LARGE SCALE CONSERVATION PROJECT UPPER TREENE LANDSCAPE (NORTHERN GERMANY)

Wiebke Sach¹

Abstract: In the north of Germany the Upper Treene Landscape a glacially formed landscape is characterized by a great diversity of geological structures and typical biotopes such as woods, peatlands, swamps, heathlands, wet and dry grasslands. These biotopes provide habitats for endangered plant and animal species thus indicating the national importance of the landscape. With the help of a federally assisted program a large scale nature conservation project has been initiated taking ten years with the aim to protect and improve natural biotopes by creating large scale pastures, developing reserves with natural woods and re-establishing natural hydrological conditions in soils and rivers.

INTRODUCTION

The Upper Treene Landscape project participates in the federally assisted program called *Large Scale Nature Conservation Project* created by the Federal Republic of Germany in order to protect landscapes of national importance as parts of the national heritage. Project realization is aided by the federal state in which the project area is located and by a local body who is responsible for the project management. Selected areas have natural or almost natural parts of landscape comprising typical biotopes with typical plant and animal species being of great importance on a regional as well as national or international scale. "Large scale projects" are defined as large sections of the landscape for example water catchment areas and mires. In the past the large scale projects had extents from some 100 ha to more than 20000 ha.

¹ Nature Conservation Association Upper Treene Landscape, Großsolter Weg 2a, D-24988 Oeversee, phone +49-4630-936096, http: //www.oberetreenelandschaft.de/, email: buero@oberetreenelandschaft.de

In 1999 the Upper Treene Landscape was suggested as a large scale nature conservation project. Discussions between the local nature conservation association *Upper Treene Landscape*, the local communities and administrative institutions, the land owners, farmers and other inhabitants resulted in an application to the program within short time. In 2000 the large scale conservation project Upper Treene Landscape finally started.

The local association consisting of private persons, several communities, the district, a water and soil association and several hunting associations is responsible for the realization of the program. Another member of this association, the private foundation for nature conservation *Kurt and Erika Schrobach-Stiftung*, pays 10 % of the total costs of the project supporting the local association. Another 75 % are paid by the Federal Republic of Germany and the remaining 15 % by the federal of state Schleswig-Holstein.

In the project's *core area*, the area with the highest nature value, project money can be spent on the acquisition or longterm leasing of land, on measures to improve the nature, on the realization of the maintenance and development plan and on staff. The project will end in 2010 (Sach, 2001).

W. Sach

Figure 1. Location of the core area of the project Upper Treene Landscape and the nature value of the subareas.



GEOGRAPHICAL AND ECOLOGICAL FEATURES

The Upper Treene Landscape is situated in the northern part of the Cimbrian peninsula just south of the Danish-German border (see Fig. 1). The landscape was formed by the Saalian and the Weichselian ice ages. It belongs to a transitional

zone were glaciers moved back and forth in turns over long periods of time thus creating different types of moraines in close succession.

The two spring rivulets of the Treene join in a wide subglacial to form lake Treßsee, nowadays a very shallow lake with huge layers of inorganic sediment and organic material. The lake is surrounded by siltation zones followed by wet and moist grasslands. The outlet of the lake - the location of the former glacier door - is the river Treene. Only the upper course of the Treene has been channelized so today the river is still characterized by meanders. The Treene valley is narrow and deeply notched into a landscape showing a pattern of used and abandoned wet and moist meadows and pastures. The slopes are covered with beech woods and forests with coniferous trees. In the center of the core area a group of push end moraines is covered with beech and oak woods as well as with forests with coniferous trees. Mires, bogs, heathlands and extensively used grasslands are interspersed.

After the last ice age the formation of dunes and mires changed the landscape. Subsequently natural ecosystems were influenced by human land use. Gravel-pits and fields on which cereals and maize are cultivated are also part of the core area. Thus nowadays a lot of different vegetation types are present in the Upper Treene Landscape whose core area covers about 2000 hectares.

Wedged between the North Sea and the Baltic Sea the project area is characterized by a moderate temperated and oceanic climate with soft moist winters and cold and rainy summers. The average temperature is about 8 $^{\circ}$ C and average precipitation amounts to 825 mm (station Oeversee, period 1951 – 1980).

