EECONET Action Fund

Project: Sava Wetlands - Spoonbill Colony Krapje Đol

Area: Croatia; Lonjsko Polje Nature Park

Lonjsko Polje Nature Park Public Service
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Final Report

The Area of Krapje Đol on a map of the year 1775,
Military Archives, Vienna

Jasenovac, 1999

Contents:

1. Krapje Đol

Krapje Đol is an old oxbow located on the left bank of the Sava River not far from the villages of Drenov Bok and Krapje in the Jasenovac commune. This oxbow is in advanced stage of eutrophication. It was the very first ornithological reserve in Croatia, and also in Central Posavina, protected as such by the Croatian Nature Conservation Institute Ruling 24/14 of 1963, which represented the first effort towards protection nature ultimately resulting in the establishment of the Lonjsko Polje Nature Park (proclaimed in 1990). Today it is manifestly not only a very important nesting place for spoonbills and several types of heron but also an important habitat for aquatic plants, many groups of arthropods and a particularly interesting amphibian community.

1.1. Location and shape

Krapje Đol is located within a bend of the Sava River that starts near Krapje and finishes after Drenov Bok, several kilometres to the west of Jasenovac (Figure 1).

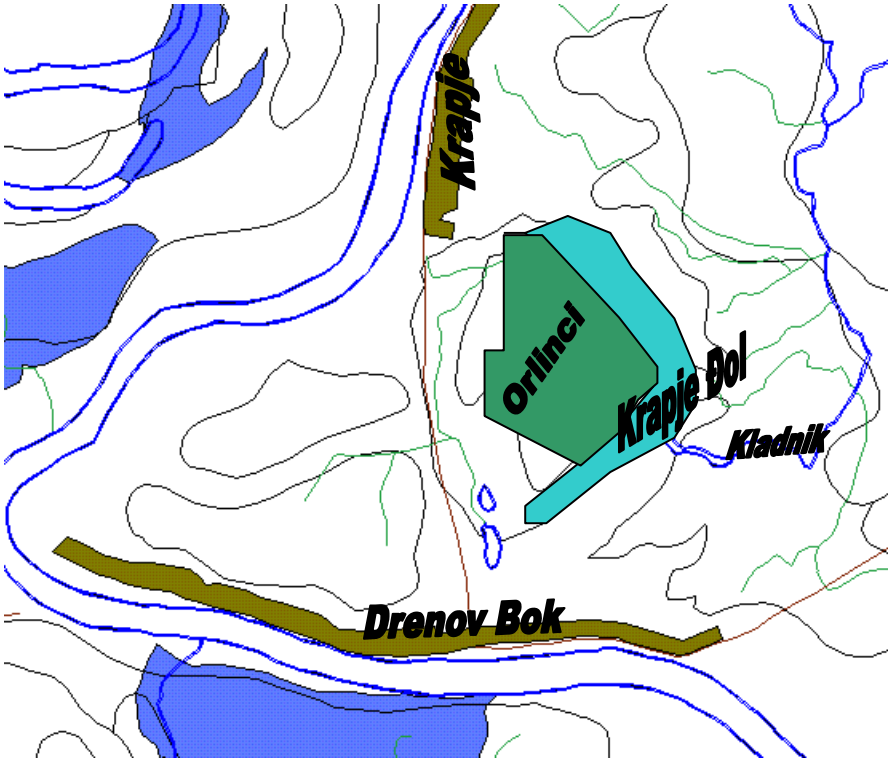

Figure 1. The location of Krapje Đol and the Orlinci pastureland.

The geographical coordinates of the area are 45° 18' N; 16° 50' E. The area is part of the low-lying Pannonian basin within the area of vegetation defined by the common oak. The area of Central Posavina that includes Krapje Đol also embraces the valley of the Sava and the Kupa from Stara Gradiška to Zagreb and Karlovac (Pokupje).

The oxbow Krapje Đol is a low depression in the shape of an arch with a section sticking out to the east. The depression is about 25 ha in area. It is somewhat lower, from 1 to 1.5 m, than the surrounding countryside. The land on the eastern side of the oxbow is somewhat higher (from 93.2 to 94.3 m a.s.l.). The ground on the western side, Orlinci, is a bit lower, and more varied (the highest parts are 93.7 m, the lowest 91.9m). Until 1987 the water in the oxbow was replenished from the Strug River via Kladnik Canal and precipitation from the surrounding land. The soil in the depression itself is amphigley, and the slightly raised ground is made up of a mix of fluvial, meadow and pseudogley soils. The land that surrounds the oxbow on the east is made up of a number of small, privately owned plots, some of them given over to various arable crops, some to meadows. The land on the western side of the oxbow was created on former pastureland through reclamation operations over a largish area (50 ha), used until 1990 for intensive farming, run by the "Braća Rađenović" PIK (socialist agro-industrial complex) and later by a private lessee.

