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Adriatic Flyway

closing the gap in bird conservation

Edited by: Damijan Denac, Martin Schneider-Jacoby and Borut Stumberger

Adriatic Flyway –
Closing the gap in bird Conservation

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Migrating Eurasian Spoonbills *(Platalea leucorodia)* in front of the Prokletije Mts, Bojana-Buna Delta, 15th March 2010 / photo P. Sackl

Protection of migratory birds

Ursula Loos

They made it – arriving at dawn from Africa, the Purple Herons landing among reeds. We are standing on a dike inside the Ulcinj salina in Montenegro, watching birds: Night *(Nycticorax nycticorax)* and Squacco Herons *(Ardeola ralloides)*, Stone-curlews *(Burhinus oedicnemus)* and other waders; an Eleonora`s Falcon *(Falco eleonorae)* wheels over the landscape.

We are the participants of the first „Adriatic Flyway Conference", organized by Euronatur in the Bojana-Buna delta on the very boundary between Montenegro and Albania. Why are we meeting here? Euronatur is attempting to unite ornithologists and conservation managers, politicians and local tourist agencies from East and West. The non-profit foundation for the protection of nature intends to draw attention to the value of this landscape, which is essential for the survival of migrating birds, but additionally yields economic chances to Montenegro and Albania and especially to the local people. This is an extraordinary opportunity for nature tourism und bird watching – but only if everybody contributes to the protection of this region.

The mouth of the Bojana-Buna River is situated in the border area of Montenegro and Albania. It is providing miles and miles of Adriatic beaches and vast wetlands in the hinterland. Together with Lake Skadar-Shkoder – both under protection of the Ramsar Convention – it is predestined for Ecotourism. Since this area is an important stepstone for migrating birds, it is highly essential for their survival. The protection of migrating birds could well go hand in hand with the development of tourism.

The Ulcinj salina provides a good example for collaboration between local enterprise and a nature protection project. The old lagoon – once formed by the Bojana-Buna delta – has been exploited for salt production for decades. But only a small part of the lagoon is used for these purposes, as its by far largest part forms a huge shallow water reservoir for the salina serving as the first stepstone for migrating birds arriving from Africa across the Mediterranean to rest and feed here.

The salina will earn money by selling tickets and souvenirs, such as the flower of salt, while tourists will be able to exploit the excellent bird watching capacities: the dike serves as a walking path to the watching towers, while cycle paths that will surround the protected area are still in the phase of construction.

In short, these are the best conditions to be taken advantage of by the rapidly growing group of bird watchers! And the conditions are excellent for Ulcinj to extend its tourist season beyond the summer season, i.e. to use and sell the infrastructure like hotels or private apartments and restaurants in spring and autumn as well. Everyone will profit from this project! The salina will earn money by selling tickets and souvenirs, such as the flower of salt, while tourists will be able to exploit the excellent bird watching capacities: the dike serves as a walking path to the

watching towers, while cycle paths that will surround the protected area are still in the phase of construction. And thousands of Common Cranes *(Grus grus)*, European Honey Buzzards *(Pernis apivorus)* and other birds have all the possibilities to rest and feed here without being disturbed after crossing the Mediterranean Sea. The Montenegrin government has banned hunting along the entire coast, which is extremely important for the dune landscape from south of Ulcinj to the mouth of the Bojana-Buna River. Here, beautiful beaches stretch for miles on end – still completely intact till 2003. Since then, however, dunes and beaches have been subjected to great pressures by land developers. In several places, dunes are interrupted by streets leading to the beaches, where parking areas allow tourists a comfortable access to the sea. At the Wadden Sea in northern Germany, walking to the beach is an integral part of peoples' holidays – and this could be provided here in Montenegro as well. There is enough space for everybody: sun-seekers, sports lovers and birds. But most essential is a sensible tourist and nature management, as well as severe hunting control.

The aim of the conference is also to draw the scientists' and conservation managers' attention to the flyway neglected in the past.

At the moment, some 500 million birds are killed along the Mediterranean coast each year, partially owing to the fact that no steps have been taken to close the hunting season or to protect the resident and migrating bird species[1]. The reason is that hunting is a profitable business for municipalities as well as hunters and private people. Specifically, it is quite easy to earn extra 200 to 300 € per month solely by selling some ducks, Pygmy Cormorants or songbirds. The income from hunting permits could be easily replaced by higher tourist taxes, etc. Nature protection, on the other hand, can only be successful if economic development is provided for the local people and municipalities. So all approaches to bird or nature protection lead to the following question: How could nature be economically attractive to the population and the politicians at the same time? And also, how can the hunters "be taken on board"?

The aim of the conference is also to draw the scientists' and conservation managers' attention to the flyway neglected in the past. For a long time, the Balkan countries have been a blank area on the map in this very respect. Many migrating birds indeed choose the western route across Gibraltar and the eastern route across the Levant Basin, but there are species that prefer the shorter and more direct „Adriatic Flyway" across the Balkan states, the Adriatic Sea and Italy to reach their destinations in Africa. The littoral states of the Eastern Adriatic are faced with unique opportunity to set the course for ecotourism: they still have the chance to develop their coasts and hinterlands for tourism in a way that the locals, tourists and birds will profit together. It is also an opportunity to improve the international and intercultural collaboration in this region as well as to protect and preserve this beautiful area by joint efforts.

The conference succeeded in instilling the Adriatic Flyway and its potential for the region into the consciousness of organisations, politicians, scientists and businessmen – an urgent need to protect migrating birds. Martin Schneider-Jacoby from EuroNatur intended to join people as well as nature. He certainly succeeded in this – but achieved even more: he joined the people of the Balkan states via nature!

[1] http://www.euronatur.org/Vogeljagd-aktuell.930.0.html

Looking Forward to Saving the Adriatic Flyway

Martin Schneider-Jacoby and Borut Stumberger

The Adriatic Flyway that runs along the east coast of the Adriatic Sea is a very important corridor for birds migrating between the eastern half of Europe and North and sub-Saharan Africa. Unfortunately, birds face numerous problems along the Flyway. For this very reason, EuroNatur embarked on a project in 2006 to tackle bird migration issues in the region. As part of this project, the First Adriatic Flyway Conference was held in 2009 in Ulcinj, Montenegro. Although there are several obstacles yet to be overcome, the project fieldwork demonstrated the still outstanding value of the priority sites and wetlands in the region for nature conservation. Based on these results, and with the help of NGO's (including hunting NGO's) and governments in Albania, Bosnia and Herzegovina, Croatia and Montenegro, much progress has been made, and continues to be made. We are therefore hopeful that, with the continued help of all those who have an emotional or financial interest in the environment, the Adriatic Flyway can be protected for the benefit of birds and people in all the countries involved.

EuroNatur started the Adriatic Flyway Project as part of the Protection of Priority Wetlands Through Integrated Site and River Basin Management project. The goal of this joint WWF – EuroNatur project was to improve the protection of three selected priority sites, i.e. Livanjsko Polje, Neretva Delta with Hutovo Blato and Lake Skadar including the Bojana-Buna Delta in the Dinaric Arc Ecoregion, through improved site management and by mitigation and elimination of impacts originating from unsustainable river basin management. From 17-20 April 2009, for the first time in 20 years, the ornithologists and bird watchers from the region met again during the Adriatic Flyway Conference in Ulcinj, Montenegro, to evaluate progress and to establish priorities for the future. For the first time, Albania was also included and 112 people from 16 countries took part. Important international organisations represented were the Bonn Convention (CMS/AEWA), BirdLife International, Council of Europe, Wetlands International and WWF.

Sustainable hunting does not negatively affect bird populations, but illegal hunting proved to be a much bigger problem in the post-war and post-communist societies than we knew and expected when drafting the Adriatic Flyway project.

As presentations at the conference showed, the lack of information before the outset of the Adriatic Flyway Project was great. The Western Balkan and the Eastern Adriatic Coast were no longer visible in international assessments of migration flyways and bird conservation. Even the former well known priority areas of Lake Skadar and Neretva Delta had disappeared from the lists of important stop-over sites for migratory birds (e.g. Jourdain 2007). The analysis by Stroud et al. (2004) had shown that, along the Black Sea/Mediterranean Flyway, 55% of migratory wader populations with known or probable trends were declining. Even now the numbers of water birds counted in the region during the International Waterfowl Census (IWC) continue to decline (e.g. at the Ramsar Site Neretva Delta), or are going down again after an initial recovery (e.g. at Lake Skadar and in the Bojana-Buna Delta).

Young Dalmatian Pelican *(Pelecanus crispus)*, Ulcinj salinas, 23rd October 2009 / photo M. Tiefenbach

Problems encountered

Our regretful conclusion after four-year fieldwork is that, in spite of the various national laws, species and site protection in the region are often not effective for a variety of reasons. For instance:

• Sustainable hunting does not negatively affect bird populations, but illegal hunting proved to be a much bigger problem in the post-war and post-communist societies than we knew and expected when drafting the Adriatic Flyway project. Illegal actions against birds are often not dealt with at court (Montenegro) or not considered a crime at all (Albania). In Bosnia and Herzegovina and Croatia, too, crimes against birds take place openly but go unpunished. For example, in protected areas of the Neretva Delta and Hutovo Blato Nature Park birds have been shot in front of everybody's eyes, but no legal action has been undertaken.

• In Montenegro and Albania, illegal tourism development along the coast has significantly increased and is devastating even protected and core areas for (migratory) bird conservation. This is happening in the Bojana-Buna Delta (Albania-Montenegro), as well as in other coastal areas. In Croatia, kite surfing is chasing birds away from the last salt marshes and mud flats at the mouth of the Neretva.

• In Croatia, the planned restoration project ("Islands for colonial water birds"), jointly prepared by the Croatian Waters, Dubrovnik-Neretva county and NGOs and approved by the Nature Protection Institute, has not been accepted by the Ministry of Culture yet, which has to grant approval. The whole process of protection stands still in the Neretva Delta.

• The privatized Solana Ulcinj – the key shore bird breeding and staging site in Montenegro and along the whole coast - is on the brink of bankruptcy. Although its basic tourist infrastructure is in place and was successfully used, for example, during the Adriatic Flyway Conference, the firm is not able to earn money from tourism and bird watching like at other salinas. The new products of Solana Ulcinj are of excellent quality and need better marketing to be internationally successful, but the current owner is promoting golf and other projects that would have a negative effect on migratory birds.

Progress made

That being said, there are also many indicators that the first four years of the Adriatic Flyway Project have had a certain success and that we have a better basis today to improve the network of protected areas and staging sites along the Adriatic East Coast and its hinterland than before.

The basis to improve the network has been given a great boost by the results of the bird monitoring and habitat mapping that have taken place in the countries participating in the project. The monitoring and mapping demonstrated **the still outstanding value of the priority sites and wetlands in the region for nature conservation**. Based in part on this work, several important changes in national legislation for the protection of birds and habitats have been made. These changes have the potential to exert very positive long-term impacts if properly implemented.

Unsustainable hunting is the major threat to migrating birds in the Balkans, Velika plaža, 1st November 2008 / photo M. Schneider-Jacoby

Birdwatchers and hunters with a heart for the environment do have common interests, and voluntary changes in the hunting regulations have also been implemented, for example at Livanjsko Polje (Bosnia and Herzegovina). Achievements of the Adriatic Flyway project to date include:

- Clear definition of the conservation problems along the Adriatic East coast by labelling this part of the larger flyways as "Adriatic Flyway"; promotion of priority sites along the Adriatic Flyway as hot spots for bird conservation and bird tourism in Europe.
- Publication of an assessment of bird hunting in the Adriatic Flyway countries and distribution to e.g. all embassies of the countries assessed in Germany, all respective national ministries and the EU focal points for the four countries.
- Inclusion of a hunting ban for the coastal estate (morsko dobro) of Montenegro, including the Bojana-Buna River, in the new hunting law that came into force in the summer of 2008. The new law protects a huge important coastal wetland zone about 5,000 ha in size.
- A ban on spring hunting in Montenegro after 15 January, and a reduction in the list of huntable species including Garganey *(Anas querquedula)*, published in the hunting regulations drafted in spring 2009.
- Successful lobbying and field work to stop illegal hunting at Velika Plaža (Montenegro) in 2010.
- Proclamation of Livanjsko Polje (Bosnia and Herzegovina) as a Ramsar site.
- Protection of important parts of Livanjsko Polje through hunting ban by local hunting organizations.
- Input into conservation and management plans. The UNDP GEF project for Livanjsko Polje, for example, is based on waterbird monitoring and site description by the Adriatic Flyway Project. And at Lake Skadar the zonation concept has been included in the GTZ project in cooperation with the Ministries of the Environment of Albania and Montenegro, based on information from the project. Similarly, EuroNatur has proposed to upgrade the protection of Livanjsko Polje and Hutovo Blato Nature Park in Bosnia and Herzegovina.
- Promotion of nature tourism and bird watching as an alternative to (illegal) bird hunting (Schneider-Jacoby et al. 2009).

Publicity and public relations

The Adriatic Flyway was twice the topic of the editorial of Acrocephalus, the regional ornithological journal (Schneider-Jacoby 2008a, b). National journals in the region (Schneider-Jacoby 2009, 2010) also reported on the problems with bird conservation. Exhibitions, films, leaflets, articles and papers produced by the partners have helped to promote the priority sites and to inform the wider public about bird protection and hunting laws.

In Germany, the campaign "Tatort Adria" (English Title: "Bird Hunting in the Balkans - Crime Scene Adriatic Coast") was conducted from January 2009 until June 2010. Its main aim was to inform the general public about the problems in bird preservation along the Adriatic East Coast. The results of the MAVA project triggered press releases and filled two background papers and several articles. Even ZDF (German TV channel) reported, in their Green Belt film, on the illegal hunting in Montenegro and Albania.

Developing leave-no-trace tourism and research work are important pillars of nature-conservation work along the Adriatic Flyway / photo B. Stumberger

In 2010, the EuroNatur team participated in the international search for the potentially extinct Slender-billed Curlew *(Numenius tenuirostris)*, organized by AEWA, Wetlands International, RSBP and BirdLife. In Europe, the species was observed for the last time in 2005 at Solana Ulcinj on the Montenegrin side of the Bojana-Buna delta. In the March of 2010, 44,000 arriving migrants were counted in the Bojana-Buna Delta alone, but no Slender-billed Curlew. We hope to continue with these monitoring activities, as it is essential to stop bird crime at the staging sites in the East Adriatic region.

Hope for the future

All these achievements give hope for the future. The concern and hopes of all that took part at the First Adriatic Flyway Conference were expressed in the unanimously adopted Ulcinj Declaration, with particular attention paid to:

- the EU's Bird, Habitat and Water Framework Directives;
- ratification of the Convention on Migratory Species (Bonn Convention) and its African Eurasian Migratory Waterbird Agreement (AEWA) and the Migratory Raptors' MoU;
- the important role of migratory birds and their habitats in sustainable economic development, including eco-tourism;
- the need for sustainable rather than illegal hunting, through new legislation and strict enforcement of the existing legislation (the European hunting organizations FACE and CIC have been informed);
- the need to identify, officially recognise, protect, manage and restore wetlands in the region, especially those that are important to migratory birds;
- and the need for institutional, governmental and cross-boundary cooperation to achieve these aims, including financial assistance from other European countries.

In relation to that final point, we are happy to say that the Adriatic Flyway Project triggered the BirdLife project "Wings across the Balkans", which will give support to the development of bird protection societies in the region.
Cross-boundary cooperation started already during the Ulcinj conference, which included a conference excursion across Lake Skadar from Montenegro to Albania, with full cooperation from both governments, only the second excursion of this kind in more than forty years.
In relation to the hunting regulations, the successful lobbying and field work to stop illegal hunting at Velika Plaža in 2010 can be replicated at other sites. And relations with protected area management bodies can be developed further, e. g. at Lake Skadar National Park, Ramsar Site Buna/Velipoja, and Hutovo Blato Nature Park, in cooperation with the NGO partners.
There is more than enough work left to do, but the migratory bird conservation train along the Adriatic Flyway is definitely moving!

Cross-boundary cooperation started already during the Ulcinj conference, which included a conference excursion across Lake Skadar from Montenegro to Albania, with full cooperation from both governments, only the second excursion of this kind in more than forty years.

Groups of foreign guests regularly admire the natural beauties of Montenegro, Paratuk, Bojana-Buna Delta, 12th May 2008 / photo P. Parodi

We thank the partner organisations:

- Association for the Protection of Aquatic Wildlife of Albania – (APAWA, Albania)
- Centre for the Protection and Research of Birds (CZIP, Montenegro)
- Croatian Society for the Protection of Birds and Nature (HDZPP, Croatia)
- Ornithological Society «Naše ptice» (Our Birds, Bosnia and Herzegovina)

and many volunteers who kindly offered their support in these first four years: Alpin Dhora, Ana Vujović, Andrej Vizi, Bariša Ilić, Adrian Tomik, Dario Horvat, Brane Koren, Damijan Denac, Darko Saveljić, Davorka Kitonić, Dejan Bordjan, Dejan Kulijer, Denik Ulqini, Denis Vengust, Dominik Bombek, Dražen Kotrošan, Dritan Dhora, Ena Šimić, Ilhan Dervović, Iztok Škornik, Iztok Geister, Ivan Budinski, Jakob Smole, Katarina Denac, Luka Božič, Marko Propadalo, Martin Vernik, Matjaž Kerček, Matjaž Premzl, Mato Gotovac, Michael Tiefenbach, Mihailo Jovčević, Mirko Šarac, Nataša Šalaja, Nela Vrešović Dubak, Ondrej Vizi, Peter Knaus, Peter Sackl, Roland Leka, Snežana Jocić, Stjepan Matić, Tibor Mikuska, Tilen Basle, Tina Lončar, Tomaž Mihelič, Urša Koce, Ursula Loos, Vaso Radović, Vesna Trup, Walter Röwekamp, Željko Šalamun, Zoran Šeremet and all other supporters which we might have forgotten.

Many important international organizations were present at the Adriatic Flyway Conference. We are deeply indebted especially to Joost Brouwer, who facilitated the spontaneous preparation of the Ulcinj Declaration.

Without the support of the MAVA Foundation, it would have been impossible to organise this project in such a short time and with so many partners. Lufthansa has been supporting the EuroNatur migratory bird project for many years, and the Ludwig-Raue-Gedächtnis Foundations gave support to the „Tatort Adria" campaign in Germany. We also thank UNDP (Livanjsko Polje), SNV and GTZ (Lake Skadar) and WWF MedPo, especially Francesca Antonelli and her team for the excellent cooperation.

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Boat trip on Lake Skadar during the Adriatic Flyway Conference, 17th April 2009 / photo B. Stumberger

Acknowledgment of Appreciation for the Support Given to the Successful Conference

Editors

Damijan Denac, Martin Schneider-Jacoby, Borut Stumberger

The opening of the Adriatic Flyway Conference was a great event thanks to the great support demonstrated by numerous people and organisations. We are grateful to the Mayor of Ulcinj, Gzim Hajdinaga, who welcomed the guests and participants in his town and in the Cultural Centre Hall. About 250 people, including delegations from Podgorica and Shkodra, participated in the event, which was chaired by Prof. Dr. Hartmut Vogtmann, EuroNatur President. The German Ambassador, Peter Platte, and the Montenegrin Minister of Tourism, Predrag Nenezić, greeted the participants and guests on behalf of their countries. The Vice Minister of the Environment, Dr. Taulant Bino, represented the neighbouring country Albania, which shares the transboundary wetland complex of Lake Skadar – Shkoder and the Bojana-Buna Delta with Montenegro. The Office for Sustainable Development of Montenegro was represented by Ljubiša Perović, its Director.

The international nature and bird preservation organisations were represented by Dr. Tobias Salathé (Ramsar Convention), Bert Lenten (Bonn Convention CMS/AEWA), Hervé Lethiér (Council of Europe) and Fritz Hirt (BirdLife International). It was a good opportunity for the people from the region to get first hand information for future cooperation. As the event was also dedicated to the twentieth anniversary of the fall of the Iron Curtain, Dr. Uwe Riecken from the German Federal Agency for Nature Conservation (BfN) acquainted the audience with the European Green Belt Initiative.

The Ulcinj community supported the event not only by offering the hall of its Cultural Centre, but by presenting its folklore as well. The dancers were a highlight of the whole opening event and we would like to pay them special compliments. The film "The Ambassadors of Montenegro" presented to the participants the birds of the host country and the great landscape from the Adriatic Sea to the top of the mountains. The Albanian Artisans Association from Shkodra exhibited the regional handicraft in the entrance hall of the Centre for the Protection and Research of Birds.

We must underline that only the help of numerous partners made the organisation of the Adriatic Flyway Conference possible. We thank Jack Delf (Black Mountain, Montenegro) and Darko Saveljic (CZIP) and their teams. Without their help, we would not have been able to organise the event. Solana Ulcinj provided decoration for the stage with their new product line and opened the gates for the early morning excursion. Both bird excursions were extremely well accepted by the participants and the big bus was virtually filled each morning with over 40 interested people, the same as the evening sessions were filled with interesting film highlights. The German Ambassador has shown much interest in the topics of the conference and participated at all excursions. Solana Ulcinj and Velika Plaža proved to be ideal bird watching sites and it was worth getting up before the presentations started.

The spectacular crossing of Lake Skadar – Shkoder was only possible with the great support of the Ministry of Tourism and the Skadar Lake National Park in Montenegro. In Albania, the town of Shkodra was very supportive, as was Dritan Dhora from our partner organisation APWA (Association for the Protection of Aquatic Wildlife of Albania). The border on the lake remained closed for all kind of boats, and it was a special treat for the participants of the Adriatic Flyway Conference to travel from the national park to Shkodra to see the whole transboundary Ramsar site. The smooth travel was organised without any problems by the customs and border police officers from both countries and we were welcomed at the mooring site at the Bojana-Buna outflow. The town of Shkodra participated in the organisation of the closing ceremony at Rosafa Castle, which proved to be an ideal ambient for such an event.

Mr Platte, German Ambassador to Montenegro (sitting front left), in discussion with Mr Salathé, Ramsar Convention Senior Advisor for Europe (sitting front right) / photo M. Schneider-Jacoby

Opening Speech Adriatic Flyway Conference, Ulcinj, April 14th, 2009

Peter Platte - German Ambassador in Montenegro

Dear Minister Nenezić, Dear Deputy Minister Bino, Dear Mayor Hajdinaga, dear guests and friends of nature,

I would like to put my introductory speech under two headings: First a question with a direct answer: What connects Montenegro and Germany? The answer is: Both, Birds and the European Green Belt! My second heading is a remark: Sometimes History is cruel, sometimes it produces little wonders! Let me explain my choice: The so-called "Iron Curtain" has been dividing Europe for almost 40 years from the Barents Sea at the border between Russia, Norway, and Finland, all the way to the Black Sea between Bulgaria and Turkey, as well as to the Adriatic Sea at the border between Albania and Montenegro. It was a political, ideological and physical barrier. In Germany we had: metal fences, walls, barbed wire, guard towers, spring guns, land mines and watchdogs. All this created a death zone through Germany and divided from one day to the other artificially my country in the East and West, and separated families and friends for decades. What happened in Germany also happened to families living on both sides of Lake Skadar or the Bojana-Buna River: families were separated and relatives could not visit each other over many years. In this zone forbidden to people the only winner was nature. The natural heritage left from the Cold War are huge natural areas in Northern and Southeastern Europe and, inside today's unified Germany, a corridor of extensive use – a stripe of natural habitats from the north to the south of Europe. Twenty years ago, the Wall between East and West Germany was brought down, creating new chances for cooperation in Europe. From the beginning, NGOs and GOs in Germany were working to protect this former border stripe, naming it the "Green Belt". Today, the Green Belt is a lifeline through Germany of nearly 1,400 km. The area between the former road intended for military vehicles and the borderline of the Federal Republic of Germany (FRG) and German Democratic Republic (GDR) is mostly a natural stripe between 50 and 200 m wide. Today it is the borderline of four German Federal States in the West and four in the East, of which 85% have remained untouched by civilisation. The need to protect this unexpected gift or wonder, as I call it, was recognized by German politics and even became a parliamentary issue of the Social Democrats in 2004, as the coalition treaty between the CDU and the SPD in 2005 refer to the need to preserve this former death corridor. The institutions responsible for the protection of this 177 square kilometres long stripe through Germany is the Federal Agency for Nature Conservation (BfN) and the German Federal Ministry of Environment, Nature Conservation and Nuclear Safety.

