Darwin Initiative for Biodiversity

Sighișoara -Târnava Mare

Framework management plan



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0. The Executive Summary

The Sighișoara-Târnava Mare Site of Community Interest (ROSCI0227) was legally established as a Natura 2000 site by Ministerial Order nr. 1964 of 2007. This site has primarily been selected because of its important scrub and grassland habitats, priority habitats under Annex 1 of the EU Habitats Directive.

The site is in the geographical centre of Romania. Its area is 85,374 ha, average altitude 542m. Continental biogeographic region. Land use across the area is approximately 40% grasslands, 43% forest, and 6.5%.

The area still supports extensive stands of semi-natural vegetation, together with habitats that have evolved in intimate association with human agriculture and other activities. Within the SCI area there have been 19 different habitats identified; of which 11 are priority habitat types for conservation under the Habitats Directive (Dir 92/43/EEC).

Open water bodies – two habitats were identified in the SCI area. Both are very rare with small scale occurrence, as the area is not typical wetland landscape.

Grasslands – six habitats were identified and 3 of them are priority habitats. Dry grasslands in the Sighisoara-Tarnava Mare SCI are impressive by its scale and relatively good status, as the area is still well maintained by traditional management measures, comparing to the rest of the Europe. From the European perspective they provide a model of how traditional agricultural practices can contribute to maintaining threatened habitats and species diversity.

Woodlands – the habitat diversity is highest in the woodlands. Eleven habitats were recorded and 4 of them are priority habitats. Several habitats are rare by their distribution in the area. The climatic climax vegetation is represented by mixed sessile oak and beech forests.

Habitat map have been elaborated on the base of two information platform: 1) APIA GIS of physical blocks and 2) habitat inventory done in framework of Sectoral Operation Programme Environment (POS) project. All habitats have been mapped, the site has been zoned for prioritisation of conservation management, and management recommendations and monitoring methodologies are provided linked to them. The zones are comprised of

- Priority grassland conservation – more than 20% of dry grasslands present in the physical block (PB)
- Sustainable grassland management – PB with grasslands and non-productive land and less than 20% of dry grasslands
- Low input farming – arable land and others PBs
- Forest management – forest PBs

The vision of protected site is to protect, preserve and enhance the natural values of the Tarnava Mare SCI and to raise awareness to those who reside in or visit the site. Purpose of protection is to keep the favourable conservation status of Annex I habitats and Annex II species.

I. Background

1.1 Policy

Through Law 462/2001, the EU Birds and Habitats directives were fully transposed into Romanian law. All species and habitats found in Romania and which are listed into the directives can be found in Appendices 2 - 5 of Law 462/2001.

The Sighișoara-Târnava Mare Site of Community Interest (ROSCI0227) was legally established as a Natura 2000 site by Ministerial Order nr. 1964 of 2007. The management of the site is the responsibility of the administrator, Progresul Silvic SRL.

The Environmental Protection Agencies of the three counties of Mures, Brasov and Sibiu are responsible for monitoring the proper management of the site, under which damage must be avoided to any habitats and species mentioned in the Standard Data Form for the site (see Standard Data Form at Annex 1).

An SPA, Podișul Hârtibaciului, ROSPA0099, 246.357 ha, has been declared over an area that overlaps most of the site. Thus bird species mentioned in the Standard Data Form (attached Annex 2) are also protected.

There are also two small forest reservations in the SCI: a 120ha wood pasture of ancient oaks; and an 11.9ha stand of downy oak wood. Both are located close to Sighișoara.

1.2 Site selection

This site has primarily been selected because of its important scrub and grassland habitats, piority habitats under Annex 1 of the EU Habitats Directive.

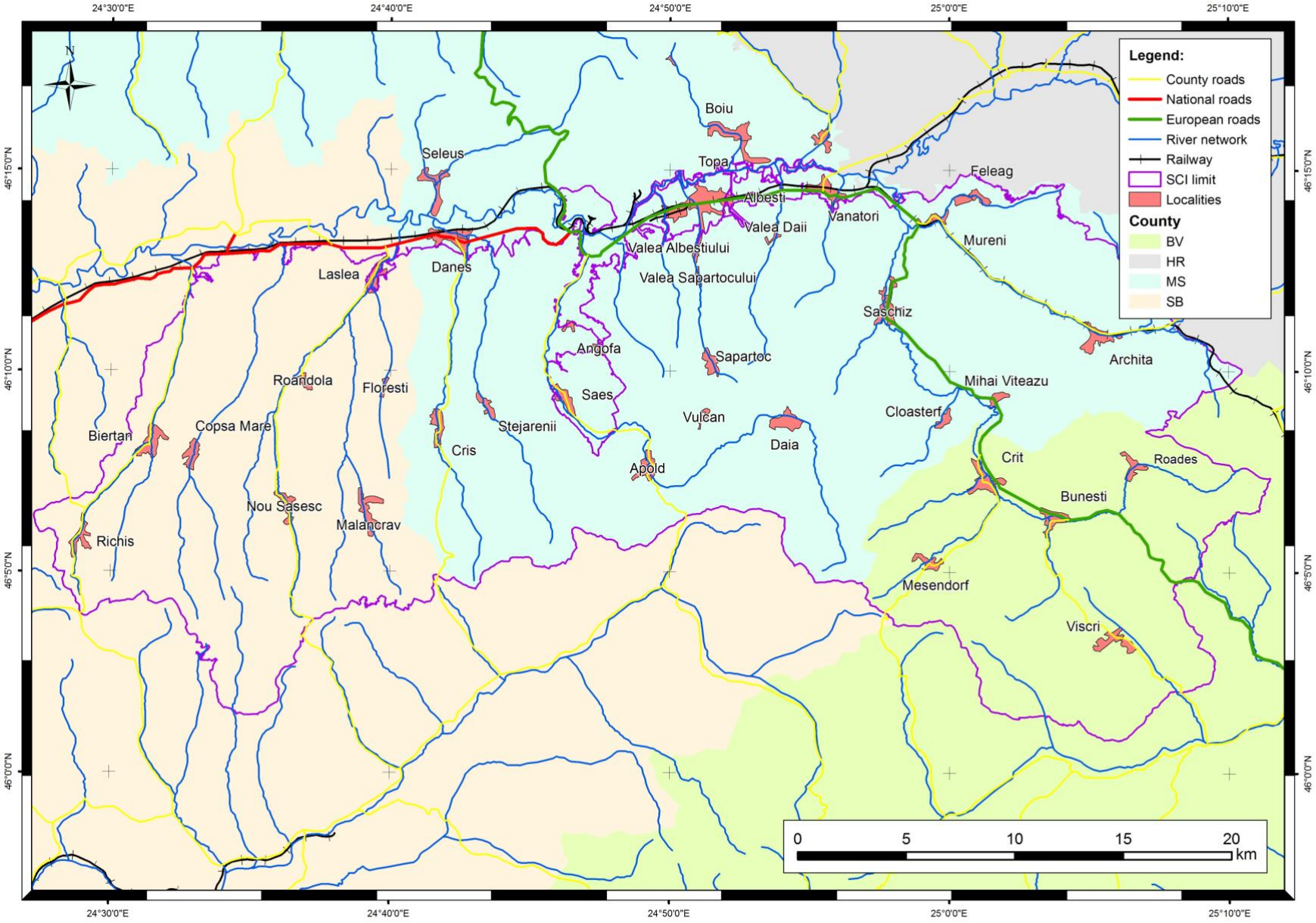
II. Site description

2.1 Location and site boundaries

The site is in the geographical centre of Romania, centred at latitude N 46º 8' 4", longitude E 24º 49' 12". Its area is 85,374 ha. Minimum altitude 330m; maximum altitude 829m; average altitude 542m. Continental biogeographic region.

See Figure 1 below.

Fig. 1. Location and site boundary



2.2 Legal status and rights

2.2.1 Ownership

Land use across the area is approximately 40% grasslands (pastures 16,400 ha, meadows 17,250 ha), 43% forest (41,500 ha), and 6.5% arable (6,000 ha).

- Pasture (25% of total area, 21,000 ha) – owned by Town Halls, managed by village grazing associations
- Meadow (15% of total area, 12,,750 ha) – owned and managed by private owners in very small parcels usually under 1 ha
- Forest (43% of total area, 36,550 ha) – majority owned by Town Halls, some private owners, managed by Town Halls or, more usually, Romsilva.

2.2.2 Legal rights

The Sighișoara-Târnava Mare Site of Community Interest (ROSCI0227) was legally established as a Natura 2000 site by Ministerial Order nr. 1964 of 2007.

2.2.3 Site status

There is currently no legally-accepted management plan for the area. This is being created as the final output of an SOP project ending 2014. However, this current plan will form the basis of the final legally-accepted management plan. Fundația ADEPT are part of the inter-NGO team responsible for the final MP

2.2.4 Other plans

Forest Stewardship Council (FSC) certification of approximately 15,000 ha of the approximately 40,000 ha of forest in the area (see Fig. 2 below) provides for conservation management of this forest area.

Fundatia ADEPT is also directly involved in the Local Action Group for the area, which ios creating a sustainable development plan for the site.

2.3 Management infrastructure

2.3.1 Organisations

The management of the site is the responsibility of the administrator, Progresul Silvic SRL.