1.2. Importance

The value of Krapje Đol in nature conservation terms lies primarily in the fact that a long-standing nesting site of spoonbills and various species of heron lies in it. It is one of the rare oxbows on the left bank of the Sava on the banks of which there are no parts of settlements and where birds have always been able to find the peace and quiet they need for their nesting. The oxbow is of a great age and very overgrown, thus supporting a very diverse fauna and flora, and pool and swamp vegetation, with rare species and communities, some of which were first described from the example of Krapje Đol.

It is a breeding place for several species of amphibians, of which *Pelobates fuscus* should be particularly highlighted.

Krapje Đol is a:

- IUCN Category 1 ornithological reserve
- part of the Lonjsko Polje Ramsar site
- part of the Lonjsko Polje IBA
- long-standing breeding site and the biggest colony of spoonbills in Croatia

1.3.History

- <u>The protection process</u>

Back in 1957 the German ornithologist Hartmunt Ern went round the Krapje Đol area and found an interesting colony of various kinds of heron and, most importantly, the first colony of spoonbills discovered in Croatia. He informed the ornithologist Dragutin Rucner of Zagreb of the find, and in 1962 Rucner himself went round the area and started a campaign to have the area proclaimed a conservation area in the Nature Conservation Institute. In 1963 this process was completed, and the area was protected as an ornithological reserve. It was actually the first such ornithological reserve in Croatia.

- <u>Land use</u>

In its relatively natural form, the broader area around Krapje Đol was covered with forests on the lower, and pastures on the higher, ground (Figure 2). The transformation of forests into pastures, and then of pastures into arable ground, took place on both sides of the oxbow. During major land reclamation works that began in 1971, the water regime of the area changed. The ground was drained with pipes that ended in Krapje Đol, rapidly bringing quantities of leached-out fertiliser and pesticide. The connection between the oxbow and the Strug River via the Kladnik Canal was

Figure 2. Depiction of the area of Krapje Đol on a military map of 1775. Military Archives, Vienna.

interrupted and it was thus cut off from the system of periodic inundations. The area of Orlinci started to be used intensively, which brought in its train great problems for the bird colony (aerial crop spraying with pesticides, and the fact that the beginning of the nesting season coincided with the use of heavy machinery for tilling).

1.4. Flora and Vegetation

The luxuriant aquatic vegetation was mentioned in the first descriptions of Krapje Đol. Individual pieces of research scheduling the flora and vegetation were done in the seventies and early eighties. A detailed schedule of the flora and vegetation of the more narrowly defined area came within the framework of the scientific treatment of Krapje Đol at the end of the nineties.

The flora consists of 123 species of vascular plants. Particular mention should be made of the aquatic plants *Stratiotes aloides*, *Spirodella polyrrhiza* and the terrestrial species *Cornus hungaricus,* Krapje Đol being the first site in Croatia in which this was found. As much as 40.7% of the flora is ornithochornous, 17 is endozoochornous and 23.6% is epizoochornous.

An inventory of species of vascular flora from the area of Krapje Đol proper (according to Trinajstić & Pavletić 1988).

Equisetum fluviatile; E.palustre; Thelypteris palustris; Salvinia natans; Acer tataricum; Angelica silvestris; Berula erecta; Daucus carota; Oenanthe aquatica; Aristolochia clematitis; Artemisia vulgaris; Bidens tripartitus; Cirium arvense; Guizotia abysinica; Leucanthemum vulgare; Solidago canadensis; Stenactis

