planning permission. Other changes in the rural zone are subject to application and eventual dispensations from the municipality.

Careful planning might prevent large scale and irreversible conversion of valuable agricultural land, but changes that influence both the environment and recreational opportunities are also occurring within the agricultural sector itself. Agriculture as an economic sector undergoes significant restructuring, as farmland is concentrated on fewer persons, leading to a minority of large-scale full time farms and a majority of part-time farms (Linares 2003). New forms of production and new products are appearing on farms, leading to a diversification of agricultural production and introduction of new kinds of business activities in the countryside (Ilbery et al. 1997). The rural innovation is expected to be most pronounced in urban fringe areas, where dynamic conditions for job opportunities, large demand for alternative agricultural products and high population density create ideal conditions for transformation of conventional production to more diversified types of agricultural production.

**Previous research**

The following section describes previous research in Gundsø municipality. The area is located 15 km from Copenhagen in the Greater Copenhagen Metropolitan region (See Figure 2) and was the focus of a research project investigating Rural innovation in the urban fringe agricultural landscapes of the Sound Region (Greater Copenhagen, Denmark and Scania Region in Southern Sweden).

![Figure 2](image_url)

Figure 2. The location of Gundsø on topographic map and on an illustration from the “Finger Plan” for Greater Copenhagen, 1947.
Objectives

The overall purpose of the project was to study the processes of transformation of the agricultural sector in the urban fringe areas in the Sound Region. This can be done from many angles including for example a structural approach focusing on policy or macro-economic issues. However, the intention of the project was to link household decisions with changes in the local agricultural situation. For this reason, we have instead been inspired from an actor approach to investigate practices and motives among the owners of the agricultural land. Because of limited project resources, it was necessary to undertake the project as a case study, and an area near Copenhagen – the major urban agglomeration in the region – was selected. The project aimed to investigate the importance and role of agricultural production and to identify pathways of development and future opportunities of different farm types in the fringe of Copenhagen and elsewhere in the Sound Region.

This area was selected because it still maintains a predominantly agricultural land use pattern, yet is strongly influenced by the location close to Copenhagen and other major towns (Roskilde, Jyllinge, Frederikssund). Gundso municipality covers 67 km2 and has a population of 15,000 persons of which approximately 90% are living in towns and hamlets.

Data collection and analysis

The project relied on information from different sources, but with a major input from a postal questionnaire targeting all 170 owners of farm properties living in Gundso Municipality. Not all owners were active farmers themselves: land could be rented out to others. Qualitative interviews were undertaken with local planners at Gundso Municipality and eight farmers, as a follow-up on the results of the questionnaire survey. Finally, national and municipal level statistical information on land use was used to analyse changes in land use and put survey data into perspective.

The survey was implemented in December 2003 and January 2004 and is based on responses from 125 land owners which means the response rate was 74%.

The questionnaire as well as the analysis was structured around three major themes: the farm, the landowner and the landscape.

All three themes are related to the conditions following from a farm location in a peri-urban agricultural area. The first theme presents the main descriptive parameters concerning the farm property as a residence and a place of production (size and type of production, trends). The second theme deals with the owner and household characteristic (age, duration on farm, background, income sources, and motives). The third theme deals with the landscape. The landscape in peri-urban locations is especially contested, as recreational interests are high. For that reason, the opinion of the landowner regarding access to his land was investigated, as were the management of the landscape for non-agricultural purposes. In all three sections, questions were included concerning the motives for specific activities and decisions taken by the land owner, in order to investigate the factors influencing trends of change in the area. The results were analysed using a combination of
descriptive statistical methods and multivariate analysis. SPPS statistical package was used to perform cluster analysis and factor analysis of relationships between parameters.

Main results

The owners of agricultural properties in Gundsø Municipality are a very heterogeneous group. In essence, they can be divided into two main groups. The first group consists of a minority of full-time farmers who own and manage most of the land. They are therefore important decision-makers concerning the future use of large land areas, although few in numbers. Their objectives are largely production-related, although the improvement of nature also was mentioned as a motive for increase of farm size. The second group consists of the majority of land owners, who are hobby farmers and have a less market-oriented production. Their land contains the largest proportion of untouched permanent grassland, which contains important conservation values. These two main groups can be further divided into sub-groups according to farmer age, ownership duration, knowledge of agricultural production and motives for farm purchase. In particular, the identification of several categories of land owners with different motives and expectations for farm purchase is very interesting. They indicate that future farm purchase will be less related to traditional motives such as the agricultural potential of the area and more related to amenity values of the property.

Increasing conflicts can be anticipated between land owners who prioritize production values including also OGA’s such as garage, storage or workshop versus those who prioritize amenity values and recreational opportunities. Planners and decision makers need to take this polarization into account in future planning schemes.

The survey indicates that the demand for land is strongly perceived by many land owners. The land structure appears to be dynamic, with a significant degree of land rental and recent up- and down-scaling of production. The high proportion of full-time farmers which expect that their farm will be less intensively run in the future is very interesting and suggests that the polarisation of the farming community will increase in the future. It could therefore be argued that the future of full-time farming looks bleak in these areas, at least as a major source of employment and income generating activity.

Several characteristics of the Post-Productivist Transition of agriculture can be recognized in Gundsø municipality. The clearest indication is the widespread diversification of production which is found on many properties. A large number of farmers undertake Other Gainful Activities (OGA’s) and a significant number mention the opportunity to engage in OGA’s as a motive for farm purchase. Policy development in these areas should take this development into consideration, and be aware of the potentials and threats associated with it.

The nature values on farm land are actively being improved on several properties. The planting of small woodlands is the most common activity, which, among other, increases the attractiveness of the property for hunting. This activity involves the largest proportion of full time farmers. However, the largest number of activities is undertaken by other farmer types. It is anticipated that the increase in the number of hobby and part-time farmers, who are motivated by the attractiveness of the area and the recreational potential will lead to even more landscape activities in the future. Howev-
er, the importance of subsidies and public funds for these activities means that future funding avail-
ability will also be an important factor in determining the level of landscape activities.