The NGO Fundația ADEPT Transilvania has its head office and a tourist information centre within the area, at Saschiz. ADEPT is active throughout the area in grassland habitat assessments (under Darwin Initiative and the SOP project) and in designing a management plan for which will be incorporated into the final legal management plan in 2015.

2.3.2 Facilities

A European road E16 runs through the area, to which the villages. Otherwise, villages are all connected by rough commune roads. There is occasional daily public transport connecting villages. Otherwise transport is by horse and cart (30-40%, decreasing) and private vehicles (60-70%, increasing).

2.3.3 Services

All houses in the area have mains electricity. Few villages – only those on the main road – have mains water and mains drainage. Most water is drawn from wells attached to each house. Human sewage, from the earth closets generally used, is buried near the villages. Rubbish is collected by town halls and taken to a processing plant in the main town of Sighisoara. Mobile telephone is the general form of phone communication: fixed lines and cable for internet are available only in villages on the main road.

2.4 Climate

The project area lies within the southern bend of the Carpathians, which separate the Transylvanian plateau from the sub-Mediterranean and Euxine climatic zone of southern and eastern Romania. Weather patterns are temperate-continental, with a mean annual temperature of about 9^0C.

2.5 Geology and land forms

The area is partially within the Târnavelor Plateau and partly the Hârtibaciu Plateau, both characterized by a hilly landscape, with valleys and plains accompanied by individualised terraces. The landscape is highly fragmented by river valleys. Erosion, by streams and small rivers draining north into the Târnava Mare and sount into the Hârtibaciu Rivers, has produced a landscape of deep parallel valleys. Floodplains are asymmetrical cuesta type, whose gentle slopes are based on a hard layer (sandstone), and steep faces revealing at least two layers (clay, sandy marl). Overall, the geology has supported the presence of various well-preserved ecosystems. When this is added to the relatively low human pressure (the area is sparsely populated) the area is a sustainable managed extensive semi-natural farmed landscape. The isothermal exposure combined with a dominant western / eastern slopes and relatively high values of global radiation results in a growing season about 195 days - a factor favorable for habitat and species of conservation interest.

2.6 Soils and substrates

Clay and sandy marl over sandstone.

2.7 Hydrology

Much of the area is quite dry. The deeply cut streams and rivers flow north into the Târnava Mare River and south into the Hârtibaciu River. The streams are often polluted by poorly controlled human effluent and waste.

2.8 Habitats, vegetation and communities

The area still supports extensive stands of semi-natural vegetation, together with habitats that have evolved in intimate association with human agriculture and other activities. Within the SCI area there have been 19 different habitats identified (Table 1); of which 11 are priority habitat types for conservation under the Habitats Directive (Dir 92/43/EEC).

Open water bodies – two habitats were identified in the SCI area. Both are very rare with small scale occurrence, as the area is not typical wetland landscape.

Grasslands – six habitats were identified and 3 of them are priority habitats. Traditional methods of grazing and haymaking have led to the development of the grasslands which cover much of the project area. Dry grasslands in the Sighisoara-Tarnava Mare SCI are impressive by its scale and relatively good status, as the area is still well maintained by traditional management measures, comparing to the rest of the Europe. From the European perspective they provide a model of how traditional agricultural practices can contribute to maintaining threatened habitats and species diversity.

Woodlands – the habitat diversity is highest in the woodlands. Eleven habitats were recorded and 4 of them are priority habitats. Several habitats are rare by their distribution in the area. The climatic climax vegetation is represented by mixed sessile oak and beech forests. The main accompanying tree species is the hornbeam, which has become dominant in certain coppices that have been erroneously managed (e.g., selective cuttings, over-harvesting). The beech holds about one third of the total forest area, followed by hornbeam with near 25% and sessile oak with 23%. The pedunculate oak occurs in only 5% of the forest area.

Table 1. Overview of habitats. * indicates priority habitats according to Annex I of Habitats Directive.

Code	Name	Distribution
Open water communities		
3130	Oligotrophic to mesotrophic standing waters with vegetation of *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*	very rare
3150	Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation	very rare
Grasslands		
40A0*	Sub-continental Peripannonic scrub	rare
6210*	Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) with important orchid sites	common
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*)	common
6240*	Sub-Pannonic steppic grasslands	rare
6430	Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	common
6510	Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*)	common

Forests		
3240	Alpine rivers and their ligneous vegetation with *Salix eleagnos*	very rare
9110	*Luzulo-Fagetum* beech forests	rare
9130	*Asperulo-Fagetum* beech forests	common
91E0 *	Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*	very rare
91H0*	Pannonian woods with *Quercus pubescens*	common
91V0	Dacian Beech forests (*Symphyto-Fagion*)	common
9170	*Galio-Carpinetum* oak-hornbeam forests	common
9180 *	*Tilio-Acerion* forests of slopes, screes and ravines	very rare
91I0 *	Euro-Siberian steppic woods with *Quercus* sp.	rare
92A0	*Salix alba* and *Populus alba* galleries	common
91Y0	Dacian oak-hornbeam forests	common

Description of Habitats

Open water communities

3130 Oligotrophic to mesotrophic standing waters with vegetation of *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*

3150 Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* - type vegetation

Open water bodies with free-floating surface communities, in SCI with dominance of *Callitriche cophocarpa, Ranunculus trychophyllus* and *Chara fragilis*.

Dry grasslands

40A0 * Sub-continental Peripannonic scrub

Low deciduous scrub with continental and sub-Mediterranean affinities, of the Pannonic basin and neighbouring regions. It occurs on both calcareous and siliceous substrates, forming mosaic-like vegetation with dry steppe grasslands and often along the fringes of woodlands. Dominant low scrub species are: *Prunus tenella (Amygdalus nana), P. fruticosa (Cerasus fruticosa), Rosa gallica*, *Cornus mas, Crataegus monogyna.*

6210 * Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) with important orchid sites

Festuco-Brometalia grasslands, present in almost the entire European continent, are among the most species-rich plant communities in Europe and contain a large number of rare and endangered species (Calaciura, Spinelli 2008). These communities are dominated by mixtures of grasses and herbs and can develop on different types of substrata. The habitat is considered a priority type (6210*) only if it is an important orchid

site (EC 2007). Important orchid sites are sites that are important on the basis of one or more of the following three criteria:

(a) the site hosts a rich suite of orchid species;
(b) the site hosts an important population of at least one orchid species considered not very common on the national territory;
(c) the site hosts one or several orchid species considered to be rare, very rare or exceptional on the national territory.

In Târnava Mare SCI site these species are usually *Orchis tridentata, Orchis coriophora, Orchis morio, Orchis ustulata, Orchis militaris,* sometimes *Orchis purpurea* and *Limodorum abortivum*.

This Annex I category includes various forms of grasslands referable in European terms to the *Mesobromion* (syn. *Cirsio-Brachypodion pinnati*) and *Xerobromion* (syn. *Bromion erecti*) alliances. The structural and floristic characteristics of the habitat are strongly influenced by microrelief, climatic factors and management practices, in particular the intensity of grazing. According to Manual for interpreting Natura 2000 habitats from Romania (Gafta, Mountford 2008), also species from wide phytosociological unit *Festucetalia valesiacae* are present in this habitat type. It means that ecological gradient is very wide, from xeric to mesoxeric types.

6210 Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia)

It is the same habitat type as 6210 *, but without occurrence of orchid species.

6240 * Sub-Pannonic steppic grasslands

This habitat includes steppe grasslands, restricted to the dry and steep slopes, belonging to *Festucion valesiacae* alliance. This occurs on the steepest, mostly south-facing slopes. This alliance includes narrow-leaved continental steppe grasslands dominated by tussocky fescues (*Festuca valesiaca* and *F. rupicola*), *Carex humilis* and various species of *Stipa - S. pulcherrima, S. pennata, S. capillata*. Grasslands have typically a high cover of xerophytic grass species such as *Agropyron intermedium* and *Botriochloa ischaemum*. Typical species are: *Adonis vernalis, Astragalus danicus, Astragalus austriacus, A. onobrychis, Campanula sibirica, Potentilla arenaria, Scorzonera* purpurea, *Allium flavum, Iris pumila, Teucrium chamaedrys, Artemisia austriaca, Chrysopogon gryllus.*

Habitat is hosting many rare and endangered species as *Crambe tataria, Iris aphylla, Oxytropis pilosa, Astragalus exscapus, A. monspessulanus, Salvia nutans, Serratula radiata, Cephalaria radiata, Dianthus giganteus.*

6430 Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels

Habitat is created by several wet and nitrophilous tall herb edge communities, along water courses and woodland borders. Diagnostic species are: *Phragmites australis, Typha latifolia, Glyceria maxima, Alisma plantago-aquatica, Calamagrostis canescens, Calystegia sepium, Galium palustre, Lycopus europaeus, Mentha verticillata, Ranunculus lingua, Juncus effusus, Mentha aquatica, Lysimachia vulgaris, Mentha longifolia,*

6510 Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*)

Species-rich hay meadows on lightly to moderately fertilised soils of the plains to submontane levels, belonging to the *Arrhenatherion* alliance. These extensive grasslands are rich in flowers and are not cut before the grasses flower and then only once or twice per year. Wet to dry sub-types occur. If management practices become intensive, with heavy applications of fertiliser, species diversity rapidly declines. It includes the following syntaxa:

Dominant species are: *Arrhenatherum elatius, Alopecurus pratensis, Trisetum flavescens, Pimpinella major, Centaurea jacea, Crepis biennis, Knautia arvensis, Tragopogon pratensis, Daucus carota, Leucanthemum vulgare, Alopecurus pratensis, Sanguisorba officinalis, Campanula patula, Leontodon hispidus*.

