

INTEGRATED BIODIVERSITY CONSERVATION IN A SEMI-NATURAL LANDSCAPE: TÂRNAVA MARE RIVER AREA (TRANSYLVANIA, ROMANIA)

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Abstract: *The landscape and biodiversity of the Sighișoara-Târnava Mare potential Site of Community Interest (pSCI), in southern Transylvania, comprise a remarkable fragment of an older Europe, where species-rich plant and animal communities thrive alongside traditional farming and land use. The wildflower meadows are probably the best that survive in lowland Europe. The area contains a range of EU Habitats Directive Annex I Habitats and Annex II species, and is a clear demonstration of the biodiversity importance of semi-natural landscapes.*

This landscape has not been created by landscape architects or nature conservationists but by farmers, by centuries of traditional management. Only continued tradition-based management can preserve this unique area. In 2005 Fundația ADEPT began an integrated project of biodiversity conservation, agri-environment and rural development, to provide economic incentives for local farming communities. This project is supported by government sector (including the UK government's Darwin Initiative), NGO sector and corporate sector (Orange Romania). The project area is about 85,000 ha, with a population of about 25,000 people, 90% of whom are small-scale farmers. This paper is one of the many scientific communications obtained derived from this unusual project, in which public and private sector support is coming together to meet conservation and rural development objectives.

Key words: *Romania, Transylvania, Târnava Mare River watershed, biodiversity, conservation, sustainable development, community participation.*

Introduction

The diversity of nature is one of the main themes of ongoing interest that concerns academic, administrative and civil society.

Cultural diversity was conceded only recently to be a main component of the general issue of biodiversity. Over centuries anthropogenic impact on natural habitats has created new valuable semi-natural habitats (called also secondary habitats), which bring as a consequence of human cultural diversity an increase in the diversity of flora, fauna, habitats, ecosystems and landscapes at the local, national and regional scale (AKERoyD and PAGE, 2006; CURTEAN-BĂNĂDUC, 2005b; MOUNTFORD and AKEROYD, 2005; CURTEAN-BĂNĂDUC et. al., 2007; BAVARU et. al, 2007).

Europe is one of the main regions of such human-induced transformations. These areas with secondary habitats can have a very beneficial influence, improving biodiversity through qualitative aspects in contrast with the general decline of the natural biodiversity all over the world (LEAKEY and LEWIN, 1995; IUCN, 2000; CONNOR, 2002), which was recorded as most accentuated in the latter half of the XXth Century. As a consequence, conservation of these types of areas is one of the ongoing major and complex challenges for European conservationists.

The Târnava Mare pSCI, in southern Transylvania, is among Europe's last extant medieval landscapes, where species-rich plant and animal communities thrive alongside traditional farming and land use. This area exhibits a remarkable diversity of micro-climates, microhabitats, habitat types and landscapes (extensively used agricultural land, wetlands, pastures, meadows – xerophilic, mesophilic or hygrophilic), stands of natural and semi-natural forest (beech, hornbeam, oak, pine, etc.), gallery forests along the main water courses, lakes, marshes, ponds, temporarily pools, rivers, soil-slumping areas, etc.). Especially, the wildflower meadows are among the best that survive in lowland Europe. This exquisite landscape has not been created by landscape architects or nature conservationists but by farmers, by centuries of traditional management. (AKERROYD 2002, 2003, 2006; MOUNTFORD and AKEROYD 2008).

An eroded plateau of often steep-sided valleys and gently rolling hills to 600–700 m or more, the well-wooded countryside has well-dispersed settlements and few roads. The region retains both an ancient human culture and an abundance of wildflowers and wildlife once plentiful but now disappeared from much of modern Europe.

