

# ZONATION CONCEPT FOR THE LIVANJSKO POLJE RAMSAR SITE

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## 1 Introduction

The sustainable development and wise use of the Livanjsko Polje Ramsar Site has to be based on data concerning the presence of indicator species and their habitats in the area. As the decision for the site's future conservation status and management is pending, here a flexible zonation system is proposed, which can be used to create a National Park with a buffer zone – preferably a Biosphere Reserve – or a Nature Park Livanjsko Polje (Annex 1 and 2). In May 2010, EuroNatur guided a delegation of local GOs and NGOs from Livanjsko Polje to the Lonjsko Polje Nature Park and Ramsar Site to learn from recent experience in Croatia and to collect a number of important documents (e.g. Tourism Master Plan, Physical Plan, Management Plan).

The present proposal is based on a vegetation map (U. Schwarz this pub.) and distribution maps for different bird species for the 2007 – 2009 period. All bird species selected for zonation planning are indicators for particular habitat conditions or, according to the European Union's Bird Directive, play a major role for the implementation of a network of Important Bird Areas (IBAs) or Special Protection Areas (SPAs). Data are derived from a total of 12 bird surveys, which have been conducted by Euronatur throughout Livanjsko Polje between 2007 and 2009 and should provide a good basis for conservation planning and future monitoring in the area. For example, the Hen Harrier (*Circus cyaneus*) is used in the guidelines for physical planning in Croatia to demonstrate how particular habitats should be preserved following the rules of the European Union's Bird and Habitat Directives (DZZP s.a.).

Zones of different conservation status and management are proposed according to the Ramsar Management Guidelines and the UNESCO MAB Programme (cf. Schneider-Jacoby et al. this pub. for Lake Skadar). Some of the findings presented in this paper have been already published in the Ramsar Information Sheet (RIS), which has been prepared for the nomination Livanjsko Polje as a Ramsar Site, as well as in various other technical papers during the last years (Schneider-Jacoby et al. 2006, Stumberger et al. 2008, Sarac & Stumberger 2009, Stumberger & Sackl 2009, Stumberger & Sarac 2010).

On a landscape scale, Livanjsko Polje is a unique site even on the global scale, as it constitutes the largest continuous Karst Polje worldwide (cf. Livanjsko Polje exhibition). Although the area has been already impacted in parts by the erection of a hydro-electrical power plant, it is still a continued cultural landscape showing the unique natural and cultural processes of a Karst Polje.

## 2 Distribution and population numbers of indicator species

### 2.1 Great Bittern (*Botaurus stellaris*) and Common Snipe (*Gallinago gallinago*)

The largely undisturbed wetland areas and peat lands in the northern part of Livanjsko Polje (Zdralovac) harbour breeding populations of Great Bittern and Common Snipe (Fig. 1). While the breeding of 3 – 9 breeding pairs (bp) of Great Bitterns is restricted to flooded reed beds, which surround Zdralovac, Common Snipes (20-40 bp) prefer wet grassland above peat layers with high ground water tables (Stumberger & Sackl 2009). Besides, essential numbers of the latter



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Hen Harrier (*Circus cyaneus*) / photo P. Sackl

species breed in periodically flooded grasslands in Jagma in the middle of the polje. Because of their high conservation status and natural/semi-natural habitat conditions indicated by the presence of both species, the areas inhabited by Great Bittern and Common Snipe are proposed as core conservation areas, which should be developed without human use. In particular, the nesting of Common Snipe in Livanjsko Polje is exceptional, as it constitutes the largest breeding population in southern Europe and throughout the Mediterranean basin (cf. Hagemeyer & Blair 1997). Following more intensive studies, even higher breeding number may be found at Livanjsko Polje.