Woodlands

3240 Alpine rivers and their ligneous vegetation with *Salix eleagnos*

Thickets or woods with dominance of *Salix eleagnos* of mountain stream in Valea Fânaţelor. It is very rare habitat type in SCI area.

9110 *Luzulo-Fagetum* beech forests

This is not very common habitat type because most soils in SCI area are base-rich and habitat is typically developed on acid soils of the medio-European domain of Central Europe.

91E0 * Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior*

The alluvial alder forests are very rare in the study area, probably due to the past anthropic impact. These stands tend to occur upstream with respect to willow forests. The main threats come from their fragmented distribution, very small extension (usually very narrow strips) and degraded status (eutrophication). The tree layer is dominated by *Alnus glutinosa* and/or *A. incana* that are accompanied by *Salix alba, S. fragilis* and more rarely by *Fraxinus excelsior*. The understory is dominated by *Cirsium oleraceum, Scirpus sylvestris, Aegopodium podagraria, Urtica dioica, Stachys sylvatica, Equisetum maximum* and so on (Gafta 2006).

9170 *Galio-Carpinetum* oak-hornbeam forests

Forests are dominated by *Quercus petraea* and *Carpinus betulus* within the central European range of this habitat. Habitat type is common in SCI, but with rare occurrence of the pedunculate oak.

9180 * *Tilio-Acerion* forests of slopes, screes and ravines

These stands are dominated by ash (*Fraxinus excelsior*), with few individuals of sycamore (*Acer pseudoplatanus*), beech (*Fagus sylvatica*) and hornbeam (*Carpinus betulus*). Despite the revealed stands are very small, the understory is rich in species of *Carpinion, Fagion* and *Alno-Ulmion*. The main character species of *Tilio-Acerion* forests – *Lunaria*

rediviva – has not been found in the stands revealed (Gafta 2006). Habitat type is very rare and small scale.

91H0 * Pannonian woods with *Quercus pubescens*

According to slope and soil deepness, the southern slopes are covered by pure/mixed downy woods (more xeric) or mixed pedunculate/sessile oak woods (more mesic). The former are often woodlands, i.e. with open canopy and „grassy" understory. Among the most common species in the understory, there are: *Carex humilis, Lithospermum purpureo-coeruleum, Brachypodium sylvaticum, Vincetoxicum hirundinaria, Salvia glutinosa, Sedum maximum, Melittis melissophyllum, Euphorbia cyparissias*, and *Astragalus glycyphyllos*.

91I0 * Euro-Siberian steppic woods with *Quercus* sp.

Habitat is created by xero-thermophile oak woods of the plains of south-eastern Europe. *Quercus robur, Quercus cerris, Q. pedunculiflora* and *Quercus pubescens* dominate in the treelayer of this habitat type, which is rich in continental stepic vegetation elements and geophytes of the *Aceri tatarici-Quercion* Zólyomi 1957. Habitat is not so common in the area and with low occurrence of *Acer tataricum.*

92A0 Salix alba and Populus alba galleries

These communities are common throughout the study area, but they usually form only narrow corridors (galleries) that are discontinuous due to past human activities. Poplars are mostly absent. These stands are generally mixed, *Salix alba* and *Salix fragilis* occurring in various proportions. The understory floristic composition is very similar with that revealed in alder forests (Gafta 2006).

9130 *Asperulo-Fagetum* beech forests (common)

91V0 Dacian Beech forests (*Symphyto-Fagion*)

Typical and common beach forests of the Romanian, Ukrainian and eastern Serbian Carpathian mountains and pre-Carpathian hills of the alliance *Symphyto cordati-Fagion*, with typical *Fagetalia* species, developed on neutral, basicline and sometimes acidocline substrates. Typical species are *Fagus sylvatica, Abies alba* and *Carpinus betulus.*

91Y0 Dacian oak-hornbeam forests

Forests of *Carpinus betulus* and various *Quercus* species, of the flanks and piedmont of the eastern and southern Carpathians. The tree layer is usually composed of either one or both oak species along with *Carpinus betulus, Acer campestre* (constant species) and sometimes *Prunus avium, Ulmus minor, Acer tataricum*. Unfortunately, the proportion of oaks, cherry trees and maples has been continuously decreasing due to various anthropic-related influences. The herbaceous layer is composed of more mesophilous species, like *Polygonatum latifolium, Helleborus purpurascens, Cardamine bulbifera, Galium odoratum, Stellaria holostea, Carex pilosa, Galium schultesii, Pulmonaria officinalis, Melampyrum bihariense, Melica nutans*, etc. (Gafta 2006).

2.9 Flora - higher plants

More than 1,200 plant taxa have been recorded in the area, over 30% of the entire Romanian flora. Six plant species are listed on Annex II of the EU Habitats Directive as following:

HD Annex II Code	Species	Population size in SCI	Conservation status
4068	*Adenophora lilifolia*	<1000	Probably more than 2% of the national population, possibly more than 15%. North-facing slopes of dry grassland
1939	*Agrimonia pilosa*	<500	Small populations in grasslands at forest edges. Threatened by collection.
4091	*Crambe tataria*	c.2000	Dryer slopes of dry grasslands
1902	*Cypripedium calceolus*	<500	Small populations in grasslands at forest edges.
4067	*Echium russicum*	c.2000	Locally abundant on drier slopes.
4097	*Iris aphylla ssp. hungarica*	<500	Probably more than 2% of the national population. North-facing slopes of dry grassland
1617	*Angelica palustris*	<500	Small population

Three plant species present in dry grassland in the area*, Crambe tataria, Iris aphylla* ssp. *hungarica* and *Echium russicum* are listed on Annex II of the EU Habitats Directive.

Together with Romanian endemic species such as *Cephalaria radiata* and *Salvia transsylvanica* those species are good indicators of quality of dry grasslands in the area. Except those species, significant from international point of view, there are many other threatened and important species from national point of view as *Salvia nutans, Oxytropis pilosa, Astragalus exscapus* and many others.

2.10 Fauna

HD Annex II Code	Species	Population size in SCI	Conservation status
1065	Euphydryas aurinia	>5000	Probably more than 2% of the national population. Linked to Habitat 6210. Relatively stable population, threatened by intensification of grassland use. (Marsh Fritillary)
1052	Euphydryas maturna	<1000	Probably more than 2% of the national population. Relatively stable population, threatened by intensification of grassland use and extraction of Ash and other habitat trees. (Scarce Fritillary)
4036	Leptidea morsei	>2000	Unknown. Species is more widespread than current field data indicate. (Fenton's Woodwhite)
1060	Lycaena dispar	>20000	Good, but threatened by drainage of damp grasslands. Probably more than 2% of the national population. (Large Copper)
1059	Maculinea teleius	<1000	Acceptable. Ants act as host for eggs/larvae. Threatened by drainage of damp grasslands, especially loss of food plant Sanguisorba officinalis. (Scarce Large Blue)
Berne convention	Maculinea arion		Acceptable. Ants act as host for eggs/larvae. Threatened by damage to dry grasslands, especially loss of thyme and marjoram food plant. (Large Blue)
	Aricia eumedon		(Geranium Argus)
	Brenthis ino		(Lesser Marbled Fritillary)
	Brenthis daphne		(Marbled Fritillary)
	Brenthis euphrosyne		(Pearl Bordered Fritillary)
	Lycaena alciphron		(Purple Shot Copper)
	Lycaena helle?		Presence possible (host plant Polygonum bistorta present) (Violet Copper)
	Maculinea alcon		Acceptable. Ants act as host for eggs/larvae. Threatened by drainage of damp grasslands, especially loss of Gentians - food plant (Alcon Blue)
	Plebeius argus		(Silver Studded Blue)

2.11 Human use within and outside the site

2.11.1 Nature conservation

ADEPT is working with local farmers and farmer associations to assist participation in grassland agri-environment schemes, in order to maintain as much as possible the biodiversity-friendly extensive management of the area.

ADEPT is working with the Local Action Group of the site to develop a vision for the area. This will assist the translation of the management plan into individual management agreements.

2.11.2 Agriculture

Mosaic management, with small parcels of 0.3-1.0 ha cut for hay at any one time owing to small-scale ownership, is ideal for biodiversity but under threat from consolidation of ownership. Grazing is changing from well-regulated mixed grazing by cows and sheep, to less well-regulated and monotonous grazing by sheep, as sheep numbers increase and cow numbers decrease, which is also a threat to biodiversity-friendly land management.

Grassland conservation is linked to agri-environment payments in the area (Axis 2, Measure 214) and Natura 2000 support, both under National Rural Development Programme. These will provide grants and other economic incentives after the end of the project. The agri-environment the payments, when in the future they are better linked to habitat-conservation management, will offer a long term incentive for continued good management of these target habitats.

