

## CONSERVATION OF HIGH NATURE VALUE (HNV) GRASSLAND IN A FARMED LANDSCAPE IN TRANSYLVANIA, ROMANIA

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**Abstract:** Romania retains significant resources of wildflower-rich lowland grassland. These farm grasslands, especially the hay-meadows, are of major international conservation importance, supporting an abundance of plants, animals and vegetation communities that have disappeared from most of Europe. The Saxon villages area of southern Transylvania in particular comprises a High Nature Value farmed landscape, where rich biodiversity co-exists alongside traditional agriculture. Continued traditional management is required to maintain the rich mosaic of habitats. Landscape protection and sustainable development must reconcile conservation of grassland and other biodiversity-rich habitats with the provision of adequate incomes and community infrastructure. Fundația ADEPT (Agricultural Development and Environmental Protection in Transylvania), has been established to address these issues, and has placed special emphasis on permanent grasslands, which occupy a central position in plant conservation, high-quality local food products and eco-tourism in the Saxon Villages. In December 2008 habitats and species in the heart of the area, Tarnava Mare (85,000 ha), acquired protection within the EU's Natura 2000 network. This designation will facilitate the provision of financial incentives for farmers to conserve the geographical, cultural and biological elements of the landscape.

**Keywords:** anthropogenic habitats, biodiversity, High Nature Value (HNV) grassland, Romania, Transylvania, Saxon Villages, sustainable development

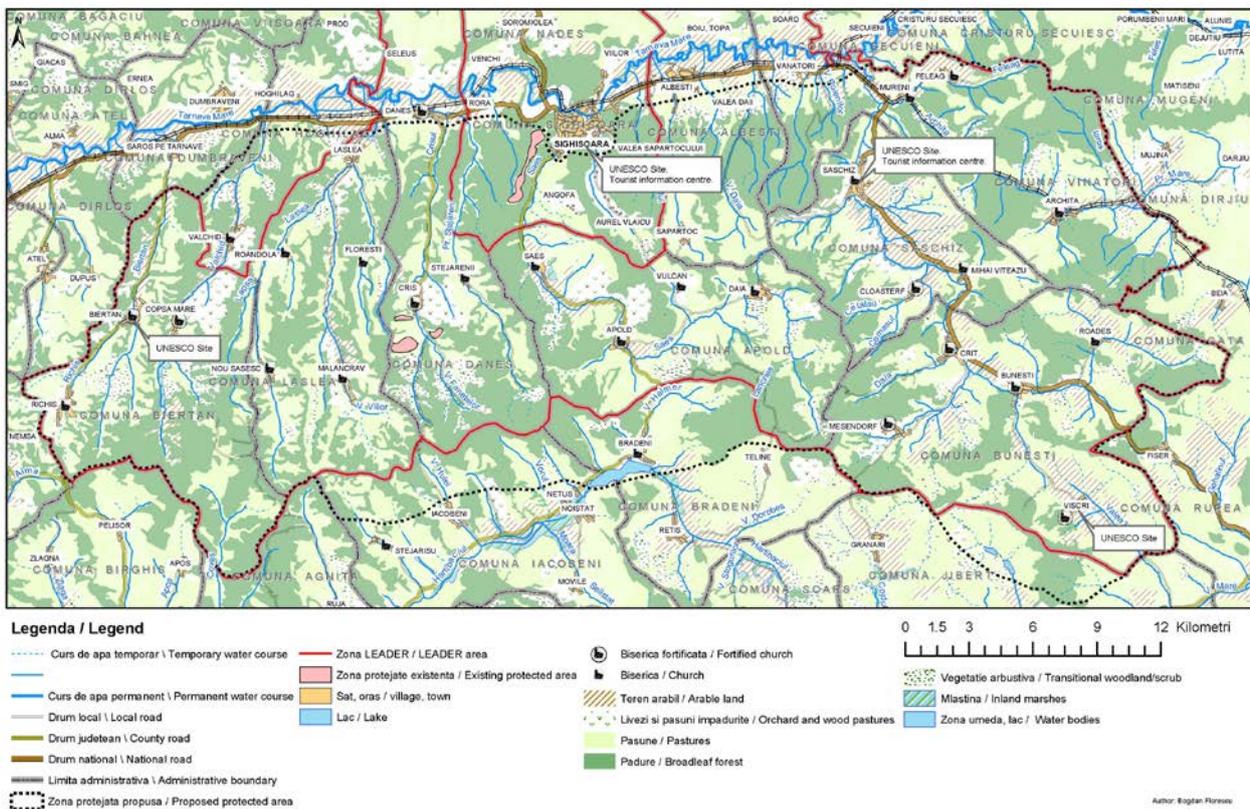
### Introduction

Romania retains some of the most significant resources of wildflower-rich lowland grassland in Europe. Since 1945 European agriculture has become increasingly intensive and food production has risen greatly at the expense of biodiversity in farmed landscapes. Under Romania's 1947–90 communist regime farming was modernized and intensified (Șârbu *et al.*, 2004), but considerable areas of traditionally managed meadows and pastures survive, even around villages which formerly had a state or collective farm. These low-input permanent grasslands, mostly in the foothills of the Carpathians, still possess an abundance of wild plants and animals that have disappeared from most of Europe (Veen *et al.*, 2009). However, they have not attracted the equivalent level of national and international attention as other Romanian ecosystems, notably the montane (>800 m) and alpine zones of the Carpathians, the steppes of the Dobruja and Danube corridor, and the wetlands of the Danube Delta (Mountford & Akeroyd, 2009).

