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Building bridges and crossing borders: Integrative approaches to rural landscape management in Europe

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The article presents current approaches to rural landscape management in Europe in light of the concepts, methods and the findings of seven research projects undertaken by the Institute of Landscape Management of the Albert Ludwigs University of Freiburg (Germany). These projects are either being or were conducted in five European countries (Germany, Italy, Luxembourg, Romania, Switzerland). The five main aims of landscape management comprise the sustainable production and supply of foods and raw materials by agriculture and forestry, the provision of recreational space, the conservation of ecological and cultural resources, and the restoration and reclamation of impaired landscapes or landscape compartments. In certain situations it may be possible that landscapes are not managed at all. Unhindered landscape development is an option in areas already largely abandoned. As landscapes are a public good, upon which many people stake claims, the cessation of any active landscape tending or the preparation and implementation of management concepts should be developed in participatory approaches. In order to solve the urgent problems facing European landscapes it is necessary to communicate adequately their specific values and to harmonise the actions of scientists, politicians, administrators, and local stakeholders.

Keywords: *Conservation, integrative studies, landscape management, landscape planning, participation*

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The need for integrative landscape management strategies

European landscapes have always been subject to change. In addition to natural factors, for millennia humans have contributed to shaping the environment, turning nature into multifaceted rural landscapes (Konold 1996; Lowenthal 1998; Birks et al. 2004). Today, all-encompassing trends such as climate and demographic change, the shortage of fossil fuels, increasing mobility and migration are impacting significantly upon the landscape. Regional distinctiveness is disappearing due to the impact of globalisation on agricultural production (Jongman 2002). Scientists and policy makers are daily being confronted with these problems and are expected to provide adequate solutions.

The continued development of the landscape calls for new strategies. Target-oriented concepts for tomorrow's landscape can only be arrived at through integrative and networked thinking. Development-oriented strategies that do not restrict the potential of the landscape to the servicing of only a few sectoral aspects are required. Landscape development must be conceived as a valid contribution to the solution of structural problems, especially in rural areas.

The European Landscape Convention (Council of Europe 2000) represents an important step towards integrative landscape policy making. With this convention, the European Council has created a policy tool to promote the conservation and further development of the European landscape (Antrop 2005). Unlike other treaties serving the protection of natural resources or cultural heritage, the European Landscape Convention is not limited solely to an assessment of the singularity of a landscape, or its overall value. Rather, it advocates the reasonable and sustainable development of all landscapes in accordance with the needs of those inhabiting them. The participant states are aware of how societal and economic activities, and the global economy, are accelerating the process of landscape change. In response, they have committed themselves to the preparation and implementation of a specific, common landscape policy. This policy is aimed at landscape protection, stewardship and planning, ultimately leading to integrative, interdisciplinary and innovative landscape management.

The definition of landscape management

There are several international approaches explaining the meaning of landscape management (Morton et al. 1995; Kendle & Forbes 1997; Baskent & Yolasigmaz 1999). The following definition formulated by North American landscape planners, policy makers and scientists is very concise:

> [A]n approach to the planning and assessment of land uses and human activities across whole landscapes. Its purpose is the long-term maintenance of landscapes to ensure the economic, social and environmental sustainability of the respective ecosystems and resources. The approach is based on an integrated management system, including various stakeholders and interest groups. It is applied on appropriate spatial scales for the necessary time periods in order to achieve the multiple management objectives. (Wildlife Canada 2006[1])

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However, this definition is at the same time largely theoretical as it reduces a complex topic to its core elements. To engender a better understanding of its more abstract contents, these can be illustrated by means of examples. To this end, seven projects carried out by the Institute of Landscape Management of the University of Freiburg (Germany) dealing with various aspects of the topic 'landscape management' are presented. Three of these seven projects have already been concluded. As the remaining four are still ongoing no final results are as yet available. Nevertheless, the preliminary findings of the selected projects allow for conclusions in relation to central questions of European landscape management, as well as the objectives and the methods employed. The projects concern, for example, the issue of the fundamental need for active landscape management in areas being depopulated as a consequence of migration, as well as the sustainable development of economic, socio-cultural and ecological resources and the participation of non-scientific stakeholders. The reader will be provided with insights into the projects while being taken on a journey through six European countries. The excursion starts in the Piedmont Alps, crosses the Swiss Rhone Valley, continues through Germany and Luxembourg and ends in Eastern Europe, in the Transylvanian Apuseni Mountains (Fig. 1).

Must all landscapes be managed?

In the years since World War II there has been an increase in the abandonment of agricultural land. Traditional land use practices have undergone a steady decline throughout many of Europe's rural landscapes, such as in the Alps, in various other highland regions and even in the plains of eastern Finland, Hungary, eastern Germany, and Poland (Beutler 2000; Pietrzak 2001). Marginal agricultural sites, in particular, have been and continue to be affected by this development as site factors such as slope, poor soil fertility, climatic conditions or poor accessibility hamper their efficient utilisation. As a result, areas that were once cultivated are reverting to forest through the process of natural succession (Vos & Meekes 1999).

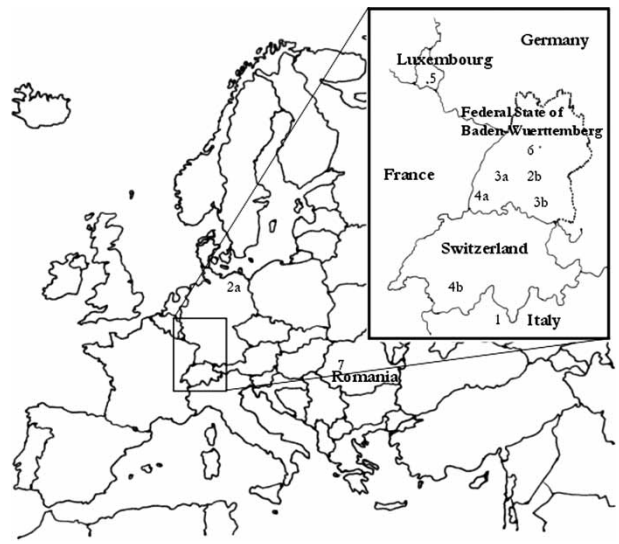

Fig. 1. Location of the study areas within Central and Eastern Europe. (1: Piedmont Project, 2a/b: Agroforestry Project, 3a/b: Forest Expansion Project, 4a/b: Vineyard Project, 5: Syr Project, 6: Landfill Project, 7: Apuseni Project).

Against this background, in Central Europe especially, for the last 20 years there has been an increasing number of voices calling for a deliberate cessation of the active tending of the landscapes in the areas in question. Wilderness advocates have launched an intensive debate on the issue of nature conservation strategies seeking to exclude humans and their activities from the rural landscape. They wish to see the landscape evolve unhindered, an end to human intervention in natural processes, and the development of vast wilderness areas (Broggi 1999; Zucchi 2002).

To act or not to act? – the Piedmont Project

The aforementioned 'wilderness' concept was the starting point for the Piedmont Project, formally titled 'From rural landscape to wilderness – Changes in Alpine landscapes resulting from a decline in land use in the Val Grande National Park and Strona Valley', carried out between 1999 and 2004 (Höchtl et al. 2005a). The effects of the abandonment of all management on both the landscape and the human population were analysed for two landscape compartments to the north-west of the Lago Maggiore. The analysis combined methods of historical geography, ecology and empirical-social research, in accordance with the transdisciplinary research strategy (Höchtl et al. 2006).