This area provides an astonishing glimpse of biodiversity-rich rural landscapes lost over most of Europe, with its traditional villages, fortified medieval churches (several now UNESCO-designated), extensive woodlands and flowery meadows, and wealth of invertebrate and vertebrate wildlife. In particular, in summer the orchards, arable strips, hay meadows and pastures are a display of wildflowers on a scale unseen in northern Europe for a generation. This is how Europe may have looked in the 18th or even the 14th century, a landscape where rich and healthy animal and plant diversity thrives alongside traditional and non-intensive agriculture; a fragile ecosystem that needs to be conserved as a geographical, cultural and ecological entity.

This landscape is in fact a product of centuries of extensive agriculture. Traditional agriculture, largely un-mechanized with little use of agrochemicals or intensive land-use, has enabled ancient patterns of European agrarian and village life to survive, modified but substantially intact, to the present day. One village, Viscri, for example, has some 400 inhabitants and 85 working horses. Mowing is still largely by scythe and weeding by hoe, and the lack of herbicides has enabled some rarer arable weeds to survive. Most of the local Saxon population of farmers emigrated to Germany in the early 1990s, but their cultural legacy endures, in their farmhouses and churches, and in the landscape they created (AKERROYD, 2006). This landscape is threatened by economic and social change, especially following Romania's accession to the European Union due to the inevitable modernisation.

The conservation of this landscape depends on continued traditional management of the forests and the agricultural land, especially the grasslands. This paper tries to

offer some solutions for the regeneration of the rural economy and village prosperity as tools for biodiversity conservation.

Natural History Data

The studies of natural sciences related to the targeted area and the local taxonomic groups have varied greatly, qualitatively and quantitatively, over the last two centuries.

XIXth Century data

The main botanical and zoological studies were fairly well represented in the study area in the XIXth Century, mainly due to the activity of members of the Transylvanian Natural Sciences Society; for botany BAUMGARTEN (1816, 1846), FRONIUS (1858), BARTH (1866, 1867), FUSS (1866), SCHUR (1866), and for zoology M. BIELZ (1843, 1851), E. BIELZ (1850, 1853, 1856, 1867), KIMAKOWICZ (1883 - 1884), BIELZ (1888) and SEIDLITZ (1891).

XXth Century data

The botanical and zoological studies are also well represented in the study area mainly due to the scientific activities developed around the scientific research centres of Sibiu, Cluj-Napoca and București.

For botany should be mentioned: BARTH (1903); FEKETE and BLATTNY (1913); PRODAN (1931); SĂVULESCU (1952 - 1976); POP (1960); TURCU (1962); CSÜRÖS and KOVÁCS (1962); BORZA and LUPȘA (1964 - 1965); PÁLL (1964, 1965, 1969); CSÜRÖS and NIEDERMAIER (1966); SCHNEIDER-BINDER (1971, 1984, 1994, 1996 1998); TAUBER and WEBER (1976); SANDA et al. (1976, 1980, 1983, 1997), DRĂGULESCU (1978, 1987); MOMEU et al. (1988); COLDEA (1992); MUCINA et al., (1993a, b); BOȘCAIU et. al. (1994); OLTEAN et al. (1994); WENDELBERGER (1994); for zoology should be mentioned: ANTIPA (1909); PETRI (1912); BĂCESCU (1947); WORELL (1951); BĂNĂRESCU and MÜLLER (1960); BĂNĂRESCU (1964); BENEDEK (1970); KIS (1971); GRAEF (1972); KLEMM (1975); SCHNEIDER (1976); SALMEN (1980); KLEMM and SALMEN (1988); PHILIPPI and POPA (1990); COGĂLNICEANU (1991); GROSSU (1993); SÁRKÁY-KISS and SÎRBU (1998); DEM and HARTEL (1999); WEBER (1999).

XXIth Century data

The XXIth Century has already brought many specially focused studies on the area both regarding botany and zoology.