annua; Tanacetum vulgare; Cerinthe minor; Myosotis scorpioies; Symphitum officinale; Cardamine amara; Roripa amphibia; Humulus lupulus; Cucubalus baccifer; Myosoton aquticum; Evonymus vulgaris; Calystegia sepium; Cornus hungarica; C. sanguinea; Bryonia alba; Echinocystis lobata; Dipsacus silvestris; Euphorbia palustris; Amorpha fruticosa; Galega officinalis; Hypericum perforatum; Ajuga reptans; Galeopsis speciosa; Glechoma hederacea; Lycopus europaeus; Mentha aquatica; Scutellaria galericulata; Stachis palustris; Teucrium scordium; Lythrum salicaria; Althea officinalis; Nymphoides peltata; Morus alba; Nuphar luteum; Nymphea alba; Epilobium parviflorum; Fraxinus angustifolia; Ligustrum vulgare; Fallopia dumetorum; Polygonum amphibium; P.hydropiper; P.lapathifolium; P.persicaria; Rumex hydrolapathum; Lysimachia nummularia; L.vulgaris; Ranunculus lingua; R.sardosa; Frangula alnus; Rhamnus catharica; Crataegus laevigata; C.monogyna; Potentilla reptans; Prunus cerasifera; P.spinosa; Rosa canina; Rubus caesius; R.discolor; Galium aparine; G.palustre; Populus alba; Salix alba; S.cinerea; S.fragilis; S.purpurea; Sambucus nigra; Viburnum opulus; Linaria vulgaris; Scrophularia nodosa; Verbascum blattaria; Veronica chamaedrys; Solanum dulcamara; Ulmus carpinifolia; U.laevis; Urtica dioica; U.kioviensis; Utricularia vulgaris; Valeriana dioica; Verbena officinalis; Viola elatior; Parthenocissus quinquefolia; Vitis sp.; Alisma plantago-aquatica; Acorus calamus; Carex gracilis; C.pendula; C.vesicaria; C.vulpina; Schoenoplectus lacuster; Hydrocaris morsus-ranae; Stratiotes alloides; Iris pseudacorus; Lemna minor; L.trisulca; Spirodella polyrrhiza; Wolffia arrhiza; Ornithogalum umbellatum; Dactylorrhiza incarnata; Glyceria maxima; Phragmites australis; Poa trivialis; Potamogeton coloratus; Sparganium erectum; Typha angustifolia; T.latifolia

The vegetation of Krapje Đol is mainly classified with the plant communities of stagnant waters, pools and swamps of the lowland zones of continental areas. It is rich in plant communities, and it was actually in Krapje Đol that the *Hydrochariti – Stratiotetum* Westhoff 1942 community was discovered for the first time in the vegetation of Croatia. Đol itself is bordered on the raised, non-inundated section, by bushes of the *Corno-Ligustretum* Ht. 1962 community.

A review of the plant communities:

Class LEMNETEA R.Tx. 1955
- Ordo ***Lemnetalia*** R.Tx. 1955
  1. *Lemno- Spirodeletum polyrhizae* (Koch 1954)
  2. *Spirodelo-Salvinietum natantis* Slavnić 1956
  3. *Lemnetum trisulce* Den Hartog 1964

Class STRATIOTETEA Den Hartog et Segal 1964
- Ordo ***Hydrocharitetalia*** Rübel 1933
  4. *Hydrochariti-Stratiotetum* Westoff 1941

Class POTAMETEA Klika et Novak 1941
- Ordo ***Potametalia*** W.Koch 1926
  5. *Myriophyllo-Nupharetum* W.Koch 1926

Class PHRAGMITETEA R.Tx. et Prsg. 1942
- Ordo ***Phragmitetalia*** W.Koch 1926
  6. *Scirpetum lacustris* Schmale 1939
  7. *Phragmitetum australis* Schmale 1939
  8. *Typhetum angustifoliae* Pignatti 1953
  9. *Glycerietum maximae* Slavnić 1956
  10. *Acoro-Glycerietum maxmimae* Slavnić 1956
  11. *Acoro calami* Schultz 1941

Class QUERCO-FAGETEA Br.-Bl. et Vlieger 1937
- Ordo ***Prunetalia*** R.Tx. 1952
  12. *Corno-Ligustretum* Ht. 1962

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1.5. The bird community and other animals present

The great value of the Krapje Đol ornithofauna inheres primarily in the spoonbill colony (*Platalea leucorodia*) which has been known in the region since about 1949

(Rucner, 1970). In 1962 the colony was estimated to consist of 10 pairs, while in July 1987 as many as 280 adults were counted. The number of nesting pairs varies from year to year, but for quite a long time it has been above 30. The following types of heron also nest here: *Ardea purpurea* (purple heron) , *Egreta garzetta* (little egret), *Ardeola ralloides* (squacco heron), *Nycticorax nycticorax* (night heron) and *Ixobrichus minutus* (little bittern). During his visit in July 1999, Martin Schneider-Jacoby was find 69 little egretts, 2 grey harons, 20 night herons, > 17 purlple herons, > 10 spoonbills (more than 40 nesting pairs was obesrved during this year), 1 hobby, honey buzzard, lesser spotted eagle (first observation since 1990)