2.11.3 Forestry

The area is 43% forest, 36,550 ha. The majority is owned by Town Halls, some private owners. It is managed either directly by the by Town Halls or, more usually, by the Romanian National Forest Agency (ANP), *Romsilva*. The forest is mainly deciduous, oak, and hornbeam with some beech. Near the villages are plantations of pine, planted by historically to provide building materials.

The forest is generally well managed with relatively little abusive felling: forest area is currently stable. Half of the forest area has been FSC certified.

A characteristic of the area are wood pastures near many of the villages, with centruries-old oak trees. These were probably used for grazing of pigs on acorns. The wood pastures are a significant habitat of the area to be considered in the management plan.

2.11.4 Recreation and tourism

The area is not suited to mass tourism, as it offers no skiing, swimming, or sophisticated infrastructure. There is limited nature tourism, into village guesthouses that provide welcome additional income for farmers. ADEPT is developing a network of mountain bike trails in the area in order to promote responsible tourism linked to village incomes.

2.11.5 Hunting and fishing

Hunting of wild boar and bear occur in the area, managed by the hunting associations. Hunting is controlled, and is not seen as a threat to the populations of wolf and bear in the area: habitat loss is a much greater threat.

2.11.6 Extraction

No significant mining in the area.

2.11.7 Water use

Water is often is short supply in the summer: wells run dry. This is the result if several years of poor summer rainfall.

2.11.8 Education, demonstration and research

ADEPT runs field classes for all the 8 schools of the area, for classes V-VIII.

The area is one of the best mapped and researched in Romania, as a result of 10 year's activity of Fundatia ADEPT which is the specialist local NGO for habitat mapping and inventories.

2.11.9 Other uses

The area contains 30 small villages, average population 600-700, which are traditional and have a low impact on the landscape and biodiversity. There is little new building: the areas was depopulated in the 1990s, owing to the mass emigration of the majority Saxon population, and the population is lower now than at any time for hundreds of years. This means that pressure for new housing is low.

2.12 Economic aspects and population

The local economy is almost entirely dependent on agriculture. The economic situation has declined as a result of Romania's transition to a market economy. After land restitution, 90% of villagers have farms under 5ha. These are mostly used for subsistence farming, with milk and cheese often being the only source of cash income. The active population has fallen from 35% to 28%, as a result of the ageing of the population and lack of jobs. The populations of the villages are of high average age with average incomes below the poverty line. In these circumstances, any conservation programme that has an impact on land management will be viewed critically, and will only receive local support if the programme is seen to take local peoples' interests into consideration.

2.13 Past human land use

The area has been used almost exclusively for livestock farming since the 12th century, with a low impact on the landscape except for some historic forest clearance which has now ceased.

2.14 Cultural heritage

The site lies within the historic Saxon Villages area of Transylvania, an area occupied and developed by “Saxons” from the Rhine and Mozel areas of lowland Germany in the 12th and 13th centuries.

The site includes 3 UNESCO World Heritage Site villages. Most villages in the site have characteristic fortified churches, of considerable historical and architectural interest. In addition, the vernacular village architecture, largely unchanged in village pattern and farmhouse/courtyard layout since the 13th century, is also of great cultural interest and importance.

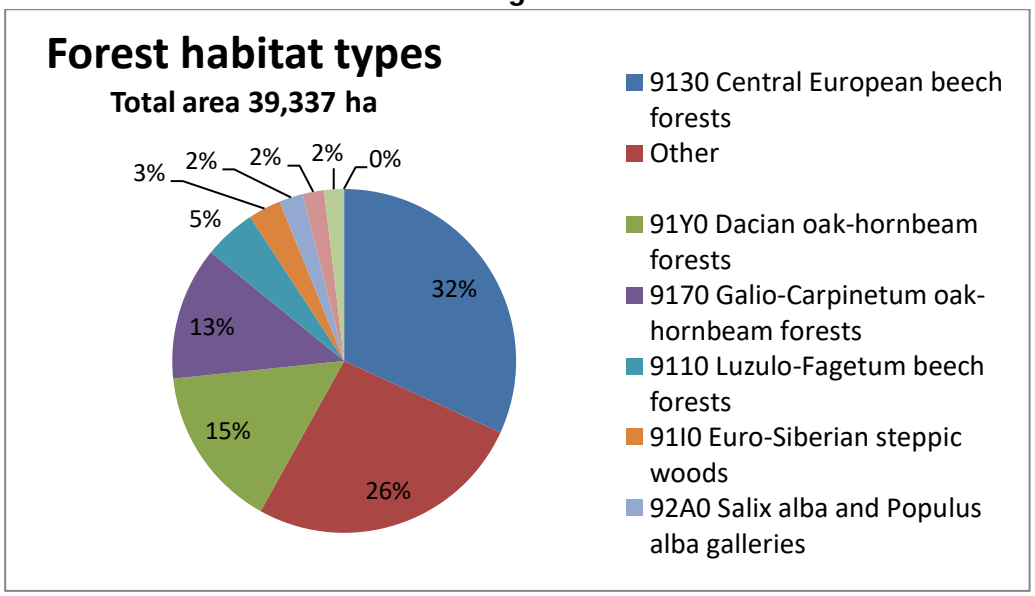
III. Evaluation and Objectives

3.1 Ecological criteria

3.1.1 Evaluation of habitats

Habitat map have been elaborated on the base of two information platform: 1) APIA GIS of physical blocks and 2) habitat inventory done in framework of POS project (Fig. 4a-c). Area of non-forest habitats is 85,533 ha (54% of area) and area of forests is 39,337 ha (46% of area). Composition of forest habitat types shows that beech forests dominate in the site (Fig. 2).

Fig. 2



Non-forest habitats are dominated by the grasslands, which occur also in non-productive land and in smaller part also in abandoned arable land. Total area of them is almost two thirds of the site.