Within Romania, many individual plants, animals and communities of farm grassland are not nationally rare or threatened, but their survival and co-existence in substantial numbers and extent greatly compensates for their loss elsewhere in Europe. These High Nature Value (HNV) anthropogenic grasslands should thus be regarded as of major international conservation importance, and it is unfortunate that farm grassland has not been regarded as a conservation priority in Romania (Akeroyd & Page, 2006), despite substantial threats (Rákossy & Kovács, 2001; Cremene *et al.*, 2005; Jones, 2007, 2009; Jones *et al.* 2010). Economic depression in rural areas is causing depopulation (*vide* Dimancescu, 2004: 47), with the loss of potential young farmers, the collapse of the existing pattern of small farms and the subsequent abandonment of

High Nature Value farmland (National Strategy Plan for Rural Development 2007–2013, 2007: 16). At the same time, economic and social pressure for large-scale rural development, land-use intensification and conversion of grassland to arable farming has increased since Romania's EU accession in January 2007.

Some of the most extensive and best-preserved anthropogenic grasslands in Romania occur in the Saxon Villages area or Târnava Mare Plateau of Transylvania (Akeroyd, 2002, 2006; Jones, 2008, 2009; Jones *et al.* 2010; Akeroyd & Page, 2006; Mountford & Akeroyd, 2005, 2009; Schneider-Binder, 2008). German immigrants from Flanders and Luxembourg, but known in Romania as *Sași* or 'Saxons', settled here in the 12–13<sup>th</sup> centuries, building walled towns and regularly planned villages dominated by their impressive churches, fortified and provisioned against invading Tartars and Turks. The region lies within and adjacent to the southern bend of the Carpathians, an area of rolling hills and steep valleys bounded by the historic Saxon towns of Sibiu, Sighișoara and Brașov (Fig. 1). Here survives one of Europe's last extensive and contiguous areas of medieval countryside, or more strictly an 18<sup>th</sup>-century agricultural landscape developed on firm medieval foundations.



**Fig. 1: ADEPT project area, now Târnava Mare SCI**

The Saxon Villages area is a floristically rich part of Europe, where a dissected and hummocky topography of steep valleys and hills up to 700–800 (–839) m produces considerable microclimatic and thus botanical differences between south and north sides of valleys. The dominant geology is lime-rich marls, with thin bands of sand, limestone, volcanic ash and loess. Soils are fertile, mostly brown earths and clays, although many of the most wildflower-rich meadows have extremely low nutrient levels (Jones, 2008, 2009) after centuries of agriculture and repeated removal of biomass. The climate is continental, with cold snowy winters during which temperatures fall below  $-10^{\circ}\text{C}$  and hot summers when temperatures often reach  $30^{\circ}\text{C}$  or more, with hot dry periods punctuated by thunderstorms from the adjacent Carpathians.

**The region exhibits a remarkable diversity of important habitats: old-growth beech, hornbeam and oak woodland, wood-pasture and scrub, riverine willow woodland, and both mesic and meadow-steppe grassland, with rich fragments of steppic flora on the driest, south-facing slopes (Akeroyd, 2002, 2006, 2007; Oroian 2009; Jones *et al.*, 2010). The countryside remains remarkably well wooded, with few roads and scattered villages, and holds significant numbers of rare birds such as Corncrake (*Crex crex*) and Lesser Spotted Eagle (*Aquila pomaria*) and large mammals, including red and roe deer, brown bears and wolves. The traditionally managed landscape of woodland (40% of the land surface), grassland (30%) and arable fields (30%), many of them now fallow and reverting to grassland, has developed over hundreds of years and still presents a medieval land use pattern, with wooded hills and gullies, pasture and hay-meadows on gentler slopes and terraces, and arable strips mostly in valley bottoms near villages. There are few major roads (Fig. 1).**

In the years following the fall of Romania's communist regime in 1990, most of the remaining Saxon population returned to Germany. However, the traditional farming systems of this conservative and culturally isolated community remain substantially intact, and rich plant and animal life has survived within a framework of non-intensive agriculture in harmony with landscape and biodiversity (Akeroyd, 2002, 2006, Oroian 2009). The biodiversity, gloriously demonstrated in the extensive, colourful wildflower-rich hay-meadows, is in good heart; but the Saxon Villages themselves, like so many farming communities in Romania, face the crisis of restructuring a damaged, out-of-date rural economy and improving incomes and prospects, especially for young people, in farming communities. Despite the gradual arrival of modern tractors and machinery, horses still provide transport and haulage, stocking levels of cattle and sheep are generally low, fertilizers have not replaced the contents of the dung-heap, weeding is often by hoe and mowing by scythe, herbicides and pesticides are little used, and many rural roads are poorly surfaced.

Clearly the region needs considerable and fairly rapid development, which the Romanian government is addressing with the aid of EU funds. The challenge is to create a stable rural society and to improve and maintain farming community incomes, whilst at the same time protecting the internationally important biodiversity and unique cultural landscape of the Saxon Villages. This has to be achieved without the ever-present pitfall that environmental conservation be "misconstrued as a hindrance to economic prosperity, apparently disenfranchising the poor by denying them the right to improve their livelihoods" (Githiru, 2007). To remove this perception, it is important that agriculture be shown to be the motor both to conserve the rich biodiversity and to raise living standards for farming communities. Fundația ADEPT (Agricultural Development and Environmental Protection in Transylvania) was established to address the complex, intimately linked problems of biodiversity conservation, food production and sustainable development.

### **Materials and Methods**

**The ADEPT project.** ADEPT ([www.fundatia-adept.org](http://www.fundatia-adept.org)) is an Anglo-Romanian, multi-disciplinary, landscape-scale project, established in 2004 and principally funded from 2006 by the Darwin Initiative for Biodiversity (DEFRA, UK) and by Orange Romania. Working with local people, it aims to preserve the scientific and cultural heritage of the Saxon Villages countryside and improve and regenerate a depressed rural economy, building upon the direct links between economic prosperity and biodiversity. The project promotes the survival and continued development of traditional agriculture and other smaller-scale rural enterprises, including quality food production, crafts and rural tourism, to contribute to a sustainable and diversified rural economy. This will be an incentive for conservation of the countryside, especially the extensive wildflower-rich grasslands, which themselves attract visitors and help provide a 'brand image'. Low input semi-natural grassland delivers a broad spectrum of

environmental benefits, or ecosystem services, including conservation of landscape quality, wild fauna and flora and archaeological sites, protection of water-courses and water quality, reduction of soil erosion, and public amenity and education (Allen, 1995). Experiments have shown that farm grassland locks up carbon to a similar degree to farmland planted with trees (Smith *et al.*, 1997).