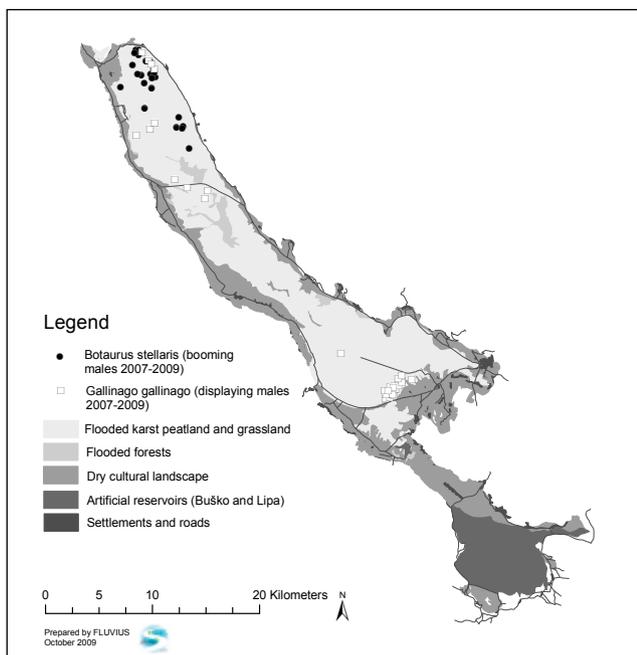


Figure 1: Distribution of booming Great Bitterns (*Botaurus stellaris*) and displaying Common Snipes (*Gallinago gallinago*) at Livanjsko polje, 2007 – 2010

## 2.2 Corn Crane (*Crex crex*)

Corn Crakes prefer to nest in large and continuous areas of grasslands with high ground water level. At Livanjsko Polje, the majority of the population is concentrated in seasonally flooded grasslands in the northern part of the polje (Fig. 2). In the area of wet grasslands, which harbour dense concentrations of calling males, more scattered nesting sites of Common Redshank (*Tringa totanus*) and low numbers of calling

Spotted (*Porzana porzana*) and Little Crakes (*Porzana parva*) were found. In 2007 and 2009, Livanjsko Polje hosted at least 314 Corn Crakes (calling males). The area is the most important site for this species in Bosnia and Herzegovina and one of the most important sites in Southeast Europe and the Mediterranean region (see BirdLife International 2004). According to B2 criterion (one of the five most important sites in the country), the site qualifies as an Important Bird Area (IBA). Currently, no other area in the Western Balkans with a comparable dense concentration is known. The population numbers of Corn Crane at Ljubljansko barje, the most important site for the species in Slovenia, dropped from 236 callers in 1992/93 to 118 callers in 2010 (DOPPS-BirdLife Slovenia, in prep.)

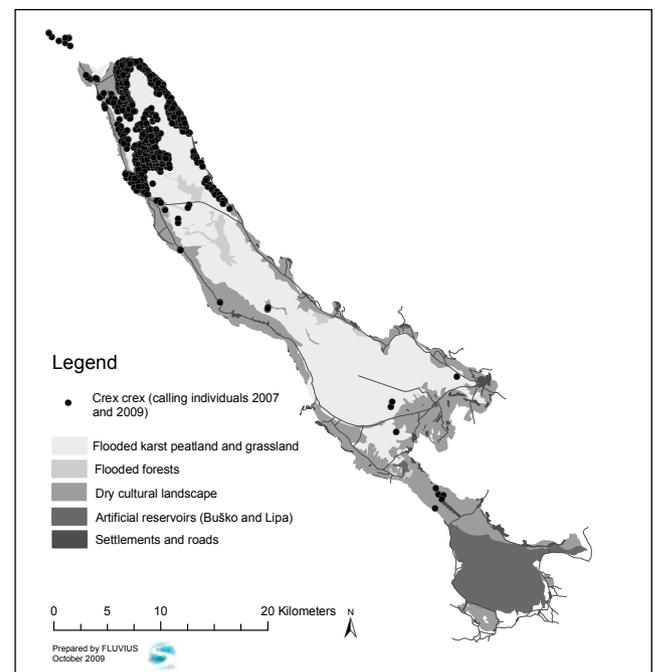


Figure 2: Distribution of Corn Crakes (*Crex Crex*) (calling males) at Livanjsko Polje in 2007 and 2009