The research focused on the following two study areas:

- The Val Grande National Park which was established in 1992 as 'Italy's largest wilderness area' (Olmi 2002). The park's territory has been cultivated since the Middle Ages. However, with the exception of its outermost zones, it is now totally depopulated and vast areas of the landscape are undergoing processes of natural reforestation (Fig. 2).

Fig. 2. Abandoned Alpine huts and pastures in the Val Grande National Park on the Alpe Serena. Photo: Franz Höchtl.

- The Upper Strona Valley, still dominated by cultivated Alpine pastures, but which following a significant decrease in population is now only inhabited in the summertime.

The purpose of the project was to analyse the landscape changes that have taken place, their effects on vegetation and structural diversity, the perception of the changes to the landscape held by local populations and tourists, as well as the social and ecological effects of land abandonment. The main goal was to discuss the 'wilderness' approach as a nature conservation strategy, and to propose future development prospects.

The project results revealed a significant drop in the landscapes' floristic diversity. The changes to biotope diversity were found to depend upon altitude and exposition. The research areas are centuries-old landscapes, whose characteristics were vanishing but were in no way lost. Rural landscape elements continued to mould large areas. Near the villages, bush fires and landslides were an outcome of the uncontrolled development of the landscape, perceived by the local population to pose a threat. Local inhabitants complained about the afforestation of the landscape and the increasing inaccessibility of the mountain area. They associated with these developments a loss of social values (landscape as a place to experience history, a store of cultural knowledge, a homeland) and economic values (decreased land usability). Visitors exhibited an ambivalent attitude towards the alterations to the landscape: some regretted the decline of the rural landscape, while others welcomed the emerging wilderness.

If the abandonment of land use is to continue, it will lead to the complete loss of precious man-made biotopes. At the same time, however, new habitats will emerge as a consequence of dynamic landscape development, for example, pioneer sites created by avalanches and landslides, and forests characterised by different successional phases. If the 'do not interfere' approach is to continue to be consistently enforced, the landscape will become utterly inaccessible and any and all land use will cease. A sensible alternative for the future of the research areas would therefore be the coexistence of areas allowed to develop without control or interference alongside areas where the rural landscape is conserved, and where traditional and innovative land use practices can be promoted and developed.

In the context of the question of whether landscape should always be managed, and at what price, it was concluded that under certain conditions management can be renounced in favour of dynamic processes (e.g. the combination of distinct utilised and abandoned areas, taking into consideration the effects of abandonment on settlements and adjacent cultivations). However, in each case there must be an exact appreciation of the values to be lost and those gained. Local studies and decision making processes integrating all land users must be a precondition for the institution of large nature development areas. In so doing, the often postulated 'controlled retirement' of the remnant population of depopulating landscapes may become possible. The final decision must be left to the locals, though. Politicians and scientists may conceive the idea, but it should never be imposed (Luz 2000; Höchtl et al. 2005b).

The aims of landscape management

The aims of landscape management are complex, multifaceted and influenced by economic, social and political circumstances, as well as by the worldviews of those planning and directing landscape management measures. However, in a more abstract sense, the five main aims consist of:

- The sustainable supply of foods and raw materials by agriculture and forestry, as well as of mineral resources by mining.
- The provision of recreational spaces.
- The conservation of abiotic, biotic, spatial-temporal, and cultural resources.
- The restoration and reclamation of impaired landscapes and landscape compartments.

In the following, the presentation of the objectives, focuses, methods, and (where available) results of five applied research projects will explain the significance of these central aims of European landscape management.

Agroforestry as a sustainable approach for the supply of food and basic raw materials

Agriculture and forestry play a decisive role in the use of the rural landscape. Both production sectors deliver foods, the basic raw materials required for the production of further goods, and more recently have started to contribute to the generation of renewable sources of energy.

In cooperation with the Institute of Forest Growth (University of Freiburg) and the Regional Office for Plant Production (Forchheim, Germany), the Institute of Landscape Management is engaged in a project investigating the sustainable combination of agriculture and forestry. 'New' agroforestry systems, compatible with modern agricultural production techniques, have been studied in other western European countries such as France, Great Britain and the Netherlands for several years (Balandier & Dupraz 1998; Dupraz et al. 2005). The results of these studies have shown that agroforestry systems can combine positive economic impacts with desirable effects on nature and resource protection (e.g. erosion control, creation of habitats, biotope connection). However, agroforestry systems remain largely unknown in Germany because as yet there has been no application of agroforestry techniques on a larger scale. Therefore, the intention of this project is to tie up with the findings from the other countries and to develop systems which are adapted to the special landscape types, ecological site conditions and land use situations in different German regions.

On the EU level, the benefits of combined agroforestry systems are clearly appreciated. The Council of the European Union's regulation (Council Regulation (EC) No 1698/2005, 20 September 2005)[2] of the European Agricultural Fund for Rural Development states that, 'agroforestry systems have a high ecological and social value ... their establishment should be supported'. Furthermore, Article 44 postulates that, 'support ... shall be granted to farmers to

create agroforestry systems combining extensive agriculture and forestry systems'.

Agroforestry systems use mixed cultures which must meet the following preconditions (Somarriba 1992, 238):

- at least two plant species that interact biologically
- at least one of the plant species is a woody perennial
- at least one of the plant species is managed for forage, annual or perennial crop production.

In the project 'Agroforestry – new options for sustainable land use', two German federal states with different natural and agricultural conditions were chosen as study regions: Baden-Württemberg in the south-west and Mecklenburg-Vorpommern in the north-east. The project aim is to develop agro-silvicultural land use systems combining the production of premium veneer quality timber with the agricultural use of crops, grassland or, as a special feature of the agricultural component, the production of biomass with short rotation plantations of willow or poplar. The research focuses on the design of a management framework for the production of valuable broadleaved tree species at wide spacing, for example, cherry, ash, sycamore, birch, and walnut (Fig. 3). At the same time, agricultural production techniques adapted to mixed stands and the concurrence of agricultural crops and trees on the same plot are developed.

From a landscape management perspective, the research questions concern the compatibility of agroforestry systems with nature conservation aims, and their contribution to environmental protection services, such as erosion control and the reduction of nutrient leaching. Another focus is on landscape aesthetics, and the public's perception and acceptance of a changing scenery.

Fig. 3. Ten year old deciduous trees on an experimental agroforestry plot near Bopfingen in eastern Baden-Württemberg. Photo: Tatjana Reeg.

The positive effects of agroforestry plots depend strongly on the natural site conditions, as well as on the type and intensity of land use, the morphology and the vegetation of the surroundings. The systems comprise a wide variety of elements, combinations and arrangements, and can be applied in different regions. The design should always fit in the landscape, though. In the following, the possible functions of agroforestry systems in two different types of landscapes are characterised.

In many regions, sites with difficult production conditions are threatened by land abandonment or afforestation, leading to a decline in biodiversity, the loss of precious habitats and the alteration of the landscape character (cf. Piedmont Project). Agroforestry systems can be an alternative, or part of an alternative, to the aforementioned developments, for example, by combining the production of quality timber with extensive pasture. On a plot used exclusively for pasture, trees present no handicap to cultivation. Instead, they provide shelter for livestock and, in the long term, increase the economic value of the land, providing additional income for the farmer. This semi-open land use system affords an adequate habitat for plant and animal species adapted to open land conditions. Furthermore, attractive landscapes can be created, which is important in rural regions where landscape-based tourism plays a major role.