To connect all states along the former Iron Curtain, Germany supported the European Green Belt Initiative and the vision to create the backbone of an ecological network that runs from the Barents to the Black Sea, spanning some of the most important habitats for biodiversity and almost all distinct biogeographical regions in Europe. The Green Belt will thus connect not only Montenegro and Germany, but also 23 states in total length of 12,500 km. The Regional Coordinator for Southeastern Europe is EuroNatur. This foundation has been engaged in nature conservation projects in Southeastern Europe since 1987, and is currently promoting

transboundary protected areas and regional cooperation in several countries along the European Green Belt. Montenegro, too, has given attention to this European Green Belt Initiative in its new national Spatial Plan. Important sites in this plan are already inscribed as protected areas, for example Lake Skadar, or are in the process of being inscribed as Prokletije. This is an excellent basis for the development and protection of the unique areas along the border. The Iron Curtain between Albania and the former Yugoslavia seems to have been guarded even more strictly that the border between the separated parts of Germany, though neither of these two countries belonged to NATO or the Warsaw Pact. Forming the border between Montenegro and Albania, a wide river, called Bojana in Montenegro and Buna in Albania, that flows from Lake Skadar to the Adriatic Sea separated these two countries hermetically. From 1947 until 1990, very few people were allowed to see their relatives on the other side of the border. Although the border was not fenced, a broad stripe was protected from any development and strictly controlled. Today, this part is another gift of history. I'm convinced we will hear more about it by our Montenegrin and Albanian Ministers and friends.

The protection of habitats here in Montenegro and Albania is therefore essential for the survival of the species, the same as migrating birds are essential for tourism as an additional attraction for the guests. In Germany, coastal areas have become very attractive tourist spots.

Montenegro and especially Ulcinj have been a favourite tourism destination for Germans. Birds, too, still migrate from Germany and Central Europe over the Adriatic Sea to Africa. Rare species, such as our ringed Wiedehopf, the Hoopoe, have been recorded in the Bojana-Buja Delta. The protection of habitats here in Montenegro and Albania is therefore essential for the survival of the species, the same as migrating birds are essential for tourism as an additional attraction for the guests. In Germany, coastal areas have become very attractive tourist spots. We have developed National Parks both at the Baltic and along the North Sea Coast to protect the unique sites not only for species but people as well. These places are today visited by guests throughout the year, as the beaches and coastline are great areas for hiking. Montenegro, too, offers unique areas along the coast for recreation and a great variety of natural and cultural sites. The European Green Belt Initiative and the migration of birds over the Adriatic Sea are no doubt excellent tools to promote these areas. The protection of the great natural values and habitats of the Bojana-Buna Delta is an important asset for the guests.

I know that all of us who have gathered here are dedicated to save this Montenegrin wild beauty for future generations as well! In this sense I wish us all a successful conference!

Adriatic Flyway conference opening speech

Predrag Nenezić - Minister of Tourism and Environment Protection, Montenegro

Ladies and gentlemen, your Excellency the Ambassador Platte, Mr. Bino, dear guests, representatives of international organisations and institutions,

At the beginning I would like to greet you all and I wish you a pleasant stay in Montenegro, in the city of Ulcinj. The richness and diversity of potentials for tourism development of high quality makes this city one of the most important centres for the future development of our country. At the same time, the area is regionally and globally recognised by its ecological and biological diversity. This confirms the fact that the Adriatic Flyway conference that begins today is a significant meeting of scientists and experts who will, by using their knowledge and experiences, help to create new approaches in conservation and preservation of natural heritage, especially populations of globally important and endangered bird species and their habitats – lakes, river basins and coastal areas. And this is fully in compliance with the constitution of Montenegro and its strict observance of the principles of sustainable development.

Protection of migratory bird species, their migration corridors and stopover sites are our prime duty.

The Government of Montenegro and the Ministry of Tourism and Environment Protection carry out, in collaboration with various national institutions, activities to adjust national legislation with the relevant EU standards and legislation. In this context I would like to point out activities in the context of progress within the framework of legislation and strategy in the nature conservation sector, like passing the law on nature conservation in 2008. This system law incorporates provisions of the two most important directives on the protection of wild species and their habitats. At the end of the last year, plan of the Biodiversity strategy with the action plan was prepared. The document defines the measures and activities that had to be implemented to reach the final aim – permanent protection and sustainable use of natural resources. As climate change and biodiversity loss have been recognised as the most important ecological changes, the activities carried out within the Nature conservation sector are the major priority in the reform of the environment protection policy.

Besides permanent activities in development of the national nature protection system, Montenegro accessed to the several significant international conventions, thus creating a platform for the regional and international cooperation. I would like to point out particularly the implementation of the UN convention on biodiversity, Bonn convention on the protection of migratory species and wild animals, Ramsar convention on the protection of wetlands, Bern convention on the protection of sites and species of European concern, and Barcelona convention on the protection of the Mediterranean Sea against pollution.

Within the framework of international cooperation, the Ministry of Tourism and Environment Protection is furthermore implementing numerous projects together with organisations such as:

Ulcinj Folklore Group performed a traditional dance at the Conference's opening ceremony, Ulcinj, 14th April 2009 / photo B. Stumberger

GEF, UNDP, UNEP, UNESCO, European Commission through IPA Programme, IUCN, World Bank, WWF and UN Commission for Sustainable Development. The aim of these projects is to enhance an efficient legislative and institutional framework, capacity building for the protected areas management, as well as experience exchange and best practice cases.

Ecologically sensitive ecosystems, globally threatened species and their habitats require special attention and joint effort by all of all relevant stakeholders. Protection of migratory bird species, their migration corridors and stopover sites are our prime duty. At the same time, these activities contribute to the improved cooperation between international organisations, the representatives of which are attending this meeting, and to the improved efforts by other subjects and the civil sector. I expect that the conference conclusions will serve as a basis for innovative approach in protection of migration routes in the Adriatic and the wider Mediterranean region. Through regional cooperation projects, it is possible to realize ideas and concepts of the scientific and professional public, which I personally see as the most important outcomes of the meeting.

As I already mentioned, our strategy is the sustainable development concept. Tourism development and positioning of Montenegro as the regional tourist leader is based on sustainable use of natural resources and diversification of tourist capacities. The Renewed Tourism Development Strategy, adopted at the end of last year, is recognising the needs of full implementation of the sustainability principle, assessment of the environment carrying capacities, and necessity to protect natural resources, especially protected areas in continental parts and in coastal areas. Only such an approach can bring true experience of the wild beauty in the ecological country of Montenegro.

And it makes sense to mention that bird-watching is an important nature-based tourism segment. Richness of bird fauna in several areas, such as Lake Skadar, the Bojana delta and Velika plaža that are situated along bird migratory routes, are our natural advantages. At the same time, permanent protection of attributes of the areas is our obligation while planning our tourist capacities development. For these very reasons we recognize the findings and convictions of internationally recognized experts, in order to be able to adjust our development plans and programmes to the EU standards in the field of sustainable use of nature resources.
At the end I would like to greet you once more and I wish you a successful work during the conference, hoping that you will find some time to visit the areas such as Lake Skadar, Lake Šasko, the Bojana delta to experience our country's unique nature, culture and tradition.

The Jablanica-Shebenik mountains at the border between Albania and Macedonia serve as an important ecological corridor for Wolf *(Canis lupus)*, Brown Bear *(Ursus arctos)* and Lynx *(Lynx lynx)* / photo U. Riecken

20 years of Green Belt - Borders separate. Nature unites!

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1 Introduction

In the area of the Iron Curtain, which formed an inhumane border between East and West throughout Europe, a belt of mostly valuable habitats has developed over the last decades. This Green Belt harbours many endangered species and ecosystems. Due to its integrity and linear character it connects many large natural landscapes and forms an important backbone of an ecological network.

Figure 1: Map of the European Green Belt

The route of the European Green Belt touches 23 countries and traverses most climate and vegetation zones in Europe (Fig. 1). In Fennoscandia (Norway, Finland and the Russian Federation), it crosses parts of the East Eurasian taiga and boreal forests with numerous rivers and lakes. Further on (Baltic States, Poland) it follows the shoreline of the Baltic Sea with many undisturbed costal ecosystems.
It continues inland through Central Europe (Germany, Czech Republic, Austria, Slovakia, Hungary, Slovenia, Italy and Croatia). In this section, cultural landscapes, rivers and mountains dominate. In the south, a branch of the Green Belt passes the Alps and reaches the Adriatic coast.
The Balkan Green Belt (Serbia, Montenegro, Macedonia, Romania, Bulgaria, Albania, Greece, Turkey) is an extremely heterogeneous, but mostly natural corridor. It is characterised by undisturbed river and lake ecosystems, traditional cultural landscapes and varied mountain ranges. It contains important habitats for Brown Bear *(Ursus arctos)*, Wolf *(Canis lupus)* and Lynx *(Lynx lynx)*. The Green Belt forms branches around Albania and ends at the shoreline of the Black Sea.

All together the European Green Belt is an important backbone of a European ecological network (Terry et al. 2005). It provides valuable habitats and connecting lines facilitating dispersal for numerous endangered animal and plant species. But it also offers a cross section through the different cultures and peoples of Europe, which have shaped the European landscapes over centuries (Lang et al. 2009).

2 Protecting the Green Belt

The conservation and development of the European Green Belt as a backbone of an ecological network is a big challenge. However, it should also enhance people's connection to their natural heritage and increase the opportunities for regional rural development that is beneficial to local communities and biodiversity as well. The Green Belt can work as a living symbol for a Europe growing together. Due to its diverse nature, quietness and remoteness, an increasing number of people are visiting this area for recreation and nature experience. Additionally, the Green Belt is a living historic monument, which reminds people of the former division of Germany and Europe.

In Germany, the first activities to protect and develop the Green Belt were undertaken as early as in 1989. Since then a lot of projects have been implemented, mainly supported by the German Federal Agency for Nature Conservation (BfN) in cooperation with different NGOs and the German Federal States (Frobel et al. 2009, Riecken & Ullrich 2010).

2.1 The European Green Belt Initiative

The European initiative sprang forth with a workshop organised by BfN in 2003 in Bonn. Guest of honour was Mikhail Gorbatshev, last president of the former Soviet Union. During this international conference in Bonn in July 2003, BfN proposed the joining and enlargement of the Green Belt initiatives to cover the entire route of the former Iron Curtain (Riecken & Ullrich 2009) and to establish an international working group.

The Green Belt can work as a living symbol for a Europe growing together.

The main outcome of the first meeting of the working group with representatives of national authorities (National Focal Points) and NGOs from countries adjoining the Green Belt in 2004 was the development and consultation of the Green Belt "Programme of Work" (PoW), which lists the main tasks and activities for the initiative in the coming years. The results of this conference in 2004 have been published by IUCN and BfN (Terry et al. 2006).

The Secretariat for the European Green Belt is hosted at the IUCN Regional Office for Europe. The Secretariat gathers and exchanges information with stakeholders active in the area and supports studies and pilot projects throughout the Green Belt. The secretary is assisted by three regional coordinators (Fennoscandia and the Baltic States, Central Europe, South Eastern Europe) and actually 18 national focal points representing state authorities, nature conservation agencies or NGOs.

The international working group involves many, initiates projects and tries to raise funding for Green Belt activities. Table 1 gives an overview on the structure of the initiative.

Table 1: Structure of the European Green Belt initiative

Function	Contact data	Logo
European Green Belt Secretariat	IUCN Programme Office for SEE, European Green Belt Secretariat, Dr. Ivana Ribara 91, 11070 Novi Beograd, Serbia Tel.: +381 11 / 2272-411 Mail: see@iucn.org Internet: www.iucn.org	
Regional coordinator for Fennoscandia	Association of Zapovedniks and National Parks of Northwest Russia c/o Baltic Fund for Nature (BFN), Universitetskaya emb. 7/9, 199034 St. Petersburg, Russia Mail: bfn@bfn.org.ru Internet: www.bfn.org.ru	
Regional coordinator for Central Europe	BUND-Friends of the Earth Germany, Project Office Green Belt, Bauernfeindstr. 23, 90471 Nürnberg, Germany Tel.: +49 911 / 81878-17 Mail: greenbelt@bund-naturschutz.de Internet: www.bund-naturschutz.de	
Regional coordinator for the Balkans	European Nature Heritage Fund (EURONATUR), Konstanzer Straße 22, 78315 Radolfzell, Germany Tel.: +49 7732 / 9272-0 Mail: info@euronatur.org Internet: www.euronatur.org	
23 Countries (actual : 18 National Focal Points)	National focal points (for details see newsletter on http://www.europeangreenbelt.org	

The Green Belt Secretariat regularly publishes a newsletter that is available in print and as electronic version. This newsletter provides an overview on activities and news as well as information on the Green Belt partners (Focal Points) in all countries.
The newsletter and further information can be procured from the IUCN Green Belt homepage[1].

2.2 Implementing the Green Belt Europe

A number of local projects try to bring the idea from "paper to practise". For example, the European Nature Heritage Fund (EuroNatur) has run a project on the protection of large carnivores along the Balkan Green Belt with financial support from BfN. The project aimed at securing the Jablanica-Shebenik mountain range as a trans-boundary protected area between Albania and Macedonia that is meant to serve as an ecological corridor for Wolf *(Canis lupus)*, Brown Bear *(Ursus arctos)* and Lynx *(Lynx lynx)* (Schwaderer et al. 2009). The protection of this area is very important, as it constitutes one of the last habitats of the Balkan Lynx subspecies.
A second focus was put on capacity building within the fields of wildlife ecology and management. Local experts were trained and are now able to support future work in these fields.

[1] http://www.europeangreenbelt.org

The project will be continued and extended to other regions along the Balkan Green Belt.

In addition to local and regional bi- and tri-national projects, large multinational projects are very important for the implementation of the goals and tasks of the European Green Belt Initiative. These offer the necessary settings to work in a network in a target-oriented and coordinated way, to make use of synergies and to accomplish bigger tasks by joining forces.

A very successful project of this kind was the EU-funded INTERREG III B-project 'Green Belt – protection and valorisation of the longest habitat system in Europe', which ran from 2006 to 2008. In this project, 19 partners from Germany, the Czech Republic, Austria, Slovakia, Hungary, Slovenia, Croatia and Bulgaria cooperated in the fields of nature conservation, sustainable development and environmental education. One product of this project is a web-page[2], which contains comprehensive information on various aspects of the Central European Green Belt, including many local projects and offers an overview of the results of this INTERREG-project. In the area of the Central European Green Belt, a follow-up INTERREG-project is in preparation, which hopefully will be funded.

The 'Baltic Green Belt' project commenced in 2009 within the framework of the INTERREG IV B-Baltic Sea Region Programme. This project can significantly contribute to developing the Green Belt in the Baltic Sea region along the coastline from Germany to Russia (Schmiedel et al. 2009)[3].

3 Outlook

The Green Belt project contributes significantly to the conservation of European natural heritage and will have positive effects on sustainable regional development based on nature tourism. Furthermore, the border areas form a living memorial that serves to keep the former division of Germany and Europe in peoples' minds as reminder.

During the last twenty years, the Green Belt Initiative has had much success both for nature as well as for the people in a Europe growing together. On the other hand, a number of economic changes have taken place that generate several threats for the landscapes and habitats of the Green Belt. Examples are infrastructure measures (roads, railroads, river constructions, etc.) and changes in agricultural land-use mainly caused by the EU common agricultural policy. The latter is responsible for both, intensification of land-use as well as abandonment of important cultural habitats with a high level of biodiversity.

Therefore, BfN and its partners in Germany and all over Europe have to continue to actively engage in the protection of ecosystems and landscapes along the Green Belt and its sustainable development. In cooperation with national and international partners, the main focus will be laid on habitat conservation, trans-boundary cooperation, knowledge sharing and public relations (Ullrich et al. 2009).

[2] www.greenbelteurope.eu
[3] www.balticgreenbelt.uni-kiel.de

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Local hunter at the Bojana-Buna Delta, pastures Gjo-Lulit, Albania, March 2008 / photo M. Schneider-Jacoby

Bird Hunting Along the Adriatic Flyway – an Assessment of Bird Hunting in Albania, Bosnia and Herzegovina, Croatia, Montenegro, Slovenia and Serbia

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Summary

According to our estimations, far more than 2 million birds are shot each year along the Adriatic Flyway. The assumed reasons for such state of affairs are intensive hunting activities by more than 200,000 hunters plus many poachers and guests, inadequate legal frameworks concerning bird hunting in most countries as well as insufficient control of the existing laws in the countries located along the Adriatic Flyway. The only exemption is Slovenia.

The main aim of the present assessment was to analyse the current legal frameworks as well as the actual situation concerning bird hunting in all countries located along the Adriatic Flyway, specifically Albania, Bosnia and Herzegovina[1], Montenegro, Serbia, Croatia and Slovenia in order to verify the above assumption and to gain a clear picture about the respective standards in each country.

The following table briefly summarizes the results of the assessment.

Table 1: Evaluation of Bird Hunting

Countries	Albania	Bosnia and Herzegovina		Montenegro	Serbia	Croatia	Slovenia
Entity		Fed[1]	RS[1]				
Control of hunting	1	1	1	1	2	3	4
Monitoring of birds shot	1	1	1	1	1	1	4
Duration of hunting season	1	1	1	1	1	2	3
Hunting during stages of reproduction	2	1	1	1	1	1	3
Hunting during the birds' return	1	1	1	1	1	2	5
Number of bird species open for hunting	1	1	1	2	2	2	4
Impact on endangered bird species	1	1	1	1	1	1	5
Illegal bird hunting	1	1	1	1	1	1	4
Hunting ban areas	2	2	2	3	2	3	3
Trend analysis	1	1	1	4	2	4	5
Trade in birds	1	1	1	1	3	4	5
	1,18	1,09	1,09	1,55	1,55	2,18	4,09

5	excellent
4	good
3	fair
2	insufficient
1	poor

[1] BiH is politically decentralized and comprises two governing entities, the Federation of Bosnia and Herzegovina (Fed) and Republika Srpska (RS). Both entities have different legal frameworks, also for hunting. In the following text, if not specified, both entities are referred to.

In the first step,

- Control of hunting
- Monitoring of birds shot
- Duration of hunting season
- Hunting during reproduction stages
- Hunting during the birds' return
- Birds open for hunting
- Impact of hunting on endangered species
- Illegal hunting
- Hunting ban areas
- Trend
- Trade in birds

were assessed in each country, rating the situation on a 1 to 5 scale with **1** being the lowest and **5** the highest rating. The results from these rankings were summed up and divided through the amount of criteria (11). This led to an overall ranking, showing that the only country along the Adriatic Flyway corridor, which has adopted good standards in bird hunting, is Slovenia (total rating 4), a country which implemented the EU Bird Directive in an exemplary manner and protects all migrating birds. In Slovenia, only six bird species are still open for hunting according to the recent hunting law.

Croatia has reached the second place in the rating, but was only given a 2 (insufficient), as there are still many deficits compared to the standards defined in the EU Birds Directive. Main deficits are, for example, that hunting is allowed during the breeding and return periods, which has very negative effects – both direct as well as indirect - on bird populations. In addition, there are huge problems with illegal bird hunting even in Croatian protected areas, e.g. in the Neretva Delta. This also lowered the total score considerably.

Montenegro and Serbia were also ranked as insufficient (2), while the other two countries assessed, Albania and Bosnia-Herzegovina, were even rated as poor (1).

Until now, only Slovenia has joined the EU out of the six countries assessed. This affects the respective legal framework concerning bird protection and hunting in the country, because Slovenia as a EU member is obliged to implement the EU Birds Directive (Council Directive 79/409/EEC of 2 April 1979)[2] which they do in an exemplary manner.
Consequently, Slovenia is a very positive example along the Adriatic Flyway, while the analysis revealed an alarming situation in the other countries assessed with Albania and Bosnia and Herzegovina being the countries with the weakest hunting laws and, in addition, the worst implementation and control of the existing laws. All countries but Slovenia have not implemented the minimal standards of bird preservation as agreed, for example, in the EU Bird Directive, and illegal hunting is widespread.

This suggests that

- with EU membership, the respective national legal framework for bird hunting as well as control of bird crime improves (example of Slovenia);
- the EU accession process leads to a step by step improvement of bird preservation and hunting (example of Croatia).

In five out of six countries assessed, the actual legislation is problematic concerning bird hunting. Long hunting seasons are impacting birds both during the breeding season and the period when they return to their rearing habitats.

The number of species open for hunting includes both protected species as well as many species that look similar to the threatened and endangered species, which in many cases – due to the lack of knowledge – leads to the killing of rare species that use the same habitats. For example, the fate of the Slender-billed Curlew *(Numenius tenuirostris)*, a species which is threatened by extinction worldwide, is most probably decided at the Adriatic Flyway.

In addition, there are no programmes for hunting ban areas in these countries in order to protect resting sites and important habitats of national and international importance. And - even worse - in several protected areas with great importance for birds, illegal hunting is widespread. Illegal bird hunting poses a huge problem and hunting organisations as entities

[2] http://europa.eu.int/comm/environment/nature/nature_conservation/focus_wild_birds/sustainable_hunting/pdf/hunting_guide_en.pdf

officially responsible for hunting, especially in Albania, Bosnia-Herzegovina, Croatia, Montenegro and Serbia, do not counteract this problem sufficiently. Often, illegal hunting is performed very blatantly, e.g. in the Neretva Delta in Croatia and Bosnia and Herzegovina, at Lake Skadar in Montenegro as well as along the whole Montenegrin and Albanian coasts. In some cases, it is even documented in publications, such as the promotional DVD about "Hunting of Geese and Ducks" (Golden Audio Video 2008) in Serbia, which is available even in Montenegrin supermarkets.
Illegal hunting activities are well known to the local hunters, but not stopped. In some cases, even hunting guards are involved in these activities, especially when foreign hunters are involved. In worst cases, the managers of protected areas even know about the problems, but are not able to react and solve them.

The trend during the last years is in many ways heterogeneous. On the one hand, there are some improvements in Croatia and Montenegro within the legal framework, but also very negative developments in Albania, e.g. with the decision taken in 2008 to prolong spring hunting in 2008. Also, the new hunting laws in both entities of Bosnia-Herzegovina[3] are worse than the former Yugoslav laws and difficult to read or understand.

On the other hand, Slovenia is a good example and demonstrates how the former Yugoslav hunting laws can be adapted to international standards. Also, the ban of hunting in the coastal area of Montenegro – 5,800 ha in size – since 2008 is a very positive trend. Other good examples for the establishment of important stop over sites are the National Park Lake Skadar at the Albanian-Montenegrin border, the Nature Parks Vransko Jezero and Lonjsko Polje in Croatia and the special reserve Slano Kopovo in Serbia, managed by the local hunters association.

1 Introduction and Range of the Assessment

The assessment is part of the project entitled "Protection of Priority Wetlands for Bird Migration (Adriatic Flyway) in the Dinaric Arc Ecoregion Through Integrated Site and River Basin Management"[4] jointly implemented by WWF MedPo and EuroNatur, financially supported by the MAVA Foundation.
While WWF is working at the basin level to preserve the priority wetlands identified within the project, specifically Livanjsko Polje (BiH), the Neretva Delta (HR) with Hutovo Blato (BiH) and Lake Skadar including the Bojana-Buna Delta (AL/MNE), from negative impacts, EuroNatur's activities within the project aim to analyse bird migration along the Adriatic East Coast and to improve the protection of the key stopover sites.

On the other hand, Slovenia is a good example and demonstrates how the former Yugoslav hunting laws can be adapted to international standards.

The present assessment "Bird Hunting along the Adriatic Flyway" provides basic information that will serve to draft recommendations for improvement of the three priority wetlands mentioned above.
The size of the total study area is 255,000 km^2 and covers the countries of former Yugoslavia – Bosnia and Herzegovina, Croatia, Montenegro, Slovenia and Serbia - plus Albania. In all these countries, EuroNatur has established long-term contacts and has cooperated with both GOs and NGOs in the implementation of conservation projects since 1987 (see www.euronatur.org). Macedonia - which was also part of the former Yugoslavia - was not included, as it is not situated inside the NE-SW migration corridor of the Adriatic Flyway (see below).

