HABITAT MANAGEMENT OF HORTOBÁGY ECOREGION FOR BIRD PROTECTION

LIFE-NATURE PROJECT OF THE HORTOBÁGY ENVIRONMENTAL ASSOCIATION
2002–2006

Balmazújváros, 2006

Cranes
(Photo: Mihály Bodnár)

Habitat management of Hortobágy

ecoregion for bird protection

LIFE-Nature project of the Hortobágy Environmental

Association in the Hortobágy

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Project beneficiary: Hortobágy Environmental Association

Project partners:
Hortobágy Society for Nature Protection and Gene Preservation
Hortobágyi Ecological Co-Operative Society
Péterné Rózsa entrepreneur

Project supervisor: Hortobágyi National Park Directorate

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A young member of the Collared Pratincole family which appeared on the project site (Photo: János Oláh)

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Introduction

The Hortobágy, which reflect the history of the Hungarian people, has been wounded countless times in the past 200 years. Some parts of it were drained, certain pusztas were cultivated and disconnected from life-giving Tisza River, its most beautiful marshlands and saline lakes were converted to fishponds, in its alkali grasslands and meadows vast paddy fields were created, lines and groups of alien species were introduced, natural rivers were transformed into channels, settlements and farmhouses foreign to the landscape were built, the ancient grazing system was destroyed, ancient domestic animal types were displaced, local people's awareness of respecting nature was smashed, the grass was mown rather than grazed, the southern parts were bombed by drilling Soviet military aircraft, power-lines were led through the sky above the puszta, domestic geese trod on the pristine grassland, the proportion of croplands was further increased, and the puszta was partly nationalized gratuitously.

In spite of all these detrimental factors, the Hortobágy puszta is still one of the most unspoilt parts of Europe, where millions of birds find a perfect habitat. Ever since the formation of the Hortobágy National Park, nature protection efforts have been gradually strengthening, especially after the change of political regime in 1990. Today, in the Hortobágy region a group of naturalists are working, who, owing to their appropriate professional knowledge could start to clear Hortobágy of its wounds. The partial restoration of the "old" conditions of 1700-1800 is an important task so as to preserve the Hortobágy in its original form. To achieve this goal, we prepared our LIFE project described below for the pusztas of Vókonya.

Zoltán Ecsedi
25 March 2006.

Typical Hortobágy landscape in Angyalháza (Photo: János Oláh)

How beautiful, how beautiful
you are
My dear Hortobágy
You are beyond compare
In the whole world
– In the whole wide world

What I love about you
You are straight
With everlasting
Silence above you
– Your solemn dignity

Did God create this land
Away from everything
And spread it out
Like a silk scarf
– For me to take pleasure in.

(Mihály Szabolcska:
"In the Hortobágy")

Activities determining the preparation of the LIFE project proposal

Our LIFE project proposal was compiled based on the experience gained from the activities described below.

Nest-building Avocets in one of the wetland habitats created by HEA (Photo: János Oláh)

1.) Creation and protection of wetland habitats in the Hortobágy between 1994 and 2002

During its life of over a decade our association had its own "evolution." Initially we created artificial saline lake-like shallow water habitats in croplands, adjusted especially to the habitat requirements of Avocet. Later with partial scooping out and deepening of marshy meadows we created saline lakes and temporarily flooded natural depressions without any considerable earthwork. Eventually, wetland habitats formed in ancient watercourses were rehabilitated together with their catchment areas, with an aim of retaining natural rainwater, with the least possible earthwork. Originally we were of the view that with regular work done with heavy equipment, mowing and by water level control we would be able to impede plant proliferation. It soon turned out, however, that there was a single cost-saving and sustainable way, that is, to utilise possibly indigenous domestic animals of different species for the management of the areas.

The protection of the graceful Black-winged Stilt has always been one of the objectives of HEA (Photo: János Oláh)

One reason for the population decline of the magnificent Great Bustard the cessation of the required level of grazing (Photo: János Oláh)

2.) Population changes of characteristic bird species in the Hortobágy

Our association published the handbook titled The *Birds of Hortobágy* in 2004. The information collected in the book explains that since the formation of the national park the population of the certain characteristic bird species has decreased dramatically. Furthermore, some species disappeared entirely from the Hortobágy, due to the sudden decline of the number of grazing stock. As a result, pasture grasses became taller and more luxuriant than decades ago and the number of insects exploiting livestock dung fell considerably, too.

The population of Red-footed Flacon, a species so characteristic of Hortobágy has also declined considerably in the past few decades. The decreased scale of grazing has had an important role in this process (Photo: János Oláh)

Table 1. Desirable population size of characteristic breeding bird species in the Hortobágy

N°	Hungarian name	Scientific name	Hortobágy population (pairs)*	Desirable population in the Hortobágy (pairs)	Nature protection activities: = conservation of present population, + population enhancement
1.	Vörösnyakú vöcsök	*Podiceps grisegena*	7-70	70-100	+
2.	Feketenyakú vöcsök	*Podiceps nigricollis*	3-237	250-300	+
3.	Kis kárókatona	*Phalacrocorax pygmeus*	87-200	200	=
4.	Bölömbika	*Botaurus stellaris*	180-300 (singing male)	300-350 (singing male)	=
5.	Törpegém	*Ixobrychus minutus*	270-290	300	=
6.	Nagy kócsag	*Egretta alba*	814-1281	1100-1300	=
7.	Vörös gém	*Ardea purpurea*	220-260	350-400	+
8.	Batla	*Plegadis falcinellus*	1-28	30-60	+
9.	Kanalasgém	*Platalea leucorodia*	340-445	400-500	+
10.	Nyári lúd	*Anser anser*	320-500	500	=
11.	Böjti réce	*Anas querquedula*	440-460	600-800	+
12.	Cigányréce	*Aythya nyroca*	140-240	350-450	+
13.	Pusztai ölyv	*Buteo rufinus*	1-2	5-6	+
14.	Kék vércse	*Falco vespertinus*	180-300	500-600	+
15.	Kerecsensólyom	*Falco cherrug*	8-12	20-22	+
16.	Fürj	*Coturnix coturnix*	1100-1120	1000-1200	=
17.	Pettyes vízicsibe	*Porzana porzana*	20-330	330-400	+
18.	Kis vízicsibe	*Porzana parva*	120-200	250-350	+
19.	Törpevízicsibe	*Porzana pusilla*	0-20	40-50	+
20.	Túzok	*Otis tarda*	91-170 (individual)	200-300 (individual)	+
21.	Ugartyúk	*Burhinus oedicnemus*	12-26	30-40	+
22.	Székicsér	*Glareola pratincola*	0-14	60-120	+
23.	Széki lile	*Charadrius alexandrinus*	0-1	10-20	+
24.	Bíbic	*Vanellus vanellus*	900-1700	2500-3000	+
25.	Sárszalonka	*Gallinago gallinago*	80-310	350-450	+
26.	Nagy goda	*Limosa limosa*	100-405	800-1000	+
27.	Piroslábú cankó	*Tringa totanus*	250-350	400-600	+
28.	Fattyúszerkő	*Chlidonias hybridus*	250-600-(865)	600-1000	+
29.	Kormos szerkő	*Chlidonias niger*	0-400-(534)	400-600	+
30.	Fehérszárnyú szerkő	*Chlidonias leucopterus*	0-120-(1287-2080)	1500-2500	+
31.	Szalakóta	*Coracias garrulus*	28-40	100-150	+
32.	Búbosbanka	*Upupa epops*	290-300	400-600	+
33.	Szikipacsirta	*Calandrella brachydactyla*	0-1	150-350	+
34.	Mezei pacsirta	*Alauda arvensis*	10 500-11 000	10 000-11 000	=
35.	Parlagi pityer	*Anthus campestris*	420-430	500-600	+
36.	Sárga billegető	*Motacilla flava*	3770-3780	3500-4000	=
37.	Kékbegy	*Luscinia svecica*	480-490	450-500	=
38.	Nádi tücsökmadár	*Locustella luscinioides*	2140-2150	2100-2500	=
39.	Fülemülesitke	*Acrocephalus melanopogon*	200-210	200-300	=