Fig. 3

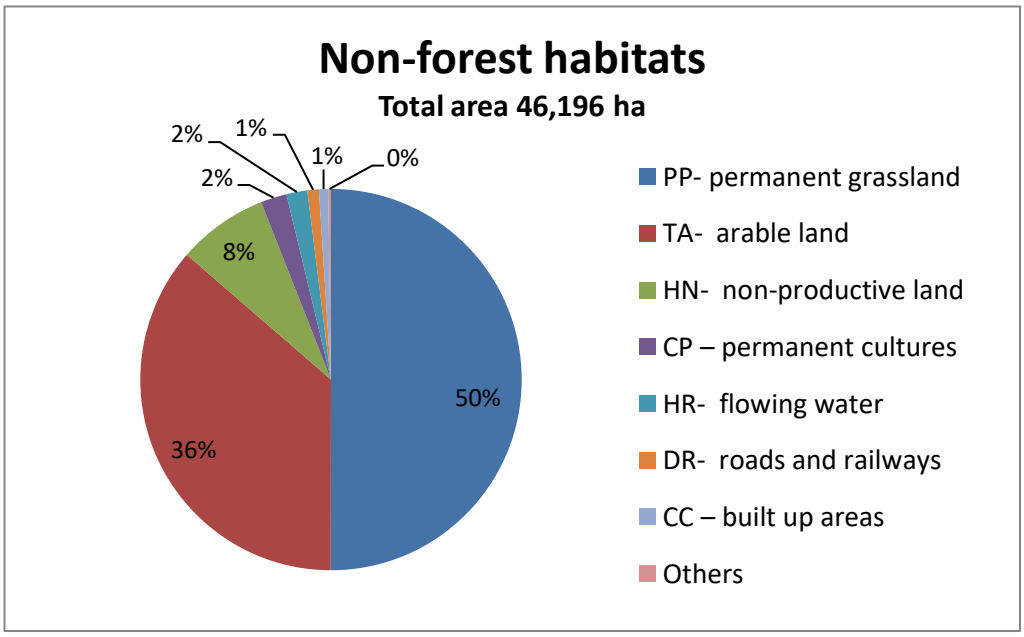


Fig. 4a

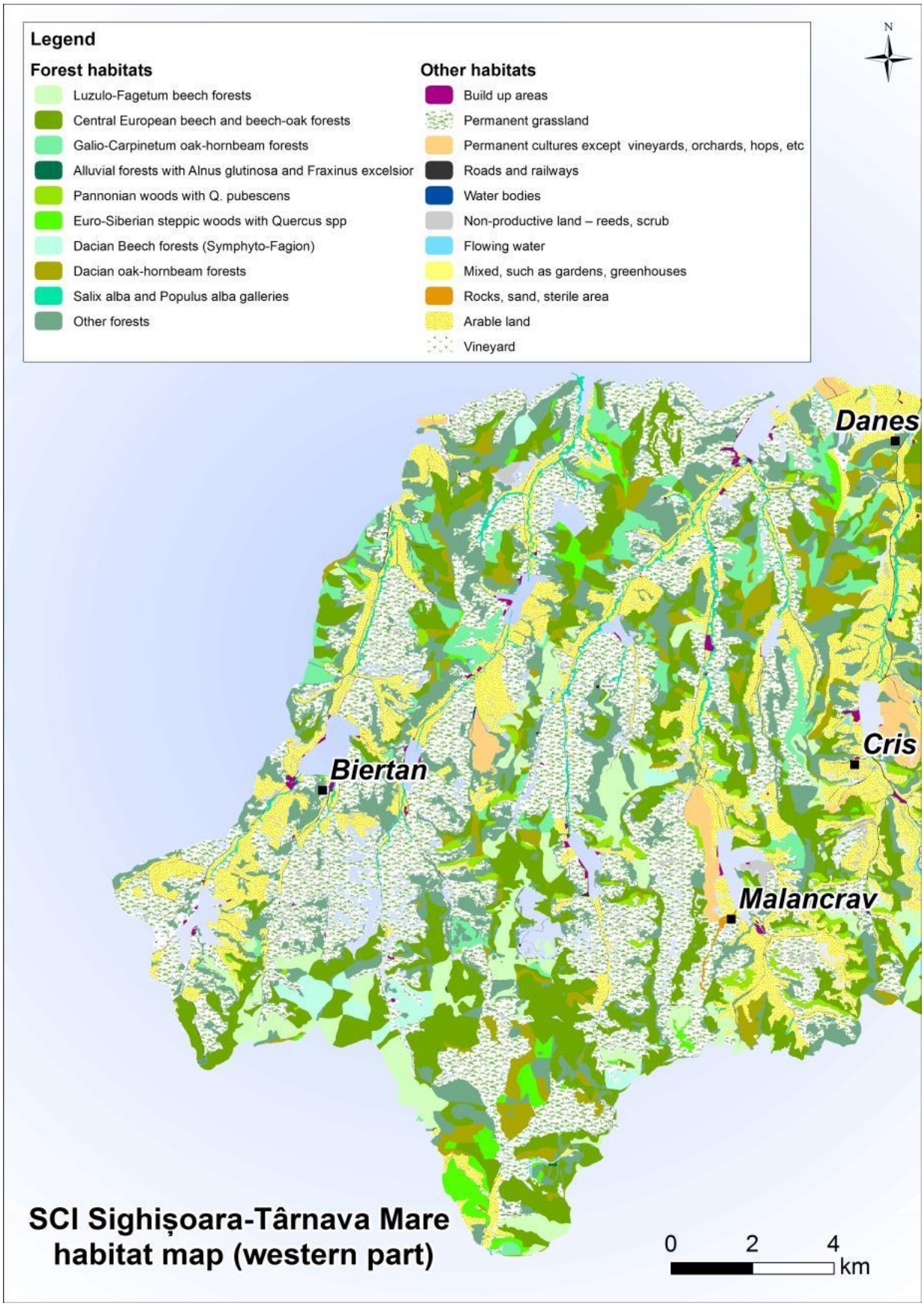

Legend
Forest habitats
Luzulo-Fagetum beech forests
Central European beech and beech-oak forests
Galio-Carpinetum oak-hornbeam forests
Alluvial forests with Alnus glutinosa and Fraxinus excelsior
Pannonian woods with Q. pubescens
Euro-Siberian steppic woods with Quercus spp
Dacian Beech forests (Symphyto-Fagion)
Dacian oak-hornbeam forests
Salix alba and Populus alba galleries
Other forests
Other habitats
Build up areas
Permanent grassland
Permanent cultures except vineyards, orchards, hops, etc
Roads and railways
Water bodies
Non-productive land – reeds, scrub
Flowing water
Mixed, such as gardens, greenhouses
Rocks, sand, sterile area
Arable land
Vineyard
N
Danes
Cris
Biertan
Malancrav
SCI Sighișoara-Târnava Mare
habitat map (western part)
0
2
4
km

Fig. 4b.

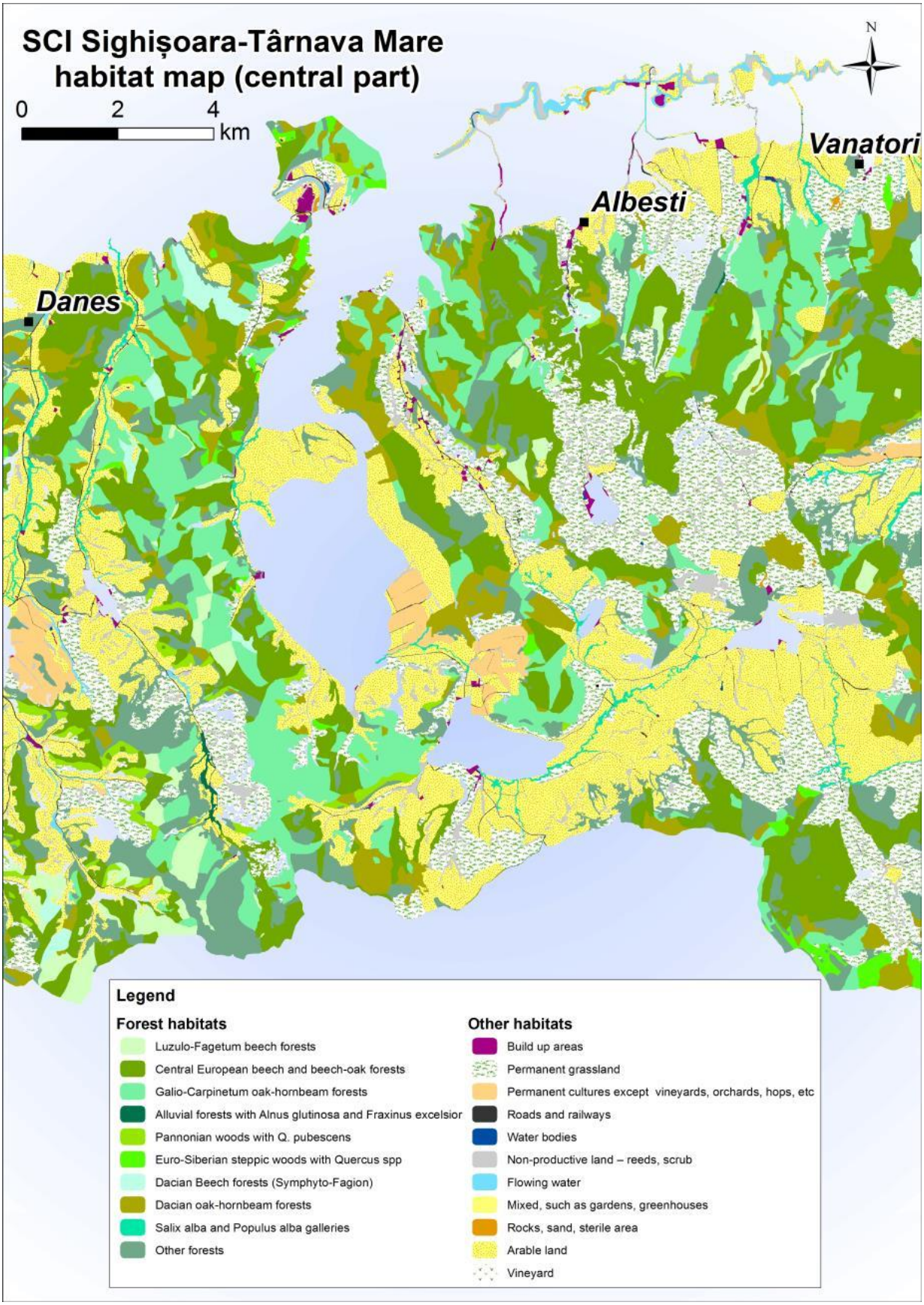
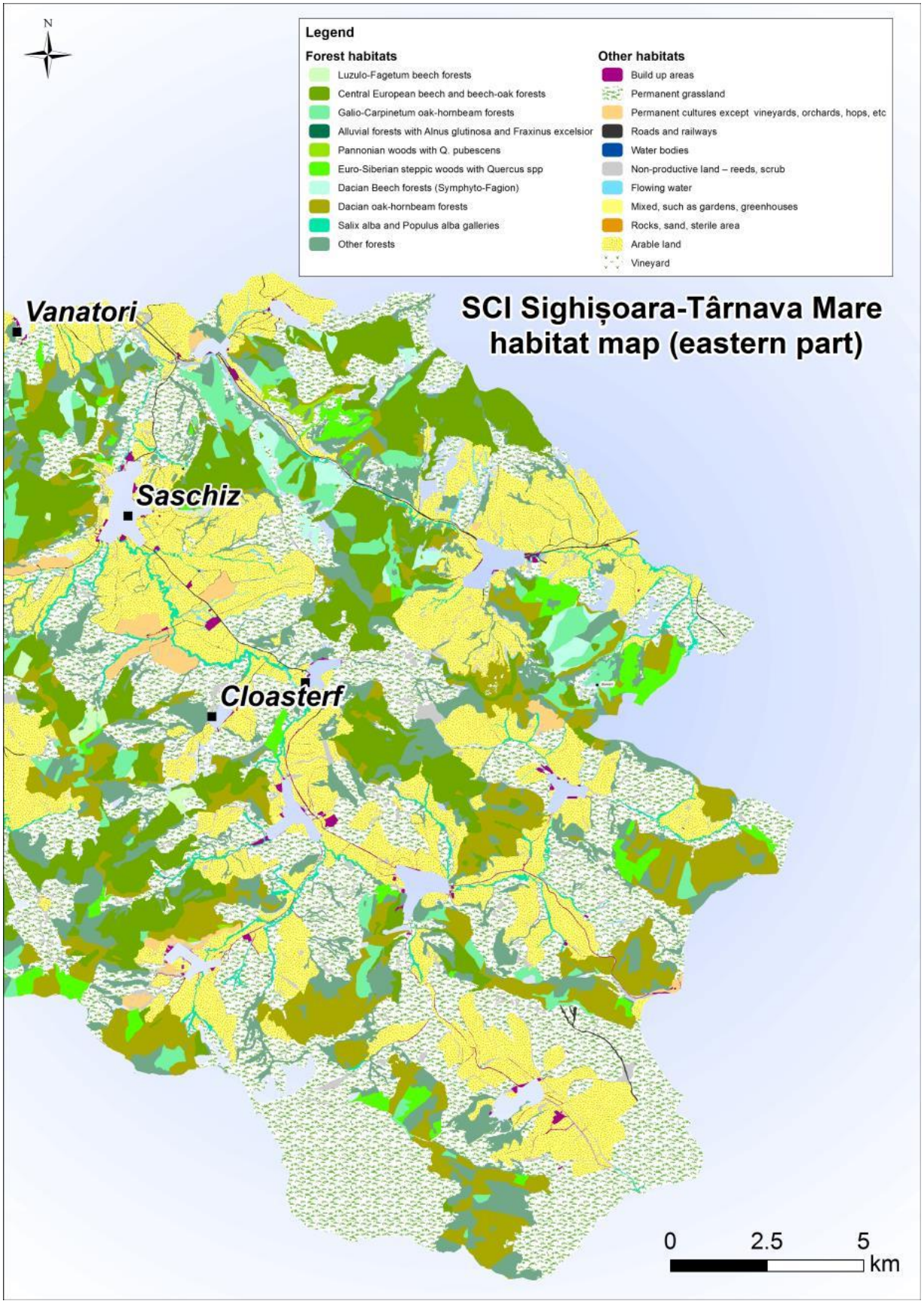