## 2.3 Montagu's Harrier (*Circus pygargus*) and Hen Harrier (*Circus cyaneus*)

The temperate grasslands of Livanjsko Polje host a breeding population estimated at approximately 30 bp of Montagu's Harrier. The distribution of feeding birds (Fig. 3) is an excellent indicator for the conservation value of grassland areas, which are mainly used by grazing sheep and cattle in the agriculturally used parts of the polje. These

cultural landscapes should be included into the landscape protected zone 2a-b (Fig. 5). In winter, the migrating Montagu's Harriers are replaced by Hen Harriers from more northern parts of Europe. Livanjsko Polje, which holds up to 120 individuals, is an important non-breeding site of the species. For both harriers, Livanjsko polje is the most important breeding or wintering site, respectively, in Bosnia-Herzegovina and probably in the entire Western Balkans.

## 2.4 Hoopoe (*Upupa epops*) and Lesser Grey Shrike (*Lanius minor*)

The Lesser Grey Shrike is decreasing in Europe (BirdLife International 2004). In Bosnia-Herzegovina, the species appears to be a useful indicator for the identification of Important Bird Areas, which are dominated by arable land. The presence of approximately 50 bp in the drier parts along the edge of the karst polje (Fig. 4) indicates high numbers and arthropod diversity and the ecological value of the cultural landscape surrounding traditional settlements. The Hoopoe, mapped at 40 bp, inhabits

the same environment. A similar distribution of Hoopoes and Lesser Grey Shrikes around the flood plain has been found in the Sava wetlands in Croatia (Schneider-Jacoby 1993). Following the European Union's Bird Directive, the Lesser Grey Shrike is a priority species for the identification of Natura 2000 areas. Currently, Livanjsko Polje is the most important known breeding site in Bosnia - Herzegovina.

## 3 Proposed Zonation of Livanjsko Polje

### Zone 1: Core Area - Wilderness Area - restricted use, natural processes

#### 1a Natural Landscapes and Wilderness Areas (without human use)

*Habitats:* The preservation of the pristine landscape with natural forests, peat lands and marshes is the target of the core zone. The proposed core areas include the periodically flooded karst lakes. Here, only guided and limited access for visitors, research

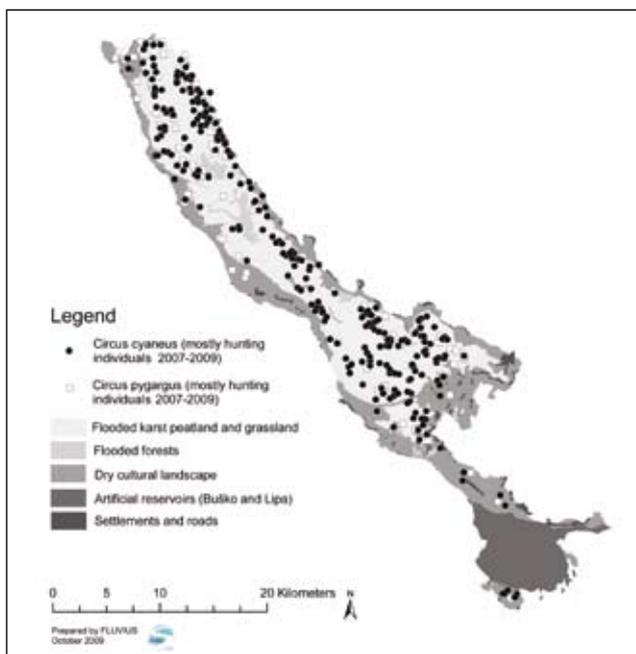


Figure 3: Distribution of Montagu's Harrier (*Circus pygargus*) and Hen Harrier (*Circus cyaneus*) at Livanjsko polje, 2007 - 2010