Botany: MOMEU and PÉTERFI (2005); DRĂGULESCU (2005); MOUNTFORD and AKEROYD (2005, 2008); Zoology: MURARIU (2000); CURTEAN-BĂNĂDUC et al. (2001); PHILIPPI (2001); GHIRA et al. (2002); VALENCIUC (2002); AKEROYD (2003), AKEROYD et al. (2003); DRĂGULESCU (2003); KATHE et al. (2003); OROIAN (2004); SÂRBU et al. (2004); AKEROYD and PAGE (2006); BĂNĂDUC (2005); BĂNĂRESCU (2005); CUPȘA (2005); CURTEAN-BĂNĂDUC (2005a); CURTEAN-BĂNĂDUC (2005b); DRĂGULESCU (2006); GHEOCA (2005);

GHEOCA and GHEOCA (2005); HARTEL and DEMETER (2005); ILIE (2005); ISTRATE (2005); JERE and DOCZY (2005); KÓSA et al. (2005); ROBERT and CURTEAN-BĂNĂDUC (2005); SÎRBU (2005); AKEROYD (2002, 2006, 2007a, 2007b); BENEDEK (2007); BUCȘA (2007); COWELL (2007); CURTEAN-BĂNĂDUC and BĂNĂDUC (2007); DRĂGULESCU (2007); GHEOCA (2007); GHIRA (2007); HARTEL et al. (2007); JONES (2007); KÓSA and PAPP (2007); MOGA and ÖLLERER (2007); OROIAN et al. (2007); SCHNEIDER-BINDER (2007).

The importance of this area's biodiversity

Landscapes

The whole intact landscape is a remarkable survival from medieval times. The most unusual feature of this area is, however, topographic as much as cultural: groups of hillocks or 'tumps' of eroded sand, gravel and marl, each usually no more than 100 m in diameter and 30 m high. They are clearly natural features but several have been modified by human activity, in one case as a hill-fort from antiquity. These hillocks, which are often elongate and either steep or flatter with convex or concave faces, often have a south and south-west facing aspect where temperatures rise to extremes and drought is the norm, and a north- and north-east-facing side that is cooler and often shady or, if clayey, slightly damp. The rest of the hillock surface provides all conditions between these two extremes. Because of this wide range of conditions, a wide range of plant species can be found from steppic and drought-tolerant plants on the south side through meadow species to woodland, wetland plants or montane/boreal on the north side. Rather than clearly defined species associations determined by mapping of recognized habitats (e.g. under EUNIS habitat classification system), these hillocks can support random assemblages of plants that may represent relicts of a range of climatic conditions through past millennia, stranded on 'islands' in agricultural land which has been ploughed or grazed more intensely. These hillocks are the most floristically rich sites in the area and appear to be more or less unique in the Carpathian and sub-Carpathian region. They are a priority for conservation.

Habitats

The Târnava Mare pSCI still supports extensive stands of semi-natural vegetation, which is species-rich and, in the case of the woodlands, closely resembles the natural habitats that occupied the Transylvanian foothills of the Carpathians prior to human impact. At the same time the region supports habitats that have evolved in intimate association with human agriculture and other activities. Several of the habitats present, and individual species, are localized in distribution and highly characteristic of this part of Central Europe. This makes the southern Saxon Villages region of considerable international value (Table 1).

Table 1 EU Habitats Directive Annex I habitat types present in Sighişara-Târnava Mare pSCI

