

PERIODIC REVIEW FOR BIOSPHERE RESERVES OF HUNGARY



STATE SECRETARY FOR NATURE AND ENVIRONMENT PROTECTION

**BUDAPEST
2007**



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AGGTELEK BIOSPHERE RESERVE



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I. NAME OF THE BIOSPHERE RESERVE

Aggtelek Biosphere Reserve

II. COUNTRY

Hungary

III. PHYSICAL CHARACTERISTICS OF THE BIOSPHERE RESERVE

Latitude and Longitude: 48° 30' N - 20° 36' E

Biogeographical Region:

Pannonian

Topography of the region: Low, karstic mountain region with the altitude of 150-604 m. Topographically dominated by systems of karstic plateaus dissected by deep valleys of river Bódva and several streams (for example Jósza, Tohonya, Ménes, Telekes streams).

Climate: The climate is humid continental with long summers. The Carpathian Mountains have a relatively strong climatic influence upon the Aggtelek Karst. The average annual temperature is rather low, 8.2 °C and the average temperature is only 15.5 °C in the growth season, such value can be measured only in higher mountains in Hungary. The annual precipitation used to be between 600-700 mm but it significantly decreased last years, the average was about 400-500 mm. It is worth to mention that the local microclimates are strongly influenced by the relief. On sunny summer days, the ambient temperature on the plateaus is affected significantly by intensive insolation. Local inversions arise between the warmer, sunnier, and therefore drier summit plateaus, and the cooler, wetter valley bottoms, which remain in shadow for most of the day.

Geology, geomorphology, soils: This is the most typical karstic area in Hungary. It is built up mainly of Triassic limestone with some dolomite, clayey shale and sandstone. Quaternary sediments have mainly accumulated at the base of plateau slopes.

The area is showing all the typical features of karstic region of medium height: deeply incised valleys, perennial- and large-discharge springs, brooks, scarcely forested or barren rocky mountain-sides and large dry dolines, extended karstic plateaus. Subsurface karstic features are in extraordinary high concentration. The registered number of caves is more than 260, among which the large horizontal caves belonging to the water system of Jósza stream and the deep potholes of Also-hegy Plateau are the most impressive.

This area differs from all karst regions with similar geographical and climatological conditions by its many independent fluvial systems evolved in the closest vicinity of each other; by the unusual morphology and exceptional density of its potholes; and from most other karst regions by the common presence of syngenetic, epigenetic and hypogenic caves.

The variety of soil types reflects the region's heterogeneous geological composition. Limestone, dolomites and their talus at the base of slopes are covered by the product of long-term weathering and fossil soils (terra rossa). Brown rendzinas, common rendzinas and luvisols occur on the lower slopes of valleys, where gravels or clayey materials have accumulated through the weathering of limestones. Cambisols and rendzinas are characteristic of plateau sites with fewer fine karstic forms and with thicker weathering deposits, often

continuously covered by oak-hornbeam forest. In the basins, brown soils are found on the margins, and hydromorphic floodplain and floodplain gley soils in the floodplains.

Significance for conservation of biological diversity: habitats and characteristic species

Habitats within the whole territory of BR:

- Caves
- Springs, streams, river,
- Petrifying spring with tufa formations (Cratoneurion),
- Calcareous rocky slopes with chasmophytic vegetation,
- Sub-continental steppic grasslands,
- Rupicolous pannonic grasslands (Stipo-Festucetalia pallentis),
- Medio-European calcareous scree of hill and montane levels,
- Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe),
- Lowland hay meadows (Alopecurus pratensis, Sanguisorba officinalis),
- Mountain hay meadows,
- Molinia meadows on calcareous, peaty, or clayey-silt-laden soils (Molinion coeruleae),
- Alluvial meadows of river valleys of the Cnidion dubii,
- Alkaline fens,
- Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels,
- thickets,
- European dry heaths,
- Juniperus communis formations on heaths or calcareous grasslands,
- Pannonian spiraea scrub,
- Subcontinental peri-Pannonic scrub,
- Asperulo-Fagetum beech forest,
- Medio-European beech forests of the Cephalanthero-Fagion,
- Tilio-Acerion forests of slopes, screes and ravines,
- Pannonic woods with Quercus petraea and Carpinus betulus,
- Hornbeam and oak forest with Waldsteinia geoides,
- Pannonian-Balkan turkey oak-sessile oak forests,
- Pannonian woods with Quercus pubescens,
- Thermophilous oak forest,
- Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae).

Detailed description of main habitat types:

1. Type of habitat: Caves.

Main human impacts: research, tourism.

Relevant management practices: Closing entrances and restriction on visitors' access.

Endemic species: Niphargus aggtelekiensis, Mesoniscus graniger, Duvalius hungaricus, Eukoeneria austriaca vagvoelgyii, Allolobophora mozsaryum.

Other vulnerable species: Rhinolophus euryale, Rhinolophus ferrumequinum, Rhinolophus hipposideros, Plecotus austriacus, Plecotus auritus, Myotis nattereri, Myotis bechsteini, Myotis emarginatus, Myotis mystacinus, Myotis daubentonii, Myotis dasycneme, Eptesicus serotinus, Nyctalus leisleri.

2. Type of habitat: Pannonian-Balkan turkey oak-sessile oak forests

Main species: Quercus cerris, Quercus petraea, Acer campestre, Sorbus torminalis, Viburnum lantana, Rhamnus catharticus, Euonymus verrucosa, Euonymus europaea, Cornus mas, Cornus sanguinea, Potentilla alba, Carex montana, Vicia cassubica, Lathyrus niger, Pulmonaria officinalis, etc.

Main human impacts: forestry.

Relevant management controls or human management practices: The aim of the management is to reach the natural forest structure. No human activity is allowed in the core area, it is restricted to the transitional buffer zones. It is necessary to monitor changes in game population.

Vulnerable species:

Plants: Pulmonaria angustifolia, Pyrola rotundifolia, Neottia nidus-avis, Cephalanthera spp., Limodorum abortivum, Platanthera bifolia, etc.

Animals: Bonasa bonasia, Dryomys nitedula, Felis silvestris.

3. Type of habitat: Pannonic woods with Quercus petraea and Carpinus betulus

Main species:

Plants: Quercus petraea, Carpinus betulus, Acer platanoides, Acer pseudoplatanus, Cerasus

avium, Fraxinus excelsior, Ulmus minor, Galium odoratum, Viola sylvestris, Poa nemoralis,

Melica uniflora, Dactylis polygama, Polygonatum multiflorum, Maianthemum bifolium, etc.

Main human impacts: forestry.

Relevant management controls or human management practices: See habitat 2.

Vulnerable species:

Plants: Daphne mezereum, Dentaria glandulosa, Cephalanthera spp., Epipactis spp., Platanthera spp., Lilium martagon, Actaea spicata, Neottia nidus-avis, etc.

Animals: Aquila heliaca, Bonasa bonasia, Strix uralensis, Dryocopus martius, Dryomys nitedula, Lynx lynx, Felis silvestris, Canis lupus.

4. Type of habitat: Hornbeam and oak forest with Waldsteinia geoides (Waldsteinio-Carpinetum)

Main species:

Plants: Quercus petraea, Carpinus betulus, Acer platanoides, Acer pseudoplatanus, Cerasus avium, Sorbus torminalis, Waldsteinia geoides, Hordelymus europaeus, Corydalis solida, etc.

Main human impacts: forestry.

Relevant management controls or human management practices: see habitat 2.

Vulnerable species:

Plants: Erythronium dens-canis, Epipactis spp., Carex brevicollis, Aconitum anthora, Cephalanthera spp., etc.

Animals: Aquila heliaca, Bonasa bonasia, Strix uralensis, Dryocopus martius, Dryomys nitedula, Lynx lynx, Felis silvestris, Canis lupus.

5. Type of habitat: Asperulo-Fagetum beech forest

Main species:

Plants: Fagus sylvatica, Carpinus betulus, Acer pseudoplatanus, Fraxinus excelsior, Ulmus scabra, Sambucus racemosa, Dryopteris filix-mas, Athyrium filix-femina, Prenanthes purpurea, etc.

Main human impacts: forestry.

Relevant management practices: see habitat 2.

Vulnerable species:

Plants: *Petasites albus*, *Dentaria glandulosa*, *Epipactis microphylla*, *Polystichum lonchitis*, *Aconitum lycoctonum* subsp. *moldavicum*, *Aconitum variegatum* subsp. *gracile*, *Polygonatum verticillatum*, *Rosa pendulina*, etc.

Animals: *Bielzia coerulans*, *Abax schueppeli*, *Carabus arcensis*, *Rosalia alpina*, *Parnassius mnemosyne*, *Ficedula parva*, *Dendrocopos leucotos*, *Dryocopus martius*, *Strix uralensis*, *Dryomys nitedula*, *Lynx lynx*, *Felis silvestris*, *Canis lupus*.

6. Type of habitat: Pannonian spiraea scrub

Main species:

Plants: *Spiraea media*, *Cotoneaster integerrimus*, *Cornus mas*, *Viburnum lantana*, *Geranium sanguineum*, *Rosa spinosissima*, *Rosa canina*, *Waldsteinia geoides*, *Iris variegata*, etc.

Main human impacts: -

Relevant management controls or human management practices: No habitat management is necessary and no human activity is allowed. It is necessary to monitor changes in game population.

Vulnerable species:

Plants: *Spiraea media*, *Cotoneaster integerrimus*, *Cotoneaster nigra*, *Aconitum anthora*, *Iris variegata*.

Animals: *Saga pedo*, *Ablepharus kitaibelii*, *Emberiza cia*.

7. Type of habitat: Pannonian woods with Quercus pubescens.

Main species:

Plants: *Quercus pubescens*, *Cerasus mahaleb*, *Crataegus monogyna*, *Cornus mas*, *C. sanguinea*, *Carex michelii*, *Pulmonaria mollis*, *Geranium sanguineum*, *Brachypodium pinnatum*, etc.

Main human impacts: collection of medicinal plants

Relevant management practices: No habitat management is necessary.

Vulnerable species:

Plants: *Asyneuma canescens*, *Phlomis tuberosa*, *Iris variegata*, *I. graminea*, *Erysimum odoratum*, *Lathyrus pannonicus* subsp. *collinus*, *Orchis purpurea*, etc.

Animals: *Anthaxia hungarica*, *Erannis ankeraria*, *Bonasa bonasia*, *Emberiza cia*.

8. Type of habitat: Thermophilous oak forest (Corno-Quercetum pubescenti-petraeae).

Main species:

Plants: *Quercus pubescens*, *Quercus petraea*, *Cornus mas*, *Crataegus monogyna*, *Rhamnus catharticus*, *Pyrus pyraeaster*, *Acer tataricum*, *Carex michelii*, *Euphorbia polychroma*, *Chrysanthemum corymbosum*, *Waldsteinia geoides*, *Lithospermum purpureo-coeruleum*, etc.

Main human impacts: collection of medicinal plants, forestry.

Relevant management practices: No habitat management is necessary.

Vulnerable species:

Plants: *Iris variegata*, *Iris graminea*, *Carduus collinus*, *Orchis purpurea*, *Epipactis atrorubens*.

Animals: *Peribatodes umbrarius matrensis*, *Paraboarmia viertlii*, *Eriogaster catax*, *Bonasa bonasia*, *Emberiza cia*, *Muscardinus avellanarius*.

9. Type of habitat: Tilio-Acerion forests of slopes, screes and ravines

Main species:

Plants: *Tilia platyphyllos*, *Fraxinus excelsior*, *Quercus petraea*, *Quercus cerris*, *Acer campestre*, *Rhamnus catharticus*, *Corylus avellana*, *Lonicera xylosteum*, *Waldsteinia geoides*, *Melica picta*, *Acer pseudoplatanus*, *Ulmus scabra*, *Staphylea pinnata*, *Aegopodium podagraria*, *Sambucus nigra*, *Geranium phaeum*, *Ranunculus lanuginosus*.

Main human impacts: collection of medicinal plants

Relevant management practices: No habitat management is needed. It is necessary to refrain local people from collecting lime-flower as medicinal plant in early summer.

Vulnerable species:

Plants: *Aconitum anthora*, *Carex brevicollis*, *Erythronium dens-canis*, *Sorbus aria*, *Aconitum lycoctonum* subsp. *vulparia*, *Anthriscus nitida*, *Phyllitis scolopendrium*, *Rubus saxatilis*, *Lunaria rediviva*.

Animals: *Otiorhynchus roubalii*, *Bielzia coerulans*, *Abax schueppeli*, *Apatura iris*, *Limenitis populi*.

10. Type of habitat: Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-Padion, *Alnion incanae*, *Salicion albae*)

Main species:

Plants: *Alnus glutinosa*, *Salix* spp., *Ulmus laevis*, *Petasites hybridus*, *Aegopodium podagraria*, *Cirsium oleraceum*, *Carduus crispus*, *Filipendula ulmaria*, *Angelica sylvestica*, *Carex* spp., *Athyrium filix-femina*, etc.

Main human impacts: illegal wood-cutting

Relevant management practices: No habitat management is needed.

Vulnerable species:

Plants: *Equisetum hyemale*, *Dentaria glandulosa*, *Dryopteris carthusiana*, *Dryopteris dilatata*, *Orchis laxiflora*, *Dactylorhiza incarnata*, *Sonchus palustris*, etc.

Animals: *Sadleriana pannonica*, *Eudontomyzon danfordi*, *Barbus meridionalis petényi*, *Salamandra salamandra*, *Crex crex*, *Cinclus cinclus*, *Motacilla cinerea*, *Neomys fodiens*, *Neomys anomalus*.

11. Type of habitat: Hazel thickets

Main species:

Plants: *Corylus avellana*. This association is the habitat of *Pholidoptera transsylvanica* (Orthoptera - included in Hungarian Red Book).

Main human impacts: forestry.

Relevant management practices: No habitat management is needed.

Vulnerable species: *Pholidoptera transsylvanica*, *Bonasa bonasia*.

12. Type of habitat: European dry heaths

Main species:

Plants: *Calluna vulgaris*, *Juniperus communis*, *Genista germanica*, *Antennaria dioica*, *Potentilla erecta*, *Sieglingia decumbens*, *Danthonia alpina*, *Anthoxanthum odoratum*, *Briza media*, *Betonica officinalis*, *Carex pallescens*, *C. panicea*, *Euphrasia rostkoviana*, etc.

Main human impacts: The existence of this habitat is due to the extensive use (pasture) of the area for centuries in the past. Although it is a secondary association, it is interesting from a biogeographic point of view. Abandonment of grazing poses a threat to this habitat "giving way" to reforestation by natural succession.

Relevant management practices: The traditional management practice must be renewed by involving the local communities.

Vulnerable species:

Plants: *Betula pubescens*, *Carlina acaulis*, *Dianthus deltoides*, *Orchis morio*, *Platanthera bifolia*, *Gentiana cruciata*.

13. Type of habitat: **Basophile marshfield** (*Carici flavae-Eriophoretum*)

Main species:

Plants: *Carex flava*, *C. lepidocarpa*, *C. panicea*, *Juncus effusus*, *Juncus conglomeratus*, etc.

Main human impacts: burning

Relevant management practices: Habitat management is not necessary and no human activity is allowed.

Vulnerable species:

Plants: *Carex paniculata*, *Eriophorum latifolium*, *E. angustifolium*, *Epipactis palustris*, *Dactylorhiza incarnata*.

Animals: *Lycaena dispar*.

14. Type of habitat: **Lowland hay meadows** (*Alopecurus pratensis*, *Sanguisorba officinalis*)

Main species:

Plants: *Cirsium canum*, *Festuca pratensis*, *Poa pratensis*, *Dactylis glomerata*, *Holcus lanatus*,

Rumex acetosa, *Chrysanthemum leucanthemum*, *Sanguisorba officinalis*, *Carex flava*,

Geranium palustris, etc.

Main human impacts: burning

Relevant management practices: Maintaining traditional use, mowing once a year, in the autumn.

Vulnerable species:

Plants: *Orchis laxiflora*, *Eriophorum latifolium*, *Epipactis palustris*, *Dactylorhiza majalis*, *Iris sibirica*.

Animals: *Maculinea teleius*, *Eumedonia eumedon*, *Phragmatiphila nexa*, *Crex crex*.

15. Type of habitat: **Calcareous rocky slopes with chasmophytic vegetation**

Main species:

Plants: *Achillea nobilis*, *Acinos arvensis*, *Carex humilis*, *Potentilla arenaria*, *Asplenium rutamuraria*, *Sedum sexangulare*, *Sedum acre*, *Campanula sibirica* subsp. *divergentiformis*, *Campanula rotundifolia*, *Helianthemum nummularium* subsp. *ovatum*, *Stipa capillata*, etc.

Main human impacts: collection of medicinal plants.

Relevant management practices: No habitat management is needed and no human activity is allowed. It is necessary to monitor the changes in game populations.

Vulnerable species:

Plants: *Dianthus plumarius* subsp. *praecox*, *Dracocephalum austriacum*, *Onosma tornense*, *Jovibarba hirta*, *Sempervivum marmoreum*, *Saxifraga paniculata*, *Sesleria heufleriana*, *Thalictrum foetidum*, *Alyssum montanum* subsp. *brymii*, *Iris pumila*, *Chamaecytisus ciliatus*, etc.

Animals: *Saga pedo*, *Stenobothrus eurasius*, *Parnassius mnemosyne*, *Chersotis fimbriola baloghi*, *Ablepharus kitaibelii*, *Emberiza cia*.

16. Type of habitat: **Sub-continental steppic grasslands**

Main species:

Plants: *Festuca rupicola*, *F. valesiaca*, *Achillea pannonica*, *Cerasus fruticosa*, *Campanula sibirica*, *Campanula bononiensis*, *Carex michelii*, *Centaurea scabiosa*, *Crepis praemorsa*, *Chamaecytisus albus*, *Cytisus procumbens*, *Hippocrepis comosa*, *Vincetoxicum hirundinaria*, etc.

Main human impacts: burning, overgrazing.

Relevant management practices: No habitat management is needed and no human activity is allowed, except for restricted grazing. It is necessary to monitor changes in game population.

Vulnerable species:

Plants: *Adonis vernalis*, *Pulsatilla grandis*, *Jurinea mollis* subsp. *macrocalathia*, *Onosma visianii*, *Adonis vernalis*, *Anemone sylvestris*, *Stipa joannis*, *S. pulcherrima*, *S. tirsia*, *Linum tenuifolium*, *L. hirsutum*, *L. flavum*, *Orchis tridentata*, *Aster amellus*, *Echium russicum*, etc.

Animals: *Saga pedo*, *Isophya stysi*, *Pholidoptera transylvanica*, *Melitaea telona kovacsi*, *Parnassius mnemosyne*, *Cupido osiris*, *Maculinea arion*, *Emberiza cia*.

17.Type of habitat: Mountain hay meadows

Main species:

Plants: *Brachypodium pinnatum*, *Bromus erectus*, *Cirsium pannonicum*, *Campanula bononiensis*, *C. cervicaria*, *C. glomerata*, *Anthyllis vulneraria*, *Trifolium montanum*, *Dorycnium germanicum*, *Antennaria dioica*, *Dianthus pontederiae*.

Main human impacts: Abandoned hayfields, the traditional land use is not ensured.

Relevant management practices: Traditional way of mowing (generally once a year, in the middle or end of the summer) as nature management. The area with these associations was cultivated (mowed) in such a manner for centuries and thanks to this land use type use such extraordinary rich communities have developed. No other human use is allowed.

Vulnerable species:

Plants: *Polygala major*, *Traunsteinia globosa*, *Gentiana cruciata*, *Gentianella austriaca*, *G. ciliata*, *G. amarella*, *Carlina acaulis*, *Anacamptis pyramidalis*, *Orchis ustulata*, *O. mascula* subsp. *signifera*, *Aster amellus*, *Geranium sylvaticum*, etc.

Animals: *Isophya stysi*, *Pholidoptera transylvanica*, *Parnassius mnemosyne*, *Melitaea telona kovacsi*, *Lycaena hippothoe*, *Crex crex*, *Spermophilus citellus*.

Endangered or threatened plant or animal species:

Plants:

Habitat Directive, Annex II.:

Adenophora liliifolia (L.) Ledeb.,

Cypripedium calceolus L.

Dracocephalum austriacum L.

Echium russicum J.F. Gmelin

Eleocharis carniolica Koch

Himantoglossum caprinum (M. Bieb.) Sprengel

Onosma tornense Jáv.

Pulsatilla grandis Wenderoth

Thlaspi jankae Kerner

IUCN World Red Book (List of rare, threatened and endemic plants in Europe)

Onosma tornense Jáv.

Dracocephalum austriacum L.

Carex brevicollis DC.

Cypripedium calceolus L.

Eleocharis carniolica Koch

Thlaspi jankae Kerner

Hungarian Red Book

Campanula latifolia L.

Carex hartmanii Cajander

Dianthus praecox Kit. subsp. *praecox*

Dracocephalum austriacum L.

Onosma tornense Jáv.

Tephrosieris aurantiaca (Hoppe) Griseb. et Schenk

Traunsteinera globosa (L.) Reichenb.

Adenophora liliifolia (L.) Ledeb.

Avenula compressa (Heuffel) W. Sauer et Chmelit.

Cypripedium calceolus L.

Dactylorhiza majalis (Reichenb.) P.F. Hunt et Summ.

Dianthus superbus L.

Dryopteris expansa (C. Presl) Fraser-Jenkins et Jermy

Eleocharis carniolica Koch

Epipactis palustris (L.) Crantz

Erythronium dens-canis L.

Fritillaria meleagris L.

Gymnadenia odoratissima (L.) L.L. C. M. Richard

Lathyrus pannonicus (Jacq.) Garcke

Medicago rigidula (L.) All.

Orchis mascula L. subsp. *signifera* (Vest) Soó

Parnassia palustris L.

Polystichum lonchitis (L.) Roth

Ribes alpinum L.

Rubus saxatilis L.

Thalictrum foetidum L.

Viola collina Besser

Achillea ptarmica L.

Aconitum lycoctonum L. subsp. *moldavicum* (Hacq.) Jalas

Aconitum variegatum L. subsp. *gracile* (Reichenb.) Gáyér

Adonis vernalis L.

Alchemilla vulgaris L.

Alyssum montanum L. subsp. *brymii* Dostál

Anacamptis pyramidalis (L.) L. C. M. Richard

Anemone sylvestris L.

Anthriscus nitida (Wahlenb.) Garcke

Aquilegia vulgaris L.

Asplenium viride Hudson

Aster amellus L.

Astragalus vesicarius L. subsp. *albidus* (Waldst. et Kit.) Br.-Bl.

Asyneuma canescens (Waldst. et Kit.) Griseb. et Schenk

Calamagrostis varia (Schrader) Host

Campanula macrostachya Waldst. et Kit.

Cardamine glanduligera O. Schwarz

Carex brevicollis DC.

Carex buekii Wimmer

Carex caespitosa L.

Carlina acaulis L.

Ceterach officinarum Willd.
Chaerophyllum hirsutum L.
Chamaecytisus ciliatus (Wahlberg) Rothm.
Coeloglossum viride (L.) Hartman
Corallorhiza trifida Chatel.
Cotoneaster integerrimus Medicus
Crepis capillaris (L.) Wallr.
Crepis pannonica (Jacq.) C. Koch
Cyclamen purpurascens Mill.
Dactylorhiza incarnata (L.) Soó
Dactylorhiza maculata (L.) Soó
Dactylorhiza sambucina (L.) Soó
Dryopteris dilatata (Hoffm.) A. Gray
Echium russicum J.F. Gmelin
Epipactis atrorubens (Hoffm.) Besser
Epipactis leptochila (Godfery) Godfery
Epipactis muelleri Godfery
Epipactis purpurata Sm.
Equisetum hyemale L.
Eriophorum angustifolium Honckeny
Eriophorum latifolium Hoppe
Erysimum odoratum Ehrh.
Gentiana cruciata L.
Gentiana pneumonanthe L.
Gentianopsis ciliata (L.) Ma
Geranium sylvaticum L.
Geum aleppicum Jacq.
Glyceria declinata Bréb.
Gymnadenia conopsea (L.) R. Br.
Hypericum maculatum Crantz
Inula helenium L.
Iris graminea L.
Iris sibirica L.
Isatis tinctoria L.
Jurinea glycacantha (Sibth. et Sm.) DC.
Lappula heteracantha (Ledeb.) Gürke
Lathyrus pisiformis L.
Limodorum abortivum (L.) Swartz
Linum flavum L.
Moneses uniflora (L.) A. Gray
Muscari botryoides (L.) Miller
Onosma visianii G.C. Clementi
Orchis laxiflora Lam. subsp. palustris (Jacq.) Bonnier et Layens
Orchis militaris L.
Orchis morio L.
Orchis purpurea Hudson
Orchis tridentata Scop.
Orchis ustulata L.
Orthilia secunda (L.) House
Phegopteris connectilis (Michx.) Watt

Phlomis tuberosa L.
Poa scabra Kit.
Polygala major Jacq.
Polygonatum verticillatum (L.) All.
Primula elatior (L.) Hill
Pulmonaria angustifolia L.
Pulsatilla grandis Wenderoth
Ranunculus lingua L.
Ribes rubrum L.
Rosa pendulina L.
Rumex aquaticus L.
Salix aurita L.
Saxifraga paniculata Miller
Sempervivum marmoreum Griseb.
Seseli peucedanoides (Bieb.) Kos.-Pol.
Sesleria heufleriana Schur
Silene bupleuroides L.
Silene nemoralis Waldst. et Kit.
Sorbus \times rotundifolia (Bechst.) Hedl.
Sorbus aria (L.) Crantz
Sorbus bükkensis Soó
Sorbus danubialis (Jáv.) Kárpáti
Sorbus graeca (Spach) Kotschy
Sorbus jávorkae (Soó) Kárpáti
Sorbus latifolia (Lam.) Pers.
Sorbus pannonica Kárpáti
Sorbus soói (Máthé) Kárpáti
Sorbus thaiszii (Soó) Kárpáti
Sorbus zólyomii (Soó) Kárpáti
Stipa tirsia Steven

Animals:

Habitat Directive, Annex II.:

Unio crassus
Vertigo moulinsiana
Sadleriana pannonica
Coenagrion ornatum
Ophiogomphus cecilia
Leucorrhinia pectoralis
Paracaloptenus caloptenoides
Pholidoptera transsylvanica
Stenobothrus eurasius
Isophya stysi
Duvalius hungaricus
Lucanus cervus
Bolbelasmus unicornis
Morimus funereus
Rosalia alpina
Cerambyx cerdo
Erannis ankeraria

Euplagia quadripunctaria
Dioszeghyana schmidti
Leptidea morsei
Colias myrmidone
Lycaena dispar
Maculinea teleius
Euphydryas maturna
Eriogaster catax
Eudontomyzon danfordi
Rhodeus sericeus amarus
Barbus meridionalis petenyi
Misgurnus fossilis
Cobitis taenia
Bombina bombina
Bombina variegata
Rhynolophus ferrumequinum
Rhynolophus euryale
Rhynolophus hipposideros
Citellus citellus
Lynx lynx
Myotis myotis
Miniopterus schreibersi
Myotis bechsteini
Myotis emarginatus
Barbastella barbastellus
Myotis blythi
Myotis dasycneme
Canis lupus
Hungarian Red Book
Lynx lynx
Canis lupus
Coenagrion lunulatum
Hesperophanes pallidus
Aricia eumedon
Schizostege decussata
Coscinia cribraria
Apamea platinea
Oria musculosa
Dichagyris candelisequa
Barbus meridionalis petenyi
Ablepharus kitaibelii
Aquila heliaca
Aquila pomarina
Bonasa bonasia
Bubo bubo
Circaetus gallicus
Ciconia nigra
Ciconia ciconia
Crex crex
Pernis apivorus

Circus pygargus
Perdix perdix
Coturnix coturnix
Tyto alba
Otus scops
Strix uralensis
Merops apiaster
Dryocopus martius
Cinclus cinclus
Barbastella barbastellus
Myotis bechsteini
Myotis emarginatus
Bielzia coerulans
Sadleriana pannonica
Cordulegaster bidentatus
Sympetrum danae
Anax parthenope
Paracaloptenus caloptenoides
Stenobothrus eurasius
Tettigonia caudata
Saga pedo
Isophya stysi
Pholidoptera transsylvanica
Duvalius hungaricus
Lucanus cervus
Rosalia alpina
Cerambyx cerdo
Potosia aeruginosa
Morimus funereus
Pharmacis fusconerbulosus
Eriogaster catax
Hemaris fuciformis
Spialia sertorius
Colias myrmidone
Pieris bryoniae
Pieris manni
Limenitis populi
Apatura iris
Erannis ankeraria
Charissa pullata
Euphya scripturata
Eupithecia denticulata
Leucodonta bicoloria
Notodonta torva
Pericallia matronula
Panchrysia deaurata
Phragmataphila nexa
Euxoa birivia
Euxoa hastifera
Euxoa distinguenda

Euxoa decora
Cucullia gnaphalii
Cucullia lucifuga
Cucullia campanulae
Photodes captiuncula delattini
Chersotis fimbriola
Amphipoea lucens
Dichagyris musiva
Rileyana favea
Lasionycta proxima
Protolampra sobrina
Rhyacia latens
Drusus trifidus
Oligotricha striata
Dendrocopus medius
Dendrocopus leucotos
Corvus corax
Parus cristatus
Luscinia luscinia
Lanius minor
Lanius senator
Emberiza cia
Monticola saxatilis
Rhinolophus euryale
Nyctalus leisleri
Dryomys nitedula
Glis glis
Muscardinus avellanarius
Felis silvestris
Somatochlora metallica
Hemaris tityrus
Marumba quercus
Proserpinus proserpinus
Zerynthia polyxena
Parnassius mnemosyne
Polyommatus admetus
Aricia artaxerxes issekutzi
Maculinea teleius
Euphydryas maturna
Argynnis laodice
Argynnis pandora
Neptis rivularis
Neptis sappho
Apatura ilia
Brenthis ino
Ennomos quercaria
Furcula bicuspidis
Pheosia gnoma
Phalera bucephaloides
Staurophora celsia
Cucullia xerathemi

Apamea syriaca tallosi
Apamea rubrireana
Aquila chrysaetos
Regulus ignicapillus

Species of traditional or commercial importance:

flower of Tilia plathyphyllos, Tilia cordata,
plant of Centaureum minus, Hypericum perforatum,
fruit of Cornus mas, Crataegus monogyna, Prunus spinosa, Rosa spp.,
seed of Alnus, Sorbus spp., Acer spp.,
edible mushrooms,
Helix pomatia

The following species are hunted in the BR only outside the core areas, and there are temporal and spatial restrictions in effect:

Anas platyrhynchos
Phasianus colchicus
Lepus europaeus
Cervus elaphus
Capreolus capreolus
Ovis musimon
Sus scrofa
Vulpes vulpes.

75% of the area of the BR is wooded. There are forestry activities restricted in time and spatial scale in 43% (6.500 ha) of the forest.

IV. ZONATION

Size of terrestrial Core Areas: **230 ha** (Nagy-oldal: 150 ha, Haragistya: 80 ha) - **currently, 1168 ha** (Nagyoldal-Haragistya) - **proposed.**
Size of terrestrial Buffer Zones: **19, 958 ha - currently, 19, 020 ha - proposed.**
Approx. size of terrestrial Transition Area: **25, 000 ha – current and proposed.**

Brief justification of this zonation (in terms of various roles of biosphere) as it appears on the zonation map:

Core area: Preservation must assure the self-governing function of nature and where it is necessary, to conserve the natural values by active management.

Buffer zone: The aim of this zone is the preservation of the core area. Specialised active nature management, tourism, research and education programmes are allowed.

Transition area: This zone is situated outside the national park, it is not legally protected but under the control of the Aggtelek National Park Directorate. Sustainable cultivation in harmony with the aims of nature conservation is allowed, which will be additionally supported by the Environmentally Sensitive Areas agri-environmental scheme in the future.

V. HUMAN ACTIVITIES

Population living in the reserve

Approximate number of people living within the Biosphere Reserve

	permanently / seasonally
Core Area(s):	- / -
Buffer Zone(s):	appr. 1000 / 1200
Transition Area(s):	appr. 10.000 / 10.500

Brief description of local communities living within or near the Biosphere Reserve:

- There are two small villages with approximately 1000 inhabitants inside the BR and 20 along the border of the BR. More than 40% of the population is unemployed. This high rate is due to the economic changes (collapsed industry and agricultural co-operatives).
- Generally the population is aging, young people move into the towns. Because of this fact the traditional cultivation methods are vanishing. This causes a lot of problems from the point of view of nature conservation, because hayfields, old orchards and pastures have become abandoned, that is why all the management activities connected with these species-rich habitats are in the responsibility of the national park. Due to the economic hardship, the poor families make a living from collecting firewood, and natural resources from the protected territory.

Indicate ethnic origin and composition, minorities etc., their main economic activities:

40 % of the total population in the region are gypsies. Many of them are unemployed.

Name(s) of nearest major town(s):

Miskolc with appr. 200 000 inhabitants is situated 70 km from the BR.

Cultural significance of the site:

There is no outstanding cultural monument in the area of the BR, some historic buildings (castle-ruin, churches), rustic dwellings and old cemeteries are worthy of mention.

Use of resources by local populations

Uses or activities in the Core Area:

No human activity is allowed in this zone, only strictly for conservation purposes (nature management, research).

Main land uses and economic activities in the buffer zone(s):

Forestry, pastures, hayfields, arable lands, old orchards, tourism. These activities can be pursued under strong control of nature conservation.

Main land uses and economic activities in the Transition Area(s):

Forestry, pastures, hayfields, arable lands, old orchards, tourism.

Possible adverse effects of uses or activities in the transition area(s) and remedial measures taken:

Huge number of visitors can have a bad effect on the site and inappropriate land use practices can destroy the habitats. The disappearance of traditional agriculture is an unfavourable process. Forestry management is the best-checked activity on the area (about 75% of the area is covered by state-owned forests).

If known, give a brief summary of past / historical land use(s) of the main parts of the Biosphere Reserve:

Forestry, pastures, hayfields, arable lands, old orchards.

Tourism

Indicate the number of visitors come to the Biosphere Reserve each year

150 000 - 200 000 tourists mainly visit the Baradla showcave

National: 90%

Foreign: 10%

Type of touristic activities:

Cavetours, surface tours, hiking on tourist trails and study trails.

Tourist facilities:

2 hotels, 3 tourist hostels, 3 campsites, private rooms, 5 restaurants, tourists trails, 5 study trails, 1 experimental trail.

Income and benefits to local communities:

Not significant, because the above-mentioned objects and services are not owned by local people, but the locals are employed.

VI. RESEARCH

List of publications of past research and/or monitoring activities:

Tóth E. – Horváth R. (eds.) (1997): Research in Aggtelek National Park and Biosphere reserve. ANP Booklets I.

Contents:

1. Speleological and Geological Research in the territory of Aggtelek National Park and Biosphere Reserve

Less, Gy.: The evolution of the geological structure of the Aggtelek-Rudabánya Mts.

Lerner, J. - Kövesdi, J.: Management Plans for the World Heritage sites - Application of the IUCN Guidelines for the Cave and Karst Protection

Sásdi, L.: Karst drainage systems established by water tracing methods in Aggtelek National Park

Knauer, J.: Relation between morphology and rock-outcropping on some plateaus near Jósvalő

Gellai, M. - Baross G.: Geological bearings of the study-paths of the Aggtelek National Park

Szunyogh, G.: A Review and Evaluation of the Speleological Treasures of the Béke Cave with the Intention to Target a Complex Scientific Analysis

Szunyogh, G. : The Mending of Man Made Destruction in the Béke Cave and Ways of the Restoration of the Original Condition

Dénes, Gy.: The source of the Jósval Stream and the name of the town of Jósvalő

Szabályár, P.: The Role of Karstic Springs in the Development of Industries in Jósvalő

2. Results of Complex Ecological State Assessment in ANP

Locsmándy, Cs. – Vasas, G.: The Macroscopic Fungi (Basidiomycetes) of the “Aggtelek Karszt”

Papp B. - Rajczy M.: Bioindication of habitat conditions with Bryophytes at some streams in Aggtelek National Park and Balaton-felvidek region, Hungary

V. Sipos, J. - Varga, Z.: Phytocenology of semi-dry grasslands (Cirsio-Brachypodion) in the Aggtelek Karst

Dósa, G.: *Inula ensifolia* (Asteraceae) as food plant preferred by daily butterflies (Lepidoptera: Rhopalocera)

Varga, Z.: Biogeographical outline of the fauna of Aggtelek Karst and surrounding areas

Deli, T.: Malacofaunistic researches in the National Park of Aggtelek

Rácz, I. - Parragh, D. - Mező, H.: Studies on Orthoptera fauna of Aggtelek Karst

Orci Kirill, M.: A comparative study on grasshopper (Orthoptera) communities in the Aggtelek Biosphere Reserve

Magura, T. & Molnár, T.: Comparison of the carabid fauna of the Ménes-valley and a higher karst plateau (Coleoptera: Carabidae).