40.	Csíkosfejű nádiposzáta	*Acrocephalus paludicola*	331-706 (singing male)	600-700 (singing male)	=
41.	Cserregő nádiposzáta	*Acrocephalus scirpaceus*	4270-4290	4100-4500	=
42.	Nádirigó	*Acrocephalus arundinaceus*	3240-3260	3200-3500	=
43.	Barkóscinege	*Panurus biarmicus*	740-750	700-800	=
44.	Kis őrgébics	*Lanius minor*	430-440	400-500	=
45.	Pásztormadár	*Sturnus roseus*	0-(600-1700)	0-2000	+
46.	Nádi sármány	*Emberiza schoeniclus*	3370-3380	3300-3500	=

3.) An outline of the history of herding in Hortobágy

We have chosen the appropriate nature protection activities so as to achieve the fullest possible restoration of the natural and cultural as well as landscape values of the old Hortobágy. In 1930 a feature film was made by Höllering titled *A komor ló*, which has been the most authentic motion picture depiction of life in the Hortobágy, although incipient processes of decay and intentional destruction are already shown. In the project area we intended to re-introduce the original livestock density, grazing intensity, shepherds' buildings and wells seen in this film and found acceptable by us. Based on this film, we also tried to restore the short-grassed, grazed puszta without channels and with natural hydrological cycles.

The restoration of historic sweep wells is an important task for the preservation of the precious traditional landscape (Photo: János Oláh)

Activities of the Hortobágy Environmental Association

1.) Objectives of the Hortobágy Environmental Association

The Hortobágy Environmental Association was formed in June 1993 in Balmazújváros with objectives such as by co-operating with the Hortobágy National Park and by complementing state nature protection activities to carry out nature and bird protection work in protected and unprotected areas, as well as to facilitate bird protection activities and enhance the intensity of ornithological research in the area of the wider-sense Hortobágy. Considering the years of drought at that time, our primary aim, was to establish wetland habitats for the protection and population growth of shorebirds (*Charadriiformes*). Our original objective, which has only slightly been modified since then, is to protect in the Hortobágy habitats and birdlife to the greatest extent with the co-operation of local farmers, conservationist organisations and young people, as well as to restore and rehabilitate damaged but still valuable habitats and create new wetland habitats. Activities aiming at the objectives defined in the HEA's conception are generally carried out by 3-5 employees and 30-60 trained volunteers.

Table 2. Major habitat protection activities of Hortobágy Environmental Association

(1) The implementation and management of saline lake and saline marshy meadow habitat restoration in damaged areas.
(2) Creation and management of wetland habitats unsuitable for agricultural cultivation and of areas representing no special natural values (navvy pits, abandoned goose farms).
(3) Funding agricultural businesses to promote introduction of plant communities necessary for the protection of Great Bustard (*Otis tarda*)
(4) Implementation of Breeding and Migratory Bird Monitoring Programmes and publication of results
(5) Practical (winter feeding, placing of artificial nests, nest guarding) and theoretical (permanent exhibition, education, publications) raptor protection in our area of activity.
(6) Elaboration and practical application of the protection scheme of globally threatened species such as Slender-billed Curlew (*Numenius tenuirostris*), Red-breasted Goose (*Branta ruficollis*) and Lesser White-fronted Goose (*Anser erythropus*) in our area of activity.
(7) Ecological education of students.
(8) Research promoting protection works.
(9) Long-term conservation of areas managed by our association with the help of our own livestock.

As a result of protection efforts and environmental education White Storks are a common sight in the pusztas of Hortobágy (Photo: János Oláh)

2.) Ecoregions in the Hortobágy

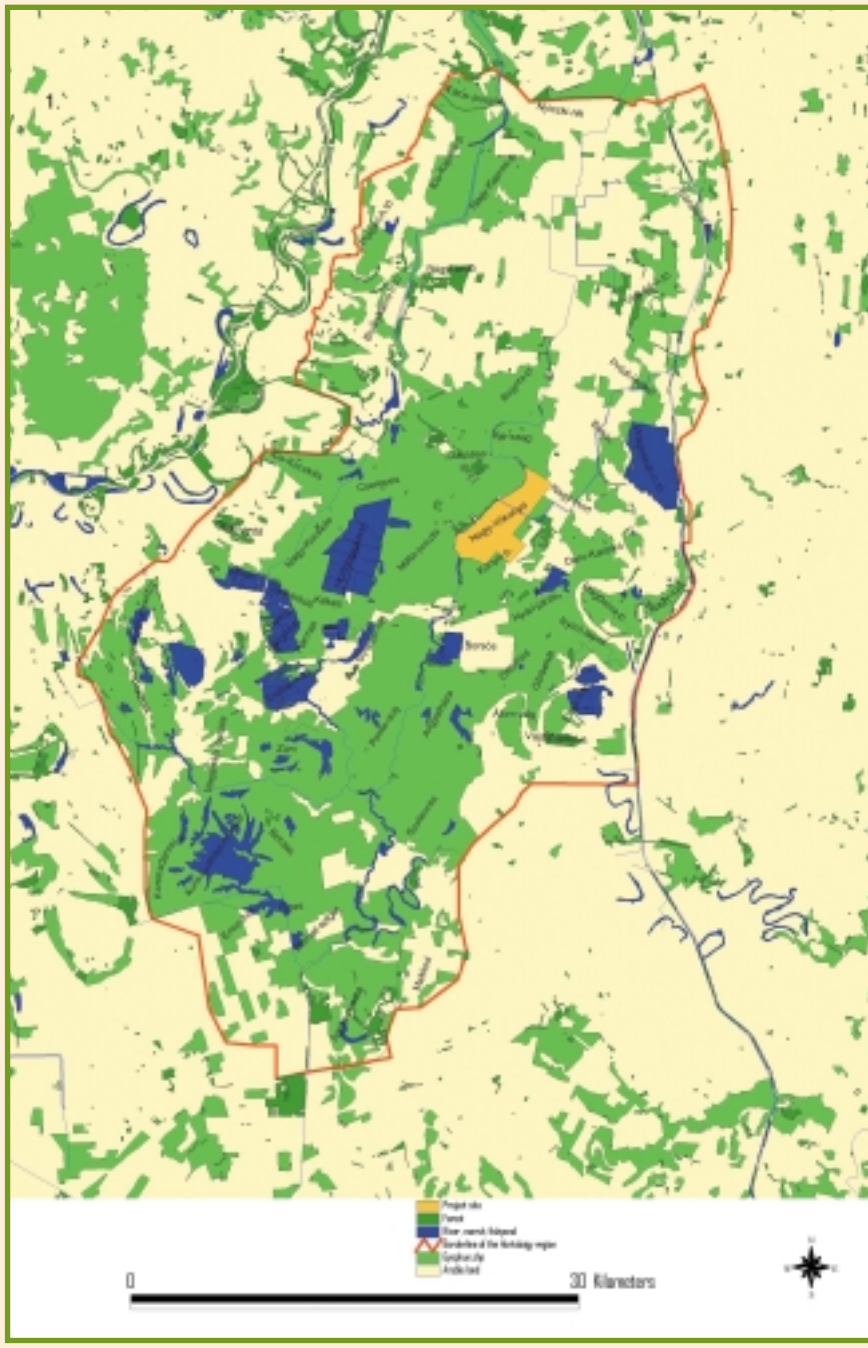
In 2002 we devised our ecoregion theory. The wider-sense Hortobágy was divided into 43 larger ecoregions, each with a separate management objective. The most important new governing principle is that so as to achieve nature protection goals, a much greater collaboration is needed among the ministries, the Hortobágy National Park Directorate, NGOs, different local organisations (non-profit companies, co-operatives, family businesses) and local people. With this collaboration the stewardship function of the Hortobágy National Park will evolve and develop.