Habitats Directive Annex 1 code	Description
3130	Temporary pools inhabited by ephemeral species of the Isoëto-Nanojunetea class
3150	Natural eutrophic lakes with <i>Magnopotamion</i> or <i>Hydrocharition</i> -type vegetation
3270	Rivers with muddy banks with <i>Chenopodion rubri</i> p.p. and <i>Bidention</i> p.p. vegetation
40A0*	Sub-continental peri-Pannonic scrub
62C0*	Ponto-Sarmatic steppes
6210*	Semi-natural dry grasslands and scrubland facies on calcareous substrates (<i>Festuco-Brometalia</i>) with important orchid sites
6240*	Sub-pannonic steppic grasslands
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels
6440	Alluvial meadows of river valleys of the <i>Cnidion dubii</i> class
6510	Lowland hay meadows (<i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i>)
6520	Mountain hay meadows
9130	Asperulo-Fagetum beech forests
9160	Sub-Atlantic and medio-European oak or oak-hornbeam forests of Carpinion betulii
9170	Galio-Carpinetum oak-hornbeam forest
91E0*	Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (Alno-Padion Alnion incanae Salicion albae)
91H0*	Pannonian woods with <i>Quercus pubescens</i>
91I0*	Euro-Siberian steppic woods w/ <i>Quercus</i> spp.
91V0	Dacian Beech forests (<i>Symphyto-Fagion</i>)
91Y0	Dacian oak-hornbeam forests
92A0	<i>Salix alba</i> and <i>Populus alba</i> galleries

* indicates priority habitats according to Annex I of Habitats Directive.

Flora

Diverse and often almost pristine habitats support more than 1100 plant taxa in over 100 families, more than 30% of the Romanian flora (AKERÖYD, unpublished). This richness is a result of geographical position, diversity of relief, varied climatic conditions and soils, and traditional land-use with a mosaic of woodland, grassland and arable cultivation. 87 taxa are listed for protection and conservation at national and international level, and 12 taxa are threatened in Europe and included in Annex II of the EU Habitats Directive. A further 77 taxa are threatened at national level and

included in the Romanian Red List. Just over half occur in meadow-steppe grassland communities. Several are rare and decreasing in Europe. More than 50 of the native plants present are related to cultivated or crop plants and constitute a potential resource for plant breeding, notably distinctive variants of forage legumes such as Sainfoin (*Onobrychis viciifolia*) and Red Clover (*Trifolium pratense*). Some village fruit trees may represent old varieties or cultivars, especially plums and pears, and wild pears and cherries too are a natural gene-pool.

The most obvious manifestation of Transylvania's astounding richness of plant and animal diversity is the wildflowers of the traditionally managed grasslands. These are probably the best lowland hay-meadows and pastures left in Europe; so extensive that you can walk through them for hours. The colourful and varied flora of these grasslands comprises a mixture of western and central European plants with a significant element of steppic species. This species-rich 'meadow-steppe' has retreated throughout Europe, even in Poland, Czech Republic and Slovakia. Wiry grasses (especially *Festuca* spp.) dominate the sward, and the species-rich communities often include 30-40 species of legumes, notably Sainfoin (*Onobrychis viciifolia*), milk-vetches (*Astragalus* spp.), several dwarf brooms (*Chamaecytisus* and *Genista* spp.) and numerous clovers (*Trifolium* spp.), a characteristic floristic element of dry grasslands in Transylvania. Several species are rare in Romania and Europe, notably populations of *Echium russicum*, a priority species on Annex II of the EU Habitats Directive, with hundreds of individuals present in some years.

On hot, dry south-facing slopes, the flora is distinctly steppic, with Pontic-Sarmatian elements such as *Adonis vernalis*, *Crambe tatarica*, *Linum flavum*, *Salvia nutans* and *Stipa pulcherrima*, and Mediterranean elements such as *Muscari comosa* and *Vinca herbacea* (AKEROYD, 2007a); also endemic xerophilous species such as *Cephalaria radiata* and *Salvia transsylvanica*. There are extensive stands of *Prunus tenella*, some 2 ha in all. Many of these species of dry slopes are Red-listed in Romania.

One of the most interesting and significant factors in the ecology of the grasslands is the low nutrient status of the grassland soils (JONES, 2007). Generations of villagers have transferred nutrients to the valleys as hay or animal dung with almost no input of nutrients to the upper pastures. This correlates with the great species diversity, the richest grassland communities (more than 40 species per 0.5 m² relevé) being on old terraces and medieval 'ridge and furrow' fields along high slopes. In other parts of Europe, for example in southern England, nutrient enrichment has done untold damage to similar ancient grasslands.