Magura, T. – Tóthmérész, B.: Diversity as an indicator in environmental assessment: A case study for carabids (Coleoptera: Carabidae).

Magura, T. & Tóthmérész, B.: Effect of forest-edge to maintain the diversity of a carabid (Coleoptera) community

Magura, T. & Tóthmérész, B.: Comparison of the carabid communities of a zonal Quercus-Carpinetum and pine plantations

Szabó, S. - Varga, Z.: Changes in species composition and abundance of Lepidoptera in the Aggtelek Karst

Dudás, Gy.: The spiderfauna of National Park at Aggtelek

Kovács, B.: Fish-faunistic data from the river Bódva in the area of the ANP

Hoitsy, Gy.: Fish-fauna of the waters in the Aggtelek National Park

Horváth, R. - Farkas, R. - Kovács, K.: Red-backed shrike scientific research in Aggtelek National Park (Hungary)

Horváth, R. & Kovács, K.: Survey of bird communities by river mapping in the Aggtelek National Park

Rácz, I. - Varga, Z.: Life-form spectra of Orthoptera and bioindication in grasslands

Boldogh, S. - Gombkötő, P.: Monitoring and Conservation of House-dwelling Bat Colonies in Administrative Area of Aggtelek National Park

Horváth, R. & Bodolai, I.: Restriction of forestry in the main forest types of the Aggtelek National Park, based on the survey of nesting bird communities

Boldogh, S. (ed.) (2003): Researches in the Aggtelek National Park and Biosphere

Reserve. ANP Booklets II.

Contents:

B. Szűts, F.: Ecological Investigation and point-mapping of the distribution of *Onosma tornense* Jáv.

Schmotzer, A.: Preliminary results of the long-term monitoring of grassland management systems (Aggtelek National Park)

Molnár, T. – Magura, T.: Study of the carabid fauna of the Aggtelek National Park

Rácz, I.A. – Nagy, A. – Orczi, K.M.: Orthoptera assemblages in different habitats of the Aggtelek Karst (North-East Hungary)

Boldogh, S. – Szentgyörgyi, P.: Research on Corncrake (*Crex crex* L. 1758) in the Administrative Area of Aggtelek National Park between 1997 and 2002

Farkas, R. – Boldogh, S. – Szentgyörgyi, P. – Bartha, Cs.: Research on Bee-eater (*Merops apiaster* L. 1758) population and its conservation in North Hungary

Nagy, D.: Research on historical land use in the Gömör-Torna karst I, Reconstruction of former landscapes in the Aggtelek National Park on the basis of military surveys I-III

Abiotic research:

Completed:

- geological mapping
- complex assessment of strictly protected caves

Ongoing:

- geomorphology
- meteorology
- complex assessment of other protected caves
- land history

Biotic research: Complex Ecological State Assessment (see above), National biodiversity monitoring system

Estimated number of national scientists: 40 persons.

Estimated number of foreign scientists: 1 person.

Research station(s) within the BR: -

Permanent research station(s) outside the BR: -

Research facilities of research stations: -

Other facilities: -

Indicate how the results of research programmes have been taken into account in the management of the biosphere reserve

The so-called **Complex Ecological State Assessment (CESA)** of the Aggtelek National Park and Biosphere Reserve started in 1992 as well as in the other Hungarian national parks in the frame of a long-term, nation-wide programme. This programme was based on former investigations and used unified methods, and generally the same taxa were studied.

This programme has four aims:

- At first the main aim was to assess the present state of the national park and biosphere reserve with regard to the most important habitats and species.
- The second was that the result of the CESA would be the basis for setting up a new, up to date **zonation** of the national park - according to the present situation and possibilities and the basis for the suitable **management plans** for the different zones.
- The third aim was that this complex research project would be the first step of a **long-term biodiversity monitoring** and also an attempt of a nation-wide **biomonitoring** which will be applied not only to survey of protected areas.

- The results of the complex ecological assessment and the monitoring system provide the scientific background for the **active nature management** and the **restrictions** of any activity inside the BR.

VII. EDUCATION, TRAINING AND PUBLIC AWARENESS PROGRAMMES

Enviromental education and public awareness:

- The National Park organises various **summer-camps** for pupils and students: "explore the nature"-camps, work-camps (bird-ringing camp, habitat-restoration camp, research camp).
- The National Park organises **field trips** for students of secondary schools, universities and postgraduate students.
- Members of the staff of the National Park usually hold **lectures with slide- and videoshow** on the natural and cultural heritage of the region to tourist-groups, students and local people.
- 5 study trails and 1 experimental trail
- Organisation of **open days** and **festivities** (Earth Day, Day of Birds and Trees, e.t.c.) for children and tourists.
- Co-operation with 26 primary schools in the region of the national park.

- Co-operation with the Slovak Karst National Park and Biosphere Reserve in the field of education.

These programmes take place mostly in the “Kúria” Educational Center in Jósvalő.

Training programmes for specialists:

- The Aggtelek National Park assists **to educational work** in the local nursery, primary and secondary schools and organise different programmes and competitions for local children.
- The National Park with the help of other governmental and non-governmental organisations organises **conferences** and **training programmes** on nature conservation, management and education. Accredited further education training course for teachers of primary schools.
- The National Park organises **field trips** for undergraduate and postgraduate university students.

Facilities for education and visitors' centres:

- Exhibition: Natural assets of the Aggtelek National Park,
- Village museum at Jósvalő, Aggtelek and Szögliget,
- 5 study trails, 1 experimental trail.

VIII. INSTITUTIONAL ASPECTS:

Aggtelek Biosphere Reserve adjoins the Slovak Karst BR and it constitutes a biogeographical and geological unit across the border between Slovakia and Hungary.

Administrative units:

State: HUNGARY,

Region: Borsod - Abaúj - Zemplén County,

Districts: Aggtelek, Bódvarákó, Bódvaszilas, Égerszög, Hidvégardó, Imola, Jósvalő, Komjáti, Martonyi, Perkupa, Szalonna, Szendrő, Szin, Szinpetri, Szögliget, Szuhafő, Terezstenye, Tornakápolna, Tornanádaska, Trizs, Varbóc, Tornaszentandrás.

Management plan / policy:

A management plan for the Aggtelek National Park and Biosphere Reserve exists from the 1st January 1997 but it does not suit the requirements of current laws.

Main characteristics of the management plan according to the zones:

Core area: Preservation must assure the self-governing function of nature and where it is necessary, to conserve the natural values by active management.

Buffer zone: The aim of this zone is the preservation of the core area. Specialised active nature management, tourism, research and education programmes are allowed.

Transition area: This zone is situated outside the national park, it is not legally protected but under the control of the Aggtelek National Park Directorate. Sustainable cultivation in harmony with the aims of nature conservation is allowed, which will be additionally supported by the Environmentally Sensitive Areas agri-environmental scheme in the future.

Total number of staff of the Directorate of the Aggtelek National Park (2005): 152

Director

Deputy directors: 2 persons

Department of nature conservation: 4 persons

Department of nature management: 18

Rangers: 7 persons.

Financial department: 8 persons

Others: staff of showcave, hotel, campsites, technicians, secretariate, e.t.c.: 112 persons

Financial sources and yearly budget (2005):

Income:	1240M HUF,
grant from the state:	405M HUF,
income from the tourism:	368M HUF,
other incomes (e.g. from project grants)	477 M HUF.

Expenses:	1210 M HUF,
salaries :	255 M HUF,
taxes :	83 M HUF,
maintenance:	310 M HUF,
electricity, telephone,	
heating, traffic, instrument, etc.	
renovation:	6 M HUF,
investments:	556 M HUF.

Authority in charge of administration:

The Biosphere reserve as a whole: Aggtelek National Park Directorate; Inspectorate of Environmental Protection, Nature Conservation and Water Management

Core area: Forestry Authority; Local Governments; Hunting Authority; Aggtelek National Park Directorate; Inspectorate of Environmental Protection, Nature Conservation and Water Management

Buffer zone: Forestry Authority; Local Governments; Hunting Authority; Aggtelek National Park Directorate; Inspectorate of Environmental Protection, Nature Conservation and Water Management.

Mechanisms of consultation and co-ordination among these different authorities:

The above-mentioned authorities are obliged to involve the Inspectorate of Environmental

Protection, Nature Conservation and Water Management in the decision-making and they

must accept its standpoint. The Inspectorate asks the opinion of the National Park Directorate

in many cases before taking a stand.

National administration

The Aggtelek National Park Directorate is the responsible authority to manage the BR. The Aggtelek National Park Directorate is under the supervision of the State Secretariat for Nature and Environment Protection of the Ministry of Environment and Water.

Mechanism for consultation of local communities:

Indicate how and to what extent local people living within or near the BR

-have been associated to the BR nomination: -

-participate in the decision-making process and management resources: only in the active nature management as employees (mowing, shepherds, etc.)

Indicate whether you consider the participation of local communities to be satisfactory and, if not, what measures are envisaged to improve this situation:

The local communities are not satisfied because of the restrictions imposed by the nature conservation acts. The management plan (valid from 1st January, 1997.) deals with this problem and the improvement of the situation. This management plan does not suit the requirements of current laws, it must be reworked.

Protection regime of the core area and possibly of the buffer zone

The territory is under legal protection according to decree 8/1978. OKTH 1st January, effective from 1st January 1979 as landscape protection area. Its whole territory was declared as national park from the 1st January, 1985 by the decree 7/1984. OKTH.

Tasks and duties of Aggtelek National Park Directorate:

To protect and preserve:

- the underground formations of the karstic area,
- cave systems,
- springs, lakes, watercourses,
- characteristic karst-vegetation with its plant and animal communities
- cultural values of the landscape

Responsible for

- providing the conditions for scientific investigation
- providing the conditions for recreation

Help:

- education, environmental awareness and tourism

Land tenure of each zone:

Core area(s): 100% of the core areas belongs to the State

Buffer zone(s): 90 % belongs to the State
3 % belongs to private owners
4 % belongs to local municipalities
2 % belongs to co-operatives
1 % other

Transitional zone: No data.

Foreseen changes in land tenure:

Through a ten-year government programme financed by the State, the Aggtelek National Park

Directorate intends to purchase the land which used to belong to co-operatives before the political transition in 1990. The Directorate also purchases lands from private owners.

Contact address(es)

Name: Aggtelek National Park Directorate

Street or P.O. box: Tengerszem oldal 1.

City with postal code: H-3758 Jósvalő

Country: Hungary

Telephone: 00-36-48-506-000

Telefax: 00-36-48-506-001

E-mail: info.anp@t-online.hu

Web site: www.anp.hu

IX. CONCLUSION

1. Representative ecological systems - graduation of human interventions

In Aggtelek National Park and Biosphere Reserve many natural ecological systems can be

find which represent very well the biogeographical region. The human impacts upon the area is low.

2. Significance for biological diversity conservation

This area is a national park, therefore the protection of the natural assets is guaranteed by the Hungarian laws.

3. Approaches to sustainable development on a regional scale

The sustainable development on the territory of BR is ensured, but outside of the BR in areas which are not protected, there are some problems with land use, partly with forestry (e.g. intensive wood-cutting in valuable forests to burn the wood in a thermal power station) and cultivation of lands (e.g. landowners plough up valuable grasslands, because they get more financial support from the state if they use their land as an arable land).

4. Appropriate size to serve the three functions

The size of the biosphere reserve is suitable to serve the three functions. The law for nature conservation (highest legal instrument) is a guarantee for providing the highest protection to Aggtelek National Park, which area is identical with the Aggtelek B.R. The most important assets are inside of the Core Area. The conditions of the life communities have been stable for decades.

5. Appropriate zonation to serve the three functions

The zonation of the BR is not accepted in laws yet.

6. Participation of public authorities and local communities

The Inspectorate of Environmental Protection, Nature Conservation and Water Management is the authority in questions related to nature conservation. The Inspectorate asks the opinion of the National Park Directorate in many cases before taking a stand.

7. a) mechanisms to manage human use and activities

Management of human uses and activities in the area of the Biosphere Reserve controlled by the Act No. LIII. 1996. on Nature Conservation and other laws.

b) Management policy or plan

Management plan for the Aggtelek National Park exist from 1st January, 1997. This management plan does not suit the requirements of current laws, it must be reworked. The Directorate is responsible for the implementation of the management plan of the BR.

c) Authority or mechanism for implementation

Aggtelek National Park Directorate

d) Programmes for research, monitoring, education and training

Research, monitoring: Complex Ecological State Assessment (see above), National biodiversity monitoring system.

Environmental education and public awareness: summer-camps for pupils and students, field trips for students of secondary schools, universities and postgraduate students, lectures with slide- and videoshow on the natural and cultural heritage of the region to tourist-groups, students and local people, organisation of open days and festivities (Earth Day, Day of Birds and Trees, e.t.c.) for children and tourists.

Training programmes for specialists: assistance to educational work in the local nursery, primary and secondary schools and organisation of various programmes and competitions for local children, conferences and training programmes on nature conservation, management and education, field trips for undergraduate and postgraduate university students.

Does the biosphere reserve have cooperative activities with other biosphere reserves?

At national level:

There is no stronger collaboration among BRs at the national level.

Through twinning and/or transboundary biosphere reserves:

There is a permanent collaboration between Aggtelek National Park and Slovak Karst National Park.

Within the World Network: -

Obstacles encountered, measures to be taken and, if appropriate, assistance expected from the Secretariat

There are usually no financial possibilities to cover the expenses to take part in conferences, workshops of MAB (even in Europe) and to organise co-operation.

Assistance from the Secretariat is sought in order to establish long-term and large-scale co-operation between BRs with similar abiotic and biotic conditions.

The information exchange is quite poor, there are rarely news about other BRs and information about workshops, conferences and possibilities for support for developments.



**PERIODIC REVIEW
FOR BIOSPHERE RESERVES IN
HUNGARY**



LAKE FERTŐ BIOSPHERE RESERVE



**SARRÓD
2007**

I. NAME OF THE BIOSPHERE RESERVE

Lake Fertő Biosphere Reserve

II. COUNTRY

Hungary

III. PHYSICAL CHARACTERISTICS OF THE BIOSPHERE RESERVE

Latitude and longitude

47°38'-57' N

16°40'-52' E

Biogeographical Region

Pannonian

Topography of the region

The area is a saline lake with huge reedy areas, and saline meadow, xerophilous oak forest associations are found in its surroundings.

Lake Fertő is the second largest lake in Hungary (the fifth in Europe). Its area is 309 km² but only 75 km² belongs to Hungary. The water level of this steppe-lake is fluctuating, and it is less than 1 meter deep on the average. The lake's bed is horizontal and only the middle of the lake is deeper by 50-60 centimetres. When the water level is at 115.50 m above sea level, the length of the lake is 35.5 km and its average width is 8.2 km, the total length of the lakeshore is 67.4 km in Austria and 24.7 km in Hungary. The catchment area of the lake is 1244 km². The biggest part of its water content originates from rainfall and groundwater but two small streams /the Rákos-stream in the Hungarian part and the Wulka in Austria/ bring some water to the lake too. The average amount of water of the lake is 400 million m³ at 114-115 m above water level.

Climate

Dry continental climate with semiarid influence. The climatic conditions are the following:

- | | |
|-----------------------------------|---------------------|
| - Average rainfall / year: | 629 mm |
| - Average temperature /year : | 10.1 C ⁰ |
| - Average temperature in January: | -1.5 C ⁰ |
| in June: | 18.7 C ⁰ |
| - Prevailing wind: | N, NW |
| - Windiest months: | April - June |

Geology, geomorphology, soils

The lake is situated in a depression of the Kisalföld region connecting to the deeper Hanság-basin in the East. The original surface of its basin had been created by the sediments of an ancient, huge, naturally desalinating lake-basin during the late Pliocene age, but it was formed by the wind later and the Ancient Danube and Lajta rivers brought and deposited layers of pebble and clay.

One of the most important character of the lake's water is the high alkaline and hidrogencarbonate content. The high natrium- and magnesium carbonate and natrium- and magnesium sulphate contents make the water so rich in life. The age of the lake is approx. 20,000 years.

List main habitat types (e.g. humid tropical forest, savanna woodland, alpine tundra, coral reef, seagrass beds) and land cover (e.g. residential areas, agricultural land, grazing land).

The water is opalescent and its hydrocarbonate content is high. The water is not deeper than 1.5 m, and the lakebed is covered by thick mud.

Aves: *Aythya nyroca*
Chlidonias niger
Sterna albifrons

Pisces:	<i>Umbra krameri</i>
	<i>Misgurnus fossilis</i>
Aves:	<i>Podiceps cristatus</i>

Pisces: Cyprinus carpio
Esox lucius
Aves: Anser fabalis
Anser albifrons

Main human impacts: fishery with traditional and modern instruments. Recreation and sports, but it is only characteristic of the Fertőrákos Bay in the Hungarian part. The infrastructure of tourism will be developed but only in this area. The introduction of fish species is not supported because of its well-known disadvantageous effects. The disturbance by the traffic crossing the state border is negligible.

Relevant habitat management practices:

It is important to restrict traffic in the core area - which is also a strictly protected area. For this area there is no need for any habitat management.

2. Type of habitat: reedbeds. One part of the reed belt is harvested annually (it is advantageous from nature conservation point of view because the natural sedimentation processes are slowed down by the reed harvesting) although reed harvesting is declining.

Main species: The reedbed is extremely wild and very difficult to carry out any research there. It is necessary to do more research for some species.

Strictly protected species:

Aves: Egretta alba
Platalea leucorodia
Aythya nyroca

Protected species:

Vertebrata:
Pisces: Umbra krameri
Misgurnus fossilis

Amphibia: Rana kl. esculenta
Rana lessonae
Rana dalmatina
Bombina bombina
Triturus vulgaris
Triturus cristatus

Reptilia: Natrix natrix

Aves:

- Podiceps ruficollis
- Podiceps cristatus
- Ardea purpurea
- Botaurus stellaris
- Anser anser
- Anas strepera
- Netta rufina
- Circus aeruginosus
- Porzana parva
- Porzana porzana
- Rallus aquaticus
- Fulica atra
- Acrocephalus arundinaceus
- Acrocephalus melanopogon
- Acrocephalus scirpaceus
- Acrocephalus schoenobaenus

Locustella luscinioides
Luscinia svecica
Panurus biarmicus
Remiz pendulinus
Emberiza schoeniclus

Mammalia: Mustela nivalis
Mustela erminea

Characteristic species which are not protected:

Plants: Phragmites australis
Typha angustifolia

Animals:

Vertebrata:

Aves: Anas platyrhynchos
Aythya ferina

Mammalia: Ondatra zibethicus

Main human impacts: fishery, reed harvesting. Its present state is similar to that written under point 1. above. Sport fishing causes many problems in the Fertőrákos part, because of the large number of citizens having a valid fishing licence.

Relevant habitat management practices: spatial, temporal and technology restrictions on reed-harvesting, on fisheries and traffic, and a ban on the introduction of fish species.

3. Type of habitat: wet and dry saline meadows. These are flooded by natural waters for shorter or longer periods especially during springtime, except for some areas located on higher ground. Sometimes these floodings remain in the deeper places for the whole year.

Main species: These biotopes are well-researched especially as regards vertebrates.

Strictly protected species:

Plants: Ophrys sphegodes

Animals:

Vertebrata:

Aves: Egretta alba
Platalea leucorodia
Ardeola ralloides
Branta ruficollis
Circus pygargus
Haliaeetus albicilla
Falco cherrug
Falco peregrinus
Falco vespertinus
Crex crex
Chlidonias hybridus
Chlidonias leucopterus
Chlidonias nigra
Himantopus himantopus

Recurvirostra avosetta
Numenius arquata
Charadrius alexandrinus
Tringa stagnatilis

Protected species: (due to their large number, only the most widespread species are mentioned)

Plants: Orchis morio
Orchis laxiflora

Animals:
Vertebrata:

Pisces: Umbra krameri
Misgurnus fossilis

Amphibia: Rana kl. esculenta
Rana lessonae
Rana dalmatina
Bombina bombina
Triturus vulgaris
Triturus cristatus

Reptilia: Natrix natrix
Lacerta vivipara
Lacerta agilis

Aves: Podiceps nigricollis
Anser anser
Anas clypeata
Anas strepera
Anas acuta
Netta rufina
Grus grus
Vanellus vanellus
Limosa limosa
Tringa totanus
Larus ridibundus
Larus melanocephalus
Sterna hirundo
Alauda arvensis
Motacilla flava
Saxicola rubetra
Acrocephalus schoenobaenus
Acrocephalus palustris
Locustella naevia
Emberiza schoeniclus

Mammalia: Sorex araneus
Crocodylus leucodon
Citellus citellus

Mustela nivalis
Mustela erminea

Character species which are not protected:

Plants: Phragmites australis
Aster tripolium ssp. hungaricus
Plantago maritima
Juncus gerardi

Animals:

Aves: Perdix perdix

Main human impacts: the most important impact is disturbance by agriculture which is in some places the main activity in the buffer zone. The area is more and more popular for visitors, especially during the vegetation season.

Relevant habitat management practices: extensive grazing by traditional animal breeds and mowing of grasslands in the buffer zone to maintain them and to prevent the natural expansion of reed and forest. There are habitat restoration projects in progress to re-establish the ancient small saline lakes which were characteristic of the area before drainage canals were built.

4. Type of habitat: xerophilous forests

Main species: The Szárhalmi forest with Quercus cerris-Quercus petraea species with patches of steppe meadow inside. The area is under continuous forest planning.

Strictly protected species:

Plants: Ophrys insectifera
Cypripedium calceolus

Animals:

Aves: Merops apiaster
Athene noctua

Protected species: (due to their big number we mention only the most widespread species)

Plants: Pulsatilla grandis
Pulsatilla pratensis ssp. nigricans
Iris graminea
Iris sibirica
Iris pumila
Iris variegata
Cephalanthera rubra
Cephalanthera damasonium
Epipactis palustris
Epipactis atrorubens
Epipactis helleborine
Limodorum abortivum
Listera ovata
Neottia nidus-avis
Spiranthes spiralis
Platanthera bifolia

Platanthera chlorantha
Gymnadenia conopsea
Orchis morio
Orchis ustulata
Orchis militaris
Orchis purpurea
Orchis laxiflora agg.
Dactylorhiza sambucina
Dactylorhiza incarnata
Dactylorhiza majalis

Animals:

Arthropoda:

Calosoma sycophanta
Papilio machaon
Iphiclides podalirius
Lucanus cervus
Helix pomatia

Mollusca:

Vertebrata:

Amphibia:

Bufo bufo
Bufo viridis
Rana kl. esculenta
Rana lessonae
Rana dalmatina
Bombina bombina
Triturus vulgaris
Triturus cristatus

Reptilia:

Natrix natrix
Elaphe longissima
Coronella austriaca
Lacerta vivipara
Lacerta agilis
Lacerta viridis
Anguis fragilis

Aves:

Buteo buteo
Pernis apivorus
Accipiter gentilis
Falco subbuteo
Strix aluco
Dryocopus martius
Dendrocopos medius
Upupa epops
Luscinia megarhynchos
Locustella fluviatilis
Emberiza schoeniclus

Mammalia:

Citellus citellus
Glis glis

Martes martes

Main human impacts: tourism

Relevant habitat management practices: agreements on the forest plans. It is necessary to carry out a habitat restoration programme to prevent this habitat from drying out and to stop the natural expansion of forests on the Kistómalmi-swamp.

Habitats of special interest: Lake Fertő is the largest saline lake in Central Europe. Its huge reedbeds are unique in this region. These are the westernmost habitats of the saline and sodic plants characteristic of alkaline steppes.

Endangered or threatened plant or animal species: The following species are of overriding importance with respect to preservation of nature and to management policies.

Plants:

Pulsatilla grandis
Pulsatilla pratensis ssp. nigricans
Iris graminea
Iris sibirica
Iris pumila
Iris variegata
Ophrys insectifera
Liparis loeselii
Cypripedium calceolus
Pinguicula vulgaris
Cephalanthera rubra
Cephalanthera damasonium
Epipactis palustris
Epipactis atrorubens
Epipactis helleborine
Limodorum abortivum
Listera ovata
Neottia nidus-avis
Spiranthes spiralis
Platanthera bifolia
Platanthera chlorantha
Gymnadenia conopsea
Orchis morio
Orchis ustulata
Orchis militaris
Orchis purpurea
Orchis laxiflora agg.
Dactylorhiza sambucina
Dactylorhiza incarnata
Dactylorhiza majalis

Vertebrata:

Pisces:

Umbra krameri
Misgurnus fossilis

Aves:

Egretta alba
Platalea leucorodia
Ardea purpurea
Botaurus stellaris
Aythya nyroca
Circus pygargus
Haliaetus albicilla
Falco cherrug
Falco peregrinus
Falco vespertinus
Crex crex
Chlidonias hybridus
Chlidonias leucopterus
Chlidonias nigra
Himantopus himantopus
Recurvirostra avosetta
Numenius arquata
Charadrius alexandrinus
Tringa stagnatilis

Species of traditional or commercial importance: Fishing of some species (Cyprinus carpio, Esox lucius, Stizostedion lucioperca) by traditional way. The harvesting of reed is done by machines. Several reed products are made in Fertőszentmiklós and in the surrounding areas of the National Park. The traditional processing of bulrush has almost entirely disappeared by now.

IV. ZONATION

Names of the different areas

Indicate the names of the different areas which make up the core area(s) and buffer zone(s).

Spatial configuration

*A Biosphere Reserve Zonation map showing the delimitations of all core area(s) and buffer zone(s) **must be provided**. Also indicate the approximate extent of the transition area(s).*

Size of terrestrial Core Area(s): 3576 ha.

If appropriate, size of marine Core Area(s): 0 ha.

Size of terrestrial Buffer Zone(s): 3665 ha.

If appropriate, size of marine Buffer Zone(s): 0 ha.

Approx. size of terrestrial Transition Area(s) (if applicable): 5301 ha.

If appropriate, approx. size of marine Transition Area(s): 0 ha.

Brief justification of this zonation (in terms of the various roles of biosphere reserves) as it appears on the zonation map.

The biggest part of the core area is situated in the central parts of the reed belt and the very sensitive saline swards. The buffer zone is in the outer parts of the reed belt and in the Szárhalom-forest. The transition zone includes some outer marsh areas with reed vegetation, agricultural lands, and the places involved in recreation and tourism.

The most important goal when marking the BR and its core area was to preserve the high diversity of several biotope-types. Here are the westernmost occurrences of the characteristic alkaline steppe-like associations in the Carpathian Basin, side by side to plant and animal species representing the flora and fauna of the Alps. The core area includes small open water surfaces within the reedbeds, locally known as internal lakes, the untouched central part of the reedy areas, the saline swards, and the steppe meadow of the Szárhalom Forest with its relict species.

The maintenance of the values of the BR was once unintentionally supported by the former strong military status of the area (iron curtain), whereas presently it is managed by the National Park Directorate. The importance of the National Park is overriding because it prevents over-exploitation, and strives to maintain the sensitive swards and other biotopes, as well as to regulate and manage tourism.

V. HUMAN ACTIVITIES

Population living in the reserve

Approximate number of people living within the Biosphere Reserve.

	Permanently	/ Seasonally	
	permanently / seasonally		
Core Area(s):	0	/	0
Buffer Zone(s):	0	/	0
Transition Area(s):	250	/	0

Brief description of local communities living within or near the Biosphere Reserve.

Indicate ethnic origin and composition, minorities etc., their main economic activities (e.g.

pastoralism) and the location of their main areas of concentration, with reference to a map if appropriate.

Territories of the following settlements (villages) are within or nearby the Biosphere Reserve: Fertőrákos, Balf, Kópháza, Hidegség, Fertőhomok, Hegykő, Fertőszéplak, Fertőd, Sarród, Fertőújlak.

The local people are mainly Hungarians, but there are minorities of Croatians (in Kópháza, Fertőhomok, Hidegség) and Germans (Fertőrákos, Balf), and there are Gipsy settlements in Fertőrákos as well.

The main economic activity was previously related to agriculture – including vineyards (traditional local sort of wine are: “Soproni Kékfrankos – Bluefrankish of Sopron and Traminer”) -, and small local factories. Recently activities related to tourism have developed more intensively. Some people work temporarily or regularly in Austria.

Name(s) of nearest major town(s).

Sopron

Cultural significance of the site

Briefly describe the Biosphere Reserve's importance in terms of cultural values (religious, historical, political, social, ethnological).

Lake Fertő was declared part of the World Cultural Heritage in 2001. Cultural values of the biosphere reserve include historic land uses, such as reed harvesting and processing, traditional fishing methods, etc. These crafts are almost disappeared by now, but can be studied at the exhibition at the visitor centre of the National Park Directorate in Sarród

There are characteristic popular architectural houses in some villages around the Fertő (Fertőrákos, Balf, Hegykő, Fertőszéplak, Sarród). There is a popular village museum in Fertőszéplak. The castles of Nagycenk and Fertőd - which belonged to Hungarian families of noble ancestry - have important architectural and cultural-historical values.

In memory of Joseph Haydn, who was musician in the castle of Fertőd, concerts are organised in Fertőd every year. There are also museums in both castles.

Use of resources by local populations

Uses or activities in the Core Area(s):

Small-scale reed harvesting in order to maintain habitats.

Main land uses and economic activities in the buffer zone(s):

Reed harvesting, fishery and silviculture.

Main land uses and major economic activities in the Transition Area(s):

Reed harvesting, fishery, silviculture and different agricultural activities (as animal husbandry, mowing and cultivation of plants, etc.).

Possible adverse effects of uses or activities in the transition area(s) and remedial measures taken:

Due to opening of the formerly strictly controlled border the disadvantageous effects of strongly developing tourism can be more significant.

If known, give a brief summary of past/historical land use(s) of the main parts of the Biosphere Reserve:

In the Fertő, reed harvesting and fishery once played an important role. On the eastern shore animal husbandry, while on the western part (near Sopron, on the hills) vineyard cultivation was important. Near the southern shore the vegetable cultivation was considerable.

Tourism

Indicate the number of visitors coming to the Biosphere Reserve each year

Guided tourists at the National Park: approx. 8 000.

Estimated visitors all around Lake Fertő (including the Austrian part) is about 200-250 000 people (domestic and foreign tourists together)

Type(s) of touristic activities (Study of fauna and flora, recreation, camping, hiking, sailing, horseriding, fishing, hunting...).

Usually, the tourists' aim is to see the natural and cultural values, for example Mekszikópuszta is typically visited for bird-watching. At Fertőrákos - which is the only beach on the Hungarian side of Fertő - the number of people coming for bathing, surfing and sailing is significant especially in summer. Bathing is permitted only in the bay of Fertőrákos which is located on the western shore of the lake.

The area (Austrian and Hungarian parts together) is a World Heritage site since 2001 as well, so tourism is affected by this fact too.

Tourist facilities and description of where these are located.

The National Park has two buildings to accommodate visitors and researchers: the Kócsagvár of Sarród and the Research House of Mekszikópuszta. Besides this, the Park has accommodation in the Sailing House of Fertőrákos (from spring to fall). The Directorate organises guided tours to the protected but visitable areas of Fertő and Hanság. The Directorate sells brochures about the region and other protected areas of Hungary at the above-mentioned information places.

Larger and qualified hotels are in Sopron and in Castle of Nagycenk. Campsites are in Sopron, Balf, Hegykő and Fertő settlements, and new campsites will be opened in the immediate future. Pensions are widespread and typical in the region. Later it can develop into rural tourism.

Almost all villages along the Fertő have at least one restaurant, which are important because of the large number of foreign tourists. You can find health spas at Balf and Hegykő.

Income and benefits to local communities

Indicate for the activities described above whether the local communities derive any income directly or indirectly and through what mechanism.

Catering industry is the most significant activity (bed and breakfast, restaurants, etc.).

VI. RESEARCH AND MONITORING PROGRAMMES

Brief description and list of publications of past research and/or monitoring activities.

In the past years systematic monitoring activity has been accomplished mainly for the abiotic factors, but also included vegetation studies, monitoring of grazing/mowing activities, waterfowl and other bird monitoring, some specific invertebrate and fish studies. At the Directorate of Fertő-Hanság National Park there is a computer-aided GIS data-base under construction, which contains formerly collected data and the results of non-monitoring activities too.

List of publications:

Antli,I. & Németh,Cs.(1995): Vörösbegy (*Erithacus rubecula*) populációk vonulásdinamikai vizsgálata Sopron környékén. Szélkiáltó, 9:15-31.

Aradi,Cs. & Kovács,G.(1982): The grey-leg goose in Hungary. *Aquila*, 89:77-88.

Aujeszky,L., Schilling,F. & Somogyi,S.(1974)(eds.): Természeti adottságok. A Fertő-táj geoszféraja. A Fertő-táj Monográfiáját előkészítő adatgyűjtemény. Vol. 1. Fertő-táj Bizottság, Bp. 254 pages.

Aujeszky,L., Schilling,F. & Somogyi,S.(1976): Alkalmazott kutatások: a Fertő-táj bioszféra-készleteinek hasznosítása. A Fertő-táj monográfiáját előkészítő adatgyűjtemény. Vol. 4. Fertő-táj Bizottság, Bp. 175 pages.

Berczik,Á.(1993): Beobachtungen über die Temperaturverhältnisse der oberen Sedimentschichten im Neusiedler See. BFB-Bericht, 79:41-46.

Behrndt,M.(1975): Häherkuckuck (*Clamator glandarius*) im Seewinkel. *Egretta*, 18:22.

Bognár,D.(1966): A fertői nádgazdálkodás. Soproni Szemle, 20:97-109.

Boronkai,P.(1968): A Fertő tó megmentése. Soproni Szemle, 22:61-64.

Breuer,Gy.(1926): *Branta ruficollis* első előfordulása a Fertőn. *Aquila*, 32-33:249-250.

Breuer,Gy.(1929): A kócsag ezidei fészkelőtelepei a Fertőn. *Kócsag*, 2:134-138.

Breuer,Gy.(1930): A MOSZ Hg. Esterházy Pál madárvártájának 1930. évi madár-jelölései. *Kócsag*, 3:278-306.

Breuer,Gy.(1947a): Csüllő a Fertő mellett. *Aquila*, 51-54:158.

Breuer,Gy.(1947b): A darvak őszi pihenője a Fertő partján. *Aquila*, 51-54:157.

Chernel,I.(1889): Madártani kutatások a Fertő délkeleti részein és a "Hanyaságban". Sopron, 19:23.

Chernel,I.(1892): Az "Öreg Eger". in: M.Kir.Term.Tud.Társ. (ed.): Emlékkönyv a Királyi Magyar Természettudományi Társulat Fél százados Jubileumára., Budapest, 202-216.

Csaplovics,E.(1989): Die geodätische Aufnahme des Bodens des Neusiedler Sees. Vol. 84. Burgenländisches Landesmuseum, Eisenstadt. 68 pages.

Dick,G.(1987): The significance of the Lake Neusiedl of Austria migrating geese. Wildfowl, 38:19-27.

Dick,G.(1988b): Habitat use and group size of greylag geese (*Anser anser*) in Lake Neusiedl area. Ökol.Vögel., 10:71-77.

Dick,G.(1990): Ortstreue und Zusammenhalt markierter Graugänse, *Anser anser*, im Brutgebiet Neusiedler See: erste Analysen. BFB-Bericht, 74:129-135.

Dick,G.(1991): On the spatial distribution and social organisation of neck-banded greylag geese *Anser anser* in their breeding area of Lake Neusiedl, Austria. Ardea, 79:265-268.

Dick,G. & Grüll,A.(1990): Ergebnisse eines mehrtägigen Zählprogrammes zur Erfassung der Nahrungsgebiete durchziehender Gänse im Neusiedler See-Gebiet. BFB-Bericht, 72:39-50.