The picture shows the ecoregion of Eastern-Hortobágy saline lakes and their catchment area (Nagy-szik–Magdolna-puszta) in its entirety, the recovery of which is also an objective of our association (Photo: István Delef)

This means that the Hortobágy National Park provides for local people by creating employment possibilities for them in traditional land use forms. This is one of the fundamental conditions for economic activities ensuring profitability but at the same time preserving nature in the Hortobágy.

3.) The Kis-Vókonya–Nagy-Vókonya–Gát hátja ecoregion

Of the designated 43 ecoregions it is the 11th one, situated directly on the border of the National Park, with its eastern edge excluded from the range of protected areas. It is one of the ecoregions most deteriorated by canalization and goose farming, a site nearly 1,700 hectares in extent. Our goal is, after restoring the puszta and the wetland habitats, to establish livestock of native breeds grazing here in a high density. As a result of this series of interventions, the population growth of organisms requiring ephemeral water bodies with highly grazed environments, the formation of breeding bird species having disappeared from the Hortobágy and the recovery of the traditional puszta landscape can be expected.



Map 1.
Location of the Kis-Vókonya–Nagy-Vókonya–Gát hátja ecoregion in the Hortobágy

A snapshot taken in the Kis-Vókonya–Nagy-Vókonya–Gát hátja ecoregion
(Photo: János Oláh)

The planning phase of the project

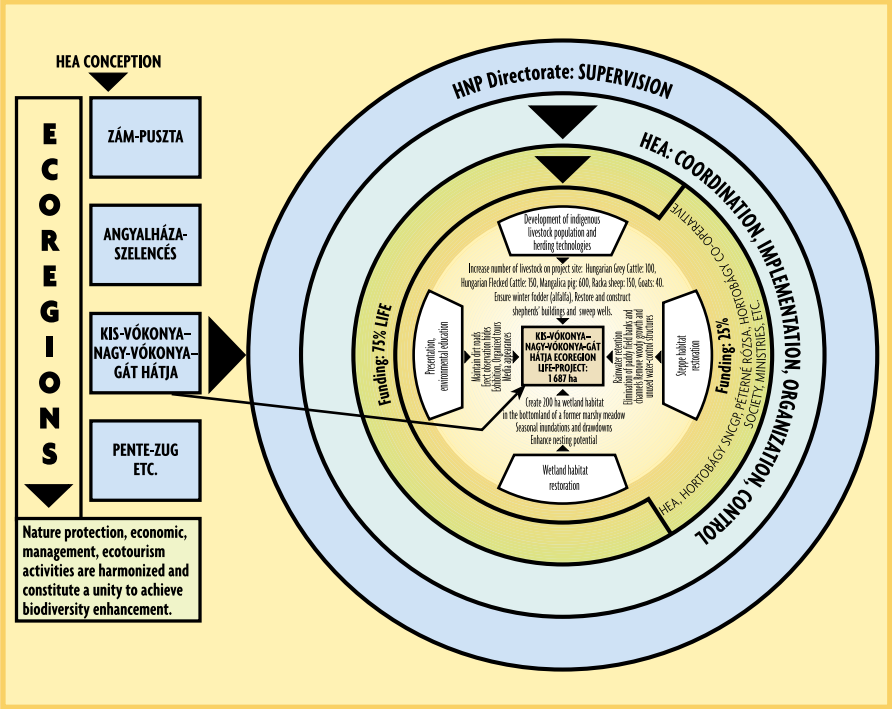


Figure 1.
The organisational and functional structure of the project

1.) The structure of the project

Based on the preliminary studies, activities and experience described above we prepared the structure of the project for the Kis-Vókonya–Nagy-Vókonya–Gát hátja ecoregion, shown in Figure 1. above.

2.) LIFE: The main contributor of the project

The European Commission's financial instrument for the environment, the LIFE program funds applicants who, by their activities improve nature protection conditions (e.g. populations of endangered bird species or plant communities) of a project site into a level significantly higher than previously. It is also imperative that the project sites are included in the European Union's protected areas of the Natura 2000 network. Our project proposal satisfied these requirements, furthermore, the nature protection intervention plan devised by us was complemented by a rural development model, which serves the long-term protection of pannonic saline steppes and marshes.

The primary objective of the project is to enhance the waterbird populations (Photo: János Oláh)

3.) Objectives of the project

The main objectives of the project:

1.) to preclude and reverse the unfavourable ecological processes witnessed in this ecoregion
2.) to restore and rehabilitate the puszta and wetland habitats exploited by bird species nearly extinct

Further aims are:

1.) to increase biodiversity
2.) raise the area onto a higher nature protection level
3.) protect natural values
4.) restore the original hydrological cycles of this ecoregion
5.) protect and rehabilitate shelters for livestock of traditional design
6.) advance extensive animal husbandry and considerably increase the number of grazing stock
7.) set up a well-functioning model for the long-term conservation of Hungarian grassland habitats
8.) create the economic and natural unity of the region
9.) build up the area to make it suitable to be shown to the public
10.) utilisation of the project site for the purposes of environmental education and eco-tourism
11.) create the possibilities for organic farming and the manufacturing of organic products characteristic of this ecoregion

Financial conditions of the project

Based on the permitted plans and price quotations we determined the costs of actions to be implemented. According to this calculation, we needed 829,534 Euros to realise the project. We requested a 75%, that is, 622,151 Euro funding from the European Commission. The Hortobágy Environmental Association ensured a 19% (161,354 Euros), the partners a 6% (46,029 Euros) co-financing of the program.