MAINTENANCE AND DEVELOPMENT PLAN

In order to participate in the program Large Scale Nature Conservation Project a natural landscape must show special features like typical plants and animal coenoses worthy of protection.

In the course of the application the core area has to be documented or described. Furthermore measures for the maintenance and development of the biotopes and species with importance to nature conservation must be planned. In case of the Upper Treene Landscape all this was done by the local nature conservation association. As part of the grant by the state and federal state firms had to be employed by the responsible body in order to check the application, the present situation and the suggested maintenance and development measures according to the aims postulated in the project application. In case of the Upper Treene Landscape two highly specialized firms were employed (Petersen, 2004; Hennings & Hohmann, 2004).

In a first step an inventory of the present situation concerning infrastructure of the region, agriculture, land use, etc. was made. But the main focus is concentrated on the biotic elements in the landscape.

Present types of vegetation were mapped in the core area and the composition of vegetation in transitional zones was quantified on a small scale (three transects in

three valleys and basins with a total length of more than 1200 meters, each plot covering an area of 9 m²) (Walter, 2002). Additionally small scale structures like ponds, ditches, hedges, steep slopes etc. were scrutinized (Petersen, 2004).

The inventory of the fauna (Grell, 2002) concentrated on some species or groups of species. Among the mammals otter (*Lutra lutra*), water shrew (*Neomys fodiens*), the insectivore *Sicesta betulina* and bats were mapped. All birds were observed and counted several times a year. Reptiles, amphibians, dragon flies, butterflies, ground beetles, xylobiontic beetles and bees were investigated in selected subareas. Fish and lampreys as well as the limnic macrozoobenthos were quantified and evaluated in rivers and selected ponds.

In the rivers and rivulets structures like vegetation, pot-holes, soil material, presence of elder roots, fixed banks etc. were mapped every 100 m in order to describe and evaluate the present situation. The edaphic situation in the river lowland and some former mires was characterized by different methods. The collected data were necessary for estimating the effects of raised water level on organic soils as well as on flora and fauna (Hennings & Hohmann, 2004).

Furthermore the present hydrological situation had to be investigated as a basis for planning future measures to reduce water run off and rewet parts of the landscape (Hennings & Hohmann, 2004).

For every species, group of species or feature a single expertise was made. The actual situation was described and evaluated. Finally suggestions were made to save the investigated species, group of species or feature.

In the second stage of the maintenance and development plan (Petersen, 2004) all information gathered on the different features were joined and analyzed with regard to different subareas the core area was divided in. For every subarea data on important vegetation types and species were scanned in order to determine the vegetation types and species worthy of protection. Data on the edaphic situation as well as the present hydrological status and its possible future development were also taken into account. Subsequently maintenance and development aims were defined. For example one aim is the establishment of large scale pastures, including mires, heathlands, pot-holes and other biotopes. Other aims consist of conservation and restauration of species-rich meadows and wetlands. Furthermore in some ecosystems and some areas the natural processes of ecosystems should be enabled and human impact should be reduced. This is suggested especially for woods, rivulets and rivers and for some wet areas. Another important aim is the reconstruction of almost natural hydrological conditions in the landscape.

The last step of the maintenance and development plan (Petersen, 2004) is to derive an overall concept to further the realization of nature conservation aims in each of the subareas. The original concept of the project application must yet be taken into account and modified. In order to realize these nature conservation aims clear described measures have to be named and spatially defined. For instance, the plan has to suggest how to rewet a certain mire, where to built fences or where to remove the abandoned above-ground biomass.

THE IMPORTANCE OF THE UPPER TREENE LANDSCAPE FOR NATURE CONSERVATION

Vegetation (Walter 2002) was mapped according to the current code of Schleswig-Holstein (LANU, 2001) allowing for a fine differentiation between vegetation types. Besides the analysis concentrated on the biotopes which are legally protected in Schleswig-Holstein (they are mentioned under nature protection law of Schleswig-Holstein in § 7a and § 15a; LANU, 1998). These biotopes are protected although most of them are not situated in declared nature reserves. Consequently conventional agricultural or forest use is allowed.