Conflicts of land use occur in the form of problems caused by visitors to private land. This is
perceived by a large number of land owners. This conflict points to a fundamental issue in
agricultural landscapes, related to the contrast between public good and private ownership. Access
to green areas is an important motive for farm purchase and many indicate that they use their land
recreationally as well. However, decision makers must address the problem of balancing the access
to the landscape with land owners’ desire for privacy and enforcement of private ownership rights.
The significantly higher proportion of newcomers with little previous experience of agricultural
production who perceives visitors as a problem is striking. As this group is likely to increase in
numbers in the future, so is the number of conflicts expected to increase.

Key References

changes in the context of urbanisation: examples from the peri-urban area of greater Copenhagen’,
Danish Journal of Geography, vol. 106, nr. 2, s. 21-34.

Præstholm, S & Kristensen, SBP 2004, ‘Rural innovation in the urban fringe agricultural landscapes
of the Sound Region.’, Department of Geography and Geology, University of Copenhagen. TAPAS

Præstholm, S & Kristensen, SBP 2007, ‘Farmers as initiators and farms as attractors for non-
aricultural economic activities in peri-urban areas in Denmark’, Danish Journal of Geography,
vol. 107, nr. 2, s. 13-27.
Reichraming is located in the province Upper Austria in northern Austria. It is situated in the midst of the emerging Long-Term Socio-Ecological Research (LTSER) platform Eisenwurzen (Figure 1). The Eisenwurzen is located in Austria’s northern limestone Alps, a mostly hilly or lower mountain region with some higher peaks and flat parts. A considerable fraction of Reichraming’s 1,800 inhabitants commute to work to the nearby cities Steyr (approx. 35km distance), Amstetten (approx. 60km distance) and Linz (approx. 80 km distance) due to a lack of local jobs.

Regional setting

The region has a longstanding history of metal mining and metallurgy (iron, manganese, bauxite, lead and others) which goes back over 500 years and which it derived its name from (Eisen means iron in German). Around 400 years ago, the amount of iron produced in the region was about 15% of Europe’s total iron production. In pre-fossil-fuel times there was a heavy draw on the region’s forests, both due to the necessary supply of fuel wood and the requirement to feed a large non-agricultural population of miners, workers in metallurgical facilities and forestry workers based on the region’s low-input/low-output agrarian land-use systems. Since the advent of large-scale coal use, railways and industrialized metal smelting and metallurgy, most mines have been abandoned and metal smelting is now concentrated in industrial centres at the fringes or outside the region, e.g. in the city of Linz.

Today, most of the Eisenwurzen has a marginal agricultural productivity. Forests are re-growing rapidly, in parts of the region to an extent that it is regarded as a burden by the local population. The region typically experiences problems of marginalized rural areas such as declining agriculture, a lack of jobs, low incomes and creeping deterioration of infrastructure. Tourism, agriculture and forestry are the region’s main economic bases. Tourism in the alpine region is highly dependent on the region’s accessibility. After 1948, the number of tourists increased due to the construction of
roads, train connections, hiking paths and ski lifts, thus putting new pressures on the biodiversity in the Eisenwurzen. Beyond the local socioeconomic drivers, the region is also affected by external drivers. Changes in socioeconomic conditions largely external to the region, such as national and supranational regional and agricultural policies, alteration of subsidy schemes, changes in prices of energy or agricultural products and many other socioeconomic trajectories (e.g., migration, economic growth, development of tourism, bio-energy policies) affect the Eisenwurzen’s socio-ecological systems. A recent project has analysed the region’s strengths and weaknesses with respect to sustainability.

The dependence of the Eisenwurzen on forestry, agriculture and tourism as main sources of income makes it vulnerable to climate change. Species adapted to living in high mountain areas are at risk of going extinct, with negative effects on native species richness. In combination with other pressures, this could affect the composition of habitats and ecosystems and therefore also the character of the landscape. Climate change increases the risk of disastrous weather phenomena. Nitrogen and sulphur emissions increased dramatically during the second half of the 20th century and caused excess deposition of N and S in natural and semi-natural ecosystems.

**Presentation of Reichraming municipality**

The Reichraming municipality includes large woodlands covering nearly 80 % of the area, particularly in higher regions, predominantly coniferous and mixed forests. Agricultural areas – meadows and pastures (5%) as well as arable land (2%) – are mostly situated in the valleys. A range of semi-natural and natural habitats of high nature value covers 5% of the area, including heath land, rocky outcrops or water bodies. Most of the 60 farms raise cattle and produce milk. The national park “Kalkalpen” (i.e. limestone Alps) covers about one third of Reichraming’s area of approximately 100 km² (Figure 2).
Planning context

The Austrian Conference on Spatial Planning is an organisation set up 1971 by the federal state, the provinces and the municipalities to co-ordinate spatial planning at the national level. The executive body at the political level, under the chairmanship of the Federal Chancellor, includes all the federal ministers and state governors, together with the presidents of the Austrian Union of Towns and the Austrian Union of Communities and with the presidents of the social and economic partners participating as advisors. The conference acts as an advisory board but has no authority to take any decisions.

Austria has no federal spatial planning act. In contrast, the provinces have the authority to legislate spatial planning on the regional and supra-regional level. Regional development programmes are provided by the provinces which are binding for the municipalities of the respective province. The municipalities are the key authorities for spatial planning decisions. They decide within their territory for example the zoning of the area. The zonation forms the basis for administrative day-to-day decisions on spatial regulation. Additionally, Reichraming is a mountainous municipality much of the 80% forest cover is managed by Austria’s state owned forest administration ÖBf.
Previous research

2007 we developed the integrated socio-ecological model SERD (Simulation of Ecological Compatibility of Regional Development) for Reichraming in a participative two-year process involving local stakeholders. SERD includes three main components: (1) An agent-based actors module that simulates decisions of farmsteads, the municipal administration and other important actors; (2) a spatially explicit (GIS based) land-use module that simulates land-use change at the level of individual parcels of land and (3) an integrated socio-ecological stock-flow module that simulates carbon and nitrogen flows through both socioeconomic and ecological system compartments. We used SERD as a tool to simulate future scenarios depending on changes in (1) external framework conditions, (2) local and regional policies and (3) preferences of individual agents with respect to income and leisure time expectations, willingness to co-operate, etc. Assumptions on local and regional policies as well as on the preferences of local agents were developed in the participatory process described above. Finally, four scenarios were defined and analysed.