SCI Sighișoara-Târnava Mare
habitat map (central part)
0 2 4
km
N
Vanatori
Albesti
Danes
Legend
Forest habitats
Luzulo-Fagetum beech forests
Central European beech and beech-oak forests
Galio-Carpinetum oak-hornbeam forests
Alluvial forests with Alnus glutinosa and Fraxinus excelsior
Pannonian woods with Q. pubescens
Euro-Siberian steppic woods with Quercus spp
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Dacian oak-hornbeam forests
Salix alba and Populus alba galleries
Other forests
Other habitats
Build up areas
Permanent grassland
Permanent cultures except vineyards, orchards, hops, etc
Roads and railways
Water bodies
Non-productive land – reeds, scrub
Flowing water
Mixed, such as gardens, greenhouses
Rocks, sand, sterile area
Arable land
Vineyard

Fig. 4c.


N
Legend
Forest habitats
Luzulo-Fagetum beech forests
Central European beech and beech-oak forests
Galio-Carpinetum oak-hornbeam forests
Alluvial forests with Alnus glutinosa and Fraxinus excelsior
Pannonian woods with Q. pubescens
Euro-Siberian steppic woods with Quercus spp
Dacian Beech forests (Symphyto-Fagion)
Dacian oak-hornbeam forests
Salix alba and Populus alba galleries
Other forests
Other habitats
Build up areas
Permanent grassland
Permanent cultures except vineyards, orchards, hops, etc
Roads and railways
Water bodies
Non-productive land – reeds, scrub
Flowing water
Mixed, such as gardens, greenhouses
Rocks, sand, sterile area
Arable land
Vineyard
Vanatori
Saschiz
Cloasterf
SCI Sighișoara-Târnava Mare
habitat map (eastern part)
0
2.5
5
km

Identification of dry grassland habitat types *6210 and *6240 as key indicator of biodiversity value of site

Based on field observations of vegetation scientists dry grasslands climatic and soil conditions are along with human influence concerned to be the most important factors affecting their floristic composition (Ellenberg, 1986). Most of dry grassland communities inhabit slopes and plateau that differ in local climatic conditions from the regional climate (Janišová, 2005). For identification of slopes we used digital terrain model (DTM).

The DTM was generated using a topographical map at 1:25000 scale. From this map the contour lines were extracted at an interval of 5 m elevation. The elevation value for each contour line was introduced in a database table. The final table with all the contour lines in the area included a number of 9136 lines, each with its own elevation value. Using the data obtained through digitizing we applied a GIS function and obtained the DTM for the area. The raw DTM was analysed, checked for errors and corrected. The resulting spatial resolution for the DTM is 5 m.

Further GIS tools were applied in order to obtain the slope raster map, at a high resolution of 5 m. This tool calculates the maximum rate of change between each raster cell and its neighbors, more particularly the maximun change in elevation over the distance between one raster cell and its eight neighbors. In the output raster every cell has a slope value. lower values characterize flat areas while higher values indicate a ore steeper terrain.

For our purpose the slope values were expressed in degree and not as percent of slope.

The rate of change (delta) of the surface in the horizontal (dz/dx) and vertical (dz/dy) directions from the center cell determines the slope. The basic algorithm used to calculate the slope is:

$$slope_radians = ATAN (\sqrt{} ([dz/dx]2 + [dz/dy]2))$$

First classification of slopes was tested in the field on occurrence of target habitats. Totally, 23 sites were tested in whole project area in July 2011. Twelve detail records with complete list of species composition and detail description of site were elaborated in the same period. After field test new classification of slopes have been elaborated:

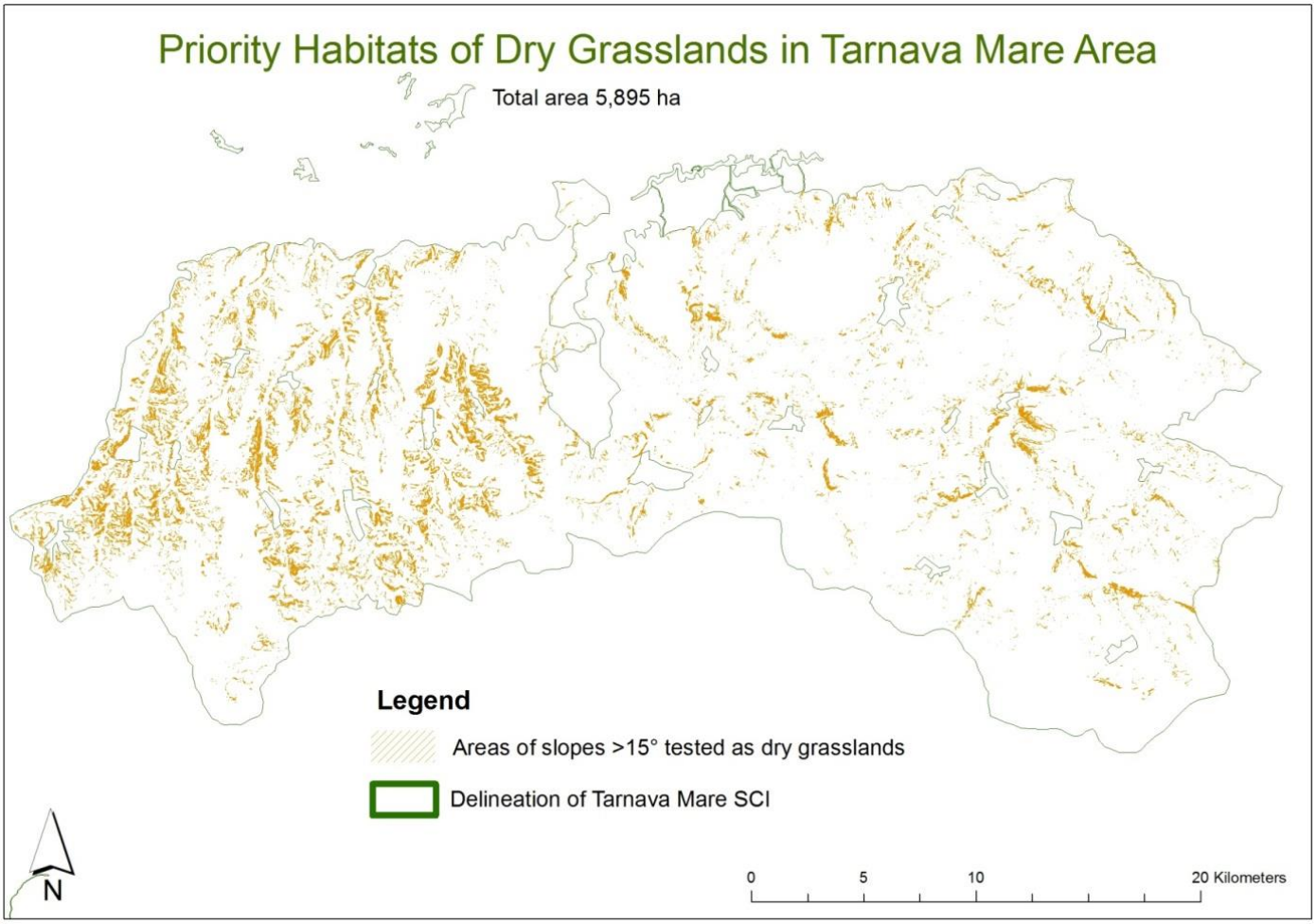
1. <15-0;
2. 15-20;
3. 20-25;
4. 25-30;
5. 30-35;
6. >35.

Last phase was elimination of slopes in the forests, which was done based on aerial photos.