On fertile sites, intensive agricultural uses often have negative impact on the environment – on soil, water and biodiversity as well as on the scenery. Integrating trees in the production systems can lower these impacts: the grass covered strips on which either solitary trees or hedgerows with trees are planted, depending on the user's strategy, reduce wind and water erosion, and the leaching of nutrients from agricultural land into aquatic systems. They provide new habitats and connect existing ones. The integration of trees in monotonous landscapes leads to greater structural diversity and the aesthetic enrichment of the scenery. Finally, agroforestry systems contribute to an improved relationship between agriculture and nature conservation by enhancing the ecological quality of agricultural land without preventing modern agricultural use.

Ensuring the recreational value of landscapes in transition

Another important aim of landscape management is the provision of recreation areas. This has special importance in the mountain areas of Europe. On the one hand, certain attractive places are suffering from excessive tourism. Here landscape management has to focus on how to save such 'hot spots' from exhaustive use and guarantee their sustainability, for example, by implementing route networks to direct visitor flows. On the other hand, from a more general perspective, the objective is basically to preserve and foster the recreational value of landscapes. This aspect is growing

in importance as in many rural regions the hitherto central economic pillar, agriculture, has lost its profitability. In its place tourism is becoming the crucial economic impulse, helping to cushion the effects of the ongoing structural changes in the agricultural sector. However, this is in effect a 'vicious circle' as the tourism value of a landscape is often inherently linked to the traditional agricultural uses now being abandoned.

An example clearly illustrating this phenomenon is the situation in the Black Forest, in south-western Germany. This mountain region is characterised by an impressive mosaic of forests and open, still cultivated areas. The typical scenery, enriched by the traditional farm houses, is the reason for the worldwide popularity of the Black Forest and its attractiveness as a destination for tourists. In recent decades, though, this landscape has been subjected to radical change. The open areas are diminishing as unprofitable agriculture is given up. As a consequence, the forest area is expanding due to both planned afforestation and natural succession (Fig. 4).

In many community districts of the Black Forest the proportion of forest land has increased by more than 10% in the last four decades. In some extreme cases, forests now cover more than 90% of the community area. The forest expansion often results in a complete change to the typical character of the landscape, which is closely linked to a feeling of 'home' for many natives and a perception of authenticity for visitors (cf. Höchtl et al. 2005b). This causes numerous problems, not only from a tourist perspective, and as a consequence 'keeping the landscape open' becomes increasingly important.

Fig. 4. Landscape change in south-west Germany induced by the expanding forest area. a) The first photograph was taken in 1938. b) The second photograph shows the same view in 2005. Left-hand photo: Hans Schwenkel, photo archive of the LUBW (Landesanstalt für Umwelt, Messungen und Naturschutz Baden-Württemberg). Right-hand photo: Wolfram Grönitz, LUBW.

This problem is addressed by another ongoing project of the Institute of Landscape Management. The objective is to gain insights into the extent of the forest expansion that has taken place to date and the expansion that is expected in the future, as well as its impacts in terms of nature conservation and tourism. An analysis of the driving forces behind this trend will aid in the design of political and landscape planning instruments to help steer the process. The investigation is focusing on the state Baden-Württemberg generally, and the Black Forest region, where the process of forest expansion is manifestly evident, specifically.

The central questions of this project are:

- How have the forest–open land proportions evolved historically?
- How do various stakeholders perceive the current situation?
- What are the consequences of forest expansion, particularly from a nature conservation and tourism perspective?
- What are the driving forces determining the forest–open land proportions?
- How will forest–open land proportions develop in the future?
- How can both natural succession and afforestation be steered successfully?

The project is divided into five interlinked work packages. The first part of the project is a historical landscape analysis on different spatial levels. The next step is an analysis of existing political programmes and local steering approaches, important from both the tourism and the ecological perspective. Various individual investigations and case studies illuminate, for example, the impacts of forest expansion on climate and tourism. The analysis and updating of key factors in landscape development (e.g. economic) will be expressed in forecast scenarios of the future development of the forest–open land proportions in Baden-Württemberg. Finally, an early warning system is to be developed to facilitate the timely recognition and combating of undesirable landscape developments, particularly at community level.

The main objective of this transdisciplinary project is to produce results with practical relevance. This can only be achieved if the results include a recognition of the circumstances and the needs of the local people, especially those of the farmers who more than anyone else shape the landscape. The knowledge and perspectives of the stakeholders will be incorporated into the project at all stages. This involves, for example, constant consulting with representatives of the relevant interest groups, as well as events held 'on site' in the research communities, such as stakeholder meetings, group

discussions and workshops (for the conceptual framework see Bieling & Höchtl 2006).

The synergies of nature and heritage conservation in historical vineyards

In rural regions landscape conservation may concern the protection of natural and cultural resources equally. However, one must tread cautiously when speaking of the 'conservation' of landscapes, because traditional conservation approaches are often backwards and inflexible. Modern countryside conservation strategies should be development-oriented, because environment and society are in a constant state of evolution. According to Forman & Godron (1986), Konold (1998) and Farina (2005), the conservation of natural resources can be divided into the conservation of abiotic (water, air, soil), biotic (plants, animals) and spatial-temporal resources (structures, patterns, processes). However, if the objective is to accentuate cultural resources, it is essential to focus on the historical, aesthetic and social values of the landscape (Cosgrove 1989; Lowenthal 1997). These values are especially tangible in traditional terraced landscapes.

Terraced landscapes such as the south-east Asian rice fields, the Mediterranean olive terraces and the Central European vine terraces represent one of the most popular rural landscape types around the globe (Loumou & Giourga 2003; Magcale-Macandog & Ocampo 2005). Traditionally, terraced vineyards possess an inherent aesthetic value resulting from the perception and interpretation of their special construction history, highly developed cultivation technique, social values, and ecology (diversity of species and biotopes, and the interlinked colours, forms, sounds, and smells). The heritage value of ancient terraced vineyards expresses itself, for instance, in the composition of a technically efficient land use system. The professional surface moulding, the harnessing of favourable site factors (exposition, radiation, soil quality) and the sophisticated compensation of obstacles to cultivation (groundwater discharge, slope, soil erosion) provide reminders of the astonishing technical achievements made by past generations (Höchtl & Konold 1998).

However, terraced landscapes are amongst the most endangered landscapes in Europe, because they deviate greatly from modern agri-technical production standards. They are most commonly threatened by abandonment and subsequent subjection to succession, or else they are transformed to desert vine-steppes as part of intensive land consolidation measures. The Vineyard Project seeks to formulate measures to counter this development using synergies between nature and heritage conservation and winegrowers.

The first impetus for the project came from two wine-growing municipalities: Roßwag near Stuttgart (Germany) and Ballrechten-Dottingen (Germany) near Freiburg. Local politicians, interest groups and winegrowers wanted to preserve the vineyards as part of their homeland, and as an important source of income. They contacted heritage and nature conservation authorities and our institute with an idea for a joint landscape development project. This provided a unique opportunity to start a user-initiated, transdisciplinary project serving both scientific and stakeholder interests.

The main project objective is to develop a practice-oriented guideline for the management of the traditional vineyards on the basis of criteria corresponding equally to both use and conservation demands. This guideline shall harmonise the interests of winegrowers, and nature and heritage conservationists, in order to pave the way for the integrative tending of the landscape. Five municipalities with historical vineyards in southern Germany and in the Swiss Rhone Valley have been selected as study sites: Ballrechten-Dottingen, Vaihingen-Roßwag (Fig. 5), Baden-Baden/Neuweier, Kernen-Stetten (all in the federal state Baden-Württemberg) and Salgesch in the Swiss Rhone Valley (Canton Valais).

