

POSTER ABSTRACTS
(in alphabetical order)

**Squaring the circle – how policies influence the interrelation between
cultural landscape and regional development:
A case study from the Visp-Saastal region (CH)**

Jenny Atmanagara

*C/o Institute of Geography, University of Berne
Hallerstr. 12, CH – 3012 Berne, Switzerland
E-mail: atma@giub.unibe.ch*

General Background

The diversification of activities in multifunctional landscapes demands the exchange of environmental goods and services between different regions and within a region. For example, tourism landscapes are often situated in rural areas, whereas the demand arises in the agglomerations and urban areas. Thus the interaction between these regions causes an increasing amount of traffic. On the one hand this is a precondition for tourism activities, but on the other hand it causes huge problems. The necessary infrastructure is usually provided by the public authorities.

Project Aim and Study Area

This poster presents the first results of my PhD thesis “Impacts on Regional Development and Cultural Landscape by Infrastructure Promotion in Regional, Transport, and Tourism Policy”. Supposing that policy has a strong influence on the accessibility of regions, regional development and cultural landscape change, the study aims at the evaluation of infrastructure promotion by the Swiss regional, transport, and tourism policy. The region of Visp-Saastal (Canton Valais) serves as the study area. The results are finally compared to development in Switzerland and the Alpine region as a whole.

Applied Methods and Data

Based on an impact model and relevant indicators, the impacts of regional, transportation and tourism policy on the cultural landscape and regional development are assessed. For this purpose, necessary information is derived from analysis of the literature and statistical data (quantitative data for the years 1970, 1980, 1990, 2000). These sources are supplemented by interviews with experts from the federal and cantonal administration, as well as transport enterprises and tourism organisations (qualitative data).

First Results

The poster will address the following main issues: the infrastructure is supported by different financial instruments that are distributed among a number of policies. The most important one for Switzerland within the last 30 years was the investment aid for mountain areas in regional policy. This financed transport and tourism infrastructure, *inter alia*. The promotion of infrastructure has positive and negative impacts on regional development and the cultural landscape. On the one hand, the improvement of accessibility slows further migration from rural areas, supports new economic activities, and thereby contributes indirectly to the maintenance of the cultural landscape. On the other hand, the upgrading of infrastructure affects the cultural landscape, increases land use conflicts and fragmentation, and often destroys the natural basics for environmental goods and services. For a sustainable development of multifunctional landscapes, the impacts of infrastructure promotion and interrelations with other policies must be considered. The first approaches and examples of best practice will be presented.

Contemporary land use in suburban areas – processes and future outlook

Jerzy Banski

Institute of Geography and Spatial Organization, PAS, Warsaw, Poland

E-mail: jbanski@twarda.pan.pl

The structure of land use in suburban areas shows certain specific features, with clear differences noticeable between land use trends around large urban agglomerations and typical rural areas. Among other things, we will consider the significantly greater proportion of non-agricultural land and specific cultivations among agricultural uses in suburban zones.

Severe conflicts arise in areas around larger cities, with the agricultural function having to compete with the residential, and to a lesser extent the industrial and transport-related. Two processes standing in opposition to each other are involved. An absorbent market is a stimulus to agricultural intensification and an increase in the area used agriculturally, while the expansion of the area and population of cities leads to an ever-worsening shortage of the land required for this. The decline in the area of agricultural land around large agglomerations is a constant and justified phenomenon. Land used agriculturally is taken over by other branches of the economy at a rate dependent on the country's economic condition. For example, the period of intensive industrial development – i.e. the 1960s and 1970s – saw urbanized areas lose several times more land from agriculture than was the case in the crisis years of the 1980s.

Today's changes in the structure of land use are correlated with the development of small business entities and housing. The greatest number of small firms in rural areas are located around large cities (e.g. Warsaw, Kraków, Poznan), with very few in peripheral areas. The concentration of non-agricultural economic activities in the vicinity of towns and cities results from the fact that they possess a more extensive technical infrastructure, as well as a more favourable structure for the population living there. In addition, many entrepreneurs "escape" to rural areas, primarily because of the very low land prices. As a result, in 2001 the number of entities, e.g. in market services, was 910 in rural communes and 1205 in urban-rural communes, as calculated per 10,000 people of productive age.

An interesting phenomenon that is directly related to housing construction in villages neighbouring big cities was a rapid increase in the acreage of agricultural lands where farming was discontinued, since it turns out that the transformation of land from agricultural to commercial can only be performed after several years of it having not been farmed. Therefore, temporarily unused land awaits a change in classification. The transformation is very profitable for the owner, since the price of such land rises severalfold. The amount of unused land in peripheral areas also rose, but this was usually due to the fall of the national sector and the fact that farming has become unprofitable.

Multifunctional land use for meeting future demands for landscape goods and services

Christophe Chauvin

Cemagref, 2, rue de la papeterie, BP 76, F-38402 St Martin d'Hères, France

E-mail: christophe.chauvin@grenoble.cemagref.fr

The Territorial Forest Charters (TFC) constitutes a new management tool launched in France in 2001 in order to integrate better forest management in land management. TFCs are built on the principle of participative multifunctional management: after a shared diagnosis, stakeholders and users of the forests are supposed to elaborate a common project for the forest at the landscape scale, in relation with the demands and constraints from society as a whole. The project includes a programme of action, and a monitoring system for follow-up between partners.

After 3 years, about 50 TFCs have been launched: it appears that it takes at least two years to build a charter, and probably two more years to reach the first effective action in or around the forest. The support of local political authorities and structures is undoubtedly essential: a project aiming at a simple validation of pre-existing classical forest projects, although it will be more easily built, will not come to fruition. At the present stage, it can be said that TFCs are already an active learning process for foresters and for their interlocutors, towards more participative management: much can be learnt about social demands and political mechanisms from meetings, discussions, soon from the first implemented actions, and perhaps even more so from failures or delays.

The role of open spaces in the longer-term planning of the spatial structure of urban regions - a case study of the Warsaw Metropolitan Region

Bożena Degórska

*Institute of Geography and Spatial Organization
Polish Academy of Sciences, PL- 00818 Warsaw, Twarda 51/55*

E-mail: m.degor@twarda.pan.pl

In the planning of city regions, open spaces should play a structure-forming role in their spatial organization, including the direction of longer-term development. The inner boundaries of open spaces are responsible for the control of urban expansion. They prevent urban areas from becoming too spread out, as well as from merging into one another. It is also important to retain countryside and to protect the character of historic towns. The objectives of the establishment of open spaces also include protection of the ecological functions and of the specific character of rural space in the vicinities of large towns, as well as the securing of places for leisure and recreation within urban regions. However, in rural open spaces there arises the problem of balancing the needs of developing recreation and sports grounds and the needs of agriculture.

The primary components of open spaces on a regional or sub-regional level are agricultural areas (arable land, meadows, pastures, orchards and other forms of agricultural land use), forests, surface waters and other areas characterized by little or no transformation and which retain the properties of the landscape resulting from the physical setting, as well as open air sports grounds and recreational facilities, and primary green areas located inside towns. It is acceptable to introduce the necessary infrastructure (e.g. for transport or power supply) and to preserve the dispersed rural settlement in the rural landscape. This issue, however, has to be considered separately for each definite area.

The basic principle of the designation of open spaces around the large cities is their spatial continuity and permanence. They should retain their connection with the green areas inside the towns. The designed pattern of open spaces in urban regions must take into consideration the current and future needs in the area of urban development and the increase in the load on the environment. Some open spaces around large cities are called a green belt or a green ring. These areas require an appropriate spatial policy and land use. Open spaces should be treated in urban planning as being equally important as built-up areas. The fundamental aim of the open space policy is to prevent urban sprawl by keeping land permanently open. The ecological effectiveness of open spaces depends, in addition to the preservation of spatial linkages, upon the natural resistance of the biotopes, their appropriate magnitude, land properties and adequate use. In order to maintain the ecological functions of open spaces, it is necessary to preserve and strengthen the areas assigned as a priority, including habitat, water and soil protection areas and air regeneration areas, etc. The planning of open spaces within urban regions and within the confines of towns requires a somewhat different, though not separate approach.