(1) The REF scenario assumed that the conditions of 2006 remain constant over the 30 years of the simulation period. It was used as a baseline with which trajectories in other scenario runs were compared.

(2) In simulating the TREND scenario we assumed a doubling of agricultural prices over the 2006 level as well as strongly improved conditions for use and production of bio-energy. Agricultural subsidies and EU subsidies for the municipality as well as internal strategies and behaviour remained unchanged. Thus, the TREND scenario simulated the impact of global improvements in terms of agricultural prices and bio-energy on a region dominated by agriculture and forestry such as Reichraming.

(3) The GLOB scenario assumed a wide-spread adoption of neo-liberal economic policies with unlimited availability of natural resources; that is, a drop of agricultural prices and an abandonment of agricultural subsidies. In this scenario we assumed that prices for agricultural products drop to 50% of their 2006 value. Agricultural subsidies and national-level subsidies for the municipality were cancelled and global conditions for bio-energy became less favourable, either due to falling fossil fuel prices or a cessation of climate policies or both. In addition to these external framework conditions, the behaviour of agents changed to a minimum willingness for co-operation on the municipality level as well as on the farm level and to a preference for shifting to alternative strategies in the agricultural sector such as direct marketing.

(4) The “local and regional policy” (LOC) scenario assumed that the external trends developed in a similar way to those in the GLOB scenario, but that local and regional stakeholders (above all, municipal and provincial policy-makers) would implement innovative strategies to try and counteract these conditions. The share of regional products daily consumed by the households of Reichraming increased. This scenario assessed the ability of regional strategies to cope with disadvantageous framework conditions.
Results

Some changes, when compared to the initial situation in 2007, can be identified in all four scenarios. Grassland areas decrease considerably, coupled with a strong reduction of the number of farms. The proportion of the remaining farms that changes their production to an innovative farming type (e.g. rearing of sheep, horses and game animals) grows considerably. The average farm size falls from 40 ha per farm to around 20 ha per farm, including grassland and private forest area. Annual agricultural working time per farmer increases in all scenarios, but with variable extent, in line with an increasing annual income per farmer through agricultural labour. Overall, the different scenarios affect C and N flows in the respective model runs through change in land use and farming intensity, but also through decisions of households towards renewable energy sources. In all scenarios, forested areas (federal forest, national park, farmstead-owned forests and forestry cooperatives) would constitute a net sink for CO₂ from the atmosphere. The forests would accumulate on average 1 kg C/ha/year, which is in good accordance with other studies (Schulze et al. 1999, Luyssaert et al. 2008). The capacity to accumulate C from the atmosphere will still be relatively high. Finally, the large area covered by forests (approximately 7 000 ha, compared to only 350 ha of grasslands) in the municipality of Reichraming will lead to a high uptake of CO₂ and therefore would contribute to negative net GHG emissions resulting from the C sink of the forested areas.

To sum up, both external (e.g., agricultural subsidies and prices) and internal (e.g., innovation, willingness to co-operate) factors can affect the behaviour of the integrated system considerably. Local and regional policies are found to be able to counteract adverse global socioeconomic conditions to some extent, but not to reverse the trend altogether. We also find strong interdependencies between socioeconomic and ecological components of the system. Fully evaluating these interdependencies is, however, not possible at the local scale alone and will require explicit consideration of higher-level effects in future research.

Key references


3. Stâncuţa municipality, Inner Danube Delta wetland

And

4. Râşcoaia municipality in Argeş County, South-central Romania. Responsible partner: UNIBUC. Submitted by Angheluta Vadineanu (UNIBUC).

The two research sites represented by:

i. Stâncuţa municipality in the Inner Danube Delta (Natural Park, Ramsar site, Natura 2000) and

ii. Râşcoaia municipality in Argeş County, South-central Romania.

The two sites were selected according with the following set of criteria:

- they are or include LTSER platforms integrated in the Long Term Ecological Research network (Inner Danube Delta is a LTSER platform and Arges County site contains part of the Neajlov Catchment LTSER platform);
- allow for the continuity of studies carried by the Department of Systems Ecology and Sustainability – University of Bucharest and ensure the complementarity with other research programs that are developed in the area, including the access to the database containing information on the structure of the related socio-economic systems;
- are located in two regions with different socio-structural and socioeconomic characteristics.

![Inner Danube Delta and Arges County in the Lower Danube River Socio-Ecological System](image)

**Fig. 1: Inner Danube Delta and Arges County in the Lower Danube River Socio-Ecological System (1. Inner Danube Delta; 2. Danube delta Biosphere Reserve; 3. Neajlov Catchment; 4. Arges county).**

**i) Inner Danube Delta (IDD) – Social and Ecological System** covers an area of about 3200 km², from which 3050 km² of floodplain (including 210 km² of Small Islands of Braila wetlands and 2350 km² of created polders) and about 150 km² of built physical capital along the river banks. The small Islands of Braila (210 km²) is the only major remnant of the extensive wetlands which used to form before 1970 the structural configuration of the Inner Danube Delta (IDD/2050 km²). After 1990 the major policy and objectives of the management plan focused on biodiversity and habitats
conservation in accordance with the EU - Bird and Habitat Directives as well as the Ramsar and Biodiversity Conventions. In that regard the area has received the status of National Park and Ramsar site and has been integrated in the Natura 2000 network. The resident human population of the Inner Danube Delta currently consists of 350,000 people. It extends along a river stretch of 215 km, between 150 and 365 km upstream from the Black Sea Coast and, between the Southern Romanian Plain, and the Dobrogean Plateau. In addition, we intend to use, whenever will be the case, the large bulk of long-term empirical data and information regarding the structural and functional dynamics of Coastal Danube Delta (CCD) under the pressure of wide range of internal and external policy and development drivers, which were implemented before and after 1990 (see fig. 1, area 2). The shift in the policy and development objectives occurred in 1990 when CCD received the statut of Biosphere Reserve, World Heritage and Ramsar site.