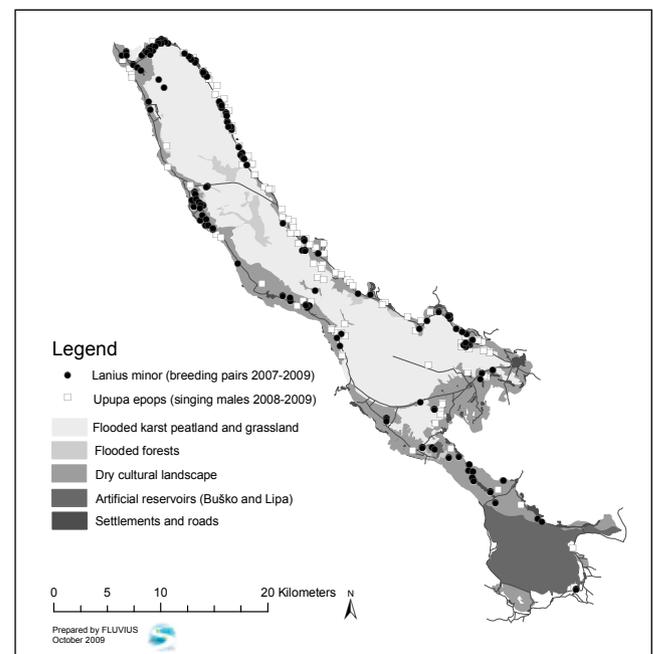


Figure 4: Distribution of Lesser Grey Shrike (*Lanius minor*) and Hoopoe (*Upupa epops*) at Livanjsko polje, 2007 - 2010

and environmental education is possible. The core area includes reed beds, fens and peat lands, natural forests (oak and ash) and elder swamps, karst lakes and springs, and other water bodies of high conservation value (including Lipa Reservoir and the shallow water zone along the spring in the northern part of Busko Blato).

*Examples:* south-eastern part of Glamocko Polje (outside Livanjsko Polje Ramsar Site, but very important for water and habitat protection); Veliki Zdravovac, Mali Zdravovac and Zdravovic (literally: Great, Small and Little Crane swamp, respectively!), including grassland areas for smoothing the polygons 1a, parts of Busko blato (flooded water surface and shallow waters).

*Goals:* Preservation of the – on the European scale – unique and very attractive landscape. The core areas are an important Unique Selling Point for Livanjsko Polje as a natural area and destination in Europe. Here, the largest peat land areas in South-east Europe, covering over 7,600 ha, exist. These peat areas are an important argument to support the management within the Climate Initiative’s framework.

A second goal is the protection of the waterbirds’ resting and feeding sites. Busko Blato currently hosts the largest waterbird concentration in Bosnia-Herzegovina. A core zone is needed to offer the birds disturbance free roosting sites. The occurrence of rare birds, like the Dalmatian Pelican (*Pelecanus crispus*) (Stumberger and Sarac 2010), and the growing number of birds, which reach the 1% criterion (see Stumberger & Schneider-Jacoby this pub.), prove the importance of waters as Busko Blato and the Lipa Lake (Stumberger et al. 2009).

### **1b Impacted Natural Landscape – Restoration and Rehabilitation Areas**

*Habitats:* Drained peat lands and areas impacted by mining.

*Goals:* Important large-scale semi-natural areas, which can be rehabilitated to maintain the original landscape functions of Livanjsko Polje with the goal to become a Wilderness Area (Zone 1a). Most important is the water regime (duration, frequency and height of floods) as well as the level of groundwater. Impacts from drainage should be limited and mitigation measures taken. Introduction of *Sphagnum* in the

areas where peat is present, but currently living plants are missing, might be an option to increase the potential of carbon storage.