In the core area of Upper Treene Landscape (about 2000 hectares) the protected and endangered biotopes (table 1) cover almost 20 % of the total territory. Compared to other regions this is a very high proportion. Most of the biotopes are characterized by high water level, some of them like mires or fens (communities of Oxycocco-Sphagnetea and Scheuchzerio-Caricetesa fuscae), bog woods (bog degeneration phase with Betula pubescens) and wet heathlands (Ericetum tetralicis) additionally showing a low nutrient status. Stands with low capacities of water storage like dry heathlands (e.g. communities of Calluno-Genistion and Nardo-Galion) and dry grasslands (e.g. communities of Corynephorion canescentis and Thero-Airion) are rare in the Upper Treene Landscape. In Schleswig-Holstein with its rather flat landscape steep inland slopes are under protection, too. This also applies to plots which have been abandoned for more than five years. Moist grasslands without rare species but with wide-spread species indicating moist or wet stands are under protection, too. These vegetation types cover 9 % of the total area. Stagnant water bodies (about 140 in the core area) and flowing water bodies were not considered for the calculation. So at the beginning of the project about 30 % of the area were important to regional nature conservation.

W.	Sach
----	------

Table 1. Legally protected biotopes in the project's core area of the Upper Treene Landscape in the federal state of Schleswig-Holstein

Biotopes	Area	Area	
	[hectares]	[%]	
Mires, bogs, fens and peatlands	62.5	3.3	
Swamps	42.0	2.2	
Shrubs on wet soils	20.5	1.1	
Reed	44.7	2.3	
Meadows with rushs and sedges	28.6	1.5	
Biotopes with springs	0.3	<0.1	
Silting zone with floating plants	4.3	0.2	
Alder carr	5.6	0.3	
Heathlands	5.1	0.3	
Inland dunes	30.4	1.6	
Steep inland slopes (> 20%	25.0	1.3	
Dry grasslands	9.8	0.5	
Abandoned biotopes	91.1	4.7	
Moist grasslands under federal protection	175.1	9.1	
Total	545.0	28.4	

According to the European Flora-and-Fauna-Directive (FFD) (Table 2) about 10 % of the core area are covered with endangered vegetation types (Ssymank *et al.*, 1998). In Schleswig-Holstein as well as in Europe some types of mires and transitional mires, inland dunes and tall forb ruderal habitats are also of great importance to nature conservation. Furthermore acidophilous beech woods and beech woods with *Galium odoratum* range among the endangered vegetation types.

Table 2. Biotopes listed	n the European Flora-and-Fauna-Directiv	e found in	the	project's
core area of the Upper	eene Landscape			

Biotopes	FFD-Code	Area [ha]	Area [%]
Inland dunes with dry heathlands	2310	18.2	0.9
Inland dunes with open grasslands	2330	6.7	0.3
Tall forb ruderal habitats on wet soils	6430	21.5	1.1
Mires and transition mires	7120	62.4	3.3
Acidophilous beech woods	9110	79.4	4.1
Beech woods with Galium odoratum	9130	1.8	0.1
Total		190.0	9.8

The number of phanerogam species included in the red lists of Germany (Korneck *et al.*, 1996) and Schleswig-Holstein (Mierwald & Beller, 1990) was chosen as another indicator of the nature value (Table 3, RL-species; species of the red lists). 467 different phanerogam species have been found in the Upper Treeene Landscape, 80 of which are endangered. This is a proportion of 17 %. Mires and

peatlands are the biotopes with the highest numbers of endangered species (nearly half of all red list species). Xerothermic grasslands and heathlands, water bodies as well as wet grasslands were documented as reserves for endangered plant species. Only few endangered species were found in moist or wet grasslands, ruderal vegetation and woods.