Dick,G., Hudec,K. & Macháček,P.(1984): Sommerlicher Zwischenzug der Graugänse (*Anser anser*) des Neusiedlersee-Gebietes nach Südmähren. Vogelwarte, 32:251-259.

Dinka,M.(1993): Über die regionalen wasserchemischen Verschiedenheiten des ungarischen Seeteiles im Neusiedler See. BFB-Bericht, 79:31-39.

Dokulil,M. & Padisák,J.(1993): Langfristige (1968-1990) und jahreszeitliche Dynamik der planktischen Diatomeen im Neusiedler See. BFB-Bericht, 79:5-11.

Dvorak,M.(1985): Siedlungsdichte und Biotopwahl von kleinem Sumpfhuhn (*Porzana parva*) und Wasserralle (*Rallus aquaticus*) im Schilfgürtel des Neusiedler Sees. in: Grosina,H. (ed.): Forschungsbericht 1981-1984. Landesmuseum Burgenland, Mattersburg, 446-454.

Dvorak,M.(1987): Ergebnisse der Schwimmvogelzählungen (1981-1986) im Seewinkel (Burgenland). BFB-Bericht, 64:5-22.

Dvorak,M.(1988a): Verbreitung und Bestand des Wiedehopfs (*Upupa epops*) im Neusiedler See - Gebiet. BFB-Bericht, 66:33-37.

Dvorak,M.(1988b): Zur Verbreitung einiger gefährdeter Singvogelarten in Neusiedlersee-Gebiet. BFB-Bericht, 66:39-55.

Dvorak,M. & Grüll,A.(1983): Avifaunistischer Bericht für das Neusiedlerseegebiet. BFB-Bericht, 48:3-23.

Dvorak,M. & Grüll,A.(1985): Daten zu Nachbrutzeit, Zug, und Überwinterung gefährdeter oder ökologisch wichtiger Vogelarten im Neusiedlersee-gebiet 1981/82, 1982/83 und 1983/84. BFB-Bericht, 52:3-35.

Dvorak,M., Grüll,A. & Kohler,B.(1987): Verbreitung und Bestand gefährdeter oder ökologisch wichtiger Vogelarten im Neusiedlerseegebiet. BFB-Bericht, 60:3-23.

Dvorak,M., Karner,E. & Ranner,A.(1992): Untersuchungen zum Brutvogelbestand vor Weingärten im Neusiedler See-Gebiet/Burgenland. BFB-Bericht, 78:65-73.

Dvorak,M. & Nemeth,E.(1992): Die Brutvögel der Zitmansdorfer Wiesen. BFB-Bericht, 78:47-64.

Faragó,S.(1981): Reznek (*Otis tetrax orientalis*) a Hanságban. Mad.Táj., 1981:131-135.

Faragó,S.(1991): Bestandsverhältnisse bei der Saatgans (*Anser fabalis*) und Dynamik ihres Zuges auf der ungarischen Seite des Neusiedler Sees. BFB-Bericht, 77:59-76.

Faragó,S.(1992): A Fertő-Hanság-Szigetköz vízrendszer vadlúdjaianak ökológiai vizsgálata. Kutatási jelentés, :44 p.

Faragó,S.(1993a): Bestandsverhältnisse bei der Bleßgans (*Anser albifrons*) und Dynamik ihres Durchzuges auf der ungarischen Seite des Neusiedler Sees. BFB-Bericht, 79:105-116.

Faragó,S.(1993b): Vadlúd állományvizsgálatok 10 éves eredményei a Fertő-tó magyar területén: 1983-1993. Áll.Közl., 79:37-47.

Faragó,S.(1993c): Vadlúd állományvizsgálatok a Fertő-tájon. Szélkiáltó, 7:15-16.

Faragó,S. & Jánoska,F.(1995): Vadlúd állományvizsgálatok a Fertő-tájon 1993/1994. Szélkiáltó, 10:12-13.

Faragó,S. & Sterbetz,I.(1985): Vékonycsőrű póling (*Numenius tenuirostris*) a Fertő-tájon. Mad.Táj., 1985:27.

Fászl,I.(1883): Sopron madarai. A Pannonhalmi Szent-Benedek-Rend Soproni Kath. Főgymnasiumának Értesítője az 1882/83 iskolaévről, 1883:1-31.

Gamauf,A. & Preleuthner,M.(1996): Die Rohrweihe (*Circus aeruginosus*) im Nationalpark "Neusiedler See - Seewinkel": Eine Rote Liste Art im Konflikt mit Landwirtschaft und Fremdenverkehr? BFB-Bericht, 84:1-42.

Greschik,J.(1930): A MOSZ madárvártái. Kócsag, 3:66-68.

Greschik,J.(1934): Adat a tavi cankó fészkeléséről a Fertőn. Kócsag, 7:75.

Grüll,A.(1982): Ein neuer Brutnachweis und die früheren Vorkommen des Stelzenläufers (*Himantopus himantopus*) im Neusiedlerseegebiet. Egretta, 25:13-16.

Grüll,A.(1988a): Zu Verbreitung, Bestand und Habitatwahl des weissternigen Blaukehlchens (*Luscinia svecica cyanecula*) im Neusiedlerseegebiet. BFB-Bericht, 66:57-65.

Grüll,A.(1988b): Zur Bestandentwicklung des Höckerschwans (*Cygnus olor*) im Neusiedlersee-gebiet. BFB-Bericht, 66:5-12.

Grüll,A.(1991): Zur jahreszeitlichen Nutzung der Zitmannsdorfer Wiesen (Neusiedler See, Burgenland) durch ausgewählte Großvogelarten. BFB-Bericht, 77:35-58.

Grüll,A.(1993): Siedlungsökologische Untersuchungen am Weißsternigen Blaukehlchen (*Luscinia svecica cyanecula*) im Neusiedler See-Gebiet als Grundlage für den Artenschutz. BFB-Bericht, 79:91-104.

Győry,J. & Gárdonyi,G.(1957): Kócsaghírek a Fertőről. Aquila, 63-64:262.

Hadarics,T.(1990): A sárgafejű billegető (*Motacilla citreola*) első megfigyelése Magyarországon. Mad.Táj., 1990:32.

Hadarics,T.(1991): A kanadai lúd (*Branta canadensis*) első megfigyelése Magyarországon. Mad.Táj., 1991:29.

Hadarics,T.(1995): Új fajok a Fertő madárfaunájában. Szélkiáltó, 10:27.

Hadarics,T.(1996): Bütykös ásólúd (*Tadorna tadorna*) fészkelése Magyarországon. Tűzok, 1:124-127.

Hadarics,T., Mogyorósi,S. & Pellinger,A.(1991a): Az ezüstsirály (*Larus argentatus*) újabb fészkelése Magyarországon. Mad.Táj., 1991:30-31.

Hadarics,T., Mogyorósi,S. & Pellinger,A.(1991b): Rendellenes színezetű seregély (*Sturnus vulgaris*) megfigyelése. Mad.Táj., 1991:42.

Hadarics,T., Mogyorósi,S. & Pellinger,A.(1993a): Fenyőrigó (*Turdus pilaris*) költése a Fertő-tájon. Mad.Táj., 1993:25.

Hadarics,T., Mogyorósi,S. & Pellinger,A.(1993b): A sárgalábú sirály (*Larus cachinnans*) újabb költése a Fertő-tónál. Mad.Táj., 1993:24-25.

Hadarics,T., Mogyorósi,S. & Pellinger,A.(1993c): Vöröscsillagos kékbegy (*Luscinia svecica svecica*) első bizonyított előfordulása Magyarországon. Mad.Táj., 1993:26-27.

Hadarics,T. & Pellinger,A.(1993a): A citrombillegető (*Motacilla citreola*) újabb előfordulása Magyarországon. Mad.Táj., 1993:26.

Hadarics,T. & Pellinger,A.(1993b): Egy szokatlan színezetű kucsmás billegető (*Motacilla flava* feldegg). Mad.Táj., 1993:24.

Hadarics,T. & Pellinger,A.(1993c): A Fertő-táj hazai részén előforduló madarak névjegyzéke (1971-1992). Szélkiáltó, 10:3-16.

Hadarics,T. & Pellinger,A.(1993d): A sivatagi lile (*Charadrius leschenaulti*) első megfigyelése Magyarországon. Mad.Táj., 1993:25.

Herzig,A. et al.(1994): Fischbiologische Untersuchung des Neusiedler Sees. BFB-Bericht, 81:1-125.

Hudec,K., Dick,G. & Pellantová,J.(1986): Sommerliche Zwischensugsbewegungen der Graugans (*Anser anser*) in Mitteleuropa 1984. Ann.Naturhist.Mus.Wien, 88-89:83-90.

Ille,R.(1995): Ergebnisse einer Bestandserhebung beim Steinkauz (*Athene noctua*) im Burgenland zwischen 1992-1994. BFB-Bericht, 83:23-29.

Jagsch,A. & Rydlo,M.(1993): Der Aal, ein Problem für den Neusiedler See? BFB-Bericht, 79:47-50.

Jánoska,F.(1992): Fertő-Hanság-Szigetköz térségében kisemlős-faunisztikai és ökológiai vizsgálatok. Kutatási jelentés, :14 p.

Jánoska,F.(1993): Adatok a réti fülesbagoly (*Asio flammeus*) téli táplálkozásához a Fertő-tájon. Aquila, 100:189-192.

Jánoska,F.(1994): Kisemlős-faunisztikai vizsgálatok a Fertő-tájon bagolyköpetek alapján. Erd.Faip.Tud.Közl., 38-39:137-147.

Karner,E., Ranner,A. & Zuna-Kratky,T.(1992): Zur Heuschreckenfauna der Zitmandorfer Wiesen und des angrenzenden Seedammes (Neusiedler See, Burgenland). BFB-Bericht, 78:31-46.

- Károlyi,S.(1933): A Fertő-tó. Vízügyi Közlemények, 15:242-256.
- Kárpáti,L.(1979): A magyar Fertő madárvilága és ornitológiai kutatásának soproni vonatkozásai. Soproni Szemle, 33:340-351.
- Kárpáti,L.(1983): Die Schilfernte und die Vogelwelt. Forum Pannonicum Rer.Nat., I.:23-25.
- Kárpáti,L.(1984): Madártani hírek Sopron környékéről - 1983. Mad.Táj., 1984:93-96.
- Kárpáti,L.(1987): Üstökösreçe (*Netta rufina*) fészkelése a Fertő hazai oldalán. Mad.Táj., 1987:29-31.
- Kárpáti,L.(1989a): Gyurgyalagok (*Merops apiaster*) a Fertő-mentén. Mad.Táj., 1989:82-83.
- Kárpáti,L.(1989b): A hazai Fertő-rész mint madárparadicsom szomorú realitásai és vígasztaló lehetőségei. Soproni Egyetem (természetvédelmi különszám), :40-45.
- Kárpáti,L.(1991a): Erste Ergebnisse der Lebensreumrekonstruktion bei Mekszikópuszta. BFB-Bericht, 77:85-91.
- Kárpáti,L.(1991b): Madártani élet az Alpokalján és a Fertőn. Az MME III. Tud.Ülése Szombathely, :11-16.
- Kárpáti,L.(1993): Élőhely-rekonstrukció a Fertő-menti szikeseken. Mad.Táj., 1993:11-15.
- Kárpáti,L. & Mogyorósi,S.(1993): Kárókatónák (*Phalacrocorax carbo*) tömeges pusztulása a Fertőn. Mad.Táj., 1993:17.
- Keresztessy,K.(1992): Halfaunisztikai kutatások a Fertő-tó és a Hanság körzetében. Halászat, :58-60.
- Király,I.(1930): A Fertő őszi madárvilága. Kócsag, 3:35-37.
- Koenig,O.(1947): Az osztrák Fertő-tó a második világháború után. Aquila, 51-54:95-96.
- Kohler,B.(1988a): Die Brutbestände von Flussregenpfeifer (*Charadrius dubius*), Seeregenpfeifer (*Charadrius alexandrinus*), Uferschnepfe (*Limosa limosa*) und Rotschenkel (*Tringa totanus*) im Seewinkel in den Jahren 1986 und 1987. BFB-Bericht, 66:13-26.
- Kohler,B.(1988b): Zur Methodik der Bestanderfassung und zu den Beständen des Säbelschnäblers (*Recurvirostra avosetta*) in den Jahren 1986 und 1987 im Seewinkel. BFB-Bericht, 66:27-32.
- Kohler,B.(1991): Zum Auftreten des des Stelzenläufers (*Himantopus himantopus*) im Neusiedlerseegebiet 1982-1990. Vogelkund.Nachr.Ostösterreich, 2:13-14.
- Kohler,B. & Rauer,G.(1990): Phänologie des Limikolendurchzugs 1985-1988 im Seewinkel. BFB-Bericht, 72:5-28.
- Kohler,B. & Rauer,G.(1993): Kurzbericht über die Wiesenlimikolenzählungen 1991 im Seewinkel. BFB-Bericht, 79:85-90.
- Koó,A.J.(1994): Pflegekonzept für die Naturschutzgebiete des Burgenlandes. BFB-Bericht, 82:1-203.

Krachler,R.(1993): Beitrag zum Wasserhaushalt der Lacken des Seewinkels. BFB-Bericht, 79:63-82.

Kysela,P.(1992): Der Einfluss des winterlichen Schilfschnittes auf die Spinnenfauna in Schilfgürtel des Neusiedler Sees. Szakdolgozat, Universität Wien.

Laber,J.(1995): Zum Wintervorkommen der Kornweihe (*Circus cyaneus*) im Seewinkel. BFB-Bericht, 83:37-43.

Lederer,E.(1990): Erste Ergebnisse zur Altersstruktur und zum Geschlechterverhältnis im Herbst durchziehender Limikolen im Seewinkel mit Berücksichtigung der Mauserzustandes. BFB-Bericht, 72:29-38.

Magerl,C.(1980): Gelbschenkel (*Tringa flavipes*) im Seewinkel. Egretta, 23:42.

Marián,M. & Traser,G.(1978): Sopron környékének kétéltl-hüllő világa. Soproni Szemle, 32:153-171.

Márkus,I.(1995): Fertő-tavi Nemzeti Park Biotóp Térkép. EFE Sopron. 1:12500. Map 19. Scale 1:12500.

Mészáros,Z. & Szabóky,C.(1981): A Fertő-tó nádrontó lepkéi. Növényvédelem, 17:372-375.

Metz,H. & Forró,L.(1989): Contributions to the knowledge of the chemistry and crustacean zooplankton of sodic waters: the Seewinkel pans revisited. BFB-Bericht, 70:3-73.

Mogyorósi,S.(1995): Függőcinege (*Remiz pmdulinus*) -jelölő tábor (Fertőrákos 1994). Szélkiáltó, 10:29.

Mogyorósi,S. & Molnár,B.(1994): Függőcinege (*Remiz pendulinus*) késői fészkelése. Szélkiáltó, 8:17.

Mogyorósi,S. & Pellingner,A.(1992): Üstökös réce (*Netta rufina*) fészke nádkévék közt. Mad.Táj., 1992:45.

Molnár,L.(1981): Faunisztikai adatok (A Faunisztikai Szakosztály adattárából 1.). Mad.Táj., 1981:24-29.

Müller,ChY.(1990): Vergleich der Ergebnisse einer kurzfristigen und zweier langfristiger Bestanderfassungen bei Vögel am Neusiedler See. BFB-Bericht, 73:15-22.

Padisák,J.(1993): Species composition, spatial distribution, and the seasonal and interannual dynamics of phytoplankton in brown-water lakes enclosed with reed-belts (Neusiedlersee/Fertő, Austria/Hungary. BFB-Bericht, 79:13-29.

Parz-Gollner,R., Szinovatz,H. & Gossow,H.(1994): Untersuchungen zur Ökologie, räumlichen Verbreitung und wirtschaftlichen Bedeutung von jagdbaren Wildarten im Seewinkel sowie Vorschläge zur Wildtierbehandlung im Nationalpark Neusiedler See - Seewinkel. BFB-Bericht, 80:3-83.

Pellingner,A.(1991b): Vörös ásólúd (*Tadorna ferruginea*) a Fertő tónál. Mad.Táj., 1991:16-17.

Pellingner,A.(1993a): A Fertő vadludairól. Szélkiáltó, 7:10-14.

Pellingner,A.(1993b): Ritka vadludak előfordulásai a Fertőn az 1991-92-es vonulási időszakban. Mad.Táj., 1993:32.

Pellinger,A.(1994): Nyári lúd (*Anser anser*) fiókát zsákmányoló sárgalábú sirály (*Larus cachinnans*). Szélkiáltó, 8:12.

Pellinger,A.(1995a): Gólyatöcsök (*Himantopus himantopus*) költése a Fertő magyarországi részén. Szélkiáltó, 10:5-9.

Pellinger,A.(1995b): Szerkők (*Chlidonias* sp.) vonulásdinamikája a Fertőn. Szélkiáltó, 10:18-20.

Pellinger,A. & Mogyorósi,S.(1989): Függőcinege (*Remiz pendulinus*) késői fiókanevelése. Mad.Táj., 1989:43.

Pellinger,A. & Soproni,J.(1995): Adatok Sopron környéke és a Fertő madárvilágához az 1993-as évből. Szélkiáltó, 10:25-26.

Pellinger,A., Turi,Z. & Kondor,K.(1990): Megfigyelések a dankasirályok (*Larus ridibundus*) táplálkozásáról a Fertő-tó környékéről. Mad.Táj., 1990:53.

Pellinger,A. & Váczi,M.(1994): Adatok a vándorsólyom (*Falco peregrinus*) táplálkozásához őszi-tavaszi időszakban. Szélkiáltó, 8:14-15.

Pichler,J.(1979)(ed.): A Fertő-táj tudományos kutatási terve. Győr-Sopron megye Tanácsa, Bp. 419 pages.

Ranner,A.(1990): Erste Auswirkungen der Ruster Schilfbeweidungsprojektes auf die Vogelwelt des Gebietes. BFB-Bericht, 73:5-14.

Sauerzopf,F.(1991): Stand der Vorkommens vom Fischotter (*Lutra lutra* L.) im Burgenland. BFB-Bericht, 76:19-23.

Schenk,J.(1909): A pusztai talpastyúk 1908. évi vándorútja. Erd.Lpk., 48:224-227.

Schenk,J.(1917): Madártani töredékek a Fertőről. Aquila, 24:66-106.

Schlenker,R.(1976): Ein Gelbbraunenlaubsänger (*Phylloscopus inornatus*) im Seewinkel. Egretta, 20:45.

Schlenker,R.(1988): Zum Zug der Neusiedlersee(Österreich)-Population des Teichrohrsängers (*Acrocephalus scirpaceus*) nach Ringfunden. Vogelwarte, 34:337-343.

Seitz,A.(1935): Ornithologisches vom Neusiedlersee. Kócsag, 8:29-33.

Sezemsky,R. & Ripfel,J.(1985): Zur Siedlungsdichte der Rohrweihe im Schilfgürtel des Neusiedler Sees. in: Grosina,H. (ed.): Forschungsbericht 1981-1984. Landesmuseum Burgenland, Mattersburg, 455-466.

Smuk,A.(1957): Nagykócsag pusztulása 1955 tavaszán a Fertőnél. Aquila, 63-64:262.

Sólymossy,L.(1938): Madarélet a Fertő-tó déli részén 1930 augusztus végén. Aquila, 42-45:657-659.

Steiner,R.(1995): Brutbestand und Verteilung der Bruten bei der Flußseeschwalbe (*Sterna hirundo*) in den Jahren 1992 und 1993 im Seewinkel. BFB-Bericht, 83:31-36.

Sterbetz,I. & Schmidt,E.(1984): Einige Daten über die Graugans *Anser anser* in Ungarn. *Acta Sc.Nat.Brno*, 18:31-32.

Szeglet,P.(1993): Probleme der Schilferhaltung in drei Seen Neusiedler See, Velenceer See, Plattensee. *BFB-Bericht*, 79:53-58.

A táj hidroszférája és vízgazdálkodása. A Fertő-tájjal kapcsolatos kutatásokat és feltárásokat áttekintő helyzetfelmérő tanulmányok(1970)(ed.): . Vol. II. Fertő-táj Bizottság, Bp. 125 pages.

Traser,Gy.(1975): A Fertő-tó madárvilágának vizsgálata és a létesítendő fertői természetvédelmi területek kijelölése. Diplomaterv, EFE Sopron. 68 pages.

Traser,Gy.(1982): Megfigyelés néhány madárfaj élőhely-(monotop)választásáról a Fertő-tó DK-i partján. *Erd.Faip.Tud.Közl.*, 1982/2:191-207.

Traser,Gy.(1983): Egy félintenzíven legeltetett tehénlegelő madárvilága a Fertő DK-i partján. *Erd.Faip.Tud.Közl.*, 1983/2:175-189.

Traser,Gy. & Christian,E.(1992): *Lepidocyrtus peisonis* sp. n., neuer Springschwanz aus dem Neusiedlersee-Gebiet (Collembola: Entomobryidae). *Fol.Entom.Hung.*, 52:119-122.

Triebler,R.(1983): Über den Seeregenpfeifer (*Charadrius alexandrinus*) im Seewinkel, Burgenland/Österreich. *Seevögel*, 4:39-41.

Triebler,R.(1984): Die Graugans (*Anser anser*) im Neusiedler-Seegebiet, Österreich. *Acta Sc.Nat.Brno*, 18:25-30.

Triebler,R.(1990): Bestand und Verbreitung der Flußseeschwalbe (*Sterna hirundo*) im Neusiedler See - Gebiet in den 80er Jahren. *BFB-Bericht*, 73:23-27.

Triebler,R. & Frushtück,H.(1979): Erhebungen über den Weiss-Storch (*Ciconia ciconia*) im Burgenland von 1963-1973. *Natur und Umwelt im Burgenland*, Sonderheft 2.:3-31.

Tunner,H.G.(1974): Die klonale Struktur einer Wasserfroschpopulation. *Z.f.zool.Systematik u. Evolutionsforschung*, 12:309-314.

Tunner,H.G.(1978): Zur Morfologie junger Wasserfrösche aus verschieden zusammengesetzten Populationen. *Ann.Naturhist.Mus.Wien*, 81:465-474.

Tunner,H.G.(1980): Kreuzungsexperimente mit Wasserfröschen aus österreichischen und polnischen Mischpopulationen (*Rana lessonae*+*Rana esculenta*). *Z.f.zool.Systematik u. Evolutionsforschung*, 18:257-297.

Ujhelyi,J.(1933): Nagy kócsag márciusban a Fertőn. *Kócsag*, 7:59.

Varga,L.(1930): A fertői és hansági kirándulás. *Kócsag*, 3:61-64.

Varga,L.(1931): A Fertő problémája. *Kócsag*, 4:109-114.

Winkler,H., Berthold,P. & Leisler,B.(1994): Monitoring of bird populations in the lake Neusiedl area. *Stapfia*, 31:29-36.

Zwicker,E. & Grüll,A.(1985): Über die jahreszeitliche Verteilung, Brutphänologie und nachbrutzeitlichen Wanderungen bei Schilfvögeln am Neusiedler See. in: Grosina,H. (ed.): *Forschungsbericht 1987-1989. Landesmuseum Burgenland, Mattersburg*, 413-445.

Brief description of on-going research and/or monitoring activities.

Abiotic research and monitoring:

Organised by ÉDUKÖVIZIG (North-Transdanubian Water Management and Environmental Directorate)

Biotic research and monitoring:

There are ongoing vegetation studies, monitoring of grazing/mowing activities, effects of reed harvesting methods, waterfowl and other bird monitoring, some specific invertebrate and fish studies partly organized by the Directorate of Fertő-Hanság National Park. There is a computer-aided GIS data-base under construction, which contains formerly collected data and the results of non-monitoring activities too.

Socio-economic research:

No recent data

Estimated number of national scientists participating in research within the Biosphere Reserve on a permanent or occasional basis.

50 persons

Estimated number of foreign scientists participating in research within the Biosphere Reserve on a permanent or occasional basis.

5 persons

Research station(s) within the Biosphere Reserve.

Hydrometeorological Station of Fertőrákos

Pollution Measuring Station of Mekszikópuszta

Permanent research station(s) outside the Biosphere Reserve.

Laboratories of Departments of Sopron University.

Research facilities of research station(s) (meteorological and/or hydrological station, experimental plots, laboratory, library, vehicles, computers etc.).

All the above-mentioned facilities are available. The Hydrometeorological Station and the Pollution Measuring Station work partly automated. The former has several measuring devices in the territory of BR. The collection and evaluation of data is accomplished mainly in external institutes.

Other facilities (e.g. facilities for lodging or for overnight accommodation for scientists etc.).

There is a study house at Mekszikópuszta offering limited facilities for scientists (mainly in the regular bird counting/ringing times).

Indicate how the results of research programmes have been taken into account in the management of the biosphere reserve

The staff responsible for the management take into account:

- the results of the research programmes on condition of reeds and on effects of reed harvesting to establish limits to harvesting;
- the results concerning land use by traditional Hungarian domesticated animals for the management of fields.

VII. EDUCATION, TRAINING AND PUBLIC AWARENESS PROGRAMMES

Describe the types of activities related to

- Environmental education and public awareness:

Educational programs (in puszta and in forest), study circles, camps.

- Training programmes for specialists:

Special study-tours, lectures, special field training (from spring to winter).

Indicate whether there are facilities for education and training activities, as well as visitors' centres for the public

There are standard and occasional exhibitions in the Kócsagvár at Sarród and some nature trails.

VIII. INSTITUTIONAL ASPECTS

State, Province, Region or other administrative units

List in hierarchical order administrative entity(ies) in which the Biosphere Reserve is located (e.g. state(s), counties, districts).

Hungary, Győr-Moson-Sopron county

Bordering villages on transition zone: Fertőrákos, Balf, Kópháza, Hidegség, Fertőhomok, Hegykő, Fertőszéplak, Fertőd, Sarród, Fertőújlak. Only Fertőboz lies in the transition zone of the BR.

Management plan/policy

Indicate if a management plan or policy exists for the overall biosphere reserve.

The Management Plan of the National Park was prepared in 1996-97 and it is in effect for 10 years. Now a new Management Plan is under way.

If yes, briefly describe the main characteristics of this plan and precise the modes of application.

The Plan is based on features of the region - situation close to the national border and co-operation with the Austrian partner - outlines the principles for management, development and habitat reconstruction of nature protection for the next decade. The working management plan took effect in 1997.

The new plan will be published after public discussion as a part of a "National Park Law".

Authority in charge of administration of the whole, i.e. of implementation of this plan/policy:

The Lake Fertő Biosphere Reserve is managed and supervised by the Directorate of the Fertő-Hanság National Park (Directorate of the FHNP). The Directorate of the FHNP is controlled by the Ministry of Environment and Water.

Total number of staff of Biosphere Reserve:

57 (38 of them are officers, rangers, ecological staff, 19 workers are involved in the management works.)

Financial source(s) and yearly budget:

Indicate the source and the relative percentage of the funding (e.g. from national, regional, local administrations, private funding, international sources etc.) and the estimated yearly budget in the national currency.

315 million Ft (2006 base)

Authority in charge of administration

The biosphere reserve as a whole:

Authority:

North-Transdanubian Environmental, Nature conservation and Water management Authority

Management:

Fertő-Hanság National Park Directorate.

Core area(s):

Authority:

North-Transdanubian Environmental, Nature conservation and Water management Authority

Management:

Fertő-Hanság National Park Directorate.

Buffer zone(s):

Authority:

North-Transdanubian Environmental, Nature conservation and Water management Authority

Management:

Fertő-Hanság National Park Directorate.

Mechanisms of consultation and co-ordination among these different authorities:

Where appropriate, National (or State, or Provincial) administrations to which the biosphere reserve reports:

Ministry of Environment and Water

Mechanism for consultation of local communities

Indicate how and to what extent local people living within or near the Biosphere Reserve.

- have been associated to the biosphere reserve nomination:

The nomination process took place under the past regime when the consultation with the local people was not necessary part of the nomination process which was decided on scientific base and forced by the power of the government policy.

- participate to the decision process and management resources:

Recently the consultation between the local communities and the Fertő-Hanság National Park Directorate (the responsible body for the habitat management) focuses on consultation of the development plans with the local communities.

Indicate whether you consider the participation of local communities to be satisfactory and, if not, what measures are envisaged to improve this situation

The better understanding of “green ideas” including acceptance of the natural values as a part of common heritage, conservational and environmental issues should be provoked by the continuous presence of the NP staff in the public life, media, etc. (It is not enough to wait for visitors passively, proactive steps are needed.)

Protection regime of the core area and possibly of the buffer zone

Indicate the type (e.g. under national legislation and date since when the legal protection came into being and provide justifying documents (with English or French summary of the main features).

Order No. 2/1991. (II. 9.) KTM

about declaration to National Park of Fertő-Lake Land Protected area

Order No. 5/1994. (III. 8.) KTM

about the modification of the name and enlargement of Fertő-Lake National Park

Land tenure of each zone

Percentage of ownership in terms of national, state/provincial, local government, private, etc.

Core Area(s): 100 % state property

Buffer Zone(s): 100 % state property

Transition Area(s): 49 % state property, 37 % co-operative property, 11 % private property, 3 % local governmental property.

Foreseen changes in land tenure.

Not expected

Contact address(es)

Contact address of the biosphere reserve for all official correspondence.

Name: Fertő-Hanság Nemzeti Park Igazgatóság

Street or P.O. Box: Rév, Kócsagvár

City with postal code: 9435 Sarród

Country: Hungary

Telephone: 36 99 537 620

Telefax (or telex): 36 99 537 621

E-mail: fhnpititkarsag@fhnp.kvvm.hu

Web site address: www.ferto-hansag.hu

IX. CONCLUSION

Brief justification of the way in which the biosphere reserve fulfils each criteria of article 4:

2. Representative ecological systems - graduation of human interventions

The Lake Fertő BR is a representative ecological system of the last, saline shallow water steppe lake series from West-Asia to E-C Europe. It has recently a well developed reed belt with high coverage representing excellent habitats for specific communities. Intensive agricultural land use (declining), leisure activity (tourism, fishing; increasing on limited areas), reed harvesting are the main human activities.

2. Significance for biological diversity conservation

One of the main aims of the Fertő-Hanság National Park Directorate is habitat conservation, so the Fertő BR can fulfil this function.

3. Approaches to sustainable development on a regional scale

Since the organizing of the national park directorate as a regional authority of nature conservation (1991), the conservational issues were handled more easily both with regard to management (in the protected areas) and to local development (in non-protected areas, through the revision of the local/regional development plans. Since 2005 the national park directorates are responsible for the management only while the regional authorization issues mostly belong to the regional Environmental, Water Management and Nature Conservation Authority. However, local development plans are still revised by the national park directorates with regard to landscape protection (including wind power plant issues, etc.).

4. Appropriate size to serve the three functions

The Fertő-Hanság National Park covers the most important, relevant habitats of the area, the BR is within its territory. So the size can be regarded as big enough.

5. Appropriate zonation to serve the three functions

The zonation is based on the IUCN criteria, so it should be fit to these functions as well.

6. Participation of public authorities and local communities

The authorization process involves the regional Environmental, Water Management and Nature Conservation Authority, which is responsible to keep the rules of involving all necessary bodies into the decision-making process.

The National Park Committee – organized in the past year – is a supporting body of the national park directorate consisting of representatives of the regional scientific and common life.

7.
 - a) mechanisms to manage human use and activities
 - b) Management policy or plan
 - c) Authority or mechanism for implementation
 - d) Programmes for research, monitoring, education and training

The land use and activities of the local people are governed by the nature conservation act and (in more detail) in the management plan of the national park. It refers to the BR as well. Authorization process is managed mainly by the “green authority” involving all necessary bodies.

The monitoring programmes are coordinated from the Ministry of Environment and Water. Basic studies are declining recently because the necessary funding is vanishing.

Education and training are steadily gaining importance, and are managed by the Department of Ecotourism and Environmental Education of the NP.

Does the biosphere reserve have cooperative activities with other biosphere reserves (exchanges of information and personnel, joint programmes, etc.)?

At the national level:

Not relevant, not connected with the MAB programme, it is mainly on the basis of the national parks.

Through twinning and/or transboundary biosphere reserves:

Not relevant.

Within the World Network (including Regional Networks):

Not relevant.

Obstacles encountered, measures to be taken and, if appropriate, assistance expected from the Secretariat:

No data.



**PERIODIC REVIEW
FOR BIOSPHERE RESERVES IN
HUNGARY**



HORTOBÁGY BIOSPHERE RESERVE



**DEBRECEN
2007**

I. NAME OF THE BIOSPHERE RESERVE

Hortobágy Biosphere Reserve

II. COUNTRY

Hungary

III. PHYSICAL CHARACTERISTICS OF THE BIOSPHERE RESERVE

Latitude and longitude

20° 37' 00" - 21° 23' 25", 47° 18' 45" - 47° 51' 55"

Biogeographical Region

Pannonian

Topography of the region

Extensive flat lowland (originally seasonal and occasional flooding area) dominates the landscape which is an ice-age alluvial cone. Abandoned, marsh-covered river beds, erosional ditches and the richness of micro-topographic features are typical. They form a conspicuous mosaic structure of habitats. Dominant types of soils are different alkaline formations. This is the largest occurrence of continental sodic and alkaline soils in Europe (except for the semidesert region around lower Volga river). Recently the landscape is treeless grassland with extensive patches of alkaline marshes.

Climate

Temperate continental forest-steppe climate (Köppen-code is CFBX), with an average temperature of -2.5 - -3.2 °C in January and 21.5 - 22.2 in July. The average precipitation varies between 500-550 mm. Extreme values of the yearly rainfall are: 280 mm and 900 mm. These features show transition to the cold continental climate. Another transition appears to the temperate steppe-climate, as there is a short arid period in late summer in the W-part of the area.

Geology, geomorphology, soils

While the main watercourse of the eastern part of Carpathian-Basin, the Tisza river moved laterally towards Northwest in the late Pleistocene, but did not erode most part of the former, slightly undulating fluvial deposits of fluvial cone sloping from north. The residual surfaces of this cone are low loess-ridges, small sand-dunes and parallel, abandoned beds.

The seasonal, flat flood plain was originally typical, before river-regulations in the 19th century. This is the "locus classicus" of the alkaline and noncoastal sodic and saline soils in Europe. Not only the largest but the most diverse occurrence of Na-rich soils considering the types and subtypes of them, special micro-geomorphologic conditions, erosional forms, microhabitats etc. As an example of this diversity one can mention the vertical size of the erosional benches ("padka" in Hungarian term) varying from 1-2 cm to 120-150 cm in their height.

Significance for conservation of biological diversity: habitats and characteristic species

Type of habitat:

Treeless alkaline pastures and meadows are predominant. The habitats of orographical series of zonation are:

1. Open water surfaces in the deepest parts of marshes and oxbow-lakes, riverbeds, covered by different size pondweed species or rarely without any vegetation (**Lemnetea**).

Main human impact was the water-regulation and the creation of new bed for the larger rivers (it resulted not only in artificial beds, but cut oxbow-lakes from the original riverbed inside and outside the flooding area also).

Main land-using types, close to Tisza river but outside of recent BR: angling and fishing. In the large water-reservoir on the Tisza-river providing irrigation-water, mass-tourism is also important. Inside the BR these habitats are unexploited.

1.1. Duckweed covered water-surfaces **Lemnion minoris association group**.

Important or characteristic vascular plant species are: Common Duckweed (*Lemna minor*), Fat Duckweed (*Lemna gibba*), Rootless Duckweed (*Wolffia arrhiza*), *Salvinia natans*.

1.2. **Lemno-Utricularietum** floating hair-weed association.

Important or characteristic species are: Common Duckweed (*Lemna minor*), Greater Bladderwort (*Utricularia vulgaris*), *Utricularia neglecta*.

1.3. Hair-weed vegetation with the dominance of Rigid Hornwort (*Ceratophyllum demersum*) and Water Soldier (*Stratiotes aloides*) (**Hydrocharition association groups**).

Other important species are: Ivy-leaved Duckweed (*Lemna trisulca*), rare *Potamogeton* species, Soft Hornwort (*Ceratophyllum submersum*).

2. Rooting hair-weed associations (**Potametea**).

These communities occur on the same places where the open water surfaces, surrounding the former ones.

Main human impacts, land using, recent nature protection management, see at chapter 1.