Inventory of bird species (98 species) noted in the Krapje Đol area:

Tachybaptus ruficollis, Ixobrychus minutus, Nycticorax nycticorax, Ardea cinerea, Ardeola ralloides, Heronta alba,Heronta garzetta, Ardea purpurea,Ciconia ciconia,Ciconia nigra,Plegadis falcinellus, Platalea leucorodia, Cygnus cygnus, Anas platyrhynchos, Anas querquedula, Aythya ferina, Aythya nyroca, Haliaeetus albicilla, Aquila pomarina, Milvus migrans,Circus cyaneus,Circus aeruginosus, Circus pygargus, Accipiter gentilis,Accipiter nisus, Buteo buteo, Falco tinnunculus,Falco vespertinus, Falco subbuteo, Phasianus colchicus, Coturnix coturnix,Crex crex, Gallinula chlorophus, Fulica atra,Porzana parva, Rallus aquaticus, Vanellus vanellus, Gallinago gallinago, Philomachus pugnax, Tringa erythropus,Tringa glareola, Tringa ochropus, Larus ridibundus, Chlidonias hibrida, Columba palumbus, Columba livia f.domestica, Streptopelia decaocto, Streptopelia turtur, Cuculus canorus, Garulus glandarius,Coracias garrulus, Otus scops, Dendrocopos major, Lanius excubitor, Lanius collurio, Apus apus, Delichon urbica, Hirundo rustica, Anthus trivialis, Luscinia megarhynchos, Oenanthe oenanthe, Saxicola rubetra, Saxicola torquata, Muscicapa striata, Motacilla flava, Alauda arvensis, Locustella naevia, Locustella luscinioides, Locustella fluviatilis, Acrocephalus schoenobaenus, Acrocephalus palustris, Acrocephalus scirpaceus, Acrocephalus arundinaceus, Turdus merula, Hippolais pallida, Sylvia communis, Sylvia atricapilla, Aegithalos caudatus, Parus cearuleus, Parus major, Remiz pendulinus, Sturnus vulgaris, Oriolus oriolus, Pica pica, Corvus monedula, Corvus frugilegus, Corvus corone cornix, Passer montanus, Passer domesticus, Fringilla coelebs, Fringilla montifringilla, Carduelis chloris, Carduelis cannabina, Carduelis carduelis, Serinus serinus, Emberiza citrinella, Emberiza schoeniclus, Miliaria calandra,

The reptile and amphibian fauna in the area of Krapje Đol proper includes important species such as: *Pelobates fuscus, Tritutus vulgaris, Triturus dobrogicus, Rana temporaria, R. dalmatina, R. lesone, R.ridibunda, Bufo bufo, B.viridis, Bombina bombina, Hyla arborea, Lacerta agilis, Anguis fragilis, Natrix tesselata, N..natrix, Coronela austriaca, Emys orbicularis* .

As for mammals, apart from several species of bat (*Nyctalus noctula, Pipistrellus pygmeus, P.pipistrellus, Rhynolophus ferrumequinum, Rh. hiposideros, Myotis emarginatus, M.daubentonii*) the following species can be found: *Erinaceus concolor, Talpa europaea, Neomy anomalus, N.fodiens, Sorex araneus, Sorex minutus, Crocidura suaveolens, Muscardinus avellanarius, Micromys minutus, Apodemus sylvaticus, A. flavicollis, A. agrarius, Clethrionomys glareolus, Microtus arvalis, M. agrestis, Pitymys subterraneus, Arvicola terestris, Ondatra zibethicus, Mustela nivalis, M. putorius, Martes foina, Meles meles, Lutra lutra, Vulpes vulpes,Felis silvestris, Lepus europaeus, Sus scropha, Capreolus capreolus*

1.6.Water supply

From the old maps it can be seen that until the construction of the dyke and road from Drenov Bok to Krapje, land reclamation works and the construction of a network of canals, the oxbow was fed with water from the Sava and later from the Strug River via the Kladnik Canal (Figure 1, Figure 2). Rainfall from the surrounding area drains into the oxbow. The total volume of the oxbow is 243,925 m^3.

2. Problems

2.1. Water shortage

In 1989, when it had stopped being regularly replenished with water, the oxbow dried up almost completely, which led to the disappearance of the heron and spoonbill colonies.