Fauna

The region's animals associated with the diverse habitats and flora include important and sometimes last significant populations of invertebrates and vertebrates in lowland Europe, among them a sustainable population of wolves (*Canis lupus*), a rich bird fauna that includes rare species such as lesser-spotted eagle (*Aquila pomarina*) and corncrake (*Crex crex*), and 300 lepidoptera species (L. Rakosy, pers. comm.) including species listed on the EU Habitats Directive and other taxa rare or threatened in Central Europe (Table 2).

Table 2 EU Habitats Directive Annex II species, plus endemic not yet included in Habitats Directive, present in the Sighișara-Târnava Mare pSCI

Group	Species	Group	Species
Mammals	<i>Rhinolophus hipposideros</i>	Insects	<i>Carabus hampei</i>
	<i>Barbastella barbastellus</i>		<i>Cerambyx cerdo</i>
	<i>Myotis blythii</i>		<i>Lucanus cervus</i>
	<i>Myotis myotis</i>		<i>Eriogaster catax</i>
	<i>Canis lupus</i> *		<i>Callimorpha quadripunctaria</i>
	<i>Ursus arctos</i> *		<i>Euphydryas aurinia</i>
	<i>Lutra lutra</i>		<i>Lycaena dispar</i>
Amphibians	<i>Triturus cristatus</i>		<i>Bolbelasmus unicornis</i>
	<i>Bombina bombina</i>		<i>Catopta thrips</i> ;
	<i>Bombina variegata</i>		<i>Leptidea morsei</i> ;
			<i>Osmoderma eremita</i>
Reptiles	<i>Emys orbicularis</i>		
		Molluscs	<i>Vertigo angustior</i>
Fish	<i>Barbus petenyi</i>		<i>Unio crassus</i>
	<i>Gobio uranoscopus</i>		
	<i>Rhodeus sericeus</i>	Plants	<i>Adenophora lilifolia</i>
	<i>Cobitis taenia</i>		<i>Angelica palustris</i>
	<i>Sabanejewia aurata</i>		<i>Crambe tataria</i>
			<i>Cypripedium calceolus</i>
			<i>Echium russicum</i> *
			<i>Pulsatilla pratensis ssp. hungarica</i> *
			<i>Agrimonia pilosa</i>
			<i>Iris aphylla ssp. hungarica</i>

* indicates priority species according to Annexe II of EU Habitats Directive.

To summarize the ecological and conservation importance of the habitats and species of the Sighișara-Târnava Mare pSCI:

- The woodlands clearly derive from the original forests of the region, and their ground flora shelters species and noda of restricted world distribution. Distinctive oak wood-pastures are a local feature, rich in birds and invertebrates.
- The grasslands and their biodiversity are of considerable importance at a European level, and are particularly rich in Dacio-Pannonic, Pontic-Sarmatian and Mediterranean floristic elements. They represent a major resource of a habitat that has contracted or disappeared over much of Europe through agricultural intensification.
- Many of the wetlands, both floodplains and flushes, remain hydrologically intact, with a semi-natural zonation of habitats, including gallery forest.

- The floristically rich habitats contain substantial populations of vertebrate and invertebrate animals that are increasingly rare over much of Europe.
- The architecturally outstanding villages, including their economic and administrative functions, are an integral part of this landscape and are in intimate association with the rich biodiversity.
- These habitats provide biologists with a model of historical ecological patterns and processes and how these can maintain high levels of biodiversity.
- The modern human impact pressure here is still low, not a common situation in other similar areas in Romania, the degree of naturalness being still high.
- Complex, floristically rich plant communities.
- The presence of some interesting and very rare microlandscape units as botanical hotspots on remnant post-glacial hillocks, containing unusual combinations of steppic and montane plants.
- The presence of some interesting and decreasing assemblages of wayside plants.
- High degree of terrestrial and aquatic invertebrate and vertebrate diversity with high abundances.
- Almost pristine habitats as living, refuge and breeding areas for protected species.
- The high heterogeneity of habitats and landscape.
- This area can be a model to facing modern driving forces for change in other lowland European areas, through flexible policies for environmental heritage protection.
- Defining in the future ecological limits of tolerance for these types of areas.