2.1. Shining Pondweed dominated pondweed association (**Potamogenetum lucentis**)

2.2. Curled Pondweed dominated pondweed association (**Potamogenetum crispum**)

2.3. Fennel Pondweed dominated pondweed association (**Potamogenetum pectinatum**)

2.4. Horned Pondweed dominated pondweed vegetation (**Parvopotamo-Zannichellietum palustris**)

2.5. Water chestnut rooting hair-weed association (**Trapetum natantis**)

2.6. Fringed Water-lily covered hair-weed vegetation (**Nymphoidetum peltatae**)

2.7. White and Yellow Water-lily's rooted hair-weed vegetation (**Nymphaeetum albo-luteae**)

3. Uliginous vegetation, occurring primarily in well-vegetated salt marshes and on the fringe of more sodic stagnant waters with larger open water (**Isoeteo-Nanojuncetea**, **Phragmitetea** and **Magnocaricetalia** communities).

Main human impacts: The water regulation that started in the second half of the 19th century and stopped 30-40 years ago. It resulted in large desiccation process and the fragmentation of catchment areas of ponds and marshes.

Land using: Significant part of the reed vegetation is used for reed-cutting. The artificial fish-ponds (inside the recent BR more than 2.000 hectares), the oxbow-lakes and the rivers are used for fishing and angling, the coastal vegetation of them for reed-cutting also.

Management for nature protection: Control of the formerly mentioned human activities. More than 8.000 hectares of marshes are floodable from the Tisza river through channel-systems for better ecological conditions, because the natural flooding by the Tisza river ceased after the course of the river was regulated in the 19th century.

3.1. Dwarf vegetation on muddy surfaces (**Elatini alsinastri-Lindernietum procumbentis**). Other important species are (other than the main association species): Mudwort (*Limosella aquatica*), Hungarian Waterwort (*Elatine hungarica*), *Elatine alsinastrum*, *Elatine triandra*.

3.2. Alkaline reeds (**Bolboschoeno-Phragmitetum**).

Other important species are: *Glyceria maxima*, *Typha angustifolia*, *Typha laxmanni*.

3.3. Alkaline bulrush vegetation (**Schoenoplectetum tabernaemontani**).

Other important species are: Narrow-leaved Water-plantain (*Alisma lanceolatum*), Flowering Rush (*Butomus umbellatus*).

3.4. Alkaline low-vegetated marsh (**Bolboschoenetum maritimi**)

3.5. Alkaline sedge associations (**Caricetum gracilis**, **Caricetum melanostachyae** and **Caricetum acutiformis**)

3.6. Pondweed vegetation of ephemeral sodic and alkaline ponds (**Najadetum minoris** and **Ranunculetum aquatilis-polyphylli**).

Other important species are: Fan-leaved Water Crowfoot (*Ranunculus circinatus*), *Ranunculus radicans*, *Ranunculus petiveri*.

4. Meadows, alkaline meadows occurring primarily at the edges of salt marshes and in shallow depressions, and covering abandoned ice-age streamlet-beds (**Beckmannion eruciformis** type vegetation).

The feature of these associations is a medium tall grassy vegetation, often with tussocks of grasses (but never of sedges).

Main human impacts: hay-cutting, sometimes grazing. Some smaller patches in the proposed transitional zone are endangered because ploughing up of virgin grasslands. Burning of the vegetation in early spring, when the winter was dry.

Management practice: Most of them are mown, but in drier years the alkaline associations can be used as seasonal pastures only. The nature protection controls the timing of the hay-cutting. Using of chemicals and fertilizers is prohibited inside of the BR – as in all cases except for some arable lands.

4.1. Alkaline meadow vegetation dominated by tall grass species: (**Agrostio albi-Alopecuretum pratensis**, **Agrostio-Glycerietum poiformis** and **Beckmannietum eruciformis**).

Other important species are: Kerner's Yellowcress (*Rorippa kernerii*), Hungarian Marsh Thistle (*Cirsium brachycephalum*), *Ranunculus laterifolius*, *Ranunculus polyphyllus*.

4.2. Hay-meadows on flooding areas of rivers (**Carici vulpinae-Alopecuretum pratensis**, **Agrostio-Phalaridetum arundinaceae** and **Ranunculetum repentis**). Important species are: Marsh Gentian (*Gentiana pneumonanthe*), Hungarian Horse-radish (*Armoracia macrocarpa*), Hungarian Rivershore Daisy (*Leucanthemum serotinum*), mostly outside of the BR.

5. Bare or less-vegetated alkaline and sodic surfaces with seasonal flooding and desiccation (**Thero suadetia** and **Puccinetalia** associations)

These associations are species-poor, often only 1-2 species occur here.

Main human impacts: Economically valueless parts of pastures, except for *Puccinellietum limosae* association, which can provide grazing or mowing possibility in wet summers.

Negative influences: Former channeling, recent undergrazing.

Management: grazing, sometimes overgrazing. Destroying of formerly built channel and dike system (completed LIFE NATURE project and ongoing plans to eliminate the remnant drainage-elements).

5.1. Annual *Camphorosma* community on drier bare surfaces (**Camphorosmetum annuae**)

Other important species are: Small Red Goosefoot (*Chenopodium chenopodioides*), Sea Plantain (*Plantago maritima*), *Kochia prostrata*.

5.2. Sand Spurrey's and Continental Seablite's association (**Spergulario marginatae-Suaedetum prostratae**)

5.3. Seablite's association (**Suaedetum salinariae**)

- 5.4. Sodic Saltwort's association (**Salsoletum sodae**)
 - 5.5. Continental Glasswort's association (**Salicornietum prostratae**)
 - 5.6. Pondbed vegetation of desiccated sodic lakes (**Crypsidetalia aculeatae**)
 - 5.7. (**Pholiuro pannonici-Plantaginetum tenuiflorae**)
 - 5.8. Puccinellia grass covered vegetation on wetter surfaces (**Puccinellietum limosae**)
- Important species are: Puccinellia distans, Aster tripolium ssp. pannonicus
- 5.9. (**Bassietum sedoidis**) association

6. Alkaline pasture communities (**Artemisio-Festucetalia pseudovinae**)

Feature: short grassy (up to 20-40 centimetres but generally less than 10 centimetres high) pastures with low production usually. These communities are dominated by Fescue grass. These communities form huge pastures in the biosphere reserve.

Main human impact was the formerly mentioned water-regulation. In the last 15 years the number of stocks had collapsed, the Fescue and Agropyron species have started to overgrow the pastures. Some smaller patches of pasture in the transitional zone are endangered by ploughing up. Spontaneous and man-made burning of large areas in early spring and summertime also occurs.

Management for nature protection: Control of grazing in time and space because of the nesting and migration period of birds. Using of chemicals and fertilizers is not allowed, except for the planned transitional zone.

6.1. **Artemisio santonici-Festucetum pseudovinae** pasture community, on lower surfaces usually with an early spring water-cover. It is similar to the Artemisia-steppes and semi-deserts of Central Asia. This association covers the greatest areas of the Hortobágy BR (cca. 25-30 %).

Characteristic species are: Slender Hare's-ear (Bupleurum tenuissimum), Schwarzenberg's Plantain (Plantago schwarzenbergiana), Alkaline Viper's-grass (Scorsonera cana), Hungarian Sea-lavender (Limonium gmelinii ssp. hungarica).

6.2. **Achilleo-Festucetum pseudovinae** pasture community, mainly on clayey soils with 10-30 cm humus layer, characteristic sneezewort species of which are Achillea setacea and A. collina. Other important species are: dwarf Trifolium species, e.g. Slender Trefoil (T. micranthum), Lesser Trefoil (T. dubium), Fenugreek (T. ornithopodioides), Lotus corniculatus, Inula britannica.

7. Tall-grassy native loess-steppe grassland (**Salvio nutanti-nemorosae-Festucetum rupicolae**), dominated by Steppe Fescue (Festuca rupicola), Wild Sage (Salvia nemorosa), Austrian Clary (Salvia austriaca).

Other important species are: Phlomis (Phlomis tuberosa), Steppe Kale (Crambe tataria) (yet disappeared), German Inula (Inula germanica), Medusa-head Grass (Taeniatherium asperum), Stipa capillata.

This association *can be used as* pasture and haymeadow also, but in dry years the production is low.

The land using and the management for nature protection are a mixture of pastures and haymeadows, depending on the actual and concrete land-using form.

8. Residual forest-steppe associations (**Peucedano-Asteretum sedifolii** and **Galatello-Quercetum roboris** communities)

8.1. Peucedano-Asteretum sedifolii dry meadow community with a medium tall grassy structure, primarily in the clearings of oak forests on alkaline soils covered by water in early spring. A species-rich association where elements of meadows, dry grasslands and alkaline areas can also be found. This association has its origin in the ages of the early Holocene or late Pleistocene.

8.2. Relic oak forest on alkaline soils (Galatello-Quercetum). It occurs always as a mixture with the Peucedano-Asteretum association.

The upper canopy is dominated by Pedunculate Oak (*Quercus robur*), and by Turkey Oak (*Quercus cerris*). Typical species of the bush-layer are Tartarish Maple (*Acer tataricum*), Field Maple (*Acer campestre*) and many other species, the undergrowth is a mixture of forest and alkaline grassland elements. The richness of the Oak species is remarkable: *Q. petraea*, *Q. pubescens*, *Q. virgiliana* still occur.

9. Oak-Ash-Elm gallery forest (**Fraxino pannonicae-Ulmetum**).

This native types of forest occur only along River Tisza, close to the recent BR but not inside it.

The canopy is closed and the dominant species are *Quercus robur*, Smooth-leaved Elm (*Ulmus minor*) and Hungarian Narrow-leaved Ash (*Fraxinus angustifolia* ssp. *pannonica*).

Other important species are: Hungarian Rivershore Daisy (*Leucanthemum serotinum*), Summer Snowflake (*Leucojum aestivum*), Helleborine Orchid species (*Epipactis helleborine*, *E. tallosi*).

Main human impacts: Forestry (the wrongly selected North-American tree species invaded the association, e.g. *Fraxinus pennsylvanica*, *Acer negundo*, *Amorpha fruticosa*).

Management practices: Replacing the exotic tree species to original ones after cutting.

10. Willow forest on the flooding areas of rivers (**Salici albae-fragilis**)

A species-poor forest association close to the riverbeds, close to the recent BR but not inside it.

The characteristic species are *Salix alba* and *Populus x canescens*. The *management problems* are similar as in the gallery forests.

11. Less than 10 percent of the area of Buffer Zone is extensive arable land (mainly crop and alfalfa). In the proposed transitional area the ratio of the ploughlands is 60-70 %.

12. Tree plantations occur everywhere, but their total area is not significant. Dominant selected species are Poplar hybrids, *Quercus robur* and *Robinia pseudoacacia*.

Main species:

The most important species were mentioned above at their relevant habitats.

Main human impacts:

The important impacts were mentioned also at the habitats.

Relevant habitat management practices:

They were mentioned also above.

Habitats of special interest:

A significant part of the above listed habitat types are interesting. The main value is the large area they cover and the coexistence in a mosaic-like pattern. Possibly the most interesting types are (from a biogeographical point of view):

Medium tall grassy alkaline meadow (*Agrostio-Beckmannietum eruciformis*), semi-desert like plant associations (*Puccinellion limosae* association-group, *Camphorosmetum annuae* community), tall-grassy loess-steppe grassland (*Salvio-Festucetum rupicolae*), *Peucedano-Asteretum sedifolii* dry meadow community, remnant oak forest on alkaline soils (*Galatello-Quercetum*).

EU Natura 2000 Habitat Directive Annex I. habitats:

1530 Pannonic salt steppes and salt marshes (priority habitat)

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

6250 Pannonic loess steppic grasslands (priority habitat)

9110 Euro-Siberian steppic woods with *Quercus* spp.

Endangered or threatened species:

P= protected in Hungary

SP= strictly protected in Hungary

IUCN= listed in the IUCN Red Data Book

B= member of the Bern Convention's lists

Fungi:

Agaricus maskae, *Amanita vittadini*, *Leucopaxillus lepistoides*, *Geastrum hungaricum*, *Secotium agaricoides*. Most interesting species are steppic elements.

Vascular plants:

From the flora of the region cca. 80 species are protected in Hungary (P) or internationally (B, Bern Conv.), or a member of an international Red List (IUCN). Most notable species are:

Agropyron elongatum (P), *Armoracia macrocarpa* (P, IUCN), *Bassia sedoides* (IUCN), *Cirsium brachycephalum* (P, IUCN), *Cirsium furiens* (P, IUCN), Hungarian Leopard's-bane (*Doronicum hungaricum*) (P), *Elatine alsinastrum* (P, IUCN), *Elatine hungarica* (P, IUCN), *Heliotropium supinum* (P), *Iris spuria* (P), *Lindernia procumbens* (P, IUCN), *Marsilea quadrifolia* (P, IUCN), *Plantago schwarzenbergiana* (P, IUCN), *Rumex pseudonatronatus* (P, IUCN), *Salsola soda* (P), *Salvinia natans* (P, IUCN), *Silene multiflora* (IUCN), *Trapa nanans* (P, IUCN), *Verbena supina* (P).

Insects:

Aeshna viridis (P, IUCN, B), *Leucorrhinia pectoralis* (P, IUCN), *Leucorrhinia caudalis* (P, IUCN, B), *Calosoma auropunctatum* (P), *Poecilus kékesiensis*, *Coscinia cribrum pannonica* (P), *Gortyna borelii lunata* (P), *Lycaena dispar hungarica* (P, B), *Proserpinus proserpina* (P, B), *Zerynthia polyxena* (P, B).

Fishes:

Umbra krameri (P, B).

Reptiles:

Emys orbicularis (P, B), *Podarcis taurica* (P), *Lacerta viridis* (P, B), *Anguis fragilis* (P, B), *Elaphe longissima* (P, B), *Coronella austriaca* (P, B), *Natrix tessellata* (P, B).

Birds (nesting species):

Plegadis falcinellus (SP, B), *Phalacrocorax pygmeus* (SP, IUCN, B), *Ardeola ralloides* (SP, B), *Haliaeetus albicilla* (SP, IUCN, B), *Buteo rufinus* (P, B), *Otis tarda* (SP, IUCN, B), *Glareola pratincola* (SP, B), *Glareola nordmanni* (SP, B), *Chlidonias leucopterus* (SP, B), *Calandrella brachydactyla hungarica* (SP), *Acrocephalus paludicola* (SP, IUCN, B).

(Migratory birds):

Anser erythropus (SP, IUCN, B), *Branta ruficollis* (SP, IUCN, B), *Numenius tenuirostris* (SP, IUCN, B), *Tringa stagnatilis* (P, B).

Mammals:

Lutra lutra (SP, B), *Sicista subtilis trizona* (SP).

Other characteristic and main species of the BR:

Plants:

Phragmites australis, *Bolboschoenus maritimus*, *Beckmannia eruciformis*, *Alopecurus pratensis*, *Puccinellia limosa*, *Camphorosma annua*, *Artemisia santonicum*, *Limonium gmelinii* ssp. *hungarica*, *Achillea setacea*, *Festuca pseudovina*, *Festuca sulcata*, *Aster sedifolius* (protected in Hungary).

Insects:

Doclostaurus brevicollis, *Epacromius coerulipes pannonicus*, *Gampsocleis glabra* (protected in Hungary), *Sympetrum depressiusculum* (protected in Hungary), *Cryptocephalus gamma*, *Saragossa porosa kenderesiensis*, *Cledeobia moldavica*.

Birds (nesting species):

Platalea leucorodia (strictly protected in Hungary, listed in the IUCN List), *Egretta alba* (strictly protected in Hungary), *Anser anser* (protected in Hungary), *Circus aeruginosus* (protected in Hungary), *Falco vespertinus* (strictly protected in Hungary), *Falco cherrug*

(strictly protected in Hungary), *Burhinus oedicnemus* (strictly protected in Hungary), *Chlidonias hybridus* (strictly protected in Hungary).

(Migratory birds):

Anser albifrons, *Anser fabalis*, *Grus grus* (protected in Hungary), *Philomachus pugnax* (protected in Hungary), *Tringa totanus* (protected in Hungary), *Tringa erythropus* (protected in Hungary), *Charadrius morinellus* (protected in Hungary), *Calidris alpina* (protected in Hungary), *Calidris ferruginea* (protected in Hungary), *Calcarius lapponicus* (protected in Hungary).

Mammals:

Lepus europaeus, *Citellus citellus* (protected in Hungary), *Microtus arvalis*, *Capreolus capreolus*, *Sus scrofa*.

Note: this enumeration is not a complete one.

EU Natura 2000 Habitat Directive Annex II. species:

Vascular plants:

- *Marsilea quadrifolia*
- *Cirsium brachycephalum*

Invertebrates:

- *Lucanus cervus*
- *Cerambyx cerdo*
- *Lycaena dispar*
- *Gortyna borelii lunata*

Vertebrates:

- *Cobitis taenia*
- *Gobio albipinnatus*
- *Gymnocephalus baloni*
- *Gymnocephalus schraetzer*
- *Misgurnus fossilis*
- *Rhodeus sericeus amarus*
- *Umbra krameri*
- *Bombina bombina*
- *Triturus cristatus dobrogicus*
- *Emys orbicularis*
- *Spermophilus citellus*
- *Sicista subtilis*
- *Mustela eversmannii*
- *Lutra lutra*

EU Natura 2000 Bird Directive Annex I. species (important migratory and nesting species):

- *Botaurus stellaris*
- *Ixobrychus minutus*
- *Ardeola ralloides*
- *Egretta garzetta*
- *Egretta alba*
- *Ardea purpurea*
- *Ciconia ciconia*
- *Platalea leucorodia*
- *Plegadis falcinellus*
- *Aythya nyroca*
- *Anser erythropus*
- *Branta ruficollis*
- *Mergus albellus*
- *Pernis apivorus*
- *Milvus migrans*
- *Haliaeetus albicilla*
- *Circus aeruginosus*

- *Circus cyaneus*
- *Circus macrourus*
- *Circus pygargus*
- *Buteo rufinus*
- *Circaetus gallicus*
- *Aquila heliaca*
- *Aquila pomarina*
- *Pandion haliaetus*
- *Falco cherrug*
- *Falco vespertinus*
- *Falco columbarius*
- *Grus grus*
- *Porzana porzana*
- *Porzana parva*
- *Porzana pusilla*
- *Crex crex*
- *Otis tarda*
- *Himantopus himantopus*
- *Recurvirostra avosetta*
- *Burhinus oedicephalus*
- *Charadrius morinellus*
- *Pluvialis apricaria*
- *Philomachus pugnax*
- *Numenius tenuirostris*
- *Tringa glareola*
- *Sterna hirundo*
- *Chlidonias hybridus*
- *Chlidonias niger*
- *Asio flammeus*
- *Coracias garrulus*
- *Dendrocopos syriacus*
- *Dryocopus martius*
- *Anthus campestris*
- *Luscinia svecica*
- *Acrocephalus melanopogon*
- *Acrocephalus paludicola*
- *Lanius collurio*
- *Lanius minor*

Species of traditional or commercial importance:

The use of native species is significant outside the Buffer Zone only. Sporadic collection of mushrooms (*Agaricus bernardii* mainly) and chamomile is regular mainly. These activities often threaten the nesting of birds in springtime.

Hunting: *Anas platyrhynchos*, *Anser fabalis*, *Lepus europaeus*, *Capreolus capreolus*.

Fishery: *Esox lucius*, *Rutilus rutilus*, *Abramis brama*, *Cyprinus carpio*, *Carassius auratus*, *Silurus glanis*

IV. ZONATION

Size of Core Areas: 1,178 ha, proposed size of Core Areas: 4,018 ha

Size of Buffer Zone: 55,372 ha, proposed size of Buffer Zone: 72,844 hectares

Size of proposed Transition Area: proposed, cca. 79,550 hectares

Altogether: 55,372 ha, the total of proposed zones is: 156,412 hectares.

List of core areas (name and size):

(The serial number is the same as on the maps of different scale)

Existing:

- 1./ Zámi löszhát CA
13,8 ha-s
- 2./ Polturás lapos CA
224,1 ha-s
- 3./ Kincses lapos CA
71.2 ha-s
- 4./ Pentezug CA
200.1 ha-s
- 5./ Madarasi puszta CA
200.2 ha-s
- 6./ Bogárzó CA
212.9 ha-s
- 7./ Margitai erdő CA
80.0 ha-s
- 8./ Kunkápolnási mocsár CA
176.0 ha-s

Proposal (with proposed enlargements of recent core areas):

- 1./ Poroszló (Tisza-tó) CA
260.8 ha-s.
- 2./ Hordód (Tisza-tó) CA
526.1 ha-s.
- 3./ Nagy-Kácsa CA
204.4 ha-s.
- 4./ Tilos-erdő CA
120.1 ha-s.
- 5./ Papegyháza CA
260.1 ha-s.
- 6./ Pentezug CA
1038.3 ha-s.
- 7./ Dögös-hát (Zám) CA
142.2 ha-s.
- 8./ Kunkápolnási-mocsár CA
625.1 ha-s.
- 9./ Kunmadarasi-puszta CA
841.1 ha-s.

Brief justification of zonation as it appears on the zonation map:

The Core Areas represent the typical series of habitats from the open water surfaces of alkaline marshes to the dry loess-ridges and oak steppe-woodlands. Base of selection was the absence of human disturbance. Only such kinds of traditional land use occur in the Core Areas that manage the protected habitats (mainly extensive grazing and very restricted reed-cutting). The other important cause of the selection was the occurrence of rare and endangered species.

The enlargement of the Pentezug CA is planned (with a cca. 2.000 ha-s large area). Here 2.400 - 3.000 ha-s were fenced around in 1996 where all human activities are prohibited. The enclosed area is for re-introducing Przewalsky's horses into the wild. (Wild horses existed some 2-5.000 years ago here natively.) This goal is ideal for a Core Area also.

The Buffer Zone is the remaining area of the Hortobágy National Park, outside Core Areas. Here (but not everywhere) other land use types are also allowed. The typical area of the National Park, where the goals of the nature protection have absolute priority. Almost the total area is state-owned and used by the Hortobágy National Park Authority. A company (Hortobágy Nature Protection and Gene Bank Company for Public Use, under the supervision of Ministry of Environment) manages agriculturally a large part of this zone under the control

of the Hortobágy National Park Directorate. The two supervision practices are the rangers' control on field, and the supervision of the contracts between the Company (and other landusers) and the Hortobágy National Park Directorate.

Transition Area: Approximately it is the same area as the "D" zone in the former IUCN zoning system, outside the National Park. Here more intensive land-using types are possible, e.g. controlled using of chemicals, fertilizers. Mainly private-owned area, but a significant part is state-owned and legally used by the Hortobágy National Park Directorate. These areas appear in the development plans for local authorities of the neighbourhood as controlled agriculture zones, where for instance the density of buildings (one farm pro sq.km) and their size is limited. The BR's manager, (Hortobágy National Park Directorate) systematically reconciles and harmonizes the new versions of these plans with the local authorities and the designers of these materials. The state-owned areas are under closer supervision of course. The Hortobágy National Park Directorate plans to enlarge both the state-owned areas and the territory of the Hortobágy National Park, with a minimum area of 20.000-30.000 hectares. Recently there are protected areas inside this zone (altogether cca. 24.000 hectares).

V. HUMAN ACTIVITIES

Population living within the Biosphere Reserve:

Core Area: permanently: 0, seasonally: 0

Buffer Zone: permanently: 200, seasonally: 400.

Transition Area: permanently: 10-11000 (estimated, because of the existence of permanent and periodical farms).

Brief description of local communities living near the Biosphere Reserve:

Traditionally agricultural villages (9) and small towns (4) surround the Biosphere Reserve. Four small villages are situated inside the Transition Area.

Ethnic origin, composition etc.:

The nationality of the local people is basically Hungarian. Gypsy minority occurs in most of the localities (estimated proportion 3-6 %). Traditionally their economic activity is not agricultural that is why their connection with the Biosphere Reserve is not too close.

Name of the nearest major town:

Debrecen (205,000 inhabitants), about 25 kilometres east of the area.

Cultural significance of the site:

The earliest remains of the human activity are tumuli (kurghans). In the territory of the Hortobágy National Park, there are still about 70, approximately 5% of the total remaining tumuli in the Carpathian Basin (additional 100-150 ones are in the Transition Area). Their diameter is usually about 30-60 m and their height about 4-7m. Some of them have a flat shape; these are the dwelling tumuli ("tell") from the late Neolithic Age (5,000-4,000 B.C.). Most of the tumuli are burial-hills (2,100-1,100 B.C.) of a nomadic tribe from the East ("Tribe of the Pit-grave Culture") who were the first nomades that reached the Carpathian Basin. They are better known as Kurghans, their Turkish name. The shape of the Kurghans is more peaked than the others from the Neolithic Age.

There are no settlements remaining from the Middle Ages except for some ruins and one small early Baroque castle close to the BR.

After the Turkish wars important trading roads passed through the Hortobágy thanks to the economic development,. That is the reason bridges and road-side inns (csárda, whose name has an Iranian origin) were necessary. The number of inns in the beginning of the 19th century in the territory of Hortobágy was around 40, most of which have been destroyed.

Most of the remaining ones, after much reconstruction and renovation, are now of Classic, provincial Classic or Baroque styles. Many inns and these bridges can be regarded as relics of the 17-19th century way of life on the Great Plain and of the often inefficient transportation system of that time (poor roads and poor public security).

The most important buildings are the following:

1. The Nine-Arch Stone Bridge over the River Hortobágy. Length: 92.14 metres, height: 7.90 metres, width: 8.85 metres. Classic style, built in 1825-33. It is the longest stone bridge in Hungary and carries a major road of the area. It will be re-routed in the future.
2. The Large Hortobágy Csárda. It has the largest base area of the inns in HNP. The first part of the present building was built in 1781. Since then, some parts have been added to it. Its basic style is Classic. On its southern facade, there are thirteen arches built in the beginning of the 19th century.
3. Szekérállás. It used to belong to the csárda on the opposite side of the current road. It was built in 1785. We can now see an exhibition here of pastoral life in the past century. The second and third buildings have tile-roofs. Buildings 1., 2. and 3. form a unit next to the River Hortobágy.
4. Meggyes Csárda. This csárda is far away from recent roads. It was built around 1770 in provincial Classical style. There are two pillars on the porch. The building is divided into two parts. The roof is covered with reeds.
5. Kadarcsi Csárda. Built in the middle of the 18th century. Due to reconstruction, it is now of provincial Classic style. With its five arcades, the csárda can be regarded as the smaller counterpart of the Large Hortobágy Csárda. Buildings 2-5 were placed on the former post-road within the distance of a relay-station of horses.
6. The Csárda at Kishortobágy. Built at the end of the 18th century in provincial Baroque style. It has three arcades. Geodetic surveys in 1823-24, when determining the regulation of rivers in the eastern part of the Carpathian Basin, used the threshold of this csárda as a measuring point. Therefore, this csárda can be regarded as a relic of the river-regulation period too.

Use of resources by local populations:

Uses and activities in the Core Areas:

Forests: Forestry activities are not allowed. Because of the weak reproduction rate of oak, this process will be assisted in the future.

Open water surfaces: Fishery is not allowed.

Reeds: Reed-cutting is partially allowed, but not in every year, only in small patches and under strong supervision of the nature conservation authorities.

Marshes and meadows: Supervised mowing or grazing by cattle are allowed partially, not in every year.

Pastures: Supervised grazing is allowed.

Main land uses and activities in the Buffer Zone:

The dominant type of land use is extensive pasture (more than 70%). Most of the marshes are mown, in extremely wet years a significant part of the pastures is also. The marshes cannot provide for hay-making in dry periods and/or locust increasing. Traditionally stocks graze on the pastures from April to October-November because of the snow-cover in wintertime and the melting after it.

Tussock-forming marsh vegetation types are normally unexploited.

The deeper marshes (reeds vegetation) are used for reed-cutting. Artificial fish-ponds and channels used for fishery (in this case they are working places for local people too) and angling (but not in the native marshes), the shoreline vegetation for reed-cutting.

Less than 10 percent of the area of the Buffer Zone (2,517 ha-s) is extensive arable land (crop and alfalfa are dominant). The use of chemicals and fertilizers here is not allowed, except in case of outbreak or danger of outbreak of pests on arable lands.

Hunting is allowed because of the control of the population of certain species mainly (*Vulpes vulpes*, *Sus scrofa*). The hunting activity is the responsibility of the Directorate of Hortobágy NP.

Main land uses and major economic activities in the proposed Transition Area:

The dominant land-use type here is arable land. Extensive agricultural activity is typical. Frequently cultivated species are: cereals, maize, alfalfa, sunflower. Rape plays a very important role in the conservation of the great bustard, because it provides the best winter food during strong wintry periods. The other extensive fields are good feeding habitats for instance for geese or cranes. Extensive pastures and fish ponds also occur in this zone. One part of them is proposed for designation as protected areas.

Possible adverse effects of uses or activities in the proposed Transition Area and remedial measures taken:

- Use of chemicals and fertilizers. Preference of "bio-economic" techniques with the help of different government schemes.
- Hunting (disturbs the bird-migration and the great bustard). Periodical restriction of this activity in the important areas.
- Construction of power lines, channels, roads, industrial or large agro-industrial settlements, amelioration systems in the future. Supervision of these activities is implemented through the issue of official permission by the Environmental, Water Management and Nature Conservation Authority as a specialised agency of administration.

Brief summary of past/historical land-use of the main parts of the Biosphere Reserve:

In the last cca. 2000 years the dominant land use type was the extensive pasture (periodically nomadic or semi-nomadic). High density of localities was not established in the early Middle Ages (as in other parts of Hungary). Later the permanent wars in the 16th and 17th century caused the total disappearance of former human populations in the area.

The using of the pastures continued. In the last 100-150 years, before the legislation of NP, the ratio of arable lands was increased.

Tourism:

National visitors come to the Biosphere Reserve each year (except for the Transition Area): Cca.50-70,000.

Foreign visitors: 15-20,000.

Type of tourist activities:

Horseriding, carting, bird-watching, angling, hunting (the last two types mainly in the Transition Area).

Tourist facilities:

Accommodation inside the National Park: 30 beds.

In the neighbouring localities: 9,000 beds and camp places. The connection of these accommodations is not too close to the Biosphere Reserve. The dominant mass-tourism activity is "spa tourism" but Hortobágy also provides some organisations and possibilities for mass tourism.

Visitors have a controlled admission to most parts of the area in the Buffer Zone and have free access only to a smaller part. Core Areas are off limits to tourists.

Income and benefits to local communities:

In the agricultural activity, the local communities are participants as landowners (in the Transition Area and partially in the Buffer Zone) or lessees.

In the tourist activity they are entrepreneurs, managers or workers. A frequent type of benefit is income from providing accommodation at private houses.

VI. RESEARCH AND MONITORING PROGRAMMES

Brief description and list of publications of past research and monitoring activities:

Research in the framework of the International Biological Programme started in the '60s here as the first study sites in Hungary. It was the time when the preparation of the national park also started. This preliminary work continued the former researches in a more intensive and complex way.

After the designation of the Hortobágy National Park in 1973, the inventory program continued. It was carried out by the Hungarian Academy of Sciences and the Hungarian Natural History Museum. In the year of designation of the Biosphere Reserve (1979) a new and complex research-project was started in the core areas. An ecological survey and monitoring of a large marsh was started after the habitat was restored.

In the last 10 years sporadic investigations are typical which are not included in bigger research projects.

Organized research projects are connected to the ongoing Przewalski-horse project started in 1997. Here, on cca. 2,400 ha-s, a fenced area provides home for more than 70 wild horses in 2006. Except for research there is no human impact in this territory, that is why this is a practical core area. Most of the researches are connected with the botanical and zoological comparison of this area with traditionally grazed ones.

The number of ongoing LIFE NATURE projects which totally or partially run in parts of the BR is remarkably high. They all consist of assessment and continuous monitoring of impacts too. These projects are as follows.

LIFE02NAT/H/008634 - Restoration of pannonic steppes, marshes of Hortobágy National Park. Only a small portion of this project is outside the BR.

LIFE02NAT/H/008638 - Habitat management of Hortobágy eco-region for bird protection. More than half of the project's territory is inside the BR.

LIFE04NAT/HU/000109 - Conservation of *Otis tarda* in Hungary.
Only a small portion of this project is connected with the BR.

LIFE04NAT/HU/000119 - Grassland restoration and marsh protection in Egyek-Pusztakócs. The project itself takes place in the neighbourhood of the BR. With regard to the avi-fauna and hidrology, the impact of the project is important on the BR as well, while on the other hand some loess grasslands of the BR provide seed-source for restoration of dry grassland on abandoned arable lands in the project area.

LIFE04NAT/HU/000109 - Conservation of *Falco vespertinus* in the Pannonian Region. While traditionally the biggest population of this raptor lives in Hortobágy, only a small portion of this project is connected with the BR.

LIFENAT/FIN/000105 - Conservation of *Anser erythropus* on European migration route. Cca. half of the project area is BR.

LIFE06NAT/H/000096 - Conservation of *Falco cherrug* in the Carpathian Basin

List of publications:

Abiotic researches:

Geology:

Sümei et al 1996: The Process of Sodification on Hortobágy in Space and Time According to Geopedological Investigations - Research Report.

Sümei, P., Bodor, E., Törőcsik, T. 2005: The origins of alkalisation in the Hortobágy region in the light of the palaeoenvironmental studies at Zám-Halasfenék. *Varia Archaeologica Hungarica* XIX.

Biological researches:

Botany:

Bodrogközy 1965: Ecology of the halophilic vegetation of the Pannonicum II. Correlation between alkali "szik" plant communities and genetic soil classification in the northern Hortobágy. *Acta Botanica Academica Scient. Hung.* 11.

Magyar P. (1928): Adatok a Hortobágy növénytársulási és geobotanikai viszonyaihoz. *Erdészei Kísérletek* 30. pp. 26-63.

Máthé - Précsényi 1970: Phytomass studies of salt pastures (*Achilleo-Festucetum pseudovinae*). *Acta Agronomica Academica Scient. Hung.* 19.

Máthé - Zólyomi - Précsényi - Kovács 1967: Der Alkali Waldsteppenwald von Margita als Arbeitsgebiet im IBP. In: *Guide*

Précsényi 1970: A study on the energy budget in *Artemisio-Festucetum pseudovinae*. *Acta Botanica Academica Scient. Hung.* 16.

Soó R. (1933): A Hortobágy növénytakarója. *Debreceni Szemle különkiadása*, Debrecen. pp. 1-26.

Szujkó -Lacza 1982: Natural History of Hungarian National Parks, The flora of the Hortobágy National Park, Acad. Publ., Budapest.

Zoology:

Aradi-Kovács 1982: The Grey-leg Goose in Hungary. *Aquila* Tom. 89., Budapest.

Dudás-Kovács-Sándor 1993: Der Adlerbussard *Buteo rufinus* als mitteleuropaischer Brutvogel in der ungarischen Hortobágy-pusta – *Limicola* 7.

Ecsedi Z. (szerk.) (2004): A Hortobágy madárvilága. Hortobágy természetvédelmi Egyesület – Winter Fair, Balmazújváros-Szeged. 588 p.

Endes 1970: Die Kurzzehenlerche. *Die Neue Brehm-Bücherei*, 422. Wittenberg-Lutherstadt.

Endes 1972: A revised Description of the Hungarian Race of the Short-toed Lark (*Calandrella brachydactyla* (Leisler). *Bull. British Orn. Club.* Vol 92. N. 6.

Faragó - Kovács - Sterbetz 1991: Goose Population staging and wintering in Hungary. *Ardea* 79.

Fintha 1977: The White-tailed Eagle (*Haliaeetus albicilla*) in Hortobágy. *Aquila* Tom. 84., Budapest.

Fintha 1999: Crane research and protection in Hungary with special reference to resting data. 3th European Crane Workshop 1996 and actual papers. Halle-Wittenberg.

Gorman 1994: The Rose-coloured Starling invasion and breeding in Hungary – *Birding World* 7(8).

Horváth 1956: A new Race of the Short-toed Lark from Hungary. *Bull. Brit. Orn. Club*, Vol. 76.

Kaszab (ed.) 1981: Natural History of Hungarian National Parks, The Fauna of the Hortobágy National Park, Vol I. Akadémiai Kiadó, Budapest.

Kovács 1980: Forschungen über auf den Winterestingvögel Hortobágy und Bihar - *Aquila* Tom. 87., Budapest.