2.2. Pesticide and fertiliser pollution

The natural world in Krapje Đol was particularly hard hit when intensive agriculture was introduced into Orlinci. Rainfall leached pesticides and artificial fertiliser into the oxbow with very negative consequences to the flora and fauna, as well as accelerated eutrophication.

2.3. Disturbance by modern agriculture practice

The work of heavy machinery and aerial spraying also had very negative effects on the bird colonies and led to an essential deterioration of the situation produced by the water shortfall in Krapje Đol.

3. Solutions

3.1. Piping in water

A pipe diameter 60 cm and 345 m long was laid down from the course of the Sava to Krapje Đol (a monetary donation from Zoological Society of Frankfurt). It delivers water when the level of the Sava at Jasenovac has attained 620 cm; at this site, the highest water level is 907 cm, and the lowest 103 cm. This solution has two advantages. The quality of the water is, first of all, much better when there is high water, and secondly, it fills the oxbow by gravitation. The natural water regime of the Sava used to result, before the reclamation works, in the replenishment of the oxbow's water. When the water in the Sava is very high, simply opening a valve will result in the Đol filling with water. This can usually be done several times a year, according to the Đol's need for replenishment. The positive effects were seen very soon, and the number of spoonbills and herons nesting has been constantly on the rise since 1991.

3.2. Hide

A donation from the Zoological Society of Frankfurt enabled the purchase of two plots of land on the eastern side of Krapje Đol. This made it possible to approach Đol and the hides in an organised manner. The small private plots and the relatively extensive agriculture do not pose a threat to Đol; on the contrary, they constitute an important feeding area for some species of birds (the white stork, sometimes the spoonbills).

3.3.Transformation of land use (intensive agriculture vs. pastureland)

Thanks to changes in the approach to agriculture, large areas of state land were leased out to private cultivators. Thus it became possible for a large area (50 ha) in Orlinci, along the western bank of Krapje Đol, to be taken out of intensive arable farming and be assigned to the Nature Park to protect the ornithological reserve. The basic point was to turn the arable land back into pasture, that is, to revert to the situation as it existed before 1987. This would assure pastures for the villages of Krapje and Drenov Bok that could be used even when high waters led to the pastureland in inundated parts of the park being inaccessible to livestock. It is a particularly suitable position for the grazing by dairy cattle. For these plans to be put into practice it was necessary to arrange an approach road to the pasture from the direction of Krapje, harrow the land, dig a well, fence the pastures, plant hedges around wire fencing, plant trees for the resting place around the well and along the eastern edge of the pasture, set the pastures up in such a way that it would constitute a useful habitat (feeding place, site of materials for nest-building) for spoonbills and herons of the Krapje Đol colony and nesting site for grassy area birds (chats, pipits, larks).

Figure 3. Orlinci, former plough-land; the earth was disk harrowed and levelled in 1998.

3.3.1. Land restoration

The land was levelled and harrowed. A shallow pit (30 X 10 m) was dug at the lowest level of the ground to great a depression in which the water would be retained for quite a long time and thus create conditions in which birds of the Charadriidae group would stay, feed and nest. The entrance into the Orlinci pasture land from the direction of Krapje village was often muddy and torn up, and when water levels were high, water from the Đol would often overflow it. Now it has been put in order and raised to a higher level.

3.3.2. Well digging

A well for watering the cattle was dug, the firm “Grgić prom” from Popovača being engaged for the works. (Figures 4, 5 and 6)

Figure 4. Concrete well pipes and setting up the drilling rig in Orlinci, 1998.

Figure 5. Setting up the drilling rig in Orlinci, 1998.

Figure 6. The work of the drilling rig in the Orlinci pasture land in the summer of 1998.

The well was dug on a ridge more or less in the centre of the pasture. A trough for watering the cattle and a sweep should be set up by spring 2000.

3.3.3. Fencing

For the pasture to be put to use, it was necessary to build a fence around it, to prevent the cattle going into the surrounding fields, and yet enable them to be kept on the pasture without employing village people on keeping watch over them.

The fence was made of oak posts two metres high and galvanised barbed wire strung in three strands. The pasture was fenced on all sides, except on the part leading to the Đol, where the protected part with the bird colony lies. Traditional wooden stiles for pedestrians were built in the fence and there are entrance gates at two places – from Krapje, and from Drenov Bok. (Figures 7, 8, 9, 10.)