Despite the fact that Kosovo is located along the Adriatic Flyway, the country has not been included in this study due to the recent political and administrative changes. The existing data on hunting for Kosovo are often still summarized under Serbia

[3] Please refer to footnote 1.
[4] In the text, the project is referred to as "Adriatic Flyway Project"
[5] http://www.face-europe.org/

in international reviews[5]. According to our knowledge though, the most urgent actions with regard to bird conservation are to review the current Kosovo hunting legislation, to stop poaching and to include the protection of resting sites for birds as soon as possible in the Important Bird Area programme in Europe.
Besides Slovenia, no country has entered into the EU yet, thus it is very interesting to see how different countries of the former Yugoslavia and Albania have improved their hunting laws concerning bird hunting with regard to a future membership in the EU in general and the EU Birds Directive specifically. For example, Croatia has the status of an accession country and is well prepared to join the EU.

The Adriatic Flyway, however, is of great importance not only for water birds.

This assessment is also meant to provide a discussion platform among hunters and conservationists with the aim to improve the actual situation in the respective countries. It is also a first benchmark for the EU accession process - which is either currently ongoing (Croatia) or will eventually start in the other countries assessed - and its positive influence on nature conservation and hunting management.
Another objective of the study was to check whether international standards of the Bern, Ramsar or Bonn Conventions are implemented and if bird populations are suitably protected according to the above mentioned Conventions.

2 Importance of the Adriatic Flyway

For water birds, Wetlands International identified three important flyways for Europe: the East Atlantic, the Black Sea and Mediterranean as well as the West Asian-East African Flyways[6]. Only the Black Sea and Mediterranean Flyway crosses the Mediterranean Sea in NW–SE direction, while the other two corridors follow the coastal zones of West and East Africa, respectively. While those water birds flying along the East Atlantic and West Asian-East African Flyways mainly use the coastal wetlands and follow the coast-line of Africa on both sides, the Central and Eastern European water birds use the Black Sea and Mediterranean (Central European) Flyway. Then they cross the Mediterranean Sea after their flight over the European continent and winter in North Africa, e.g. in Tunisia or in the Central African Niger Basin. Along this flyway, resting sites throughout the journey over the European continent and the Mediterranean Sea are limited. Typical bird species using this flyway are the Common Crane *(Grus grus)* (compare the poster on www.UNEP-AEWA.com), Great White Egret *(Egretta alba)*, Garganey *(Anas querquedula)* or the Eurasian Spoonbill *(Platalea leucorodia)*, which cross the Balkan Peninsula and the Adriatic Sea. We call that specific section of the Black Sea and Mediterranean (or Central European) Flyway running over the Balkan Peninsula and the Adriatic Sea the "Adriatic Flyway" (Schneider-Jacoby 2008) to point out the specific importance and threats of this passage.

In comparison to the huge Eurasian breeding areas and the size of the wintering areas in Africa, the Adriatic Flyway is a real bottleneck section along the Central European Flyway with limited resting sites and many obstacles such as the Adriatic Sea and the Dinarid Mountains. While other areas along the Central European Flyway (e.g. Malta and the Strait of Messina) have been described as bottleneck areas already for a long time, bird migration over the Balkan Peninsula has been difficult to assess due to the lack of data and recent political changes, including war. For example, Yugoslavia collapsed during the preparation of the first edition of "Birds in Europe" (Grimmet & Jones 1989) and Albania was still a politically isolated country. Therefore, the situation in the region could not have been assessed thoroughly.
During the preparation of the second edition (Heath & Evans 2000), armed conflicts and minefields hindered bird monitoring in large parts of the former Yugoslavia.

[6] http://www.wingsoverwetlands.org/

Number of Waterfowl during the international census (IWC) in the six countries is not higher than one million water birds based on the national reports. Key resting sites are the lowlands of the Danube, Drava, Mura and Sava in the Pannonian Plain. During hard winters, though, the birds have to leave these riverine wintering sites. Then, the coastal areas of Dalmatia become important alternative wintering sites. Key resting sites are then the Neretva Delta, Vransko Jezero, the Bojana-Buna Delta, as well as the large wetland system of Lake Skadar and the lagoons and deltas in Albania and Montenegro. The number of birds wintering in the littoral of the sea is yet unknown (Mikuska in lit). Currently, EuroNatur explores the capacity of the Karst Poljes as stopover and resting sites during spring and autumn migration (Stumberger this publ.). First information gathered in Livanjsko Polje show a great potential as resting sites for different species of migrants (Schneider-Jacoby et al. 2006).

The Adriatic Flyway, however, is of great importance not only for water birds. Migratory raptors are typical guests along the whole Adriatic East Coast and need resting sites as well. For example, with eight globally threatened and near threatened migratory raptors, Croatia and Serbia & Montenegro (today two countries) reach the highest number of endangered migratory raptors, which has been found in the African-Eurasian assessment for all countries in a study of the Bonn Convention (Tucker & Goriup 2005). In addition, many species of the cultural landscape, such as Common Quail *(Coturnix coturnix)* and Wood Lark *(Lullula arborea)*, use the resting site along the Adriatic East Coast.

3 Background and Method

Within the framework of the Adriatic Flyway Project, questionnaires were distributed to all countries and answered by NGO partners. Based on the answers and the compiled information, this assessment was prepared and bird hunting in the countries was rated based on the EU Birds Directive and the status of birds in Europe[7]. **Rating** is made on a **1 to 5** scale with **1** being the lowest and **5** the highest **rating** (1 – Poor, 2 – Insufficient, 3 – Fair, 4 – Good, 5 – Excellent). Good solutions and practices rated with 5 are the best or most highly recommended.

In addition, the assessment considers the findings of 20 years of joint field work in the countries along the Adriatic Flyway, conducted by local NGOs, protected area managers and bird watchers in cooperation with EuroNatur. The data collected during the field work

Table 2: Country overview

	Total land area in km²	No. of registered hunters	Inhabitants (Mio)	Hunter/ Inhabitants (%)	People/ km²	Hunter/ km²	Killed birds/ year	Waterbirds in January
Slovenia	20,000	22,000	2.0	1.0	100	1.1	*50,834	50,000
Albania	29,000	17,000	3.6	0.6	124	0.6	?	100,000
Bosnia and Herzegovina	51,000	50,000	4.6	1.2	90	1.0	?	20,000
Croatia	57,000	55,000	4.5	1.4	79	1.0	?	200,000
Montenegro	14,000	4,500	0.7	0.6	50	0.3	?	200,000
Serbia	88,000	80,000	10.1	0.7	115	0.9	**?	300,000
Total	259,000	22,500	25.5	0.9	93	0.8	?	870,000

According to FACE, additional EuroNatur information indicated in green

* Hirschfeld & Heyd 2005
** 38.000 Quails only in Vojvodina
Simić &Tucakov 2005

[7] http://www.birdlife.org/action/science/species/birds_in_europe/index.html

Figure 1: Killed Common Shelduck *(Tadorna tadorna)* at Solana Ulcinj, Montenegro, April 2008. One of the last remaining breeding individuals along the entire Adriatic East Coast. / photo D. Saveljic

Figure 2: Hunting hide at Velika Plaza, March 2009 / photo B. Stumberger

served to prepare different reports, such as reports on hunting, and to assess the negative impacts on birds, as prepared for Croatia (EuroNatur 2003). In 2003 and 2004, a rapid field assessment to evaluate the ecological importance of the Bojana-Buna Delta (MNE/AL) was conducted by EuroNatur (Schneider-Jacoby et al. 2006). This assessment also included the monitoring of bird hunting in the area.

Since 2006, regular bird monitoring has been implemented in the Bojana-Buna Delta (ME/AL), Lake Skadar (ME), Neretva Delta (HR) and Livanjsko Polje (BiH), as well as in other important areas for birds in the region such as the old salinas "Solila" near Tivat in Montenegro (Sackl et al. 2006). This field work revealed intolerable conditions for the protection of birds in most countries along the Adriatic Flyway, as hunting of birds is common and not controlled in most cases.

In 2006, EuroNatur embarked on the previously mentioned Adriatic Flyway Project. One of the goals of this project is to minimize bird hunting pressure in the different project areas.
To be able to take effective measures, it is necessary to well understand the countries' specific situations and regulations concerning (bird) hunting to have a sound basis for the development and implementation of solution approaches.
For that purpose, a questionnaire was developed, based on other international programmes dealing with the reduction of excessive, indiscriminate and illegal hunting of (migratory) birds. The questionnaire contained questions related to

- the legal framework and its implementation
- the number of hunters and their organisational structures
- the hunting activities and practises
- the socio-economic importance of hunting
- possible alternatives to hunting, and
- possible best practise models.

The above questions were to be answered for the whole country. In addition, a second set of questions dealt with hunting in protected areas, the priority site identified within the Adriatic Flyway Project, respectively.

The questionnaire was filled in by NGO partners in the respective countries and evaluated by EuroNatur. For the evaluation, the situation in each country was rated in relation to the EU Birds Directive[8], taking into consideration also the status of birds in Europe[9].

4 Number of Hunters

According to FACE (Federation of Associations for Hunting and Conservation of the EU), there are 228,500 hunters registered in the range countries. Consequently, the density of hunters per square kilometre differs between 0.6 and 1.3 in different countries, with an

[8] http://europa.eu.int/comm/environment/nature/nature_conservation/focus_wild_birds/sustainable_hunting/pdf/hunting_guide_en.pdf
[9] http://www.birdlife.org/action/science/species/birds_in_europe/index.html

average of 0.9. As large parts of Albania, Croatia and Montenegro are mountainous areas and not densely populated, hunting in these countries is focused on the coastal areas and lowlands.

For example, in the Croatian Neretva Delta, according to Bukvic (in Schneider-Jacoby 2002), the density of hunters in the remaining wetland was 47 hunters/ km^2. This led to a huge pressure on the arriving and resting migrants. On Velika Plaza, a natural monument along the coast of Montenegro, 5 km^2 in size, up to 50 hunters were counted along the coast at the same time (Schneider-Jacoby 2007). Still, in 2008, 21 hunting hides were built along the 9 km long Velika Plaza beach. With some 2,000 local hunters in Albania and Montenegro and hunting tourism (mainly Italians), hunting has an important impact on the bird fauna of the Bojana-Buna Delta (375 km^2, Schneider-Jacoby et al. 2006).

According to FACE, about 1% of the population is registered in the countries as hunters. The hunters are organised in national hunting organisations, which are cooperating with European hunting associations such as CIC and FACE. CIC organises a special Coordination Forum for Central and South Eastern Europe, chaired by the Slovenia hunters association at the moment[10], which could be an important tool to fight illegal bird hunting and to improve the situation based on the Slovenian legal system in line with the EU Birds Directive.

5 Control of the Hunting

The assessment has shown that the enforcement of the existing hunting laws is lacking in all countries except Slovenia, from where only minor problems have been reported. Although the ministries in all countries employ hunting inspectors, their number is too small and the means to control hunting in the countries are not sufficient. For example, in Montenegro the hunting inspector announces his visit at the hunting ground and is guided during the inspection by the hunting organisation. The inspection in known in advance; a serious control of hunting activities is certainly not possible under these circumstances.

In general, the control of hunting is transferred from the state level to the hunting organisations themselves, which have to employ hunting guards. According to our own observation and the reports given in the questionnaires, this system is not effective, as often those people being in charge of the control are also involved in the hunting activities and especially in the hunting tourism they can financially benefit from. Film documents from Serbia and observations in Montenegro prove that illegal activities, such as hunting outside the hunting season and killing of protected species, are not stopped by the "guards".

6 Hunting Season

6.1 Duration of the hunting season

In all countries within the study area, the hunting season is extremely long. Even in Slovenia, bird hunting is open for seven month, leading to a disturbance in the countryside. In Bosnia and Herzegovina, Croatia and Serbia, some bird species are hunted throughout the year. Often, the hunting of migrating birds starts already during the breeding seasons in summer and ends as late as in the ensuing spring. The length of the hunting season is impacting the breeding bird populations in the countries and especially all kinds of ducks, which are consequently very rare along the Adriatic East Coast and coastal marshes, as shooting continues after January 15th. This applies for Ferruginous Duck *(Aythya nyroca)*, Garganey, but even Mallard *(Anas platyrhynchos)* and other species such as waders and birds of prey. In 2008, the Oystercatcher *(Haematopus ostralegus)* became extinct in this part of Europe. The Common Shelduck *(Tadorna tadorna)*, too, is on the brink of extinction, as only one or two pairs have been left in Solana Ulcinj in the Bojana-Buna Delta (MNE).

6.2 Hunting during the rearing season and the various stages of reproduction

Even in Slovenia, Magpie *(Pica pica)*, Eurasian Jay *(Garrulus glandarius)* and Hooded Crow *(Corvus corone cornix)* are hunted in August during the breeding season. As the EU Birds Directive forbids hunting during the various stages of reproduction,

[10] CIC Newsletter 2008/2 - http://www.cic-wildlife.org/index.php?id=37

this also has to apply for corvid species (Corvidae). In addition, many other bird species still rear their young in September and shooting should not be allowed during this month. This specifically applies to the wetlands in the whole region, which are home to the Ferruginous Duck (Schneider-Jacoby 2003), a late breeding species for which ducklings in September are normal. This and other species are impacted by the hunting activities in late summer, which are allowed in all countries assessed.

In the other countries along the Adriatic Flyway, hunting during the breeding season is even more stretched out, leading to huge impacts on all kinds of bird species. In Bosnia-Herzegovina, Croatia and Serbia, bird hunting starts on August 1st, followed by Albania and Montenegro on August 15th. One of the target species, the Common Quail, is still rearing its young during this time of the year. The impact of these hunting activities on bird communities in the cultural landscape is huge. Consequently, bird hunting should not be allowed in August and September, in order to secure breeding success of all species in the respective habitats.

In total, we estimate far over two million birds killed in the six countries each year at a minimum.

6.3 Hunting during the birds' return to the rearing grounds

On the Adriatic Coast, birds start to return early to their breeding grounds. Only Slovenia stops Mallard hunting on January 15th, the latest possible date not to endanger breeding birds returning to their breeding habitats. It would be much better, though, to stop hunting at the end of the year to avoid impacts on the returning populations and already formed pairs.

In all other countries, birds are also shot during their return to their breeding grounds in January and February. Even migrating birds such as Garganey, Common Snipe *(Gallinago gallinago)* or Woodcock *(Scolopax rusticola)* are open for hunting during the return period. It is most important that hunting during the return period is stopped in all countries and on all bird species. The worst examples in this context are Albania and Montenegro, where the hunting period was prolonged in 2008 in order to be able to shoot more Garganey until March 15th in 2008, because the number of killed birds had decreased in the years before. It is out of question that this species is decreasing in the countries north-east of Montenegro and Albania due to the huge hunting pressure during the return period (Schneider-Jacoby 2007). In addition, the killing of the returning ducks in Montenegro and Albania also led to extremely small breeding populations in those two countries. EuroNatur wrote letters to both responsible ministers in 2008 to stop shooting birds during their return to the rearing grounds. Neither of the countries have commented on the letters.

7 Number of Birds Hunted

For most countries, there is no information on how many birds are actually shot. Only for Slovenia, a figure of over 50,000 birds per year is reported by Hirschfeld & Heyd (2005). As in Slovenia bird hunting is not very popular and only six species are open for hunting, it is evident that the number must be much higher in the other countries. Recent information also indicates sinking bird bags in Slovenia due to the good hunting regulations[11], but information on shot corvids are missing in the statistics.

The hunters association of Vojvodina (Serbia) reported on 8th November 2004 that during the 2004 season 38,000 Common Quails were killed. It was also reported that the annual number of birds killed during the breeding period in Vojvodina was between 20,000 and 30,000 (Simić & Tucakov 2005). This amount does not only endanger migrating birds, but also the remaining breeding populations of 3,000 to 5,000 pairs of Common Quail in this province of Serbia, given that hunting starts already on August 1st. Using these figures and the huge hunting pressure in all countries, including all kinds of illegal measures, the

[12] www.traffic.org/species-reports/traffic_species_birds2.pdf
[11] http://www.stat.si/letopis/2007/17-07-EUR.pdf

Table 3: Number of bird species open for hunting per country

	Albania	Bosnia and Herzegovina	Montenegro	Serbia	Slovenia	Croatia
Bean Goose (*Anser fabalis*) [C]		x		x		x
Black Grouse (*Tetrao tetrix*) [B]		x	x			
Blackbird (*Turdus merula*) [B]	x					
Capercaillie (*Tetrao urogallus*) [B]		x	x			
Chukar Partridge (*Alectoris chukar*) [B]						x
Collared Dove (*Streptopelia decaocto*) [B]		x	x	x		
Common Coot (*Fulica atra*) [C]	x	x	x	x		x
Common Goldeneye (*Bucephala clangula*) [B]		x				
Common Pheasant (*Phasianus colchicus*) [C]		x	x	x		x
Common Pochard (*Aythya ferina*) [C]		x	x	x		x
Common Quail (*Coturnix coturnix*) [B]	x	x	x	x	x	x
Common Scoter (*Melanitta nigra*) [B]		x				
Common Raven (*Corvus corax*) [A]		x				
Common Shelduck (*Tadorna tadorna*) [A]		x				
Common Snipe (*Gallinago gallinago*) [C]	x	x	x	x		x
Common Starling (*Sturnus vulgaris*) [B]	x					
Common Teal (*Anas crecca*) [C]	x	x	x	x		x
Crested Lark (*Galerida cristata*) [A]	x					
Eurasian Jackdaw (*Corvus monedula*) [B]		x				x
Eurasian Jay (*Garrulus glandarius*) [B]		x	x		x	x
Eurasian Spoonbill (*Platalea leucorodia*) [A]		x				
Eurasian Wigeon (*Anas penelope*) [C]	x		x	x		
Fieldfare (*Turdus pilaris*) [B]	x					
Gadwall (*Anas strepera*) [C]	x	x	x			
Garganey (*Anas querquedula*) [C]	x			x		x
Glossy Ibis (*Plegadis falcinellus*) [A]		x				
Goosander (*Mergus merganser*) [B]		x				
Goshawk (*Accipiter gentilis*) [A]				x		
Grey Partridge (*Perdix perdix*) [C]		x		x	x	x
Greylag Goose (*Anser anser*) [C]		x	x			
Great Snipe (*Gallinago media*) [A]		x				
Grey Heron (*Ardea cinerea*) [A]		x		x		
Hazel Grouse (*Bonasa bonasia*) [B]		x	x			
Hooded Crow (*Corvus corone cornix*) [B]		X	x		x	x
Jack Snipe (*Lymnocryptes minimus*) [C]		x				
Long-tailed Duck (*Clangula hyemalis*) [B]		x				
Magpie (*Pica pica*) [B]		x	x		x	x
Mallard (*Anas platyrhynchos*) [C]	x	x	x	x	x	x
Marbled Duck (*Marmaronetta angustirostris*) [A]		x				
Mistle Trush (*Turdus viscivorus*) [B]	x					
Northern Shoveler (*Anas clypeata*) [C]	x	x				
Nutcracker (*Nucifraga caryocatactes*) [A]		x				
Pintail (*Anas acuta*) [C]	x	x				
Red-crested Pochard (*Netta rufina*) [B]		x				
Rock Partidge (*Alectoris graeca*) [C]	x	x	x	x		x
Rock Dove (*Columba livia*) [C]	x	x	x			x
Rook (*Corvus frugilegus*) [B]		x		x		x
Ruddy Shelduck (*Tadorna ferruginea*) [A]		x				
Sky Lark (*Alauda arvensis*) [B]	x					
Smew (*Mergus albellus*) [A]		x				
Stock Dove (*Columba oenas*) [B]		x				
Tufted Duck (*Aythya fuligula*) [C]		x	x	x		x
Turtle Dove (*Streptopelia turtur*) [B]	x	x	x	x		
Virginia Quail (*Colinus virginianus*) [A]						x
White-fronted Goose (*Anser albifrons*) [B]		x		x		x
Wood Pigeon (*Columba palumbus*) [C]		x	x	x		x
Woodcock (*Scolopax rusticola*) [C]	x	x	x	x		x
Number of species open for hunting	**20**	**47**	**23**	**21**	**6**	**23**

A: Indicated green: Species that are not allowed to be hunted in any EU member state, as they are not mentioned in Appendix II of the EU Birds Directive.

B: Species that are mentioned in Appendix II/2 of the EU Birds Directive. Member states have to apply for a special permission to hunt these species in their country.

C: Species that are mentioned in Appendix II/1 of the EU Birds Directive and are open for hunting in all EU member states, given that this does not jeopardize conservation efforts in their distribution area.

annual kill of Common Quails only can be estimated to be much higher than 100,000 individuals in all six countries assessed.

At least 58 species can be seasonally hunted in one Flyway country, despite the fact that some of them are protected according to the EU Birds Directive Appendix I, as they are in need of special conservation measures or not listed in Appendix II as hunting species at all.

In total, we estimate far over two million birds killed in the six countries each year at a minimum. This figure is based on following criteria:

- The number of Common Quail shot in Vojvodina (see above) indicates very active bird hunting activities. This is also evident from the field work, where in a single hour more than 10 shots per hunter are often registered.
- In countries where bird hunting is popular, the average of killed birds per hunter varies, for example 11 birds in Spain, 23 in Italy, 37 in Greece, 26 in France and 59 in Belgium. We assume that the average number of birds killed by one hunter in the countries along the Adriatic Flyway is at least 10 per hunter.
- The number of unregistered hunters in the region is unknown. Only for Albania, about 50,000 unregistered guns are estimated.
- Illegal trade in wild birds indicates transports of thousands of birds to Italy. Two hunting firms alone smuggled two million birds over six years from Serbia to Italy (see below)[12]

Therefore, our estimate of two million birds killed by 206,500 hunters along the Adriatic Flyway (without Slovenia) is a very conservative one.

8 Number of Birds Species Open to Hunting

A large number of bird species is open for hunting in the Adriatic Flyway countries. At least 58 species can be seasonally hunted in one Flyway country, despite the fact that some of them are protected according to the EU Birds Directive Appendix I, as they are in need of special conservation measures or not listed in Appendix II as hunting species at all. Many of the species open for hunting along the Adriatic Flyway suffer under a very unfavourable conservation status especially in the countries where bird hunting is widespread.
There are, however, huge differences in the number and quality of the hunting laws. In Slovenia, for example, all migrating birds are protected and only six species are listed under the hunting law. In this case, we have a very positive example of a sound implementation of the international standards and a good adaptation of the old Yugoslav hunting law.

The opposite applies for Bosnia and Herzegovina. Here, 120 bird species are listed as hunting animals ("divljac") in the hunting law of the Federation, and even 157 species in the law of the Republika Srpska. This is against all international standards, as many of these species are protected by international conventions. It is also not clear why these species are listed under the Hunting Law, as there are no programmes for the protection or monitoring organised by the hunters for these species.

If we delete those bird species from the list that are listed in a special paragraph in both laws as permanently protected, we still end up with 38 seasonally hunted species of birds in the Federation and 43 in the Republika Srpska. This list includes rare birds such as Glossy Ibis *(Plegadis falcinellus)*, Eurasian Spoonbill, Goosander *(Mergus merganser)* and Smew *(Mergus albellus)*. In the Republika Srpska (BiH), all rails (Rallidae) including the Common Coot *(Fulica atra)* are protected by the Hunting Law. Nevertheless, the Hunting Associations have opened a hunting season on Common Coot. This proves that the Hunting Act is not understood and/or respected by the hunters themselves.

Figure 3: Killed Garganeys *(Anas querquedula)* and Grey Heron *(Ardea cinerea)* in a hunting hide at Buljarica, Montenegro, March 2009 / photo M. Schneider-Jacoby

For several other hunting species, such as corvids, no hunting season is defined in the "hunting calendar" of the Republika Srpska. We assume that this means that they can be hunted throughout the year. Even more unclear are the hunting seasons in the Federation, the other entity of Bosnia-Herzegovina.

In Albania, song birds such as Sky Lark *(Alauda arvensis)*, Blackbird *(Turdus merula)* and Fieldfare *(Turdus pilaris)* are open for hunting, and even in Europe widely protected Crested Lark *(Galerida cristata)* has a hunting season. This leads to a huge impact on the passerine species, as most hunters cannot distinguish between the different species of small songbirds.