Table 3. Phanerogam species of the red lists (RL) of Germany and Schleswig-Holstein found in the project's core area of the Upper Treene Landscape (absolute numbers and proportions)

Biotopes	Total No. of Species [n]	RL- Species [n]	RL- Species/ Total No. of Species [%]	RL- Species/ Total No. of RL- Species [%]
Water bodies	45	9	20	11
Arable grasslands	9	-	-	-
Moist grasslands	43	4	9	5
Dry grasslands	39	5	13	6
Wet grasslands	28	9	32	11
Mires	35	16	46	20
Peatlands	81	21	26	26
Ruderal vegetation	33	3	9	4
Xerothermic grasslands, heathlands	65	11	17	14
Woods	89	2	2	3
Total	467	80	17	100

Table 4 gives an impression of the degree to which phanerogam species are endangered. Most of them are classified as endangered in the red lists of Germany (Korneck *et al.*, 1996) and/or Schleswig-Holstein (Mierwald & Beller 1990). 20 of the 80 species are highly endangered and three species (*Carex pulicaris, Polygonatum verticillatium, Pulsatilla vulgaris*) are on the verge of extinction in Schleswig-Holstein.

Table 4. Red list (RL) classification of phanerogam species found in the project's core area of the Upper Treene Landscape

Red list classification	Species [n]		
RL SH 1	3		
RL D 2 and RL SH 2	6		
RL D 2 or RL SH 2	14		
RL D 3 and RL SH 3	22		
RL D 3 or RL SH 3	34		
RL SH 4	1		
Total	80		
D: Germany; SH: Schleswig-Holstein			
Red list classes of endangering: 1: almost extinct ; 2: highly endangered; 3: endangered; 4: highly endangered locally			
endangered; 3: endangered; 4: highly endangered locally			

All these criteria as the red lists and the FHH-directive were evaluated for the floristic investigations in order to gain a spatial overview of the nature value. For each subarea a floristic value was generated.

The faunistic investigations were evaluated in a similar way. Based on all these data a nature value was produced. The range of the nature value consists of five levels, from "very low quality" up to "very high quality" (see Figure 1). The level "very low quality" is not present in the project's core area. The level "low quality" is concentrated on an intensively used valley of one of the Treene spring rivulets and on a little area covered with acres. The level "high quality" occurs in the Treene valley and in another valley with its used and abandoned wetlands, in the dunes landscape of lake Treßsee and in the central woods. The gravel-pits, the mires and some species-rich wetland have a "very high quality".

SIMULATION OF THE HYDROLOGICAL SITUATION

In former times mires, bogs, siltation zones, river valleys and depressions were drained by man in order to gain pastures or arable land. Subsequently the structure of organic soils changed, organic soils mineralized, nutrient availability increased, soils densified and their porosity decreased. The mineralization of the organic soil causes the subsidence of the ground surface. The intensity of drainage governed the degree of edaphic and hydrological degeneration. One of the main goals of the Upper Treene Landscape project is the re-establishment of natural hydrological conditions in drained areas and of natural hydrodynamic conditions in ditches and rivers.

As already mentioned above the present edaphic and hydrological situation in the Treene valley and two basins with drained peatlands was mapped. The results were analyzed in order to determine the nature value of the landscape and to derive nature conservation aims.

The description of the current hydrological situation and the simulation after increasing the water level started with a survey of the rivers and their valleys using

terrestrial methods as well as aerial surveys by laser scan. These data were fed to a computerized digital elevation model in order to derive the current relief. The water level has been registered at some gages at the Treene and the rivulets since long time. Precipitation and run-off were calculated for the catchment area. With the help of the software MIKE 11 from the Danish Hydrographic Institute the real occurred water levels were simulated. The software offers to vary some parameters (e.g. resistance within the water body) so a good correspondence between the real occurred and the simulated situation can be achieved. In the next step it is possible to simulate future water levels after - for example - increasing the height of the runoff because of hydrological measures. In the project Upper Treene Landscape the height of the new water level has to depend firstly on the handicap that the future hydrological situation will not effect any private house or installation as a purification in the core area and outside of it (in case of realization nobody shall be affected by the measures otherwise sue for damages will follow). Secondly the nature conservation aims concerning soil, flora and fauna have to be considered.

The best way to re-wet the basin of the lake Treßsee, the spring of the river Treene, would be the installation of a so-called "Sohlgleite": while run-off will be increased water organisms can still pass easily as there is no weir but a low slope installation with a correspondingly low current. This installation consists of embankments of stones with a different diameter to raise the river bed. It could be built at the former glacier door.