The research project focuses on the genesis of the selected vineyards, their stylistic differences, the construction techniques applied, the quality of landscape elements, the local perception of the landscapes, and the development of future conservation strategies through the combined efforts of winegrowers, and nature and heritage conservation bodies. The project is composed of six successive working steps:

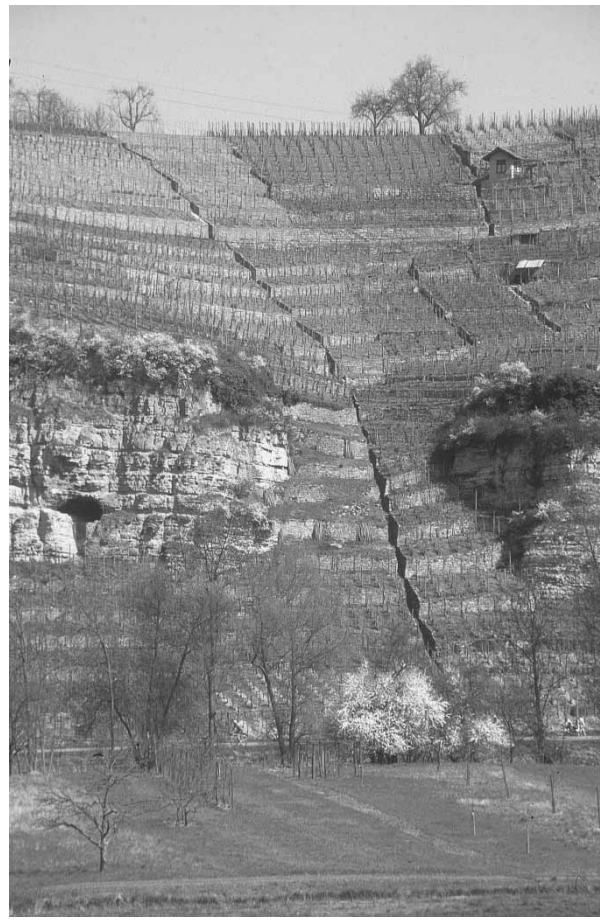

Fig. 5. The centuries-old, richly structured vineyards of Vaihingen-Roßwag. Photo: Werner Konold.

- An historical landscape analysis.
- The construction of a rural landscape register.
- A survey of youths between the ages of 15 and 20, focusing on their attitudes towards and their perception of the vineyards as part of their 'homeland'.
- A Delphi-Analysis providing information about the attitudes and perceptions of users and nature/heritage conservationists in relation to the historical vineyards.
- The definition of guidelines for the conservation and development of the historical vineyards.

The overriding principle behind the project is permanent stakeholder participation. The central stakeholder groups are involved in the project via workshops, interviews, surveys, and informal discussions. The entire research concept has already been adjusted to their needs. The stakeholder participation – the consideration of their interests and perceptions – makes the project a model for a multisectoral development of strategies for the future of culturally and ecologically valuable landscapes.

The lessons of the first stakeholder meetings are clear: ancient terraced vineyards can only be conserved through the common efforts of winegrowers, conservation authorities, scientists, agrarian politicians, and economists. The future maintenance of the vineyards will strongly depend on the successful marketing of its high quality wines. Therefore the scientist's part will be, beyond research activities, the communication of the project's findings to a wide public (e.g. through press releases, seminars, guided tours) in order to strengthen people's awareness about the vineyards' outstanding values and the interlinkage between landscape and their products.

Restoring landscapes for biodiversity conservation

The restoration of landscapes to enhance habitat quality for plant and animal species constitutes another challenge facing European landscape management. The significance of implementing restoration measures in an overall landscape context will continue to grow in the future. In 1992 E.O. Wilson predicted the following for the 21st century: 'Here is the means to end the great extinction spasm. The next century will, I believe, be the era of restoration in ecology' (Takacs 1997, 205).

According to Middleton (1999), ecological restoration is the restitution of a degraded site to a condition similar to that which existed before it was altered, along with its pre-disturbance functions and the related physical, chemical and biological characteristics. This definition adheres to a guiding principle targeting the reconstitution of natural conditions present in landscapes prior to human use. This understanding of restoration – known as the historic model – was developed in North America, where pre-disturbance conditions referred to landscape states before the immigration of European settlers (Higgs 1997). In the case of European rural and peri-urban landscapes the goals of restoration projects must accommodate more complex demands. Restoration projects should focus less on solely reconstructing a primeval archaic vision of a historic state, but incorporate cultural developments and the overall landscape context as well as social framework conditions. Respecting this regional variety of starting points and goals, the common definition of ecological restoration was expanded by the Society for Restoration Ecology International to include 'the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed' (SER 2004, 4).

Water bodies, wetlands and floodplains – as heavily modified and threatened habitats – have been the focus of restoration efforts from the outset. Semi-natural water bodies and floodplains could provide habitats for numerous rare and threatened species in European landscapes (Joyce & Wade 1998). This high biodiversity potential is triggered by river dynamics and flood pulsing, highly variable vegetation structures, and traditional extensive land use practices (Middleton 1999). However, these complex ecosystems have been changed, regulated and degraded to a high degree throughout human history, as they were centres of cultural activity and served as sources of timber, transportation routes and areas for agricultural production and settlement (Konold 1998; Haase 2003).

Reconstructing the original states that existed prior to intense human intervention is almost impossible in the case of European water bodies and floodplains (Konold 1998). Therefore, modern restoration strategies must consider especially landscape history, functionality and overall landscape context, as well as the sustainability of the future land use system. Measures recommended for application in floodplain areas include the restoration of water body dynamics, and the reintroduction of non-intensive management systems to promote a structurally rich, semi-open landscape character. The Floodplain Restoration Project seeks to evaluate the combination of such measures and to derive practice-oriented recommendations for their implementation and management in the floodplains of Central Europe.

The floodplain study was initiated by the Administration des Eaux et Forêts of Luxembourg and conducted along a 2.5 km section of the Syr floodplain, which is part of the Natura 2000 network and is located in south-east Luxembourg. In the 19th century the River Syr – a small lowland river – was relocated from its original riverbed into a canal at the valley edge. The floodplain was used for agriculture and consisted of homogenous hay meadows that have been meliorated by drainage ditches and fertilisers. Today, the floodplain has to support new functions in the peri-urban environment around the city of Luxembourg, such as the conservation of biodiversity and the provision of potable water and flood protection, or as scenery for recreational activities. The main challenge was therefore to establish a management scheme which would restore river dynamics and wetland diversity but simultaneously conserve an open-landscape character as habitat for meadow breeding birds and achieve societal acceptance by stakeholders and local citizens for induced landscape changes. The concept formulated by the state authorities was the restoration of the 'swampy grassland' – recorded for this floodplain on a historical map dating from the 18th century – by a scheme combining water body restoration and a year-round system of extensive (as opposed to 'intensive') cattle grazing

Fig. 6. Grazing Galloway cattle on the bank of the restored River Syr in Luxembourg. Photo: Harald Schaich.