The ADEPT project area covers approximately 85,000 ha, including 35 villages in eight communes with some 21,000 human inhabitants (Fig. 1). A pilot project set up in the commune of Saschiz covers three villages with a combined population of *c.* 2,100 and total area of 9,700 ha, of which 3,500 ha is grassland and 3,500 ha woodland. This pilot is now being expanded into other communes. ADEPT's proposals have been drawn up in consultation and discussion with villagers, town halls, county councils and environment offices, and Romanian government ministries, especially the Ministry of Agriculture and Rural Development (MARD) and the Ministry of Environment and Forests (MEF). The proposals have been widely welcomed as an appropriate model to develop the region, and ADEPT is supported by departments within MARD responsible for rural development, and those in MEF responsible for protected areas. ADEPT is a member of the National Monitoring Committee for Rural Development, a consultative group including a handful of NGOs working with MARD in designing and implementing the Ministry's rural development policies. As part of this co-operation the ADEPT project area has been selected as a pilot study for testing EU incentives for good grassland management that can be expanded nationwide.

ADEPT has combined field surveys of biodiversity, in collaboration with colleagues from Transylvanian institutes (Babeş-Bolyai University, Cluj; Lucian Blaga University and Museum of Natural History, Sibiu; University of Medicine and Pharmacy, Târgu Mureş) and wildlife NGO Milvus Group, with practical village-based projects, and teaching, training and dissemination of information. Field surveys by ADEPT, mostly in 2006–8, to locate and make a preliminary assessment of plant communities by vegetation relevés and an inventory of plants and animals, have concentrated on grassland (especially with Prof. Silvia Oroian and colleagues from Târgu Mureş), a habitat central to the production of high-quality local foods – meat, cheese and honey. Other partners have concentrated on macro-fauna, freshwater ecology and woodland vegetation. The basic information gathered was assembled on the Romanian Natura 2000 website and will continue to be disseminated in scientific publications. Oroian (2009) has published a valuable recent synopsis of the flora and vegetation of the Saxon Villages.

## Results and Discussion

### BOTANICAL DIVERSITY OF THE GRASSLANDS

In Romania, as elsewhere across most of lowland Europe, grassland is not the natural climax vegetation, which in the Saxon Villages region would have included a mosaic of deciduous woodland and scrub, but with grassland probably always present, especially on steep, unstable or slumping marl slopes. Millennia of human management as meadows (still frequently mown by scythe) or pastures (grazed by cattle and sheep, with some water-buffalo and goats) have created plant- and animal-rich dry and mesic grasslands, derived from species of pre-existing treeless or semi-treeless habitats. These grasslands are outstanding both in extent and quality of plant species present, several of restricted Romanian or European distribution. They are also rich in arthropods (notably Lepidoptera), herpetofauna and birds.

Romanian botanists have described the characteristic grassland communities of Transylvania (Sanda *et al.*, 2001; Doniţă *et al.*, 2005), including the Saxon Villages (Csűrös & Kovács, 1962; Schneider-Binder, 1971, 1975, 2008, *etc.*). These authors and others, and researchers working with ADEPT, have shown that these species-rich grasslands fall phytosociologically within communities of dry, more or less steppic grassland ('Dacio-Pannonic meadow-steppe'), in the orders *Brometalia erecti* Br.-Bl. 1936, *Festucetalia valesiaca* Br.-Bl. *et*

Tx. ex Br.-Bl. 1949, and *Stipo pulcherrimae-Festucetalia pallentis* I. Pop. 1968 (Mountford & Akeroyd, 2009). Although they are floristic outliers of the extensive Eurasian steppe vegetation, which extends to southern Romania (Banat and Danube Corridor) and the Pannonic steppe of Hungary, in Transylvania it is incorrect to term this vegetation steppe, for it is closer to the semi-natural or secondary ‘meadow-steppe’ of Central Europe (Cerovsky, 1995). These grasslands differ from true steppe by the presence of shrub communities, some relict woodland species and a substantial Mediterraneo-Atlantic and Mediterranean floristic component, including orchids and bulbous (*Liliaceae sensu lato*) species.

Within the order *Brometalia erecti*, the alliance *Cirsio-Brachypodium pinnati* Klika et Hadač 1944 is tall pasture and hay-meadow dominated by tor-grass, often with abundant sainfoin (*Onobrychis viciifolia*). A distinctive association is species-rich hay-meadow, with sub-Atlantic and sub-Mediterranean floristic elements, dominated by brome-grass (ass. *Rhinantho rumelici-Brometum erecti* Sanda et Popescu 1999). A high diversity of 30–40 or more clovers, vetches and other legumes (*Fabaceae*) is a feature of these and similar grasslands in Transylvania (Pușcaru-Soroceanu, 1963). A wide range of grassland noda is present, in a complex mosaic of seral stages derived from repeated episodes of human modification and disturbance in time and space (Jones 2010), and it is often difficult to assign individual noda to discrete phytosociological associations.