9 Impacts of Hunting on Endangered Species

9.1 Waders

Hunting of waders is not generally forbidden, which is causing huge problems for bird preservation. In all countries of the study area beside Slovenia, species of waders are still shot. This leads to impacts in the remaining wetlands especially along the coast. While hunting of Woodcock in forest areas far away from wetlands might have little impact on other wader species, the hunting season for Common Snipe is a real problem as this species rests in the very same areas as used by many other waders during migration. As species such as the Slender-billed Curlew are near to extinction worldwide, hunting on all waders should be immediately forbidden in all countries along the Adriatic Flyway (Cleeves et al. 2008). Killing of Common Snipe, a species which is endangered in Germany and decreasing in Europe, is also not in line with the international responsibility of the hunters.

9.2 Ducks

Duck hunting also causes problems, as several duck species are rare or decreasing in Europe. A huge problem is hunting of Common Pochard and Tufted Duck in August and September, but also during the return period until the end of February, as the endangered Ferruginous Duck lives in some habitats of these species and is in some areas even more common than those two similar looking duck species open for hunting (Schneider-Jacoby 2003). The hunting period has to be limited to the times when Ferruginous Ducks are wintering in Africa in order to avoid impact on this rare species, whose survival depends very much on habitats in Croatia, Bosnia-Herzegovina, Montenegro and Serbia. In Albania, the last few pairs breed in the Bojana-Buna Delta and are impacted by illegal hunting activities as well as the prolongation of the hunting season. Duck hunting in the region of the Adriatic Flyway should, in general, not be allowed from January to October. Many of the species are extremely rare along the coast and their populations are depleted or even extinct.

9.3 Grouse and Partridges

Several Grouse and Partridge species are still open for hunting throughout the region, although they are very rare and there are no good data sets available on their population size and trends. It would be highly important to protect the Capercaillie, Hazel Grouse, Black Grouse and Rock Partridge as rare species. Even Grey Partridge, which is a common species in other parts of Europe, is rare in many areas along the Adriatic East Coast.

9.4 Birds of Prey

All species of birds of prey are protected in all countries with only one exception. The Goshawk is

open for hunting in Serbia from August 1st to January 31st. It is extremely important that all birds of prey species are protected to avoid any killing of rare species by chance. The Adriatic Flyway is among the most important corridors for endangered birds of prey worldwide (see above). The killing and disturbance of prey species is also impacting the populations of these birds. In hunting ban areas, as on the island of Tilos, the density of Bonelli's Eagle *(Hieraaetus fasciatus)* is much higher (Rigas and Xenogianni 2007) than for example in the Bojana-Buna Delta due to the fact that neither the species itself nor its prey (mainly Chukar Partridge) are shot.

9.5 Song birds and Common Quail hunting

The shooting of song birds and Common Quail should be stopped in all countries along the Adriatic Flyway. Common Quail hunting is not sustainable as populations are already depleted and continuously decreasing. The impact of hunting in cultural landscapes and the remaining open resting sites along the coast is huge and the number of other birds killed unknown. Several other species, which are similar to the Common Quail, as for example Corn Crake *(Crex crex)*, different Larks or Pipits, are likely to be killed during hunting. In the area of Velika Plaza (MNE), even the Andalusian Hemipode *(Turnis sylvatica)*, a bird extremely rare in Europe (Schneider-Jacoby et al. 2006), is shot as it resembles Common Quail[13].

10 Hunting Ground Definition

The definition of areas, which can be declared as hunting grounds, is important for bird preservation. A comparison of the different laws and definitions in the countries along the Adriatic Flyway show possible solutions that can be used to improve the situation in other countries as well. For example, in Albania, Croatia, Bosnia and Herzegovina and Montenegro, the sea is not considered a hunting ground, which forms an important basis for the protection of migrating birds. It is important that this fact is communicated widely, as we have observed hunting activities at and on the sea several times.

A very important step concerning the protection of migrating birds has also been made in the new hunting law of Montenegro in 2008, when the coastal zone (morsko dobro) has been declared a non-hunting ground. In total, the area covers 58 km^2 and forms a new refuge area for migrating birds[14]. The area is of great importance for all kinds of birds during migration and during cold snaps in winter (compare Schneider-Jacoby et al. 2006). The other coastal areas in Croatia and Albania should be declared non-hunting grounds according to the Montenegrin example as soon as possible as well.

According to the law in Croatia, fish ponds cannot be included in hunting grounds. This is a very important definition not only for birds' preservation but also for food safety as lead shots are commonly used throughout the region. It is very important to supervise this regulation in the hunting law in Croatia and to apply it to the other countries as well. Fish farms in Serbia and Bosnia and Herzegovina are very important bird habitats and should therefore not be declared as hunting territories.

Traffic corridors are also declared as zones free of hunting in different hunting laws as hunting activities would endanger passengers. While in Croatia the law is implemented for all traffic corridors as stated in the law, this does not apply to Serbia. For example, rivers such as the Sava are traffic corridors and therefore not considered hunting grounds in Croatia, while thousands of geese and ducks are killed on the Danube in Serbia - an important international traffic corridor. Based on the hunting law of Serbia, however, hunting is forbidden on all larger rivers that are used for navigation.

11 Hunting Ban Areas

None of the countries has a programme to establish secure areas for migrating birds, taking into consideration international standards. This is a huge deficit especially as the region is of great importance for many migrating species. A good example for such a programme is the protection of the bird areas

[13] http://ec.europa.eu/environment/nature/conservation/wildbirds/threatened/t/turnix_sylvatica_en.htm
[14] www.gom.cg.yu/files/1107778025.pdf

of national (18) and international (10) importance in Switzerland according to the 1991 decree for the protection of migrating and water birds[15].

Nevertheless, there are examples that prove the importance of such preservation measures. At Lake Skadar, the number of water fowl rose again since the hunting ban was imposed in 2002 – despite the fact that poaching is still widespread. In Croatia, the fish farm Crna Mlaka and Nature Parks Vransko Jezero, Kopacki Rit and Lonjsko Polje are becoming increasingly important resting sites for migrating birds, based on the step by step implementation of hunting bans on these sites. Another excellent example is the special reserve Slano Kopovo in Serbia, Vojvodina Province, where the number of resting Common Cranes rose from 500 (Grimmet & Jones 1989) to 15,000 – 20,000 (Heath & Evans 2000) due to the establishment of a nearly 10 square kilometres large hunting ban area and its excellent management by the local hunter organisation.

12 Illegal Hunting

12.1 Killing of protected species

Hardly any bird species is safe along the Adriatic Flyway. In recent years, reports on illegal hunting activities include a long list of protected species (e.g. EuroNatur 2002, Stumberger et al. 2009). We know about two Hoopoes *(Upupa epops)* ringed in Germany and shot in Albania: a big loss for the small population in Germany and a potential explanation for the strong decrease of the Hoopoe population in Germany. Greater Flamingos and Common Cranes have been reported to be killed in Montenegro (Saveljic et al. 2004). The last remaining breeding pairs of Oystercatcher along the whole Adriatic East Coast in the Bojana-Buna Delta were shot on the beach in June 2004. According to our research, this species became finally extinct along the whole Adriatic East Coast in 2007. The next species likely to become extinct will be the Common Shellduck, as killed specimens have also been found during the last few years. Like many other ducks, which used to breed along the coast, this species is vanishing, too.

Even Eurasian Spoonbills, Little Egrets *(Egretta garzetta)* and Little Bitterns *(Ixobrychus minutus)* are not safe from hunters, as injured and killed species have been discovered by the EuroNatur team. Shot Pygmy Cormorants *(Phalacrocorax pygmeus)* and Night Herons *(Nycticorax nycticorax)* have been found at the fish market in Shkodra. A group of Slovenian and Austrian bird watchers found shot, Grey Herons and a Night Heron in the Neretva Delta (Stumberger 2001). During the visit in April 2001, the same group mentioned above did not manage to register even a single individual of the Common Coot, a bird living on open water and open for hunting, but four other species of rails, which normally hide in the reed beds. The promotion DVD for duck and geese hunting on the Danube (Golden Audio Video 2008) is an incredible proof that Italian hunters do not care which species they kill. The film documents how the protected Common Goldeneye and Smew are shot by hunters in one of their most important wintering areas in Europe, the Ramsar Site Labudova Okna, and the killed protected animals are even proudly presented to the viewers. Worse still, the facilities are owned by Vojvodinašume, a state-owned organisation in Vojvodina, which is the manager not only of the Ramsar Site and the protected area, but also of the hunting area. This means that hunting is organised by the very same people who are responsible for the protection, but do not care about any law in order to financially benefit from the Italian hunters.

The shooting of song birds and Common Quail should be stopped in all countries along the Adriatic Flyway.

In winter, when cold snaps force the birds from Central Europe to warmer retreats at the Adriatic coast, hunters in the Neretva Delta then attract these birds arriving during the night to their hides and artificial

[15] www.wild.uzh.ch/winfo/winfo_pdf/winfo035.pdf

Figure 4: Common Redshank *(Tringa totanus)* and Grey Heron *(Ardea cinerea)*, both wounded in Solana Ulcinj, Bojana-Buna Delta, Montenegro, March 2004 / photo D. Saveljic

lakes to kill them in the dark (see below). Little *(Tetrax tetrax)* and Great Bustards *(Otis tarda)* have recently been reported shot in the Bojana-Buna Delta (Dhora & Kraja 2006, Schneider-Jacoby et al. 2006).

The promotion DVD for duck and geese hunting on the Danube (Golden Audio Video 2008) is an incredible proof that Italian hunters do not care which species they kill.

Furthermore, the EuroNatur team found shot birds of many species, like Pygmy Cormorant, Grey Heron *(Ardea cinerea)*, Common Buzzard *(Buteo buteo)*, Common Redshank *(Tringa totanus)*, Oystercatcher and Black-headed Gull *(Larus ridibundus)* during the preparation of the Rapid Assessment of the ecological values of the Delta (Schneider-Jacoby et al. 2006).
As hunters are found everywhere along the coast and their activities are not controlled at all, we are afraid that the impact on protected species is even much greater than reflected by the few reports.

12.2 Use of illegal techniques

Illegal hunting techniques, which are against the respective hunting laws in the countries, are used openly and with exception of a few bird watchers nobody cares about it. An exception is Slovenia, with some parts of Croatia and Vojvodina (Serbia). In Montenegro, the National Park Skadar Lake works hard to implement the hunting ban at the lake, but the number of hunters entering the park makes it difficult to control them without strong police forces. In addition, some of the hunters seem to be pretty sure that nobody will stop them. The same applies for Solana Ulcinj in Montenegro, where hunters regularly enter the private estate and only some of them have been caught in recent years. In the reports collected, all kinds of activities (see below), which are easily perceived, are described, but the hunters, the responsible organisations or the police do not stop them. In many cases, the activities are known to local people and, as we heard from different representatives, even to hunting associations.

Hunters use boats with strong outboard motors – speedboats - to kill and chase water fowl on different water bodies. This is not allowed. It would be easy in each case to identify the boats and the persons aboard. We have observed this extremely disturbing hunting practice in National Park Skadar Lake (MNE), at Lake Ormoz Lake on the Croatian-Slovenian border, in Nature Park Hutovo Blato (BiH), and on water reservoir Busko Blato, part of the new Ramsar Site Livanjsko Polje (BiH). Besides the actual killing, it is the disturbance of the whole wetland that strongly impacts the birds. In addition, the flocks have to leave the protected areas and are driven towards other areas, where hunters are waiting for them.

Figure 5: Speedboats used openly for duck hunting in the hunting ban area of Lake Skadar National Park. These hunters were shooting at Ferruginous Ducks *(Aythya nyroca)*. Montenegro, October 2008 / photo P. Knaus

The use of decoys or lures for different kind of birds is widespread, although forbidden by law. The artificial birds are placed in front of the hunters' hides to attract the respective bird species. At Velika Plaza, a Natural Monument in the Bojana-Buna Delta, several artificial models of large waders as Curlews and Godwits are used by Italian hunters to attract the arriving waders during their return from Africa in March (Schneider-Jacoby 2007). Very likely, specimen of the Slender-billed Curlew are also killed, as the site is one of the key stopover sites in the centre of the migration route of this species (Cleeves et al. 2008). The most recent observation of this worldwide endangered species is from Solana Ulcinj, which proves this assumption. The use of different duck lures is common in all countries except Slovenia. In the Neretva Delta, a huge number of illegal pools have recently been constructed in the protected water estate of the Ramsar Site. Here, hunters leave the plastic birds even during the day, without any fear to be punished. A hunting enterprise in Croatia even presents hunters with decoys on the internet[16]. In the promotion film for duck and geese hunting on the Danube, decoys are again used openly (Golden Audio Video 2008). Different artificial song bird lures were used, e.g. in October 2008 at Velika Plaza (MNE).

The use of tapes to attract all kinds of birds is very common, although forbidden. Alarming is the use of curlew calls and those of other waders as observed in March 2007 and 2008 at the coast to attract arriving birds flying over the sea at Velika Plaza. As even a dead Dunlin *(Calidris alpina)* was found in a hunting hide at Velika Plaza (Schneider-Jacoby 2007), we have to fear that all species of waders arriving at the Adriatic East Coast are killed without any exception. In September 2008, the coastal lowlands of Montenegro were controlled during the night (Schneider-Jacoby 2008). The few remaining open areas (dunes, meadows or fellow land), which have not yet been destroyed by legal or illegal buildings, are bottleneck areas for the Common Quail migrating in southwest direction. In the early morning hours, birds stop migration at the coast to rest in a suitable habitat. Tapes with Common Quail calls were located in all open areas near the coast and hunters killed the birds attracted by the loudspeaker by prowling through the vegetation in the early morning. In most cases, several hunters and even Italian guests were shooting several times per minute during the hunt. It is very obvious that the whole coastal area is regularly depleted in this way, and we have similar reports from the Albanian and Croatian coasts as well as from the hinterland.

In autumn and winter, calls of the Common Coot and ducks are used along the coast to attract the birds heading southwest (e.g. Schneider-Jacoby, 2008).

[16] http://www.setter.hr/hunt.php

Figure 6: Curlew decoy and loudspeaker used illegally at Velika Plaza, Montenegro, March 2007. The use endangers the last remaining Slender-Billed Curlews *(Numenius tenuirostris)* during their spring migration. / photo EuroNatur archive

12.3 Impact on protected areas

During the World Bank mission to Hutovo Blato Nature Park (BiH), Sunday, January 29th, 2006, at least 20 hunters using boats were shooting inside the park on Svitava Lake (Schneider-Jacoby in lit.). There was no reaction by the park director, not even the registration numbers of the cars with which the hunters had entered the area were written down, although hunting is forbidden. Numerous illegal hunting activities have been reported in this protected area (Stumberger et al. 2008). In the Neretva Delta Ramsar Site (HR), hunters built illegal small ponds in the reed beds to be used for hunting. The facilities can be seen from anywhere or, even better, using Google Earth. Although these illegal hunting activities are implemented blatantly, nobody in Croatia is able to stop them.

There are many other examples from protected areas impacted by hunting, e.g. Lake Skadar National Park (MNE), the protected Buna River area (AL), and the protected Danube areas (SR).

There are very few examples of best practice where managers of the protected areas actually work on the implementation of the protection of sites. The situation improved considerably, for example in Lake Skadar National Park, although poaching is still practised. Here, the bird populations slowly recovered from a long period of hunting, but boats without registration still impact flocks of Ferruginous Ducks and hunters enter the area from the villages without any control. Further improvements in all protected areas can only be achieved if hunting is no longer accepted by the public and if all state organisations actively support the implementation of the hunting ban.

13 Trend

The trend in bird hunting and the impacts deriving thereof in the countries can be assessed by (a) the legal framework development and (b) the observed impact on the birds in the hunting grounds and protected areas.

For Albania, the trend is negative. Already before 2008, the impact on the stopover sites was huge and disturbance by hunting is present all over the country, especially along the coast. In 2008, the Ministry of the Environment prolonged the hunting season in spring for Garganey until March 15th, following the bad example of Montenegro[17]. It is an extreme example for a negative trend, especially as it concerns spring hunting as well as a species that is decreasing all over Europe and is endangered in many countries such as Germany.

[17] EuroNatur letter to the Minister of Environment, Forests and Water Administration, Mr. Lufter Xhuveli, 14th March 2008

Figure 7: Equipment to attract Common Quail *(Coturnix coturnix)* during the night at Tivat Solila, Montenegro, September 2008 / photo M. Schneider-Jacoby

Figure 8: Pile of leftover shells in the hunting ban area of Hutovo Blato Nature Park, Bosnia and Herzegovina, February 2009 / photo B. Stumberger

Montenegro has improved its hunting legislation considerably in 2008. EuroNatur and the Center for the Protection and Research of Birds (CZIP) have pointed out the huge hunting impact along the coast, the killing of rare species in the country and the illegal hunting activities in their several studies and documents. The new hunting law from 2008 has defined those bird species that are open for hunting according to international standards, and has deleted several species from the list. The hunting season was shortened by two weeks as Garganey, which used to be hunted until March 15th, is now no longer a species open for hunting. The whole coastal zone was declared a hunting ban area, because it is not a hunting ground any more. This is a good example the other Adriatic Flyway countries should follow.

In Croatia, the former legislation was improved in the last few years, since EuroNatur had compiled the report on illegal hunting activities in the country (EuroNatur 2003). For example, the hunting season has been shortened from August 15th to September 15th for some species as duck hunting had impacted the breeding season of Ferruginous Duck (Schneider-Jacoby 2003).

Extremely negative is the development in Bosnia and Herzegovina, where the new legislation is not in line with the European policy at all and even worse than before in Yugoslavia. This applies to both entities.

14 Trade

Although hunting and eating of songs birds is not common in the region, trade is a huge problem as it is triggered by the export to Italy[18]. In March 2007, a hunter in Montenegro even told reporters at Velika Plaza that he was selling birds to the USA. Italian hunters are active throughout the region and take the birds home to Italy, which according to the strict EU regulations after the outbreak of birdflu is not possible anymore at all.
The intensity of illegal trade in birds is not known, but in several cases transports were stopped and proved a professionally organised bird crime. In Slovenia and Croatia, customs and the environmental inspection fight illegal trade and cases are brought to the public. In Croatia, posters with protected species, such as the Ferruginous Duck, were even published to inform the border control. In Serbia, cases where illegal traders were caught were also published. From Albania, Bosnia-Herzegovina and Montenegro, no reports concerning bird trade have been published and it is evident that control in these countries is lagging well behind.

15 Hunting and Tourism

No information on the economy of bird hunting tourism could have been obtained in the countries. Fees paid by the foreign hunters per day are small, e.g.

[18] www.traffic.org/species-reports/traffic_species_birds2.pdf

100 € per day in Montenegro. In Slovenia, shooting of a Mallard costs 10 €, Common Pheasant 15 €, Grey Partridge 25 €.

Montenegro has improved its hunting legislation considerably in 2008.

The impact of hunting on eco-tourism is no doubt huge. All countries along the Adriatic Flyway would offer great possibilities for bird watchers, but as birds are extremely shy in all countries along the Adriatic East Coast due to the high hunting pressure, it is - with a few exceptions - very difficult to observe birds. Countries such as Montenegro are aiming to prolong the tourist season and wish to increase nature tourism, but there is nothing much to show to the guest except the landscape. The wild animal populations are very small and too shy to be seen by tourists.

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Figure 9: Selling of Night Heron *(Nycticorax nycticorax)*, Great Cormorant *(Phalacrocorax carbo)* and Pygmy Cormorants *(Phalacrocorax pygmeus)* at the fish market in Shkodra, Albania, February 2005 / photo D. Saveljic

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Figure 10: Bird watching at the Ulcinj salinas, Montenegro, during the Adriatic Flyway Conference, April 2009 (http://www.euronatur.org/Adriatic-Flyway-Conference-2009.899.0.html) / photo N. Ramadani

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Pygmy Cormorant *(Phalacrocorax pygmeus)* / photo P. Sackl

International importance of three Adriatic Flyway priority sites: Livanjsko Polje, the Neretva Delta and Lake Skadar-Shkoder with the Bojana-Buna Delta

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Abstract

During 2007, 2008 and 2009, a EuroNatur team carried out, with the support of local experts and organisations, four waterbird counts each year at three Adriatic Flyway priority sites: Livanjsko Polje (Bosnia-Herzegovina), the Neretva Delta (Croatia – Bosnia-Herzegovina) and Lake Skadar-Shkoder including the Bojana-Buna Delta (Albania – Montenegro). According to WPE4 (Wetlands International 2006), a minimum of 24 waterbird species reach the specific 1% criteria based on waterbirds of the Ramsar Convention. The actual data do not reflect the value and carrying capacity of the three Western Balkan priority sites, which is much higher as disturbance is limiting the numbers of birds at all sites.

1 Introduction

During 2007, 2008 and 2009, a EuroNatur team performed, with the support of local experts and organisations, four waterbird counts each year at three Adriatic Flyway priority sites:

Livanjsko Polje (Bosnia and Herzegovina)
Neretva Delta (Croatia – Bosnia and Herzegovina)
Lake Skadar-Shkoder including the Bojana-Buna Delta (Albania – Montenegro)

Counts for each site where carried out in January, March/April, June and October. For the Bojana-Buna delta, additional waterbird counts through EuroNatur assessment (Schneider-Jacoby et al. 2006) are available and included since 2003. In 2010, waterbirds were counted in January (IWC) as well as in March and April at all priority sites, additionally, a migration survey was carried out on the Ada-Bojana on all days in March. Due to the ecological difference of the Bojana-Buna Delta and the lack of protection in Montenegro, the results are separated from those at Lake Skadar.

According to WPE4 (Wetlands International 2006), a minimum of **24 waterbird species** reach the specific criteria based on waterbirds of the Ramsar Convention:

- **Criterion 6:** A wetland should be considered internationally important if it regularly supports 1% of the individuals in a population of one waterbird species or subspecies.

and **two sites** reach criterion:

- **Criterion 5:** A wetland should be considered internationally important if it regularly supports 20,000 or more waterbirds.

It is very likely that these western Balkan wetlands sites have been important for more waterbirds species in different times in the year as migration peaks are quite short and resting time limited due to disturbance. Many species, such as Garganey *(Anas querquedula)*, Pintail *(Anas acuta)* or even Ferruginous Duck *(Aythya nyroca)*, stay far away of the wetlands along the Adriatic Sea due to disturbance. According to the biogeographic regionalisation scheme given by Wetlands International (2006), the sites belong to the Eastern Mediterranean Region. We defined the

Ramsar Site Livanjsko polje / photo M. Šarac

Ramsar Site Neretva Delta / photo M. Schneider-Jacoby

Adriatic Flyway as the core area inside the huge Black Sea/Mediterranean Flyway for waders (http://www.wingsoverwetlands.org/) or European Siberia/Black Sea-Mediterranean Flyway for the Anatidae (Boere and Stroud 2006). Only the Black Sea/Mediterranean Flyway crosses the Mediterranean basin in NW – SE direction, while the other two corridors, the East Atlantic Flyway and the West Asian/East African Flyway, follow the coastal zones of West and East Africa (Stroud et al. 2004). While the waterbirds flying along the Eastern and Western African Flyway use mainly the coastal wetlands and follow the coast line, the European and some Siberian waterbirds cross the Mediterranean Sea after their flight over the European continent and winter in North Africa, e.g. in Tunisia or in the Sahel, e.g. in the Niger Basin. The Adriatic Flyway is linked to the stop over (staging) sites along the East coast of the Adriatic Sea and its hinterland (Schneider-Jacoby 2008).

2 Sites overview

2.1 Livanjsko Polje

Beside the Eurasian Spoonbill *(Platalea leucorodia)* Pannonian population, Common Coot *(Fulica atra)* and Common Pochard *(Aythya ferina)* (Table 1), shorebirds such as the Ruff *(Philomachus pugnax)* are likely to fulfil the Ramsar Criteria for the 610 km² large Livanjsko Polje karts field. At the moment, the 55 km² large water surface of Busko Blato (in the year 1972 changed from periodical into semi-natural lake) is hosting the main concentration of waterbirds. The 76 km² large peatlands and 234 km² large grasslands are important breeding sites and non-breeding area for raptors such as Montagu´s Harrier *(Circus pygargus)* (30 bp) and Hen Harrier *(C. cyaneus)* (120 ind. wintering). Here, large flocks of shorebirds and up to 1,000 Common Cranes *(Grus grus)* rest during migration, especially if the Polje is suitably flooded. Together with Duvanjsko, Kupresko and Glamocko poljes, the Karst poljes of the upper Cetina catchment area fulfil the criteria for the regionally important bottleneck site for Common Crane with max. of 2,200 migrating birds/day for population, which overwinter in North Africa. At Livanjsko Polje, the highest numbers of waterbirds are recorded in autumn (Fig. 1). Busko Blato, part of the Karst polje used to accumulate water, holds at the moment the highest waterbird numbers (max. 67,144). We estimated the carrying capacity of Livanjsko Polje at up to 100,000 waterbirds and even more. This is the number of waterbirds, which could be present during spring migration, when the Karst Polje is often flooded. Still, the access to about a half of the Polje is limited due to land mines from the 1991-1995 war.