**Stâncuța municipality – a rural landscape with RAMSAR designation in the Inner Danube Delta**

**Introduction** - Stâncuța municipality is a local administrative unit (NUTS5) in Brăila County (NUTS3), Romania. It is situated along the Danube River stretch, 45 km south of the county capital, the town of Brăila (234 000 inhabitants, one of the largest Romanian ports), and is part of Inner Danube Delta Long Term Socio-Ecological (LTSER) platform. The municipality covers four villages: Stâncuța, Stanca, Polițești and Cuza-Vodă, with a population of 3800 inhabitants and an area of 250 km².

**Land management situation** - The Stâncuța municipality is located in a former flooding area. On the left side of the Danube river embankments and drainage channels were built after 1950 to obtain land for intensive agriculture. The largest rice plantation (7000 ha) in Romania was established in the Stâncuța area in the 1960s. The process of restructuring the land ownership and farming systems after the fall of communism has been accompanied by significant land abandonment. A slow re-instalment of rice plantations has been observed in the last years. The portion of the municipality that remained in the natural flooding regime is part of the Small Island of Brăila (in Romanian: Balta Mică a Brăilei) Natural Park established officially in 2000. In 2001 the park received the international recognition as RAMSAR site and was integrated in the network of Special Protected Areas (SPA) and areas of Special Conservation Interest (SCI).

**Land use** - Agricultural use is the most important land use in the municipality. About 2/3 of the area is arable land while villages occupy less than 1.5%. The households also have land that is used for small scale vegetable, corn or wine production for their own needs. According to the management plan of the Natural Park, the grazing of domestic animals has been restricted and an alternative solution consisting of newly established pastures outside the park has been adopted and implemented. Although it is a predominantly agricultural area, approximately 35% of the land is a compact and heterogeneous wetland system that contains numerous shallow lakes, marshes and channels that are strongly connected by longitudinal and lateral flows, under the Danube natural flooding regime. Alluvial forests and natural grasslands are found in the Danube River and lake areas.

- A set of Research projects, with domestic and EU-FP₇ financial support, were implemented from which: ERMAS 1, ERMAS-2, DANUBS, SOBIO, EUROLIMPACS, ALTER-NET, AQUAMONEY.
- Major research topics were related to: hydrochemistry; hydrology and hydromorphology of the River and Deltas; population dynamics, energy budget and nutrient cycling; composition and structure of aquatic communities, exergy accumulation and energy flow, and biogeochemical cycles of nutrients and some heavy metals; nutrient loads and eutrophication of channels and shallow lakes from Inland and Coastal Danube Delta as well as the lagoons; land use changes (mainly conversion of wetlands into agricultural polders) and the effects of changes in the structural configuration of Lower Danube River Wetland System. After 2000, new topics have been addressed, like: structure of social capital; social capacity - people’s perceptions, attitudes and behavior regarding conservation and sustainable use of biodiversity and ecosystem services and/or restoration of structural configuration and functional regime of the aquatic ecosystems and Lower Danube Land-Waterscape; valuation of ecosystems and landscapes, in particular monetary valuation of significant changes occurred in the key biodiversity and ecosystem services.

ii) Neajlov catchment/ Arges county – Socio-Ecological Complex

The Neajlov Socio-Ecological System covers an area of about 3760 km², most of which is agricultural land. The resident human population consist of 280.000 people. The Arges County – located in Muntenia, South-Central Romania, covers a wide range of ecosystems and landscapes (from the mountains in the north to agricultural plains in the south, 6826 km², ~700.000 inhabitants). Short and medium term policy objectives focus on key aspects related to rural landscape reconfiguration, reduction of the surface of abandoned land, establishing multifunctional farms and biodiversity conservation and diffuse pollution control.

Râștești municipality – a post-socialist rural landscape

Introduction - Râștești municipality is a local administrative unit (NUTS5) in Argeș County (NUTS 3), Romania. The area is representative for the southern part of the country, in majority agricultural areas and it is part of Neajlov Catchment Long Term Socio-Ecological Research (LTSER) platform. Râștești municipality covers seven villages: Râștești, Tigveni, Pătuleni, Furduș, Ciupa-Mânciulescu, Nejlovelu, Mavrodolu, with a population of approximately 3300 people in an area of 80 km². The municipality is 20 km from the county capital city – the town of Pitești (167 000 inhabitants), with direct access through a highway.

Land management situation - Râștești municipality is a rural area; the principal occupation of the people is agriculture. Although it is located in the vicinity of a large industrial city, the area didn't develop towards industrial or residential use, neither in the communist period, nor in the past twenty years. The agricultural policies before 1989 were focused on gaining more land for agriculture, and afterwards the relatively poor infrastructure and the general economic situation in the region postponed the urban development. However, significant changes in the structure and management of the agricultural ecosystems occurred after 1990, when state owned and large crop farms and animal husbandry have been replaced by small (10-15 hectares) or very small (1-3 hectares) private farms.

Land use - The land is used mainly for agriculture; over 80% of the area is occupied by cereal and vegetable crops. Cultivated pastures allow small animal production farms. Forests cover about 8% of the area. Around three percent of the municipality (220 ha of arable land,
80 hectares of forest and 30 households) is registered as areas with risk of flooding from two important water courses - Argeş and Neajlov rivers. Along the main water courses have been created water reservoirs for different uses – flood retention, irrigation, and intensive fishery. Clumps of trees, shrubs and helophyte vegetation are found in the vicinity of the water areas. The improvement of the infrastructure in the past couple of years has started a few residential and recreational projects in the municipality.