Species-rich meadows on the driest and steepest, south- or south-west-facing slopes, hillocks or terraces are dominated by fescues (ass. *Festucetum rupicolae* Burduja et al. 1956) or sometimes feather-grasses (ass. *Stipetum pulcherrimae* Soó 1947) and have extensive patches of *Carex humilis* (ass. *Cariceto humilis-Brachypodietum pinnati* Soó (1942) 1947). These communities include a more truly steppic floristic facies (Akeroyd, 2007a; Jones et al., 2010) of rare or local Pontic-Sarmatian floristic elements but relatively low species diversity (ass. *Salvia nutanti-nemorosae-Festucetum rupicolae* Zólyomi 1958). The plant species present, several of them both striking in appearance and Red-listed in Romania, include *Adonis vernalis*, *Brassica elongata* subsp. *elongata*, *Cephalaria radiata*, *Crambe tatarica*, *Echium maculatum* (*E. russicum*), *Iris aphylla*, *Seseli peucedanoides*, *Prunus tenella*, *Pulsatilla pratensis*, *Salvia nutans* and *S. transylvanica*. One recently discovered site, so far unique in the Saxon Villages, characterized by its stony substrate and well-developed therophyte flora, holds remarkable regional rarities such as *Hyacinthella leucophaea* and *Polycnemum majus* var. *mediterranea* Beck (Jones et al. 2010). These dry grasslands and associated habitats contain more than 20 Red-listed plant species and, perhaps more significant, four species listed on Annex II of the EU Habitats Directive (Table 1a). The whole assemblage is, however, more important than any individual species, as similar grasslands have disappeared across Europe (Veen et al., 2009).

Another grassland type, a more species-poor *Agrostis-Festuca* community on moister and less lime-rich soils (order *Arrhenatheretalia* Pawl. 1928; ass. *Arrhenatheretum elatioris* Br.-Bl. ex Scherrer 1925, *Anthoxantho-Agrostetum capillaris* Silinger 1933, *Festuco rubrae-Agrostetum capillaris* Horvat 1951), is generally managed as pasture and often associated with grazed oak (*Quercus robur*) plateau wood-pasture, a cultural and ecological feature of the Saxon Villages (Akeroyd, 2003b). Herbaceous species include *Dianthus armeria*, *Chamaespartium sagittale* and *Genista tinctoria*. This grassland grades into moderately moist and more nutrient-rich, neutral to mildly acid pastures and meadows. Around the villages, some rare examples survive of mesic semi-natural, species-rich hay-meadows, although most of these have apparently been replaced by 3- to 4-year leys of fodder legumes. In damp, nutrient-rich grasslands the plant communities sometimes include more montane species such as *Narcissus poeticus* subsp. *radiiflorus*, *Persicaria bistorta*, *Succisa pratensis*, *Trollius europaeus* and *Veratrum album* (Table 1b).

The grassland flora exhibits considerable variation, often over distances of just a few metres, in species composition – not always readily explained by gradients in ecological conditions. This ‘gamma diversity’ pattern, an indicator of High Nature Value traditionally

farmed landscapes (Jones, 2008, 2009; Jones et al., 2010), is particularly vulnerable to agricultural intensification. The most extreme floristic variation is associated with steep, slumping slopes, often in the form of groups of hillocks or *movile* of eroding marl, sand or gravel, usually not more than 100m in diameter and 30m high. Probably natural features (although at least one site was modified in ancient times into a hill-fort), they can have different shapes and extreme aspects – such as a hot, dry, sunny south or south–west-facing side and a cooler, shady north- or north-east-facing side. Because of this wide range of conditions, a considerable variety of plant species occurs (Schneider-Binder, 2008; Jones, 2008, 2009; Jones et al., 2010) from those of steppic to more mesic or damp grassland, those of woodland/woodland-edge habitats and sometimes more montane taxa such as *Anthyllis vulneraria* subsp. *carpatica*, *Campanula rotundifolia*, *Daphne cneorum*, *Lilium martagon* and *Sesleria heuflerana*. Similar hillocks are topographical features of two floristically rich steppic nature reserves to the north in Cluj county, at Suatu (Cristea, 1994) and Fânațele Clujului (Cristea, 1995).

**Table 1a: Some nationally and internationally important plant species associated with dry grassland on floristically rich hillocks and steep slopes in the Saxon Villages**

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<i>Adenophora lilifolia</i> – VU, EU Habitats Directive (Annex II)
<i>Adonis vernalis</i> – VU, protected medicinal plant
<i>Cephalaria radiata</i> – NT, endemic
<i>Cephalaria uralensis</i> – local in Romania
<i>Crambe tataria</i> – VU; EU Habitats Directive (Annex II)
<i>Daphne cneorum</i> – VU, protected
<i>Dictamnus albus</i> – VU
<i>Echium maculatum</i> ( <i>E. russicum</i> ) – VU; EU Habitats Directive (Annex II)
<i>Gymnadenia conopsea</i> – NT
<i>Hierochloa australis</i> – NT
<i>Iris aphylla</i> – VU, EU Habitats Directive (Annex II)
<i>Mercurialis ovata</i> – NT
<i>Orchis militaris</i> – NT
<i>Orchis tridentata</i> – NT
<i>Orchis ustulata</i> – NT
* <i>Pulsatilla</i> cf. <i>pratensis</i> subsp. <i>nigricans</i> – rare in Romania (Oprea, 2005)
<i>Prunus fruticosa</i> – crop relative, local in Romania
<i>Prunus tenella</i> – VU, protected; <i>Prunetum tenellae</i> Soó 1951 (<100 ha in Romania)
<i>Salvia transsylvanica</i> – NT, endemic
<i>Seseli peucedanoides</i> – NT
<i>Sesleria heuflerana</i> – Carpathian endemic
<i>Silene chlorantha</i> – NT

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**Legend:** Romanian Red-list (IUCN) categories: NT, Near-threatened; VU, Vulnerable

\* A characteristic dark violet-flowered variant of *Pulsatilla pratensis* on steep slopes in the Saxon Villages that closely resembles *P. transsylvanica* Schur but requires further taxonomic study.