The investment-related demand for vacant areas in urban regions causes serious danger to the open spaces. The most dangerous is urban sprawl, especially in areas where the determination of open spaces had not been a subject of spatial planning in regional and sub-regional scale. On the other hand, it is true that for some urban areas and regions for which green belts or green rings have been established and the areas intended for urban development have already been exhausted, it becomes necessary to revise the planning policy.

The presented study refers to the problem of urban sprawl around Warsaw and to opportunities for the sustainable planning of the Warsaw Metropolitan Region, with particular regard to open spaces planning.

The planning perspective of multifunctional land use at the regional scale

Marek Degórski

Institute of Geography and Spatial Organization, Polish Academy of Sciences, Warsaw, Poland

E-mail: m.degor@twarda.pan.pl

One of the consequences of civilisation-related population growth is constituted by the structural transformation, reflected through land use changes, which in turn generates functional and spatial changes in the landscape. Along with these changes, there are also transformations in the domains of resources, structure, diversity, the stability of the matter and energy fluxes in the landscape (the geo-dynamic and bio-geo-chemical processes), the spatial cohesion of the areas valuable for their natural assets, or the social utility of landscape quality.

A special place in all these changes is occupied by rural areas, particularly those located in suburban areas. These areas, as indicated above, are the most active element of space in civilisation-related transformations. They are, in particular, the locus of the change from the traditional agricultural functions to the residential, transport, industrial, service or tourist-recreational functions. These areas are therefore subject to the strongest processes of anthropomorphisation of the landscape.

The aim of this presentation is to identify the conditions of regional development linked to spatial differentiation of multifunctional land use at the regional scale. In the procedure of scenario-creation, all landscape functional goals are taken into consideration.

One of the tools allowing for the optimisation of this development is smart growth. This concept associates the ideas of sustainable land use, sprawl control and spatial order. Smart growth means the smart management of resources in both growing and declining communities. Smart growth, like sustainable development, is both productive and environmentally, economically and socially sound, while enhancing the choices that people have regarding housing, jobs, recreation and transportation. The long-term needs of people, businesses and the environment ultimately define what is smart and sustainable growth and what is not.

The application of the ecosystem evaluation of forests in the praxis in the Czech Republic

J. Fialová, F. Špacek, I. Vyskot, J. Schneider & P. Kupec

Faculty of Forestry and Wood Technology, Mendel University of Agriculture and Forestry.

Zemědělská 13, 613 00 Brno, Czech Republic

E-mail: fialka.jitka@post.cz

Forests are one of the dominant components of the natural environment, and have a basic influence on the quality of the environment of a human population. The existing utilitarian and anthropocentric conception of the relationship between man and forest has been based on the idea that forests exclusively serve man according to his present demands. The new modern conception of integrated multifunctional management recognises the equivalent importance of all of the forest's functions.

There are several methods in the Czech Republic for the evaluation and quantification of forest functions, e. g. the method published by Seják [1], Vyskot et al [2]. The method used by Vyskot et al. [2] is the only ecosystem method in the Czech Republic that is enacted and used by the Czech environmental inspectorate for the valuation of detriment (damage) to forest functions.

The ecosystem method of quantification and evaluation of forest function (Vyskot et al. [2]), is based on the quantification and evaluation of elements and parameters of forest ecosystem, determining their functional effects. The procedure is implemented on two levels; the real potential of forest functions is the quantified functional potential of a forest under optimum ecosystem conditions, and the real topical effect of forest functions is the topical quantified functional effect of a forest under topical ecosystem conditions. The functions of forests are determined by function criteria. Their values are expressed by a value in various classification levels (0 - 6), from functionally unsuitable to extraordinary. The real effect expresses the rate of a produced function with respect to its potential capacities in percentage values. The stand condition is specified by parameters of the age and spatial structure, and is affected by topical health dispositions. The age and spatial structure of forests is not determined only by natural ecosystem process, but is significantly modified by forest management measures and decisions.

The quantification and evaluation of forest functions is necessary for the establishment of the recommended optimized system of multifunctional forest management. The results of the quantification and evaluation of forest function can be used in many spheres of decision-making. The forest owner, state body or institution can use these results. They can use results through the creation of Forest Management Plans, Regional Plans of Forest Development, which are the defining principles of forest management according to the natural forest areas in the Czech Republic, Management Plans for protected areas, or the construction of recreational areas, etc. The method of Vyskot et al. [2] is also used for the evaluation of detriment to forest functions. Czech courts of justice use the scientific reports based on this method as conclusive evidence.

Landscape as a new space for art

Lucie Fiserova

*Mendel University of Agriculture and Forestry Brno, Department of Landscape Architecture,
Zemedelska 1, 613 00 Brno, Czech Republic
E-mail: fisla@email.cz*

The article aims to suggest land art as an alternative way of reclaiming post-industrial landscapes and brownfields, and tackles land art as a new type of land use that could satisfy the needs of modern man for aesthetic features in the urban landscape.

How could a desolate or devastated landscape be utilised or reclaimed? How could spaces that are no longer used for traditional human activities find a new function? A new direction might be suggested by the work of land artists. Those artists who have worked with the landscape and the natural space since the 1960's do use the potential of forgotten, neglected and often badly damaged landscapes in order to create new aesthetic and cultural values. The landscape is used as a stage for artistic action, as well as a material in itself. The hand of an artist can turn the landscape into a sculpture, painting, object or concept. Thus, a space originally having no sensible use receives a new ideological input, absorbs it, and comes back to life again. The viewer, who has the chance to watch this rebirth of a desolate landscape into a space with a new meaning, will perhaps be moved and become conscious of the importance of the landscape and nature in general, and begin thinking about their protection for future generations.

The historical composed landscape – dynamics and conditions for regeneration

Markéta Flekalová

*Mendel University of Agriculture and Forestry Brno, Institute of Applied and Landscape Ecology,
Zemědělská 1, 613 00 Brno, Czech Republic*

E-mail: marketa.flekalova@uake.cz

The historical composed landscape is one of the land use types that is determined by the cultural-historical development of a given area. Man impress his thoughts to the landscape, and intentionally forms its visual appearance.

One such area is the former dominion of Nové Dvory in Central Bohemia. It was adapted completely in the style of an ornamented farm, especially by Jan Rudolf Chotek, between 1787-1824. The compositional heart is Kacina Castle, which was built in the imperial style. Thanks to its position on the mound, the landscape arrangements could be developed in all directions. In accordance with the baroque tradition, the composition was founded on two trident-shaped visual axes, as asserted by Novák 1999, which diverged both of the yard of honour and the garden frontage. These ones were fixed up by tree alleys, important points in the landscape and then by wooden vegetation elements.

During the development of the dominion of Nové Dvory the scale of the landscape became finer together with the growth of human impact, its permeability grew, and a mosaic structure arose. As a result of the post-war intensification of agriculture, the scale got courser with compact masses of woods and fields.

Part of the former dominion is covered by the landscape heritage zone Žehušicko, while the adjacent castle and English park were declared a national cultural site in 2001. There is an interest in keeping and regenerating the landscape elements of importance in raising the compositional aim. Current landscape requirements differ from the conditions required in forming the composition. It is necessary to harmonize economic interests, site conservation regime, landscape character protection, conservation and development of the Areal system of ecological stability (USES), the living standard of the inhabitants and tourism.

The main principles of composed landscape regeneration are restoration of the composition legibility and the space relations between castle and landscape, although it is not possible to return the fine scale of the whole landscape. The castle is opened to the landscape, visually organizing a broader space and serving as the dominant feature. The proposal renews the visual links, makes the composition remain visible, eliminates inept adaptations made after the Second World War, makes the landscape accessible to walkers and works with wooden vegetation elements to reach the original composition aim. It suggests considering the regeneration of the water system, now collapsed, which drained wet areas and enabled the existence of many ponds.