- A set of research projects and studies were carried out in the last ten years, among which: i) NICOLAS, EVALUWET, DANUBS, Alter-Net, EBONE, within the Neajlov Catchment, and; ii) a study of Arges County, funded by the Emmy Noether-Programme of the German Research Foundation (DFG)

- Major research topics were focused on: the links between policy and strategy objectives of macro and microeconomic reforms (transition) and land use changes, land cover, land abandonment, and their impact on structural configuration and functioning of the rural landscapes; point and diffuse nutrient emissions; nutrient balance in the Lower Danube River Catchment; Nutrient retention by riparian zones; functional indicators of the integrity of freshwater ecosystems; interactions between terrestrial, lotic and lentic ecosystems; biodiversity and ecosystems functions and services assessment; social and economic drivers and pressures; social and economic valuation.

Data and information from both case studies, relevant for Volante
- Preliminary results regarding the interactions between socio-economic systems and the components of Natural Capital, as well as the social and economic drivers and pressures;
- Large data sets on the dynamics of structural and functional parameters of the main Trophodynamic Modules (TDM'), HGMU', local climate and river hydrology;
- Mechanisms of response to hydrological regime, trophic state, light, moisture and seasonability;
- Information about dynamic relationships between biodiversity and ecosystem / landscape functions and services;
- Long-Term structural and functional patterns of different types of ecosystems and landscapes, identified in the Lower Danube River and its catchment;
- Long-term and large scale data integration and synthesis showing the structural threshols in the dynamics of Lower Danube Land-Water scape and the shift in functional regime of the lentic and lotic ecosystems, from Inland and Coastal Danube Delta, lagoons and coastal waters;
- First estimation of the monetary values of key ecosystem services;
- Empirical data for social analysis and application of Agent Based Models with first Stakeholder Map and Social Capacity estimation;
- Land cover Map and landscape composition for Neajlov / Arges area;
- Pattern of Landscape Changes in the Arges County;
- The outputs of first study on the relationships between policy targets (e.g. land ownership, free market economy, social and economic transition) and major pressures (fragmentation and land abandonment, land use changes), and the dynamics of rural landscape and economy;
- A package of alternative Scenarios for Integrated Management of Lower Danube River Catchment (including Neajlov / Arges county Case Study) and Lower Danube Land-Waterscape (including Inland and Coastal deltas).
**Need for new data sets or to improve existing data**
- Structure and metabolism of local economic systems;
- Improve and update stakeholder Maps for both case studies;
- Extend and improve information which is required for social capacity assessment and modelling;
- Needs for information, education and communication in order to develop and strenghten the social capacity;
- Data and information required for assessing the impact of climate changes;
- Improve the identification and assessment of biodiversity and ecosystem functions and services;
- Improve the information about the ways people value (including in monetary terms) biodiversity and ecosystems.
- Regarding Methodological approach: development of packages of tested and validated methods, technics, indices and conceptual and numerical models which may allow the investigation, understanding and holistic management of the complex, and non linear dynamic Socio-Ecological Systems, at large space and time scales.

**Key references:**

1) **Inner Danube Delta (IDD)/Stâncuţa municipality**


2) **Neajlov catchment/ Arges county/Răteşti municipality**


(This area has been used for the following two case studies)

1. Ayvalik and Lesvos: towards a cultural tourism region in the Aegean (‘Aegean1’)

Tourism currently represents the primary economic activity in the Aegean region of Greece. With grave difficulties in ‘catching up’ with the rest of Europe on socio-economic grounds, this region faces a series of challenges and concerns vis-à-vis a desirable sustainable future—in which tourism plays a leading role. The insularity of the larger area under study probably represents the most significant provenance of its problems and potentials. Moreover, it is on border islands (‘less developed’ or development-aspiring islands) such as Lesvos, our case study, where such processes are usually played out at their most dramatic. Although climatic impacts are generally amplified and sustainability problems enlarged on islands—with the impact of development, globalization and increased accessibility—yet, very often in the case of the Mediterranean, these problems tend to be contained by physical, cultural and historical factors. Environmental fragility is thus further exacerbated by the continuing onslaught of tourism, paradoxically relying on, which diminishing, the potential appeal of the landscape and/ or natural assets as poles of tourist attraction.

Furthermore, the island of Lesvos represents a showcase of deficient tourism infrastructures, which often come hand in hand with the deterioration of the local environment and landscape, its main sources of tourism attraction. For the capital city of Mytiline, in particular, one of the main tourism destinations of Lesvos, major problems include environmental and noise pollution, garbage accumulation, stray dogs and serious traffic congestion. Several of our respondents pointed out ongoing and lingering issues concerning the main port of the capital city of Mytiline; the construction of its new marina; its airport; and last, but not least, the city and the whole island road network. They also emphasized seriously inadequate visitor accommodation units and host services. Again, the remedy and rectification of such problems calls for wide-ranging and multi-layered cooperation between city/ regional planners and agents of infrastructure and environmental monitoring, management and implementation—at all scales and levels (examples of interviewees’ suggestions). Collaboration between administrative agents and tourism entrepreneurs in boosting the islands’ tourism supply side is only one side of the solution; the active mobilization and collaboration of the whole civil society and pertinent NGO’s in all matters directly or indirectly related to local tourism development is paramount if these measures are to take hold (action by grass-roots movements, such as “Aeolistas”).