Several of these species (Table 1a), especially on drier slopes, are Red-listed in Romania (Oltean et al., 1994; Oprea, 2005) and are rare at a European level. Such apparently random assemblages of plants may represent ancient relicts of climatic conditions over past millennia, stranded on ecological islands among more intensively managed agricultural land. The flora varies not only across the hillocks but also between adjacent hillocks and slopes. The hillocks are ‘the jewel in the crown’ of these grasslands and they probably ought to have strict protection – although Schneider-Binder (2008) has indicated that they remained in good condition over a 20-year period up until at least 1999. A decade later they mostly remain in good condition, and comprise a special element in the network of species-rich habitats in the Saxon Villages, complementing other regional diversity hotspots represented by steppe grasslands in Transylvania (Rákósy & Kovács, 2001; Cremene et al., 2005). The hillocks may be especially

good candidates for protection, because not only do the extensive HNV farm grasslands that surround them act as a buffer against deleterious environmental impacts, but also serve as broad ecological corridors between these widely dispersed sites of highest diversity. Species-rich agricultural landscapes in other parts of Transylvania are increasingly fragmented (Cremene et al., 2005), greatly hindering the efforts of conservationists.

**Table 1b: Some nationally and internationally important plant species of damp grassland on woodland margins in the Saxon Villages**

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<i>Achillea ptarmica</i> – VU
<i>Dactylorhiza incarnata</i> – NT
<i>Dactylorhiza majalis</i> – NT
<i>Dianthus superbus</i>
<i>Epipactis palustris</i> – NT
<i>Gentiana pneumonanthe</i>
<i>Iris sibirica</i>
<i>Narcissus poeticus</i> subsp. <i>radiiflorus</i> – VU
<i>Orchis laxiflora</i> – NT
<i>Peucedanum rochelianum</i> – NT, more or less endemic to Romania
<i>Phyteuma tetramerum</i> – NT
<i>Trollius europaeus</i> – NT

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Romanian Red-list (IUCN) categories: NT, Near-threatened; VU, Vulnerable

The grasslands include not only semi-natural communities on steep slopes and marginal land, but also those with considerable impact of human activity and management. Much grassland shows evidence of having been ploughed in the past, and a range of species, notably legumes (*Onobrychis viciifolia* and species of *Lathyrus*, *Trifolium* and *Vicia*), can be observed actively re-colonizing former arable land abandoned at the end of the communist period in seral stages from arable to species-rich grassland (*vide* Ruprecht, 2005). Evidence from topographical features such as relict terraces or lynchets with ‘ridge-and-furrow’ and small earthworks, probably early medieval in origin, suggests that grassland has repeatedly re-colonized former arable land. In such a plant-rich landscape, with low nutrient input and a varied and uninterrupted ‘seed rain’, one frequently sees a mosaic of arable, old and newer meadow and pasture, with evidence of repeated episodes and cycles of re-colonization. Even over-grazed pastures are locally species-rich, consisting of a complex of seral stages deriving from periods of intensive sheep-grazing and flock-folding (Jones 2010), and for the most part the grasslands of the Saxon Villages do not require extensive restoration – as needs to be carried out in western Europe and even in Ukraine, Russia and other parts of eastern Europe (Struchkov & Kuleshova, 2005). That said, modern agriculture has the capacity to rapidly devastate or degrade such landscapes.

The colourful wildflower meadows of this region, probably the finest that survive in lowland Europe, remain central to a rural economy based on the production of meat, cheese, honey and, in an ongoing ADEPT project, jams made from the abundant wild fruits. They provide a living link with the past, and a rich genetic resource for the future selection of forage crops, especially legumes. Some 60 of the plant species recorded in the Saxon Villages region are crop relatives (Akeroyd, 2003a). Although this ancient and special landscape remains substantially intact, the survival of its unique biodiversity depends upon maintenance of traditional agricultural practices. These are threatened by the precarious state of the local agricultural economy and social structure. The lack of profitability in traditional farming methods and the emigration of most of the experienced farming population have created pressure to abandon marginal land and intensify farming on readily accessible sites. This has led, for example, to encroachment of a scrub of *Crataegus monogyna*, *Prunus spinosa* and other dense or spiny shrubs on to grasslands.

There is also the danger that the application of artificial fertilizers will seriously damage or destroy wildflower-rich hay-meadows, allowing coarse or vigorous grasses and weeds to invade. Traditional manuring is not a problem, but even a single application of chemical fertilizer would undoubtedly have catastrophic effects on the survival of the most species-rich grasslands. Research by ADEPT (Akeroyd & Page, 2006; Jones 2008, 2009) has identified a number of threats to biodiversity (Table 2). A pervasive threat in recent years has been a sharp contraction in cattle numbers in several villages due to low milk prices, leading to a reduction in both grazing and hay-cutting. Unchecked, these processes can only lead to deleterious environmental change and contribute to poverty and hardship for local people, apart from the scientific loss through erosion of biodiversity, with the disappearance of flora, fauna and habitats, and denying a unique opportunity for ecological research in a substantially intact 18<sup>th</sup> century or medieval ecological landscape.

**Table 2: Threats to biodiversity in the Saxon Villages**

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- The intensification of grassland management, with nutrient over-enrichment by fertilizers or high stocking rates, or over-grazing, especially by sheep.
  - The increase of sheep at the expense of the traditional communally-grazed village cattle herd – changing management practices, damaging hay-meadows by grazing rather than mowing, and destroying the incentive for maintaining hay-meadows.
  - The abandonment or reduction of traditional land management practices such as the mowing of hay-meadows or the cutting or burning of scrub on slopes.
  - Unsustainable forest management by private owners and local government authorities, including clear-felling or planting with exotic woody species.
  - Uncontrolled and inappropriate infrastructure development for intensive agriculture, industry, recreation and tourism.
  - The drainage or alteration of the small surviving wetlands.
  - The further spread of weeds and invasive species, especially aggressive aliens such as *Asclepias syriaca*, *Fallopia japonica* and *Solidago canadensis*.
  - The unsustainable collection of medicinal plants, which remain a significant element in the rural economy (*vide* Kathe, 2003).
  - A progressive loss of ruderal plants around villages, including medicinal and other species of economic or cultural value (Akeroyd, 2008).
  - Climate change, perhaps leading to severe or extended periods of heat and drought, and snow cover absent or low in winter.
  - Limited public information, knowledge and awareness about the rich ecological, cultural and potential economic value of the area.
  - The lack of a comprehensive network of protected areas; only a tiny part of the countryside of the Saxon Villages is at present included in nature reserves.
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#### AGRICULTURE, PAST AND PRESENT

Conservation in the Saxon Villages needs to be directed across the wider countryside rather than within strict nature reserves. Not only might nature reserves be perceived unfavourably by local people, but also much of the biological richness of the area derives from and depends upon continuing non-intensive farming (Akeroyd & Page, 2006). For centuries the Saxon farmers maintained their countryside with great care. Decades of poor management under the communist regime failed to inflict too much damage on this buffered, well-managed historic landscape. Conservation must build upon the Saxon achievements in order to achieve a sustainable future.