Threats on the project site

Among the actual project objectives the priority was given to the task to remove the impact of detrimental ecological processes witnessed in this ecoregion. This problem was targeted by all of the implemented activities described below.

1.) Periodical aridification of the project site

During the building up of paddy-fields, an irrigation and drainage system of about 100 kilometres was established in the area. After the disappearance of these fields, canals, banks and water-control structures (nearly 300) were left there, which substantially altered the natural hydrography of the puszta, and channels served exclusively as a drainage system thereafter. This fact resulted in the aridification of the area, as well as in the disappearance of characteristic vegetation of saline meadows and marshes. A great proportion of the plant and bird communities of the saline puszta require large tracts of shallow periodic waters, most of which was drained by the channel system. Parallel to the aridification process, the groundwater level decreased, too. As a result, the level of salts soluble in water subsided deeper, and hence superficial salt condensation ceased to exist, which led to the disappearance of salt-tolerant plant communities. The process had a noxious effect both on insects and birds living in this area.

2.) Agricultural activities detrimental to nature

Traditional extensive animal husbandry fundamentally changed after World War II. Livestock breeds native to the region were displaced by traditional European species, which have now a different influence on saline pusztas. At the same time, the number of domestic animals decreased substantially, and the keeping of certain breeds (such as Racka sheep, Mangalica pig and goat) ceased completely in the area of the project, and hence most of the shepherds' buildings have become ruinous or destroyed since then. Owing to permanent medication of animals and the cessation of extensive animal husbandry the veterinary hygiene of the livestock population improved, as a result of which the diversified and abundant insect fauna could not evolve in the dung of the cattle, which would have served as a primary food for disappearing bird species. Furthermore, in the 1980s, owing to the pressure of the great demands of Eastern markets,

Large-scale goose farming with short-term prospects seriously damaged nature and the environment in the Hortobágy pusztas (Photo: Zoltán Ecsedi)

The channels of abandoned paddy fields drain rainwater from the puszta (Photo: Zoltán Ecsedi)

the keeping of ungulates was replaced by large-scale goose farming, and 25 or 30 thousands of domestic geese were kept squeezed together in the area of the present project, which further damaged the structure of indigenous phytocoenoses. The areas not utilised this way were mowed, which impaired biodiversity substantially, and on banks unsuitable for scything or mowing advanced the encroachment of scrub. After World War II, under the influence of Communist policy and parallel to the decrease of grazing, a large part of the project area was planned to be used for growing rice. Although the attempt was doomed to failure, the native flora was partly broken up.

Implemented actions

The following three activities were aiming at the preclusion of the threatening factor causing periodic aridification of the project site. As a result of these activities, we expect the hydrological cycles of the pusztas in this area to recover, shallow water pools and lakelets to revive and the disappearance of woody species to ensure unbroken of vast short-grass swards, that is, the pusztas of Vókonya to return to their old magnificence.

1.) Elimination of unused channel network

Nearly 300 water control structures were removed from the puszta, which were later recycled as road bases for local villages and towns. Over 100 kilometres of channels and banks were eliminated with heavy equipment, resulting in rainwater forming shallow pools of about 200 hectares in extent in the puszta. This rehabilitation process can be compared to an operation on a human body: we cut a single, rapid but healing wound in the landscape so as to ensure a long life. This wound healed fast, and the original vegetation re-colonized almost entirely in place of the backfilled channels by the following year, which was also due to the presence of native domestic animals grazing here. In the puszta only plant species survive that tolerate the grazing, defecation and treading of livestock.

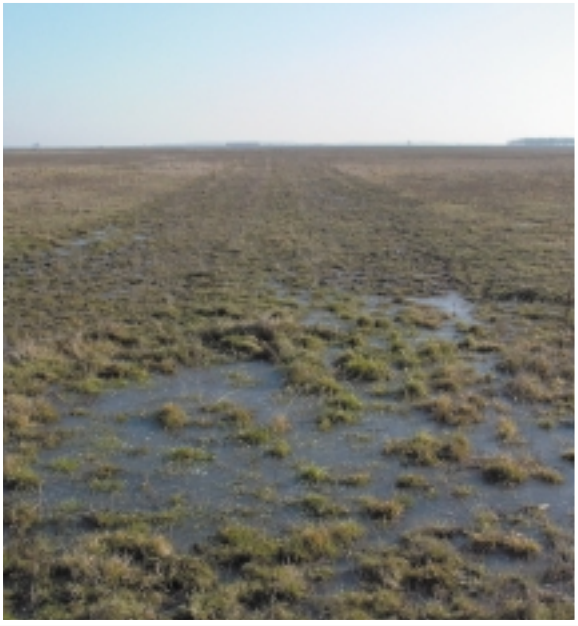
Years	The length of eliminated channels and banks (km)
2003	83
2004	4
2005	19

Table 3.
The length of channels and banks (km) eliminated during the project in yearly breakdown

A perfectly engineered former paddy field system created in the 1960s. The photo shows the conditions after the backfilling of the channels on the project site. The natural water regime of the puszta had been partly recovered by the following spring, which is evidenced by the appearance of an extensive seasonal water body (in the back central part of the picture) (Photo: János Oláh)

A channel reach filled up in summer 2003 under favourable dry weather conditions subsequent to all necessary work processes (bulldozing, disking, heavy planing, planing, and harrowing) in Nagy-Vókonya (Photo: Zoltán Ecsedi)

After the completion of the field works in October 2003. Soon after a small shower the original vegetation started to re-establish on the edge of the affected area (Photo: Zoltán Ecsedi)



The same site in November 2004. By then nearly all of the original vegetation had re-appeared on the backfilled channels, which was to a great extent due to the grazing and treading of Great Grey Cattle herd kept in the area (Photo: Zoltán Ecsedi)

Seasonal pools are favoured by Wood Sandpiper, regularly migrating through Hungary and generally protected in European Union member states (Photo: János Oláh)

2.) Removal of woody growth from the puszta

The puszta is an endless land comprising short-grass swards, insisted on by animals living here, in particular birds nesting on the ground, such as Northern Lapwing, Great Bustard and Collared Pratincole. Lovers of the Hortobágy landscape also have this picture in their minds when they think of the Hortobágy. So as to satisfy this requirement, we removed bushes and scrub (nearly 3,000 woody plants), most of which were low-value, invasive species introduced artificially to Hungary, like oleaster from Syria and ash tree from the American continent.