Rarity on its own may not always be the best criterion for assessing conservation needs and a holistic approach is required to protect such a sensitive and fragile ecosystem (AKERROYD and PAGE, 2006). The grasslands cannot be separated from the cultural landscape, of which they are a historical and integral element. Sites with the rarest and most interesting plants, for example a steep grazed slope kept clear of scrub through burning and with *Salvia nutans* and other steppic species (JONES, 2007), were poor in species (c.10 per relevé) but of inestimable ecological and conservation interest at a European level. Plant species diversity, and of Red Data Book species or other threatened plants and animals, although important in ecological terms, should not be always be considered in isolation as a measure of conservation value.

Throughout most of Europe, traditional grasslands have suffered drastic shifts in management and are in a state of flux. This part of south-east Transylvania represents a still functioning historic landscape, with the fauna, flora and complement of soil microorganisms of an intact ancient ecosystem, in which extensive wildflower meadows still retain their role in agriculture. Such areas are rare in lowland Europe and therefore extremely valuable for conservation research and interpretation. They also are a cultural treasure.

Potential threats to landscape

Any change to overall land use will detract from the value of the landscape. The current mix of woodland (c. 40%, grassland (c. 30%) and arable cultivation (c. 30%) is close to the traditional pattern of land use and creates the special landscape and mosaic of habitats that we see today. At present the villages are compact and most have apparently have changed little in size for hundreds of years. The Saxons, presumably for reasons of defence and safety, prevented the people in their communities from building outside towns and villages, although communities of Romanians did expand the areas of some villages. The main building outside villages was on state farms during the communist era, although many of these buildings are now deserted or ruinous. Strict planning will be necessary to prevent excess building outside the boundaries of villages and should in theory be prevented or severely limited under the jurisdiction of Natura 2000.

Potential threats to habitats, vegetation and flora

The survival of the unique biodiversity of the countryside of the Saxon Villages depends upon maintenance of traditional agricultural practices. These are threatened by the present 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 pressures to abandon marginal land and to intensify farming on more readily accessible sites. 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. Woodlands are generally well-managed, but changes in ownership have created pressures for quick profits, and some localized clear-felling. Scrub is encroaching on to grassland in many places, although this vegetation does provide a suitable habitat for many bird and plant species.

Research by ADEPT (AKERoyD and PAGE, 2006; JONES, 2007; and AKEROYD, JONES, unpublished) has identified a number of substantial threats to habitats and biodiversity. Unchecked, these factors will 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. Environmental damage would also deny a unique opportunity to scientists for research in an ecologically intact 18th century or medieval landscape.

The principal threats to the wild plants and vegetation of the Saxon Villages are:

1. Uncontrolled agricultural expansion into grasslands, with nutrient over-enrichment and over-grazing, especially by sheep, and invasion by a ruderal flora of unpalatable species such as thistles and other invasive weeds;
2. Abandonment or reduction of traditional grassland management such as grazing and scrub clearance;

3. Unsustainable forestry practices such as planting with exotics or clear-felling;
4. Unsuitable and unsustainable infrastructure development for recreation and tourism, with new roads and buildings;
5. Unsustainable exploitation of wild populations of plants, especially over-collection of medicinal plants;
6. Further spread of weeds, especially aggressive aliens such as Japanese Knotweed (*Fallopia japonica* var. *japonica*);
7. Climate change, for example an increase in frequency and duration of prolonged spring and summer drought;
8. Lack of public knowledge and information about the region's ecological value, and the potential economic value of the natural landscape (in terms of EU incentives to conserve biodiversity and the market potential for eco-tourism).