Figure 7. Digging in the posts for the fencing. Orlinci pasture land, 1999.

Figure 8. Setting up barbed wire on the fence around Orlinci pasture land, 1999. Lonjsko Polje Nature Park rangers.

Figure 9. Stringing out and setting up barbed wire on the fence around Orlinci pasture land, 1999.

Figure 10. A stile for walkers in the fencing around Orlinci pasture land, 1999.

3.3.4. Hedge and trees planting

Planting of hedges is planned at places where the wire fence has been set up to keep the pasture separate from the nearby arable areas. In time the wire fence should fit in with the hedge. The plant composition of the hedge should be in line with the species composition in existing hedges around Krapje Đol, described in a review of the flora as the *Corno-Ligustretum* Ht. 1962 community. It is planned to plant the following species of trees and bushes (number of plants anticipated at the initial phase:

Cornus sanguinea	(10-15 plants)	*Prunus spinosa*	(10 plants)
Euonomys europea	(10 plants)	*Fraxinus excelsior*	(10 plants)
Salix fragilis	(30 plants)	*Pyrus communis*	(10 plants)
Crategus monogyna	(50 plants)	*Malus communis*	(10 plants)
Viburnum opulus	(10 plants)	*Morus alba/nigra*	(5 plants)
Ligustrum vulgare	(20 x 3 plants)	*Populus sp.*	(5 plants)
Rhamus catarica	(10 plants)	*Cornus sanguinea*	(20 plants)
Sambucus nigra	(20 plants)	*Rosa canina*	(5 plants)

The hedge is planted on the outside of the fence, 1.5 metres away, so that the cattle cannot destroy it before it is properly established. In a later phase of care hedges of willows and ash will be pollarded in the traditional way to create a thickening of the trees with hollows suitable for hiding places for bats and nests for owls and other birds.

Figure 11. Initial phase of creating a fence on the outer side of the fencing around the Orlinci pastureland.

Figure 12. Pupils of the Jasenovac elementary school planting bushes around the Orlinci pasture land.

3.3.5. Involvement of the local community in problem solving

The stock raisers of Krapje and Drenov Bok were from the outset involved in the conception and implementation of reclaiming Orlinci for pastureland. At meetings, the interest of individual local people in keeping livestock on the Orlinci pastureland and the number and kind of animals they wished to keep on the pastureland was investigated. From the beginning, too, they took part in the preparation and distribution of the posts (Figures 13 and 14).

Figure 13. Farmers from Krapje with their tractors did all the transportation work from the village and the post storage place to various parts of the Orlinci pastureland.

Pupils from Jasenovac elementary school being employed on planting hedges around the pasture fence (Figure 12.).

Planting bushes and setting up the hedge along the fence was done with the help of Jasenovac elementary school pupils. The twenty pupils, while doing the work, became aware of the values of the Krapje Đol Ornithological Reserve.

Figure 14. Farmers from Krapje and Nature Park rangers at the storage site working the oak fence posts.

4. Final results

4.1. Water level control

The placing of pipes between Krapje Đol and the Sava River enabled Krapje Đol to be filled with water from the Sava and the optimum level of water for nesting spoonbills to be maintained. The negative effect of agriculture (pesticides, herbicides, artificial fertiliser) on the natural world in the water of the Đol was reduced.

4.2. The formation of protective rings around Krapje Đol

On one side, Krapje Đol is almost totally separated by the pastureland from the areas devoted to intensive arable farming. This has eliminated the negative effect of heavy agricultural machinery, aerial spraying and such like on the bird colony during spring.

4.3. Support for the spoonbill and heron colonies from a useful and friendly surrounding landscape

The transformation of the plough-land by Đol back into pastureland has created a habitat that can be used by the spoonbills in collecting material for their nests. The pasture is also a feeding ground for storks from the neighbouring villages, and a nesting place for pipits and chats**.** Project leader Dr. Martin Schneider-Jacoby has observed during his visit in 6th May 1999. nesting activities of at lest 30 pairs of skylark, 20 pairs of winchat, 5 pairs of yellow wagtails and 2 pairs of tree pipit. The new hedges and single-standing trees will increase the diversity of the landscape, will become nesting and resting places for many bird species and refuges for other creatures.

4.4. New pastureland for the inhabitants of Drenov Bok and Krapje

The new-old pastures of Orlinci are closest to the villages of Krapje and Drenov Bok. It is particularly important to enable livestock to graze even when there is water in the surrounding retention areas.