As a result of the elimination of channels, several tiny seasonal pools were formed on the project site, a habitat which supports the most valuable wildlife associations on Pannonic saline steppes (Photo: Zoltán Ecsedi)

On channel banks elevated from the surrounding saline surface clumps of mostly introduced trees and shrubs spread after the 1960s, following the cessation of grazing (Photo: Zoltán Ecsedi)

The same site after the wetland creation in November 2004 (Photo: Zoltán Ecsedi)

The same part of the area in early spring 2006. As a combined effect of the high grazing level and the presence of seasonal water bodies re-establishment of woody growth is precluded. The landscape of the Hortobágy was similar to this state prior to the appearance of the most detrimental human-induced stresses (canalization, cessation of grazing, afforestation) in the 1930s (Photo: Zoltán Ecsedi)

3.) Creation of a wetland habitat to be flooded by artificial means

Due to the presence of some irrigation channels still in use, the elimination of which was not permitted, certain shallow ponds formed in old riverbeds were left without a sufficiently sized catchment area and hence with scarce water supply even in wet years. In Nagy-Vókonya we managed to artificially flood by gravity one of these areas in 200 hectares. We modelled the now disappearing, unique shallow-water plain in the Carpathian Basin, which is grazed by indigenous livestock breeds and after being restored, offers a habitat for the decreased populations of characteristic Hortobágy flora and avifauna now able to re-establish.

The wetland area in spring of 2003 prior to the restoration works. The channels and woody plant species on the banks to be eliminated are clearly visible (Photo: Attila Szilágyi)

Aerial photograph of the wetland habitat in April 2004, after the completion of restoration works. Although traces of the eliminated channels can still be seen, the landscape shows a more natural picture (Photo: János Oláh)

The wetland habitat serves as a foraging area for birds breeding in other parts of the Hortobágy, such as Glossy Ibises, ... (Photo: János Oláh)

... as a breeding habitat for White-winged Terns bound to wet steppes, ... (Photo: János Oláh)

... and as a migration stopover for the now very rare Marsh Sandpiper bound to steppes east of Hungary (Photo:János Oláh)

The entirely renovated Andrástelki Shelter and the neighbouring shepherds' accommodation. On traditional shepherds' buildings the Hungarian national colours (red, white and green) were often present (Photo: Zoltán Ecsedi)

4.) Ensuring the conditions for traditional livestock herding

The following two implemented activities were aimed at the preclusion and reversal of unfavourable agricultural interference detrimental to nature. The history of Hortobágy reveals that swards of the Hortobágy steppe can only be preserved and utilised by applying grazing stock of indigenous breeds. Any other attempts to maintain and exploit this area have been and are doomed to failure. Re-establishment of the old traditional grazing system serves both the interests of conservationists and people living near the Hortobágy, for the resumption of the intentionally disrupted practices, however, overarching collaboration is indispensable.

To ensure the conditions for traditional herding of grazing stock, and to restore the landscape values the shelters and sweep wells were renovated. Also, due to the enhanced livestock population, new, traditionally designed summer shelters and windbreaks had to be constructed from natural materials. Winter fodder for the animals was produced outside the grazing area. Thus, the high level of grazing on the swards could be maintained, which has proven to be an important instrument to preserve the unrivalled wildlife found here.

Deteriorated goose shelters were replaced with summer shelters built from natural materials and in traditional style. One of them was readily occupied by donkeys (Photo: János Oláh)

In 2003 the Hortobágy Society for Nature Conservation and Gene Preservation, as one of our project partners commenced the renovation of one of the largest shelters situated on the project site (Photo: János Oláh)

The only Y-shaped windbreak in the Hortobágy today. Prior to the 1930s this construction was widespread in the treeless Hortobágy and used for the protection of livestock from fierce wind and strong sunlight (Photo: János Oláh)

In parallel with the enhancement of livestock population, on the project site the Crested Lark increased in their number, too, being a species of inhabited farmsteads and shelters (Photo: János Oláh)

The protection of the Hungarian Flecked Cattle is just as important as that of the Great Grey Cattle, since they are similarly well applicable for managing the puszta. 150 individuals were purchased with the help of financial contribution from LIFE (Photo: Zoltán Ecsedi)

Great Grey Cattle are grazing evenly scattered, creating the characteristic surface of saline pusztas with many bare, white patches thus managing the puszta in the most appropriate way (Photo: Zoltán Ecsedi)

5.) Considerable increase of indigenous livestock population

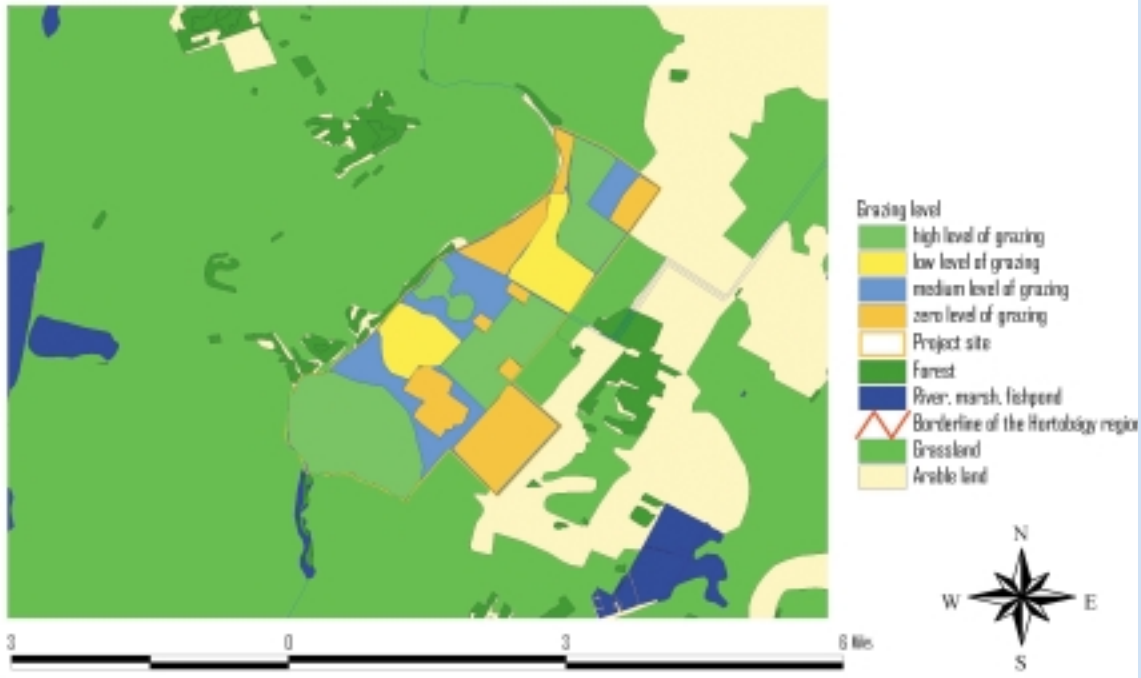
By the end of the project duration, the number of native livestock (Hungarian Flecked and Great Grey Cattle, Mangalica pigs, Racka sheep and goats) were enhanced by 1,040, with the help of fiancial contribution from LIFE. This population is kept by our association and partners primarily for the project purposes, which means the proper management of puszta and wetland habitats. Map 2 shows areas where high and medium levels of grazing of this livestock population were realised thus ensuring the maintenance of life conditions for the dwindled biota in the Hortobágy. The wetland habitat enclosed by an electric fence is managed with the application of livestock of mixed breeds, the only grazing instrument for the long-term preservation of such habitats.