**In 2007 and 2009,  
Livanjsko Polje hosted  
at least 314 Corn Crakes  
(calling males).**

### **Zone 2: Buffer Zone – Landscape Protection – Cultural Landscape – traditional use (Livanjski sir etc.)**

#### **2a Flooded Karst Polje grasslands with human traditional use**

*Habitats:* Meadows, pastures, forests used as meadows or pastures, forest extensively used

*Goals:* Maintenance of the adapted use in relation to the Water Frame Directive (WFD) and protection of retentions areas and important zones for drinking water protection. The habitats of this zone are of very high ecological values based on vegetation and the presence of protected bird species (FFH Directive, Bird Directive).

#### **2b Dry Karst Polje with traditional use**

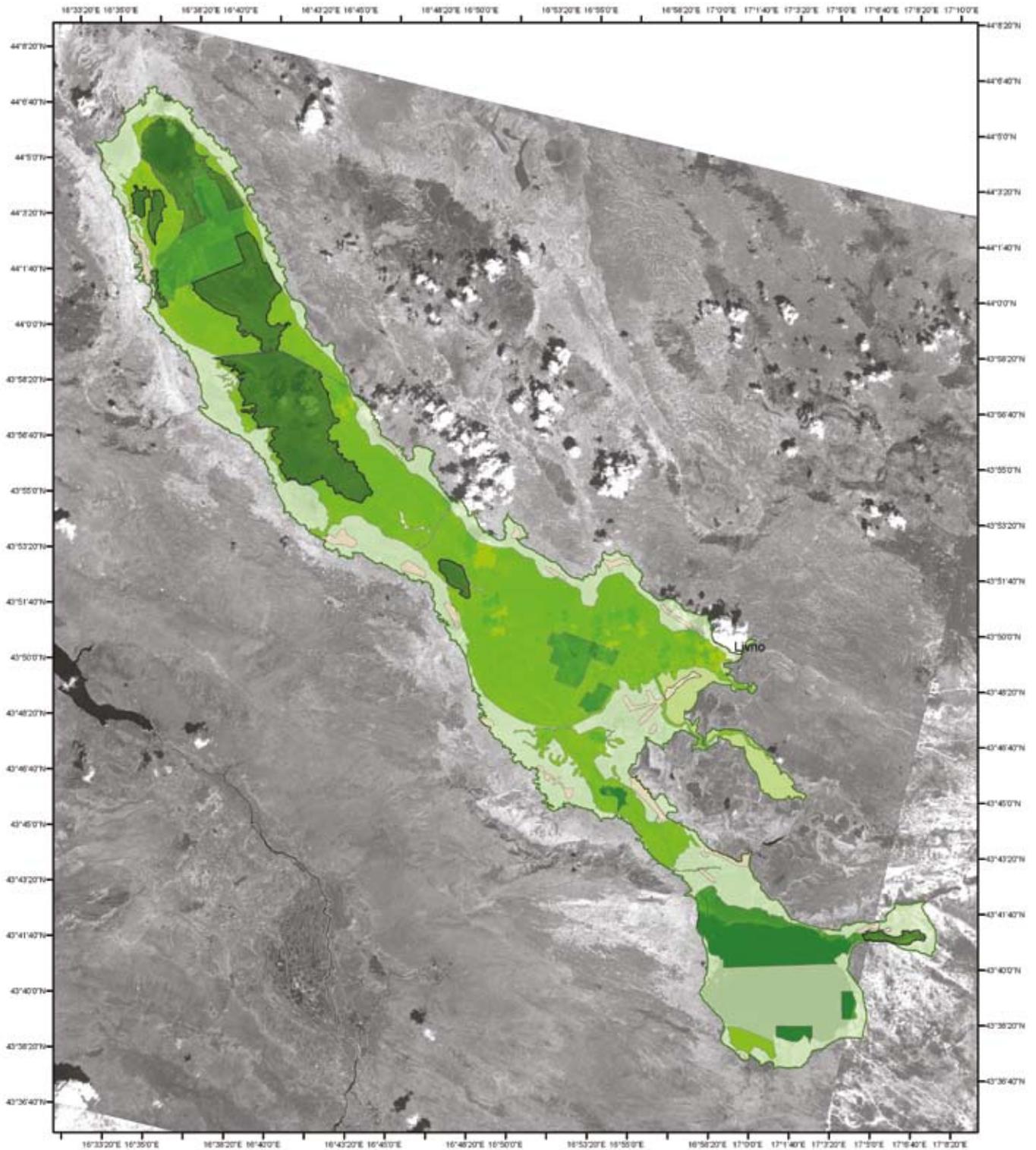
*Habitats:* Extensively used cultural landscape with orchards and hedgerow landscape, small-scale arable lands are a characteristic element of this landscape type.