Nowadays the water and soil association cleans the rivers and ditches to achieve an unobstructed run-off in order to lower the water level in the soils. In the course of this process lots of plants and animals are killed directly by being put on the river banks and indirectly by the destruction of vital structures within the water body. As nature conservationists want to stop these measures the effect of stopping this cleaning was simulated. The map with the simulation results shows an extended flooded area. But the annual and the 50 year flood inundations will damage land outside the core area: One of the two rivulets has low slopes so that changed water regime might cause inundation beyond the core area. The simulation revealed that no effect will occur if the clearing of the water body will be continued at the beginning of this rivulet within the core area on a length of about 500 m. The maintenance and development plan suggests to increase the average water level in lake Treßsee in summer from 24.25 m NN to 24.50 m NN in order to reduce mineralization of the organic soil or even re-start processes of accumulation. The siltation zone will be extended and within the re-wetted basin the grazing of cattle will still be possible with the object of creating an open landscape with different types of vegetation and typical animal coenoses.

In the upper course of the Treene some hundred meters below the former glacier door the river has been channelized and its bed has been dredged out. The idea of reconstructing the natural meanders was studied for the maintenance and development plan. A "Sohlgleite" was considered to increase the water level in this lengthened part. Nowadays the river is notched in its valley; to get enough water in a broadened river bed and to re-wet the lowland in summer the computer simulation program calculated a water level rising so high that it would affect the lake Treßsee as well as the land beyond the core area. As a consequence this potential measure was rejected. Now the maintenance and development plan suggests to stop the cleaning measures and to flatten the river banks in some parts. Dead trees and stones shall be put into the river to improve the diversity of structures within the water body. In some parts the river banks shall be planted with *Alnus glutinosa*.

NATURE CONSERVATION AIMS AND MEASURES

The presented short overview over the endangered habitats and the endangered plant species in the Upper Treene Landscape reveals that a total stop of the agricultural use will lead to a reforestation. As most of the endangered species live in open biotopes like bogs and fens, heathlands, grasslands and gravel-pits it is vital for their protection to keep up an extensive land use. Arable land should be transformed into grasslands. The creation of large scale pastures interspersed with bogs and fens, lakes, woods and abandoned gravel-pits will protect these biotopes and support the development of landscape with a high diversity of different vegetation types. Furthermore natural processes will be accepted. In large scale landscapes with low numbers of cattle and/or other livestock the intensity of grazing governs a pattern of different structures. A combination of open and half-open landscape elements will provide good conditions for most of the endangered species. Thus large scale pastures will be established in the hitherto mostly open areas of the Upper Treene Landscape. The development of the vegetation will be influenced by abiotic conditions and the grazing behavior of the livestock which in turn will depend on livestock density and the kind of grazing species chosen. To reduce nutrient levels in soils the application of fertilizers will be stopped. Long fences will be built to join plots creating large scale pastures. Livestock will be kept in the pastures the whole year through and not be given additional fodder if possible. The nature conservation association will lend these pastures to regional farmers so that they will be responsible for the animals. Yet the regime will be managed by the farmers and the association.

The first large scale pasture with more than 100 hectares was created in 2001 north of lake Treßsee. It is interspersed with wet, moist and dry grasslands, dunes, drained peatlands, small water bodies and hedges. 30 cows with their calves live here the whole year through. On small plots trees and shrubs were planted to further the presence of some woody structures in a very open landscape.

In order to prevent degeneration an itinerant herd of about 250 sheep and goats with offspring preserves peatlands and heathlands, habitats on dunes and in gravelpits. Besides this herd is kept in biotopes and some grassland plots hitherto not integrated in large scale pastures.

In the valley of the river Treene species-rich wet meadows can still be found. A lot of these former meadows have been abandoned because of the difficulties involved with the agricultural use of the mostly extremely small sized plots (< 1 ha). The ground water level lies near the ground surface and even in summer the valley is submerged. The soil density is low so it is very difficult to use machines for the

mowing of the vegetation and the removal of the biomass. The maintenance of these meadows and the improvement of the abandoned land is one of the association's nature conservation aim. But the problems connected with the use of these plots still remain. Some meadows with great importance to nature protection have been mown by a track-laying vehicle. Because of the extreme danger of soil compaction the removal of the cut biomass could only be realized in two dry summers with low ground water levels. As the costs are extremely high the track-laying vehicle can only be hired for special plots.