Racka sheep play a key role in the creation of short-grass swards, bare dry habitats and islands, this is why they are of vital importance in the management of shorebird habitats (Photo: János Oláh)

Goats are excellent for managing weed-grown patches as well as tall vegetation appearing on draining banks shown in the picture (Photo: János Oláh)

Livestock kept in herds of mixed breeds ensure the optimum level and quality of grazing for birds breeding and foraging in shallow-water wetland habitats (Photo: János Oláh)

Mangalica pigs are adequate instruments for managing marshy areas even in winter (Photo: Zoltán Ecsedi)



Map 2.
Location of areas under low, medium and high grazing intensity on the project site

As a result of a high level of grazing, the wetland habitat was frequented by the now very rare, beautiful Collared Pratincole, which used to be regarded as the most characteristic bird species of the Hortobágy even in the past decades (Photo: János Oláh)

Spoonbill, another typical bird of the Hortobágy finds its prey in shallow ponds with grazed vegetation (Photo: János Oláh)

Monitoring

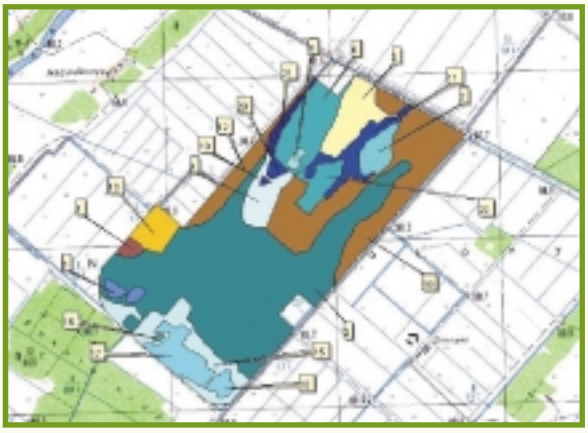
Only then is it possible to implement any project properly if changes are tracked and recorded. This monitoring work was carried out by employees of the HEA, university students and experts of the Hortobágy National Park. Their efforts substantiated that the project activities affected the area and its wildlife favourably. In accordance with the requirements of the LIFE program, the project site was raised to a higher nature protection level as a result of the activities detailed above.

1.) Flora

This tiny plantlet, the Hungarian Elatine (*Elatine hungarica*) can find a habitat nowhere else in the world but in the Carpathian Basin, hence its protection must be provided primarily in Hungary (Photo: Balázs Lukács)

One of the favourable changes in the flora is that most of the damaged, dried out habitats in the wetland habitat transformed into valuable saline meadow and marshland vegetation. Rare aquatic (*Lemnetea*) and mudflat (*Nanocyperion*) plant assemblages appeared in the area, with one species endemic to the Carpathian Basin, namely the Hungarian Elatine (*Elatine hungarica*). On the project site 288 plant species were recorded during the project period, which can be considered a remarkable achievement in relation to the Hortobágy.

Map 3.
The wetland habitat in 2003, prior to the restoration. Shades of brown denote damaged, dry areas, shades of blue represent wetland habitats



Map 4.
The wetland habitat in 2004–2005, after the restoration. The considerable expansion and diversity of valuable saline meadow and marshy habitats denoted by shades of blue can clearly be seen

2.) Invertebrates

The difference between grazed and ungrazed areas was studied with the help of terrestrial arthropod monitoring. From 2003 to 2005 altogether 22,463 terrestrial arthropods were recorded, 12,942 of which were found in the grazed units, and 9,521

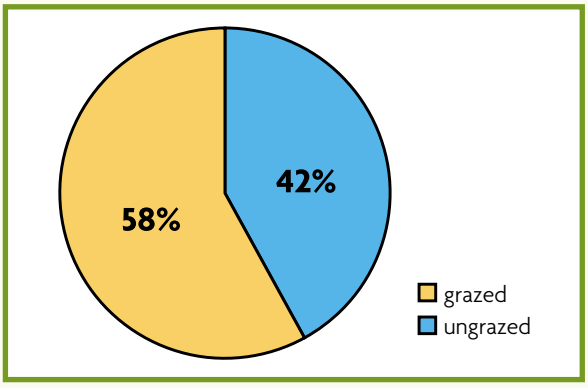


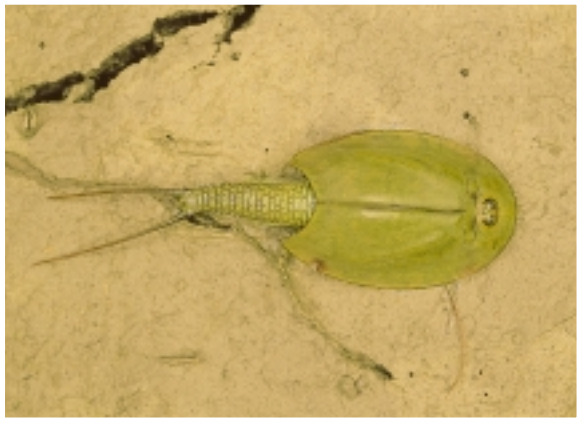
Figure 2.
Proportions of arthropods found in grazed and ungrazed units

were observed in the ungrazed tracts. The survey substantiated that the high intensity of grazing has a beneficial effect both on the insect fauna and the birdlife feeding on them in the pannonic saline steppes.

The most adequate animal group to judge the changes in wetland habitats is dragonflies (*Odonata*). In 2003, prior to the wetland creation 19 dragonfly species were found, and following the restoration, by the end of 2005 this number increased to 32, which represents nearly half of the total number (65) of

dragonfly species observed in Hungary. Furthermore, 6 of the *Odonata* species are protected in Hungary, one is listed in the Hungarian Red Data Book, two are IUCN Red List species, four are included in the CORINE Endangered Species List and one is an EC Habitat Directive species. Our dragonfly monitoring research showed that with the restoration works completed the wetland habitat was raised onto a higher nature protection standard.

The conditions of seasonal, some cm deep pools are shown by the fact that four rare phyllopod species



The bizarre shield shrimp, resembling a prehistoric animal became very rare in the waters of Hungary, but occurred regularly on the project site (Photo: Balázs Lukács)

(2–6 cm) were observed on the project site, one of which (*Imnadia yeyetta*) represented a new record for the Hortobágy, and for the Trans-Tisza Region as well, another species has occurred in the Hortobágy only twice.