Figure 15. Pastureland Orlinci in the may 1999.

Figures 16. Cows grezing on Orlinci pastureland, may 1999.

5. Follow-up

5.1. Construction of a combined platform or hide for bird watching and shade facility for livestock.

Observation of the colonies of spoonbills, of the pastureland and the nesting birds of the pasture land should be possible from the hide built close to the western edge of the grazing area. At the same time, the feature will protect cattle from the heat of the summer (particularly during the period in which the trees on the so-called resting areas are not yet fully-grown). A wooden facility on posts to serve both purposes is foreseen.

5.2. Research into the succession of plant communities on the Orlinci pastureland.

The changes of the plant composition of the Orlinci pastureland have to be monitored so as gradually to ensure the formation of plant communities characteristic of pastures beyond the reach of floodwaters, everywhere very rare today. For this purpose, two transects marked by wooden posts have been established. They cut the pastureland in such a way as best to cover the micro-relief differences and the effect of the animals on the plant communities of the pasture. During summer 1999, a preliminary distribution of the plant communities along these transects was prepared by german student Jutha Meiforth (Figure 17.).

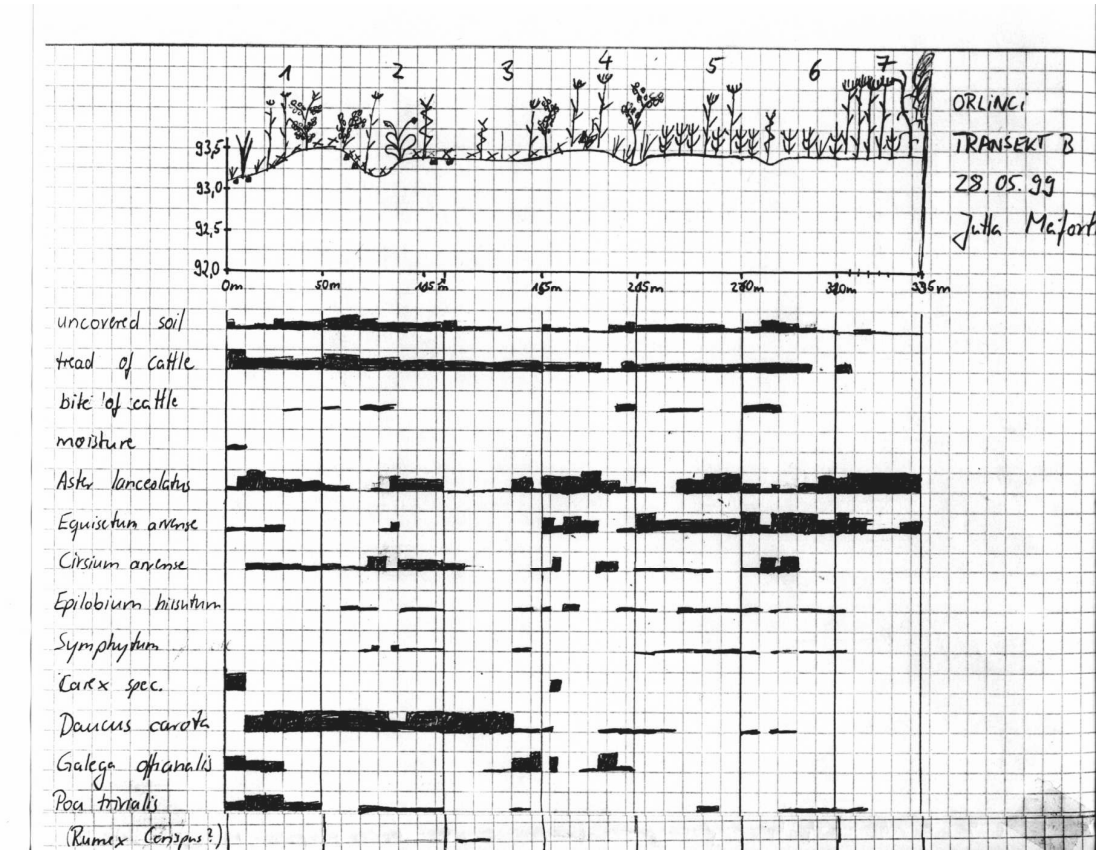

Figure 17. Exemple of the preliminary distribution of the plant communities along transects across Orlnci pasture prepared by German student Jutha Meiforth in May 1999.