Landscape regeneration cannot be ordered. The aim, advantages and disadvantages should be discussed with subjects acting in the area and a suitable compromise, a sensitive solution, found. During the post-war period, spiritual relations and also the spatial-temporal continuity in the landscape were interrupted. Nowadays it is necessary to support the establishment of new relations, including the preservation of landscape characteristics and the mental heritage of the ornamental farm. This does not mean a thoughtless return to the original shape; landscape transforms together with changes in people's needs, and it should not be kept in a constant form. The new content could point out the cultural-historical importance and focus on short-time visitors, which will instead bring to the landscape new dynamics, different from natural or agricultural dynamics, but also economic sources.

The potential for recreational activities and tourism on abandoned land in the mountains of SE Poland

Radosław Janicki

Department of Environmental Protection, University of Maria Curie – Skłodowska

Al. Krasnicka 2CD/19, 20-718, Lublin, Poland

E-mail: radjan@umcs.lublin.pl

The study tackles issues concerning the abandonment of land in Southeast Poland that occurred as a result of World War II and subsequent events. This increased the potential for the tourism-related use of local landscapes. Nowadays most of this land is protected as national or landscape parks, due to its high aesthetical, ecological and recreational values.

The terrain under review consists of medium-height mountains (called Bieszczady) in the south, and its foothills in the north. While the foothills have quite fertile soils, they were used for planting crops, and the mountainous part, with poorer soils, was used mainly as pasture. As a result of overpopulation, both parts were highly deforested by the beginning of WWII. This highly fragmented landscape was a mosaic of narrow strips of fields, meadows, pastures and forests. Throughout the 20th century wars, especially World War II and the following civil war between Poles and Ukrainians, the majority of local farmers were resettled or perished. Hence, for over 60 years, the renaturalization of the local landscape has been in progress, manifested in the growth of forested areas. This land went through a series of transitions in land use – from agricultural to being abandoned, to recreational use.

The research on land use change required the examination of statistical data, archival and present-day maps, aerial photographs as well as field investigations. Computer-aided spatial data analysis and modelling, through the use of Geographical Information Systems (GIS) software, such as ArcView version 3.2 and ArcInfo, were conducted. For basic analysis, maps at the scale of 1:300,000 dating from 1929 and 1997 were studied. Two villages – Lomna and Letownia – were selected for more detailed investigations. Comparisons were made of the land uses in both villages between the years 1852 and 2002.

As a result of the multifaceted research, three patterns of landscape succession were distinguished. In small areas found only near the bigger towns, changes in land use were minor. Most of the land in those villages remained agricultural, but some families that have found work in nearby towns no longer cultivate their land. The proportion of foothill land, however, that remains cultivated as before, changed significantly – about 40-60% of land was abandoned. In the last decade, tourism gradually became a more important sector of the local economy. Radical changes occurred in large areas in the mountains, where 80 to 100% of land was abandoned. The change related both to intensity and type of land use. Nowadays, the leading use of the landscape is tourism-related.

Population continues to decrease and, as a consequence, land is left uncultivated. While the southern and higher part is popular among tourists, the northern areas remain neglected. The potential for recreation in both parts is high: the region has interesting relief, most of it is covered with forest, and an artificial lake built in the seventies, sits at the centre, and the area is surrounded by communities with interesting folklore and old architectural structures. The land has potential for both intensive and extensive forms of tourism and recreation for young and energetic people as well as for families and elders. Thus it is recommended to develop the tourism infrastructure here with the aim of attracting visitors. This would improve the financial situation of residents, which at present is unsatisfactory. Agro-tourist lodging and services, which have already begun to develop in the region, could offer improved livelihoods to locals and attract tourists. Since this land has high potential for recreation and tourism, this use of the landscape will emerge as a more environmentally-friendly alternative, with potentially higher benefits to upland dwellers.

Water management as a driving force for multifunctional land use – a case study of the Gasawka River catchment

Edmund Kaca & Leszek Labedzki

Institute for Land Reclamation and Grassland Farming, Poland

E-mail: e.kaca@imuz.edu.pl, labl@poczta.onet.pl

The water management system developed and implemented in the Gasawka River catchment is presented in this poster. Options for the management of water resources depend on many factors and functions, such as land cover, agriculture, forestry, fishery, tourism, recreation, industry, ecosystems, biodiversity and so on. The case study shows how operational water management activities depend on land use and functions of water resources.

The super-system of the Notec River basin has been divided into 12 sub-regions in which research, implementation and promotion activities were conducted. The systemic principles of water management are under implementation in two large subregions: the Old Notec subregion and the Gasawka subregion - a subcatchment with an area of 590 km².

In the Gasawka catchment, different functions of water resources are identified. The users of water are: fish ponds, a sugar plant, grasslands in subirrigated objects, the water biocenosis of the Gasawka River and its tributaries, angling, tourism and recreation. The functions of water resources result from the economic and demographic conditions in the region, as well as history, nature and landscape value. The key problem is how to perform the functions, because water resources are insufficient to meet demands related to certain functions. Further sustainable development can be determined and restricted to a great extent by water availability.

To fulfil the required and expected functions of water resources, a water management system has been implemented that enables the multifunctional development and use of land and water resources. If the system is not introduced and performed, some of these functions cannot be realized because of the shortage of water resources. That is why the water management system can be treated as a driving force for multifunctional land use.

For many years, efforts have been made to define system activities aimed at a balanced development of farmland in regions where water is a resource available at a minimum level and thus requires protection and rational use. It was assumed that, to accomplish the objective of the balanced development of rural areas, a comprehensive and systemic approach was necessary for regional water management.

A water management system in the Gasawka River catchment has been developed, with the purpose of developing sustainable agriculture and ecologically sound waters in rural areas. The analysis conducted indicates the need for rational and planned use of water resources. Failure to manage the water resources of the catchment may lead to considerable water deficits therein, both in the biologically necessary flows and business water intakes.

The Gasawka subcatchment is also a supersystem for subirrigation systems and other water users and consumers. In order to ensure the efficient management of water resources, a three-level control hierarchy was established: 1 - the top level for the coordination of water distribution between the water management subregions, 2 - the subregional water distribution control level, 3 - the user/consumer water management level (water management in a secondary subirrigated unit, fish ponds etc.).

The water management system algorithm can be used to analyse alternatives for future water management processes with respect to changes in land and water use and functions.

Interconnection of landscape elements through energy and water vapour advection processes

Andrzej Kedziora

*Research Centre for Agricultural and Forest Environment, Polish Academy of Sciences, Poznan,
Bukowska str. 19, Poland*

E-mail: kedan@man.poznan.pl

During the warm period and under conditions of intensive solar radiation, one can observe differences in the surface heating of individual elements of landscapes that have a diversified structure. Bare soils like fallows or rye fields after harvest are much more strongly heated than adjacent fields covered with rich vegetation, especially tall vegetation such as afforestation.

Such differentiation in the heating of an active surface induces local atmospheric circulation, which transports the heat from over the bare soil to fields covered by plants or to water reservoirs. This heat transfer causes increased evaporation from these surfaces. On the other hand, when wind is blowing from a wetter area towards dried ones, the water vapor is transported by the air, and this process can cause an inversion of the vertical humidity profile, and as a result, the condensation of water on the active surface is observed even when air humidity is very low.

The paper presents the results of investigations of advection processes observed within agricultural landscapes located in different climatic zones. The case studies concern advection processes occurring in the following conditions:

wind is blowing from crop fields towards a tall stand of trees,

wind is blowing from an area after harvest toward an irrigated alfalfa field,

wind is blowing from mountains towards a semi-desert area,

typical oasis effect: lysimeter with shallow ground water table located in a sugar beet field.