In the large scale woods forestry shall be stopped. Beforehand the number of coniferous and allochthon species has to be reduced. In some parts of the woods young autochthon trees will be planted to establish mixed plots with a diversified age structure. Some preparatory measures of this kind have already been taken in the late 1990s before the present project was even started. The allochthon species *Prunus serotina* is strongly competing with young autochthon wooden species growing on sandy soils in the Upper Treene Landscape. In order to support the indigenous species it is necessary to cut *Prunus serotina* every year until it can not shade the young plants any longer. Moreover the fruit bearing trees must be cut in order to prevent the spreading of its seeds by birds.

The grasslands, abandoned fields and arable lands lying within the woods shall be developed to woodland. Bogs, fens, heathlands and open gravel-pits shall be grazed by the itinerant sheep herd in order to be preserved. Plots with deciduous and/or coniferous trees or shrubs shall be integrated into the large scale pastures to increase structural diversity there.

The restoration of almost natural hydrological conditions in the drained areas and of natural hydrodynamic conditions in ditches and rivers are important tasks of the project. Every flowing water body shall develop according to natural dynamics. The clearing shall be stopped if there is no negative consequence on private houses etc. The speed of the water flow shall be reduced and floods shall be delayed. Supporting measures for the coenoses of the rivers and rivulets as well as the protection of their siltation zones will reduce the input of nutrients and sediment into the water and hinder translocation by water effectively. Furthermore the stop of agricultural use will improve the situation.

On a small scale the water level can be raised by the construction of small dams in the ditches. These measures can only be realized if the interests of other owners will not be harmed. Other owners and the water and soil association also have to agree if the height of the run-off within the area of the large scale nature conservation project shall be lifted by some centimeters. Some dams have been built in pastures and in woods within the project run time. In the wood the height of the run-off has been raised by putting stones into the river bed. In peatlands original soil from the plot were used to reduce the run-off in the ditches. Large scale measures like stopping the clearing of flowing water bodies, the deconstruction of water pipes, the inundation of basins and the reconstruction of meanders require the acquisition of the land concerned. Consequently such measures could not be realized yet.

ACQUISITION OF LAND

The realization of this project is based on the acquisition of land in the core area in order to grant a long-term protection. Therefore one of the tasks of the project Upper Treene Landscape is to buy land. Another option is to take land on lease for 30 years but the owner has to accept and preserve the effects of nature conservation measures for time afterwards. The owners of some plots don't want to sell or lease but they agree with the conservation concept and accept the effects of the realized measures on their land.

Initially the private nature foundation *Kurt und Erika Schrobach–Stiftung*, a member of the private nature conservation association Upper Treene Landscape, owned 300 hectares of land located in the core area. As the foundation pays with its own capital for the association it owns the acquired land. The foundation "Stiftung Naturschutz Schleswig-Holstein" owns about 250 hectares of land. Moreover the communities and the state own land in the core area. These owners support the project by accepting measures on most of their plots. One goal of the project is the acquisition of 1.200 hectares of (formerly) private property. Until now almost 300 hectares have been bought. Beside woods, peatlands, heathlands and abandoned land it was possible to acquire grasslands and arable land. The reasons for this success are the low quality of soils in this region, financial problems of the landowners and changes in the agricultural situation. Thus consolidation process initiated by Schleswig-Holstein is in favor of both the nature conservation association and the farmers.

THE NATURE CONSERVATION ASSOCIATION UPPER TREENE LANDSCAPE

The nature conservation association Upper Treene Landscape concentrates on the Upper Treene Landscape. It has about 125 private members, several communities located in this region, the district, a water and soil association, hunting and canoe associations. The aims are the promotion of nature conservation, promotion of regional tourism and promotion of the economic potentiality basing on the regional landscape with its interesting nature. Besides the large scale nature conservation project the association engages in nature conservation as for example the maintenance of endangered species (e.g. *Arnica montana*) and biotopes (e.g. mowing of species-rich meadows). To improve the tourism paths through the Upper Treene Landscape were prepared and marked by posts, at the same time a plan with the marked paths was printed so guests can easily discover the landscape with its nature and culture. Excursions and events are offered. Another task is public relationship.