Potential threats to the fauna

The important faunal associations present here can be easily unbalanced and destroyed as a result of the increase of the impact of human activities. In the immediate future the main potential threats for the local and the regional fauna are:

1. In general the threats to the wild plants and vegetation noted above represent also indirect threats to the fauna;
2. Any major changes in land use will favour some organisms but will affect others, including their disappearance;
3. Due to relatively small patches of characteristic habitats in a large variable mosaic, even small erosion of some habitats can induce the destruction of certain animal associations and the loosening of habitats connectivity for the area and region;
4. Natural and semi-natural habitats are important for the biodiversity value of this area;
5. The heterogeneity of the habitats is the main element which gives this area its particular and special aspect regarding the landscape and biodiversity;
6. The diminishing or disappearance of well-conserved riverside thickets;
7. Unsustainable exploitation of wild populations of animals, especially over-collection of terrestrial gastropods.
8. Even a slight increase of organic pollution and/or the appearance here of some new aggressive types of pollution in the case of the local many but small lotic systems can transform them into sewerage channels with no life or with no valuable aquatic, semi-aquatic, hygrophilous and meso-hygrophilous species and/or associations. All the lotic systems (the ones with natural status, with moderate human impact and already affected by the human impact) should be managed based on an integrated management plan for the watershed (Târnava River basin).
9. Due to small number of wetlands (except the rivers) and their relatively small surfaces and volumes, even small destruction of some habitats can induce their disappearance in the area and of associated species and associations.

10. Temporary habitats should be also protected like the permanent ones due to their role for: shelter, feeding, migration and breeding.
11. Human induced introduction even of species which naturally live in surrounding areas can affect local species populations.

It should be noted that the most immediate threats can only be countered by working with local communities to continue traditional management. To protect and conserve semi-natural landscapes such as the Târnava Mare pSCI, the key question is: how to create economic incentives to encourage local people to maintain current landscape management. The area can be protected in the long term only if its conservation is shown to have an economic value to its inhabitants and is linked directly to economic regeneration, such that each supports the other. The grassland especially, the greater proportion of which are High Nature Value meadow and pasture, must yield definite benefits to farmers – whether as subsidized economic incentives or commercial income.

Conclusions

The survival of its unique biodiversity depends upon maintenance of traditional agricultural practices. These are at present 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. 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. Woodlands are generally well-managed, but changes in ownership have created pressures for quick profits, and some localized abusive felling.

To protect the biodiversity of this special landscape, the multi-disciplinary Anglo-Romanian ADEPT project was established in 2002. Since 2006 the project principal funding has come from DEFRA and the Darwin Initiative in the UK and Orange Romania. Working with local people, ADEPT 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 has not only involved cataloguing of biodiversity, but also established a programme of measures towards the sustainable development necessary to promote the survival and evolution of traditional agriculture and other smaller-scale rural enterprises, including quality food production, crafts and rural tourism, so as to contribute to a sustainable and diversified rural economy. Only then will biodiversity enjoy a safe future, perhaps within some form of protected area.

The principal achievement towards this goal has been the recognition by the Government of Romania of an 85,000 ha area of the Saxon Villages as a potential Site of Community Interest (pSCI) Natura 2000 site. It is hoped that the site may be

expanded slightly, to 100.000 ha, to take in habitats on the margin of the area that are under-represented both in the pSCI and in the rest of Romania. The pSCI designation is of major significance because it is the largest such site to be declared in Romania in a farmed landscape. The inclusion of 35 villages and 25,000 inhabitants is a change in policy for Romanian conservation, which has concentrated on the higher Carpathian mountains and the Danube Delta. The rich cultural legacy of farming communities is already widely recognized in Romania. The further recognition of the value of farmed landscapes for the successful conservation of biodiversity is, however, a major step forward in the long-term protection of Romania's rich natural heritage.

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