Though highly promising, tourism on Lesvos is problematic in terms both of quantity and quality. These problems mainly stem from networks of dependency of the island’s tourism trade on larger tourism organizations (economic dependencies) or international treaties (institutional obstacles) that local tourism stakeholders have failed to put in the service of local tourism. On a very attractive Greek island, such as Lesvos, with enormous potential for alternative forms of tourism growth, but diminishing tourist arrivals during the past 4-5 years and a decline in package tour alliances, continuing dependence on big tour operators remains a precarious matter and serious concern.
Charter tourism is strewn with limitations and problems; however, it readily remains the ‘easy solution’, as seen from a bottom-up perspective. The presence of and cooperation with the main state institution/instrument of tourism policy in the country and on the island of Lesvos, the Greek National Tourism Organization, is of minimal and almost inconsequential significance (political deficiencies). Furthermore, a most serious shortcoming stems from the inability of the local side to take substantial advantage of cruise tourism, one of the most successful and dynamic forms of tourism in the Aegean, on the basis of a lack of necessary legal and infrastructural conditions concerning port amenities in Lesvos (legal shortcomings, limitations of Treaty of Schengen).

Objectives

The objectives of this cross-border research project were a) to determine and inventory existing cultural and tourism resources and infrastructure (supply, demand, market, potential) in Lesvos and Ayvalık; b) to investigate and compare how this potential is currently utilized in cultural tourism in both areas of research (strengths, weaknesses, opportunities and threats) and c) to propose measures/strategies towards the development of one larger cultural tourism area of Ayvalık and Lesvos. The main goal of this proposal was to record and map cultural and tourism resources of the larger area of Ayvalık and of the island of Lesvos, for the purpose of development of an Aegean region of cultural tourism that utilizes the strengths, overcomes the problems and ‘learns’ from the weaknesses of both places. It thus aimed in assisting and stimulating sustainable forms of tourism development in the two countries, while simultaneously safeguarding local cultural heritage. A side goal of this endeavor was to enrich processes of culture and tourism planning, management and policy-making, as well as provide concrete empirical material for further comparative research in this part of the world—that may also offer valuable insights for tourism development in other parts of the world.

Methodology

The methodology consisted of an overview of related literature (archives, libraries, data bases); data collection via filed trips, questionnaires and interviews with locals, tourists and tourism developers and other agents, including local authorities and analysis and synthesis of data (mapping, visualization of data) and creation of GIS data base for long-term sustainable use. The context of this research is the cultural and tourism geographies of the two regions. Primarily, Ayvalık and Lesvos were taken up independently; data on Ayvalık and Lesvos were presented and discussed comparatively. These consisted of cultural and tourism data; research in Ayvalık was carried out by Turkish geographers, while research in Lesvos was carried out by Greek geographers. Besides the literature and archive search, research also included social scientific methodologies, such as interviews and questionnaires supported by participant observation, in order to collect the variety of necessary data from all categories of parties involved (i.e. local residents, authorities, entrepreneurs, planners, tourism intermediaries and tourists) with regard to cultural and tourism resources of Ayvalık and Lesvos.
Results

The findings of this case study point to the significance of bottom-up horizontal networks and partnerships of mutuality and reciprocity, as most promising venues for the future development of various forms of tourism on the island of Lesvos, provided these initiatives overcome structural and functional barriers and constraints inhibiting tourism growth (vertical cooperation deficiencies). Ideally, of course, problem-solving and future potential growth and development in the tourism industry generally necessitate cooperation among all tourism stakeholders, at all levels, both vertical and horizontal.

Key References


2. Towards the formulation of a model for landscape conscience (‘Aegean2’)

This research project constitutes a study towards the advancement of landscape theory; furthermore, it specifically purports to contribute to a broader and more effective and intrinsic application of the European Landscape Convention among European countries that lag in this respect. In fact, such an understanding, analysis and interpretation of human-landscape interactions on the basis of landscape conscience is essential and imperative if public participation and governance are to be employed in landscape conservation, management and planning, (in the context of ELC aims towards more balanced human-landscape interrelationships and a higher quality of life). This study attempts to achieve this objective through an analysis of the factors and processes of landscape conscience formation, leading to the introduction of ‘a model of landscape conscience’ that pulls together human emotions, perceptions and behaviors deriving from, expressed through and affecting human-space interrelationships. The study is based on theoretical approaches and analytical models from psychology and geography. The landscape conscience model is intended as a tool towards landscape conscience assessment, improvement and/or modification, in the context of landscape planning, research, education, policy, etc. Its empirical testing took place in rural and semi-rural/urban Greece (and specifically in our case in the area around Mitilene, Lesvos), with the aid of ethnographic methodologies (interviews and questionnaires to local residents and stakeholders).
Results

The survey results indicate a deficient and/or underdeveloped landscape conscience in surveyed areas of Lesvos, pointing to some of the causes of this deficiency. This case study attempted to address some of the difficulties and challenges encountered in the implementation of European Landscape Convention and to contribute to their resolution and rectification—especially in the case of Greece. It is considered as ground work towards this goal, as concerns lay decisions on land use/change and landscape interventions with applications in spatial planning (e.g. sport, recreation, therapy), environmental education, policy development, public participation in land use decision-making, etc, aiming at the improvement of human quality of life and the restoration of balance between humans-nature and society-environment.

Lesvos island and the case study in the southeast part of the island — Source: http://www.argo-vatera.gr

Key References


Introduction
Portofino is a famous village and at the same time a small peninsula between Genoa and Sestri Levante (Liguria). Most of the peninsula is since 1935 part of the Parco del Monte di Portofino, which since 1977 has the status of a Regional Nature Park. The core area of the Park is located within three municipalities of the Province of Genoa: Portofino, the smallest with two square kilometres and a population of only about 580 inhabitants, and Camogli and Santa Margherita Ligure, with respectively 5,800 and 11,000 inhabitants on some 18 square kilometres. Most people live in Camogli and Santa Margherita, outside the park area, in contrast to Portofino, which is fully located within the park. The total protected area is 1056 ha. The highest point of the peninsula, the Monte di Portofino (610 m a.s.l.) is named after the small harbour of Portofino.