2.2 The Neretva Delta

Only the 202 km² large Neretva Delta failed to support 20,000 waterbirds present at the same time (Criterion 5, Fig 1.), as here the habitats for more than 50,000 birds are blocked by mainly illegal bird hunting. In Bosnia and Herzegovina, Hutovo Blato Nature Park has four important waterbirds sites: 17 km² large swamps of Deransko Blato, 11 km² large Svitava

Franz Joseph Islet in the Bojana-Buna mouth, Bojana-Buna Delta, 28th April 2003 / photo B. Stumberger

Lake Skadar - Shkoder, 14th June 2008 / photo D. Denac

reservoir, 4 km² large flooded meadows and wet cultural land during the spring and winter months. Officially, the site is a hunting ban area. The large and still flooded 34 km² reed beds and karst lakes in Croatia are ideal resting sites, the same as the large pro-delta with sand and mud flats at the mouth of the River, the Parila lagoon and few remaining flooded pastures. In the last few years, only Pygmy Cormorant *(Phalacrocorax pygmeus)* reached the Ramsar criteria (Table 1), while the Eurasian Spoonbill with its great turnover numbers in the Neretva Delta failed to do so, owing to various disturbances, including kite surfing, bait collection by fisherman and even illegal hunting in the river mouth. Spoonbills rested during recent years further northeast in Mostarsko Blato karst field with up to 200 birds/day indicating the importance of resting sites in the Neretva valley. The delta with Hutovo Blato Nature Park still holds a capacity for resting waterbirds of over 100,000 individuals at the same time and is an extremely important stopover site for many species such as Eurasian Spoonbill, Ferruginous Duck, Glossy Ibis *(Plegadis falcinellus)*, Garganey, Black-tailed Godwit *(Limosa limosa)*, etc., which, however, cannot rest due to disturbance even in the core areas of the Ramsar Site.

2.3 Bojana-Buna Delta

The key habitat inside the Bojana-Buna Delta (222 km²) is at the moment the 14.5 km² large Solana Ulcinj (Stumberger et al. 2008). In this privately managed salina, hunting has been banned by the national hunting law and the owner's decision. Several other important resting sites, such as pastures and marshes in Albania, have been described by EuroNatur (Schneider et al. 2006). The Viluni Lagoon (3.9 km²) in Albania and Lake Sasko (3.2 km²) in Montenegro provide open water surfaces for waterbirds to rest. The Bojana-Buna Delta is the most important resting sites for waders at the moment along the Adriatic East Coast, with a total of 16 waterbird species meeting the Ramsar criteria there (Table 1). This assembly of waterbird species is responding to the unique combination of different wetland habitat types in the Bojana-Buna Delta. From late autumn till the end of winter, the number of waterbirds reaches about 20,000, while in spring no less than up to 40,000 waterbirds can be seen in the delta (Fig. 1). The capacity of the Bojana-Buna Delta is far above 100,000 waterbirds. In combination with flooding of extensive pastureland during the spring passage, is capacity of 200,000 waterbirds is possible for the area. The current low number is a result of the constant and extensive illegal hunting even inside the private protected areas (Solana Ulcinj) and core zones at the Buna Ramsar Site in Albania (e.g. Velipoja Reserve and Viluni Lagoon).

2.4 Lake Skadar-Shkoder

The capacity of Lake Skadar is more than 350,000 wintering waterbirds, with 220,000 counted in the 90ties in Montenegro only (e.g. Vasic et al. 1992). This numbers confirmed the huge value of the site. This 600 km² large shallow lake with its large oscillations (Beenton 1981) fulfils the Ramsar

Criteria for 10 waterbirds species at the moment (Table 1). Remarkable is the species composition, which differs from the connected Bojana-Buna Delta. For fish-eating waterbirds, Lake Skadar is a very important site; especially Grebes and Cormorants are still present there in large numbers, while Pygmy Cormorant reaches fantastic 16% of the European sides of the border.

3 Conclusions

The number of waterbird species, which today reach the 1% level given by WPE4 at one of the three Western Balkan priority sites, is high. It is clear that

Collared Pratincole *(Glareola pratincola)*, Ulcinj salinas / photo P. Sackl

The three priority sites, however, are key stopover sites not only for the bird species that reach the 1% threshold and are in need of better protection.

and Turkish population. Another specific value of the lake concerns species preferring large macrophyte carpets, such as Squacco Heron *(Ardeola ralloides)*, Ferruginous Duck and Whiskered Tern *(Chlidonias hybridus)*, as at least 30 km^2 are covered with plants like Water Chesnut *(Trapa natans)*, White *(Nymphaea alba)* and Yellow Water-lily *(Nupar luteum)*. While the costal Albanian wetlands have lost most of their waterbirds at the end of the 20th century (compare Nowak 1980, Hagemeijer 1994, Vangeluwe et al. 1996, Zekhuis & Tempelman 1998), Lake Skadar has still preserved most of its values as a wetland for non-breeding and breeding waterbirds along the Eastern Adriatic coast (compare Fig. 1, Table 1). Nevertheless, the actual midwinter numbers with 60,000 – 130,000 are much lower than 20 years ago, and disturbance is still increasing in the former inaccessible area (iron curtain) at the border and due to uncontrolled tourism based on motor yachting in Montenegrin National Park. Illegal hunting is widespread on both

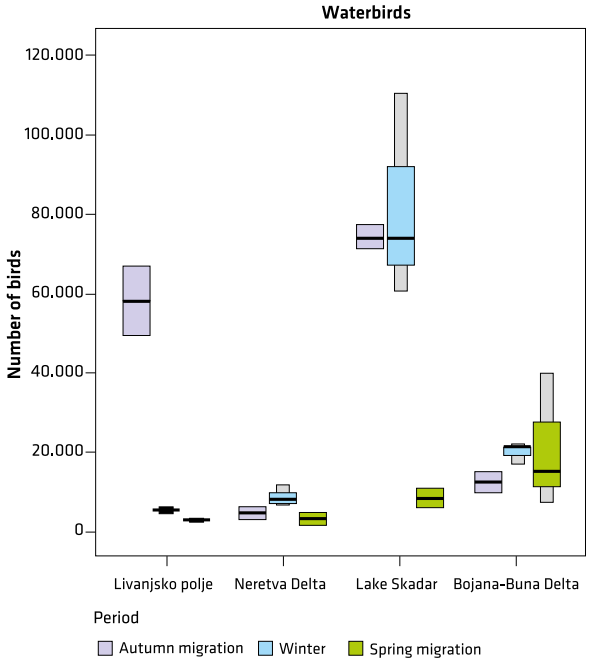

Figure 1: Number of waterbirds during the non-breeding period for Livanjsko Polje, Neretva Delta, Lake Skadar-Shkoder with Bojana-Buna Delta between 2007 and 2009 (figure credit: Peter Sackl)

Table 1: Application of numerical Criteria of the Ramsar Convention through WPE4 (Wetlands International 2006) for the Adriatic Flyway priority sites

Species	1% level WCP4	Livanjsko polje	Neretva delta	Bojana-Buna delta	Lake Skadar-Shkoder
Great Crested Grebe *(Podiceps cristatus)*	7,250				12,561
Black-necked Grebe *(Podiceps nigricollis)*	2,200				2,904
Dalmatian Pelican *(Pelecanus crispus)*	45			119	*34
Great Cormorant *(Phalacrocorax carbo)*	4,000				20,694
Pygmy Cormorant *(Phalacrocorax pygmeus)*	700		2,366	1,419	11,857
Great White Egret *(Egretta alba)*	470			501	
Little Egret *(Egretta garzetta)*	580			783	
Squacco Heron *(Ardeola ralloides)*	600				**506
Eurasian Spoonbil *(Platalea leucorodia)*	120	138	***86	***220	
Common Shelduck *(Tadorna tadorna)*	750			620	
Garganey *(Anas querquedula)*	20,000			20,000	
Common Pochard *(Aythya ferina)*	10,000	13,141			
Ferruginous Duck *(Aythya nyroca)*	450				1,035
Baillon's Crake *(Porzana pusilla)*	60			55	
Common Crane *(Grus grus)*	900	1,000			
Common Coot *(Fulica atra)*	20,000	51,992			64,416
Black-winged Stilt *(Himantopus himantopus)*	500			**392	
Collared Pratincole *(Glareola pratincola)*	240			280	
Kentish Plover *(Charadrius alexandrinus)*	410			472	
Dunlin *(Calidris alpina)*	13,300			10,503	
Black-tailed Godwit *(Limosa limosa)*	1,300			4,263	
Slender-billed Curlew *(Numenius tenuirostris)*	1			1	
Spotted Redshank *(Tringa erythropus)*	900			2,249	
Black-headed Gull *(Larus ridibundus)*	13,000				20,230
Whiskered Tern *(Chlidonias hybridus)*	1,000				2,896
n ≥ 1% level per species		4	2	16	10

* during the 2007-2009 breeding season, some 45 birds with max. 70 birds (Vresovic-Dubak, pers. comm.)
** some 40 km² large feeding swamps in northern lake area never counted
*** turn-over rates seem to be quite remarkable

the Adriatic Flyway is still of a great international importance for waterbird protection. The three priority sites, however, are key stopover sites not only for the bird species that reach the 1% threshold and are in need of better protection. Many of the species concerned face a dramatic population decrease in Europe, especially in the countries N and NE of the Adriatic Flyway (compare BirdLife 2004). For waders, the East Atlantic flyway seems to be in the healthiest state: only a little over one third (37%) of the populations are decreasing. This is in contrast to the Black Sea/Mediterranean Flyway, where 55% of the populations with known or probable trends are declining, and the West Asian/East Africa Flyway with 53% of wader populations in decline (Stroud et al. 2004). Comparable negative trends are known for more waterbird groups (compare Stumberger: A classification of karst poljes in the Dinarides and their significance for waterbird conservation, this publication). The actual data do not reflect the value and carrying capacity of the three Western Balkan priority sites. During spring 2006, when Bird Fly stopped the illegal hunting (Stumberger & Schneider-Jacoby in prep.), the numbers in the Bojana-Buna Delta were much higher, proving that disturbance limits the number of birds. Only in March 2006, 20,000 Garganey were counted resting and migrating in a single day, while in other years only few birds settled down or flew near the shore. To stop the negative trend in the European waterbird population, a full protection of all priority sites is crucial. At the same time, more support is to be provided for the

countries under consideration, the site managers as well as local nature and bird protection NGOs.

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Wetlands of the Eastern Adriatic coast – perspectives for waterbird conservation

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1 Introduction

For millennia, waterbirds traverse the Mediterranean basin to reach their main wintering areas in North and West Africa. In the central Mediterranean region, herons, Eurasian Spoonbills, Common Crane, many other waterbirds as well as birds of prey regularly cross the max. 220 km wide Adriatic Sea between the Apennine and Balkan Peninsulas during spring and autumn migrations. While the eastern coast of the Adriatic mainly consists of steep, rocky shores, only a handful of continuous wetland habitats, adequate for resting and recovering from their long flights for larger numbers of waterbirds, exist. The majority of wetlands in the Eastern Adriatic region have been created by sediments deposited by rivers along their lower reaches and in mouths in the form of deltas. During the last 10,000 years, following the last glaciation of the Pleistocene Epoch, river deltas have undergone a period of rapid growth (Kelletat 1984). The original, almost pristine conditions of the wetlands along the eastern coast of the Adriatic Sea for birdlife were described by several authors, like Germar (1817), Reiser & von Führer (1896), Reiser (1923, 1939) and Laska (1905), who reported on hundreds of thousands of ducks and of lakes, lagoons and rivers full with pelicans and other waterbirds.

First substantial human alterations of the hydrology and ecology of wetland habitats in the Eastern Adriatic region came during the Austria-Hungarian Monarchy some 130 years ago. The period of early river engineering and the events, which later took place throughout the Eastern Adriatic, is well illustrated by the 200 km^2 delta of the Neretva River in southern Dalmatia: Between 1881 and 1889, Austro-Hungarian hydraulic engineers started to regulate the lower Neretva River. Soon, the river delta front was reconstructed as well. Despite the strong opposition by the locals, most of the river delta was meliorated during the 1960s according to the decisions made by the central government of the former Yugoslavia. In the early 1970s, the formerly extensive lagoons were drained with FAO support. More recently, serious problems have started to arise as a result of the large-scale drainage. Following the decomposition of peat, which covers former marshlands, the delta's soil horizon slowly declines below sea level and arable soils are threatened by salinization (e.g. Glamuzina 1986). More than three quarters of the Neretva Delta which were originally covered by permanent or seasonally flooded wetlands, are currently used for agriculture or have been destroyed by urban developments, while migrating and resident waterbirds are exposed to increased pressures from hunting, bird shooting and other human disturbances in remaining wetland habitats (Stumberger et al. 2008a). Well documented is the alteration of the Koper Bay and the fight to save the remaining wetland at Skocjanski zatok in Slovenia (Salaja et al. 2007).

No thorough surveys of the current situation and historical losses of wetlands in the course of the last 130 years along the eastern Adriatic coast exist. In the present paper we try to fill in this gap by comparing the original and current extent of wetland habitats in the area.

2 Study area and methods

For the present analysis, the Eastern Adriatic coast has been defined as the coastal belt, including all islands, which is running at an airline distance of 780 km from the estuary of the Isonzo/Soca River (Trieste/Italy)

Tivat salinas, Montenegro, January 2004 / photo B. Stumberger

Figure 1: The eastern coast of the Adriatic Sea consists of predominantly steep and rocky shores, like here on the island of Pag (Croatia), with the massif of the Velebit Mountains in the background / photo B. Stumberger

Figure 2: Distribution of coastal wetlands along the eastern coast of the Adriatic Sea. The increasing size of symbols (points) indicate extension of wetland areas (map compiled by Borut Stumberger).

south to the Karaburun Peninsula (Vlore/Albania). Along the Eastern Adriatic coast, more than 700 mostly rocky islands exist. On average, the some 160 km wide Adriatic Sea constitutes the northernmost section of the Mediterranean Sea, which divides the Apennine and Balkan Peninsulas. The coastline of the eastern Adriatic and its islands consists mainly of rocky shores, which are among the most inclined in the Mediterranean basin (Fig. 1). South of Ulcinj (Montenegro), the lowlands of coastal Albania are characterised by sandy beaches, which spread at an airline distance of 176 km along the greater part of the Albanian coast down to Vlore. Barrier islands and lagoons, which stretch parallel to the Albanian costal-line, are composed of river sediments.

With the help of historic topographical maps produced by Austro-Hungarian authorities during the late 19th and the beginning of the 20th centuries (Kartensammlung des Geographischen Instituts in Wien), satellite images (Landsat, Spot and Corona) and information obtained from GoogleEarth and various free Viewers, the distribution and extension of continuous wetland habitats > 0.5 km^2 was investigated. For estimating its current extent and conservation status, conditions since 2000 have been taken into account. For all identified wetlands, their national affiliation, autochthonous names, the original and current surface areas (in km^2) prior and after major reconstructions were established. The current conservation status and pressures by urbanisation, agricultural development and tourism were estimated with the help of satellite images, information from local experts and surveys conducted by Euronatur since 2003. River flood plains, permanent marshlands, sand dunes and inland lagoons were classified as natural/semi-natural wetland areas. These habitat types are situated in the areas of substantial sedimentation along the lower reaches, approximately 10 km upstream. In the case of the Neretva (Croatia), Bojana-Buna (Montenegro/Albania) and Drini Rivers (Albania), the zone of heavy sedimentation extends as much as 20 km upstream. In addition, virtually flooded karst fields, situated near sea level and locally known as "blato", and all artificial reservoirs were considered. All wetlands that have not undergone substantial reductions in their original surface area during the late 19th and 20th centuries are classified as "preserved wetlands". In the same way, salinas have been categorised as preserved, while prodeltas were excluded from the estimate of the coastal wetland surface areas.

3 Results

Along the Eastern Adriatic's coast and its islands, 39 wetlands larger than 0.5 km^2, with only eight exceeding 100 km^2, were identified. Prior to major reconstructions by hydraulic engineering and meliorations during the late 19th and 20th centuries, wetland habitats covered a total area of 1,765 km^2.

Until 2000, more than 76% or 1,350 km² of formerly intact wetland habitats have vanished or were at least substantially transformed by drainage, agriculture and urban development (Table 1). Currently, remnants of more or less preserved wetlands cover an area of approximately 415 km², with 296 km², i.e. 71%, belonging to Albania. However, for the early 20th century, preceding the large-scale meliorations, we estimated the total area of coastal wetlands in Albania at some 1,350 km² (parts of the Bojana-Buna Delta in Montenegro included), of which 1,054 km² (78%) have been destroyed during the Communist era. Currently, apart of Vransko Jezero (36 km²) and the Neretva Delta (48 km²), no coastal wetland larger than 10 km² exists on the north-eastern coast of the Adriatic Sea between the Isonzo/Soca River Delta in Italy and the Bojana-Buna Delta in southern Montenegro (Fig. 2).

Table 1: Wetlands along the Eastern Adriatic coast

Country	Wetland	Estimated former size (km²)	Heavily impacted or destroyed (km²)	Main reason for destruction
IT	Isonzo/Soca mouth	98.0	90.0	agriculture
IT	Stundra (Molfancone)	5.0	4.5	urbanisation
SI	Skocjanski zatok	5.0	3.5	urbanisation
SI	Strunjanski zatok	0.5	0.1	salt production, tourism
SI	Secoveljske soline	10.5	4.0	salt production, urbanisation
HR	Mirna	10.0	10.0	agriculture
HR	Rasko polje	4.7	4.7	agriculture
HR	Jezero (Krk)	0.8	0.1	water supply
HR	Ponikve (Krk)	0.6	0.6	reservoir
HR	Vransko jezero (Cres)	5.8	0	natural lake
HR	Slatina (Cres)	0,4	0	natural lake
HR	Kolansko blato (Pag)	0.8	0	natural lake
HR	Solana Pag	3.5	1.0	salt production, urbanisation
HR	Solana Dinjiska (Pag)	0.7	0	salt production
HR	Malo blato (Pag)	0.8	0.1	natural marsh
HR	Velo blato (Pag)	1.9	0.1	natural lake
HR	Uvala Plemici (Rtina)	1.2	0.3	tourism, urbanisation
HR	Solana Nin	2.3	1.7	tourism, salt production
HR	Bokanjacko blato	4.6	4.6	agriculture
HR	Nadinsko blato	4.8	4.8	agriculture
HR	Bare (Benkovac)	1.4	1.4	agriculture
HR	Vransko jezero [1]	39.0	3.0	natural lake
HR	Trogir	0.5	0.2	urbanisation
HR	Strobec (Split)	1.1	0.9	urbanisation, regulation
HR	Cetina mouth [2]	0.6	0.6	urbanisation, tourism
HR/BIH	Neretva delta	202.0	154.0	agriculture, urbanisation
HR	Solana Ston	0.5	0	salt production
HR	Blatina (Mljet)	0.2	0	natural intermittent lake
HR	Sobra (Mljet)	0.1	0	natural intermittent lake
ME	Igalo	0.8	0.8	urbanisation, agriculture
ME	Tivat	3.5	3.0	urbanisation, airport
ME	Micevo polje	2.2	2.0	agriculture, tourism
ME	Buljarica	1.2	0.2	urbanisation, tourism
ME/AL	Bojana-Buna delta	222.0	165.0	agriculture, tourism, urbanisation
AL	Drini delta [3]	156.0	135.0	agriculture & urbanisation, tourism
AL	Mati delta	122.0	97.0	agriculture & urbanisation
AL	Erzen delta (N Dures)	131.6	119.0	agriculture, tourism
AL	Kavaja	40.0	40.0	salt production, agriculture, urbanisation
AL	Shkumbini delta [4]	183.0	92.0	agriculture, urbanisation
AL	Seman delta [5]	209.0	172.0	agriculture
AL	Vjose delta	277.0	226.0	agriculture, urbanisation, tourism
AL	Orik (Duman)	9.5	8.0	agriculture, urbanisation, tourism
Total		**1,765.1**	**1,350.1**	

[1] probably by 17 km² larger before building a dam in NE lake area
[2] zone of Common Reed *(Phragmites communis)* along the river not included
[3] to the last dam of intact lagoon in the south
[4] to the Myzege canal in the south (south of Karavasta lagoon)
[5] to the canal in the town of Fier in the south

Salinas constitute a very specific type of wetland habitats. With a total area of 48.4 km², they cover almost 12% of the surface area of all identified wetlands in the Eastern Adriatic region that we estimated as persevered. There are 10 salinas in the area. The largest three are situated in Vlore (Albania), Ulcinj (Montenegro) and Secovlje, Slovenia (Tab. 2).

Table 2: Salinas along the Eastern Adriatic coast (with data in parenthesis representing maximum salt production in tons)

Country	Salina	Estimated size (km²)	Average salt production (t)	Status
SI	Strunjanske soline	0.2	part of Secovlje salina	partly operational, protected
SI	Secoveljske soline	6.5	4,000 (40,0000)	partly operational, protected
HR	Solana Pag	2.5	13,000-15,000 (20,000)	industrial salt production stopped in 2008
HR	Dinjiska (Pag)	0.7	?	operational
HR	Solana Nin	0.5	1,500 (3,500)	operational
HR	Solana Ston	0.5	1,500-2,000 (6,000)	operational
ME	Solila Tivat	1.5	never in operation	inactive, protected
ME	Solana Ulcinj	14.5	15,000-20,000 (42,000)	operational
AL	Kryporja Kavaja	2.5	2,000	inactive
AL	Kryporja Vlore	15.4 (+1.4)	30,000-70,000	operational
Total		**48,4**	**67,000-115,500 (183,500)**	

4 Discussion

The present analysis demonstrates that very few larger pristine wetland complexes, which exceed 0.5 km², still exist on the east coast of the Adriatic Sea. Pristine, but rather small wetland habitats exist on some islands, like Mljet, Krk and Cres (cf. Table 1), but are often used for local water supply. This means that they are impacted by water absorption, although they are well protected (e.g. hunting and fishing ban on Krk). The most interesting wetlands of the Dalmatian Islands are those on Pag which, due to their predominantly karst character, are unique and represent a combination of various freshwater, brackish and hypersaline stop-over sites for waterbirds.

The steep and mainly rocky shores, together with low tidal amplitudes (< 30 cm), prevented the formation of extensive wetlands along most of the Eastern Adriatic coast. Additionally, many rivers, which drain the highlands of the Dinaric Karst, are fed by underground waters and transport no or very low loads of sediments and, therefore, form no extensive deltas. Typical karst rivers, like the Krka, Zrmanja or Ombla, are relatively short and enter the Adriatic Sea in canyon-like valleys. North of the Bojana-Buna Delta (Montenegro/Albania), only very few rivers transport enough sediments to fill up the river valleys, which have been flooded due to the sea level rise in the last 18,000 years. During the last glaciation (Würm), the sea level was by 116-126 m lower than today (Fairbanks 1989). Only in Albania and the southernmost Montenegro, the coastal zone is characterised by a wide belt of predominantly river sediments, where a number of important coastal wetlands are found (Tekke 1996, Schneider-Jacoby et al. 2006).