Kovács G. (1992): Mesterséges szikes tavak és szikes kopárok létesítésének módszerei és tapasztalatai a Hortobágyi nemzeti parkban. *Aquila* 99. pp. 155-161.

Kovács G.(1995): A Hortobágy-halastó madárvilága (1974-1994) In: major I. (szerk.) Alföldi mozaik. TermészetBúvár alapítvány Kiadó, Budapest. pp. 7-63.

Kovács-Végvári 1999: Population size and habitat of the Aquatic Warbler (*Acrocephalus paludicola*) in Hungary – *Vogelwelt* 120.

Kovács-Végvári-Kapocsi 2000: Population trends and conservation of Spoonbills in the Hortobágy National Park, Hungary – Wetlands management and conservation of Spoonbills and other waterbirds census. The network of organizations managing Europe's heritage.

Lanszki-Molnár 2003: Diet of otters living in three different habitats in Hungary – *Folia Zool.* H. 52 (4) p. 378-388

Mahunka (ed.) 1983: Natural History of Hungarian National Parks. The Fauna of the Hortobágy National Park, Vol. II. Acad. Publ., Budapest.

Nyilas 1987: Environmental factors governing the occurrence of *Calosoma auropunctatum* (Carabidae) in the alkaline steppes of the Hortobágy National Park - *Acta Phytopath. Entom. Hung.* Vol. 22(1-4)

Philippona - Lebreton 1967: Geese on the Hortobágy. The Wildfowl Trust.

Sándor, I., Zimmermann, W (2000): Przewalski's horses in the National Park Hortobágy - Proceedings from the meeting, Slatinany 1999., *Gazella* 27, 1.1.2000, p: 53-64

Udvardy M. (1941): A Hortobágy madárvilága. Tisia V. Debrecen. pp. 92-169

Végvári 2002: Roost site selection of the Common Crane *Grus grus* in the Hortobágy National Park, Hungary between 1995-2000 – *Ornis Fennica* 79.

Zimmermann, W., Kolter, L., Sándor, I., Dukát, Zs. (1998): Przewalskipferde in der Hortobágy-puszta - ein Natur-und Artenschutzprojekt. - *Zeitschrift der Kölner Zoo*, 41/1: 37-55.

Zimmermann, W., Kolter, L., Sándor, I., Dukát, Zs. (1999): Naturschutzprojekt Hortobágy - Jahresbericht 1998 - Zeitschrift der Kölner Zoo, 42/1: 37-45.

Zimmermann, W., Kolter, L., Sándor, I. (2000): Naturschutzprojekt Hortobágy - Jahresbericht 1999 - Zeitschrift der Kölner Zoo, 43/1: 37-47.

Complex:

Ecsedi I. (1914): A Hortobágy puszta és élete. Városi Nyomda, Debrecen. 295 p.

Fintha I. (1988): Ahol az ég a földet éri... Hortobágyi Nemzeti Park - Reflektor Kiadó, Budapest. 54 p.

Horváth R. – Lisztes L. – Molnár A. (szerk.) (2001): A Hortobágyi Nemzeti Park természetvédelmi kezelési szabályzata. Hortobágyi Nemzeti park Igazgatóság, Debrecen. 64 p.

Kovács Gné. – Salamon F. (szerk.) (1976): Hortobágy- a nomád pusztától a nemzeti parkig. Natura, Budapest. 351 p.

Molnár A. (szerk.) (2005): Hortobágyi mozaikok. Hortobágyi Nemzeti Park Igazgatóság, Debrecen. 106 p.

T. Horváth I. (2003): Hajdú-Bihar megye és a Hortobágyi Nemzeti Park természeti értékei. Válogatott bibliográfia 1950-2002. Magyar Madártani Egyesület HBCS, Debrecen. 126 p.

Tóth A. (szerk.) (1988): Tudományos kutatások a Hortobágyi Nemzeti Parkban 1976-1985. Budapest. 303 p.

Tóth A. (szerk.) (1996): Ohattól Meggyesig. A Hortobágyi Természetvédelmi Kutatóbár huszonkét éve. Természet- és Környezetvédelmi Tanárok Egyesülete, Budapest. 176 p.

Varga Zné. – Nyilas I. – Varga Z. (1982): Természetvédelmi kezelési útmutató. Nyírólapos-Nyári járás. Hortobágyi Nemzeti park Igazgatósága, Debrecen. 56 p.

Varga Zoltán et al 1990: Summary of results of ecological investigation of BR Core Areas - Research Report.

V. Sipos J. – Varga Z. (1993): Hortobágyi krónika. Debrecen 96 p.

Socio-economic sciences:

Landuse and its history:

Bod 1968: Zucht und Handlung der uralten ungarischen Haustierrasse auf der Steppe von Hortobágy. Domestikationsforschung und Geschichte der Haustiere. Acad. Publ., Budapest.

Archaeology and history:

Módi 1970: Die Siedlungs- und Besitzgeschichtliche Übersicht des Gebietes des heutigen Komitats Hajdu-Bihar in 13. Jahrhundert. Déri Múzeum Évkönyve, Debrecen.

Módi 1971: Die Siedlungs- und Besitzgeschichtliche Übersicht des Gebietes des heutigen Komitats Hajdu-Bihar in 14-15. Jahrhundert. Déri Múzeum Évkönyve, Debrecen.

Veress L. – Aradi Cs. – Dunka B. (2000): A Hortobágy hasznosítása. Magyar Tudomány XLV/12. pp. 1467-1510.

Brief description of on-going research and monitoring activities:

Abiotic:

One small geological research-project

Biotic:

In the last 10 years sporadic investigations (some of them are typical which are not included in bigger research projects. The inventory of the National Park Directorate as supervisor body consists of 23 research items and reports. All of them are in Hungarian only.

The subjects are as follows:

- general management: 1
- species management: 2
- geology: 1
- microbiology: 1
- botany: 4
- zoology: 14

8 of these small-scale research programs are only partially situated inside the area of BR.

Hungarian National Biodiversity Monitoring System:

Three 5 x 5 km quadrates are selected here for landscape-scaling monitoring (there are 123 in Hungary):

1. In ET05 (-D4, -C3, -B2, -A1) UTM quadrate, H05300360 CORINE site.
2. In DT95 (-A4, -B3, -C2, -D1) UTM quadrate, H05200042 CORINE site.
3. In DT77-D4, DT78-C3, DT87-B2 and DT88-A1 UTM quadrates, H05200046 CORINE site.

There are selected habitats and species in the BR also included in this Monitoring System. Here stable plots and points are used for systematic surveys.

Habitats:

Galatello-Quercetum forest steppe
Artemisio santonici-Festucetum pseudovini alkaline pasture
Achilleo setaceae-Festucetum pseudovini pasture
Agrostio-Alopecuretum pratensis alkaline meadow
Agrostio-Beckmannietum eruciformis alkaline meadow
Peucedano-Asteretum sedifolii alkaline meadow
Pholiuro-Plantaginetum tenuifolis pan
Camphorosmetum annuae pan
Puccinellietum limosae ecoton

Orthopteran communities in Artemisio-Festucetum and Achille-Festucetum

Species:

Plants:

Marsilea quadrifolia
Cirsium brachycephalum

The ongoing and yet completed LIFE NATURE projects mentioned above have assessing, monitoring and follow up monitoring research-phase.

Socio-economic:

None

Estimated number of national scientists participating in the research in the Biosphere Reserve:

10-15 persons.

Estimated number of foreign scientists participating in the research in the Biosphere Reserve:

3-4 persons.

Note: This is a yearly estimation.

Research station within the Biosphere Reserve:

Inside the Przewalski horse project area there are pit-falls for ground-dwelling invertebrates and light traps.

Permanent research station outside the Biosphere Reserve:

None

Debrecen University can provide such kinds of stations for field research.

Research facilities of research station(s):

None

Other facilities:

The researchers use mainly the National Park Directorate's accommodations for lodging.

How the results of research programmes have been taken into account in the management:

The scientific results are utilized mainly through the management plans. Researchers often discover important values or appearance of endangering factors that require immediate actions.

VII. EDUCATION, TRAINING AND PUBLIC AWARENESS PROGRAMMES

Types of activities related to:

- Environmental education and public awareness:

Staff of the NP Directorate often gives professional presentations for the local primary and secondary schools.

- Competition organized yearly for primary and secondary schools of the region about nature protection and ethnography with the cooperation of two NGOs in Debrecen town.

- Occasional presentations for primary and secondary schools.

- Participation on the events organized by the surrounding local communities (village days etc.) by presentations, information desks (the NP directorate has several mobile desks), papers and brochures.

- Occasional arrangement of international conferences, like Conference on Spoonbill Protection in 2005, Conference on Crane Conservation is now under preparation, Eurosite Conference in 2000 etc.

Travelling exhibiton

- Existing travelling exhibition about Hortobágy was presented in more than 30 localities (schools, small museums etc.).
- Regular, yearly participation on countryside „Travelexpo 2004, 2005, 2006 etc.) exhibition in Budapest

- Training programmes for specialists:

- Some of the Hungarian universities that offer courses in biology organize field trips to the area of Biosphere Reserve.
- Assistance in work of summer education camps organized around the BR:
 1. Regional education camp for primary and secondary schools (NGO organized).
 2. International (english language) camp for secondary schools (organized by the county council)
- Organizing and arrangement of an educational course for the local university's students, evaluated as special course of lectures. Subject: professional ecotouristical guidance.
- Arrangement of field trips for teachers of primary and secondary schools as continuative education program, yearly.

Facilities for education and training activities, as well as visitors' centres for the public:

- A new Visitors' Centre has been established and opened in this year, in the centre of the area, in Hortobágy village. It includes: 2 conference halls for 30 and 90 persons, exhibition on two floors (for 40-60 persons simultaneously), a shop of brochures, information materials and hand made artcraft products, information desk, office and an educational room equipped with technical tools (like microscopes, projector etc.) for max. 35 students.
- Museum of Pastoral Culture now managed by the NP Directorate and renovated this year.
- Bird-watching narrow-gauge railway on the central fishpond-system
- Observation towers around the roads cutting the area of BR (roads No 3316 and 33)
- exhibitional-educational byke-road with signs.
- New exhibition in the building complex called Western Gate (of the NP) about craftsmanship in the region.
- Góré's raptor repatriation center with exhibition of certain birds in captivity and repatriation methods.
- The Malomháza-center is now under preparation. It will exhibit the functioning of temperate grasslands from the vertebrates' point of view with the network of following settlements:
 - Cave-watch to observe carnivorous mammals of temperate steppes,
 - Artificial wetland with captive and non-captive waterbirds, the so called „pelican-lake”,
 - fence-system to keep native ungulates of the Eurasian steppes, with watching towers.

VIII. INSTITUTIONAL ASPECTS

State and other administrative units:

State: Hungary. Counties: Hajdú-Bihar, Jász-Nagykun-Szolnok, Heves, Borsod-Abaúj-Zemplén.

Management plan/policy:

There is a management plan drawn up 1998 for the area of the NP, i.e. the Core Areas and the whole Buffer Zone.

Description of the main characteristics of the plan and its application:

The structure of the management plan is approximately the same as that recommended by the practical work of EUROSITE. The plan consists of general information on administrative units, descriptions of the protected areas, list of land owners and users, geographical and biological description, description of land use types. The last part of the text deals with objects related to the different problems and possibilities. Different maps are also included, e.g. land acquisition map, map for forestry, location of natural values, endangering factors etc. The former management plan's most useful part was the description of values and the list of publications. We hope the new type of plan will be useful even more in the practical management work.

Authority in charge of administration of the whole, i. e. implementation of this plan/policy:

Total number of staff of the BR:

10 rangers on field work

appr. 18-20 workers more or less directly at the head office of the directorate in Debrecen town

8 specialists and 11 logistic workers in educational and PR tasks in and around the BR

Financial source and yearly budget:

National financial source: cca. 220 million HUF in 2005.

Income from land users by contracts: cca. 120 m HUF in 2005.

Other income: cca. 50 mHUF.

Ongoing domestic and EU projects: cca. 300 mHUF.

Altogether: cca. 690 mHUF in 2005.

(Transfer to EURO is: appr. 250 HUF in April 2007)

To estimate the correct amount is difficult because the HNP Directorate manages more than two times bigger size of protected areas as the BR and it has regional nature protection tasks too, like species protection. The total responsible area is more than 15,000 sqkms.

The expenses are in approximate balance with the sources. There are not enough data to determine the exact part of the budget for the BR from the total yearly sum.

Authority in charge of administration:

Directorate of Hortobágy National Park (as management), but legally supervised by regional authorities of environmental and nature protection and water management.

Authority in charge of administration of each zone:

Core Areas:

Directorate of Hortobágy National Park

Buffer Zone:

Directorate of Hortobágy National Park

In other administrative areas (not under nature conservation) other authorities are in charge of administration. The most important ones are:

- Two Local Authorities for Environmental and Nature Protection and Water Management
- Local Authorities of villages and towns,
- Local Authorities for Forestry in the four counties of the BR,
- Countyside Agricultural Authorities

Mechanism of consultation and coordination among these different authorities:

The usual mechanism is that prescribed for administrative procedures. It includes for instance the supervision of the 10-year-long forestry planning inside the protected areas, supervision of the regional and local development plans both inside and outside and the supervision of the legally prescribed environmental impact's studies inside and outside protected areas.

National administration to which the Biosphere Reserve reports:

Ministry of Environment and Water

Hungarian National BR Council also prescribes reports and discussions.

Mechanism for consultation of local communities:

How and to what extent local people living near the Biosphere Reserve

- have been associated to the BR nomination:

none

- participate to the decision process and management resources:

They participate in these activities during the preparation of plans of the municipalities mainly. In this process the NP Directorate participates as specialized agency of administration.

Participation of local communities is satisfactory or not. Measures envisaged improving this situation:

The role of regional planning is enhanced because of legislation. That can better clarify the Transitional Area in practice. The description and prescriptions related to this zone built in this plan will transplant hopefully more efficiently into the plans of municipalities than in the past.

The role of local communities inside the BR is low because of the low number of local population and the dominant state ownership.

Protection regime of the Core Areas and possibly of the the Buffer Zone:

The Hortobágy National Park was established on January 1, 1973 by Presidential Decree 185-51/1972 of the National Authority for Nature Conservation. The area of the National Park was extended by the Decree 11/1993. (III.9.) of the Minister of Environment and Regional Policy. It covers the whole area of the recent Core Areas and Buffer Zones.

The National Park area is managed under the provisions of the Act no. LIII./1996 and Decree no. 3/1990. of the Minister of Environment and Regional Policy.

Biosphere Reserve status was approved in 1979 at governmental level. It was proclaimed by the Presidential Decree no. 2100/1980 of the National Authority for Nature Conservation and Environmental Protection.

Presidential Decree no. 2486/1980 of the National Authority for Nature Conservation and environmental Protection designated a part of the area as a Ramsar-site.

The transitional area was placed under the control of nature protection by the law for nature protection no. 53/1996.

This law's 29. § (4) designates all core areas of BRs as strictly protected areas.

Land tenure of each zone:

Core Areas:

100% state owned, NP Dir. used

Buffer Zone:

92.5 % state owned, managed by Hortobágy National Park Directorate

5.5 % other state owned

2.0 % private owned and owned by local communities

Transitional Zone:

Not enough data required. Dominant tenure is the private ownership.

State owned and managed by Hortobágy National Park Directorate: 8.1 %.

Foreseen changes in land tenure:

There is an existing government plan and a prescriptive Act No. XCIII of 1995 for the land acquisition for state ownership everywhere inside the protected areas. The above-mentioned programme and act started a land acquisition process in 1996. In that year the NP Authority obtained 8,092 ha of land inside of the Buffer Zone. This process is practically completed inside of the present NP and BR.

Is there a land acquisition programme, to purchase private lands, or plans for privatization for public lands?

The above-mentioned programme and act, a land acquisition process started in 1996. In that year the NP Authority obtained 8,092 ha of land inside of the Buffer Zone.

An ongoing LIFE project includes land acquisition for great bustard protection in the proposed transitional zone.

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IX. CONCLUSION

Brief justification of the way in which the Biosphere Reserve fulfils each criteria of article 4:

Conservation function:

In everyday practice the NP Authority calls the clients' attention to the international importance of the BR. The Core Areas function as unique natural values inside the protected area. The zoning helps in the management planning. The ecological investigation and monitoring of the different zones from external sources are funded.

From the opposite point of view, the national park legislation and the state ownership with NP Directorate responsibility are the main guarantees of the efficient protection. 5 of the core areas are totally free of human impact while the remnants have very low level, nature management impacts.

Development function:

Recently the most important roles are being elaborated in the regional plan and the new management plan. From the local people's point of view the touristic facilities and the cheap rental pastures are most significant.

Logistic function:

This function in practice is described in chapter VII.

National network, international network:

Collaboration at national level exists. It includes for instance different types of collaboration by staff of the authorities.

International twinning is planned, the proposed BR is Réserve Nationale de Camargue.

Askaniya-Nova Zapovednik BR's delegates visited in Hortobágy in last years. We hope this connection will stay alive in the future.

Getting benefit after the designation of the Biosphere Reserve:

The above-mentioned practical, everyday benefit is the most important.

Obstacles encountered, measures to be taken, appropriate assistance from Secretariat:

More efficient information exchange is proposed.

Creation of working network of similar global ecosystems: in our case those BRs which represent temperate grasslands and temperate wetlands.
Providing news, papers, books etc. directly linked to the BRs which consist of working results of BRs, on home-page, e-mail or by post.



**PERIODIC REVIEW
FOR BIOSPHERE RESERVES IN
HUNGARY**



KISKUNSÁG BIOSPHERE RESERVE



**KECSKEMÉT
2007**

I. NAME OF THE BIOSPHERE RESERVE

Kiskunság (National Park) Biosphere Reserve

II. COUNTRY

Hungary

III. PHYSICAL CHARACTERISTICS OF THE BIOSPHERE RESERVE

Latitude and longitude

47°12' - 46°36', 19°04' - 19°39'

Biogeographical Region

Pannonian

Topography of the region

Lowland areas:

Wetlands (inc. Flood – and marshy areas, salt-affected
temporary wetlands, natron lakes)

Sand dunes

Saline plains

Lowest and highest elevation above sea level: 92 – 130 meters

Climate

The region has a temperate continental climate. Its unique features are limited cloud cover, a relatively high number of sunshine hours, high daily and annual temperature variation, relative dryness and very low humidity values.

This region is the area with the least cloud cover in Hungary. The annual average cloud cover is 52-57%. The annual average number of sunny hours is approx. 2050. At the same time this is one of the warmest areas in the country. No significant variations exist in this region. The annual average temperature is between 10-11°C. The mean temperature of the coldest month (January) is between minus 1.5 and minus 2°C, while that of the warmest month (July) is 21-22°C. Characteristically of areas with a continental climate, the annual average temperature variance is quite significant (23-24°C). The region can be classified within Hungary as one with a short winter and a long summer. The number of winter days is only 26-31, however, major frosts are common. Spring comes early, and the average temperature rises above 10°C in the whole region between 7-12 March. The number of summer days is 81-84. In the fall the daily average temperature falls below 10°C again generally between 17-21 October.

The Kiskunság is one of the regions with the least precipitation in Hungary. Under normal conditions the annual precipitation is between 500-600 mm in the region. The rainfall of the summer semester (April-September), the vegetative period, is around 300-350 mm. The winter precipitation occurs mainly in the form of snow. The number of snow cover days is 30-40. The precipitation conditions therefore are relatively disadvantageous. This is further intensified by low humidity values, with an annual average of many years at 71-74%. Based

on these data the balance of precipitation and evaporation is negative in the region. The wetlands that have developed and exist owe their subsistence to supplementary water influences (e.g. ground water).

Geology, geomorphology, soils

Following the withdrawal and the sedimentation of the last lake, the so-called Late Miocene Lake Pannon in this region in the Great Plain, approximately 4.5 million years ago, the ancestral structures of the Danube, the ancient Tisza and the tributaries of the latter appeared. From this point in the previous lake sediment supply was replaced by river sedimentation (primarily by the Danube). Until the Günz-Minden Interglacial Episode in the Pleistocene Ice Age following the Pliocene Epoch the Danube ran southeast-bound towards the present-day Szeged, cutting the region in half, and supplied river sedimentation in a width of some 1000 metres. In the Günz-Minden Interglacial Episode of the Ice Age a major change occurred: with the development of the region's south-western depression (Kalocsa depression) the Danube gradually started to drift westward by leaving its previous diagonal flow direction and took over its present north-south position. The Danube had already filled up the previous areas. River sedimentation ceased in the alluvial fan replacing these, situated east of the region, which remained higher than the Transisza region, and a thick eolic sedimentary layer was deposited on it (in the areas undisturbed by water).

This sedimentary layer consists of sand blown out of the Danube valley in the ice-free periods of the Ice Age, which was structured as a series of sand piles in the north-south direction according to the dominant wind direction, as well as loess developed during the ice formation periods, their transformed (e.g. soil) varieties and sediments washed out by local precipitation.

The sediment pattern delivered by the Danube-Tisza interfluvial winds protrudes slightly east of the current Tisza route, between the river layers of the Tisza. Therefore a geological situation developed in the smaller eastern section of the region where the Tisza, through its westbound movement, entered the alluvial fan of Danubian origin and in certain locations cut up and destroyed the surface of Danubian origin from the late Pleistocene period and enriched it with its own sediments (occasionally in an astonishing width of several hundred metres).

Based on geological evolution, the geological structures covering the surface and the morphological conditions the region can be divided into three major geological units:

- Danube Valley (a tectonic and erosional depression along the Danube river in a width of some 20-30 km) with an average height of 90-100 m above sea level,

- Danube-Tisza Interfluvial Ridge. An area with a varied surface protruding some 30 m above the Danube Valley and almost 40 m above the Tisza sedimentary layer smoothing into the loess Bácska plain in the SW direction. Due to its position and surface features this is also the natural divide of the region, which is roughly sketched going from north to south by a line between the communities of Ladánybene, Fülöpháza, Helvécia, Bócsa, Tázlár, Kéleshalom and Bácsalmás.

Its average height above sea level is 110-135 m.

- Tisza Valley, which is the lowest situated unit of the region. Its height above sea level is below 90 m.

Saline plains of river water origin

The saline plains belonging here are situated in the Danube Valley area, with the exception of the Baks steppe.

Prior to the river control of the Danube the Danube Valley used to be the river's normal floodplain, then it was an area covered with inland waters on a regular basis subsequently, as well. Also, as a result of its pedological (mainly calcareous-saline plains developed on a fine granule rock bed) and geological structure (the significant presence of a fine waterproof clay layer) precipitation filters downwards with difficulty and may remain permanently in the depressions. It is generally true that due to the winter precipitation and the high ground water in the spring significant water volumes appear in the depressed areas (in the isolated depressions of lakebeds and old water flows).

The total solute content of the region's ground water is relatively high. Even the smallest values are around 1000 mg/l. The highest values vary between 2-4000 mg/l. In the event of high ground water levels the ground water also brings solutes to the surface via its capillary ascent.

The most important cations and anions of the ground water are Na^+ , Ca^{2+} , Mg^{2+} and HCO_3^- .

The soil types developed here are:

- Chernozem meadow soil types, which are surfaces developed on a sandy loess base situated in the highest level layers in the region, with high humus content. Their layer thickness varies 20-40 cm. Generally the salty ground water already does not impregnate these layers. In cases where these highest locations are relatively expansive, tillage activities are carried out on them, and if they are smaller in size (a few 100 m²), they form isolated patches in the saline steppe, partly conserving the old sand and loess steppe flora of these areas.
- Solonetz meadow or carbonated solonetz soils, which appear in non-classical forms, in patches, and are more of a transition between the meadow and saline soils in various combinations,
- Solonchak-solonetz soils, saline solonchak soils, solonchak soils of eroded salt berms. Among these calcareous-saline solonchak-solonetz soils are the most common, giving the character of the saline plains found here.

The cause of salination in all cases is the salty ground water with a high $\text{Na}(\text{Mg},\text{Ca})\text{HCO}_3$ content.

Saline plains of ridge deflation origin

Similar natural historical characteristics to those of the above-mentioned areas (pedological and ground water chemical features, etc.) can also be found in these areas. However, their evolution is different from that of the saline plains developed by river water, given that they developed in wind-formed depressions.

It can be generally stated that the water permeability capacity of the sand dunes blown onto the loess of late pleistocene origin or of the original loess in the depressions of sand-covered areas is low. Due to their isolation and poor runoff conditions such depressions and low areas promoted the accumulation of periodic waters, which, as a result of the known salt composition of ground water, led to the formation of natron lakes and higher level saline areas.

In pedological terms such areas are similar to the above-mentioned areas.

Ridge sand areas

The majority of the sedimentary layer forming the surface is made of the sand blown out of the Danube Valley during the ice-free periods of the Ice Age, organised in dune series according to the dominant winds from the northwest-southeast direction, which is only interrupted here and there by loess developed during the ice formation periods and by sediments washed out by local precipitation.

The surface details of the sand areas are multifaceted. One of their basic feature is the array of diversely shaped sand dunes from the northwest-southeast direction. Between the dunes, most of which today are already covered with vegetation, numerous dune-straddled depressions or plain sections of various shapes and sizes can be found. The sedimentary material that builds up the sand regions is primarily shifting sand with high lime content. The precipitation falling onto the surface – which is not great in volume to start with – penetrates downward quickly, and due to the lack of major surface watertight layers limited opportunities existed for the development of surface water streams in the sand regions. However, water penetration is not only vertical, but also lateral. As a result of this temporary water surfaces and, in addition to the already mentioned natron lakes, bog and marsh environments also appear.

In the majority of the sand regions shallow shifting sand soils with a humus content of less than 1% are common. In places where the surface of the relatively thin sand cover was/is close to ground water, usually humic soils or chernozem type sand soils have developed. In cases where the sand surface is situated in the vicinity of saline depressions, deep saline meadow and solonetz meadow soils can be found.

Accordingly the Southern sand ridge area located in the SE corner of the Danube-Tisza Interfluvium is included in this category.

In terms of morphological and pedological terms this is the most heterogeneous area of the region. A major section of the surface is a slightly rolling plain, on which basins with a NW-SE direction can be found, which used to have natural confinement (today they are opened and connected via canals). The areas are diversified by the lime mud shallows of slight depressions with a northwestern-southeastern direction towards the Tisza Valley, on which saline habitats, small lakes and characteristic, generally shallow bogs and marshy areas have developed in many places. The sand layer occasionally also covers the lower surfaces with meadow limestone or lime mud bedding.

The soils have mainly developed on sand. Shallow shifting sand and humous sand soils, and chernozem type soils with more advantageous water and nutrient cycle are characteristic. The soil types of the smaller, a few centimetres higher areas of grasslands on loess are deep saline plain, lime-covered and meadow chernozem soils, as well as solonetz meadow chernozems in deeper areas.

While the expansion of meadow soils that developed on sand or loess sand is significant, that of the bog meadow soils is very limited.

The proportion of loess-structured saline areas affected by ground water is also significant. Therefore the expansion of solonchak-solonetz soils is also large.

Specific soil erosion phenomena are not significant due to the large-scale vegetation cover.

Marshes and bogs developed in the periphery of the Ridge and the old Danube floodplain

Typical calcareous boggy plains and marshes, intertwined in a chain-like pattern, have developed in a width of 8-10 km and in a length of some 120 km along the periphery of the old Danube floodplain, the Danube Valley saline plains and the Ridge sand regions. Danube floodwaters entering the sand dune series, preserved in the depressions, and the Danube

tributaries that developed provided a foundation for the formation of bogs and marshlands in the late Pleistocene period. Following the Danube river control in the 19th century the connection of these regions was cut off from the river, however, the ground water movement towards the Danube Valley from the Ridge provided an adequate and continuous supply of water reserves for the marshland subsequently, as well.

By today most of the natural connections to the specific boggy and marshy areas have ceased, but this region still belongs to the wettest regions of the country even in its current condition. Iszáki Kolon Lake and Dél-Örjeg are greatly expansive boggy and marshy areas even in national terms.

The following soil types are the most common based on the past and current water conditions of the specific areas, the chemical composition of the soil and the surface water, the rock bed conditions and the soil-forming vegetation:

- carbonated shifting sand shallow soils,
- carbonated humous sand soils,
- chernozem type sand soils,
- meadow chernozems,
- boggy soils,
- muskeg soils,
- carbonated meadow soils,
- deep saline meadow soils,
- solonetz meadow soils,
- solonchak-solonetz soils.

Bogs and marshes developed in the Hátság depressions

Bogs and marshes of smaller and larger sizes developed in the depressions of the sand dune regions and of the Bácska loess regions, as long as they had a stable watertight layer, and if they were deep enough to sustain stagnant water conditions. The depressions were not formed by the tributaries or the floods of the Danube, but rather by local water streams and the wind. Following their formation these locations were generally isolated areas without runoff. These conditions were changed by the inland water control measures started in the beginning of the past century.

Similarly to the bog and marsh regions developed by the river, the sections included in this group are also characterised by a high level of diversity. Wet habitats regularly alternate with higher level, dry loess and sand surfaces, but areas under the effects of excessive water dominate here, as well.

Their soil types are similar to those listed in the category above, with the difference that the proportion of typical bog soils is smaller.

Active floodplain, riparian area

For this category in our proposal we mean the areas falling between the main protective dikes and the river's high banks of natural origin, which used to be regularly flooded by the Tisza appearing in the eastern boundary of the Ridge in the Danube-Tisza Interfluvium. The plain filled by the Tisza in the Holocene period in the section affecting this region is relatively narrow with a width of 2-4 km. However, the size of the area once regularly inundated by the river used to be significantly more expansive.

Raw alluvial and meadow alluvial soils with a low calcareous content dominate the riparian area. With the disappearance of regular inundations in the lowest areas intense organic material accumulation takes place, and bog soils have started to develop.

Significance for conservation of biological diversity: habitats and characteristic species

List main habitat types (e.g. humid tropical forest, savanna woodland, alpine tundra, coral reef, seagrass beds) and land cover (e.g. residential areas, agricultural land, grazing land).

Type of habitat:

1. Grasslands:

- Continental salt steppes
- Pannonic loess steppic grasslands
- Pannonic sand steppes
- Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*)
- Grasslands of intensive agricultural use

2. Woodlands:

- Near-natural woodlands
 - Pannonic inland sand dune thicket
 - Riparian mixed forests of *Quercus robur*, *Ulmus laevis* and *Ulmus minor*, *Fraxinus excelsior* or *Fraxinus angustifolia*, along the great rivers (*Ulmion minoris*)
 - Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)
 - Euro-Siberian steppic woods with *Quercus* spp.
- Planted forests:
 - Non native poplar stands
 - Pine plantations
 - Black locust plantations

3. Wetlands:

- Salt water:
 - Continental salt marshes and natron lakes
- Fresh water:
 - Alkaline fens
 - Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition*-type vegetation
 - Natural dystrophic lakes and ponds
 - Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*
 - Rivers with muddy banks with *Chenopodion rubri* p.p. and *Bidenton* p.p. vegetation
 - Riverine: oxbow lakes
 - Canals

Main species:

Grasslands:

Animals: Burchinus oediconemus, Otis tarda, Limosa limosa, Charadrius alexandrinus, Acrida hungarica, Crex crex, Falco cherrug, Falco vespertinus, Falco tinunculus, Glareola pratensis, Lanius minor, Lanius collurio, Mantis religiosa, Merops apiaster, Mustela erminea, Mustela eversmanni, Numenius arquata, Sagittaria arifolia, Vipera ursinii rakosiensis, Zerynthia polyxena, Rhyarioides metelkana, Dorcadion fulvum cerveae, Anisus vorticulus, Lycaena dispar, Carabus hungaricus

Plants: Alkanna tinctoria, Astragalus asper, Astragalus dasyanthus, Astragalus excapus, Colchicum arenarium, Colchicum autumnale, Dactylorhiza incarnata, Dianthus diutinus, Dianthus superbus, Dianthus serotinus, Ephedra distachya, Iris arenaria, Iris pumila, Iris sibirica, Iris spuria, Onosma arenaria, Ophrys sphegodes, Orchis coriophora, Orchis militaris, Orchis morio, Plantago schwarzenbergiana, Gladiolus palustris, Clematis integrifolia

Woodlands:

Animals: Athene noctua, Buteo buteo, Ciconia nigra, Coracias garrulus, Falco subbuteo, Haliaeetus albicilla, Lanius collurio, Oriolus oriolus, Picus viridis, Picus canus, Strix aluco, Turdus philomelos, Upupa epops, Myotis dasycneme, Cucujus cinnabarinus,

Plants: Anemone sylvestris, Arum orientale, Botrychium lunaria, Cephalanthera longifolia, Cephalanthera rubra, Epipactis atrorubens, Epipactis helleborine, Epipactis bugacensis, Iris variegata,

Wetlands:

Animals: Anser anser, Ardeola ralloides, Aythya nyroca, Chlidonias hybrida, Circus pygargus, Egretta alba, Egretta garzetta, Himantopus himantopus, Platalea leucorodia, Recurvirostra avosetta, Larus melanocephalus, Luscinia svecica, Lutra lutra, Misgurnus fossilis, Umbra krameri, Leucorrhinia pectoralis, Emys orbicularis

Plants: Cladium mariscus, Gallium palustre, Hottonia palustris, Nymphaea alba, Urtica kioviensis,

Main human impacts:

1. Reed and grass harvesting
2. Water regulation is the main management practice by the water directorates.
3. The stagnant water regulation is also an important management practice.
4. Dredging of the boggy area to create open water is also a relevant management method.
5. Controlled grazing is characteristic and relevant in the grasslands.
6. Controlled local cultivation of forests.
7. Alien plant species removal from the areas is a common management method.
8. In the higher elevation there is some plough-land, where controlled cultivation is going on.

9. Restricted and organised tourism.

Relevant habitat management practices :

Grasslands:

- Grazing,
- Mowing of meadows
- Removal of alien (tree and weed) species from the areas

Woodlands:

- Removal of alien (tree and weed) species from the areas
- Timber harvesting

Wetlands:

- Reed harvesting
- Habitat restorations
 - creation of deep open water bodies
 - creation of shallow open water surfaces
 - creation of temporary wet areas

Habitats of special interest:

Describe and indicate the location of habitats which are unique or exceptionally important from the point of view of conservation.

- Natron lakes and salt affected temporary wetlands and salt affected grasslands in the Danube Valley.
- Sand dunes have a great nature conservation value, because of the large number of endemic plant and invertebrate species.
- Marshes and bogs developed in the periphery of the Ridge and the old Danube floodplain (Lake Kolon)

Endangered or threatened plant or animal species:

Identify species (with scientific names) or groups of species of particular interest for conservation, in particular if they are threatened with extinction.

Mammals:

Lutra lutra, *Mustela eversmanni*

Birds:

Egretta garzetta, *Ardeola ralloides*, *Burhinus oedipnemos*, *Charadrius alexandrinus*, *Chlidonias hybrida*, *Ciconia nigra*, *Platalea leucorodia*, *Haliaeetus albicilla*, *Circus pygargus*, *Coracias garrulus*, *Crex crex*, *Falco cherrug*, *Glareola pratincola*, *Asio flammeus*, *Coracias garrulus*, *Luscinia svecica*, *Lanius minor*, *Otis tarda*

Fish:

Misgurnus fossilis, Umbra krameri

Reptiles:

Vipera ursini rakosiensis, Coronella austriaca,

Amphibians:

Rana arvalis,

Insects:

Saga pedo, Rhyparoides flavoides metelkanus, Ammobiota festiva, Staurophora celsia

Plants:

Astragalus dasyanthus, Astragalus excapus, Urtica kioviensis, Iris humilis ssp. Arenaria, Iris sibirica, Menyanthes trifoliata, Ophrys insectifera, Gentiana pneumonanthe, Onosma arenaria, Botrycium lunaria, Linum hirsutum var. glabrescens, Leucojum aestivum, Gladiolus palustris, Eryophorum angustifolium, Epipactis bugacensis,

Species of traditional or commercial importance:

Indicate the use(s) of these species or varieties.

Agriculture:

Maize, wheat, rye, barley, oat, alfalfa, sunflower.

Ancient domesticated animals:

Grey cattle, Mangalica pig, Cigája sheep, Hungarian half-breed horse, Kuvasz, Puli and Komondor dog species. Striped bare-necked hen.