CONCLUSIONS

The main focuses of the project are the re-establishment of natural hydrological conditions in drained areas and natural hydrodynamic conditions in ditches and rivers, the establishment of reserves with self dynamic development and the establishment of grazing areas. Grazing intensity will create open grasslands as well as grasslands with shrubs and woods. Natural biotopes will be integrated in the grazing areas. In addition to cows and horses an itinerant herd of sheep and goats will preserve special habitats. In the reserves natural woodlands will be developed.

The realizsation of this project bases on the acquisition of land in the core zone, followed by first measures of re-establishment and creation as for example tamping ditches, planting shrubs, removing conifers.

For this tasks a graduate agrarian engineer and a biologist are responsible. They are supported by the nature conservation association and by a lot of employees of the local authorities.

According to the philosophy nature conservation demands the engagement of the local people which must be voluntarily, this bottom-up principle is seen to be the important guarantor for long-term success.

REFERENCES

- Grell, H., 2002 Maintenance and development plan for the large scale nature conservation project Upper Treene Landscape: Synthesis of the faunistic investigations, unpublished, German (Pflege- und Entwicklungsplan für das Naturschutzgroßprojekt Obere Treenelandschaft: Synthesebericht der faunistischen Untersuchungen).
- Hennings, H.-H. & Hohmann, A., 2004 Maintenance and development plan for the large scale nature conservation project Upper Treene Landscape: Edaphic and hydrological investigations, unpublished, German (Pflege- und Entwicklungsplan für das Naturschutzgroßprojekt Obere Treenelandschaft: Bodenkundliche und wasserwirtschaftliche Untersuchungen).
- Korneck, D., Schnittler, M. & Vollmer, I. 1996 Red list of the Pteridophyta and the Spermatohyta of Germany [in:] Bundesamt für Naturschutz (ed.) - Rote Liste gefährdeter Pflanzen Deutschlands, Schriftenreihe für Vegetationskunde 28, 21-187, Landwirtschaftsverlag Hiltrup, German (Rote Liste der Farn- und Blütenpflanzen (Pteridophyta et Spermatohyta) Deutschlands).
- LANU, 1998 Landesamt für Natur und Umwelt des Landes Schleswig-Holstein (ed.), 1998
 Biotopes legally protected according to §15a of the nature protection law of Schleswig-Holstein, mapping system, Flintbek, 53 p., German (Die nach §15a Landesnaturschutzgesetz gesetzlich geschützten Biotope in Schleswig-Holstein, Kartierschlüssel).
- LANU, 2001 Landesamt für Natur und Umwelt des Landes Schleswig-Holstein (ed.), 2001
 Standardized list of the biotope types in Schleswig-Holstein. 1st version, Flintbek, Polykopie, 151 p., German (Standardliste der Biotoptypen in Schleswig-Holstein).
- Mierwald, U. & Beller, J., 1990 Red list of the Pteridophyta and the Spermatohyta of Schleswig-Holstein. Landesamt für Naturschutz und Landschaftspflege Schleswig-

Holstein (ed.), Kiel, 64 p., German (Rote Liste der Farn- und Blütenpflanzen Schleswig-Holsteins).

- Petersen, S., 2004 Maintenance and development plan for the large scale nature conservation project Upper Treene Landscape preliminary report, unpublished, German (Pflege- und Entwicklungsplan für das Naturschutzgroßprojekt Obere Treenelandschaft: Zwischenbericht).
- Sach, W., 2001 Large scale nature conservation project Upper Treene Landscape, [in:] Natur und Landschaft 76: 9/10, 407-414, German with English summary (Naturschutzgroßprojekt Obere Treenelandschaft, Schleswig-Holstein).
- Ssymank, A., Hauke, U., Rückriem, C. & Schröder, E. 1998 The European protection area system NATURA 2000, Schriftenreihe für Landschaftspflege und Naturschutz 53, 560 p., German (Das europäische Schutzgebietssystem NATURA 2000).
- Walter, J., 2002 Maintenance and development plan for the large scale nature conservation project Upper Treene Landscape: Results of the floristic investigations, unpublished, German (Pflege- und Entwicklungsplan für das Naturschutzgroßprojekt Obere Treenelandschaft: Ergebnisse der vegetationskundlichen Untersuchungen).