3.) Avifauna

Between 2002 and 2006 altogether 225 bird species were observed on the project site, which is an outstanding result in Europe for an area of merely 1,700 hectares. It is noteworthy that 13 of the recorded bird species are included in the IUCN Red List Species published in 2004. By 2006 a total of 96 breeding species were recorded, 11 of which are strictly protected by national legislation. Of the EC Bird Directive Annex I species after the restoration, in 2004 up to 56 pairs and in 2005 63 pairs of waterbird species were nesting in Nagy-Vókonya. Furthermore, while in 2003 only 7,603 waterbirds were estimated to have appeared on habitats in place of the former, damaged paddy-field, following the restoration works, in 2004 61,248 and in 2005 96,755 individuals of waterbirds could find a roosting, foraging and stopover habitat on the project site.

The majestic White-winged Tern was breeding for the first time on the project site after the restoration. In 2004 6 pairs and in 2005 210 pairs were recorded (Photo: János Oláh)

One of the most sensational ornithological data was that in the restored wetland habitat about 21,000 individuals of the endangered Crane roosted during their autumn migration in 2005 (Photo: János Oláh)

Avocet fledgling hatched on the project site. As a tradition, our association creates a habitat for this beautiful species in the course of each of our habitat restoration projects (Photo: János Oláh)

The Great Bittern is under the protection of the EC Bird Directive. Its population has increased by 600% on the project site after the implementation of habitat restoration works (Photo: János Oláh)

Further experience gained from the project

1.) The size of wetland habitats

On the project site as a result of inundations and elimination of channels the extent of shallow-water habitats increased from 37 hectares to 295 hectares, a habitat type to be protected most in the Carpathian Basin. Considering the achievements, it is imperative that the elimination of paddy field and irrigation systems in the pusztas of Hortobágy is continued in future, thus serving wetland habitat protection purposes by facilitating rainwater retention.

Pygmy Cormorant, a species strictly protected by the EC Bird Directive also visited the waters of the project site abundant in tiny fish (Photo: János Oláh)

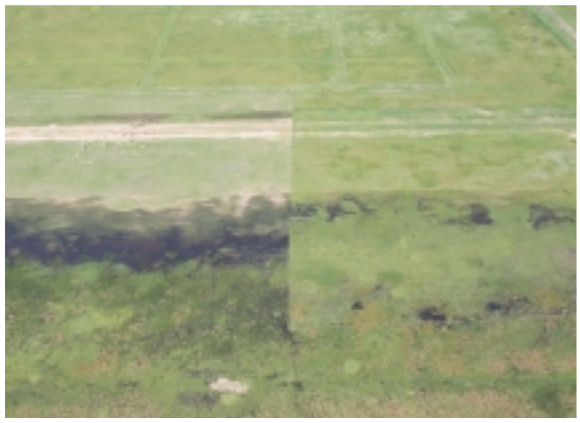
The survival of the Night Heron (in Hungarian also called *"blind crow"*) population depends on the extent of wetland habitats located in the puszta (Photo: János Oláh)

Map 5.
The extent of wetland habitats in spring 2003, before the start of the restoration works

Map 6. The extent of wetland habitats in spring 2004, 2005 and 2006 after the completion of the restoration works

2.) The impact of grazing

The abundant wildlife of pannonic saline steppes can be preserved in the long run only by applying the adequate level (middle or high) of grazing. Birds breeding in such areas require steppe habitats interspersed with typical white patches, which are formed as an effect of grazing, the indented muddy shoreline of wetlands as well as the abundant insect fauna evolving in the dung of grazing stock. The breeding density of birds was proven to be closely related to the intensity of grazing in a given area.



The more diversified, grazed wetland habitat unit (on the left-hand side of the photo) can clearly be distinguished from the ungrazed, homogeneous part (on the right) (Photo: János Oláh)

3.) Organic animal herding

In the future farmers in the Hortobágy – and animal husbandry with less funding than the older member states of the EU – are able to remain competitive only by practising organic animal husbandry. To obtain this in the Hortobágy there must be an incentive force (funding schemes, programs, popularization campaigns, building up a marketing network, etc.) to switch the entire puszta with its buffer zones (a total of 170,000 hectares) to organic farming, which would multiply the farmers' present revenue, and assert conservationist interests. Small steps towards this goal were taken, and promotion of this cause was initiated during the LIFE project.

We hope that our recommendations based on the project experience will be considered by many conservationists, and then Great Egret, the heraldic figure of nature protection in Hungary will be able to fly in the skies of the Carpathian Basin for a long time (Photo: János Oláh)

Now protection programs must be initiated to enhance the population of a formerly so common species, the Lapwing (Photo: János Oláh)

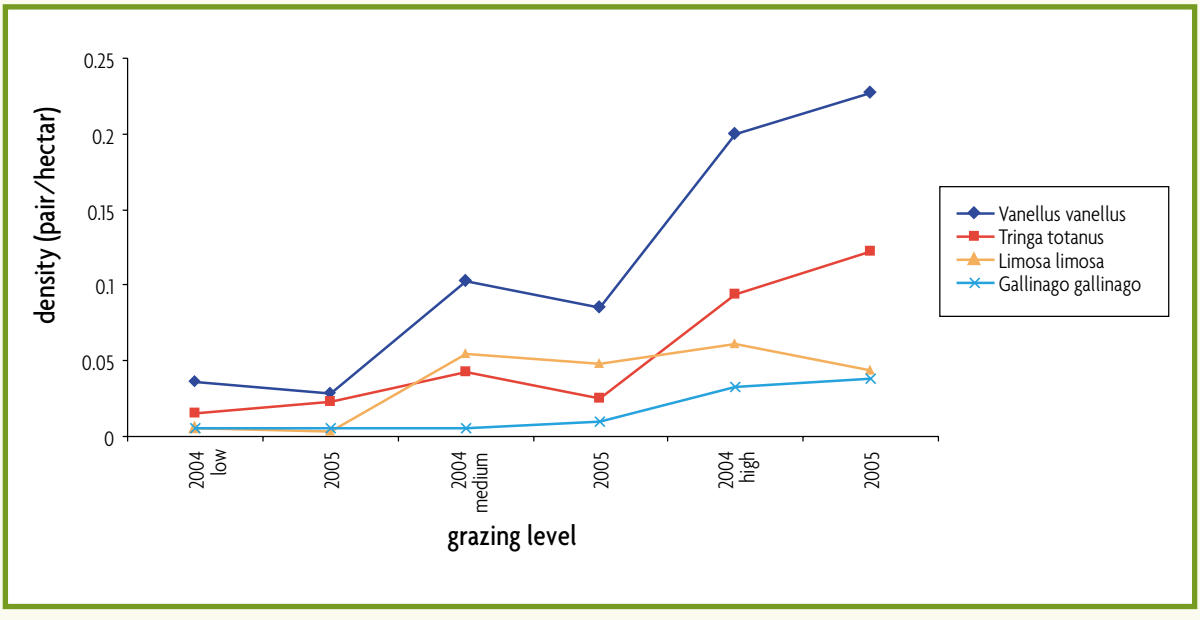


Figure 3.
Breeding density changes of the most characteristic shorebird species (Lapwing, Redshank, Black-tailed Godwit, Common Snipe) depending on the grazing intensity in the Hortobágy in 2004 and 2005

Presentation material prepared by the HEA

In the film made in Nagy-Vókonya and presenting our project several beautiful shots of birds can be seen, such as this foraging Hoopoe (Photo: János Oláh)

1.) Website

The most important stages of our project were uploaded to our website (www.hortobagyte.hu) after each phase. The present document as well as the detailed Final Report will be made available, too. Those interested in the program are able to contact us through our homepage.