Result of identification of dry grasslands is shows their distribution in Figure 5. Total estimated area is 5,895 ha. We can see that western part of project area has much higher occurrence of dry grassland habitats.

This estimation can be biased by preciseness of DTM in case small slopes, which can be neglected. On the other side, flat parts of hills with dry grasslands are omitted as well.

Figure 5.



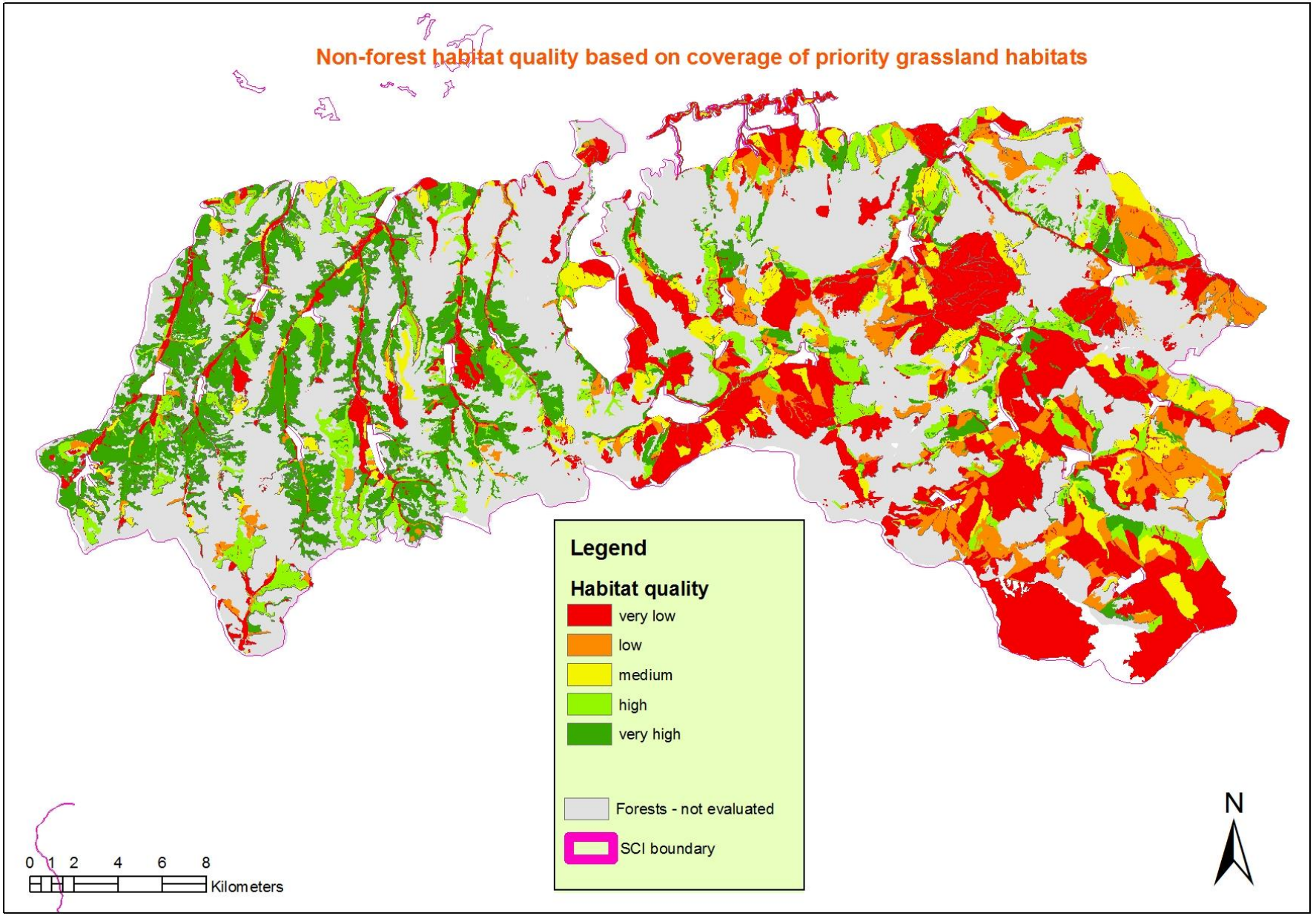
We have prepared map of non-forest habitat quality based on habitat map (Fig. 4) combined with dry grasslands/slopes layer (Fig. 5). There are basically 3 groups of habitat types with different biodiversity values: arable field lowest, dry grasslands highest and other grasslands have let say medium quality.

We used as indicator quality of particular polygons percentage of cover by priority dry grasslands:

- very low quality less than 2%
- low quality (2 – 5%)
- medium quality (5 – 10%)
- high quality (10 – 20%)
- very high quality more than 20% (Fig. 6).

We can see that western part of the site has significantly higher level of grassland biodiversity, which resulting from different character of area narrow valleys and steeper slopes, less arable fields. Eastern part of the site is much more used for more intensive agriculture production, but still keeps important areas with high biodiversity value.

Fig. 6


Non-forest habitat quality based on coverage of priority grassland habitats
Legend
Habitat quality
very low
low
medium
high
very high
Forests - not evaluated
SCI boundary
N
0 1 2 4 6 8
Kilometers

3.2 Ideal (long-term) objectives for the site

The vision of protected site is to protect, preserve and enhance the natural values of the Tarnava Mare SCI and to raise awareness to those who reside in or visit the site. Purpose of protection is to keep the favourable conservation status of Annex I habitats and Annex II species.

3.3 Socio-economic criteria

- Dry grasslands are currently faced by two threats. On the one hand, land use change through afforestation with non-native pines or conversion into arable fields is occurring in more productive areas. On the other, traditional usage as pastures or hay meadows is ceasing due to changes in the socioeconomic situation, so that litter accumulation and shrub encroachment takes place, leading to diversity losses and changes in vegetation structure.

- Traditional agricultural practices that have mostly been lost in Western Europe, such as common grazing and hand scything of meadows, are still part of everyday farming life in SCI Târnava Mare. Support of small scale farming communities is important to diversify and increase their income from extensively grazed grasslands, to improve livelihoods and conserve habitats and species.

- Invasion of the allochtonous, strongly aggressive tree *Robinia pseudacacia* (black locust) is serious threat to dry grassland and forest habitats. An intensive vegetative spread as well as production of a large quantity of seeds makes this species a superior competitor in secondary succession.

- Unsustainable forestry practices such as planting with exotic trees, or clear-felling with loss of tree cover is threatening forest habitats.

IV. Implementation – management strategies

4.1 Zoning

4.1.1 Criteria for zoning

Zones are defined based on habitat quality and habitat types layers (Fig. 7).

- Priority grassland conservation – more than 20% of dry grasslands present in PB
- Sustainable grassland management – PB with grasslands and non-productive land and less than 20% of dry grasslands
- Low input farming – arable land and others PBs
- Forest management – forest PBs

4.1.2 Management of zones

Low input sustainable farming

The key to maintaining low input sustainable farming is to use as much as possible the agri-environment grassland payments available in the area, in addition to developing marketing to create economic incentives linked to landscape quality. Measures available are:

- 214/1: To maintain high nature value grassland. Payment is €120/ha. This requires no mowing until after 1 July: no use of artificial ferilisers and limited use of farm yard manure, sticking rates between 0.8 L.U/ha and 1.2 L.U/ha
- 214/2: To maintain wildlife by applying traditional farming practices. Payment €180/ha. Same conditions as 214/1 but no mechanized management allowed

The Romanian National Rural Development Programme (NRDP) identifies some plant species as indicators for this package: *Ononis spinosa, Pimpinella saxifraga, Knautia arvensis, Leontodon hispidus, Plantago media, Briza media, Thymus serpyllum, Veronica austriaca, Leucanthemum vulgare, Dianthis carthusianorum, Trifolium montanum, Polygala major, Linum catharticum, Primula veris, Origanum vulgare, Prunella grandiflora, Viola hirta, Lathyrus pratensis, Succisa pratensis, Sanguisorba officinalis, Serratula tinctoria, Clinopodium vulgare.* However, this species list is not used to judge eligibility of parcels, but as a means of monitoring impact of the measure on biodiversity. The target is to avoid the decline of these species. This list may be upgraded by adding other relevant plant species, if this will be considered necessary during the monitoring project. NRDP states that these will be annually monitored on some parcels under commitment on a sample basis.

In 2012, 24,505 ha were receiving payments across the area for these schemes, out of a total eligible area of approximately 34,000 ha (this includes some former arable land that is become permanent grassland, although registered as arable in Fig. 3 above). The measures 214/1 and 214/2 are therefore significant factors in maintaining low input sustainable farming.

In addition to these grant incentives, local markets, branding, promotion of direct sales, and promotion of agro-tourism will also play a role in maintaining low input sustainable farming.

As regards arable systems, not eligible for grassland support payments, the following guidelines are recommended for good arable farming practice that might exceed management obligatory under GAEC (Good Agricultural and Environmental Conditions, requirement to receive direct paymenst) might include:

- nitrogen applications of maximum 175kg/ha, carefully applied in dry weather to avoid runoff.
- field margin strips of 2-3m remain uncultivated to minimise run off and to sustain some ground nesting birds
- restrictions on crops or cropping systems that are harvested before July.
- prescribed patterns of harvesting of crop (i.e. not in decreasing circles), allowing late-nesting birds to escape
- only EU approved pesticides should be used.