Forestry:

Oak, poplar, black locust, pine, ash

Reed harvesting:

Reed

Medical plants:

Juniper

IV. ZONATION

Names of the different areas

Indicate the names of the different areas which make up the core area(s) and buffer zone(s).

- I. Upper Kiskunság Plain
- II. Upper Kiskunság Natron Lakes
- III. Lake Kolon at Izsák
- IV. Sand Dunes of Fülöpháza
- V. Meadows of Orgovány

- VI. Sand Dunes of Bócsa-Bugac and the Sand-puszta
VII. The back-water of the Tisza River at Szikra

Spatial configuration

*A **Biosphere Reserve Zonation map** showing the delimitations of all core area(s) and buffer zone(s) **must be provided**. Also indicate the approximate extent of the transition area(s).*

Size of terrestrial Core Area(s):	2.275 ha.
If appropriate, size of marine Core Area(s):	----- ha.
Size of terrestrial Buffer Zone(s):	12.005 ha.
If appropriate, size of marine Buffer Zone(s):	----- ha.
Approx. size of terrestrial Transition Area(s) (if applicable):	11.211 ha.
If appropriate, approx. size of marine Transition Area(s):	----- ha.

Brief justification of this zonation (in terms of the various roles of biosphere reserves) as it appears on the zonation map.

The Core Areas include natural and semi natural systems with minimal human impact.

The Buffer Zones (1.) are between the core areas and transition zones. These areas are used extensively by different agricultural activities (grazing, mowing), and forestry.

The Transition zones (Buffer Zones 2.) mainly include man-made landscapes, for example agricultural areas, areas of touristic importance.

V. HUMAN ACTIVITIES

Population living in the reserve

Approximate number of people living within the Biosphere Reserve.

	Permanently	/ Seasonally
Core Area(s):0.....	/
Buffer Zone(s):500.....	/
Transition Area(s):	...2000.....	/

Brief description of local communities living within or near the Biosphere Reserve.

The Biosphere Reserve is located in an agricultural land. The people who live within the reserves are also farmers (smallholders).

Indicate ethnic origin and composition, minorities etc., their main economic activities (e.g. pastoralism) and the location of their main areas of concentration, with reference to a map if appropriate.

Their main activities: farming, tourism.

Name(s) of nearest major town(s).

Towns: Kecskemét, Kunszentmiklós, Szabadszállás, Izsák, Kerekegyháza

Villages: Fülöpszállás, Akasztó, Fülöpháza, Bócsa Kaskantyú, Páhi, Orgovány, Ágasegyháza, Csengőd,

Cultural significance of the site

Briefly describe the Biosphere Reserve's importance in terms of cultural values (religious, historical, political, social, ethnological).

The area is a typical region of pastoralism (historical importance), small-scale farming.

Use of resources by local populations

Uses or activities in the Core Area(s):

Biological inventories, long-term biological monitoring, conservation management practices, controlled hunting and some agricultural and forest activities.

Main land uses and economic activities in the buffer zone(s):

Agricultural, forestry activities in accordance with the conservation management strategy, controlled hunting, research, environmental education, some tourism and restoration of natural habitats.

Main land uses and major economic activities in the Transition Area(s):

Controlled agricultural, forestry and hunting activity, conservation management practice, research, environmental education, tourism.

Possible adverse effects of uses or activities in the transition area(s) and remedial measures taken:

Huge number of visitors could have a bad effect on sites and inappropriate land use practices can destroy the habitats. The measures to be taken: continuation of the land-purchase programs, reinforcement of guarding, a strict control on tourism.

If known, give a brief summary of past/historical land use(s) of the main parts of the Biosphere Reserve:

The main part of the reserve was used as a pasture for centuries. This is one of the reasons for the formation of the vast grasslands found here.

Tourism

Indicate the number of visitors coming to the Biosphere Reserve each year

National: ...50.000.....

Foreign: ...30.000.....

Type(s) of touristic activities (Study of fauna and flora, recreation, camping, hiking, sailing, horse riding, fishing, hunting...).

Organized groups visit the national park tourist centres for a short period. Within the tourist activities, the horse shows, horse-back riding are the most popular. There is also a traditional pastoral building exhibition, featuring the tools of pastoral life. Ecotourism is becoming more widespread as well. Sport fishing is very popular near the Szikra oxbow.

Tourist facilities and description of where these are located.

House of nature (Kecskemét)

The House of Nature is the main visitors' centre of the BR. The building houses an exhibition, which gives a view of the history of nature preservation in Hungary. Also, an introduction to the history and present of the national parks in Hungary and to the typical habitats of the Danube-Tisza region is offered, as well as a display of ancient Hungarian crafts.

Bugacpuszta Shepherds Museum

The cone-shape building of the 'Shepherds Museum', built in the style of dry mills so typical of the Danube-Tisza region, houses an exhibition of the relics of the life of shepherds in the plains around Kecskemét and the typical flora and fauna of the region. In the open-air exhibition different replicas of buildings once used by horse herders and shepherds are shown.

Reconstructed Árpáadian (Medieval) Village, Tiszaalpár

The reconstructed Árpáadian (Medieval) village on the edge of the Alpár meadow was inaugurated on the 1,000th anniversary of the foundation of the Hungarian state. The reconstructed settlement, whose buildings were all structured in a traditional way using only traditional materials, serves as a model for experimental archaeology. Different early medieval buildings and objects, such as pit houses, ovens, granaries, and a well are displayed.

Virágh Mansion Local History Exhibition, Kunszentmiklós

The former mansion in Kunszentmiklós gives home to an exhibition introducing the life of the Cumanians (i.e. people living in the Kiskunság) back in history. Apart from the ethnographical and local history exhibition, there is a nice display of the typical flora and fauna of the surrounding plains.

Nyakvágó Inn Museum

The Nyakvágó (Throatcut) Inn got its name after a murder: on the very last day of June 1801 a man killed the innkeeper's wife by cutting her neck with a knife. The Inn Museum revives the atmosphere of the border-area inns of the 19th century and the memory of outlaws who once lived in the neighbourhood.

Study trails

1. Hankovszky Grove, KNP Management Centre

The undisturbed 2.5-acre garden provides safe shelter to a variety of plants and animals. The study trail in the garden is primarily used to teach schoolchildren how to explore and cherish natural values.

Length: 500 m

2. Báránypirosító study trail, Fülöpháza Sand Dunes

Walking along the study trail the formation and the typical flora and fauna of the sand dunes, as well as the development of the network of scattered farms and the effects of human nature remaking can be observed.

Length: 1500 m

3. Boróka (Juniper) study trail, Bugac

The study trail offers the opportunity to get acquainted with the history of the narrow-gauge railway of the puszta and the typical plants and animals of the sand dunes. Apart from these, information on the ancient Hungarian domestic animals and the exceptional way of life of the shepherds is also provided.

Length: 2000 m

4. Réce (Duck) study trail, Upper-Kiskunság Plain

The wetland habitat, which was formed from the one-time rich fishponds, is one of the last reminders of the water world of the puszta. Along the study trail the nesting birds of the reeds and the saline plains can be observed. The two lookouts at the two ends of the trail provide excellent views over the puszta.

Length: cca. 1000 m

5. Kontyvirág (Arum) study trail, Tőserdő

During a pleasant walk in the forest the typical species and the rare plants of the underwood of the flood plain forests can be observed. Looking closely at the oak trees of Majális Meadow, some species of the rich insect population can be seen. At the last stage of the trail there is a geomorphologic rarity, a subsoil water springlet.

Length: 3500 m

6. Árpád fejedelem (Prince Árpád) study trail, Tiszaalpár

The trail with its 11 stages provides an overview of the history and cultural heritage of Tiszaalpár, and the variegated flora and fauna of Alpár Meadow.

Length: 3000 m

7. Aqua Colun study trail, Izsák, Lake Kolon

The study trail provides an insight into the specific flora and fauna of the vast marsh. From the observation post hidden in the reeds and from the lookout at the end of the trail the careful visitor can watch the eventful life of the exuberant bird population living in the reeds.

Length: 3500 m

8. Poszáta (Warbler) study trail, Izsák, Lake Kolon

Anyone wishing to examine thoroughly the magic world of the reeds of Lake Kolon should definitely visit this study trail. Following the marked trail the visitor is informed on how the local people once made good use of the treasures of nature. The birdwatch and the lookout in the reeds provide a view of the typical marshes of the area. In the Bird Observatory the visitor gets an insight into the techniques of bird ringing, and birdwatch research findings are introduced.

Length: 2000 m

9. Cankó (Sandpiper) study trail, Fülöpszállás, Kelemen-szék

The Upper-Kiskunság Lakes are the largest natron lake system in Hungary. The special salt-resistant and halophyte species represent an outstanding natural value that is recognised internationally. The lakes are an important resting and feeding place for several species of migrating birds. The Cankó (Sandpiper) Study Trail shows the formation and the species of the natron lakes. At Kelemen-szék there is an extended black-headed gull population of 1000-1500 couples, which can be well observed from the lookout at one of the stages of the trail. The last stage of the study trail is a hide big enough for 10-15 people. The birds visiting the wet meadow feed in front of the hide and can be watched very closely.

Length: 1000 m

TOURIST TRAILS

Red Cross Trail, Bugac

Starting point: Karikás Csárda (Inn), Bugac

Length: 12 km, loop-shaped trail

Yellow Stripe Trail, Lake Kolon

Starting point: Izsák Railway Station

Length: 12 km

National Red Stripe Trail

This is the longest tourist trail in Bács-Kiskun County.

Total length: 100 km

Accommodation

Naprózsa Oktatóközpont (Sun Rose Education Centre), Fülöpháza

The Centre accommodates 30 people at a time. It is primarily recommended to student groups to be used as a base for open-air school or nature education camps.

Boróka (Juniper) Researchers' Lodge, Bugac

The lodge was originally designed to accommodate 20 people at a time. Tents can be set up in the garden.

Income and benefits to local communities

Indicate for the activities described above whether the local communities derive any income directly or indirectly and through what mechanism.

Through land use practice (agriculture, forest etc. activities), providing the conditions for tourism, taking part in educational and training programmes, getting some compensation for maintaining the traditional cultures and resource use practices.

VI. RESEARCH AND MONITORING PROGRAMMES

Brief description and list of publications of past research and/or monitoring activities.

Getting general information is from aerial photographs, carrying out vegetation mapping, soil mapping, biological surveys, geological and geomorphological studies, wildlife population dynamics, inventories on a lot of wildlife taxa. The complete list of publications is too long to put it down here.

The most important publications are the following:

- The Fauna of the Kiskunság National Park I.
Edited by S. Mahunka
ISBN 963 05 3874 1 (Series)
ISBN 963 05 3875 X (Vol. 1.)
- The Fauna of the Kiskunság National Park II.
Edited by S. Mahunka
ISBN 963 05 3874 1 (Series)
ISBN 963 05 4352 4 (Vol. 5.)
- The Flora of the Kiskunság National Park I.
Editors J. Szujkó-Lacza and D. Kováts
ISBN 963 05 2518 6 (Series)
ISBN 963 7093 19 2 (Volume)
- The Flora of the Kiskunság National Park II.
Editors L. Lőkös and M. Rajczy
ISBN 963 05 2518 6 (Series)
ISBN 963 7093 62 1 (Volume 2)
- National Park in the Kiskunság (in Hungarian)
Published by Natura, Budapest 1979
ISBN 963 233 048
- Agócs, J., Kocsó, M. és Traser, Gy. (1996): Felhagyott fenyőállományok vizsgálata. (research study)
- Altbäcker V., Kertész M., Nyéki O. (1991): The possible role of rabbit (*Oryctolagus cuniculus*) grazing in maintaining the structure of Bugac Juniper Forest. Abstr. 34th Symp. IAVS, 26-30 August, 1991, Eger, Hungary. p. 55.
- Altbäcker V., Kertész M., Szabó J., Förgeteg Zs. (1991): The distribution of rabbit warrens in Bugac Juniper Forest (Hungary) in relation to vegetation type. Proc. XXth Cong. Int. Union Game Biol. Gödöllő p. 4.
- Altbäcker, V. (1998): Növényevő emlősök és a vegetáció kapcsolatának vizsgálata homoki társulásokban. In: Fekete, G. (ed), A közösségi ökológia frontvonalai Budapest: Scientia Kiadó. p. 125-143.

- Altbäcker, V., Bilkó, Á., Hahn, I., Kertész, M. & Tóth, T. (1999): Plant-herbivore interactions: the Bugac Rabbit Project. In: Kovács-Láng, E., Molnár, E., Kröel-Dulay, Gy. & Barabás, S. (eds), Long Term Ecological Research in the Kiskunság, Hungary Vácrátót: Institute of Ecology and Botany, H.A.S. p. 52-53.

- Altbäcker, V., Hudson, R. & Bilkó, Á. (1994): Rabbit mothers' diet influence the pups' food choice. *Ethology*.

- Altbäcker, V., Nyéki, O., Szabó, J. & Kertész, M. (1993): The Bugac Rabbit Project. Part 3. The distribution of rabbit warrens in Bugac Juniper Forest (Hungary) in relation to vegetation type. *Journal of Wildlife Management*.

- Ambrus A.- Bánkúti K.- Kovács T. (1998): A Kiskunsági szikes tavak (KNP II.) ismételt komplex állapotfelmérése 1998. - Szitakötők (Odonata). Kutatási Jelentés a KNP Ig.-részére. Kézirat. 1998. p. 1-16.

- Andó M.- Mucsi M. (1967): Klimarhythmen im Donau-Theiss-Zwischenstromland. *Acta Geographica Szeged*. Tom.VII. Fasc.1-6. p. 43-53.

- Babos, I. (1955): A Duna-Tisza közti homokbuckák termőhelyfeltárása. - *Erd. kut.*, 2. p. 3-53.

- Babos, I. (1955): A nyárfások homokbuckán előforduló megjelenési formái. - *Erd. kut.*, 51. p. 31-86.

- Babos, I. (1956): Homoki termőhelyláncok. *Erdészeti kutatások*. 4. p. 33-72.

- Babos, I. (1957): Site-Chains on Sand Soils. *Acta Agronomica* VIII 1-2. 1957. May p. 141-158.

- Babos, I. (1957): Standortsketten der Sandgebiete *Acta Agronomica* VIII 1-2. 1957. May p. 159-161.

- Bagi, I. (1987). The vegetation map of the Kisapaj UNESCO Biosphere Reserve core area, Kiskunság National Park, Hungary. *Acta Biol. Szeged.*, 33, p. 63-74.

- Bagi, I. (1988). The role of water management in the degradation processes of halophilic vegetation in Hungary. *Environmental Conservation* , 15(4), p. 359-362.

- Bagi, I. (1988). The vegetation map of the Szívós-szék UNESCO Biosphere Reserve core area, Kiskunság National Park, Hungary. *Acta Biol. Szeged*, 34, p. 83-95.

- Bagi, I. (1989). The vegetation map of the Tripolisz UNESCO Biosphere Reserve core area, Kiskunság National Park, Hungary. *Acta Biol. Szeged.*, 35, p. 39-51.

- Bagi, I. (1991). A Felső-szunyog pusztai bioszféra-rezervátum természetvédelmi értékelése. *Természetvédelmi Közlemények*, 1(1), p. 41-48.

- Bagi, I. (1997). Átalakuló homoki vegetáció a Duna-Tisza közén. *Kitaibelia*, 2(2), p. 253-264.
- Bagi, I. (1990). The vegetation map of the Szappan-szék UNESCO Biosphere Reserve core area, Kiskunság National Park, Hungary. *Acta Biol. Szeged.*, 36, p. 27-42.
- Bagi, I. (2000). A *Cleistogenes serotina* inváziójának dokumentumai a Kiskunsági Nemzeti Park "Fülöpházi homokbuckák" UNESCO bioszféra-rezervátum magterületén, 1975-1999. In: Virágh, K. & Kun, A. (eds), *Vegetáció és Dinamizmus. A 70 éves Fekete Gábort köszöntik tanítványai, barátai és munkatársai*. Vácrátót: MTA Ökológiai és Botanikai Kutatóintézete. p. 147-156.
- Bankovics Attila (1997): A tűzok (*Otis tarda* L., 1758) természetvédelmi kezelése kiskunsági élőhelyein *Természetvédelmi Közlemények* 1997. 5-6 p. 87-92.
- Bankovics Attila (1996): A tűzok (*Otis tarda* Linné, 1758) állományának növekedése a Kiskunsági Nemzeti Parkban *Állattani Közlemények* 1996. 81 p. 3-8.
- Bankovics A. (1987): Madártani vizsgálatok a a Kiskunsági Nemzeti Park III. sz. természetvédelmi területén. Jelentés a Szegedi Akadémiai Bizottsághoz, Kézirat, p. 156-165.
- Barabás, S. (1999): A Lakitelek-Szikrai mintaterület élőhelytérképezése és leírása. A Duna-Tisza köze aktuális élőhelytérképezése program 41. számú területe, p. 39. (research study)
- Bíró, M. (1998): Az első katonai felmérés (1783-1784) feldolgozott élőhely szintű térképe.
- Bíró, M. (1999): A harmadik katonai felmérés (1883) feldolgozott élőhely szintű térképe
- Bíró, M. & Molnár, Zs. (1998). A Duna-Tisza köze homokbuckásainak tájtípusai, azok kiterjedése, növényzete és tájtörténete a 18. századtól. *Történeti Földrajzi Tanulmányok*, 5, p. 1-34.
- Bodroγκözy Gy. (1966): Ecology of the halophilic vegetation of the Pannonicum *Acta Botanica Academiae Scientiarum Hungaricae*. Tom. 12. p. 9-26.
- Bodroγκözy Gy., Bagi I. (1989): Jelentés a Kiskunsági Bioszféra Rezervátum magterületeinek vegetációtérképezése című kutatási témában végzett munkáról. *JATE Növénytani Tanszék, Szeged, Kézirat*, p. 155.
- Borbás, V. (1879): Budapest és környékének növényzete - Budapest p. 4-172
- Borbás, V. (1885): Az alföldi zsombék - *Természettudományi Közlöny* 17. köt. p. 273-280.
- Boros, Á. (1915-71): Úti napló - Kézirat (MTTM Növénytár)
- Boros, Á. (1936): A Duna-Tisza köze köriserdői és zsombékosai - *Botanikai Közlemények* 33., p. 84-97.
- Boros, Á. (1952): A Duna-Tisza köze növényföldrajza - *Földrajzi Értesítő* 1. p. 39-53.

- Boros E.(2002): Investigations on the relation between potential food resource of shorebirds (Charadrii) and habitat management practices on saline grassland habitats in the Kiskunság. *Aquila* 107-108, p. 15-35.
- Borsy, Z. (1977). A Duna-Tisza közti hátság homokformái és a homokmozgás szakaszai. *Alföldi Tanulmányok*, 1, p. 43-54.
- Fekete, G. (1999). Dynamic relationship of primary vegetation types on sand. In: Kovács-Láng, E., Molnár, E., Kröel-Dulay, Gy. & Barabás, S. (eds), *Long Term Ecological Research in the Kiskunság, Hungary Vácrátót: Institute of Ecology and Botany, H.A.S.* p. 14-15.
- Fekete, G. (1992). The holistic view of succession reconsidered. *Coenoses*, 7(1), p. 21-29.
- Fekete, G. & Melkó, E. (1981). Reproductive allocation in the stages of sandy succession. *Acta Bot. Acad. Sci. Hung.*, 27(3-4), p. 351-364.
- Fekete, G., Précsényi, I., Molnár, E. & Melkó, E. (1976). Niche studies on some plant species of a grassland community I. Comparison of various measurements. *Acta Bot. Acad. Sci. Hung.*, 22(3-4), p. 321-354.
- Fekete, G. & Tuba, Z. (1982). Photosynthetic activity in the stages of sandy succession. *Acta Bot. Acad. Sci. Hung.*, 28(3-4), p. 291-296.
- Fekete, G., Tuba, Z. & Melkó, E. (1988). Background processes at the population level during succession in grasslands on sand. *Vegetatio*, 77, 33-41. Fekete, G., Tuba, Z. & Précsényi, I. (1980). Niche studies on some plant species of a grassland community, VII. Quantity and seasonality of photosynthetic pigments. *spring. Acta Bot. Acad. Sci. Hung.*, 26(3-4), p. 289-297.
- Fényes J. (1980): A Duna-Tisza közti tőzeges tavak fejlődéstörténete Mollusca fauna vizsgálat alapján. Szakdolgozat. JATE, Szeged, p. 67.
- Harmat I.(1999): A lecsapolások, a vízrendezések hatása a Duna-völgy hidrológiai- és talajviszonyaira. *Növénytermesztés és környezetvédelem, MTA Agrártudományok osztálya*, p. 107-110.
- Harmat I.(2000): A vízrendezések hatása a Duna-völgy szikes talajaira. *Agrokémia és Talajtan* Tom. 49. No. 3-4. p. 369-380.
- Harmat I (2000): A duna-völgyi szikes talajok és ezek talajvizének sótartalma. *Agrokémia és Talajtan* Tom. 49.No. 3-4. p. 383-397.
- Havranek, L. (1962): Life of the river Tisza XX. Mammological investigations in "Tös"-forest. *Acta Biol. Szeged.* VIII (1-4), p. 167-171.
- Horváth I., Margóczy K. (1979): Region reconstruction of the Tisza dead-arm at Lakitelek on the basis of the ecological investigations performed in Tőserdő. *Tiscia* 14:89-104.

- Iványosi Sz. A. (1984): Az izzási Kolon-tó üledék és környezetföldtani vizsgálata. Doktori értekezés. JATE Szeged, p. 135.
- Járai-Komlódi M. (1958): Sukzessionstudien an Eschen-Erlenbruchwaldern des Donau-Theiss zwischenstromgebiets. Annls. univ. sci. 2. p. 113-122.
- Járai-Komlódi, M. (1987). Postglacial climate and vegetation history in Hungary. In: Pécsi, M. & Kordos, L. (eds), Holocene environment in Hungary Budapest: Akadémiai Kiadó. p. 37-47.
- Kuti L. (1975): A Duna-völgyi legfelső kavicsréteg kutatása az izzási térképlapon. MÁFI évi jelentés az 1974. évről. Budapest, p. 125-132
- Margóczy K. (1979): Region reconstruction of the Tisza dead-arm at Lakitelek on the basis of the ecological investigations performed in Toserdo. Tiscia 14, p. 89-104.
- Molnár B., Iványosi Sz. A., Fényes J. (1979): A Kolon-tó kialakulása és limnogeológiai fejlődése. Hidr. Közl. 59. 12. p. 549-560.
- Molnár, B. (1992) (szerk.): A Kiskunsági Nemzeti Park földtani és vízföldtani viszonyai, (research study) p. 205.
- Molnár Zs., Horváth F., Litkey Zs. és Walkovszky A. (1997): A Duna-Tisza közti körises égerlápok története és mai állapota. Természetvédelmi Közlemények 5-6, p. 55-77.
- Molnár, Zs. & Vajda, Z. (1999). Habitat mapping in the Danube-Tisza Interfluve (D-TMap project, 1996-2000). In: Kovács-Láng, E., Molnár, E., Kröel-Dulay, Gy. & Barabás, S. (eds), Long Term Ecological Research in the Kiskunság, Hungary Vácrátót: Institute of Ecology and Botany, H.A.S. p. 18-19.
- Tóth, K. (1985). Tudományos kutatások a Kiskunsági Nemzeti Parkban 1975-1984 . Budapest: Hungexpo.
- Tóth K. (1995): 20 éves a Kiskunsági Nemzeti Park Házinyomda Kft. Kecskemét
- Tóth, T. (1999). Dynamics of salt accumulation in salt-affected soils. In: Kovács-Láng, E., Molnár, E., Kröel-Dulay, Gy. & Barabás, S. (eds), Long Term Ecological Research in the Kiskunság, Hungary Vácrátót: Institute of Ecology and Botany, H.A.S. p. 25-26.
- Tóth, T. & Kuti, L. A talaj sótartalom-változás tényezői a kiskunsági Apajon. In: Talaj és környezet. Debrecen. p. 106-115.
- MTA TAKI (1983): Jelentés a Kiskunsági Nemzeti Park részére 1981-ben végzett munkálatokról. Budapest Kézirat. p. 52.

Brief description of on-going research and/or monitoring activities.

Abiotic research and monitoring:

Studies on hydrological conditions.

Biotic research and monitoring:

There are several individual ongoing projects within the biosphere reserve. Most of the biotic research are run by various universities and research institutes or researchers.

The main monitoring program was initiated by the Authority for Nature Conservation with the support of the PHARE programme of the European Union, involving several research institutes. The system originally proposed in 1997 has been running with an increasing number of component projects, and it is named the Hungarian Biodiversity Monitoring System (HBMS).

Monitoring activities have been clustered into 10 groups (projects). The projects have been formulated by definition of the objectives and the exact description of tasks as follows:

- I. Monitoring of protected and threatened plant and animal species.
- II. Monitoring of aquatic and wetland habitats and their communities
- III. Monitoring of habitat types in Hungary
- IV. Monitoring of populations of invasive plant and animal species
- V. Monitoring of selected sites of the Hungarian Forest Reserve Network
- VI. Regional monitoring of the biota of the Kis-Balaton wetlands
- VII. Regional monitoring of the Szigetköz wetlands
- VIII. Monitoring of salt-affected habitat types
- IX. Monitoring of dry grasslands
- X. Monitoring of mountain hay meadows

Socio-economic research:

The Hungarian Academy of Sciences organised a study on life in scattered farmsteads.

Estimated number of national scientists participating in research within the Biosphere Reserve on a permanent or occasional basis.

Permanent: 35 (botanist: 25, zoologist: 10)

Occasional: 60

Estimated number of foreign scientists participating in research within the Biosphere Reserve on a permanent or occasional basis.

Permanent: -

Occasional: 5

Research station(s) within the Biosphere Reserve.

There are two permanent stations for biological monitoring activity at the Sand Dune region at Bugac. These stations belong to the University of Szeged, and Eötvös Lóránd University, Budapest. There is a permanent station for biological monitoring activity at the Sand Dune region at Fülöpháza. This research centre belongs to the Institute of Ecology and Botany of Hungarian Academy of Sciences, Vácrátót.

Permanent research station(s) outside the Biosphere Reserve.

There is no research station vicinity of the Biosphere Reserve.

Research facilities of research station(s) (meteorological and/or hydrological station, experimental plots, laboratory, library, vehicles, computers etc.).

Meteorological station, experimental plots, permanent experimental plots for long term monitoring, labs, vehicles, computers.

Other facilities (e.g. facilities for lodging or for overnight accommodation for scientists etc.).

32 separate overnight accommodations for researchers in Fülöpháza Education Centre at the Sand Dune area, and Bugac.

Indicate how the results of research programs have been taken into account in the management of the biosphere reserve

Any outcome of research programmes useful for the everyday management practice becomes an integrated part of the management plans.

VII. EDUCATION, TRAINING AND PUBLIC AWARENESS PROGRAMMES

Describe the types of activities related to

- Environmental education and public awareness:

The Field Study Center at Fülöpháza. This study center is the core of the environmental education program at Kiskunság BR. It provides an area for the park to be used as an educational tool for students of all ages, and also a place from which scientific research can be conducted. The center receives groups of students from primary and secondary schools from throughout the area, as well as university classes that would like to conduct week long field studies in the park. The center has also been used as the site of a training camp for teachers that would like to learn more about outdoor environmental education techniques.

House of Nature

The Biosphere Reserve has a visitor centre in the city of Kecskemét. It is called the House of Nature. Dioramas draw a picture of the flora and fauna as well as the protected habitats of the BR such as natural forests on flooded areas and natron lakes. Lectures on conservation are held according to a timetable. Groups are welcome by prior arrangements. Guided tours (for over 10 persons) can also be booked here. Individual guests are able to gain information about those parts of the National Park and Biosphere Reserve which are open for tourists. Brochures, postcards are also available.

- The exhibition of the building introduces the Hungarian nature conservation and the natural values of the land between the Danube and Tisza Rivers.
- It serves as an information center that expands the social base of nature conservation by giving programs, lectures, and issuing publications.
- Environmental education for young children and students which will enhance classroom environmental science curriculum, and the dissemination of scientific knowledge to students, teachers, and researchers.
- A starting point and information center for tourists visiting the Kiskunság National Park and Biosphere Reserve.
- The House serves as a place for conferences and seminars.
- In the House there is a library of nature conservation documents and relevant data on the region between the Danube and Tisza rivers including photos, films, video tapes, slides, scientific papers, technical books, maps, etc....

Public relations, information service, social connections

- Creation of data base and it could be reached by the public.
- Information service related to ecotourism (Connected with Hungarian national parks and other protected areas, and visit of KNP.)
- To maintain relations with nature conservation and environmental associations. To give place and technical equipment to their programs.
- To organize permanent and periodic nature protection exhibitions.
- Aiding nature conservation associations.
- The Nature Conservation House serves as a place for professional forums.
- To organize open days of the national park.

- Organization of courses - provision of lecture hall on rent
- Organization of city and county nature conservation and environmental programs.

- Training programs for specialists:

There are ad hoc training courses for specialists from other Hungarian biosphere reserves with particular attention to problems like the management of burnt areas, or recently rehabilitated areas.

Indicate whether there are facilities for education and training activities, as well as visitors' centers for the public

There are two education and four visitor centres in the reserve. One education centre in Fülöpháza with 30 beds for the students and tourists, one in Bugac with 20 beds.

The visitor centres are the following:

- Shepherd's Museum and Visitor Centre at Bugac
- Virág Kúria Museum and Visitor Centre at Kunszentmiklós
- Throatcut Inn Museum at Kunszentmiklós
- House of Nature, Kecskemét

VIII. INSTITUTIONAL ASPECTS

State, Province, Region or other administrative units

List in hierarchical order administrative entity(ies) in which the Biosphere Reserve is located (e.g. state(s), counties, districts).

State: Hungarian Republic

Province: Bács-Kiskun County

Region: Kiskunság

Management plan/policy

Indicate if a management plan or policy exists for the overall biosphere reserve.

There is detailed Management Plan for the Reserve from 1996. This is the latest version of the Management Plan. This management plan does not suit the requirements of current laws, it must be reworked.

If yes, briefly describe the main characteristics of this plan and precise the modes of application.

The management plan is mainly for the land use practice within the reserve. It consists of two sections:

1. General principles of the proposed management
2. An operative part including all sites and their code number from the land register and specific management descriptions to each of them.

Authority in charge of administration of the whole, i.e. of implementation of this plan/policy:

The Kiskunság Biosphere Reserve is managed and supervised by the Directorate of the Kiskunság National Park. (Directorate of the KNP). The Directorate of the KNP is controlled by the Ministry of Environment and Water.

Total number of staff of Biosphere Reserve:

Total number: 74 (of the National Park)

The staff listed below all work at the Park HQ in Kecskemet and service 9 sites of the National Park and Biosphere Reserve.

1 Park Director

2 Deputy Directors: a) Professional staff. & b) Finances

Under the Deputy Director, Professional staff, there are four departments:
Nature Conservation, Nature Education, Rangers Service and Authorities.

Financial source(s) and yearly budget:

Indicate the source and the relative percentage of the funding (e.g. from national, regional, local administrations, private funding, international sources etc.) and the estimated yearly budget in the national currency.

The yearly budget: 720 million HU Forints

69 % from the state,
31 % from other sources (income, applications etc)

Authority in charge of administration
The biosphere reserve as a whole:

Directorate of the Kiskunság National Park

Core area(s):

See above

Buffer zone(s):

See above

Mechanisms of consultation and co-ordination among these different authorities:

There are minimum two meetings a year with the competent authorities. On the meetings take part not only the directors and the deputies, but the leaders of the different departments as well.

Where appropriate, National (or State, or Provincial) administrations to which the biosphere reserve reports:

The State Secretariat for Nature and Environment Protection of the Ministry of Environment and Water

Mechanism for consultation of local communities

Indicate how and to what extent local people living within or near the Biosphere Reserve.

- have been associated to the biosphere reserve nomination:

They have not been associated to the Biosphere Reserve Nomination.

- participate to the decision process and management resources:

The decision on management resources are made by the Directorate of the KNP, and put down in management plans. However the management plans are consulted with local communities. They may contribute to and amend them.

Indicate whether you consider the participation of local communities to be satisfactory and, if not, what measures are envisaged to improve this situation

It is getting to be satisfactory. However the lack of capital and the rapid changes in our society even now cause a lot of problems and frictions.

Protection regime of the core area and possibly of the buffer zone

Indicate the type (e.g. under national legislation and date since when the legal protection came into being and provide justifying documents (with English or French summary of the main features).

Kiskunság Biosphere Reserve recognized by Director -General of UNESCO: 1979.
Accepted by Hungarian legislation: 1980 (a statement), originally on a land of 22.095 ha. Since the National Park land has been extended we would like to do so with the Biosphere Reserve land.

The Act No. LIII. of 1996 on Nature Conservation in Hungary that came into force on 1st of January, 1997 designated the Core area of the Biosphere Reserves as a strictly protected area.

“Article 29 (4) By virtue of this Act, the natural zone of national parks, the core areas of biosphere reserves and the core areas of forest reserves shall be declared strictly protected.”

Land tenure of each zone

Percentage of ownership in terms of national, state/provincial, local government, private, etc.

Core Area(s):

State owned:	95 %
Privately owned:	5 %

Buffer Zone(s):

Buffer zones 1:

State owned:	83 %
Privately owned:	15 %

Co-operatives: 1 %
Local municipality: 1 %

Transition Area(s):

Buffer zones 2:

State owned: 56 %
Privately owned: 42.8 %
Co-operatives: 0.35 %
Local municipality: 0.85 %

Foreseen changes in land tenure.

Due to the land purchase program the size of land owned by the state will increase.

Is there a land acquisition programme, to purchase private lands, or plans for privatization of public lands?

As indicated above. In the transition area a lot of local farmers have acquired fields around their farms.

Contact address(es)

Contact address of the biosphere reserve for all official correspondence.

Name: Directorate of the Kiskunság National Park

Street or P.O. Box: Liszt Ferenc u. 19.

City with postal code: 6000 Kecskemét

Country: Hungary

Telephone: +36-76-482-611

Telefax (or telex): +36-76-481-074

E-mail: mailknp@knp.hu

Web site address: www.knp.hu, <http://knp.nemzetipark.gov.hu>

IX. CONCLUSION

Brief justification of the way in which the biosphere reserve fulfils each criteria of article 4:

4. Representative ecological systems - graduation of human interventions

The BR has a great importance from the point of view of protection of endemic dry grassland species and habitats of inland calcareous sandy areas in the Carpathian Basin.

As a result of the mosaic-like structure unfavourable edge effects threaten all units of the BR. It has high vulnerability first of all because its water conditions - in most units of the site - highly depend on the use of a dense network of drainage canals. Regional decrease of ground water level has degraded a lot its wetland habitats, including humid grasslands and native forests as well. All the BR natural habitats are sensitive to agricultural pollutions from the surrounding areas as well.

Intensive leisure activities have an influence on some parts of the BR - especially on the outskirts of Töserdő -, such as bathing, hiking, leisure fishing. The unfavourable effects of these activities are mainly pollution and disturbance of human presence.

Expansion of the adventive plants (*Solidago gigantea*, *Solidago canadensis*, *Asclepias syriaca*, *Robinia pseudo-acacia*, *Ailanthus altissima*, *Fraxinus pennsylvanica*, *Acer negundo*) is the other serious problem of the BR.

2. Significance for biological diversity conservation

The characteristic feature of the BR is that it consists of seven separate units. All of them are different from each other. Due to its mosaic-like structure the BR is characterized by high biodiversity both on species and habitat levels. Most important habitat types are: dry sand habitats such as pannonic sand steppes, humid sand grassland, alluvial meadows, *Molinia* meadows, reedbeds, different kinds of marshes, poplar woodlands, semi-natural, planted deciduous woodlands, artificial forest cultures. Most of the BR habitats are in natural and semi natural condition and they have a great importance. As a result of intensive agriculture these areas are the last remnants of the original vegetation of the Danube-Tisza Interfluvium area. Units of the BR are important stepping-stones from north to south for the fauna and flora as well.

3. Approaches to sustainable development on a regional scale

Inside the BR there is no room to improve any kind of human activities. The main goal of the BR is to protect the biological diversity of the protected area, therefore, the level of human activities, as much as possible has to decrease.