A main feature of the peninsula – and thus of the Portofino Park – is the steep ridge that rises from sea level up to Monte di Portofino over a distance of only one kilometre, with an average slope of 59°. The geology, climatic variations together with the various expositions and slopes of the place, have decisively determined its vegetation differentiation.

Land management situation
Over the recent decades there has been a strong pressure on the coastal area of Italy, a spread of villages and towns due to economic activities as well as tourism occurred with detrimental effects on the coastal zone.

Portofino encompasses a complex of environmental relationships, a case study full of interesting stakes that helps understand the evolution of landscape dynamics, of an extensive coastal front in the north-western part of the Mediterranean basin.

The long history of human habitation (from prehistoric times onwards) has shaped the landscape. From the 16th century onwards multifunctional land use was common. Over the past decades it changed, and tourism, habitation and nature conservation have become important. Less suitable areas have been abandoned.

Apart from a strategic transit harbour, the village of Portofino was since at least Roman times a fisherman’s place. Portofino became internationally famous among tourists already more than 100 years ago. Today, it is a well-known resort and an attractive site for the ‘rich and famous’, and well-to-do Milanese and Genovese urban people to have second houses, and for investors to develop facilities for tourism.

Apart from the statistics there is the story of the people. The farmers from the surroundings of Portofino village were interviewed by Mosconi (2000) during May 1999.. All farmers that have been interviewed were between 60 and 80 years old, as all young people moved to town or recreation resorts for jobs. Most of the old farmers were still (part-time) working. The number of farmers that still work as sharecroppers is very small. Presumably they still keep this position for the cultivation of land for their own purposes.
In the opinion of the old farmers, there are no incentives stimulating farming with their sons. The numerous laws and regulations that restrict the use of the park area, as well as the increased numbers of wild boar are found to be obstacles.

**Land use**
Most common are natural vegetation types: more then 50 % is forested, some 42 % is broadleaved forest, remaining is pine forest and mixed forest. Some 20 % is covered with macchia vegetation, and some 20 % of the area has an agricultural function (Figure 1)

Figure 1.Land use in Portofino
Farming in Portofino area is mainly for subsistence or a part-time activity– a characteristic of low intensity farming. Agriculture has been widespread in the east of the Park, in total some 150 ha and in addition some 40 ha of abandoned agricultural areas. In the park east of Olmi and Molini some 50 % of the land was cultivated, which is shown by the terracettes and (partly abandoned) orchards. In the past there were also terraces in the west, on the slopes near Semaforo Nuovo, but these have been abandoned and are totally eroded now. Most important for the local economy were olives. Most commonly grown are olives, largely for export. Main problem is the small size of holdings, i.e. 85 % of the holdings is less than 5 ha in size. Usually no irrigation is applied for olive growing and there are usually limited possibilities for mechanisation. Fertiliser use is common and pesticides are applied 2 to 7 times per year. Pesticide-use can also be high in crops like grape growing (Narciso 1992).

Also grapes and many other fruit trees were planted. Vine growing is less important nowadays, since prices are currently low and it is labour intensive.

Old abandoned farmland is sometimes restored, terraces are repaired, and houses are being renovated, often by people not originating from this area. Vegetable gardens are concentrated around the houses and small settlements. It is a type of ‘coltura mista’, mixed farming with orchards, fruits, some vegetables and often wheat or Lucerne. No grazing takes place, since grazing is not allowed anymore within the park boundaries. According to the historical land use survey grazing was always limited in this area (Mosconi 2000).

In the past the gathering of firewood was definitely one of the main factors determining vegetation patterns in the Mediterranean areas.

Wood was the only source of energy for many economic activities until the 19th century, such as carpentry, naval workshops, metallurgy, limekilns, or glassworks. In Italy, the trade of charcoal was very active, for energy supply to all main cities. Until the beginning of the century this was one of the major forms of income for the rural population. The sweet chestnut tree was intensively managed until the end of the 19th century. Due to the rural exodus as well as changing agricultural policies by the EC plantations were abandoned. Chestnut grows in oak forests, at more favourable, deep moisture retaining soils on north facing slopes.

Previous research

Extensive research was done in the period 1999-2001, in which a landscape survey was done with some 150 observation points in the regional park. In addition, historical analysis was done, as well as collection of geographical data (geology, soils, geomorphology, cultural history etc. Based on this survey a landscape classification was prepared with the programme Ecognition. This was based on map segmentation, based on geology, aspect and slope. As well as vegetation and land use. At the moment (2011), the monograph is in press, some 300 pages, bi-lingual Italian-English, full colour with maps and figures, describing the landscape ecology and landscape assessment.

Key References


Introduction

The Heerde municipality is situated in the northern part of the IJssel Valley. It measures some 8000 ha. mostly consisting of land and some 167 ha water. The number of inhabitants is 18.282, most live in the town of Heerde and smaller settlements like Wapenveld and Veessen.

There are three major landscape zones in the municipality: the Veluwe in the West, a transition zone and the IJssel floodplains in the East.

- The Veluwe is an old periglacial plateau which contains the largest forest area of the Netherlands. It is a protected area with many thousands of visitors each year. Core values are the size of the forest complex (the most extended forest complex in Western Europe), its drift sands, which form a rare habitat in Europe, and its variety of open and enclosed landscapes. Tourism and forestry are the main functions of this zone.

- The IJssel and its floodplains are formed by river dynamics. The IJssel river is one of the smaller rivers in the Netherlands (a branch of the River Rhine) and it is important for water discharge to the IJsselmeer. The floodplains and surrounding areas are traditional riverine landscapes, connecting Hansa towns like Zutphen, Deventer and Zwolle. Agriculture is the main function, and most land in this region is privately owned.

- The transition zone is the area where most settlements and infrastructure is found. This area is dominated by human settlement and (often small scale) service industries. This has historical reasons: in medieval times the main industries were dependent on the fresh and clean water from the Veluwe massive, which fed the water mills for various production processes, paper factories and laundries. Nowadays the central location in the Netherlands, as well the vicinity of larger cities promote service industries.