Sustainable grassland management

Habitat 6510 management measures:

A. Traditional grazing according to local custom

- Early spring and autumn grazing
- Communal grazing, based on traditional procedures organized through the town halls; stocking rate for cattle should be ≤1 animal per hectare.
- Grazing throughout growing season, with rotation of stock
- June-July aftermath grazing

B. Habitat restoration by grazing

- Increased stocking where undergrazed
- Decreased stocking where overgrazed
- Maintaining the balance of cattle against sheep; aiming to keep appropriate breeds of cattle, i.e. those not bred for intensive feeding.

C. Rotational grazing control across the habitat.

D. Traditional mowing

- mowing 2-3 times/year
- mowing after maturity/seeding of the majority of flowers; in practice this should be after c.20 June.

E. Machine mowing: although the use of scythes is preferred, small cutting machines do little or no harm to species-rich grassland.

F. Restricted use of fertilisers/pesticides

G. Restricted use of minerals

Priority grassland conservation

Dry and semi-dry grasslands in mosaic with mesic and other types of grasslands in the Sighisoara-Târnava Mare SCI represent important example of high species richness due to still preserved traditional and big scale management practices.

Dry grassland habitats 40A0*, 6210*, 6210, 6240* management measures:

A. Maintain traditional grazing according to local custom

- Early spring and autumn grazing.
- Communal grazing, based on traditional procedures organized through the town halls; stocking rate for cattle should be ≤1 animal per hectare.
- Grazing throughout growing season, with rotation of stock.

B. Habitat restoration by grazing

- Increased stocking where undergrazed.
- Decreased stocking where overgrazed.
- Maintaining the balance of cattle against sheep; aiming to keep appropriate breeds of cattle, i.e. those not bred for intensive feeding.

C. Rotational grazing control across the habitat, especially the placing of sheepfolds.

D. Traditional mowing – mowing after maturity/seeding of the majority of flowers; in practice this should be after c.20 June.

E. Machine mowing: although the use of scythes is preferred, small cutting machines do little or no harm to species-rich grassland.

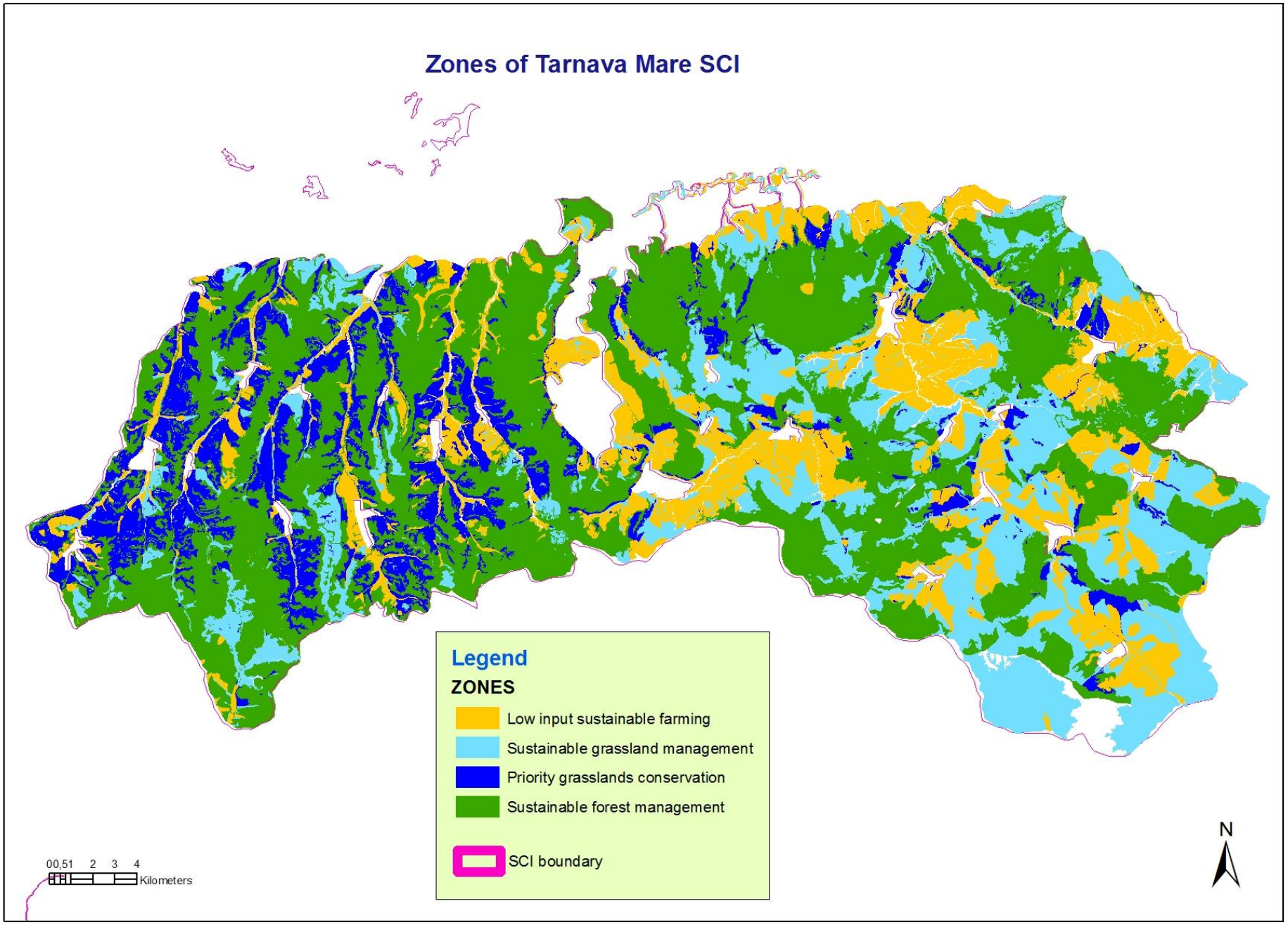
F. Restricted use of fertilisers/pesticides.

G. Restoration management implemented – removal of secondary succession scrubs and trees.

Sustainable forest management

The prescriptions for sustainable management of forest habitats are described in detail in the FSC sudy, Annex 1, which is only available in Romanian.

Fig. 7.


Zones of Tarnava Mare SCI
Legend
ZONES
Low input sustainable farming
Sustainable grassland management
Priority grasslands conservation
Sustainable forest management
SCI boundary
0 0,5 1 2 3 4
Kilometers
N

V Monitoring

Monitoring of habitats is continuous or repeated measurement of biological indicators (eg. species richness, representativity, conservation status). Monitoring has been identified as the critical link in adaptive management processes for dealing with uncertainty in the management of large-scale systems.

Monitoring is not research. The definition of scientific research is performing a methodical study in order to prove a hypothesis or answer a specific question. A variable must be manipulated, although purely observational science do not always comply with this norm.

A field study is an experiment performed outside the laboratory, in the 'real' world. A field experiment still follows all of the steps of the scientific process, addressing research problems and generating hypotheses.

Monitoring methodology should focus on changes in habitat structural characteristics and species composition in large (hectares) and small scale (meters) in order to be capable significantly detect trends after restoration action. Monitoring should cover the whole scale of restoration actions, which will be defined in restoration plan (Activity A1 and A3).

Data sampling

The large scale monitoring of habitats will focus on Annex I habitat types (6210* and 6240*). Proposed methodology for data sampling on large scale is to repeat the inventory by using the “Methodology for dry grassland habitat mapping in Tarnava Mare pSCI” (Seffer, Sefferova Stanova 2011).

The difference will be localisation of monitoring sites (normally linked to physical blocks), which will be linked to homogeneous dry grasslands areas identified in A1.

The proposed methodology for small scale monitoring is sampling of permanent plots. Permanent quadrat 4x4 m will be established in each monitoring site. Corners of quadrats could be marked by iron sticks (or tubes) of size about 20 cm. They will be buried in soil, only 2-3 cm stays above the surface. Localisation of permanent plot will be done by GPS. Corners can be found by metal detector.

Data sampling will start by recording of releve (Braun-Blaquet approach) in 4x4 m quadrate. It will follow by recording of species lists in grid of 8 quadrates 0,5x0,5 m. The reason is to objectively monitor changes in small scale species diversity.

Monitoring period

The periodicity of monitoring depends on the dynamics and variations in species composition of particular habitat types. For more dynamic habitat types such as grasslands under restoration, the monitoring period should be shorter i.e. one year. Description of baseline situation of grassland habitats will be result of inventory on large scale in 2011. Monitoring plots for small scale monitoring have to be established before realization of restoration management, to be able to evaluate impact of realised measures on priority habitats. Monitoring will be realised in 2011-2013.

Data evaluation

Evaluation of the large scale data will be based on a rapid assessment of area, representativity and conservation status. Further evaluation of monitoring results should be based on the evaluation of species composition changes. Different techniques could be used taking into account variety of ordination and classification methods widely used in vegetation science (eg ter Braak et Smilauer 1998, Gauch 1982, Peet 1980).

Forest Habitats Monitoring

Monitoring plan was developed under the FCS certification of the forests. See Annex 2. Only available in Romanian.

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