(Fig. 6). In particular, the effectiveness of ungulate grazing to restore diversity in wetland vegetation and the determination of an appropriate range management in this context is highly debated (Gander et al. 2003; Isselstein et al. 2005). Moreover, there is a plea for more 'cultural sustainability' in restoration activities by integrating land use history and a stakeholder's attitude analysis in research and planning for better success of such projects in the long run (Nassauer 2004). The Floodplain Restoration Project was thus initiated to provide an interdisciplinary evaluation and to determine the nature conservation potential of the measures implemented for the restoration of the biodiversity and functionality of other Central European floodplains (Schaich & Konold 2006).

The floodplain research project aims to answer questions about biodiversity development and especially vegetation dynamics, the interactions between cattle behaviour and vegetation development, the driving forces and the mechanisms influencing the diversity changes, the historical landscape changes, and also the perceptions and acceptance of the changes by stakeholders and the local population. Finally, the objective is to provide guidance for the future-oriented management of restoration measures in floodplains. The project has a three-tiered research design which includes ecological data (monitoring of ecological indicators such as vegetation development and groundwater level fluctuations), ethological data (behavioural study and impacts of the cattle on the pasture) and socio-cultural data (land use history, stakeholder attitudes and local acceptance).

Preliminary results document a slow but significant increase of total species diversity and species diversity and number of threatened species per sample plot ($4m^2$) as well as a rapid change of vegetation structure towards more heterogeneity on different spatial levels. Besides enhanced groundwater table level and variability, seasonal habitat use patterns and selective foraging of cattle are the main determinant of change. The study of the floodplain's environmental history revealed that flood dynamics and the wet character of the sites with low-intensity grazing and cutting were still evident until the 1970s. Earlier river regulation and land improvement measures often lacked in effectiveness and thus the current restoration measures have the potential to affiliate to those biotope traditions. Stakeholder attitudes revealed ambivalent results: whereas the project in general is appreciated by tourists, local governments and citizen associations, environmental NGOs and agricultural associations have criticised the implementation of a grazing regime and subjected the whole measure complex to scrutiny. In contrast, the public view of the 'new floodplain landscape' seems to be predominantly positive.

The reclamation of 'lost' landscapes

Our understanding of landfills and former surface mining areas, for example brown coal mines, gravel pits or quarries, is fraught with inconsistencies – are they just holes, lesions, waste or lost land, or do they have the potential to become the most important secondary habitats that may occur in the landscape (Bradshaw 1984; Gilcher & Bruns 1999)? It is beyond dispute that reclamation and reorganisation may be an adequate approach to enhance their landscape compatibility. However, reclamation projects must not only balance the achievement of conserving ecological values (i.e. protection of rare species) or aesthetically valuable landscapes but also the technical aspects necessary to achieve the long-term security of the environment.

In Germany reclamation is legally required for all former mining areas and landfills. Until a few years ago, the focal point was set on the restitution of the 'old' conditions: creating useable areas and restoring the natural scenery. Where forest was originally cleared recultivation should again result in woodland. In the meantime there has been a reappraisal of the approach to leave more room for natural processes, for example, unhindered natural succession. Former quarries (Fig. 7), gravel pits and sand pits, where mining activities created locations valuable for nature protection (e.g. steep rock faces, boulder slopes, dry and nutrient-poor gravel/sand heaps, stockpiles, oligotrophic water bodies of different sizes and permanence) are well suited to this strategy.

Fig. 7. View of an abandoned quarry, with rock faces, boulders, gravel heaps, and other dry and oligotrophic sites. Photo: Peter Wattendorf.

Under natural conditions these biotopes are populated by highly specialised flora and fauna, but as a result of land use intensification these have become increasingly rare. An appropriate form of reclamation can recreate islands of secondary habitats in intensively used landscapes. However, the habitual picture associated with the previous rural landscape may not always be reproduced. In the renaturalisation of mining areas, in most cases 'only' nature conservation and landscape management aspects have to be considered, whereas environmental protection comes to the fore when landfill sites are to be restored.

The landfill project analysed, for example, how the emission of pollutants by drainage water into the environment could be avoided or diminished. This requires a persistent seal on the dump's surface. The recultivation layer is part of this surface sealing system. The main purpose of incorporating a recultivation layer into the surface sealing system is to increase the evapotranspiration of precipitation by vegetation, in order to reduce and evenly distribute the runoff of seepage water. This consideration is important in the context of precautions taken in the sustainable handling of the environment. Contrary to technical sealing elements, its effectiveness is not merely temporary. The efficiency of the recultivation layer is greatly subject, among other factors, to the climate of the site, however.

In addition to climate, the effectiveness of the water supply layer depends upon the soil and vegetation characteristics. The substrate quality, soil structure, and the planting and regulation of the vegetation are of great significance if seepage is to be reduced by means of the greatest possible evaporation. For as much water to be evaporated as possible, natural cover appropriate to the site in question is necessary. Usually, this is forest, which establishes intensive root systems within the soil and can draw soil water even from great depths. This means that the recultivation layer of a landfill must satisfy special demands. It is particularly important that suitable soil material is used and that the substrates are in as natural a state as possible. Usually, the soil in recultivation layers is compacted to increase their stability on slopes. This is unfavourable, because compacted soils store less water and permit less intensive root expansion. This was the starting point for our research, carried out in large-scale lysimeter fields, investigating the impact of soil compaction on the water balance. The landfill project dealt with the question of whether non-compacted recultivation layers could be installed on landfill sites and remain stable up to a defined gradient, and whether there were any notable differences between compacted and non-compacted soils in terms of minimising percolation and leaching.

It was determined that the non-compacted recultivation layer is a much better plant surface and habitat for soil fauna, primarily earthworms. The vitality of the planted trees was found to be significantly better. The growing biomass of the trees was higher, and the rooting deeper and more intense. This led to higher evapotranspiration rates on the non-compacted soil and its vegetation cover. The most important finding of the field research was that the water regimes of the two recultivation layers differed clearly. As a consequence of the higher evapotranspiration, the total runoff from the non-compacted recultivation layer was approximately 29% lower than from the compacted recultivation layer. In addition, the runoff rate from the compacted soil was less stable, that is, the compacted layer exhibited higher maximum values and was more closely related to precipitation events (Wattendorf 2006). It is to be expected that the differences between the test fields will continue to increase as the woody plants grow. These results demonstrate the possibility to implement high-grade recultivation measures, contributing to precautionary environmental protection and at the same time meeting the demands for the reintegration of former landfills into the surrounding landscape.

Public participation as an important precondition for sustainable landscape management

As stated previously, there are many facets to landscape management and there are various ways in which they can be accommodated. However, there is one junction to which many roads lead: the bottom-up approach, the involvement of stakeholders in landscape management. Landscape is a public good on which numerous people stake claims. This fact implies that the concepts, which ought later to be accepted, should be developed in a participatory approach. Pivotal stakeholders are in most cases politicians and decision-makers from different levels, public agencies, NGOs, but most importantly the people inhabiting the landscape. Whereas the initiation of participatory processes is almost standard practice in landscape planning in western Europe, bottom-up approaches are often rare in Eastern Europe. This fact prompted our institute to launch the 'Proiect Apuseni' (Apuseni Project) conducted in the Apuseni Mountains in north-western Romania (Fig. 8). It analysed the methods and the organisation of participatory

Fig. 8. The typical semi-open farmland–forest mosaic of the Apuseni Mountains. Photo: Proiect Apuseni.

landscape management in Romania together with various partners in the past few years.