5.3. Construction hedges and approach paths from Krapje Đol to Drenov Bok.

There is no kind of linear structure (row of trees or hedge) to enable the movement of many kinds of mammals, birds and insects from the village to the Đol and back again. The drainage canal that stretches across the middle of this area along the approach road to the Đol, which is particularly important for amphibians, is not at present shaded by any vegetation, and the water in it heats up in late spring and summer. The planting of a hedge would result in the access path to the observation area by Krapje Đol being shaded, and would also provide cover for groups of observers arriving.

5.4. The construction of a rest area and information point on land purchased on the eastern side of Krapje Đol

On the purchased land that links the access road from Drenov Bok and the path around Đol, it is planned to build a wooden rest area and information point. Groups of visitors would be able to obtain basic information about Krapje Đol and after that they would split up into smaller groups for going round Đol and observing the birds from the two hides (Figure 18.).

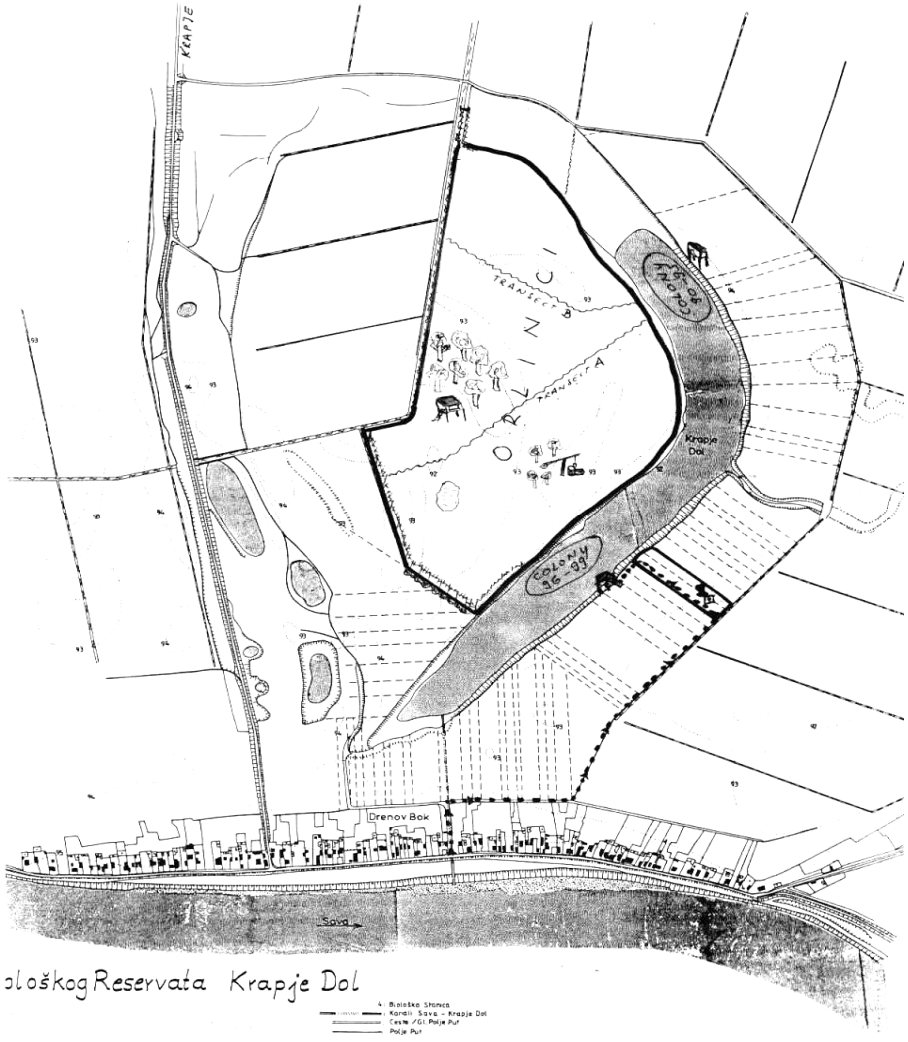

Figure 18. The drawing of the Zoological reserve Krapje Đol with Orlinci pasture and pointed out the main infrastructure.

6. Literature:

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Project name: Sava Wetlands – Spoonbill Colony Krapje Đol

Area: Lonjsko Polje Nature Park

Country: Croatia

Time table: start- 1997; end –1999.

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Following report has been prepared in a manner that shows all completed and planned activities concerning protection and field presentation of the Krapje Đol Ornithological Reserve