*Goals:* Preservation of the dry parts of Livanjsko Polje as an important area during high floods and habitat for animals and plants preferring drier habitats. Important habitats for several bird species according to the Birds Directive.

### **Zone 3: Transition Zone – Settlements (within the Ramsar Site)**

*Habitats:* Urban areas and larger settlements.

*Goal:* Clear delineation of the urban areas and building regulation. Until today, the villages and settlements have been formed around and in the traditional settlement zone. To maintain the landscape character of Livanjsko Polje, the future construction activities and urban development need a careful planning.



**LEGEND**

**Zoning proposal**

- Zone 1a (core zone, natural landscape and wilderness area)
- Zone 1b (core zone, impacted natural landscape - restoration and rehabilitation area)
- Zone 2a (buffer zone, flooded karst polje with traditional landuse)
- Zone 2b (buffer zone, dry karst polje with traditional landuse)
- Zone 3 (transition zone)
- Ramsar site "Livanjsko Polje"



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Figure 5: The proposed zonation of Livanjsko polje



Livanjsko polje - dry and flooded / photo M. Schneider-Jacoby and M. Šarac

## 4 Conclusions

The zonation concept for the Livanjsko Polje Ramsar Site is initially based on the vegetation (habitat map) and distribution of selected bird species (breeding and wintering). Several indicator species have been chosen, which are characteristic of different parts of the karst polje. Based on criteria of the European Union's Bird and Habitat Directives, the whole polje, beside the urban areas, is a priority site for nature conservation in Europe. The district will benefit from maintenance of the karst polje as a Unique Selling Point. The implementation of different zones according to conservation and landscape values will be important for further development of the area. Programmes for sustainable agriculture and drinking water protection are needed to maintain the polje's ecosystem services. The whole plain of the karst polje constitutes an outstanding natural asset and is a unique example for a continued cultural landscape in Europe (potential UNESCO Cultural World Heritage Site).

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Annex 1: Size of the different proposed zones

MAB	Description	Zone	Hectares	%
Core zone	natural landscape and wilderness area	1a	6,756	14.72
Core zone	impacted natural landscape – restoration and rehabilitation area	1b	5,204	11.34
buffer zone	flooded grasslands with traditional land use	2a	16,908	36.85
buffer zone	dry karst polje with traditional land use	2b	15,916	34.69
transition	settlements	3	1,089	2.37
<b>TOTAL*</b>			<b>45,873</b>	<b>100.00</b>

\*Totalling to 45,873 ha, which equals the size of the Livanjsko Polje Ramsar Site (45,868 ha according to the old GIS).

Annex 2: Size of the most important compartments of the 1a and 1b core zones

Name	Hectares	Zone
Veliki Zdralovac	1431.2	1a
Zdralovac	1773.9	1b
Mali Zdralovac	1497.2	1a
Lug	66.4	1a
Jaruga – Gredina	154.6	1a
Zdralovcic	102.9	1a
Rakite	194.1	1a
Jagma	171.1	1b
Male Table	119.8	1b
Bazen Lipa	102.2	1b
Busko jezero - Bilo polje	2222.6	1b
Busko jezero - Golubinka	115.7	1b
Busko jezero - Gale	147.2	1b
Busko jezero - Vrilo	166.7	1a
Velike Table	551.3	1b
Veliki i Mali lug	3143.1	1a
<b>Total</b>	<b>11960</b>	