Land management situation

The floodplains were traditionally all meadows, due to the high groundwater table and flooding risk, but of late more and more fields are ploughed for maize production. The traditionally fine-mazed pattern of hedgerows and tree lines has disappeared as a result of rationalisation of agriculture.

Since the 1990s, floodplain restoration is seen as a necessity to increase the water retention capacity, as a flood mitigation strategy. More frequent flooding is part of this strategy, which goes with further ecological development, based on the ’Room for River’ program from the State River Authorities

Over the last decades there has been a strong urban pressure, from Zwolle and Deventer mainly, but also people from the west of the Netherlands that settled in these rural areas after retirement. In addition, small scale activities with regard to tourism have developed and in summer the area receives many national and –to a smaller extent- international visitors.
Land use

The main land use classes in Heerde municipality are shown in Figure 1.

Although farming is declining, it is still the mainstay of residents in the rural areas. There is an increase in scale of farming, fewer farms cultivate a slightly smaller area. Table 1 shows that the number of farms declined by 26% over ten years (1991-2001).
Table 1: Number of farms in Heerde Municipality

<table>
<thead>
<tr>
<th>Type of farm</th>
<th>1991</th>
<th>1996</th>
<th>2001</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arable farming and horticulture</td>
<td>30</td>
<td>28</td>
<td>20</td>
</tr>
<tr>
<td>Livestock farms</td>
<td>160</td>
<td>144</td>
<td>126</td>
</tr>
<tr>
<td>Intensive livestock farms</td>
<td>14</td>
<td>12</td>
<td>8</td>
</tr>
<tr>
<td>Mixed farms</td>
<td>17</td>
<td>10</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>221</td>
<td>194</td>
<td>163</td>
</tr>
</tbody>
</table>

Most common is livestock farming (which consists mainly of keeping cattle, sheep, goats and/or horses), the traditional land use for the low-lying meadows in the flood plains. Although very intensive with regard to European standards, it is not intensive, high-density livestock farming like poultry battery cages and pig farms.

Table 2: Land use

<table>
<thead>
<tr>
<th>Type of farm</th>
<th>Land use Heerde municipality</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arable farming and horticulture</td>
<td>3 %</td>
</tr>
<tr>
<td>Livestock farms</td>
<td>89 %</td>
</tr>
<tr>
<td>Intensive livestock farms</td>
<td>1 %</td>
</tr>
<tr>
<td>Mixed farms</td>
<td>7 %</td>
</tr>
</tbody>
</table>

Almost 90% of the land is used by livestock farms. The farms are often small and fragmented, income is small and farmers seek therefore additional income from off-farm activities. This includes recreational horse riding, campsites on the farm, fruit picking on the farm, etcetera.

The land is fragmented over the farms. Some 70% of farms has up to 5 parcels of land, and 9% has 10 parcels or more. The best potential for farming is found in the areas in the floodplain. In the future, it is expected that organic farming will increase, as a response to environmental and societal pressure.

Previous research

The area was part of the National Landscape Survey, which investigated changes in historical linear landscape elements between 1900-2003. The IJssel Valley comprised 4 of the 72 sample points in the Netherlands, which makes it possible to relate it to land use developments in the Netherlands.

Although several studies have evaluated the presence of historical landscape relicts in the Netherlands, these have so far been restricted in terms of the time periods they covered and the methods they used. As a result, there is insufficient reliable information available about the precise changes that have taken place in such landscape elements. The present study connects with the landscape sample survey 'Steekproef Landschap', which originally analysed landscape changes in a wider perspective between 1990 and 2003.

On the basis of 72 1x1 km grid squares, we have analysed which landscape elements that existed in 1900 were still present in 2003, using historical topographic maps and aerial photographs (for the post-1990 period). Results have been obtained by extrapolation from the 72 grid squares for the
The Netherlands as a whole, for the higher and lower parts of the country and for some landscape types. As far as possible, these have been compared with the conclusions of previous studies.

The aim of the current project is to extend the time series from 1990-2003 for historical relicts, which has been compiled for the Steekproef Landschap project, to allow analyses starting from 1900. We have used historical topographic maps to supplement the series starting in 1900 with data for 1950 and 1980. The analysis has focused on linear relicts. Comparisons with previous studies are also made in the report.

The results show that between 1900 and 1950, landscape changes were mostly related to changes in agricultural practices, particularly the reclamation of wastelands. In 1900, large stretches of land had not yet been reclaimed, especially large tracts of heathland and raised bog in the sandy eastern parts of the country. After 1950, it was land consolidation schemes that became more and more important in reshaping the landscape. Many traditional boundaries between parcels disappeared as a result of larger parcel sizes and improved drainage. In some cases, whole new drainage systems were constructed. This period of agricultural redevelopment in the Netherlands continued until 1990, although the process was already slowing down in the late 1980s. After 1990, another large-scale landscape development set in: that of urban sprawl. Although this development had already started in the 1960s, it was originally restricted to the main cities. Since 1990, urbanisation has become the main driving force behind changes in the Dutch landscape. Our main conclusions at national scale are:

- Of the linear historical relicts that were still present in 1900, according to topographic maps, 51.6% were still present in 2003.

- The findings for the various subcategories of landscape elements show that dikes and roads tend to persist (about 80% of them still being present in 2003), unlike rows of trees and hedgerows and other boundaries between parcels (about 45% of which were still present in 2003). Water elements occupy a middle position, with 60%.

Key References


http://www.hattem.nl/roonline/0246/AF999A24-6C53-490A-AAAD-BD8513A97D9F/t_NL.IMRO.0246.00000405-va01_5.1.html#inhoud
http://www.nationalelandschappen.nl/landschap.php?id=16
http://www.synbiosys.alterra.nl/natura2000/gebiedendatabase.aspx?subj=n2k&groep=5&id=n2k038#Ken