The result of these investigations shows that the effect of heat advection can enhance evapotranspiration by as much as 40%. The mean daily density of the horizontal flux of heat advection can reach as much as 50 to 60 W·m⁻². The relative share of heat advection in energy available for ecosystem evapotranspiration is higher when net radiation is lower, i.e. in the spring and in the autumn. The condensation of water vapor on the active surface of very dry soil was observed even when relative humidity was about 15% but the wind was blowing from the mountainous – in very wet areas. Advection processes are very important in the case of shelterbelts surrounding the mid-field ponds. These shelterbelts are biogeochemical barriers, and their evapotranspiration enhanced by advection can completely control the inflow of chemical compounds transported by ground water into water reservoirs.

An introduction to the Leitbild concept and its requirements in environmental planning studies – Demands on the Leitbild term and what environmental planners should expect from it

Hermann Klug¹ & Marion Potschin²

¹ *Centre for GeoInformatics (Z_GIS), University of Salzburg, Hellbrunnerstraße 34, 5020 Salzburg, Austria, E-mail: hermann.klug@sbg.ac.at*

² *Centre for Environmental Management, School of Geography, University of Nottingham, Nottingham NG7 2RD, England, E-mail: marion.potschin@nottingham.ac.uk*

As demonstrated elsewhere, the landscape planning of multifunctional landscapes is performed through a variety of methods, concepts and theories. In this presentation we shall focus on the "Leitbild" approach. At present, the term is introduced into the relevant English literature by using several attempts for translation. Confusion arises in the selection of words such as landscape exemplary model, landscape guideline, landscape vision, guiding pictures, target concept, target system, guiding vision and others, as well as the theory behind these words. These translations do not capture the true meaning of and complex approach to this method. Although this and similar concepts are very fashionable nowadays, there is a need for a better cross-disciplinary understanding so we can use all good practice and experiences in this field.

In general, two main landscape ecological perspectives of Leitbild development become apparent. The scientifically qualified expert opinions are based on scientifically proofed and measurable criteria ('hard fact systems'), whereas the more transdisciplinary holistic view integrates social needs, economical demands and political constraints, and is more subjective than objective ('soft systems'). The pros and cons of the two different approaches have been widely discussed in the literature. It has not yet been possible to combine physio-geographical and social-economical aspects to overcome the present weaknesses of each.

Different contexts, perspectives and uses of Leitbilder are investigated, from historical origin to present developments. Additionally, examples are extracted from recent publications and brought in connection with different aspects (historical, abiotical, biotical, aesthetical, functional-balanced, and others), and disciplines in the development environment of Leitbilder (e.g. landscape planning, geography, landscape ecology, and others). To overcome the existing controversies to other expressions, putative synonyms as termini in relation to the term Leitbild are confronted and explained against the Leitbild term. Hence most of the putative synonyms were developed in German-speaking countries, and English translations and explanations are given. It should, however, also be noted that the German term Leitbild has been introduced in the English literature without a more detailed explanation (paper) of its approach. This presentation and the subsequent publication will overcome this shortcoming

Having distinguished several termini and clarified essential elements of the Leitbild term, we arrive at a synthesis of the Leitbild definition: A Leitbild describes the aspired state of a spatial unit or a specific issue, taking into consideration the relevance of the driver's primary objectives. System immanent target conflicts are dealt with by means of a preference ranking or a balancing of interest.

Having explained the background and meaning of Leitbilder and how the concept can be used in landscape planning studies, the research provides a significant step towards the progression of Leitbilder. It contributes to an understanding of how, under certain circumstances, the landscape of tomorrow will best be prepared.

Changes in landscapes as indicated by historical maps

Helle Koppa¹, Jüri Jagomägi^{1,2} & Ülo Mander¹

¹ Institute of Geography, University of Tartu, 46 Vanemuise St., 51014 Tartu, Estonia

E-mail: hellek@ut.ee, ulo.mander@ut.ee

² Regio Ltd, Riia 24 Tartu, 51010 Estonia

E-mail: jyri@regio.ee

Landscapes are dynamic, continuously changing systems. For a better understanding of functions, structures and changes in landscape, we should add a historical dimension into landscape research. While landscapes of the present and recent past can be observed using remotely sensed data, historical landscape patterns can only be explored from old maps.

The integration of information from such diverse sources into GIS requires one to deal with a variety of differences. The most important and fundamental of these are:

1) geometrical differences – differences of scale, accuracy; differences in mapping techniques; differences in reality model;

2) differences in content and in semantic agreement – number of features; content of features; thematic information interpretation;

3) temporal fault – the date of the landscape situation is older than the nominal date of the map. This is a considerable source of errors in the investigation of landscape dynamics.

These differences are often intertwined, which makes it difficult to understand whether the changes really happened in the landscape or were just changes in the map image.

The major focus of this research is the set of spatio-temporal information of the landscape, which is collected and interpreted from a sequence of maps extending from 1800 to the present day. In this study, 6 time layers describing the area of Vana-Kuuste, Tartu County, Estonia (~12 km²), were used. The study site is located in the Porijõgi catchment, which has served as a pilot study area for various landscape processes.

The newest time layer is based on the digital Estonian Basic Map (scale 1:10,000), which represents the present landscape (1995). The next time layer consists of the land-use plans of former collective farms (kolkhozes; 1:10,000), which represents the period of the extensive land reclamation campaign (1970). The third map layer consists of Soviet topographic maps (1:25,000), which show the condition of the landscape before the widespread land reclamation (melioration) campaign (1947). The next three layers are based on old cadastral maps from 1914, 1870 and 1800 (1:4500, 1:4500 and 1:5200, respectively).

Hardcopy maps were scanned; old cadastral maps were photographed; and film exposures were scanned. Rasterized map images were transformed and rectified to the Estonian Basic Map projection according to the contemporary cadastral boundaries. In the process of vectorizing, we identified land use units on the raster map. The vector data was organized in thematically defined layers. These thematic layers were used for composing thematic maps, which represent the land use of each time layer in the Vana-Kuuste area.

The analysis of the thematic temporal layers of the study area considers: 1) the quality assessment of the materials used and the analysis of their suitability for landscape changes; 2) the estimation of errors and the reasons for differences between time layers; and 3) the analysis of landscape changes as indicated by land cover and land use characteristics over time.

GEO-data in Denmark. A state of the art basis for modelling the effects of multifunctional agriculture

I.T. Kristensen, S.L. Tind &, E.O. Bach

Danish Institute of Agricultural Sciences. P.O. Box 50. DK-8830 Tjele. Denmark

E-mail: sonja.tind@agrsci.dk

Changes in agricultural structure may have an impact on employment in rural areas, the environment, wildlife and landscape. Traditionally, administrative units have been used in describing the agricultural structure. This poster describes a new method to determine the geographical variation in agricultural structures using data from individual farms and map the geographical distribution of land use and types of farming.

The Danish General Agricultural Register and the Central Husbandry Register (GAR/CHR) has provided the opportunity to map individual farms. In Denmark, information about all farms are registered together with address co-ordinates. However, it is difficult to get an overview from point data. The Danish Institute of Agricultural Sciences has developed a method to determine the geographical variation in agricultural structures from data from individual farms. To do so, farms are categorised into a number of classes so as to associate the farm category to the arable land and to map the arable land (Figure1).

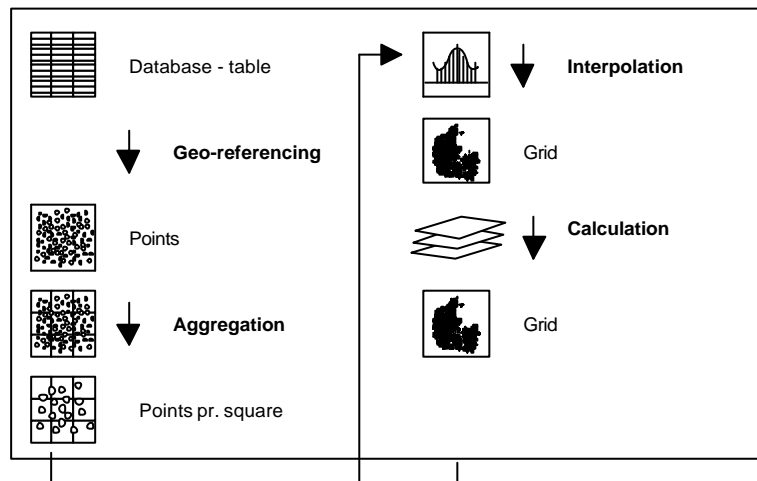


Figure 1: An overview of the working process for the classification.