The study area is situated in the Moti country, where the traditional agro-silvicultural land use is currently undergoing a transition from subsistence economy to gradual participation in national and global markets. The aim of this project, supported by the German Ministry of Education and Research, was to analyse this transformation process, to identify and evaluate development strategies, and to make recommendations for sustainable regional development (Ruşdea et al. 2005).

A 'nested approach' was adopted for the research, comprising three geographic areas, in which data collection was carried out with decreasing intensity. The village of Ghetari with its surroundings (308 hectares, 28 households, 106 inhabitants in the year 2000) constituted the central study area. The investigations extended gradationally from this community towards the administrative centre in the village Gârda de Sus (situated in the valley at 700 m) and to the mountain high-pasture 'Poiana Calineasa' (1350 m) covering an area of *c.*6000 ha, 63% covered by forests. Generalisations about the region could be made from studies of the social and economic characteristics of 15 communities in the Moti country. Disciplinary approaches were used to investigate the physical and biological characteristics of the landscape, the agricultural and forestry land use practices, the history of culture, settlement, architecture, and the life of the people. Two economic approaches were adopted to assess the economy at household level (combination of subsistence and market production, activities, products, costs, and prices), and at the regional level – the 'Moti country'. Additional studies related to the specific political and legislative conditions in Romania. Together these studies facilitated the analysis of the functional coherence of the regional land use system.

These disciplinary approaches provided the basis for an evaluation of landscape units in relation to nature conservation and to the economy. The evaluation according to the principles of nature conservation employed the criteria naturalness/hemeroby (natural/cultural), and endangerment. The economic evaluation was based upon the production capacity and the yields of the farmers' individual land parcels. The results of these analyses and evaluations yielded the indicators and descriptors for the creation of a land use model, which describes and explains the functioning of the system. On the basis of this interdisciplinary modelling, scenarios for the future development of the landscape, and social and economic situation could be created. A comparative analysis and evaluation of these alternative scenarios was used to define recommendations for the sustainable development of the landscape.

From the outset, the Apuseni Project was based on transdisciplinarity (Thompson Klein et al. 2001; Balsiger 2005), which implies participatory action research involving the stakeholders. Long-term effects and success can only be achieved if the motives and interests of the rural population are taken into consideration (Selman 2004). This implies continuous discussion, the revision of concepts targeting specific actions and the implementation of research findings (Moser 1977). Starting with a stakeholder analysis – which provided the basis for the integration of local, regional and national actors – the central problems of the region were identified by the local actors. An overview of the situation was obtained through the use of questionnaires and personal interviews with farmers, experts and local politicians. The problems identified were clustered on a problem-tree, showing the cause-and-effect relationships. Afterwards they were transformed into objectives for future development with the specification of key indicators. The majority of the problems identified by the local stakeholders were either of an economic or a social nature; very few of the identified problems were ecological.

Another participatory method was also employed, an approach termed 'Planning for Real' (Fig. 9). Together with the pupils of the local school, a three-dimensional model of the village was built, in which their personal wishes regarding the future development of the village were expressed (e. g. construction of a church, opening of a small shop and a youth centre). This participatory action served at the same time as tool for discussions with the parents and other stakeholders.

On the basis of the problems identified through participatory methods, future trends and scenarios for the mountain village Ghetari were defined for the next 15 years. Three scenarios – representing three different political strategies of future development – were presented to and discussed with local and regional experts and politicians during a planning workshop. The local people of Ghetari and politicians were invited to participate in a role playing session, in which three major candidates ('traditio', 'evolutio' and 'capitalinvestitio') presented their programmes, defined as an action strategy for a particular scenario. Afterwards the people evaluated the three programmes (scenarios) by a means of a vote. The results of this 'vote' revealed that men tended to prefer a policy promoting sustainable land use ('evolutio'), the children clearly voted in favour of a policy to attract a big investor, and the women's votes showed no clear preference.

According to the degree of cooperation and communication, four levels of involvement were distinguished: informa-

Fig. 9. Villagers at Ghetari (Apuseni Mountains, Romania) during a 'Planning for Real' meeting. Photo: Proiect Apuseni.

tion and motivation – which were most important at the outset – as well as participation and cooperation, which were more relevant towards the end (Bühler & Wehinger 2005). Due to language barriers and different educational backgrounds, both verbal and non-verbal communication was used. The quality of the participatory action process was continuously monitored (briefing of staff members, evaluation of every action). The participatory methods chosen were selected to allow for feedback between researchers and stakeholders. They included intercultural and organisational aspects, as well as discussions relating to disciplinary research (Bühler et al. 2005).

For centuries, the life of rural people in Eastern Europe was dictated by hierarchical structures. As a result, the farmers in the Apuseni Mountains became sceptical of governmental institutions, individualistic, and developed an aversion to association and cooperation. Recently attempts have been made to include the farmers and their interests in decision making processes. The foundation of a local steering group, which included people from the village, local politicians (village council) and project team members, was most important. Another milestone was the establishment of a local village association, targeting the sustainable regional development of the whole Ghetari plateau. The Apuseni Project supported promising local initiatives, implemented as so-called 'pilot projects'. They were selected using the following criteria: importance for sustainable development, sustainability after termination of the project, possibility of rapid success, and realisation during the project period (Brendle 1999). Such common practical actions were implemented in the fields of rural tourism, agriculture (crop farming, manure processing, fertilisation, hay harvesting), water supply, medicinal plants, and forest use/wood processing.

The experiences garnered from these pilot projects and the results of the larger project revealed the strengths and weaknesses of this mountain region, and were used to formulate recommendations for regional development. They will continue to provide impulses for sustainable development and livelihoods in this mountain area and at the same time help to preserve at least some of the habitats within the landscape. As the pilot projects demonstrated, successful regional development will be the most convincing argument in the transfer of the results to other mountainous rural regions in Eastern Europe.

The experiences gained from the Apuseni Project provide for six central recommendations in relation to participatory approaches to landscape management:

- Allow all stakeholders participate from the very beginning: in the participatory management of rural landscapes it is important that all political levels be considered. The local and regional level are certainly of greater relevance, but stakeholders from national and even EU level should also be involved.
- Respect local knowledge and experience: the identification of respected key actors and local multipliers with a high degree of influence may play a decisive role in the success of the process.
- Establish local 'steering groups', for example, local agenda groups: these are necessary to ensure the smooth running of the process and the continuation of management after the end of a project.
- Enact and support practical solutions and joint actions: the implementation of results should not only begin after the conclusion of a project. Small and successful working initiatives should be carried out during the fieldwork phase in order to improve the local standing of researchers and managers.
- Appreciate communication as the most important key factor: the participatory approach requires a great deal of openness, sensitivity, patience, and communication skills appropriate to each target group and social level. A sophisticated public relations concept is essential for good and effective implementation.
- Not all projects require the same degree of participation: the participatory appraisal should suit the different framework conditions (political and legal conditions, social and economic situation), with respect to the different democratic traditions and social hierarchies (especially when comparing different projects in eastern and western Europe).

Sustainable landscape management and planning is not possible without participation. In regional development the participatory process could provide the arena for consultation, negotiation and the joint actions of the people involved.

The project's common thread

As mentioned at the outset of this paper, 'integration' will be one of the key components of future European landscape policy. 'Integration' means completion and union, the Latin 'integratio' referring to the 'restoration of a whole'. When one considers the projects described herein in combination, they all have a common denominator, namely their integrative character with respect to social anchoring, the methods, and the components time and space.