Agriculture in the Saxon Villages is not primitive or even medieval, as some commentators have implied, but more reflects 18<sup>th</sup> century (and subsequent) improvements. The

techniques employed are perfectly adequate for semi-subsistence farming but cannot compete efficiently in a modern commercial economy. The farming appears old-fashioned today, but in its time the region would have been an island of agricultural innovation in eastern Europe, where agricultural development was held back for centuries, largely the domain of feudal landlords with plentiful labour. The self-governing Saxons, protected by legal and fiscal privileges granted by Hungarian kings, maintained hundreds of years of careful and prosperous peasant husbandry (Akeroyd, 2006). These immigrants from Flanders, Luxembourg and adjacent districts of the lower Rhine and Moselle would have brought with them improved medieval German agricultural technology, based on better ploughs and extensive cereal cultivation (Bartlett, 1993) and including larger barns and 3-course crop rotations. It should also be noted that the Saxons and other German farmers moved into their new lands in Transylvania and elsewhere in eastern Europe during a period of climatic warming ('medieval climatic optimum', c.1000–1300), which undoubtedly favoured colonizing and agricultural ventures.

By the 16<sup>th</sup> century the NW European homeland of the Transylvanian Saxons (then mostly part of the Spanish Netherlands) was densely populated, economically successful and a zone of pioneering intensified agriculture. This rural development was based in part on the progressive replacement of fallow by leguminous fodder crops, notably Red Clover (*Trifolium pratense*), in an expanded field rotation. The enhanced nitrogen system helped to improve the feeding of stock and enabled production of larger cereal yields. Principal regions of agricultural improvement were Friesland and Zeeland provinces of the Netherlands, Flanders and Brabant provinces (in modern Belgium), and adjacent France and Germany, with pockets ('*Intensitätsinseln*') elsewhere in Germany (Slicher van Bath, 1969). Reaching England from the late 17<sup>th</sup> century, these agricultural improvements would underpin the so-called 'Agricultural Revolution' (Overton, 1996). The Transylvanian Saxons – their countryside has something of the character of 18<sup>th</sup> century England, both in landscape and agriculture – undoubtedly absorbed changes in agricultural practice through continued cultural and racial links with their German roots. However, they did not enclose, intensify and specialize, as did progressive English 18<sup>th</sup>-century landowners and farmers, although their substantial farmhouses (built and continuously rebuilt in 18<sup>th</sup>-century style) suggest a sometime prosperous rural economy. By contrast, the Maramureş region of northern Transylvania retains almost medieval agricultural systems and vistas, similar to those present in formerly less agriculturally improved regions of Europe such as Sweden well into the 19<sup>th</sup> century (Slotte, 2002).

Even today, the rural landscapes and villages of the region whence the Saxons emigrated share features with the Saxon Villages of Transylvania (L. Rákósy, pers. comm.). More especially, the largely self-sufficient agricultural systems which persist in the Saxon Villages bear a striking resemblance to those of Luxembourg's southern *Bon Pays* or *Gutland* half a century or more ago (Naval Intelligence Division, 1944): farmhouses grouped along village streets, scattered strip-fields outside the villages with low mechanization, emphasis on dairy products and raising pigs, extensive permanent grazing (also on marl soils), hay stored in barns rather than outdoor stacks, and productive farmhouse gardens. Today's Saxon farm economy remains, as then (*ibid.*, 1944), "based on the need for producing sufficient food for man and beast through the winter". As elsewhere in Romania, the principal crop is maize (corn) – which feeds both. Hay remains important, the cut from semi-natural hay-meadows being augmented by leys of Lucerne (*Medicago sativa*) and some Red Clover.

The economy of the Saxon Villages still depends almost entirely upon agriculture, although only sheep and cow dairy farming is at all commercially developed, with several processing companies collecting milk. The milk of one or a few cows frequently provides a household's only cash income. Sheep and goat milk are also made into plentiful cheese for local consumption (Akeroyd, 2006). Development of small craft-related enterprises is hampered by a lack of capital investment and poor marketing. Demographic trends are also a problem. With the

post-1990 departure of the Saxons, village populations fell by 30%, even 50% in some cases. Populations have since been prevented from falling further by the arrival of ethnic Romanians and Roma – a considerable shift from a predominantly Saxon population (90%), to one in which typically Saxons make up 10%, Roma 50% and Romanians 40%, many from outside the area who may not share agricultural traditions with the Saxons. Roma traditionally derive income as farm labourers, by making craft products such as brooms and baskets, or metal-working. The villages have a predominance of older people and average income falls below the poverty line.

Considerable problems have beset the agricultural economy and society of the Saxon Villages following the departure of almost all established Saxon farmers, ending centuries of successful farm tradition. Their last major exodus coincided with the difficult social transition following the collapse of communism in Romania and transition to a market economy. The present rapid transition of Romania to a full EU economy, following EU accession in January 2007, further exacerbates problems for semi-subsistence farming and associated activities and employment.

The scale of the problem is illustrated by the following agricultural statistics. There are 4.2 million farm holdings in Romania, with an average size of 2.1 ha. Of these, over 80% (3.45m) of holdings retain more than 50% of their production for home use, and can be regarded as semi-subsistence farmers (National Strategy Plan for Rural Development 2007–2013, 2007: 8). The mosaic landscape of small holdings, with many field edges (different crops in arable areas, different mowing times in the meadows), has done much to maintain this HNV landscape.