Through GIS and geo-statistical analyses, the observations are generalised to maps showing the geographical variation of, for instance, mean farm size, mean livestock hold, or the number of animals per hectare. This poster shows examples on the mapping of beef cattle farms and grassing areas in a Danish landscape, which is designated as one of the study areas of the MEA-scope EU strategic research project (www.mea-scope.org). In this project, the maps and data serves as input for the modelling of the effects of multifunctional farming.

The mapping and integration of multifunctionality in landscape and agriculture

***Søren P. Kristensen*¹, *Søren Præstholt*² & *Henrik Vejre*³**

¹ *Institute of Geography, University of Copenhagen
Øster Voldgade 10, DK-1350 Copenhagen K, Denmark
E-mail: sk@geogr.ku.dk*

² *Institute of Geography, University of Copenhagen
Øster Voldgade 10, DK-1350 Copenhagen K, Denmark
E-mail: sp@geogr.ku.dk*

³ *Landscape and Forest, Royal Veterinarian and Agricultural University
Rolighedsvej 23, 1958 Frederiksberg C, Denmark
E-mail: Henrik.Vejre@flec.kvl.dk*

Multifunctionality is used in various scientific and political circles to compare the agriculture of Europe and other regions of the world with old cultural landscapes. Further, the use of multifunctionality in relation to landscapes has increased during the last decade. Despite its widespread use, few well-defined and broadly accepted definitions exist. This paper analyses different aspects of multifunctionality in relation to both landscape and agriculture. The purpose is to arrive at a deeper understanding of the types of multifunctionality occurring within each dimension, the driving forces behind them and the diversity and complexity arising from the integration of the two dimensions. The analysis is rooted in a three stage model dealing with functions in relation to landscape, the farm enterprise, and the farm-related building structures.

The paper is based on a case study from the urban fringe zone of Copenhagen, Denmark. Information from qualitative interviews and a questionnaire survey of agricultural production and other uses of agricultural assets (land, buildings, labour) forms the basis of the analysis. In addition, information about land use practices and other activities and area designations, such as recreational use, non-agricultural land use and protected area designation are integrated with the former data set in order to investigate the diversity of uses and functions in the area. A classification of agricultural enterprises and land according to the level of multifunctionality is a central step in the estimation of the actual and potential level of multifunctionality in the case area. The paper discusses the influence of temporal and spatial scale on multifunctionality, and normative and positive definitions of multifunctionality, with the main emphasis being on developing tools for the analysis of functionality in landscapes and farms.

Multifunctional land use: wind energy as an option for rural areas in coastal Estonia

Ain Kull

*Institute of Geography, University of Tartu, 46 Vanemuise St., 51014 Tartu, Estonia
E-mail: ain.kull@ut.ee*

Estonia is situated on the eastern coast of the Baltic Sea. Its long (3800 km) and winding coastline, which abounds in islands and small islets, makes it spectacular and rich in biodiversity. Traditionally there has been a relatively large proportion of open grasslands, wooded meadows, alvars, wet meadows and wetlands in the Estonian coastal zone. During recent decades marginalization, the low demand for agricultural products and reduced earnings have decreased cattle breeding. Thin soils vulnerable to drought do not support intensive crop farming. In order to avoid further marginalization and maintain natural diversity in coastal regions, there is a great need for supplementary activities to assure the employment rate and that the land should obtain additional surplus value through multifunctional land use. Wind farms and stand-alone wind turbines in open agricultural land are an option with which landowners can earn additional income. Intensive cyclonic activity over Estonia makes the coastal zone attractive for wind engineering. The wind energy yield with modern 2-3 MW wind turbines reaches 9500 MWh/yr in Western Estonia and 6000-8000 MWh/yr in Northern Estonian coastal areas.

In order to promote the sustainable exploitation of wind resources, it is important to determine the most favourable sites and areas for wind power plants that do not conflict with environmental and other public interests. The present study aims to take into account EIA principles and all of the main factors impacting on the environment as a result of wind energy utilization. Indirect social effects such as landscape aesthetics, alternative land use, etc., which are highly dependent on public opinion and are subject of change according to positive or negative feedback of construction of first wind farms, are also taken into consideration. A strict set of criteria was developed for the zoning process in order to determine suitable areas for siting wind turbines. Five different restrictive zones were distinguished according to legislative status and pith (exclusion area, strictly restricted area, restricted area, reservation area, naturally unsuitable area). Areas without any restrictions are evaluated as suitable regions for building wind farms and turbines. In these regions, laws establish no restrictions, and no social opposition could be expected, as wind energy utilization has no harmful impact. The whole Estonian coastal region was assessed according to the main principles of the Environmental Impact Assessment (EIA) and using the Geographical Information System (GIS).

In Estonian coastal regions (a 20-km-wide zone along the 3800-km-long coastline) there are 114,000 ha (7.9% of the total area) of open fields that are fully suitable for the harnessing of wind energy. The majority (from 58.4% in Saaremaa to 83.3% in Hiiumaa) of the coastal zone is unsuitable for natural reasons, mainly due to the high proportion of forests and wetlands, which on average make up 71% of the Estonian coastal zone. On the northern coast, the main restrictions are connected with settlements. Exclusion areas represent 36.8-39.1% of the coastal zone in Western Estonia and the islands, while higher settlement density along the Gulf of Finland results in a very high proportion of exclusion areas in Harjumaa (58%), but also in Lääne-Virumaa (49.6%) and Ida-Virumaa (47.3%). Reservation areas (consisting of features like Natura 2000 areas, the areas around natural and historic monuments, etc.) do not have legal restrictive status but may have a major impact on wind harnessing through public opinion. The lowest proportion of reservation areas is in Ida-Virumaa (10.8%), while 41.5% of the coastal zone in Harjumaa and 43.4% of Western Estonia is limited for that reason.

Many restrictions overlap in regions (e.g. naturally unsuitable area (forest, wetland) that may also be under nature protection (strictly restricted area) or be an important bird area), therefore despite the high proportion of limiting factors, there still remain large open areas for wind energy applications. 37,000 ha (12.7% of the area) is suitable for building wind turbines in Saaremaa, and 19,000 ha (9.5%) in Lääne-Virumaa. The smallest amount of suitable area is found in Harjumaa, 9,000 ha (5.4%), due to extensive naturally unsuitable or settled areas. In Hiiumaa, 6,000 ha (6.1%) and South-West Estonia 18,000 ha (5.9%) are suitable for building wind turbines.

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Afforestation of abandoned agricultural land in Estonia – threat or possibility for the landscape?

Ain Kull¹, Katre Palo¹ & Enn Kull²

¹ University of Tartu, Institute of Geography, Vanemuise 46, 51014 Tartu, Estonia

E-mail: ain.kull@ut.ee

² Estonian Agricultural University, Faculty of Forestry, Kreutzwaldi 5, 51014 Tartu, Estonia

Due to socio-economic reasons, land use intensity and agricultural production in Estonia has drastically decreased since 1990. A considerable proportion of former arable land has been abandoned. According to the Statistical Office of Estonia, there has been an increase of about 300,000 hectares of abandoned agricultural land compared to 1985. Some of these abandoned agricultural areas have already been covered with low-value brushwood. According to the EU CAP policy, no effective measure is foreseen for the reusing of abandoned arable land. If these fields have no perspective in agricultural use, one should find an alternative use for them. One widely discussed possibility is afforestation of the low value or abandoned former agricultural land. The estimated share of abandoned low productive agricultural land that could be afforested in Estonia reaches 100,000 ha.