Due to the low renting fees of the protected grasslands, and the agricultural compensation system the local people have a good income from the BR.

4. Appropriate size to serve the three functions

The size of the BR is large enough to protect the nature conservation values of the area. A law for nature conservation (highest legal instrument) is a guarantee for providing the highest protection to Kiskunság National Park (inc. Kiskunság B.R.) Due to that more than 75% of the total land area of the KNP belongs to the state (and this figure will be extended), the

Biosphere Reserve has an unified management practice. The main administrative body of the reserve (Kiskunság B.R.) is a state organization.

The area of the national park has been extended to a size of 50,000 ha. All national park area should be in the Biosphere Reserve through the necessary procedures.

5. Appropriate zonation to serve the three functions

Due to its mosaic-like structure the zonation of the BR is not ideal, but it has been functioning. The enlargement of the core areas should be necessary in the near future.

6. Participation of public authorities and local communities

Due to the fact that more than 75% of the total land area of the Kiskunság National Park belongs to the state the local communities have no interest to take part in the management of the BR. The Hungarian legislation gives right to public authorities to control different activities taken by Kiskunság National Park.

- 7.
- a) mechanisms to manage human use and activities
 - b) Management policy or plan
 - c) Authority or mechanism for implementation
 - d) Programmes for research, monitoring, education and training

Management of human uses and activities in the area of the Biosphere Reserve are controlled by the act of nature conservation and the contracts between Kiskunság National Park and the local farmers.

Due to the fact that more than 75% of the total land area of the Kiskunság National Park belongs to the state the local communities have no interest to take part in the management policy and planing of the BR.

Kiskunság National Park is responsible for the implementation of the management plan of the BR.

Research, monitoring and training are increasingly being conducted through partnership arrangements between government and non-government organizations and universities in the general area of the BR. The goal of the BR is to educate the general public about the protected areas and their importance in preserving the natural treasures of Hungary. The Park Directorate feels that it is part of the purpose of the BR to provide a place for education in biological sciences, as well as general environmental education that will create an awareness of the need to protect the environment. The programs at these facilities are aimed at students of all ages as well as at teachers that want to learn more about environmental education techniques. Many of these facilities provide housing and equipment for professional and student research projects as well. These facilities not only provide researchers with excellent opportunities to access the park, but the results of their studies will provide the park with information that will assist us in future park management. Possible linkages to international research programs merit more consideration.

Does the biosphere reserve have cooperative activities with other biosphere reserves (exchanges of information and personnel, joint programmes, etc.)?

At the national level:

On-going activities: training on improving management practice
training on wetland rehabilitation
exchange of information

Planned activity: training on the specific usage of core areas

Through twinning and/or transboundary biosphere reserves:

Co-operation with reserves like Leighton Moss Reserve (UK. Twinning by EUROSITE)
Co-operation with organizations like EUROSITE, IUCN, etc.

Within the World Network (including Regional Networks):

No special cooperation.

Obstacles encountered, measures to be taken and, if appropriate, assistance expected from the Secretariat



**PERIODIC REVIEW
FOR BIOSPHERE RESERVES IN
HUNGARY**



PILIS BIOSPHERE RESERVE



**BUDAPEST
2007**

I. NAME OF THE BIOSPHERE RESERVE

Pilis Biosphere Reserve

II. COUNTRY

Hungary

III. PHYSICAL CHARACTERISTICS OF THE BIOSPHERE RESERVE

Latitude and longitude

47°45'N, 18°49'E (for the peak of Dobogókő, which is approximately the centre of the BR).

Biogeographical Region

Pannonian

Topography of the region

Medium height hills (average altitude 450-500 m), in between basins (mean altitude 250-300 m), deep valleys with streams, in the north and east bordered by the River Danube (Danube Bend). Considerable differences in relief is characteristic (mean relative relief 130 m/km²). Highest elevation above sea level 757 m (Pilis-tető); lowest elevation 106 m (Danube).

Climate

Temperate warm, "Cf" by Köppen-climate classification; above altitude 600m moderately cool". The annual precipitation varies between 500-600 mm.

Geology, geomorphology, soils

The north-western unit, the Visegrád Hills are built up of Andesite (Middle-Miocene, Badenien –Mátra Andesite Formation), the south-eastern unit, the Pilis Hills are composed of Upper-Triassic sedimentary rocks: dolomite and limestone (Dachstein Limestone Formation, Hauptdolomite Formation).

Soils: forest soil, erubase, ranker.

Significance for conservation of biological diversity: habitats and characteristic species

Type of habitat: Turkey oak and sessile oak forest (*Quercus petraeae-cerris*)

Distribution: regional (between 250-450 m extrazonal, above 700m at Pilis-tető, and at Dobogókő)

Main species: *Quercus petraea*, *Q. cerris*, *Carpinus betulus*, *Fraxinus excelsior*, *Tilia cordata*, *Acer campestre*, *Ulmus minor*, *Crataegus oxycantha*, *C. monogyna*, *Ligustrum vulgare*, *Cornus mas*, *Euonymus europaeus*, *E. verrucosus*, *Festuca heterophylla*, *Melica uniflora*, *Poa*

nemoralis, Digitalis grandiflora, Mellitis grandiflora, Lathyrus niger, Chrysanthemum corymbosum, Campanula persicifolia.

Vulnerable species: Epipactis latifolia, E. purpurata, Cephalanthera damasonium, C. rubra, Cerambyx cerdo, Lucanus servus, Dryocopus martius, Felis silvestris, Martes foina, etc.

Type of habitat: Hornbeam and oak forest (Querco petraeae-Carpinetum)

Distribution: Regional (between 450-700 m, extrazonal under 450 m in northern exposure)

Main species: Quercus petraea, Carpinus betulus, Fagus sylvatica, Quercus cerris, Cerasus avium, Ulmus glabra, Acer pseudoplatanus, A. platanoides, Tilia platyphyllos, Ligustrum vulgare, Euonymus europaeus, Staphylea pinnata, Corydalis cava, Isopyrum thalictroides, Anemone ranunculoides, Galanthus nivalis, Asarum europaeum, Hepatica nobilis, Cyclamen purpurascens, Lilium martagon.

Vulnerable species: Helleborus purpurascens, Allium ursinum, Hepatica nobilis, Hesperis matronalis ssp. Candida, Milvus milvus, Circaetus gallicus, Felis silvestris, Martes foina, etc.

Type of habitat: Extrazonal beech forest (Melitti-Fagetum)

Distribution: local (usually above 600m, in northern exposure above 500m)

Main species: Fagus sylvatica, Acer platanoides, A. pseudoplatanus, Fraxinus excelsior, Carpinus betulus, Quercus petraea, Asperula odorata, Oxalis acetosella, Carex pilosa, Melica uniflora, Luzula albidula, Aegopodium podagraria, Mercurialis perennis.

Vulnerable species: Helleborus purpurascens, Epipactis microphylla, Allium ursinum, Daphne mezereum, Rosalia alpina, Lucanus servus, Dryocopus martius, Dendrocopos leucotos, Falco cherrug, etc.

Type of habitat: Mercuriali-Tilietum

Distribution: local

Main species: Tilia platyphyllos, T. cordata, Mercurialis perennis, Parietaria officinalis, Geranium lucidum, etc.

Type of habitat: Phyllitidi-Aceretum

Main species: Fraxinus excelsior, Acer pseudoplatanus, A. platanoides, Fagus sylvatica, Ulmus glabra, Tilia platyphyllos, Sambucus nigra, Ribes grossularia, Staphylea pinnata, Urtica dioica, Parietaria officinalis, Phyllitis scolopendrium, Lunaria rediviva, Anthriscus sylvestris, etc.

Vulnerable species: Phyllitis scolopendrium, Lunaria rediviva

Main human impacts:

(It refers to every habitat type)

- forest industry, tourism

Relevant habitat management practices: The aim of the management is to reach the natural forest structure. Human activity is restricted in the Core Areas and the Buffer Zones. It is necessary to monitor the changes in populations.

Habitats of special interest: Mercuriali-Tilietum, Phyllitidi-Aceretum, Seslerio-Fagetum, Corno-Quercetum, Crataego-Cerasetum fruticosae, Amygdaletum nanae, Festuco ovinae-Nardetum

Endangered or threatened plant or animal species (for details see appendix 4.):

- a) plants: *Gentiana pneumonanthe*, *Gentianopsis ciliata*, *Iris* spp., *Orchideaceae*, *Amygdalus nana*, *Helleborus purpurascens*, *Hepatica nobilis*, *Digitalis lanata*, *Phlomis tuberosa*, *Dictamnus albus*, *Campanula macrostachya*, *Pyrus nivalis*, *P. magyarica*, *Ferula sadleriana*, *Sesleria sadleriana*.
- b) animals: *Austropotamobius torrentium*, *Calopteryx virgo*, *Mantis religiosa*, *Stenobothrus eurasius*, *Saga pedo*, *Lucanus cervus*, *Dorcus parallelepipedus*, *Synodendron cylindricum*, *Megopis scabricornis*, *Morimus funereus*, *Rosalia alpina*, *Cerambyx cerdo*, *Zerynthia polyxena*, *Parnassius mnemosyne*, *Papilio machaon*, *Maculinea alcon*, *Jolana jolas*, *Vanessa atalanta*, *Arctia festiva*, *Phoxinus phoxinus*, *Neomacheilus barbatulus*, *Barbus meridionalis petényi*, *Rana dalmatina*, *Rana temporaria*, *Coronella austriaca*, *Pernis apivorus*, *Asio otus*, *Lullula arborea*, *Motacilla cinerea*, *Certhia familiaris*, *C. brachydactyla*, *Accipiter gentilis*, *Alcedo atthis*, *Falco subbuteo*, *F. cherrug*, *F. peregrinus*, *Corvus corax*, *Milvus migrans*, *Cinclus cinclus*, *Chiroptera* species, *Martes martes*, *Felis silvestris*.

Species of traditional or commercial importance: *Adonis vernalis* (herb), *Helix pomatia*.

Game species are: red deer, roe deer, wild boar and moufflon.

Hunting has a tradition in the Pilis Hills.

IV. ZONATION

Names of the different areas

Spatial configuration

*A Biosphere Reserve Zonation map showing the delimitations of all core area(s) and buffer zone(s) **must be provided**. Also indicate the approximate extent of the transition area(s).*

Size of terrestrial Core Area(s):

1. Szamárhegy-Kerektó:	138,9 ha
2. Ábrahámhegy-Vértes-hegy:	144,3 ha
3. Apátkúti bérc-Őrhegy:	261,5 ha
4. Öreg Pap-hegy:	178,5 ha
5. Prédikálószték:	332,5 ha
6. Pilistető:	152,7 ha
7. Feketekő-Háromszázgarádics-Árpádvár:	86,6 ha
8. Kétágú-hegy-Fehér-szikla	88,6 ha

Size of all Core Areas: **1483,0 ha.**

If appropriate, size of marine Core Area(s):

Size of terrestrial Buffer Zone(s): **4697, 0 ha.**

If appropriate, size of marine Buffer Zone(s): -

Approx. size of terrestrial Transition Area(s) (if applicable): **20000 ha**

If appropriate, approx. size of marine Transition Area(s): -

V. HUMAN ACTIVITIES

Population living in the reserve

	Permanently	/ Seasonally
Core Area(s):0/...0.....	
Buffer Zone(s):0/...0.....	
Transition Area(s):	approx. 5000.../approx. 200000.....	

Brief description of local communities living within or near the Biosphere Reserve.

Originally Serbian, Slovak and German minorities lived in and around the area of the biosphere reserve. But the vicinity of Budapest and the natural wealth and beauty of the Danube Bend have drawn many people to settle down in this region (this process is still going on). Szentendre and Esztergom are characteristic towns of the region. The genuine characters of villages of Pilisszentlászló (Slovak minorities), Pilisszentlélek (Slovak minorities), Visegrád (German minorities) and Dunabogdány (German minorities) have been preserved.

Indicate ethnic origin and composition, minorities etc., their main economic activities (e.g.

pastoralism) and the location of their main areas of concentration, with reference to a map if appropriate.

Main activities: agriculture, forest management, tourism, industry (travelling by commuting), but there are less labour facilities in the field of agriculture and forest management.

Name(s) of nearest major town(s). Budapest, Szentendre, Esztergom.

Cultural significance of the site

This region has played an important and specific role in Hungarian history from the Hungarian Conquest till now, but the size of this report is too small even for the brief introduction of the region. The BR lies among three major towns (Esztergom, Visegrád, Buda – all were residing cities of Hungarian kings) with numerous sites and monuments of historical, cultural and archeological importance. Esztergom is the seat of the Catholic Archbishop. There are many archeological sites from the Later Stone Age, Bronze Age, Iron Age, Ancient Times (the Danube was the eastern border of the Roman Empire), Times of the Great Migration and from the Middle Ages.

Use of resources by local populations

Uses or activities in the Core Area(s):

All Core Areas but one (Kerektó moorland –not in use nowadays) are state forests. Silvicultural use is only for the preservation of the natural wealth. Besides this there are few hiking trails leading through these areas.

Main land uses and economic activities in the buffer zone(s):

These areas are also state forests. Forestry is controlled and supervised by the professional staff of the protected area. Conservation is the main objective during forest management planning.

Main land uses and major economic activities in the Transition Area(s):

The main land use is forestry. Viniculture, fruit production, grazing and plant cultivation are less important activities. The BR is one of the most visited tourist destinations (besides Lake Balaton and Budapest) in Hungary, so tourism is a major type of land use.

Possible adverse effects of uses or activities in the transition area(s) and remedial measures taken:

An unfavourable process is the disappearance of traditional agriculture and the expansion of planted forest. Forestry management is the best controlled activity in the area (about 80% of the area is covered by state-owned forests). (Preparation and implementation of forest management plans are assisted and revised by the nature conservation directorate.

If known, give a brief summary of past/historical land use(s) of the main parts of the Biosphere Reserve:

Hunting and silviculture are the first to be mentioned among the historical land uses. Throughout this hilly region there was a vast hunting ground reserved for royalties and later for the State. The Catholic Church owned forests here in the past too. Viticulture and wine-growing are the second to be mentioned, which had flourished from medieval times till the turn of this century (in that time Szentendre –Buda wine-growing region was well known and appreciated in Europe). Then there was a major set-back caused by a pest. Fruit production in the third to be mentioned. It played an important role in this region from the beginning of this century to World War II. After World War II fruit-production was finished. Secondary steppes were formed at the place of abandoned orchards, and small gardens and holiday camps were established in the 1960s and 1970s at the place of steppes.

Tourism

Indicate the number of visitors coming to the Biosphere Reserve each year

The estimated number of foreign and national visitors is around two million per year. There is no regular statistical study about the number of visitors. The estimations concern the Transition Area and the nature trail of BR.

One day tour – the most significant type (estimated 8000-1500000 visitors)

Weekend recreation (only in favorable season) – mainly in adjacent area of the BR but in the Transition Area it is also significant (est. 300000 visitors).

Hunting – mainly for big game (wild boar, deer, mouflon) in both state-owned and private land.

Camping – there are four campsites in the BR and additionally 20 at out of the border of the Transition Area.

Camping for EE – there are about 20 places where nature conservation and environment protection is taught to 10-14 years-old children in a week long camp. One of the most important is Nature and Forest Protection Camping (Mogyoróhegy forest school in Visegrád) operated by Park Forestry Pilis Ltd. (abbreviated as PP).

Horseriding – it is not permitted in the Core Areas and Buffer Zones. It is organized and operated by privately owned clubs around the Transition Area. For the most time it is linked to other recreational activities (e.g.: one day tour, weekend camping etc.).

Rock climbing – it is not significant because the suitable places are usually strictly protected areas (Core and Buffer Zones) for the conservation of rare geological formations, plants and animals.

Mountain biking – it has become very popular in recent years. The impact has not been assessed yet, it mainly depends on the measure of land-using, but this activity is not a welcomed type of tourism from the point of view of nature conservation.

Para-gliding, hang-gliding – they cause severe damage to Pilis-tető Core Area by trampling or the vegetation at set-off points and by disturbing animals.

Observation of plants and animals – the activity is mainly organized, it happened in the nature conservation camps, on the permitted areas.

Fishing – **there are two** lakes are in the Transition Areas. Among them Kerektó connects to the Core Area, here it is important to supervise the fishing activity.

Tourist facilities and description of where these are located.

Visitors can find accommodation in hotels (there are two), boarding houses, inns, private rooms, and hotels (3 of them in the Buffer zone), located in the Transition Area. Generally, they are managed by private entrepreneurs
Dobogókő Winter Sport Centre and Visegrád Tourist Centre are situated in the BR as main tourist centers. They are managed (the former only in part) by Pilis Park Forestry Ltd. This company also manages and maintains marked hiking trails (in total approximately 400kms) and along them playgrounds, resting areas, look-out towers and activity trails. Maintenance was coordinated and financed by Pilis Park Forestry Ltd. until 1990s. Nowadays public organizations maintain the trail blazes.

Income and benefits to local communities

Indicate for the activities described above whether the local communities derive any income directly or indirectly and through what mechanism.

Local communities derive income indirectly from holiday resort tax. More tourist facilities are under construction in this area and the local governments take part in these projects.

VI. RESEARCH AND MONITORING PROGRAMMES

Brief description and list of publications of past research and/or monitoring activities.

Researching and monitoring of the abiotic nature factors:

The Danube Monitoring Programme is undergoing at the border of the BR.

Researching and monitoring of biotic nature factors:

In the frame of NBMR the monitoring of indicated important species in Hungary and in the EU has been carried out since 1997, e.g. botanical research was done in several places within the area of BR. This kind of monitoring is continuous. Strictly protected and colonially nesting birds are regularly surveyed since 2001. Since 2006 dormouse monitoring program has been made in this area, which is part of a national program and it is also unique in the EU. Since 1996 an ecological research has been running on the behaviour of the population of Tawny Owl inhabiting in this area.

Complex research station functioned in the BR between 1983 and 1986 but the management of BR was not properly informed about the results.

During the researches from 1990 to 1995 which contributed to the establishing of Duna-Ipoly National Park, important plants and animals were surveyed with the coordination of the Nature Conservation Bureau in Budapest.

Between 2002 and 2003 a cadastre was made about the ponds within the BR. This included not just the conditions of the ponds, but also their wildlife. According to this cadastre habitats in several ponds might need to be restored. The work was done by the staff of the National park, financed by the Environmental Protection Fund.

Socio-economic researches:

Annually about 20 - 25 scientists participate in the researches.

Brief description of on-going research and/or monitoring activities.

Abiotic research and monitoring:

We do not have any detailed information. We do not know about any further researches.

Biotic research and monitoring:

No information available.

Socio-economic research:

No information available.

Research station(s) within the Biosphere Reserve.

One research station has been set up by the Department of Ecology and Animal Taxonomy of Eötvös Lóránd University, Budapest, for doing research work on hole-nesting songbirds.

Permanent research station(s) outside the Biosphere Reserve.

No information available.

Research facilities of research station(s) (meteorological and/or hydrological station, experimental plots, laboratory, library, vehicles, computers etc.).

We do not have any research facilities.

Other facilities (e.g. facilities for lodging or for overnight accommodation for scientists etc.).
4-6 people can be accommodated in the Visitor Center of Esztergom.

Indicate how the results of research programmes have been taken into account in the management of the biosphere reserve

Among the research programs we used especially successfully our own-coordinated monitoring results and the results of researches, which contributed to the establishing of the national park, partly in authority work and to a certain extent in the designing of the habitat restorations and in the environmental education

List of publications:

1. Geology, speleology, geography, geomorphology

- Á JANICSEK ZS.: Szentendre funkciói és vonzáskörzete. Földr. Ért. Bp. 1963.
- BARA I.: Tekintetes Nemes Pest, Pilis és Solt törvényesen egyesült vármegyéknek természettudományos leírása. I. füzet, Pest, Trattner-Károlyi 1839. 4. x, 176 nl.
- BÁTHORI Z.: A Rámszakadék. Term. Tud. Közl. 1962. 6. sz. 261-263.
- BEKEY I. G.: A csobánkai Macska-barlang. Barlangkutató. Bp. 1914.
- BEKEY I. G.: A piliscsabai Klotild-barlang. Barlangkutató. Bp. 1915.
- FERENCZ K.: A Pilishegy és a tőle D-re eső terület földtani viszonyai. MÁFI Évi Jel. 1939-40-ről. 1. 1943. Bp.
- HEGEDŰS Gy.: Adatok a Pilis-hegység földtani ismeretéhez. MÁFI Évi Jel. 1945-47-ről. 2. 1951.
- KÉZ A.: A Duna visegrádi áttörése. Mat. és Term. Tud. Értesítő. Bp. 1933.
- KOCH A.: A csobánkai és solymári barlangok. Földt. Közl. I. 1871.
- KOCH A.: A Szt. Endre-Visegrádi és a Pilis hegység földtani leírása. MÁFI Évk. 1. 1871.
- KOCH A.: Új barlang a Hosszúhegyen. Földt. Közl. V. 1875.
- KORMOS T.: A pilismaróti kőfülke Földt. Int. Évk. XXIII. 6. Bp. 1915.
- LÁNG S.: A Szentendre-Visegrádi-hegység felszíne. Földr. Ért. Bp. 1953. 2. sz. p. 447-469.
- LÁNG Sándor: A Pilis morfológiája. Földrajzi Értesítő.
- LEÉL-ÖSSY S.: A Kevély-hegységcsoporthoz karszti morfológiája és barlangjai. Földr. Ért. 1958. 1. sz. p. 17-32.
- LEÉL-ÖSSY S.: A Pilis és a Visegrádi-hegység geomorfológiája. Term. Tud. Közl. 1964. 2. sz. p. 66-68.
- LEÉL-ÖSSY S.: A pilisi Legény- és Leány-barlangok. Földr. Ért. 1954. 3. sz. p. 594-603. 2 térkép.
- LENGYEL E.: A Dunazughegység andezitterületének felépítése. MÁFI Évi Jel. 1951-ről. 1953.
- MIKE K.: Tektonische Doau-Terrassen in der Umgebung von Budapest. Beitrage zu Quartar und Landschaftsforschung. p. 345-355. Wien. 1978.
- NOSZKY J.: Adatok a Visegrádi Duna-szoros teraszképződmények geológiai ismeretéhez. MÁFI Évi Jel. 1940.
- PÉCSI M.: A basaharci löszfeltárás. 13(89). évf. 1965. 4. sz. p.354-355. 3 ábra.

- PÉCSI M.: A Dunavölgy magyarországi szakaszának kialakulásáról. I. Magyar Földr. Kongresszus előadása. 1955.
- PÉCSI M.: A magyarországi Dunavölgy kialakulása és felszínalaktana. Földr. Monográfiák VI. Akad. Kiadó. Bp. p. 345. 1959.
- PÉCSI M.: A Pilis és a Dunakanyar vulkáni hegyvidéke. in Pécsi-Sárfalvi: Magyarország földrajza. p. 130-131.
- SCHERF E.: Hévforrások okozta közetelváltozások a Buda-Pilis hegységben. Hidr. Közl. 1922.
- STIEBER J.: A hazai felsőpleisztocénből származó faszénmaradványok anthrakotómiai vizsgálata. (kiadatlan kandidátusi értekezés) 1957.
- SZALAY T.: Új adatok Pomáz és környékének geológiájához. Földt. Közl. 54. 1924.
- SZAPPANOS A.: Kiegészítő adatok a Pilis-hegység geológiájához. Erdő. 1964. 2. sz. p. 79-82.
- SZEBÉNYI L.: A basaharci löszfal elhatárolása ásványtani alapon. 13(89). évf. 1965. 4. sz. p. 356-357.
- VÉGHÉLYI L.: Előzetes jelentés a Strázsa-barlang kutatásairól. Barlangkutatás X-XIII. Bp. 1925.

2. Climatology, Hidrology

- AMBRÓZY P. (szerk.): A Duna-kanyar bioklimatológiai és hidrometeorológiai vonatkozásai. Met. Társ. 12. vándorgy. MTESZ 1967

3. Botanica

- BAUER N. (1996): A Dorogi Strázsa-hegy és környékének botanikai értékeiről. Kanitzia, vol. 4.
- BÉRCES S. (2003): A Duna-Ipoly Nemzeti Park Igazgatóság 2002 évi védett növényfaj monitorozása. DINP. Budapest.
- BODNÁR B.-JEANPLONG J.-PRISZTER SZ.: *Lamium orvala* a Pilis-hegységben. Bot.Közl. 1956. p. 251-257.
- BORBÁS V.: A Buda-Pest és környékének növényzete. Bp. 1879. A Magyar Orvosok és Természetvizsgálók 1879-ik évi vándorgyűlésére készített Budapest monographiájából.
- BORBÁS V.: Az *Orob. ochroleucus*, vagyis a *Vicia Pilisiensis* magyarföldi növény. Term. Tud. Közl. 1899. XXXI. köt. p. 189-190.
- BOROS Á.: A Pilis-hegység növényföldrajza. Földr. Ért. 1963.
- BOROS Á.: A Pilis-hegység új *Sphagnum*os lápja. Bot. Közl. 1945/1947. p. 6-8.
- CSESZNÁK: A Visegrádi-hegység erdőművelésének új iránya az erdők fejlődésének tükrében. Kand. dolg. 1967.
- DÁNSZKY István (szerk.): Magyarország erdőgazdagsági tájainak erdőfelújítási, erdőtelepítési irányelvei és eljárásai. vol. IV. Dunántúli Középhegység erdőgazdagsági tájcsoport. Országos Erdészeti Főigazgatóság. Bp. 1963.
- DINPI (2003): Fajvédelmi kezelési terv készítése a Duna-Ipoly Nemzeti Park Igazgatóság illetékességi területén előforduló 13 fokozottan védett növényfajra.
- GRUNDL I.: Berg Pilis, bei Grau in Ungarn. Österreichische Botanische Zeitschrift. 1863. XIII. köt. p. 16-17.
- HALUPA L. - MÁTYÁS CS. - CZÁJLIK P. (1998): Erdőrezervátumok 1998. évi szemlézése Pilisoldal, Vadállókövek, Nagy Istrázsahegy, Pogány-Rózsás, Gerecse, Juhdöngölő völgy, Meszes-völgy, Kisszénás, Ócsai Turján. ERTI. Budapest.
- HORÁNSZKY A.: A Szentendre-Visegrádi-hegység erdei. Kand. ért. 1957.
- HORÁNSZKY A.: Adatok a Pilis-hegység flórájához. Botanikai Közlemények. 1958. XLVII. köt. 1-4. füzet.

- HORÁNSZKY András: Die Walder des Szentendre-Visegráder Gebirges. Akad. Kiadó. Bp. 1964.
- KÁRPÁTI I.-PÉCSI M.-VARGA Gy.: A vegetáció és az ártéri szintek fejlődésének kapcsolata a Dunakanyarban. Bot. Közl. 1962. 299-309.
- KERNER, A.: Das Pilis-Vértes Gebirge, eine pflanzengeographische Skizze. Veth. der Zool.-Bot. Gesellschaft in Wien. 7/1857.
- KOVÁCS É.: *Epipogium aphyllum* a Pilisben. Bot. Közlem. Bp. 1957. 47. sz. p. 114.
- KUN A. (2001): A Duna-Ipoly Nemzeti Park területéről származó florisztikai és társulástani adatok adatbázisa - Vértes, Budai-hegység, Pilis, Naszály, Cserhát és Gödöllői-dv. DINP. Budapest.
- PAPP B. - ÓDOR P. - SZURDOKI E. (2003): Az NBmR mohamonitorozó programjának 2003. évi végső jelentése. MTM. Budapest.
- PENKSZA K.-MORSCHAUER T.-HORVÁTH F.-ASZTALOS J.: A kesztölci Kétágú-hegy és környékének vegetációtérképe. Bot. Közl. Bp. 1994.
- SEREGÉLYES T.-CSOMÓS Á.: Természetvédelmi célú botanikai feltáró vizsgálatok. Az esztergomi Stárzsa-hegy, a szôdi Kocsmarét és Debegló-hegy, a békásmegyeri Ezüst-hegy botanikai értékei és természetvédelmi zónabeosztása. Göncöl Alapítvány. Vác, 1993.
- STRAUB M.: Adalékok Pest-Pilis-Solt-Kiskun megyének florisztikus ismeretéhez. M. Növ. Lapok 1879 III. köt. p- 33-36.
- SZEPESFALVY J.: Májmohák Budapest és a Pilis-hegység területéről. Magyar Bot. L. 1928.
- SZEPESFALVY J.: Pest környéke és a Pilis-hegység mohanövényzete. I. Annales Mus. Nat. Hung. 1940. II. u.o. 1941.
- SZEPESFALVY J.: Ritka és érdekes lombosmohák új termőhelye a Pilis-hegység és Budapest környékének területéről. Bot. Közl. 1935. p. 154-160.
- SZERDAHELYI Tibor-PENKSZA Károly: A Pilisi Tájvédelmi Körzet területén végzett vegetáció- és ponttérképezési kutatások. Gödöllői Természetkutató Egyesület. Gödöllő, 1996.
- TIMKÓ Gy.: Új adatok a budai és szentendre-visegrádi-hegyvidék zúzmóvegetációjának ismeretéhez. Bot. Közl. 1925.
- WALGER J.: A *Phyllitis scolopendrium* újabb pilis-hegységi termőhelye. Bot. Közl. 1940. p. 196.
- ZÓLYOMI Bálint: A közép-dunai flóráválasztó és a dolomitjelenség. Botanikai Közlemények. 1942. p. 209-224.

4. Zoology

- BÉCSY L.: Hollófészkelési adatok. Aquila. 1971-72. vol. 78-89. p. 228.
- BÓKAY B.: Madártani adatok a Pilis-hegységből. Aquila. 1952-55. vol. 59-62. p. 410-411.
- DANDL J.: A kerti sármány fészkelése Pilisvörösváron. Aquila. 1952-55. vol. 59-62. p. 396.
- DANDL J.: Parlagi sas Dunabogdányban. Aquila. 1952-55. vol. 59-62. p. 379.
- FARKAS T.: A dunabogdányi buhu. Aquila. 1952-55. vol. 59-62. p. 385.
- FESTETICS A.: Daru és vörösnakú lúd előfordulása Szentendre környékéről. Aquila. 1956-57. vol. 63-64. p. 264.
- KEVE A.: Das Vogelleben der Mittleren-Donau. Studia Biologica Hungarica. 7. sz. Bp. Akad. Kiadó. 1969. p. 127.
- KEVE A.: Kormosfejű cinege a Pilisben. Aquila. 1968. vol. 75. p. 290.
- KEVE A.: Kormosfejű cinege ismét előfordult a Pilis hegységben. Aquila. 1976. vol. 83. p. 290.
- KEVE A.-SCHMIDT E.: Fenyőszajkó adatok. Aquila. 1971-72. vol. 78-79. p. 230.
- KUN. A. (ed.) (2005): A budai szakállasmoly (*Glyphipterix loricatella*) 2005. évi állományfelmérése a Budai-hegység, a Pilis és a Vértes területein.

- LÁSZLÓ M. GY. - SZEŐKE K. (2005): A csüngőszárnyú araszolólepke (*Phyllometra culminaria*) előfordulásának felderítése és a populációk nagyságának, veszélyeztetettségének felmérése a DINP területein.
- MANNSBERG A.: Buhu fészkelése Visegrádon. *Aquila*. 1948-51. vol. 55-58. p. 241.
- PALKÓ F.: A kígyászölyv fészkelése a Pilisben. *Aquila*. 1952-55. vol. 59-62. p. 381.
- PÁTKAY I.: Örvösrigó a Pilisben. *Aquila*. 1956-57. vol. 63-64. p. 304.
- PINTÉR L.: A nyugati Pilis puhatestűfaunája. *Állattani Közl.* LV. p. 105-113.
- SCHMIDT E.: Denevérmaradványok magyarországi bagolyköpetekből. *Vert. Hung.* XII. 1970-71. p. 93-102.
- SOMFALVY E.: Fenyőszajkó megfigyelések. *Aquila*. 1976. vol. 83. p. 290.
- SOMOGYI P.: Pernis apivorus fészkelése a Pilisben. *Aquila*. 1968. vol. 75. p. 284.
- SZENTENDREY G.: Feketeréce Tahi határában. *Aquila*. 1973-74. vol. 80-81. p. 284.
- TAPFER D.: Hollók a Pilis hegységben. *Aquila*. 1962-63. vol. 69-70. p. 263.
- TAPFER D.: Örvösrigó Esztergom szőlőhegyei között. *Aquila*. 1976. vol. 83. p. 292-293.
- URBÁN S.: Törpesas fészkelése a Dunazug-hegységben. *Aquila*. 1952-55. vol. 59-62. p. 379.

5. Archeology

- DINNYÉS I. et al.: Magyarország régészeti topográfiája. (Szerk.: GEREVICH L.) 7. Pest megye régészeti topográfiája. A Budai és a Szentendrei járás. Akadémiai Kiadó, Bp. 1986.
- GYÖRFFY GY.: Adatok a Pilis megyei monostorok középkori történetéhez. *Műv. Tört. Ért.* 1956. 4. sz. p. 280-285.
- HILLEBRAND J.: A kiskevélyi barlangban 1912 évben végzett ásatások eredményei. *Barlankutás*. Bp. 1913.
- HORVÁTH I.-H. KELEMEN M.-TORMA I.: Magyarország régészeti topográfiája. (Szerk.: GEREVICH L.) 5. Komárom megye régészeti topográfiája. Akadémiai Kiadó, Bp. 1979.
- MTA topográfiai munkaközössége: Pest megye műemlékei.
- NÉMETH P.: Rómváros nyomai a Pilisben. Budapest. 1967. 7. sz. 26-28.
- SOPRONI S.: Római erőd Pilismaróton. *Dunakanyar Tájékoztató*. 1966. 2. sz. p. 51-53.
- VÉRTES L.: Moustierre-i, vagy szeletai-e a Kiskevélyi-bg. alsó rétegeinek lelete? *Archeol. Ért.* 1958. 2. sz. p. 127-131. (térképpel).

6. Nature conservation

- HARANGOZÓ G. (1999): A DINP és a természetvédelem. Duna-Ipoly Nemzeti Park Igazgatóság. Budapest.

VII. EDUCATION, TRAINING AND PUBLIC AWARENESS PROGRAMMES

Describe the types of activities related to

- Environmental education and public awareness:

The centres of EE in the BR are at Szentendre, Esztergom and Visegrád. Besides children, adults too can find programmes in the EE Centre at Szentendre. The Forest Culture House at Mogyoróhegy Tourist Centre (near Visegrád) welcomes children from elementary school. In summer this centre offers programmes to the Nature and Forest Conservation Camp (as mentioned earlier). The National Park manages the Visitor Center in Esztergom from 1998. There is a forest school (working with Waldorf 's method) at Visegrád which has nature education programmes for children from Elementary School. Programmes for High School students planned later.

- Training programmes for specialists:

There are not any regular courses for specialists in the area, but many programmes are organized here on a more occasional basis. Different departments of the Eötvös Lóránd University take there students of botany, zoology and geology to field and the professors of Forestry and Wood Industry University (Sopron) do the same in the PBR. Pilis Park Forestry Ltd. sometimes organizes outdoor courses, field trips and interchange programmes to foresters. In the Forest Culture House in Visegrád occasionally vocational trainings are organized for teachers, and the staff of BR also takes part in organisation and tuition.

VIII. INSTITUTIONAL ASPECTS

State, Province, Region or other administrative units

List in hierarchical order administrative entity(ies) in which the Biosphere Reserve is located (e.g. state(s), counties, districts).

The BR lies in the Countries of Pest and Komárom-Esztergom in the Hungarian Republic. Among EU regions, it is situated in the Central Hungarian and the Middle Transdanubian regions.

Management plan/policy

Indicate if a management plan or policy exists for the overall biosphere reserve.

The area of the PB and of the Pilis Protected Landscape Area (abbreviated as PPL) overlap completely. The Pilis Protected Landscape Area became part of the National Park in 1997. As the supplement of the 1/1978. (III. 31.) OKTH resolution, management principles were introduced, which were confirmed by the 34/1997. (XI.20.) decree of KTM. Nature protection management plan was made only for the forest, the regulations of Directive and Nature Protection Management Plan, which was made to the PPL in 1978, were introduced at non-forested areas. The Directive is applied in the authoritative activity, the management plan is introduced in nature protection management.

The management principles, as the supplement of the 1/1978. (III. 31.) OKTH resolution are still in force. We do not have any management plan to this area.