On the basis of our estimates, the original extent of permanently or seasonally flooded wetlands in Albania is almost twice the area hitherto published in literature; e.g. Hagemeijer (1994) calculated a total of 600 km² of "flooded areas and swamps" for the 2,500 km² large lowlands of western Albania, while Hoda & Gjiknuri in Tekke (1996) give a total area of 700 km² for the coastal wetlands of the country. Despite hydrological data, which we have received for Albania, the available information has to be handled with care. A good example constitutes the interconnected deltas of the Bojana-Buna and Drini Rivers. Based on historic maps from 1900, we estimated the extension of regularly flooded areas between the rivermouth upstream till the confluence of both rivers 1 km below Rosafa/Shkodra to more than 280 km² (50%). In November 2003 and January 2004 alone, almost 90 km² were found to be flooded in the Bojana-Buna Delta, most of it in the lower part of the delta (Schneider-Jacoby et al. 2006). However, in January 2010, during the most recent major flooding of the Drini River, a total of 105 km² were flooded in

Brackish temporary wetlands and sand dunes, Bax-Rrjoll, Bojana-Buna Delta, April 2004 / photo B. Stumberger

Figure 3: Kneta Gjeratit wetland in Albania, core area of the Ramsar site of the Buna River and Bojana-Buna Deltas: a typical example of an impacted wetland with low carrying capacity due to its use as hunting ground by the locals and foreign hunters. View to the north showing artificial hunting pools in the foreground, March 2009 / photo B. Stumberger

Figure 4: Parts of the 105 km^2 large inundation zone in the upper Bojana-Buna Delta (Albania/Montenegro) in January 2010. View to the west, with flooded Kneta Gjeratit (left) and the pastures of Gjo Lulit (right) in the foreground, and the snow-covered peaks of the Rumija Mountains (Montenegro) in the background / photo B. Stumberger

the upper Bojana-Buna Delta (Fig. 4). While this may illustrate the potential extension of the floodplain areas of some Albanian rivers, it seems that the former size of wetlands in the coastal lowlands of western Albania may be much larger than hitherto reported. Nowak (1980) reported for Albania about 2,000 km^2 of large swamps and floodplains till 1940, especially for western Albania. His data fit well with our estimates.

During the 20th century, land reclamation for agriculture was the main motivation for regulating the river flow, drainage and melioration of wetlands. In contrast, since the late 20th century industrialization, urbanisation and development of tourism are the main drivers for human encroachment upon coastal wetland habitats. Following the loss of major wetlands in Italy, Slovenia, Istria and northern Dalmatia, the restoration of wetlands in the Eastern Adriatic region has so far been recognised as a developmental opportunity only in Italy (Isonzo/Soča) and Slovenia (Škocjan inlet, Strunjan and Sečovlje Salina). In contrast to the Slovene and Croatian coasts, a number of extensive and at least partially preserved wetlands exist along the southern Dalmatian coast, in southern Montenegro and Albania (Fig. 2). Despite large areas of apparently undisturbed marshlands, reedbeds, inland lagoons and coastal sand dunes, surprisingly low numbers of wintering and breeding waterbirds have been found since the 1990s in the southern Dalmatia's Neretva Delta (EuroNatur waterbird counts 2003 – 2010), Bojana-Buna Delta (Schneider-Jacoby et al. 2006) and in Albanian wetlands (Hagemeijer 1994, Zekhuis & Tempelman 1998, T. Bino, pers. comm.). For the lower Neretva River, Laska (1905) has reported "hundreds of thousands" of ducks and other waterbirds, while during the recent counts by EuroNatur, some 5,800 – 11,300 waterbirds (2007 – 2010) were found in the area. In the same way, in relation to the extension and physical condition of the still existing wetland habitats, comparatively low numbers of waterbirds were recorded in the coastal zone of Montenegro, like the Tivat salina in the mouth of the Bay of Kotor (Sackl et al. 2006). Thus, besides physical destruction, the significance of many wetlands for waterbirds and other wildlife appears to be heavily impaired by human disturbances, like hunting, bird-shooting, fishing, recreation and tourism (Fig. 3). The carrying capacity of all the wetlands is much higher and they are today even more important than before, when the surface area of the potential resting sites was much higher.

Apart of some 112 already implemented plants (mostly <10 MW), Albania is planning the construction of at least 158 additional <10 - >50 MW hydropower plants on all major rivers (U. Schwarz, in prep.). According to Bird (2010), the combined yield of Albanian rivers amounts to 52.9 million m^3/year, of which 25%

consists of relatively coarse material retained on beaches and 75% silt and clay dispersed offshore. Although tidal range is very small, wave action during strong south-westerly winds is effective in moving sea floor sediments to depths of up to 8 m along the Albanian coast (Bird 2010). Retaining of river sediments by hydropower plants will trigger

Figure 5: Coastal erosion due to the lack of river sediments is a major threat to tourist destinations and is causing serious losses of prime costal wetland habitats. Sandy beach of the tourist resort on Ada Island, close to the smaller, northern mouth of the Bojana-Buna River (Montenegro) in May 2010, former Oystercatcher *(Haematopus ostralegus)* breeding habitat / photo B. Stumberger

long-term, but substantial changes in river and sea floor sedimentation, coastal erosion and wetland hydrology. The erosion of barrier islands and shore-line along the delta front due to the lack of sediments has been already documented in the Bojana-Buna and Drini Deltas in northern Albania (MedWet 1998, Schneider-Jacoby et al. 2006). Besides further losses of prime waterbird habitats, erosion along shore-line and of sand beaches will heavily impair future tourist developments (Fig. 5).

Different studies indicate that abandoned as well as operative salinas exert significant positive effects on local biodiversity and the overall carrying capacity of wetland systems (Anonymus 1996). In the Eastern Adriatic region, the Ulcinj Salina in southern Montenegro is a good example (Schneider-Jacoby et al. 2006, Stumberger et al. 2008b). Therefore, beside prime wetland habitats, the preservation and adequate management of all salinas –operational or not - play a major role for wetland conservation on the Eastern Adriatic coast. Positive examples are Secoveljske and Strunjanske soline, well managed also as a tourist attraction, in Slovenia.

As already three quarters of the wetland areas on the Eastern Adriatic coast have been lost, all remaining sites are of outstanding importance to secure the functioning of the Adriatic Flyway as a core corridor on the Black Sea – Mediterranean Flyway. The impacts, which lower the carrying capacity and all potential melioration projects as foreseen in the new physical plan for Dubrovnik Neretva county (Dubrovacko-Neretvanska Zupanja 2010), have to be stopped or mitigated (Schneider-Jacoby 2009). The actions taken with EU support to save Skocjanski zatok in Slovenia should be an example of how to save even the heavily impacted remaining wetland sites.

Therefore, beside prime wetland habitats, the preservation and adequate management of all salinas –operational or not - play a major role for wetland conservation on the Eastern Adriatic coast.

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Livanjsko polje, June 2009 / photo B. Stumberger

A classification of karst poljes in the Dinarides and their significance for waterbird conservation

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1 Introduction

The mountains of the Dinaric Karst, which are interspersed by extensive depressions, generally known as karst fields or poljes, constitute the most extended, continuous karst area in Europe (Gams 1974). The karst poljes of the Dinarides are covered by wetlands and extensive areas of periodically flooded grasslands, which both harbour significant resting sites and nesting habitats for waterbirds and grassland birds (cf. Valvasor 1689, Reiser 1896, 1939, Kmecl & Rizner 1993, Polak 1993, Schneider-Jacoby et al. 2000). Nevertheless, the significance of the karst fields in the Dinarides for the conservation of European bird populations and Western Palearctic migrants has so far been largely neglected.

With the seasonal appearance, duration and extent of floodings, the prime factor, which limits the occurrence and population numbers of most bird species in karst fields (compare Schneider-Jacoby 1993, 2005), the suitability of individual poljes for waterbirds and other species is determined by their specific hydrologic cycles. In order to **(a)** identify potential breeding and resting habitats for water- and meadow birds in the Dinarides along the Central European – Adriatic Flyway, which **(b)** could be used as a basis for the identification and delimitation of Important Bird Areas (IBAs), data on the hydrologic conditions, in particular on the appearance and extent of seasonal floodings, have been put together in this paper for all karst poljes along the 800 km long ridge of the Dinarides between Slovenia and Montenegro.

2 Methods

The location and extent of karst fields were identified with the help of a digital relief model of Dinaric karst (72,000 km^2) as terrain with gradients <1% (see Bojovic in Acknowledgements). The delimitation and hydrologic conditions of the karst poljes in the Dinarides (130,000 km^2) was further verified according to literature (Ballif 1896, Reiser 1939, Gams 1974, Bozicevic 1992, Bonacci 2004, Rodic 1991, Trontelj 1998), topographic maps (1:100,000), historical maps (Austro-Hungarian Monarchy), satellite images (Landsat, Corona and Spot) and according to unpublished information on the duration and spatial extension of floodings by local experts (see Acknowledgements). On the basis of the scale and resolution of existing maps and satellite images, the minimum area for a continuous karst field, used for this study, is prescribed with 0.2 km^2. All in this way identified karst poljes were assigned to one of the following types (e.g. Gams 1974, Bozicevic 1992):

1) *contact poljes* (kontaktno polje) – with no uninterrupted karst circumference,
2) *dry poljes* (suho polje) – polje without surface waters, which are drained exclusively by underground water courses, also known as »fossil« polje,
3) *discharge poljes* (pretočno polje) – classical karst polje with underground karst tributaries and underground effluents as well as uninterrupted karts circumference,
4) *poljes with combined functions* (polje s kombinirano funkcijo) – the same as type 3, but either with surface tributaries or surface effluents.

The main goal of the analysis was to characterize the existing karst fields according to their hydrological conditions, unaltered by human influence, and to identify in this way naturally dry (type 2) and wet poljes (types 1, 3, 4), of which the later should – at least - potentially harbour significant populations of water- and meadow birds.

3 Results

Throughout the Dinarides, I have managed to identify 139 karst fields, of which 44 or roughly a third of all karst fields were classified as dry, 48 as rarely inundated, and 47 as frequently flooded. Most poljes were classified as dry and discharge poljes, while only

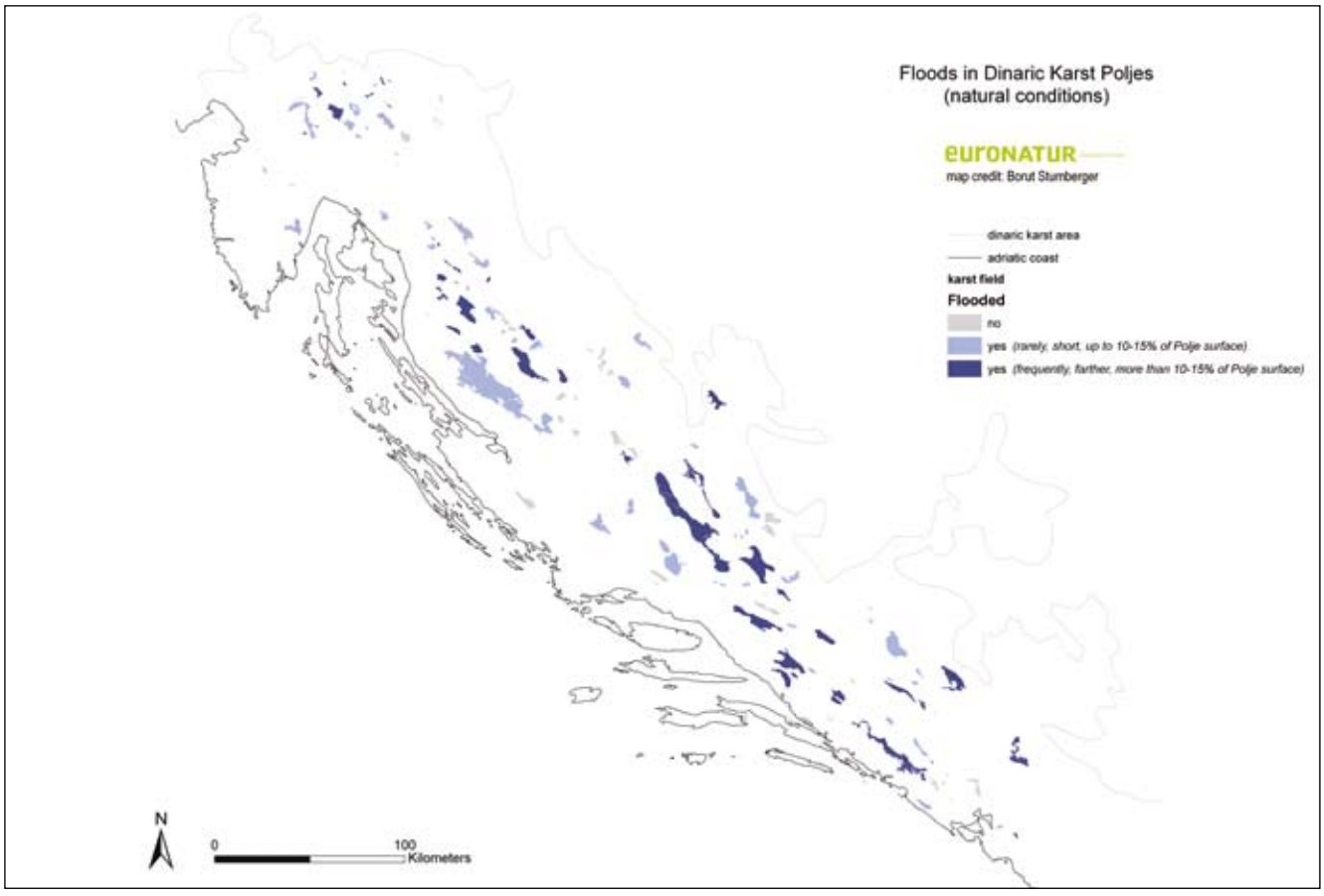

Figure 1: Location and characterization of karst poljes in the Dinaric Karst according to the occurrence and extent of flooding

All poljes, which were identified as potentially wet or seasonally flooded, were further subdivided into:

- frequently flooded poljes, which are annually inundated for longer periods, and across at least 10 – 15% of their surface areas (type W1), and
- irregularly and normally only for shorter periods of time, and for a maximum of 10 - 15% of their surface areas inundated poljes (type W2)

All karst poljes and the attributes described above were digitized and archived as a GIS project (ArcGIS 9.2).

3 belong to the transitional form (type 4). With a total area of 3,056 km^2, the surface area of poljes varies between 0.2 km^2 in Preserje (Slovenia), 408 km^2 at Livanjsko polje (Bosnia-Hercegovina) and 459 km^2 at Licko polje in Croatia, of which the latter constitutes a conglomeration of different, smaller karst fields (Annex 1). Seasonal floodings are known to occur on 2,745 km^2 or 90% of the whole area of poljes. Of these, however, only 1,547 km^2 (= 51% of the total surface area of karst fields) are regularly flooded for longer periods of time (type W1). With regard to the densely packed karst areas of the Dinarides, which according

to Bozicevic (1992) cover a total area of 72,000 km^2, and the fact that according to the present study poljes cover only a fraction of 4% of the Dinaric Karst, all regularly or periodically flooded areas are of particular interest for conservation and for the identification of IBAs in the Dinaric Karst (Fig. 1).

4 Discussion

Owing to the features used for their identification and delimitation, the numbers of karst poljes, recognized by different authors in the Dinaric Karst, vary considerably. Thus, the map of the Yugoslav Karst by Serko (1948) contains 217 depressions, i.e. 109 poljes, 68 hollows and 35 transitional forms, while following a more conservative definition Gams (1974) recognized only 45 karst fields. A few years later, Bozicevic (1992) mentioned a number of 130 poljes for the area. Baliff (1896) has investigated the hydrology of 47 karst fields in Bosnia-Herzegovina and in parts of Dalmatia, but made no attempt to survey or to categorise the depressions in the whole area of the Dinaric Karst. According to the methods, applied for this study, approximately 140 karst poljes exist in the area.

For some countries of the Western Balkans, like Slovenia (Polak 2000, Bozic 2003), Croatia (Radovic et al. 2005) and parts of Montenegro (Saveljic et al. 2007), a number of IBAs have been already identified. Although in other parts of the Dinarides large areas of wetlands, suitable for waterbirds and wet grassland birds, exist, no comprehensive ornithological surveys throughout the karst fields of the Western Balkans have been conducted so far. In particular, for Bosnia-Herzegovina, which harbours a number of extensive karst poljes, few data on the distribution and current numbers of waterbirds and other species exist (cf. Heath & Evans 2000). Because the more extensive and regularly flooded poljes (Table 1) are expected to harbour significant wetland habitats for both groups – aquatic species and birds of wet grasslands – the classification, applied for this study, will help in establishing priorities for survey work and conservation planning.

During migration to their winter quarters and back to the breeding areas, many bird species cross large areas in broad fronts *("Breitfrontzug")*, while other species use discrete migration corridors, like Common Cranes *(Grus grus)*, or traditionally used resting sites, like Eurasian Spoonbills *(Platalea leucorodia)*. The latter migration strategy is known as narrow front migration or *"Schmalfrontzug"* (Berthold 2000). For trans-Mediterranean migrants, which cross the Central Mediterranean region between their European and West Siberian breeding areas for wintering in North and West Africa (Adriatic Flyway), the mountain ridges and dry highlands of the Dinaric Karst constitute a considerable barrier before and after the crossing of the 180 km wide Adriatic Sea, which separates the Balkans from the Apennine Peninsula. In addition, because of the mostly rocky shores and low tidal amplitudes < 30 cm few wetlands, suitable for resting and wintering waterbirds, exist along the eastern coastline of the Adriatic Sea (Smit 1986, Stipcevic 1997), while in the approximately 800 km long and up to 150 km wide Dinaric Karst, karst poljes are the only wetlands available for resting waterbirds. Therefore, the protection and restoration of wetland habitats in both types of periodically flooded karst poljes is of high conservation priority.

According to the major migration routes, delimitated by Isakov (1967) and Scott & Rose (1996), the karst poljes of the Dinarides are key resting sites for the Western Siberian/Black Sea-Mediterranean biogeographical populations of ducks, geese and swans.

Till now, the importance of periodically flooded karst poljes for bird migration has been studied by Kmecl & Rizner (1993) at Cerkniško polje in Slovenia and by Stumberger et al. (2008) at Livanjsko polje, Bosnia-Herzegovina. Both studies as well as the analyses

Karst field Jezerac in Croatia, 7th May 2010 (left) and 13th June 2010 (right) / photo B. Stumberger

of ringing data indicate that the karst fields of the Dinarides are frequented by populations from central and north-eastern Europe and migrants from western and north-western Siberia. According to the major migration routes, delimitated by Isakov (1967) and Scott & Rose (1996), the karst poljes of the Dinarides are key resting sites for the Western Siberian/Black Sea-Mediterranean biogeographical populations of ducks, geese and swans. Current estimates of the population trends of waterbirds, which migrate through the Dinaric Karst, mostly in SW – SSW directions, indicate long-term declines for 33 species (Annex 2). Some species, which use the Adriatic Flyway, like Slender-billed Curlew *(Numenius tenuirostris)*, are already on the brink of extinction (Wetland International 2006). The significance of the Dinarides' network of karst poljes for bird migration and conservation of Eurasian waterbirds has been largely overlooked, as bird hunting seems to be a major impact and that larger concentration of resting birds are missing at most poljes (Schneider-Jacoby 2008, 2009, Stumberger et al. 2009). If hunting ban areas would be established at the poljes, large important resting and breeding sites could be created in short time. The largely pristine wetlands and grassland areas are endangered by drainage, urbanization and water use for energy, drinking water and irrigation and are in need of urgent national and international attention.

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Annex 1: Karst poljes in the Dinaric Karst

Country	Surface area (km²)	Karst Field	Flooded	Flooded surface (%)
BiH	62.4	Glamočko polje	yes	>10-15%
BiH	77.5	Nevesinjsko polje	yes	<10-15%
BiH	28.9	Dabarsko polje	yes	>10-15%
BiH	1.5	Trusinsko polje	yes	<10-15%
BiH	60.1	Gatačko polje	yes	>10-15%
BiH	12.7	Ljubomir polje	yes	<10-15%
BiH	7.7	Fatničko polje	yes	>10-15%
BiH	125.0	Duvanjsko polje	yes	>10-15%
BiH	23.0	Grahovsko polje	no	0
BiH	13.6	Pašića polje	yes	>10-15%
BiH	19.2	Ravanjsko polje	no	0
BiH	81.8	Kupreško polje	yes	<10-15%
BiH	28.1	Vukovsko polje	no	0
BiH	4.5	Donje Zijemlje	no	0
BiH	14.1	Rakitno	yes	>10-15%
BiH	5.7	Medeno polje	no	0
BiH	22.4	Petrovačko polje	yes	<10-15%
BiH	74.5	Rastoka i Ljubuško polje	yes	>10-15%
BiH	33.1	Mostarsko blato	yes	>10-15%
BiH	21.7	Posušje	no	0
BiH	19.1	Dugo polje (Dugorudo)	yes	<10-15%
BiH	2.7	Šuičko polje	yes	<10-15%
BiH	9.4	Bjelajsko polje	no	0
BiH	8.8	Rudno polje	no	0
BiH	2.5	Dugo polje	no	0
BiH	34.2	Podrašničko polje	yes	>10-15%
BiH	22.7	Palanka	yes	<10-15%
BiH	32.7	Hutovo blato (Deransko-Svitavsko polje)	yes	>10-15%
BiH	3.9	Roško polje	yes	<10-15%
BiH	1.4	Hansko polje (Gornje Zijemlje)	No	0
BiH	4.0	Borovo polje	no	0
BiH	3.6	Kruško polje	no	0
BiH	10.1	Marinkovci	no	0
BiH	4.9	Kočerinsko polje	yes	<10-15%
BiH	2.2	Viničko polje	yes	<10-15%
BiH	3.3	Lukavačko polje	yes	<10-15%
BiH	4.1	Slato polje	yes	<10-15%
BiH	2.9	Crničko polje	no	0
BiH	1.1	Vučipolje	no	0
BiH	1.1	Jasenpolje	yes	>10-15%
BiH	5.5	Cernica	yes	>10-15%
BiH	1.4	Konjsko polje	no	0
BiH	1.0	Orahovac polje	no	0
BiH	1.8	Studeničko polje	yes	>10-15%
BiH	9.6	Grab polje	no	0
BiH	0.6	Plana	no	0
BiH	0.3	Carevo polje	no	0
BiH	6.2	Mokro polje	yes	>10-15%
BiH	4.4	Ravna Mliništa	yes	<10-15%
BiH	2.2	Gradac	no	0
BiH	408.0	Livanjsko polje	yes	>10-15%
BiH	118.9	Popovo polje	yes	>10-15%
CG	46.0	Nikšićko polje	yes	>10-15%
CG	6.9	Ljubinjsko polje	yes	<10-15%
CG	10.4	Dragalj	no	0
CG	2.3	Njeguško polje	yes	<10-15%
CG	3.1	Cetinjsko polje	yes	>10-15%
CG	1.0	Livari	no	0
HR	28.5	Čepićko polje	yes	<10-15%
HR	10.9	Fužine-Lić	yes	<10-15%
HR	40.6	Ogulin	yes	<10-15%

Country	Surface area (km²)	Karst Field	Flooded	Flooded surface (%)
HR	20.8	Plaščansko polje	yes	<10-15%
HR	7.2	Lug	yes	<10-15%
HR	1.9	Drežničko polje	yes	>10-15%
HR	95.1	Krbavsko polje	yes	>10-15%
HR	13.5	Lipovo polje	yes	>10-15%
HR	22.2	Koropolje Koreničko	yes	>10-15%
HR	16.3	Bjelopolje	yes	<10-15%
HR	71.3	Gacko polje	yes	>10-15%
HR	19.1	Vrhovinsko polje	yes	<10-15%
HR	20.6	Lapačko polje	yes	>10-15%
HR	47.7	Bare i Gračačko polje	yes	<10-15%
HR	18.1	Hrvatsačko polje	yes	<10-15%
HR	8.9	Paško polje	yes	<10-15%
HR	37.7	Petrovo polje	yes	<10-15%
HR	29.6	Trolovka	no	0
HR	66.0	Sinjsko polje	yes	<10-15%
HR	87.4	Imotsko polje	yes	>10-15%
HR	31.3	Jezero	yes	>10-15%
HR	12.7	Konavosko polje	yes	<10-15%
HR	5.6	Vrelo-Krapani	yes	<10-15%
HR	1.7	Krakar	yes	<10-15%
HR	2.7	Crnač	yes	>10-15%
HR	5.4	Stajničko polje	yes	>10-15%
HR	11.3	Mazinsko polje	no	0
HR	2.1	Dabarsko polje	yes	<10-15%
HR	8.4	Brezovačko polje	no	0
HR	6.9	Homoljačko polje	no	0
HR	8.9	Velikopopinsko polje	no	0
HR	20.2	Perušičko polje	yes	>10-15%
HR	3.7	Podpolje	yes	>10-15%
HR	1.3	Krasno polje	no	0
HR	8.8	Vrličko polje	yes	<10-15%
HR	8.8	Hrvatsko polje i Kompolje	yes	>10-15%
HR	3.5	Gušić polje	yes	>10-15%
HR	1.0	Letinac	yes	<10-15%
HR	8.1	Gubavčevo polje	no	0
HR	2.4	Brezovac Dobroselski	no	0
HR	12.7	Brinjsko polje	yes	>10-15%
HR	17.2	Krušvarsko ili Dicmo polje	no	0
HR	1.4	Dugopolje	no	0
HR	4.1	Krbavica	yes	<10-15%
HR	1.6	Trnavac	yes	<10-15%
HR	5.5	Jezerac	yes	>10-15%
HR	1.0	Aržano	yes	<10-15%
HR	459.4	Ličko polje *	yes	<10-15%
HR	1.7	Lanišče	no	0
MN	7.1	Grahovsko polje	no	0
MN	0.5	Vrbanje polje	no	0
SI	1.9	Rakitna	yes	>10-15%
SI	0.7	Močila	yes	>10-15%
SI	3.9	Radensko polje	yes	>10-15%
SI	1.3	Lučki dol	yes	<10-15%
SI	0.5	Belščica	no	0
SI	0.5	Predjama	no	0
SI	10.2	Planinsko polje	yes	>10-15%
SI	43.4	Postojnska kotlina	yes	<10-15%
SI	36.4	Cerkniško polje	yes	>10-15%
SI	8.2	Bloško polje	yes	<10-15%
SI	6.4	Resja	yes	<10-15%
SI	3.8	Rašica	yes	>10-15%
SI	0.8	Krkovo	no	0

* Conglomerate of different poljes (e.g.Otesko, Klanacko, Brezovo, Smiljansko, Vedro, Peregino and other poljes)

Country	Surface area (km²)	Karst Field	Flooded	Flooded surface (%)
SI	1.5	Mlake	yes	>10-15%
SI	26.9	Ribnica	yes	<10-15%
SI	1.7	Stržen	yes	>10-15%
SI	0.8	Palško jezero	yes	>10-15%
SI	0.2	Bačko jezero	yes	>10-15%
SI	15.9	Loška dolina	yes	<10-15%
SI	1.0	Mažnarjev potok	yes	<10-15%
SI	17.5	Kočevje	no	0
SI	2.3	Kočevske poljane	no	0
SI	2.4	Sušica	no	0
SI	2.4	Kočevska reka	no	0
SI	1.1	Briška dolina	no	0
SI	5.8	Logaško polje	yes	<10-15%
SI	2.8	Babno polje	yes	<10-15%
SI	1.1	Mirna peč	yes	<10-15%
SI	2.0	Movraška vala	yes	<10-15%
SI	0.2	Preserje	yes	>10-15%
Total	3055.8			

Annex 2: Review of population trends of waterbirds occurring in the karst poljes of the Dinarides (Wetland International 2006). Abbreviations: STA = stable, DEC = declining, INC = increasing. Species with significant population declines in bold.