The case study was carried out in Southern and Western Estonia to investigate extent of the potential afforestation of abandoned agricultural lands, to study landowners' actual interest and capacity in the afforestation of abandoned fields and to describe the characteristics of fields which could be converted to forests. The study is based on the field inventory at the smallest actual land unit level. Land units suitable for afforestation are analyzed using the geographical information system.

Land units, which are considered by owners to be potentially afforestable areas, are relatively small fields which are usually already set aside or are in use as grasslands. They are delimited by natural borders (streams, rivers etc), roads, and ditches or by cadastral borders. Both in Läänemaa and Valgamaa, most land units have an area of 0.5-5 ha, and only a few fields have a size of more than 50 ha. In Läänemaa, the forestation of arable land and pastures is more often planned. In several cases, pastures are old overgrown wooded meadows where forestation is planned instead of mowing. This can lead to a decrease in biodiversity and nice views.

The forestation of former agricultural lands is planned mainly by planting, which embraces 83% of the total area of afforestable land. Forest cultivation in Läänemaa is planned almost entirely by planting (98%), and any other method of cultivation is quite exceptional. In Valgamaa natural regeneration will often (27%) be used with additional planting. Forestation of agricultural land by sowing is rare, and is used only in the case of birch cultivation.

Threat or possibility for landscapes?

Land units that are considered to be potential forests have an average area of 5.3 ha in Valgamaa and 1.3 ha in Läänemaa. The evaluation of land use types showed that most of the afforestable land units are currently fallow land or grassland.

Silver birch and pine are the most appreciated tree species for afforestation by land owners. The list of preferred tree species was more diverse in Läänemaa than in Valgamaa. In addition to birch and pine, there is also interest in planting Norway spruce, alder, aspen, ash, larch and curly birch

The land units which are considered to be converted to forest are mostly located at the forest's edge or in the middle of woodlands. This reduces the number of forests with irregular bending edges, small wooded meadows, undulating landscape with open appearance (Photo) and landscape heterogeneity.

The actual interest of landowners in the afforestation of agricultural land of low productivity is limited. Thus the assumption that too great a proportion of former agricultural lands will be converted into forests is not valid.

Forestation avoids excessive brushwood fields and enables the maintenance of picturesque views if principles of landscape planning are taken into consideration.

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Multifunctional land use in the Polish Carpathian Mountains

A. Kuzniar & S. Twardy

Malopolska Research Centre, Institute for Land Reclamation and Grassland Farming,

21B Ulanow st. 31-450 Krakow, Poland

E-mail: imuzkrak@kki.pl

This paper presents the structural problems involved with sustainable and multifunctional land use in the Polish Carpathian Mountains. The area under discussion has specific natural conditions. Its climate, relief and soils are not favourable for plough cultivation, and therefore grassland-pasture management is preferable. Small private peasant farms with an average area of about 4 hectares are predominant. The land utilization in such farms is generally extensive, although the stocking rate per 100 ha is rather high, because in each farm there is animal husbandry on a subsistence level. Plant production is significantly differentiated depending on the elevation above sea level and the exposure of the slope. It was found that there is a disparity in the land use pattern between particular administrative NUTS-5 units (districts). In the western part of the Carpathians, agricultural land prevails and UAA exceeds 60 percent, whereas in the Tatra Mountains and in the eastern Polish Carpathians, wooded areas are dominant, in some districts over 70%. In most districts (municipalities), however, arable land does not exceed 50 percent of UAA. In recent years, the area occupied by abandoned and fallow soils has increased, and this arises from the low revenues from the agricultural sector. The Polish Carpathians fulfil many functions, including the storing of water, landscape, tourism, recreation, winter sports, spa localisation etc. Thus it can be concluded that multifunctional land use, in which agriculture is one of many components, is employed.

Landscape planning through agricultural policies – a planner's perspective

Anders Larsson

Department of Landscape Planning, SLU Alnarp. P.O. Box 58, S - 230 53 Alnarp, Sweden

E-mail: anders.larsson@lpal.slu.se

The aim of this article is to examine the EU agro-environmental policy (AEP) from the perspective of how intentions transform into practical action, with special emphasis on various instruments of control. The AEP is especially discussed in relation to the basic issues of (environmental) efficiency and democracy. This corresponds to the definition of a 'planning perspective' used here, which mainly focuses on 'effect planning' (not comprehensive planning), including both organisational and action-related issues. The hypothesis is that problems related to goal fulfilment are more an effect of insufficient knowledge of action, rather than an effect of insufficient knowledge of the (environmental) facts. This problem is of general theoretical relevance also in discussing the possibilities and shortcomings of other landscape-oriented EU programmes such as the Convention on Landscape or the 6th Environment Action Programme.

The article is above all an English summary of the results of a case study in Sweden. One conclusion is that within today's AEP there is neither a concise planning-oriented discussion of the character of current agro-environmental problems nor on the most relevant and effective means by which to handle these. Existing economic instruments of control and general forms of environmental measures need to be supplemented by more effective legislation directed towards environmental problems that cannot be solved on a voluntary basis and on a local implementation level. Furthermore, there is a great need for alternative organisational solutions for sharing the responsibility for environmental problems that can only be handled effectively on the local and regional implementation levels.

Another conclusion is that the autonomy of Swedish farmers has gradually decreased since the great land allocation reforms. This gives cause for concern from the point of view of democracy. The dialogue perspective reveals that farmers must become more influential within the agro-environmental policy process, but also that we must consider the fact that many farmers do not wish to participate in agro-environmental programmes. Concepts like paternalism and professionalism are helpful in trying to grasp the situation and in answering the question why this process has been left to develop so far without being noticed or challenged. The main topic of this article can thus be seen as a contribution to resolving the central issue, which remains, i.e. how to combine the demands for greater environmental efficiency without further infringement on the autonomy of local players?

Biodiversity aspects of riparian communities in two river systems in Estonia

Kadri Meier¹, Valdo Kuusemets¹ & Jaan Luig²

¹ *Institute of Geography, University of Tartu, 46 Vanemuise St. 51014 Tartu, Estonia*

² *Museum of Zoology, University of Tartu 46 Vanemuise St. 51014 Tartu, Estonia*

E-mail: kadri.meier@ut.ee, valdo.kuusemets@ut.ee, jaan.luig@ut.ee

River systems are important elements of landscapes, creating connecting corridors between core areas and forming an ecological network, whereas important elements of rivers are their riparian buffer zones and riparian communities. The importance of rivers as landscape elements in increasing biodiversity and forming connecting corridors between core areas has been emphasised often, but has been supported by only a few investigations. In many cases, biodiversity is mainly described as plant diversity in the area. We studied the diversity of plants and insects in relation to plant community type and management practice. The main focus was on solitary bees and wasps as the main pollinators of plant communities. It has been shown that the diversity of solitary bees and wasps, especially parasitoids, is characteristic of the diversity of the whole ecosystem, while they do not very fast and easily occupy new territories, and they reflect rather well changes in landscapes.

Two river basins, the Velise River as a typical agricultural area with open landscapes and agricultural impact (grazing, mowing, cultivation), and the Pedja River as the reference area, with a nearly 40-km-long riverbed along the wild deciduous forest area with unique natural riparian plant communities such as flooded meadows, natural grasslands and open woodlands, where old traditional agriculture was used until the 50s and 60s. In the Velise River, 10 agriculturally used sites were selected for the study. In the Pedja River, 8 key sites were selected, 4 are agriculturally used, and 4 have been abandoned for more than 10 years. The description of land-use and plant cover was made for all key sites.

The number of solitary bees and wasps was determined using insect nest-traps made from 10-15 cm long pieces of reed with different diameter (2 to 10mm) that are open on one side and closed on the other. 15 pieces of reed were bound together to form nests that were placed in the spring to the meadows close to rivers at a height of 1-1.5m, with 10 nests per key area. Nests were removed in autumn, incubated, and the species and number of bees and wasps was determined.