If yes, briefly describe the main characteristics of this plan and precise the modes of application.

The above mentioned OKTH resolution regulates in detail the activities of

Approval of plans

Leasehold

Placing of establishments, use of

Landscape conservation

Water management

Traffic

Protection of wild animals and plants

Hunting management

Angling

Use of vineyards, orchards and arable lands

Management of pastures and meadows

Forest management

Forest by-products, of herbs

Mining

The use of chemicals for plant protection

The protection of genetic reserves

Scientific researches, education

Sport, visiting

Authority in charge of administration of the whole, i.e. of implementation of this plan/policy:

The Pilis Biosphere Reserve is managed and supervised by the Duna-Ipoly National Park Directorate. The Directorate is controlled by the Ministry of Environment and Water.

Total number of staff of Biosphere Reserve:

There are 4 rangers (and if it is needed the executives of the Nature Protection Department of the Directorate of DINP can take part in the maintenance activities, and the staff of Environmental Education Department can take part in the PR, environmental and education activities).

Financial source(s) and yearly budget:

Indicate the source and the relative percentage of the funding (e.g. from national, regional, local administrations, private funding, international sources etc.) and the estimated yearly budget in the national currency.

The Pilis BR has no separate budget, because its manager, the Directorate of DINP is responsible for the budget. The Directorate employs the rangers and the executives, and the Directorate's budget covers the costs and salaries. The annual turnover of the Pilis region, which is directly spent on the BR, was in 2005:

Incomes: 8.880.877 Ft

Expenses: 9.914.370 Ft

Balance: - 1.033.493 Ft

The Directorate of DINP is responsible for the carrying out of the project.

Authority in charge of administration

The biosphere reserve as a whole:

The Directorate of Duna-Ipoly National Park (DINP); Middle-Danube-valley Inspectorate for

Environmental Protection, Nature Conservation and Water Management; Management of

State Forestry Service in Budapest (forestry authority) is responsible for the carrying out of the project.

Core area(s):

It is the same as above.

Buffer zone(s):

It is the same as above.

Mechanisms of consultation and co-ordination among these different authorities:

Management of DINP, State Secretariat for Nature and Environment Protection of the Ministry of Environment and Water.

Where appropriate, National (or State, or Provincial) administrations to which the biosphere reserve reports:

Directorate of DINP, State Secretariat for Nature and Environment Protection of the Ministry of Environment and Water.

Mechanism for consultation of local communities

Indicate how and to what extent local people living within or near the Biosphere Reserve.

- have been associated to the biosphere reserve nomination:

Those locals, who live in the area of BR, made a statement about participation of establishing of PPL and DINP.

- participate to the decision process and management resources:

The local authorities and the mayor offices promote local's interests in the decision processes. The public organizations also have the possibilities to express their opinion, and they can take part in the in the management processes, especially in the monitoring and in the bird protection activities.

Indicate whether you consider the participation of local communities to be satisfactory and, if not, what measures are envisaged to improve this situation

In the past 10 years public awareness improved a lot, but the environmental conditions are bad, and occasionally the economic interests, which are opposed to nature conservation, are strong. The cooperation is very good in some places, e.g. Pilisszentlászló, Pilisszentkereszt, but it is weaker in e.g. Dömös and Pilisszentlélek. We would like to improve this actual situation by negotiations with local authorities and public organizations.

Protection regime of the core area and possibly of the buffer zone

Indicate the type (e.g. under national legislation and date since when the legal protection came into being and provide justifying documents (with English or French summary of the main features)).

The core areas are protected by the force of Act No. 53 of 1996 on nature protection. The core and buffer areas are indicated in the strictly protected areas of PPL, which was established by the 1/1978 (III. 31) OKTH, so the buffer areas are also strictly protected. The decree of

34/1997 (XI.20.) KTM also followed this zonation, so these areas are also strictly protected in the DINP.

Land tenure of each zone

Percentage of ownership in terms of national, state/provincial, local government, private, etc.

Core Area(s):

State property: 100%

Buffer Zone(s):

State property: 99%

Private property: 1%

Transition Area(s):

State property: 80%

Authority property: 2%

Private property: 18%

Foreseen changes in land tenure.

The land tenure changed significantly between 1990 and 2002. This land tenure seems stable, considerable changes are not expected.

Is there a land acquisition programme, to purchase private lands, or plans for privatization of public lands?

The BR does not have any programmes related to buying territories, because of lack of financial resources.

Contact address(es)

Contact address of the biosphere reserve for all official correspondence

Name: Directorate of the Duna-Ipoly National Park

Street or P.O. Box: P.O 86.

City with postal code: H-1525, Budapest

Country: Hungary

Telephone: 36-1-391-4610

Telefax (or telex): 36-1-391-4610

E-mail: dinpi@dinpi.hu

Web site address: www.dinpi.hu

IX. CONCLUSION

Northwest from Budapest, forced by the andesite block of Börzsöny and Visegrád Hills the Danube flows in a narrow, meandering valley – almost like a U-turn, called the 'Danube Bend'. The scenery was described by Bernard Newmann as 'one of the grandest' stretches of the 2000 miles long river.

Several ruins and archeological discoveries, protected buildings, and historic monuments illustrate its rich, and eventful past. This area used to be the heart of the country during the Middle Ages: although after two hundred years the royal court abandoned Esztergom for Buda, the former town remained the centre of the Hungarian Catholic Church. Later Visegrád became the capital. The castle built here was originally founded by the Angevin King Charles Robert, and was the setting for the Visegrád Congress of 1335, attended by the monarchs of Central Europe and the Grandmaster of the Teutonic Knights. Emperor Sigismund and King Mátyás Corvinus also ruled the country from this town.

The Pilis and Visegrád Hill ranges on the west bank of the Danube – once a royal hunting ground – were designated a Landscape Protection Area in 1978 in order to conserve the landscape and its abundant natural values. Due to these values and the remarkable possibilities for environmental education it was recognized as part of the International Network of Biosphere Reserves by UNESCO in 1981.

An unique feature of this biosphere reserve is its variability. The range of hills, cut across by valleys due to tectonic forces and erosion, is made up of more than ten types of rocks, involving Dachstein Limestone, Andesite tuff, etc. On this variable surface, according to the relief and aspect, several plant and animal communities have formed.

The rocky ridges of the Pilis Hill at Pilisszentkereszt are the place of the only substantial population of pannon ferule (*Ferula sadleriana*) a relict plant of the glaciations. Horánszky's milfoil (*Achillea horánszkyi*) can be found only here throughout the world on Szamárhegy next to Esztergom. The fauna is represented by rare species like the raven (*Corvus corax*), saker falcon (*Falco cherrug*), short-toed eagle (*Circus gallicus*), or by stone loaches (*Neomacheilus barbatulus*), and stone crayfish (*Austropotamobius torrentium*) in streams. Occasionally, one can also see a rare nesting or wintering bird, the dipper (*Cinclus cinclus*).

Feather-grasses (*Stipa dasycarpa*, *S. tirsia*, etc.) are common on the slopes covered by grasslands. Rarities such as common pasque-flower (*Pulsatilla grandis*) and slender sternbergia (*Sternbergia colchiciflora*) live here alongside mountain pennycress (*Thlaspi montanum*) which one comes upon only here in Hungary.

This Biosphere Reserve offers excellent facilities to escape from the polluted air of Budapest. It is easy to reach from the capital. The nature conservation takes the responsibility of making use of these advantages for environmental education. We are primarily engaged in teaching, pupils from the age of ten to fourteen but we also assist at the education of secondary school and university students. Such groups investigated the flora of Szamárhegy (near the town of Esztergom) and the stone crayfish population of Apátkút stream (next to Visegrád).

Children in our holiday camps are given opportunities both for on-site learning and for becoming involved with practical nature conservation projects in the field.

Detailed information about Core Areas

1. Szamárhegy-Kerektó Core Area

The southern rocky slope of Szamárhegy hill and its surroundings is a very good place to see rock and steppe vegetation. Here are different types of brush-forest, and dry oak-forest found along with oak-hornbeam which occur in cooler and mistier valleys of the hill. An endemic plant, Horánszky's milfoil (*Achillea horánszkyi*) is only known from here. Besides this plant there are numerous species which are rare throughout the midlands. Many various protected vascular plants can also be found here (e.g. feather-grasses, irises, pasque-flowers, spring adonis – *Adonis vernalis*, Hungarian leopardsbane – *Doronicum hungaricum*, jurinea – *Jurinea mollis*, etc.). Kerektó is the only place in this area where a moorland still exists surviving destructive activities by man. It is a remnant of a disappearing – once rich – flora. But there is still a refuge for protected (e. g. early marsh orchid – *Dactylorhiza incarnata*, marsh helleborine – *Epipactis palustris*, bog orchid – *Orchis laxiflora* ssp. *palustris*, bogbean – *Menyanthes trifoliata*, marsh lousewort – *Pedicularis palustris*, *Thelypteris palustris*, etc.) and rare species (e. g. microspecies of purple moor-grass). Sporadic studies of insects have brought about some significant data (e. g. new species for the Hungarian fauna).

2. Ábrahámbükk-Vértes-hegy

A whole sequence of vegetations between places with different extreme microclimate is represented here in transition from the southern slopes to the northern ones. Besides extrazonal beech forests there are oak-hornbeam forest brushwood and Sorbo-*Quercetum petraeae* association, which lives on steep and rocky ridges in this area. Many protected vascular plants can find refuge here (e. g. irises, orchids, one subspecies of whitebeam – *Sorbus aria* ssp., spring adonis, etc.). Meadows of this hill are significant because a few species of plants live here which prefer acid soil (e. g. *Nardus stricta*, *Danthonia alpina*, *Ophioglossum vulgatum*) and plants that are rare in Hungary (orchids and marsh gentian – *Gentiana pneumonanthe*). Among wood-associations the most important one is the *Caricetum humilis-Quercetum*. The relict appearance of this association is rare not only here, but everywhere on volcanic soils.

3. Apátkúti-bérc-Őrhegy

The examined and mapped part of this area is very diversified. The area goes up to the oak-hornbeam belt. Different soil formations caused the formation of mosaic-like vegetation here. Almost all forest-associations of the Pilis range can be found. Besides this, one can find planted pine forests and the Botanical Garden of Visegrád in the area. The most important protected plants are pannon thistle (*Carduus collinus*) and *Carex brevicollis*. There is a good example for *Mercuriali-Tilietum* and *Corno-Quercetum pubescenti-petraeae* (this one has a continental character). The latter ones were recorded from here for the first time. There are excellent possibilities to examine the influence of man on native meadow vegetation and to make a comparison between zonal and extra zonal oak-hornbeam forests. The meadow among wooded areas is very important.

4. Öreg Pap-hegy and its surroundings

The characteristics of this area are the great altitudinal differences with steep and rocky ridges and deep valleys. The vegetation is old, diverse and hard to reach. It is a good place to preserve primeval-like forests (set aside for research) because of its settings and the poor quality of the soil. Main values of this area come from the presence of many different plant associations (e. g. secondary steppes, forests clearings that are difficult to replant and downy oak forests with submediterranean character) that can be set aside as sites for research. At these sites one can also do research on rare or protected plants and insects and the changes related to them as well. Important species are pannon meadow-grass – *Poa pannonica* ssp. *scabra*, pannon thistle – *Carduus collinus*, feather-grasses, irises, and new species (unknown to science up to now) of soil-dwelling insects.

5. Prédikálószerk and its surroundings

This is the main model-site for PBR research where complex research has been going on. The vegetation map of this area was also completed during the 1950s so there is a remarkable possibility to do comparative research by using aerial photographs. The area has rich flora, fauna and diversified soil types. Because of the great altitudinal differences, there is a place here for zonal, extrazonal and edaphic plant associations, too. One of the richest rock vegetation (*Minuartio-Festucetum pseudodalmaticae* et *Poëtosum scabrae*) can be found here on the ridges of Vadállókövek. Important plant species (rare or protected) are pannon thistle (*Carduus collinus*), burning brush (*Dictamnus albus*) spring adonis (*Adonis vernalis*), a subspecies of Dame's violet (*Hesperis matronalis* ssp. *candida*), *Carex brevicollis*, feather-grasses and irises. Rarities and new species of soil-dwelling animals have been discovered in recent years. Besides this, new species of microscopic fungi have found here too.

6. Feketekő

It is the only formation of dolomite rocks which is situated on the northern slope in the Pilis range. Because of its isolated situation it is the only shelter for many species in the range e. g. *Dianthus plumarius* ssp. *regis-stephani*. The most important plant associations here are *Mercuriali-Tilietum*, *Tilio-Fraxinetum*, *Stipo-Festucetum pallentis*. The association of *Fago-Ornetum* is also significant and this is its northernmost stand. Common columbine (*Aquilegia vulgaris*), long-leaved hare's-ear (*Bupleurum longifolium*) and white sedge (*Carex alba*) live here. A northern relict fescue species (*Festuca pallens*) living in the opened or closed dolomite vegetation is also important to be mentioned.

7. Pilistető

This area has the highest elevation in the limestone Pilis Range. The vegetation is different from the one of volcanic areas. Because of the great altitudinal differences, the same community may occur in different positions (so-called zonal and extrazonal p.). The most numerous population of the endemic pannon ferule (*Ferula sadleriana* – a plant of the Umbellifer family) lives here. Other populations of this precious plant (living elsewhere) are in great danger nowadays. There are many protected plants (e. g. feather-grasses, irises, pasque-flowers, pallid orchid – *Orchis pallens*, snowdrop windflower – *Anemone sylvestris*, spring adonis – *Adonis vernalis*) and important plant communities

(*Cratogeomys*-*Cerastium fruticosae*, *Waldsteinia-Spirea* *mediae*) here. Due to its numerous micro-habitats formed by dolomite surface many plant species can live here (e.g. common rockrose – *Helianthemum ovatum*, common globularia – *Globularia aphyllanthes*, silvery paronychia – *Paronychia cephalotes*, *Fumana procumbens*, etc.) A small population of ramsons (*Allium ursinum* – which is wide-spread throughout Transdanubia) occur here. The prehistoric settlement of Pilisszántó and unique rock formations (Éleskő, Vaskapu-szikla) enrich the flora and fauna of this area with rare and special species. The unique *Sesleria sadleriana*-Fagetum association lives only on the rocky slopes of Vaskapu-szikla. The grass-layer is formed by the endemic Sadler's moor-grass (*Sesleria sadleriana*) and this is the home of many rare alpine species (e. g. nodding wintergreen – *Orthilia secunda*, three-leaved valerian – *Valeriana tripteris*).

8. Cserepesvölgy-Árpádvár

This area is situated on the border of sedimentary and volcanic formations. Specific communities of *Luzulo-Quercetum subcarpaticum* and *Genisto piosae-Quercetum petraeae* live here on the steep crumbling rocky slope with poor quality soil.

9. Háromszázgarádics

Beech forests (*Sesleria*-Fagetum) and forests of *Mercurialis-Tilia* cover the northern slope and rock vegetation – with many fern species – do the same on the steep rock faces of Fekete-hegy mount. A lode of andesite lies at the bottom of the limestone cliff and gives geological importance to this area. The group of Fehér-szikla (near to this place) has the same feature too. The northern slopes on the rock-faces give the opportunity for formation of unique flora and fauna.

10. Kétágú-hegy

The western – south-western slopes of this core area are covered by karstic scrub and steppic grassland. There is zonal oak-hornbeam forest at the top and plant communities of sand vegetation occur at the bottom. The latter is a very special feature of this area. Protected and rare plant species are abundant (e. g. houseleeks, hen-and-chickens-houseleek – *Jovibarba hirta*, woolly milk-wetch – *Oxytropis pilosa*, Austrian milk-wetch – *Astragalus austriacus*, sand milfoil – *Achillea ochroleuca*, Venus' looking-glass – *Legousia speculum-veneris*, sand everlasting – *Helichrysum arenarium*, *Gypsophila paniculata*). This sandy area at the bottom of the hill is very important to conserve the species of the sand vegetation (this area can be considered as a genetic reserve). The large patches of former gardens have remained here between the foothill of Kétágú-hegy and the village of Keszölc. They have to be conserved as important elements of the landscape. The forms of terraces made from loess and clay have interesting features from the point of view of geomorphology. They are the last stands of loess vegetation here.

Brief justification of the way in which the biosphere reserve fulfils each criteria of article 4:

5. Representative ecological systems - graduation of human interventions

BR is situated in a medium high hill range 80% of which is covered by deciduous forest. The human activity affects especially the border zone of the area (not the forest ecosystem). Forestry management is the dominant activity in the Transition Area and in the Buffer Area. It plays less important part in the Core Areas. Tourism is another significant human activity in this area. There are many hiking trails (in total approximately 400kms) in the Buffer Areas. The hiking trails go through the Buffer Areas, and can be used without permission, but it is prohibited to leave the trails. The hiking trails do not go through the Core Areas.

2. Significance for biological diversity conservation

Those populations, which are more endangered because of their restricted occurrence and special habitat requirements occur almost without exception in the Core Areas. So we contribute to the maintenance of biodiversity especially by protecting special plant and animal species of the area. The whole territory is part of the Natura 2000 network, in the interest of protection of the diversity of the BR including earlier mentioned populations, peripannon shrubs and subpannon steppes and many animal species.

3. Approaches to sustainable development on a regional scale

Sustainable development is in an initial stage, but it is planned to be brought to the foreground. The Directorate of the national park may express their opinion in the local and regional planning, so they can influence the plans and they can promote the BR's protection interests. The BR and the National Park also take part in the introduction process in their own visitor center, partly coordinating with the other educational centers of the region.

4. Appropriate size to serve the three functions

The 26.000 hectare-sized territory of BR is enough for the working of main functions, despite of that, in some places (Szamárhegy) there was no chance to delineate Buffer Areas around Core Areas. The most important values are inside the Core Areas. The conditions of the life communities have been stable for decades due to the suitable size of the Core Areas. The relatively big sizes of the Buffer Areas (which is approximately 20 % of the total area of BR) and the strictly protected Buffer Areas help to protect values. There are many valuable habitats, which are endangered especially at the margins, but the conditions of internal areas are better. Cities like Szentendre, Visegrád, Esztergom which are in the Transition Areas are possible places for establishing and presenting sustainable development. These cities are the most important centres of Danube Bend, these are the primary targets of inland and foreign tourism, so these cities are the most suitable for reaching the third function.

5. Appropriate zonation to serve the three functions

The zonation to serve the three functions was made in 1983, which has not changed since. See the list in the 2. map supplement.

6. Participation of public authorities and local communities

Local authorities are contacted during the various planning processes. It has more considerable importance since 2005 because earlier the National Park Directorate also had authority powers. Instead of using authoritative decisions, we now have to use the tools of influence and conviction..

- 7.
- a) Mechanisms to manage human use and activities in the Transition Areas
 - b) Management policy or plan
 - c) Authority or mechanism for implementation
 - d) Programmes for research, monitoring, education and training

At the national level:

This happens under the coordination of the Hungarian MAB committee and the State Secretariat for Nature and Environment Protection of the Ministry of Environment and Water. National park directorates are responsible for the management processes in the biosphere reserves within their administrative territories. The Directorates have cooperative activities including the issues of biosphere reserves.

Through twinning and/or transboundary biosphere reserves:

Harmonization program and exchanging of experiences are started with Romanian colleagues, in the interest of establishing a Romanian biosphere reserve.

Within the World Network (including Regional Networks):

At present there are no cooperative activities with other biosphere reserves within the World Network.

Obstacles encountered, measures to be taken and, if appropriate, assistance expected from the Secretariat

The BR is situated in one of the most important centres of the country, in the Danube Bend. The prices of real estates are very high. It has two negative effects on nature protection. Because of the high prices we cannot buy some areas which would be protected safely by state-ownership, because these prices are 10 or 100 times higher here, than in other parts of the country. Real estates are good investments in this area if these are suitable for tourist purposes, so the investors want to build up these areas by all means. During the privatization in the 1990s many real estates which were situated in the area of BR became private property (on the border of Transition Areas). Many of them are built-up areas, and the others may be built up in next years. The only solution for this problem might be the implementing of state ownership on these areas, but it would need strong financial foundations.

Another problem is the lack of staff at the Directorate of DINP, which organizes the management activities. It means for the BR there is no administrator to coordinate the BR issues. 4 rangers take care of the area, but number of rangers is very low compared with the proportion of tourism in the area. The conditions are not suitable for the regular controlling, so there are just random controls in the area.

The BR has no individual budget. It is budgeted by the Directorate of DINP, which is the responsible organization for BR. As you can see in chapter VIII., the financial sources are not enough for the economic working of BR, including maintenance of habitats and development processes.

Aggtelek Biosphere Reserve

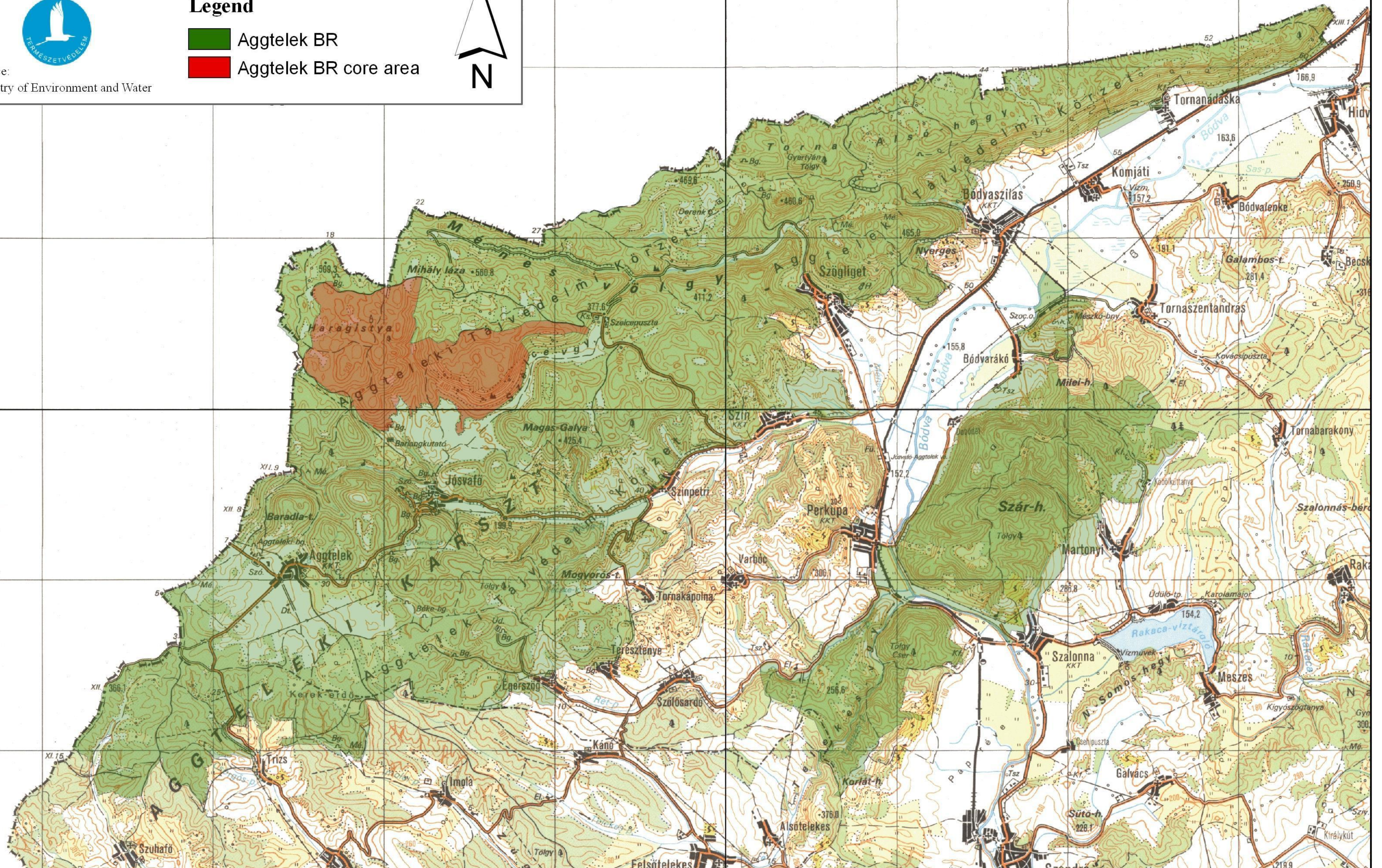
0 5 10 km



Source:
Ministry of Environment and Water

Legend

-  Aggtelek BR
-  Aggtelek BR core area





Lake Fertő Biosphere Reserve

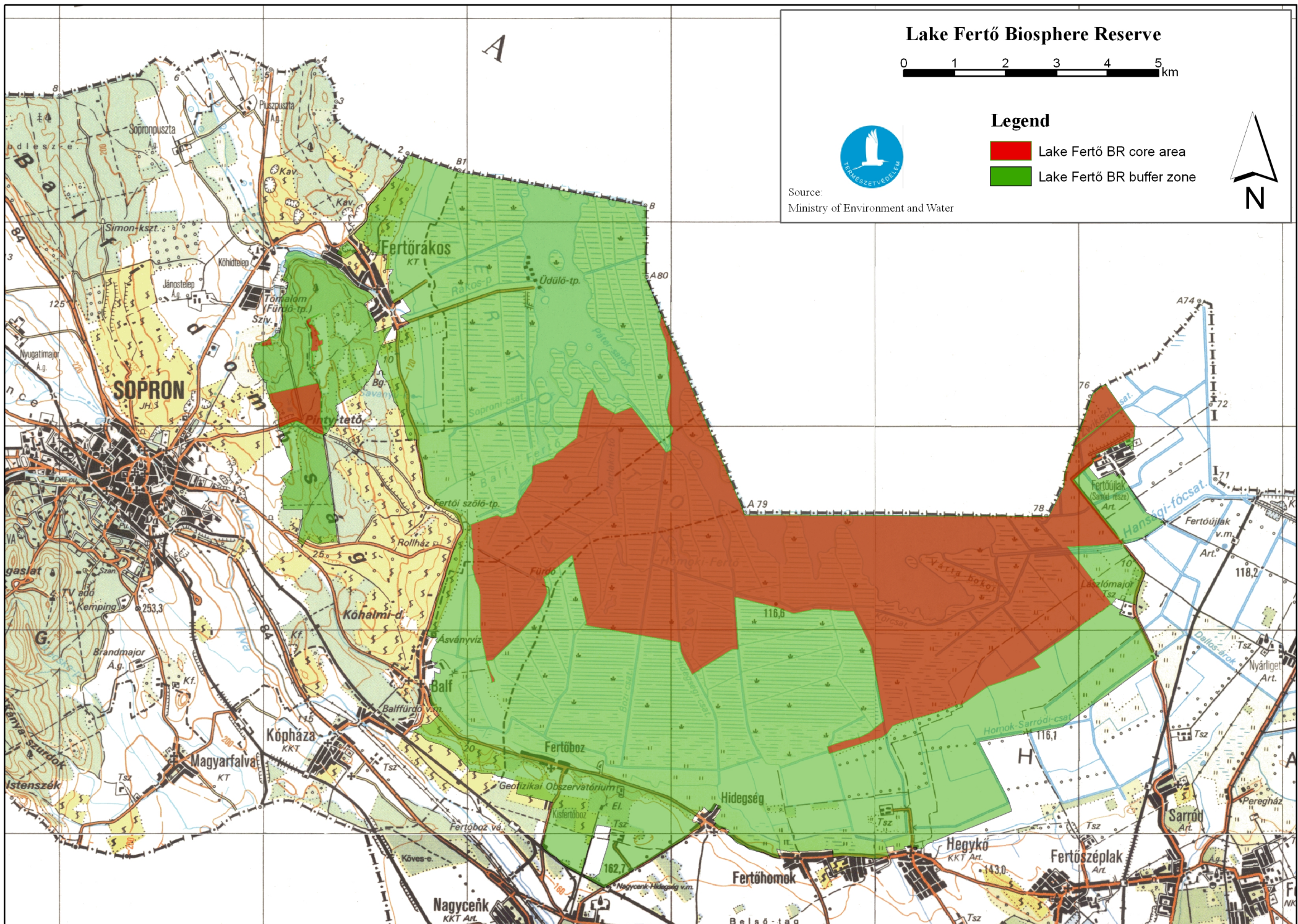
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Source:
Ministry of Environment and Water

Legend

-  Lake Fertő BR core area
-  Lake Fertő BR buffer zone



Hortobágy Biosphere Reserve

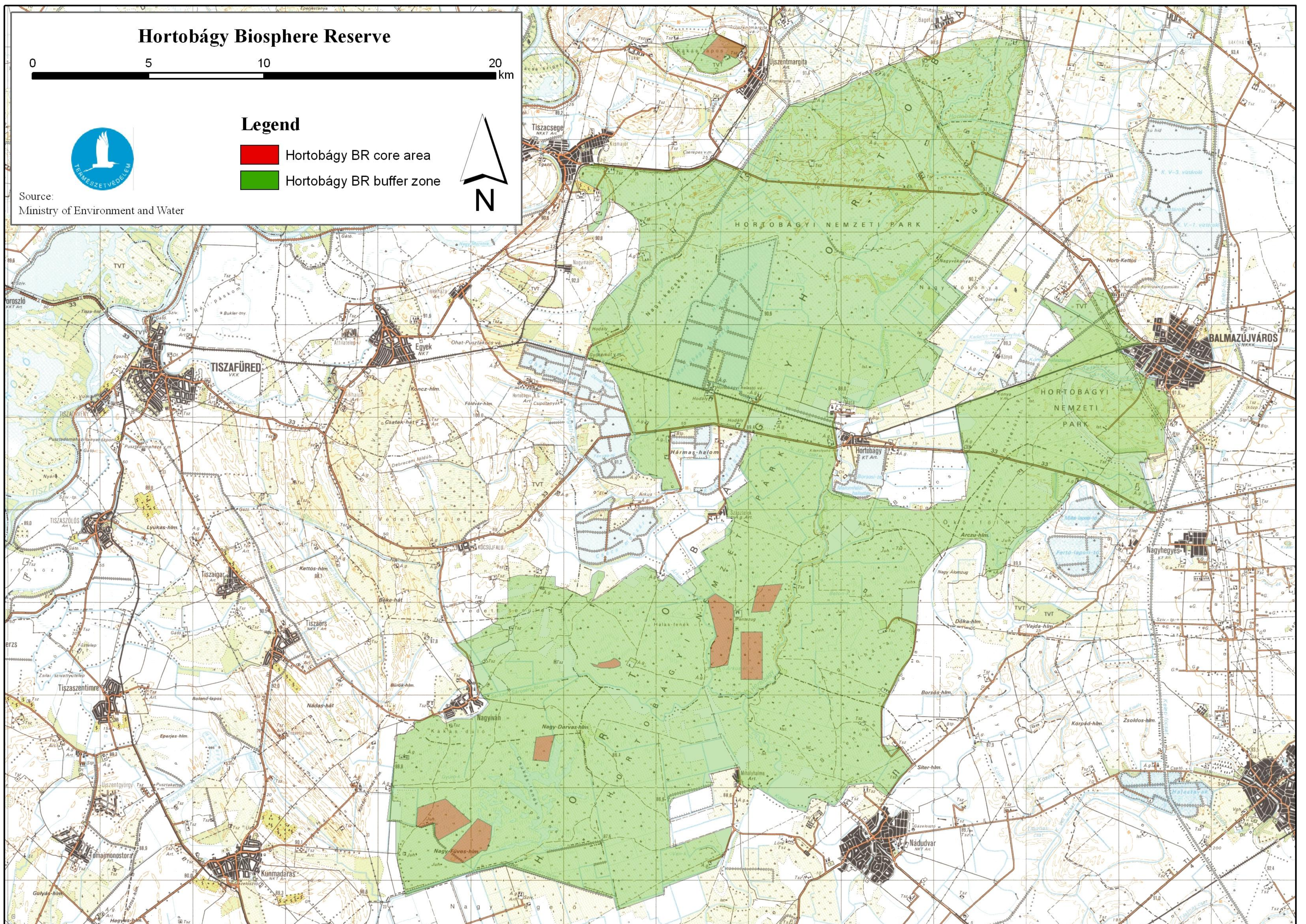
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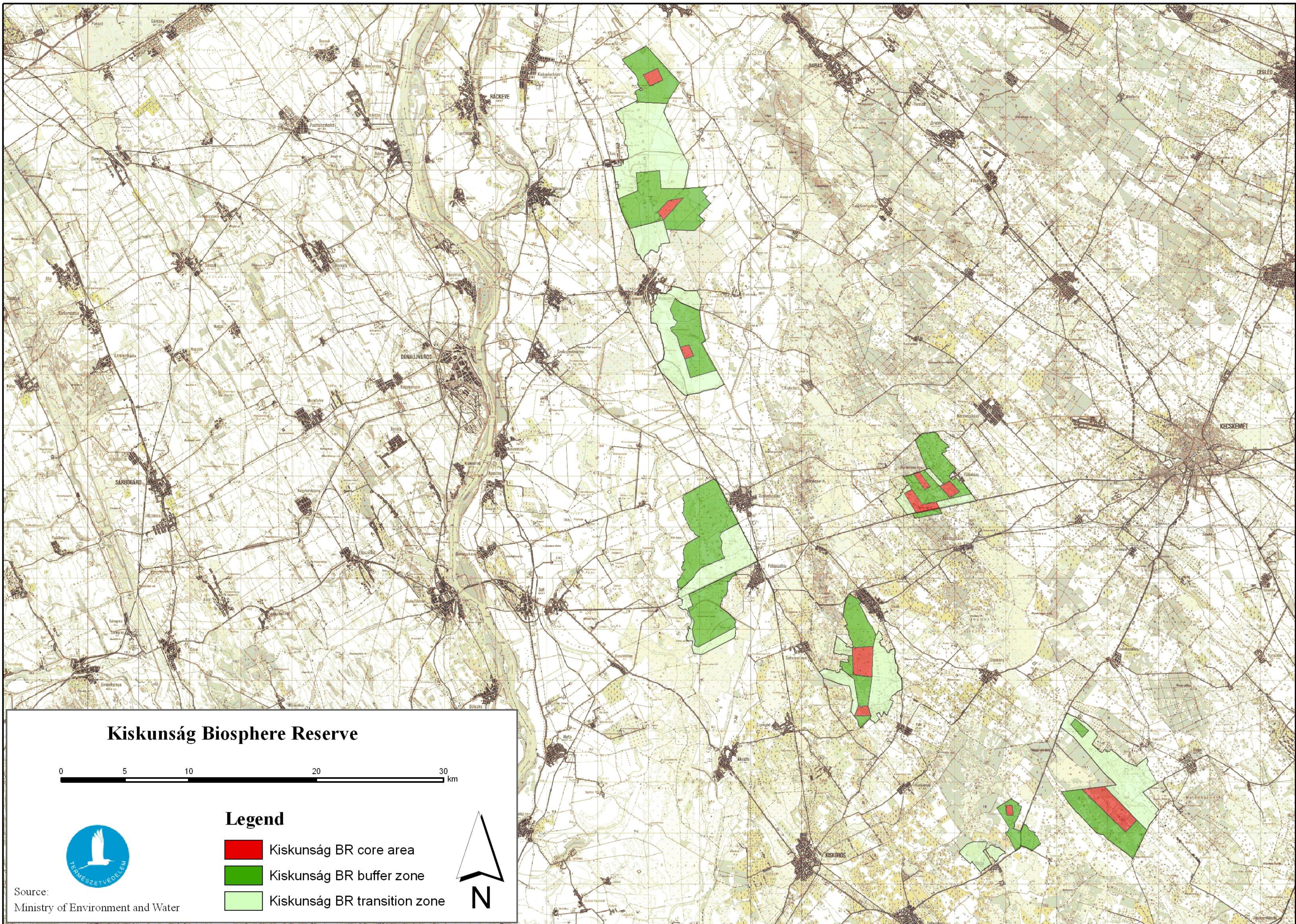


Source:
Ministry of Environment and Water

Legend

- Hortobágy BR core area
- Hortobágy BR buffer zone







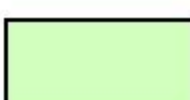
Kiskunság Biosphere Reserve

0 5 10 20 30 km



Source:
Ministry of Environment and Water

Legend

-  Kiskunság BR core area
-  Kiskunság BR buffer zone
-  Kiskunság BR transition zone