The consequences of the economic problems of farming communities (Table 3) need to be addressed if progress is to be achieved towards long-term conservation of the grasslands and wider landscape.

**Table 3: Economic problems faced farming communities in the Saxon Villages**

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- The collapse of former state farms, the only significant employer in most villages, with subsequent decay of buildings, machinery and cultivated land.
  - The un-profitability of small farms, most of which have fewer than five cows, sometimes a single cow. After land restitution, 90% of villagers have farms of under 5ha. Often milk fails to meet strict EU hygiene requirements, so threatening the sole source of income for many villagers.
  - The lack of investment in and the low profitability of farming, leading to changes in land use, with some land abandoned and other areas seeing an intensification of agriculture. There are strong economic pressures to manage both farmland and forests more intensively and less unsustainably.
  - Non-agricultural enterprises providing only limited employment – traditional skills (blacksmiths, carpenters, cloth and basket weavers), mechanics, honey producers, bakeries, village shops and bars, and more recently guest-houses. Tightened regulations after EU accession are making it more difficult for small farming communities, with little or no capital to invest, to diversify.
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#### COMMUNITY-BASED ENVIRONMENTAL CONSERVATION

The biodiversity of the Saxon Villages area can be protected in the long term only if biodiversity conservation is clearly shown to have an economic value to local people and is linked directly to economic regeneration, such that each supports the other. Grassland, the greater proportion of which is HNV meadows and pastures, must be seen as integral to the rural economy and to yield definite benefits to farmers – whether as subsidized economic incentives or commercial income.

Small-scale farmers generally find the EU grants available under Pillar II of the Common Agricultural Policy (CAP) confusing, and participation has been relatively low. ADEPT's farm advisory team has had considerable success in increasing farmer uptake, so that participation of Târnava Mare farmers in the agri-environment scheme is five times the

national average. Also, smaller-scale farmers, whom ADEPT has targeted for special assistance, have participated – as shown by the average size of applications (Table 4).

**Table 4: Average take-up of EU agri-environment funding, in the 5 communes in which ADEPT is active, compared to the 45 other communes in Mureş county, 2009**  
(official data)

<i>Communes in Mureş county</i>	<i>Mean number of farmers participating in Measure 214</i>	<i>Area covered by Measure 214</i>	<i>Average size of application</i>
Communes (5) in which ADEPT is active	200	2028 ha	10.1 ha
Other eligible communes (45) in the county	30	537 ha	17.9 ha

At the same time, studies of fauna and flora have indicated that a strong scientific basis exists for statutory protection of the area to halt or reverse threats to biodiversity and the rural economy outlined in Table 1. On the basis of biodiversity data assembled so far, the whole 85,000-ha ADEPT project area was included in the Natura 2000 network of Sites of Community Interest (SCI), the final stage being approved by the EU Council of Ministers in December 2008. This makes the Saxon Villages the largest SCI in Romania outside the Carpathian Mountains and Danube Delta. The site is exceptional not only for its large size, but also in having a significant level of agriculture and a sizeable human population. Natura 2000 designation should bring additional incentive grants to farmers to maintain traditional management that conserves HNV farmland (National Strategy Plan for Rural Development 2007–2013, 2007: 42, 62).

To encourage economic regeneration, protect natural heritage and promote the establishment of a protected area, ADEPT is now engaged in a range of activities (Table 4) with farming communities, which have gained the support of local people and local administrations.

**Table 5: ADEPT’s activities in the Saxon Villages**

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**Conservation**

- Contributing to designation of the 85,000 ha ADEPT project area as a Natura 2000 Site of Community Interest (Târnava Mare SCI).
- Continuing fieldwork to map and assess habitats and to develop management proposals; and to expand the SIC, mostly immediately to the south, by c.10%.
- Developing management guidelines in consultation with county environment offices and local people, ensuring that ecologically sensitive areas are eligible for special incentives based on management agreements.
- Managing and monitoring experimental grassland plots, with representative flora of common and rare species, including experimental cutting, grazing and fertilizing, as a demonstration for farmers and visitors.
- Convening, with the European Forum on Nature Conservation and Pastoralism, in Sibiu (7–9 September 2010), an international conference on “High Nature Value grasslands”.

**Community**

- Establishing a Local Action Group along the lines of the EU’s LEADER programmes, to ensure local participation in management and development decisions.
- Developing educational projects for schoolchildren related to the environment, in conjunction with the NGO Milvus Group.
- Established a monthly community newsletter, distributed to all households in Saschiz commune; a newsletter is planned for all eight SCI communes.
- Building capacity for long-term local management through education and training.

### Agri-environment

- Establishing a pilot scheme in 2007 to enable 190 small farmers, managing some 2000 ha of wildflower-rich hay-meadow, to receive over €180,000 per year from EU grants for good management.
- Providing a farm advisory service under which 80% of the 5000 eligible farmers in the area have signed up for further agri-environment schemes, considerably higher than the national average.
- Contributing feedback into national rural development policy via membership of the National Monitoring Committee for Rural Development.
- Co-operating with MARD in design and monitoring of agri-environment measures.
- Presenting agri-environment modules in agricultural courses for farmers.

### Farm incomes and diversification

- Running a Tourist Information Centre in Saschiz, in conjunction with Saschiz Town Hall, distributing information and publications, selling local products, and raising awareness of nature value of the area among local people and visitors.
- Working to create and establish a strong 'Saxon Villages' brand image for marketing quality produce from local farms, integrating food production and nature values.
- Encouraging local producers to develop a range of traditional food products – cheeses, jams, honey, herbs, dried/smoked hams and sausages, now being sold successfully at farmers' markets in Sibiu, Brasov, Sighisoara and elsewhere.
- Working with shepherds and government agencies towards meeting new rules on hygiene in summer sheepfolds.
- Donating branded village signs, displaying tourism and heritage images, which increased visitor numbers in Saschiz from c.400 in 2006 to c.6000 in 2010, of whom 40% were Romanian.
- Providing agro-tourism and food hygiene courses for applicants from throughout the project area.
- Diversifying food production by introducing low-tech solar driers, constructed by local carpenters, for garden vegetables and fruits; and experimenting with production of mature cheeses with a longer shelf-life than existing cheeses.
- Campaigning, with WWF Romania and the Romanian Food Safety Authority, for appropriate interpretation of EU food hygiene regulations so that small-scale food producers are not disadvantaged or eliminated.
- Upgrading existing and building new EU-standard milk units to collect, bulk up and test the milk from small village farms, making it commercially viable.