The plant diversity was higher in mowed grasslands with buffering alder strips or with bordering forest; in open landscape the diversity was highest in grazed grassland. Lower diversity of plant cover was found in mowed open grasslands and in fields with buffer strips.

There are no clear relations between plant diversity or flowering herbs with the number of species of bees and wasps.

The management practice may have more impact on the number of bees and wasps, which was slightly lower in grazed grasslands. The number of parasitoids is higher in wild extensively cultivated and abandoned areas.

The alder strips between fields and rivers considerably increase the species diversity of plants and bees and wasps in the agricultural area.

Landscape issues in the EU Common Agricultural Policy reform: Implications for modelling

Bernd Osterburg, H. Nitsch & S.H. Gay

Institute of Rural Studies, Federal Agricultural Research Centre (FAL), Germany

E-mail: bernhard.osterburg@fal.de

The 2003 reform of the EU Common Agricultural Policy (CAP), with the decoupling of direct payment and cross compliance as the most important elements, will fundamentally change support for agriculture in the EU-15 and will have an important impact on land use and landscape issues. Decoupling breaks the link between the production of a specific agricultural commodity and the receipt of direct payments. This means that farms do not need to use their land productively or to keep livestock. From 1 January 2005, eligible farmers will receive one area-based payment rather than several separate production-based payments. Various options are open to Member States to adopt partial decoupling. The two main possibilities for introducing decoupled, historically-referenced payments are single farm payment based on historical receipts (Regulation (EC) 1782/2003, Article 33 *et seq.*) and flat-rate area payments (Article 58 *et seq.*), also known as hybrid systems. These forms of implementing decoupled payments not only have different distributional effects between farms and regions, but also impacts on land management and the area controlled through cross-compliance.

Environmental standards have increasingly become a precondition for agricultural support in the CAP, and this reflects the multifunctional role of agriculture. In the first pillar of the CAP (market and price policy), this linkage is defined as 'cross-compliance', while in the second pillar (rural development measures), requirements are defined as 'minimum standards' or 'usual good farming practices' (GFP). Following the reform of the CAP in June 2003, a more harmonised, obligatory approach for the first pillar will be introduced by 2005, divided into EU legislative standards (Annex III) and 'Good Agricultural and Environmental Conditions' (Annex IV). The method of administrative implementation is crucial to the possible effects of cross-compliance, in particular minimum management requirements for non-cultivated land, verifiable control indicators and risk assessment for targeted controls.

Eligible land for activation of payment entitlements will possibly exceed the number of hectare-based payment entitlements to a significant extent, which will influence the transfer and allocation of payment entitlements in coming years. The cross compliance requirements of Annex IV shall counteract the negative impacts of decoupling on landscape development, e.g. the abandonment of agricultural land or the loss of grassland. As landscape features under cross-compliance rules can also be used to activate payment entitlements, their maintenance and also creation will be more favoured in future. Second pillar support measures used to counteract the negative impacts of decoupling will lead to a partial 're-coupling' to agricultural production, e.g. extensive livestock farming.

All of these developments will have a fundamental influence on landscape development in coming years, and thus pose a challenge to incorporate them into agricultural and land use models. The use of the regionalised agricultural sector model RAUMIS as a case study for Germany shall show the possible impacts of the reform on regional agricultural production and thus agricultural land use and intensity. The sensitivity of different means of implementing the reform on land use issues will be analysed and discussed.

**Prediction of vegetation cover based on landscape data:
A case study from Saare County, Estonia**

Anneli Palo, Raivo Aunap & Ülo Mander

Institute of Geography, University of Tartu, 46 Vanemuise St., 51014 Tartu, Estonia

E-mail: ann@torvandi.ee, ulo.mander@ut.ee

The main objectives of this study were to estimate the predictability of vegetation site types (VST) on the basis of soil parameters, and to prepare the existing data layers for the compilation of the digital vegetation cover model for the islands of Saaremaa and Muhu (Saare county, Estonia). We used various digitised materials (vector format basic map 1:10,000; digitised soil maps, 1:10,000; vector-format mesoscale landscape units (mesochore) subtypes map, 1:50,000; vector-format CORINE Land Cover map, 1:100,000; the classification of Estonian vegetation site types and type groups), and field observation results from 1999 and 2004. On the basis of the values of the combined-digital data fields (soil types + vegetation of basic polygons of the basic map + special restrictions arising from mesochore type or CORINE land use type) defined using theoretical and field observation data, queries were made to ascertain the distribution of natural vegetation site types. Only 3.16% of the classification area was rejected due to contradictory query criteria. The resulting synthesis map was verified using three different data layers. The results of the verification indicated a need for additional ordination of the system "soil-vegetation" in the light of the varied geomorphology of the island of Saaremaa, and also the highlighted obvious systematic errors in the databases used for verification.

In general, the various wetland VSTs and plant communities in drier positions and with higher elevations (on the upper parts of steeper slopes) showed the strongest significant association with biophysical landscape factors. However, calcareous bedrock, Ca-rich soils, a strong influence of the successional stage due to the uplift of the area, and the long-term human influence on both islands have caused an enormous variety of biophysical factors, which creates a much more complex association/segregation of VSTs with landscape factors than expected.

As a result of the verification, 25% of suitable soil distribution areas were, on average, covered by so-called accurate (well-correlated) site types (in some cases by site type groups); accurate and similar, probably due to their mode of use or some change in abiotic conditions, site types and site type groups accounted for around 82% of the soil distribution areas. Queries-based maps can easily be upgraded if the accuracy of the data layers is improved and they can be used in the fields of forestry, nature protection and planning.

Ecological elements in the rural landscape that have been impacted by land consolidation operations – the Slovene case study

Marina Pintar & Anka Lisec

Agronomy Department, University of Ljubljana, Slovenia

E-mail: marina.pintar@bf.uni-lj.si

Land consolidation is an important component of agricultural and rural development. With the main aim of improving the landholdings of farmers by concentrating their farms in as few parcels as possible, land consolidation contributes to improving the productivity, efficiency, and competitiveness of the agricultural sector.

The main aim of land consolidation was to improve the plot structure by the amalgamation and re-allotment of land plots, and to support the farms with roads and infrastructure when needed. In order to achieve sustainable development of rural areas during the process of land consolidation, some ecological aspects should be taken into account. If land consolidation is implemented in a comprehensive way, it could support environmental protection and natural resource management. The fragmentation of natural ecosystems as a result of inappropriate land consolidation has been recognised as one of the major causes of the decline in biodiversity, the others being wind and water erosion, and the lowering of the water table.

The most intensive period of land consolidation in Slovenia was between 1976-1990, when agricultural land areas of 54,344 ha were consolidated. Political changes in the beginning of 1990s also brought about modifications in the process of land consolidation.

The analysis of changes in boundary lengths and field sizes due to agricultural land consolidation presented in the article is based on the digital cadastral data for eleven consolidated areas in Slovenia, where land consolidation was implemented within the last decade. The average area of land plots before land consolidation was 0.20 ha, and after land consolidation the average area amounted to 0.46 ha. As mentioned above, concentrating farm land in as few parcels as possible is one of the main objectives of land consolidation, and this contributes to the productivity and efficiency of the agricultural sector.

On the presumption that the plot boundary is a certain frontier ecological element in the rural landscape, the comparison of the old plot structure (before land consolidation) with the new plot structure (after land consolidation) shows that the surface of different ecological patches along the plot boundaries is reduced in accordance with the reduction of plot boundaries. In the case study, the total length of the plot boundaries has been reduced by approximately 1036 km, i.e. almost 50% of the total length of the boundaries before land consolidation. Supposing that the average frontier width is half a meter, the area of the special frontier ecological structures amounts to 52 ha, which is more than 2% of the whole consolidated land. Furthermore, the plot structure after land consolidation is not in correspondence with the old state. Not only were the areas of different ecological patches along the plot boundaries reduced in accordance with the reduction of plot boundaries, but also the boundaries of the new parcels are mostly new linear structures in the rural landscape. Therefore the percentage of losses of the frontier ecosystems is even higher.