Species	Region	Trend
Tachybaptus ruficollis	Europe	STA
Podiceps grisegena	Black Sea, Mediterranean	DEC
Podiceps cristatus	Black Sea, Mediterranean	DEC
Podiceps auritus	Baltic Sea, Mediterranean	DEC
Podiceps nigricollis	S & W Europe to N & W Africa	DEC
Pelecanus crispus	Black Sea, Mediterranean	INC
Pelecanus onocrotalus	Europe	DEC
Phalacrocorax carbo	N, Central Europe, Mediterranean	INC
Phalacrocorax pygmeus	SE Europe, Turkey	INC
Ardea cinerea	C & E Europe, Black Sea, Mediterranean	INC
Egretta alba	Europe	INC
Ardea purpurea	C & E Europe, Black Sea, Mediterranean	DEC
Ardeola ralloides	C & E Europe, Black Sea & Mediterranean	DEC
Egretta garzetta	C & E Europe, Mediterranean & Black Sea	STA?
Nycticorax nycticorax	C & E Europe, Black Sea, Mediterranean	DEC
Botaurus stellaris	W Europe, Mediterranean	DEC
Ixobrychus minutus	C & E Europe, Black Sea & Mediterranean	DEC
Plegadis falcinellus	E & S Europe	DEC
Platalea leucorodia	Mediterranean, N tropical Africa	DEC
Cygnus cygnus	Black Sea, E Mediterranean	DEC
Anser fabalis ssp. rossicus	Central & SW Europe	STA
Anser albifrons	SE Europe, Turkey	STA
Anser erythropus	SE Europe, Caspian Sea	DEC
Anser anser		INC
Branta ruficollis	W to N Black Sea, Caspian Sea, SE Europe	DEC
Tadorna tadorna	Black Sea, Mediterranean	STA
Anas penelope	Black Sea, Mediterranean	DEC/STA
Anas strepera	C & E Europe, Black Sea & Mediterranean	STA
Anas crecca	Black Sea, Mediterranean	
Anas platyrhynchos	Black Sea, E Mediterranean	STA?
Anas acuta	Black Sea, Mediterranean	DEC
Anas querquedula	Europe	DEC

Species	Region	Trend
Anas clypeata	Black Sea, Mediterranean	STA
Netta rufina	Black Sea, Mediterranean	DEC
Aythya ferina	Central Europe, Black Sea, Mediterranean	DEC
Aythya nyroca	E Europe, E Mediterranean, Black Sea	DEC
Aythya fuligula	Central Europe, Black Sea, Mediterranean	STA
Bucephala clangula	Middle Danube, Adriatic	
Mergellus albellus	Black Sea, E Mediterranean	
Mergus serrator	Black Sea, E Mediterranean	
Mergus merganser		
Grus grus	Algeria, Tunisia, Libya	INC
Fulica atra	Black Sea, Mediterranean	
Himantopus himantopus	C Europe, E Mediterranean, Black Sea	STA?
Recurvirostra avosetta	SE Europe, Black Sea, Turkey	STA/DEC?
Burhinus oedicnemus	Mediterranean basin	DEC
Glareaola pratincola	SE Europe, Black Sea	DEC
Vanellus vanellus	Europe	DEC
Charadrius alexandrinus	Black Sea, Mediterranean	DEC
Gallinago gallinago	South & West Europe	DEC/STA
Limosa limosa	E C Africa N of Equator, Black Sea, Mediterranean	DEC
Numenius arquata	W Europe, Mediterranean	DEC
Tringa erythropus	W & NW Africa, S & W Europe	STA?
Tringa totanus	E Mediterranean, Asia Minor...	DEC
Tringa glareola	E & S Africa, Persian Gulf, Red Sea, E Mediterranean	STA?
Actitis hypoleucos	W Africa, Mediterranean	DEC?
Arenaria interpres	E Mediterranean...	
Calidris minuta	W Europe, Black Sea, Mediterranean	DEC?
Calidris temminckii	via Black Sea, Mediterranean	
Calidris ferruginea	via Black Sea, Mediterranean	INC
Calidris alpina ssp. alpina	W Europe, Mediterranean, N & W Africa	STA
C. alpina ssp. centralis	Caspian, SW Asia, E Mediterranean	
Larus canus	Europe	DEC?
Larus audouinii	Mediterranean	INC
Larus cachinnans	Black & Caspian Seas...	INC
Larus ridibundus	Mediterranean	
Larus genei	Black Sea, Mediterranean	STA
Sterna nilotica	Black Sea, E Mediterranean	DEC
Sterna caspia	Mediterranean	INC
Sterna sandvicensis	Mediterranean, Black Sea	FLU
Sterna hirundo	S, W & NE Europe	STA
Sterna albifrons	E Europe, E Mediterranean, Black Sea	DEC
Chlidonias hybridus	E Europe, E Mediterranean, Black Sea	STA
Chlidonias niger	W, C & S Europe	DEC

Lake Skadar-Shkoder, 29th June 2009 / photo B. Stumberger

Habitat mapping of the Livanjsko Polje (BA), the Neretva Delta (HR, BA) and Lake Skadar-Shkoder (ME, AL)

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1 Introduction

The project is embedded in the Adriatic Flyway Project and provides basic habitat maps for the three project areas of Livanjsko Polje (Bosnia and Herzegovina), the Neretva Delta and the lower Neretva (Croatia and Bosnia and Herzegovina) and Lake Skadar-Shkoder (Montenegro and Albania) as indicated in Figure 1 to support nature conservation, environmental impact assessments and spatial planning purposes.

Figure 1: The location of the three project areas

2 Description of the three project areas

The core area of the Livanjsko Polje is limited to the polje valley floor, defined by the surrounding roads and settlements followed by mountainous slope forests. It includes Busko reservoir, which was constructed on the former southern part of the Livanjsko Polje system for hydro energy production in the adjacent Cetina valley. Ritter-Studnicka et al. (1971 and 1972) prepared a detailed vegetation analysis of the area.

The core area of the Neretva Delta is defined in the south by the estuarine and fluvial lowland of the Neretva delta and Neretva including all lateral swampy areas (fed by numerous karst springs), in the northeast by the large protected Hutovo Blato lake system, and in the northwest by the city of Capljina, where the middle Neretva narrow valley starts upstream. Bonacci (2004) gives an overview of the vulnerable karst water system of the eastern Neretva catchment.

The Lake Skadar-Shkoder system comprises all major western karst spring tributaries and the main Moraca tributary spreading northwest in the direction of the city of Podgorica. It includes the whole lowland of the Montenegrin lake shore as well as the sediment fans and shores of the Albanian cost. Only the rocky south shore was covered as a small assessment band. The outflow, the Bojana-Buna (-Drin) System, was covered in a previous project, which was directly connected to this analysis. Boskovic et al. (2004) give a good introduction into the genesis and the hydrological regime of Lake Skadar-Shkoder. Stumberger et al. (2005) highlight the ecological importance of the Bojana/Buna Delta.

3 Methodology and results

As input data, several Landsat satellite images (interpolated 15 m ground resolution) from 2000-2003 covering wet and dry conditions in spring and late summer were used as background information and to estimate initially the flood dynamics in all

Figure 2: Delta of the Moraca River, the largest tributary of Lake Skadar-Shkoder, creating a unique floodplain landscape / photo U. Schwarz, FLUVIUS

areas. In addition, three SPOT 5 m infrared colour images from 2002-2005 for the three core areas enabled seamless habitat classifications. To estimate the historical landscape development, CORONA b&w images (5 m ground resolution) from 1963-69 covering wet and dry scenes were analysed. A total number of 3,000 ground and 500 airborne images (only for Livanjsko Polje) from early summer 2007 supported the survey. Topographical maps (1:50,000) from about 1980, as well as historical maps (third Austrian "Landesaufname" 1880-1910 on a scale of 1:75,000 and additional available maps) served as background and for the raw historical landscape analysis. Finally, data on vegetation, hydrology and geographical description supported the analysis.

Based on dry and wet landsat scenes and a 5 m ground resolution infrared SPOT satellite image, the habitats where classified, segmented and mapped. Due to the limited spectral and textural resolution of the used satellite images, high resolution satellite data from freely available sources such as Google Earth were used in addition for calibration and enhancements. From the technical view point, a strong integration from ENVI EX (feature extraction module for image segmentation) as remote sensing software, ArcGIS as main GIS software and the exchange with GoogleEarth was implemented.

The extractable, mapped landscape and habitat patches were set into relation to the EUNIS and Natura 2000 classification scheme where possible, taking available local vegetation literature into consideration. In total, an area of 234,670 ha was mapped (Livanjsko Polje 53,236 ha, Neretva Delta 45,670 ha and Lake Skadar-Shkoder with Drin/ Bojana-Buna 135,764 ha visualized in 63 1: 25,000 maps.

The following figures summarize and highlight the

Table 1: Landuse structure/ habitat types (as extracted mostly from remote sensing analysis) and corresponding EUNIS and FFH classification (where possible), as well as occurrence in the three project areas (main type groups are sorted in different grey colours: 1. Waters, 2. Swampy vegetation, 3. Grasslands, 4. Forests, 5. Agriculture, and 6. Settlements and infrastructure)

Code and name in map	Code and name of EUNIS habitat	Code and name of FFH habitat (*priority habitats)	Lake Skadar-Shkoder	Neretva Delta	Livanjsko Polje
0-Adriatic Sea			x	x	
96-Adriatic Sea littoral (coastal waters)			x	x	
89-Shallow sea water sand	A5.2-Sublittoral sand	1110-Sandbanks which are slightly covered by sea water all the time	x	x	
5 Lagoon, brackish water, Salina		*1150- Coastal lagoons	x	x	
1-Rivers		3260-Rivers with Ranunculion fluviantis and Callitricho-Batrachion, 3220-Alpine rivers and the herbaceous vegetation along their banks	x	x	x
84-Temporary streams (residual water)			x	x	x
2-Canals			x	x	x
3-Karst springs			x	x	x

Code and name in map	Code and name of EUNIS habitat	Code and name of FFH habitat (*priority habitats)	Lake Skadar-Shkoder	Neretva Delta	Livanjsko Polje
4-Lake, Floodplain waters		3150-Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* – type vegetation	x	x	x
98-Filled gravel pits			x	x	
7 Floating leaves scattered	C1.31-Free-floating vegetation, C1.32-Free-floating vegetation of eutrophic waterbodies, C1.33-Rooted submerged vegetation of eutrophic waterbodies	3150-Natural eutrophic lakes with *Magnopotamion* or *Hydrocharition* – type vegetation	x	x	
8 Floating leaves			x	x	x
9 Floating leaves dense			x	x	
10 Pioneer silt			x	x	
11 Pioneer sand			x	x	
12 Pioneer gravel			x	x	x
13 Rocky pioneer			x	x	x
62 Gravel beach			x	x	
63 Rocky beach		1240-Vegetated sea cliffs of the Mediterranean coasts with endemic *Limonium* spp.	x	x	
14 Reed with cattail			x		
15 Reed			x		x
16 Reed with willows			x		
82 Drained reeds for agri.				x	
70 Karst-Fen scattered bottom vegetation	C1.67-Turlough and lake-bottom meadows D5.24-Fen [Cladium mariscus] beds, Fen D5.31-[Cladium] beds	*3180- Turloughs, *7210-Calcareous fens with Cladium mariscus and species of Caricion davallianae *7110 Active raised bogs 7120-Degraded raised bogs still capable of natural regeneration			X
71 Karst-Fen vegetation with bulk sedges					X
72 Karst-Fen vegetation fringes with succession					X
73 Degradated Karst-Fen veg. drained for peat reclamation					x
44 Brush succession in drained areas on peat					x
85 Fan sedge and bush-type sedges				x	
97 Carex, juncus swampy			x	X	
17 Sandy beach, shore line			x	X	
18 Pioneer coastal Dunes		2160-Dunes with *Hippophaë rhamnoides,* (2210-*Crucianellion maritimae* fixed beachdunes)	x	X	
19 Muddy banks brackish		1140-Mudflats and sandflats not covered by seawater at low tide	x	X	
99 Beach swamps with Carex, Juncus, salt meadows	(no corresponding Eunis class)	1410-Mediterranean salt meadows (*Juncetalia maritimi*), 1420-Mediterranean and thermo-Atlantic halophilous scrubs (*Sarcocornetea fruticosi*)	x	X	

Code and name in map	Code and name of EUNIS habitat	Code and name of FFH habitat (*priority habitats)	Lake Skadar-Shkoder	Neretva Delta	Livanjsko Polje
20 Meadow/pasture wet	E3.51 -[Molinia caerulea] meadows and related communities	6410-Molina meadows	x	X	x
21 Meadow/pasture moist			x	X	x
22 Meadow/pasture dry		*6210-Semi-natural grasslands (Festuco-Brometalia *important orchid sites	x	X	x
45 Slope meadows and hedgerows					x
23 Gravel steppe/pasture dense			x		
24 Gravel steppe/pasture scattered			X		
25 Med. succession incl. grasslands on rocks			X	x	
26 Dry grassland with hedgerows			x	x	x
29 Dry open grasslands on pebbly substrate (in polje flooded)					x
30 Willow shrub	G1.1-Riparian [Salix], [Alnus] and [Betula] woodland, G1.211-[Fraxinus] - [Alnus] woods of rivulets and springs	*91E0-Alluvial forests with Alnus, Fraxinus and Salix	X		x
31 Willow softwood			X		x
47 Willow-polar woods			x	x	
32 Willow-poplar-alder-birch woods					x
27 Alder woods					X
39 Tamarix shrub			X		
33 Hardwood wet	G1.223-South-east European [Fraxinus] - [Quercus] - [Alnus] forests	91F0-Riparian mixed forests of Quercus, Ulmus and Fraxinus	X		
28 Scattered ash woods					x
34 Hardwood			X		
74 Polje Oak Woods					x
35 Montenegrin oak-hornbeam wood			X		
86 Subalpine-Mediterranean hornbeam forest					x
36 Lake slope wood			x	x	
37 Mediterranean wood			X	x	
38 Mediterranean shrub			X	x	
46 Scattered dry slope forest					x
81 Other forests/conf. plantations		9260-*Castanea sativa* woods (area 3 only)	x	x	x
60 Rock mountains (in forested areas)			X		x
40 Extensive (small scale) agriculture incl. orchards			X	x	x
41 Large scale agriculture			X	x	
42 Plantations/ Vineyards			X	x	
43 Fallow land			X	x	x
44 Vineyards, orchards			X		
80 Drainage agriculture (mostly tangerine)				x	
83 Glasshouse cultures				x	
50 Settlement dense			X	x	x
51 Settlement scattered			X	x	x
52 Single Houses/infrastructure/ruin			X	x	x
53 Main road			X	x	x
54 Small road			X	x	x
55 Railway			X	x	
61 Gravel extraction, quarry, construction works			X	x	x
79 Harbour, industry, markets				x	
88 Rip-rap, major guiding wall, dike				X	x
56 Airport				X	