2.) Film

Events and achievements of the project were filmed, which is planned to be presented, entirely or partly not only in local, but also in national and international media as well.

3.) Final Report

The Final Report detailing our project will be published in English. The 300 page colour book will be available through our website.

Presentation on the project site

At the organic product shows held in the Nagyvókonya Farm the guests had plenty of opportunities not only for tasting delicious dishes but also to get acquainted with the most important objectives and achievements of the LIFE program (Photo: János Oláh)

1.) Events and meetings

One of the greatest merits of the projects is that more than 8,000 people saw the project site and listened to our lectures on the project. So as to develop the quality of such presentations, the dirt road system around the area was built up, and visitors now have the opportunity to study the wildlife of the wetland habitat from observation hides.

2.) Eco-tourism

In 2004 and 2005 the project site was regularly frequented by foreign eco-tourist groups organized and guided by Hungarian birdwatching agencies. The nearly 600 birdwatchers arrived mainly from Great Britain, Switzerland and the United States of America.

Events	2003	2004	2005	until 1st July 2006	TOTAL
National Organic Cooking Competition	1500	2200	3000	-	6700
Rural tourism	30	50	150	50	280
Meeting of Agricultural Ministry employees	-	-	80	-	80
Organised birdwatching tour	-	295	285	11	591
Field visit of undergraduates from the Faculty of Environmental Management in the College of Szarvas	90	150	80	90	410
Field visit of undergraduates from the Faculty of Ecology in the College of Nyíregyháza	-	-	-	48	48
Meeting of mayors of Bihar–Bihor Region	-	20	-	-	20
Visit of the Hungarian Field Birdwatchers	-	60	40	-	100
TOTAL	1620	2775	3635	199	8229

Table 4.
Number of visitors to events held in Nagy-Vókonya

Media appearances

1.) Press articles

Local, county and national newspapers published articles on the project on several occasions. Professional results will be issued in 2006–2007 in national and possibly international journals.

2.) Radio and television

Documentaries on our LIFE project were televised several times by local and national television channels, and one of the regional television channels broadcast an interview with our project manager on a weekly basis. The latter can be received in the whole Carpathian Basin. In addition, some thoughts were communicated about our project even in one of the episodes of the extremely popular radio play series "*The Szabó family*", which has been on the programme of a national radio station for several decades.

These days nature films are often on the programme of television channels. The Little Egret, seen in this picture could be a motion picture celebrity, having starred in numerous films (Photo: János Oláh)

The Hortobágy was designated as a World Heritage Site, humans and nature having lived together for several centuries in synergy. This notion must be passed on to the next generation, for the wonderful view, for instance, of these three White-tailed Eagles and one Imperial Eagle sitting idly near the Nagyvókonya Farmstead (Photo: János Oláh)

Foreign birdwatchers are enthusiastic admirers of the colourful birdlife of Hungary. One of their favourites is the Bee-eater (Photo: János Oláh)

Life after LIFE

By triennial autumn inundations we provide roosting areas for masses of Cranes migrating through the Hortobágy (Photo: János Oláh)

Members of the Hortobágy Environmental Association and the project partners are committed to ensure the future running of the project after the termination of the LIFE funding. The long-term sustainability depends on three fundamental factors: One is the maintenance of the buildings and constructions, another is the stabilization (or slight increase) of the number of livestock established by the project and the third one is the seasonal inundation of the wetland habitat based on the management plan devised during the project period. Financial resources to cover the costs of these activities will be provided by the partners from the profit yielded by the livestock purchased from the LIFE contribution; and by the HEA from the Agri-environmental Funds granted for the leased plots of land.

Lessons learnt

We have drawn up practical guides for programs aiming at the preclusion of environmental and nature protection problems caused by domestic goose farming as well as at the elimination of paddy fields and irrigation systems so as to protect pannonic steppes and marshlands. These guides are to be exploited both by Hungarian and foreign professionals.

Statistical analyses were supported by research which evidenced that medium and ecologically sustainable high levels of grazing have a beneficial impact on the migrant and breeding waterbird populations. Cessation of grazing or a decrease in its intensity to a great extent minimizes the occurreme frequency of arthropod and bird species on a given habitat.

The importance of the maintenance of organic farming practices cannot be emphasized enough, since this type of livestock herding yields a considerably larger a profit than non-organic animal keeping activities. Larger profit ensures the potential for the maintenance of a stable livestock population, or, possibly, the gradual increase of it. This is the fundamental instrument to sustain pannonic steppes and marshes. This, however, can be realised exclusively when organic farming practices are supplemented by a comprehensive processing and marketing network in the entire area of the Hortobágy.

Based on experience gained from the project activities a protection scheme for the characteristic Hortobágy bird species was compiled. This includes guidelines as to which of the bird species in the Hortobágy are to be protected necessarily in order to achieve bird protection objectives with a wider focus.

So as to realise nature protection ideas effectively, the concept of regions must be discarded and displaced by the notion of ecological regions as regards the level of implementation. The geological, geographical, hydrological characteristics of a given ecoregion, the biota found there and farming traditions as well as land use conditions, among others, all define the management objectives to be realised.

The implementation of further LIFE projects will largely contribute to, or may prove to be indispensable for, the long-term sustainability of the present project's achievements.

Rural development goals must be congruent with nature protection endeavours aiming at the recovery of Hortobágy pusztas, thus providing for the preservation of natural values from subsidy schemes.

Acknowledgements

The Board of Leaders of the Hortobágy Environmental Association would like to thank our employees for taking part in the implementation of the project, Zoltán Ecsedi, János Oláh, Gyula Nagy, Mária Harangi, Judit Ágh, as well as volunteer members for their invaluable efforts.

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We could not have realised our objectives and accomplished the project activities without the professional help of several Hungarian workers of the LIFE program and the staff of the European Commission and the External Monitoring Team, in particular Marco Fritz and Jan Sliva.

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Also special thanks to Regina Szegedi and Mike Watson for their much valued assistance in proofreading and editing of this publication.

On behalf of the birds, the creation of the precious habitats is thanked by these two Quails (Photo: János Oláh)