Within each of these studies the landscape is recognised as a comprehensive habitat incorporating plants, animals and people. People are attributed a predominant role, as the agent responsible for managing and moulding the landscape. In different times and places man makes different demands on the landscape, all of which must be harmonised. The manner in which the factor man is incorporated in the various research processes is revealed in:

- The handling of real life problems (e.g. concerns in relation to the effects of unhindered landscape development on village inhabitants in the Piedmont Project).
- The close cooperation with additional scientific partners, non-scientific stakeholders and the local population (e.g. experts from the areas of forestry and agriculture, administration and politics, and also local residents in the Agroforestry and Forest Expansion projects).
- The incorporation of aesthetic, cultural and social values, as well as landscape perception (e.g. Agroforestry and Vineyard Projects).

- The common, practical implementation of project findings (e.g. 'pilot projects' in the Apuseni Project).
- Comprehensive public relations measures, to arouse and heighten public awareness in relation to landscape issues.

The research questions taken up in each of the projects are complex. In order to find answers to the questions posed, a broad methodical spectrum is necessary. The projects incorporate ecological investigations, but equally social, planning, historical, and political science approaches. Some of the projects involve close cooperation with scientists from other disciplines, in other cases the researchers employ methods from various traditional scientific branches and combine the results to provide a solution to the problem at hand (cf. Syr Project, Apuseni Project, Piedmont Project). According to scientific theory, this approach is a primary component of integrative, inter- and transdisciplinary research (Tress et al. 2001; Höchtl et al. 2006).

Spatial integration plays a role when – as in the case of the Piedmont Project – many of the findings obtained in relation to the processes of natural succession at the species level (micro level) and the level of communities and habitats (meso level) are correlated so that conclusions in relation to the development of vegetation at the landscape level (macro level) are possible. It also becomes relevant for the Forest Expansion Project if measures for the steering of forest expansion in south-western Germany are to be derived from the comparative overview of local and regional approaches for the maintenance of an open landscape, as well as from national and international forestry and agroforestry programmes. The approach adopted in the Landfill Project also possesses a spatial integration component, as it targets the sympathetic incorporation of disturbed and damaged areas of land into the overall context of the rural landscape.

Aspects of temporal integration arose when, upon reflection of the past situation, guidelines for current and future management were developed. These can provide for continuity (e.g. the maintenance of a specific status quo) or support a shift in emphasis (the facilitation of unimpeded landscape development upon the abandonment of agricultural and silvopastoral land use). In the Forest Expansion Project, for instance, a 150-year retrospective provides for the identification of the driving forces of the much maligned expansion of forest areas in the German Mittelgebirge. In addition to the more comprehensive analysis of current economic and political framework conditions, these serve as starting points for the development of political and planning instruments for the steering of future forest development. In the Piedmont Project a historical landscape analysis was carried out in order to evaluate the current character of the developing 'wilderness' landscape in the Val Grande National Park against the backdrop of the long history of agricultural and silvopastoral land use now abandoned. The findings support the formulation of strategies for a generally accepted future treatment of the developing 'wilderness'.

Finally, science also assumes a particular responsibility with respect to sustainable landscape management. It should chart and highlight the historical development of the rural landscapes of Europe, their diversity and their importance for the future, creating instruments to steer their sustainable development and contribute to educating the wider public in relation to these values. To accomplish these comprehensive tasks, the synergies between science, politics, administration, local users, and interest groups must be identified and availed of. Inherent in this is a willingness to cross over the borders of various disciplines, to open up to new realities, to take the concerns of others seriously and to develop common goals. This is not easy, but it is almost certainly the only way to develop and to preserve a valuable European landscape heritage.

Notes

1 Report on the National Landscape Management Workshop. http://www.whc.org/documents/IML_Report_Final_August.pdf (accessed 14 December 2006).

2 European Agricultural Fund for Rural Development (EAFRD). 2005. http://eur-lex.europa.eu/LexUriServ/site/en/oj/2005/l_277/l_27720051021en00010040.pdf (accessed 23 April 2007).

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References

Antrop, M. 2005. Why landscapes of the past are important for the future. *Landscape and Urban Planning* 70:1–2, 21–34.

Balandier, P. & Dupraz, C. 1998. Growth of widely spaced trees – A case study from young agroforestry plantations in France. *Agroforestry Systems* 43, 151–167.

Balsiger, W.P. 2005. *Transdisziplinarität. Systematisch-vergleichende Untersuchung disziplinenübergreifender Wissenschaftspraxis.* Wilhelm Fink Verlag, München.

Baskent, E.Z. & Yolasigmaz, H.A. 1999. Forest landscape management revisited. *Environmental Management* 24:4, 437–448.

Beutler, H. 2000. *Landschaft in neuer Bestimmung. Russische Truppenübungsplätze.* Findling Buch- und Zeitschriftenverlag, Neuenhagen.

Bieling, C. & Höchtl, F. 2006. Politische Ökologie: ein theoretisch-konzeptioneller Rahmen für Forschungsarbeiten im Bereich der Landespflege und Regionalentwicklung. *Natur und Landschaft* 81:11, 542–546.

Birks, H.H., Birks, H.J.B., Kaland, P.E. & Moe, D. 2004. *The Cultural Landscape. Past, Present and Future.* Cambridge University Press, Cambridge – New York.

Bradshaw, A.D. 1984. Land restoration: Now and in the future. *Proceedings of the Royal Society of London. Series B, Biological Sciences* 223:1230, 1–23.

Brendle, U. 1999. *Musterlösungen im Naturschutz. Politische Bausteine für erfolgreiches Handeln*. Landwirtschaftsverlag, Münster.

Broggi, M.F. 1999. Ist Wildnis schön und nützlich? Konold, W., Böcker, R. & Hampicke, U. (eds.) *Handbuch Naturschutz und Landschaftspflege, Zielvorstellungen*, 1–7. ecomed Verlag, Landsberg.

Bühler, J . & Wehinger, T . 2005. Der Partizipationsansatz im Proiect Apuseni: Verfahren und Instrumente. Ruşdea, E., Reif, A., Povara, I. & Konold, W. (eds.) *Perspektiven für eine traditionelle Kulturlandschaft in Osteuropa. Ergebnisse eines inter- und transdisziplinären, partizipativen Forschungsprojektes im Apuseni-Gebirge in Rumänien*, 324–327. Culterra 34 (Schriftenreihe des Instituts für Landespflege der Albert-Ludwigs-Universität Freiburg). Institut für Landespflege, Freiburg im Breisgau.

Bühler, J ., Wehinger, T ., Reif, A . & Ruşdea, E . 2005. Partizipative Elemente der Leitbildentwicklung; Bilanzierung der Partizipation. Ruşdea, E., Reif, A., Povara, I. & Konold, W. (eds.) *Perspektiven für eine traditionelle Kulturlandschaft in Osteuropa. Ergebnisse eines inter- und transdisziplinären, partizipativen Forschungsprojektes im Apuseni-Gebirge in Rumänien*, 344–357. Culterra 34 (Schriftenreihe des Instituts für Landespflege der Albert-Ludwigs-Universität Freiburg). Institut für Landespflege, Freiburg im Breisgau.

Cosgrove, D. 1989. Geography is everywhere: Culture and symbolism in human landscapes. Gregory, D. & Walford, R. (eds.) *Horizons in Human Geography*, 118–135. Macmillian, Basingstoke.

Council of Europe. 2000. *European Landscape Convention*. CETS No. 176. Council of Europe, Strasbourg. http://conventions.coe.int/Treaty/en/Treaties/Html/176.htm (accessed 14 December 2006).