### Publications (in English and Romanian)

- *The Historic Countryside of the Saxon Villages of Southern Transylvania/Peisajul Istoric al Satelor Sasești din Sudul Transilvaniei* (Akeroyd, 2006);
- Colour brochures on Natura 2000 and on the ADEPT project, for local and regional use, and a range of leaflets on food and cultural tours for visitors;
- Detailed 1: 50,000 high-quality map of the project area, *Harta turistica-Tourist map. Sighișoara-Târnava Mare*, Descopera Eco-Romania nr 1–2 (2007, 2009);
- *Minimum food hygiene and food safety conditions for small producers* (2008), published in conjunction with the MARD, WWF-Romania and Milvus, and available in Romanian, Hungarian and English. Over 50,000 copies have been distributed nationally. The booklet has had a positive influence on producers and on food inspectors, who are now more flexible when dealing with small, local or traditional producers.
- *Brief Guide to Butterflies and Moths of Sighișoara-Târnava Mare Natura 2000 site/Micul Ghid al Fluturilor din Sit Natura 2000 Sighișoara-Târnava Mare* (Rákosy, L., 2010). Further Brief Guides are planned.
- Annotated year-planner wall-charts and diaries for farmers, with information on grant applications and submission dates for agri-environment measures(2011–).

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We need to continue to address how best to conserve the remarkable HNV grasslands and farmed landscapes of southern Transylvania in the face of profound economic and social change.

Not least, we should try to protect the cultural legacy of the Transylvanian Saxons, now diminished in numbers but historically one of the most idiosyncratic and successful of the racial groups in the ethnic and cultural mix of the Carpathians and the sub-Carpathian region. Above all, any conservation measures must take into account the interests of the farming communities and local people.

For the present, the designation of Târnavă Mare SCI offers protection for those habitats and species listed in Annexes I and II of the EU Habitats Directive. However, there are currently no Natura 2000 payments for farmers who are obliged to alter their management to conserve these habitats and species. Financial incentives for biodiversity-friendly management instead come from other Pillar II Axis 2 measures, especially agri-environment grassland measures. Farmers are eligible for these payments if they farm within designated HNV areas of Romania, not linked to Natura 2000 designation. Since so much HNV grassland of critical importance lies outside Natura 2000 sites, this criterion particularly helps the conservation of HNV grassland.

For the future, ADEPT is working with MARD, and the European Commission (DG Agriculture) to propose and design a range of measures for the new CAP period, 2013–2020. These measures will target small-scale farmers, and include simplified payments scheme for small farm holdings; improved criteria for eligibility of land (much permanent grazing land of considerable biodiversity importance is currently not eligible for direct payments or agri-environment payments owing to tree or rock cover, but should be included for the ecosystem services that they provide so long as they continue to be managed); and funding for locally-based farm advisory services such as that piloted by the ADEPT project.

The combination of outstanding biodiversity with renowned cultural heritage and landscape features (Akeroyd, 2006; Ogden, 2000) makes Târnavă Mare a potential candidate for future Natural Park status (IUCN Category V) and/or a UNESCO Cultural Landscape World Heritage Site – nine fortified village churches and the citadel of Sighișoara are already UNESCO World Heritage Sites. The Management Plan required for such a Natural Park might be another mechanism to provide other protection and incentive measures suited to local conditions, while ensuring and encouraging sustainable economic activities and initiatives. It would be the first Natural Park of significant size in Romania to be aimed mainly at conserving semi-natural grassland habitats. It might also provide a model for the conservation of anthropogenic grassland elsewhere in Romania and other countries of Eastern Europe.

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## CONSERVAREA PAJIȘTILOR CU VALOARE NATURALĂ RIDICATĂ DIN TRANSILVANIA, ROMANIA

### (Rezumat)

România deține resurse semnificative de pajiști bogate în floră spontană. Aceste pajiști, mai ales fânețele, prezintă importanță majoră de conservare la nivel internațional, având o abundență de comunități vegetale și animale, care au dispărut din majoritatea zonelor Europei. Mai ales satele săsești din sudul Transilvaniei conțin peisaje cu Valoare Naturală Ridicată, unde biodiversitatea coexistă cu agricultura tradițională. Managementul tradițional continuu este necesar pentru a menține mozaicul bogat de habitate. Protecția peisajului și dezvoltarea durabilă trebuie să medieze conservarea pășunilor și a altor habitate bogate în biodiversitate cu asigurarea veniturilor adecvate și a infrastructurii comunitare.

Fundația ADEPT (Agricultural Development and Environmental Protection in Transylvania – Dezvoltarea Agriculturii și Protecția Mediului în Transilvania) a luat ființă pentru a răspunde acestor cerințe și a evidențiat mai ales pășunile permanente, care ocupă o poziție centrală în conservarea plantelor, producerea de alimente locale de înaltă calitate și eco-turism în satele săsești. În decembrie 2008, habitatele și speciile din centrul zonei, Târnavă Mare (85 000 ha), au devenit protejate în cadrul rețelei europene Natura 2000. Acest fapt va facilita asigurarea stimulentei financiare pentru fermieri, care vor conserva elementele geografice, culturale și biologice ale peisajului.

Lucrarea face și o analiză a diversității floristice și fitosociologice din acest sit Natura 2000, identificând problemele actuale ce pot amenința perenitatea biodiversității și calitățile peisajului.