The elimination of the determined sum of areas from agricultural land use for the purpose of conservation and the establishment of natural habitats in the landscape is becoming more and more important in today's land planning and land management. The consequences of past unsustainable land consolidation and the results of this research could be treated as an example of how to explain and base the protection and establishment of the ecological structures in the rural landscape, when planning and implementing land consolidation in the future.

An integrated model for assessing the sustainability of intensive agriculture

Milada Stastna¹ & Elmar Stenitzer²

¹ *Mendel University of Agriculture and Forestry Brno, Institute of Applied and Landscape Ecology, Zemedelska 1, 613 00 Brno, Czech Republic*

E-mail: stastna@mendelu.cz

² *Institute of Land and Water Management, Petzenkirchen, Austria*

The aims of the study were to apply, test and present the ability of the deterministic simulation model SIMWASER in computing soil-water balance components. We present two case studies for the assessment of percolation losses from irrigated carrots to deep groundwater at Obersiebenbrunn in the Marchfeld (Austria), and ground water recharge and capillary rise from shallow groundwater in grass lysimeters at Berlin - Dahlem (Germany), in order to demonstrate the performance of the model in comparison with measured and simulated results from field experiments. At Obersiebenbrunn, simulated percolation and evapotranspiration was 183 and 629 mm, while the respective measured values amounted to 198 and 635 mm. At Berlin – Dahlem, simulated capillary rise and evapotranspiration were -122 and 458 mm, whereas the measurement showed -155 and 454 mm. These results testified confirmed SIMWASER as a good applicable tool for assessing the sustainability of intensive agriculture and the influence of land use.

Possible methods for stream revitalization

Jana Synková & Kristýna Kubová

Mendel University of Agriculture and Forestry, Zemedelska 3, 613 00 Brno, Czech Republic

E-mail: synkova@mendelu.cz, kkrista@seznam.cz

The streams in our countryside are often in a miserable state due to neglect, incorrect melioration or devastating floods. Our aim is to revitalize them in order to restore the ecological structures in the countryside.

The restorative were sometimes done without a true reference to the stream and its scene itself - using an improper route, contour or material. Our investigation was made to find out the eligibility of selected reclamation measures and their influence on the emergence of *bentos*.

These measures especially include the morphology of the stream channel, which is important for the suggestion of longitudinal bed slope, cross-stream profile, bank lining and cross-structures. Sediment transport and storage and their amount and structure affect stream channel morphology. The meanders and erodible banks have been moving, and they have been creating new side banks. Another factor is the water capacity of the channel, and its distribution in time. Recent stream revitalization is mainly connected with the demand for greater capacity. This admission is not advisable for ecological aspects, especially for long stretches. This admission additionally produces stream depression, stream widening and sediment charring. That is the reason, why we should use alternative solutions.

Water regime interfaces by human in landscape

Jana Synková & Kristýna Kubová

Mendel University of Agriculture and Forestry, Zemedelska 3, 613 00 Brno, Czech Republic

E-mail: synkova@mendelu.cz, kkrista@seznam.cz

The hydrology of small spring catchment area is defined by collection of relations in the whole ecosystem. The main inputs in system are atmospheric condensation and own springs which are involved (in ecosystem approach) in components of forest ecosystem of spring's catchment area. The spring's drains are another important part of hydrology regime, which form receiving stream. The third part of primary hydrology network is the receiving stream.

The main characteristics of anthropogenic interference in catchment areas is the secondary hydrology network, which is formed as a consequence of human impact. Own anthropogenic disruption of water regime of forest ecosystems arise from 2 elements. The first one is disruption, optionally the change of hydrology network. The second one is change of other factors in ecosystem, especially the soil and vegetation components.

The grade judgement of anthropogenic disruption of water regime in small catchment areas depend on their components. That means in practice, that we have to accomplish complex hydrological characteristics in specific catchment area with adequate accuracy. The subjects are: terrain's morfology, catchment area description, detailed hydrology network, research on groundwater and, especially, the spring and surface water (outflow characteristics and water quality). Mentioned research of components is completed by erosion phenomena.

Indicators for agricultural policy impact assessment: The case of beef production

Yuca Waarts

European Centre for Nature Conservation, Reitseplein 3, P.O.Box 90154, 5000 LG Tilburg, The Netherlands

E-mail: waarts@ecnc.org

The objective of my research is to identify indicators for the quantification of the non-commodity outputs of agriculture in rural areas. A common set of indicators is provided, which have already proven their European applicability and which will be used for a quantification of the impacts expected from the CAP reform options being assessed. The second part of my research focuses on the difference between indicators that one would like to use in theory, and indicators that can be used in practise (so called “soft” and “hard” indicators). In real life, there is usually a gap between these two kinds of indicators. My work emphasizes beef production only, but I think that the outcomes of my research can be applied to a broader scope of agricultural production.

Landscape character and windfarms – assessing the capacity of the landscape to accommodate a new land use change

Eva Zallmannova

*Mendel University of Agriculture and Forestry Brno, Department of Landscape Architecture,
Zemedelska 1, 613 00 Brno, Czech Republic
E-mail: zallmannova@seznam.cz*

The article tackles a problem that has recently been discussed extensively in the Czech Republic – how to deal with windfarms, which are being proposed at numerous sites all over the country, following the contemporary European trends of promoting environment-friendly approaches to producing energy.

In recent years, the Czech Republic has pledged to comply with the EU regulations concerning the increase of energy produced from renewable sources. Apart from biomass utilisation, the most promoted way of “green” energy production is currently wind. However, the latest available surveys on climatic conditions related to windfarm operation suggest that the country does not seem to be particularly suitable for this type of power generation.

Windfarms are a new feature in the landscape of the Czech Republic, and a completely new type of land use. The Czech Republic is famous for its varied landscape character that is rich in aesthetically valuable scenic areas and documents the historic development of the Central European cultural landscape. The question is whether and to what extent such a landscape is capable of accommodating a new land use such as windfarms without causing irreversible damage to the existing values. The role of planning tools such as EIA and visual impact assessment in the protection of valuable landscapes is discussed, as well as the description of the main potential collisions between valuable landscape character and windfarm development.

**Multifunctional land use within traditional agricultural landscapes
(case study: loess uplands of South-Eastern Poland)**

Wojciech Zglobicki & Bogusława Baran-Zglobicka
Geology Department, University of Maria Curie-Skłodowska
Krasnicka 2c, d, 20-718 Lublin, Poland
E-mail: zglobek@biotop.umcs.lublin.pl

The loess areas of South-Eastern Poland are characterized by the appearance of a specific and culturally valuable landscape. At the same time, due to the existence of fertile soils, it is crucial for the area to make a rational usage of the environment potential. Polish rural areas also undergo a quick transformation of land use structure for social and economic reasons.

The present-day very specific spatial arrangement of land use forms makes the traditional agricultural landscape of SE Poland unique in Europe. It is characterized by the appearance of very long and narrow fields and dense networks of ground roads. This a type of regional landscape is called *Poland's strip fields landscape* (Meeus 1995).

Detailed research was carried out in three model areas (altogether about 100km²). A specific loess landscape occurred there, characterized by considerable relative heights, the appearance of steep slopes, dense valley nets and the predominance of arable ground in the structure of land use.

Spatial and quantitative analyses were carried out on the Arc View 3.3 platform. The first step consisted of the creation of a digital database of the studied area. The database comprised six thematic layers: surface sediments, main relief elements, aspects, soils, a map of agricultural – soil complexes and finally a land use map.

The primary aim of the study was to find the answer to the following question: Is human activity, conditioned mainly by social and economic determinants, using the existing environmental potential in a proper way?

The data obtained not only characterize the landscape structure but also show the key areas where land use forms are not well matched with the environmental conditions. Three general functions of land use were suggested: agricultural (expected to remain the main one in this area – about 70%), soil- and water-protective (about 30%) and finally the tourist function. The scale of the studies performed allows the general strategies of the spatial development of a rural area to be established.