Dupraz, C., Burgess, P. & Gavaland, A. 2005. *Synthesis of the Silvoarable Agroforestry for Europe Project*. INRA-UMR System Editions, Montpellier.

Farina, A. 2005. *Principles and Methods of Landscape Ecology.* Kluwer Academic, London.

Forman, R.T.T. & Godron, M. 1986. *Landscape Ecology.* John Wiley & Sons, New York.

Gander, A., Rockmann, A., Strehler, C. & Güsewell, S. 2003. Habitat use by Scottish Highland cattle in a lakeshore wetland. *Bulletin of the Geobotanical Institute ETH* 69, 3–16.

Gilcher, S. & Bruns, D. 1999. *Renaturierung von Abbaustellen*. Ulmer, Stuttgart.

Haase, D. 2003. Holocene floodplains and their distribution in urban areas – Functionality indicators for their retention potentials. *Landscape and Urban Planning* 66, 5–18.

Higgs, E.S. 1997. What is good ecological restoration? *Conservation Biology* 11:2, 338–348.

Höchtl, F. & Konold, W. 1998. Dynamik im Weinberg-Ökosystem. *Naturschutz und Landschaftsplanung* 30:8-9, 249–253.

Höchtl, F., Lehringer, S. & Konold, W. 2005a. *Kulturlandschaft oder Wildnis in den Alpen? Fallstudien im Val Grande-Nationalpark und im Stronatal (Piemont/Italien)*. Paul Haupt Verlag, Bern – Stuttgart – Wien.

Höchtl, F., Lehringer, S. & Konold, W. 2005b. 'Wilderness': What it means when it becomes a reality – A case study from the southwestern Alps. *Landscape and Urban Planning* 70, 85–95.

Höchtl, F., Lehringer, S. & Konold, W. 2006. Pure theory or useful tool? Experiences with transdisciplinarity in the Piedmont Alps. *Environmental Science and Policy* 9:4, 322–329.

Isselstein, J., Jeangros, B. & Pavlu, V. 2005. Agronomic aspects of biodiversity targeted management of temperate grasslands in Europe – A review. *Agronomy Research* 3:2, 139–151.

Jongman, R.H.G. 2002. Landscape planning for biological diversity in Europe. *Landscape Research* 27:2, 187–195.

Joyce, C.B. & Wade, P.W. 1998. Wet grasslands: A European perspective. Joyce, C.B. & Wade, P.W. (eds.) *European Wet Grasslands – Biodiversity, Management and Restoration*, 1–12. John Wiley & Sons, Chichester.

Kendle, T. & Forbes, S. 1997. *Urban Nature Conservation: Landscape Management in the Urban Countryside.* E. & F.N. Spon, London.

Konold, W. (ed.) 1996. *Naturlandschaft, Kulturlandschaft. Die Veränderung der Landschaften nach der Nutzbarmachung durch den Menschen*. ecomed Verlag, Landsberg.

Konold, W. 1998. Landnutzung und Naturschutz in Auen – Gegensatz oder sinnvolle Kombination. *Wasser und Boden* 50:4, 50–54.

Loumou, A. & Giourga, C. 2003. Olive groves: 'The life and identity of the Mediterranean'. *Agriculture and Human Values* 20, 87–95.

Lowenthal, D. 1997. European landscape transformations: The rural residue. Groth, P. & Bressi, T.W. (eds.) *Understanding Ordinary Landscapes*, 180–188. Yale University Press, New Haven, CT.

Lowenthal, D. 1998. *The Heritage Crusade and the Spoils of History.* Cambridge University Press, Cambridge.

Luz, F. 2000. Participatory landscape ecology – A basis for acceptance and implementation. *Landscape and Urban Planning* 50, 157–166.

Magcale-Macandog, D. & Ocampo, L.J.M. 2005. Indigenous strategies of sustainable farming systems in the highlands of northern Philippines. *Journal of Sustainable Agriculture* 26:2, 117–138.

Middleton, B. 1999. *Wetland Restoration: Flood Pulsing and Disturbance Dynamics.* John Wiley & Sons, New York.

Morton, S.R., Smith, D.M.S., Friedel, M.H., Griffin, G.F. & Pickup, G. 1995. The stewardship of arid Australia: Ecology and landscape management. *Journal of Environmental Management* 43:3, 195–217.

Moser, H. 1977. *Methoden der Aktionsforschung – Eine Einführung*. Kösel Verlag, München.

Nassauer, J.I. 2004. Monitoring the success of metropolitan wetland restorations: Cultural sustainability and ecological function. *Wetlands* 24:2, 756–765.

Olmi, F. 2002. La più grande area Wilderness delle Alpi e d'Italia [Preface]. Barbaglia, D. & Cresta, R. (eds.) *Genti e luoghi di Valgrande*, 5. Alberti Libraio Editore, Verbania-Intra.

Pietrzak, M. 2001. Changes in the forest boundaries within central greater Poland over the last 200 years. *Ekologia-Bratislava* 20, Suppl. 3, 181–184.

Ruşdea, E., Reif, A., Povara, I. & Konold, W. (eds.) 2005. *Perspektiven für eine traditionelle Kulturlandschaft in Osteuropa. Ergebnisse eines inter- und transdisziplinären, partizipativen Forschungsprojektes im Apuseni-Gebirge in Rumänien*. Culterra 34 (Schriftenreihe des Instituts für Landespflege der Albert-Ludwigs-Universität Freiburg). Institut für Landespflege, Freiburg im Breisgau.

Schaich, H. & Konold, W. 2006. Auenrenaturierung und extensive Beweidung in Luxemburg – Evaluation einer Naturschutzmaßnahme in der Syr-Aue. *Berichte der Naturforschenden Gesellschaft Freiburg i. Br.* 96, 83–110.

Selman, P. 2004. Communitiy participation in the planning and management of cultural landscapes. *Journal of Environmental Planning and Management* 47, 365–392.

SER [Society for Ecological Restoration International, Science & Policy Working Group]. 2004. *The SER International Primer on Ecological Restoration*. Society for Ecological Restoration International, Tucson, AZ.

Somarriba, E. 1992. Revisiting the past: An essay on agroforestry definition. *Agroforestry Systems* 19, 233–240.

Takacs, D. 1997. *The Idea of Biodiversity: Philosophies of Paradise.* Johns Hopkins University Press, Baltimore.

Thompson Klein, J., Grossenbacher-Mansuy, W., Häberli, R., Bill, A., Scholz, W.R. & Welti, M. (eds.) 2001. *Transdisciplinarity: Joint Problem Solving among Science, Technology and Society – An Effective Way for Managing Complexity.* Birkhäuser Verlag AG, Basel – Boston – Berlin.

Tress, B., Tress, G., Decamps, H. & d'Hauteserre, A.M. 2001. Bridging human and natural sciences in landscape research. *Landscape and Urban Planning* 57, 137–141.

Vos, W. & Meekes, H. 1999. Trends in European cultural landscape development: Perspectives for a sustainable future. *Landscape and Urban Planning* 46, 3–14.

Wattendorf, P. 2006. The water balance of recultivation layers – Results of measurements and water balance modelling. *Wissenschaftliche Berichte der Hochschule Zittau/Görlitz* 86, 207–220.

Zucchi, H. 2002. Wildnis als Kulturaufgabe – ein Diskussionsbeitrag. *Natur und Landschaft* 77:9-10, 373–378.