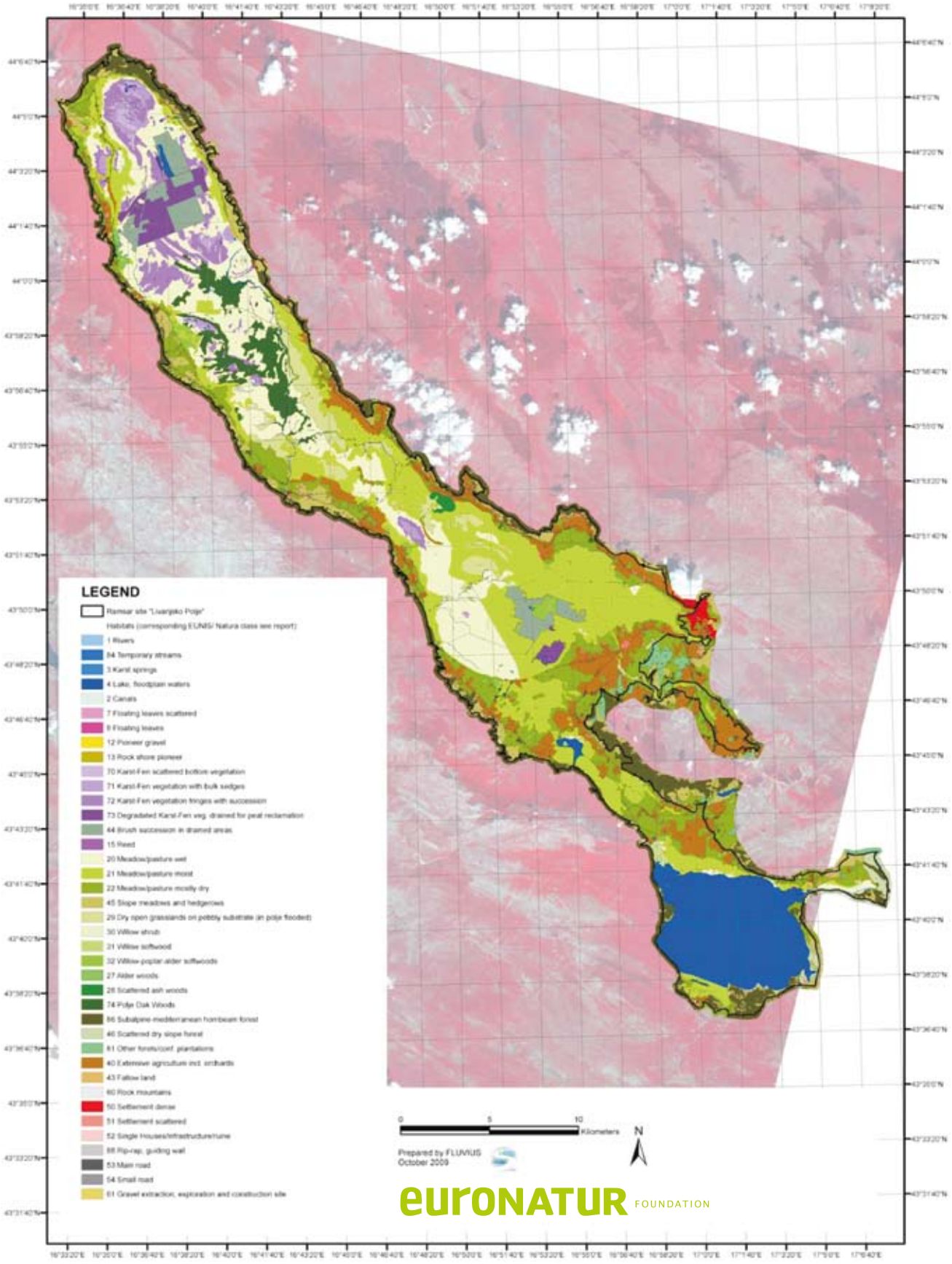

Figure 3: Livanjsko Polje Habitat mapping

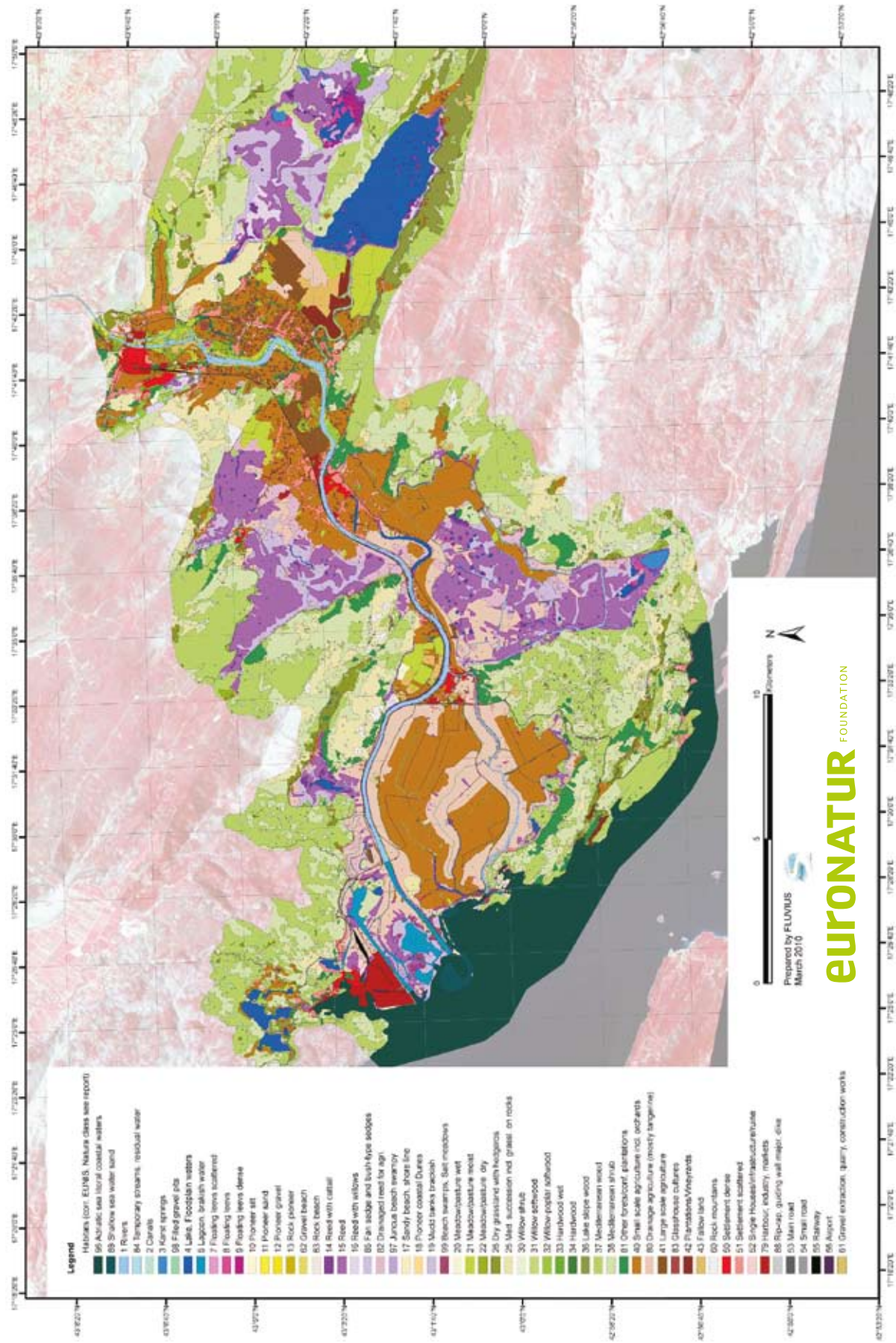

Figure 4: Neretva Delta Habitat mapping

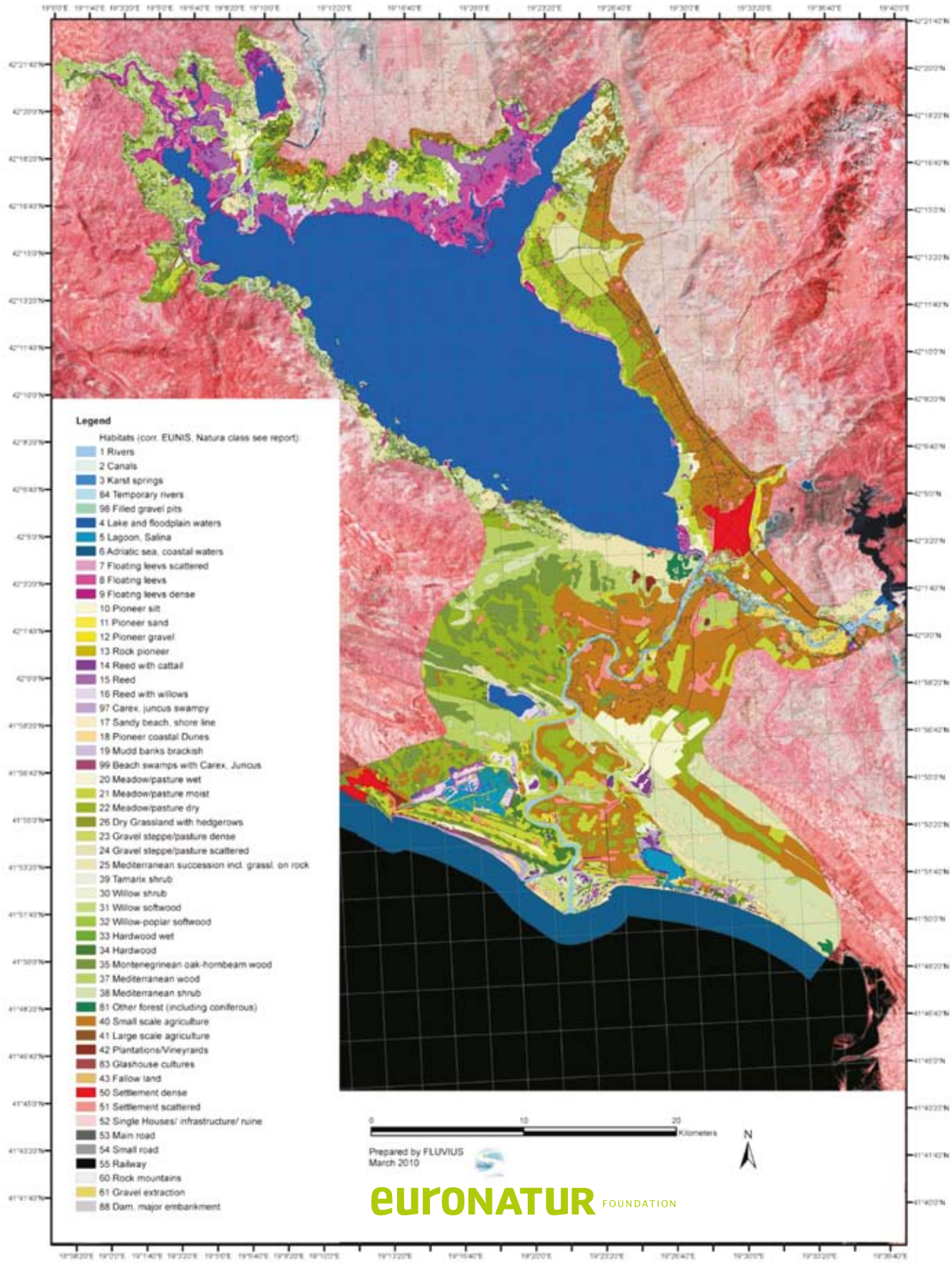

Figure 5: Skadar Lake, Bojana-Buna and Drin Rivers Habitat mapping

importance of the three wetlands (the attention should be set to the total values for habitats, as the total area size of the three areas is significantly different). Fig. 6 starts with the river, lake and coastal waters and lagoon ecosystems, including pioneer stands such as silt, sand and gravel bars, beech, coastal dunes and mud banks of the lagoons (only the Neretva Delta and Lake Skadar-Shkoder) as well as water bodies with floating carpets of macrophytes (in particular relevant for Lake Skadar-Shkoder).

Second group of important habitats are the reed beds, swamps and water related forests (Fig. 7). For the Livanjsko Polje, the greater part of the area is covered not by Common Reed but strongly endangered karst swamps (bottoms of temporary shallow karst lakes). Remarkable is the extent of hardwood forests (oak) in the Livanjsko Polje as well as the more than 4,000 ha of softwood (a large part belonging to Lake Skadar-Shkoder), which equals the last remaining large softwood stands at the middle and lower Danube, such as the Kopacki Rit (HR, RS) and Small Braila island (RO).

Last group (Fig. 8) shows the grassland distribution and indicates the importance of the Livanjsko Polje regarding wet and moist grasslands. Excluded from the summary are smaller grasslands within agricultural

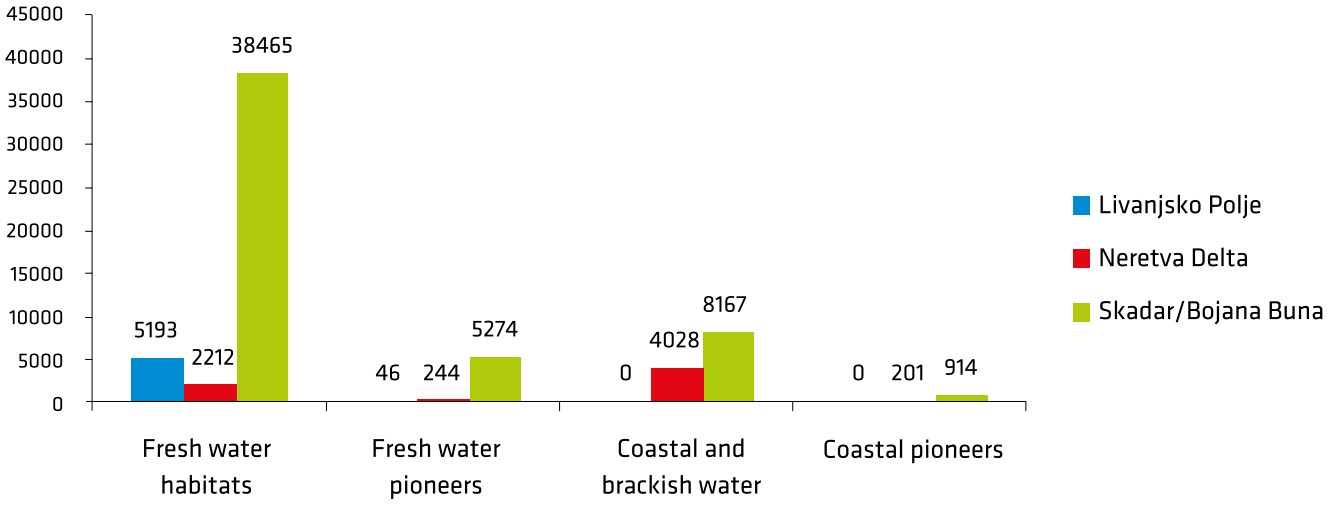

Figure 6: Fresh water habitats (rivers, lakes), pioneer stands and floating carpets of macrophytes, as well as coastal and brackish waters with coastal pioneer area in ha.

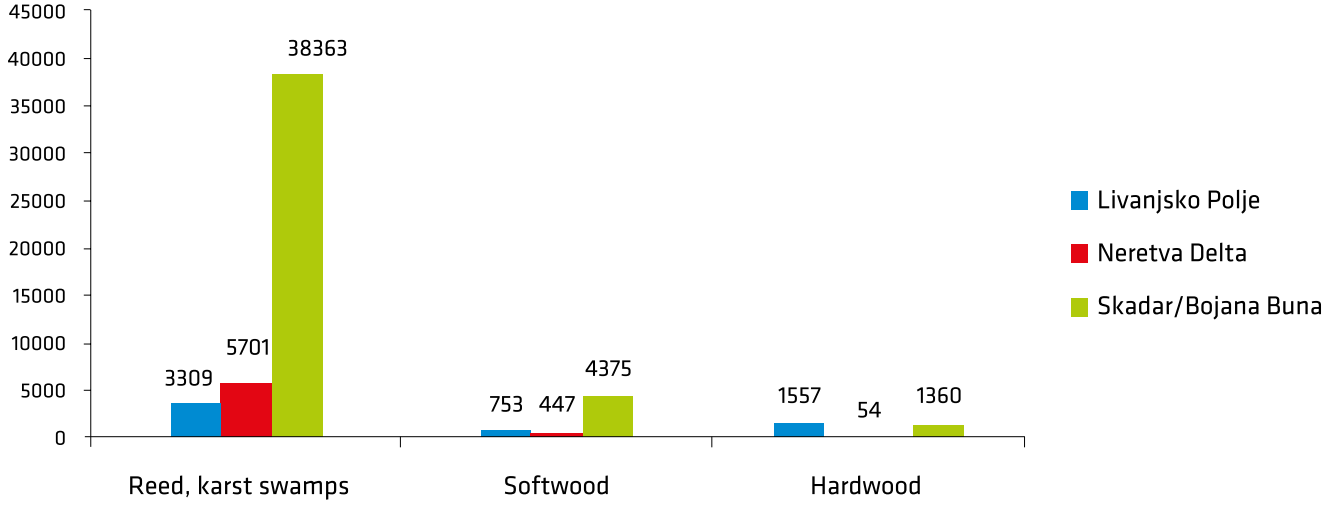

Figure 7: Habitat distribution in ha.

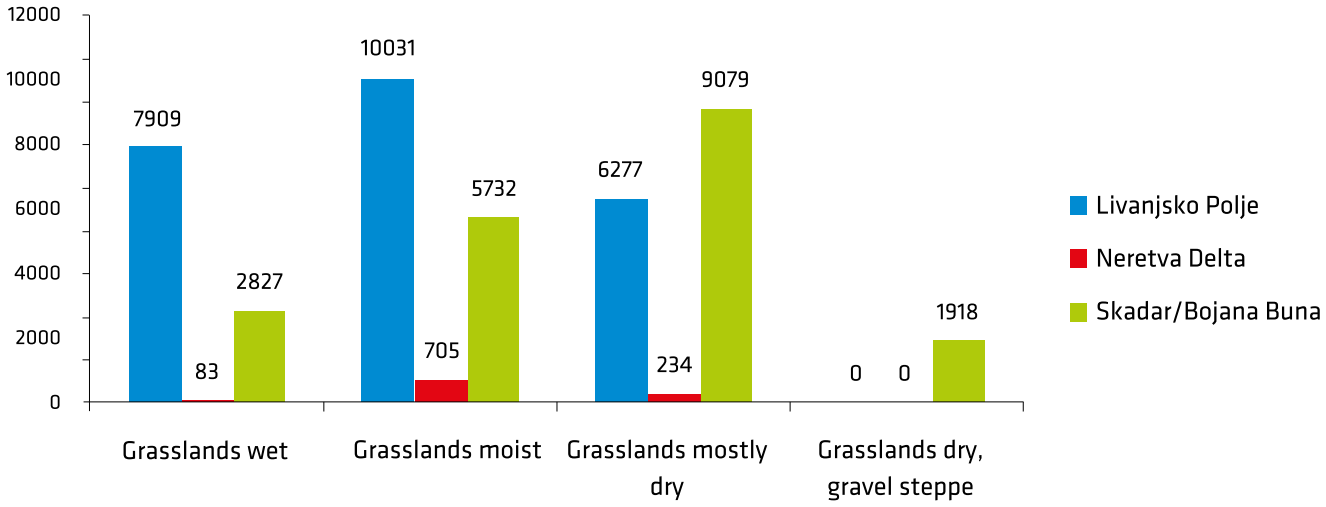

Figure 8: Habitat distribution in ha

areas located outside the flooded plains. Special attention should be given to the steppe habitats on a huge gravel fan on the north-eastern coast of Lake Skadar-Shkoder in AL. The most valuable wet (and dry) habitats are still used as pastures.

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Olive trees / photo M. Schneider-Jacoby

Guidelines for the Zonation of Lake Skadar-Shkoder

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1 Introduction

Lake Skadar will undergo a huge development in the near future. After many years along the Iron Curtain with a strictly controlled border until 1990, the region will now attract tourists and guests and rehabilitate its former image as a unique natural site in Europe. After the embargo and the political changes in the former Yugoslavia have restricted the development of this region between Albania and Montenegro for several years, now the time has come to develop new capacities and to use the natural and cultural values as a Unique Selling Point (USP) for the regional development.

After the independence gained by Montenegro, only the Kosovo question has remained unsolved in the region, which might hinder tourism development. But a new highway from Tirana to Pristina is already under construction. The accession process to the European Union will stimulate the development as seen in natural areas in other SEE countries. Several new built restaurants and some under construction along the former strictly protected border area in the north of the Lake in Albania, one of them only 100 meters from the border, prove the actual increase of interest and also the threats facing the landscape and species, if no clear development concept will streamline these activities.

The actual stimulation of transboundary tourism by the agreements of the Ministers of the Environment in 2006 is a new approach to increase the boat traffic on the Lake. Other plans, such as enlargement of the Port of Virpazar, building of marinas in the National Park, the vision to use the Bojana-Buna River again for boating, and plans to stimulate sailing and surfing as part of tourist development will lead to an increase in boating and a huge disturbance on the entire Lake. The new and fairly large harbour in Plavnica in the centre of reed beds and water vegetation of the National Park provides many people with anchoring places for their new ships, which will lead to increased disturbance by leisure, motor, tourist and angling boats on the Lake. The area faces demands that did not exist in former times and are in need of urgent management measures to avoid further biodiversity losses.

Concerning the conservation of natural heritage, a concept is needed as to how the use of the Lake and development of its tourism can be controlled in a way that the following indicators are preserved:

- the unspoilt natural landscape of the Lake with only very few (fishing-) boats and no sailing boats at all,
- the specific habitats (e.g. EMERALD network) as floating and submersed vegetation with important indicators such as the Whiskered Tern *(Chlidonias hybridus)*,
- the endangered species, such as the Dalmatian Pelican *(Pelecanus crispus)*, which can only survive if the existing and increasing disturbance is controlled,
- the existing populations of breeding birds and their colonies including their feeding sites on the Lake,
- and the importance of the Lake as an internationally important resting site of migrating water birds with a capacity of more than 300,000 resting birds in need of undisturbed resting and feeding sites on the Lake.

Concerning the conservation of natural heritage, a concept is needed as to how the use of the Lake and development of its tourism can be controlled.

To preserve the natural heritage of the Lake, next important objectives have to be reached:

a) a transboundary zonation of the Lake based on international standards, such as the UNESCO Biosphere concept and/or the Ramsar Convention, to adjust the different levels of protection in both countries,
b) a transboundary management plan based, for example, on the Ramsar guidelines including common binding regulations for boating and fishing to achieve a clear common vision for sustainable development and wise use,
c) well organised, independent and well equipped management organisations to protect the areas in both countries,
d) transboundary cooperation according to the guidelines of the Ramsar Convention and the EU Water Frame directive, and
e) verification of the management based on the Europarc basic standards for transboundary cooperation in the protected area management.

The proposed zonation guidelines are based on the legal protection of Lake Skadar in both countries and at different protection levels[1].

2 Overall Goal

The increasing number of visitors at Lake Skadar – a 10-time increase of visitors is possible in the next ten years - is to be controlled by strictly considering the transboundary zonation and visitor information and guide system. Thus the natural habitats and pristine landscape including flora and fauna would be preserved in full and without impacts that threaten the natural and cultural assets. The number of wintering birds –at least 300,000 in 2020 - and the size and number of breeding colonies would increase. The Dalmatian Pelican should build a stable breeding colony – with at least 50 pairs breeding in 2020 – protected from human disturbance. Bird watching should become a mayor activity of the guests visiting the area throughout the year.

To fulfil these goals, the following objectives are to be met:

- Guests and local people are guided around the sensitive areas (e.g. large scale strictly protected core zone around the potential pelican breeding areas and other important colony sites).
- Birds and other natural assets are presented near to the easily accessible public areas. The zonation will draw birds, including pelicans, to the visitor points (e.g. core zone in the centre of the National Park at Vranjina or Shkodra).
- Areas envisaged for tourism development and housing are clearly defined and do not impact neither the important habitats nor the overall landscape values of the protected areas on both sides of the border.
- The preservation of local use rights and the traditional landscape use are clearly identified in the zonation. Local fishermen are protected and areas in need of sustainable use, such as meadows and pastures, are defined.
- Supervision of the use is provided for the whole Lake based on best practice, registration and licences.
- Monitoring of the key indicators proves the effectiveness of the zonation and management measures.

[1] http://www.iucn.org/themes/wcpa/wpc2003/pdfs/outputs/pascat/pascatrev_info3.pdf#search=%22IUCN%20categories%22

Grazing along Lake Skadar, 15th June 2008 / photo D. Denac

Montenegrin part of Lake Skadar, 14th June 2008 / photo D. Denac

3 Actual Problems to be Solved

The use of Lake Skadar by boats, although still in small numbers, is unsustainable, because:

a) Numbers and registration of the boats on the Lake are lacking even inside the National Park[2], which makes control of boating and violation of regulations ineffective or even impossible.
b) Impact of boating can be clearly seen on the whole lake surface and even inside the most sensitive and internationally protected habitats, such as floating vegetation.
c) Illegal activities, such as poaching and bird hunting, are not effectively controlled.
d) For many years, the flagship species Dalmatian Pelican has had no or hardly any breeding success due to disturbance by fishermen, poachers, birdwatchers and all kinds of uncontrolled boating. The colony and symbol of the whole Lake, situated in the National Park in Montenegro, is highly endangered.
e) The number of fast motor boats – speedboats – is increasing in the National Park (ME), although these boats are known to damage the natural assets (floating vegetation), irradiate colonies of Whiskered Terns by large unnatural waves[3], ruin the remoteness and quietness of the Lake and are used for illegal activities, such as poaching.
f) Planned and legal protected zones are not clearly defined and/or clearly marked.
g) Lake tourism is promoted with no clear vision. The Unique Selling Points (USP) and tourist activities, which are possible without damaging the ecological and economic assets of the Lake, have not been defined yet.
h) Legal and illegal activities, which are already carried out (gravel excavation, building) or are being planned (peat excavation, marinas, roads, tourist facilities...) impact natural habitats.

4 International Standards

4.1 IUCN Protected Area Categories

The Guidelines for the Protected Area Management Categories have been developed by the IUCN World Commission on Protected Areas with the assistance of the World Conservation Monitoring Centre.

In Montenegro, Lake Skadar is protected as a National Park IUCN Cat II:

CATEGORY II: National Park: protected area managed mainly for ecosystem protection and recreation
Definition: Natural area of land and/or sea, designated to

[2] A single exception has been noted. At Koplik, boats had registration numbers.
[3] About 50% of the floating water carpets, mainly west of Vranjina, are already without colonies of Whiskered Terns; a huge impact that is to be mitigated.

a) protect the ecological integrity of one or more ecosystems for present and future generations,
b) exclude exploitation or occupation inimical to the purposes of designation of the area, and
c) provide a foundation for spiritual, scientific, educational, recreational and visitor opportunities, all of which must be environmentally and culturally compatible.

In Albania, Lake Skadar is protected as a Managed Protected Area (IUCN Cat. IV):

CATEGORY IV: Habitat/Species Management Area: protected area managed mainly for conservation through management intervention
Definition: Area of land and/or sea subject to active intervention for management purposes, so as
a) to ensure the maintenance of habitats, and/or
b) to meet the requirements of specific species.

The priority management objectives of both IUCN Categories II (MNE) and IV (AL) are biodiversity protection and environmental services. As the key objectives are the same, the creation of a coherent transboundary zonation system is necessary and will help to achieve the objectives of each protected area.

4.2 Ramsar Conventions

The Ramsar Convention provides important tools for the preservation and development (wise use of wetlands):

X. Management units, zonation and buffer zones

53. In general, the management planning process and management plan should cover the entire site. However, where a wetland site is composed of more than one discrete sub-site separated by areas of other land use (for example, discrete wetlands along the floodplain of a major river), separate management plans for each sub-site may be appropriate. However, such individual sub-site plans must fit under the umbrella of an overview plan that should be prepared before those for the sub-sites.

54. Likewise, where the wetland is very large, it may be helpful to divide the site for management planning purposes into several contiguous zones or regions, and to develop separate management plans for each of these zones, again under the umbrella of an overall plan prepared in advance.

55. Several other types of zonation may be appropriate for application to different sites, depending on their characteristics and their relationship to other land uses in the surrounding area. Ramsar sites range from only the area of wetland itself to the inclusion of substantial areas of surrounding non-wetland habitats, often with multiple land-uses. This great variety of what is included within the boundaries of Ramsar sites means that any zonation scheme applied under the Convention must be sufficiently versatile and flexible to cover this variety of site characteristics.

56. When the Ramsar site itself does not include a buffer zone, it is generally appropriate for management planning purposes to identify and establish such buffer zone around the core wetland area defined within a Ramsar site or other wetland. The buffer zone should be that area surrounding the wetland within which land use activities may directly affect the ecological character of the wetland itself, and the objective for land use within the buffer zone should be one of sustainable use through ecosystem

Figure 3: Protected area management objectives and IUCN protected area categories (adapted from IUCN, 1994)

Management objective	Ia	Ib	II	III	IV	V	VI
Science	1	3	2	2	2	2	3
Wilderness	2	1	2	3	3	-	2
Biodiversity protection	1	2	1	1	1	2	1
Environmental services	2	1	1	-	1	2	1
Natural/cultural features	-	-	2	1	3	1	3
Tourism and recreation	-	2	1	1	3	1	3
Education	-	-	2	2	2	2	3
Sustainable use	-	3	3	-	2	2	1
Cultural attributes	-	-	-	-	-	1	2

1 = Primary objective; 2 = Secondary objective; 3 = Potentially applicable objective; - = Not applicable

Prisoner Island Grmožur, former Common Tern *(Sterna hirundo)* and Dalmatian Pelican *(Pelecanus crispus)* breeding site, Lake Skadar / photo O. Vizi

management, consistent with the maintenance of the ecological character of the wetland. When a wetland site is composed of discrete sub-sites, a buffer zone should be defined for each, including, where appropriate, all the area between the sub-sites.

57. The location of a buffer zone in relation to the core wetland area of a designated Ramsar site will vary depending upon what ecosystems are included within the site boundaries. Where the designated site is only the wetland itself, then for management purposes a buffer zone should be defined in the surrounding area outside the designated site. In contrast, where the site encompasses the wetland and its surroundings, the buffer zone should extend to the boundaries of the designated site, and then a ‚core area', perhaps the wetland ecosystem itself, defined within the site.

58. As described in Section III, the dependence of wetlands on water supply from outside the wetland means that for the purposes of wetland management planning the river basin or catchment area of the coastal zone should be viewed in effect as a buffer zone for the wetland, since water and land-use in these extended areas indirectly affect the ecological character of the wetland. However, particularly in the case of a wetland within a very large river basin, basin-scale or coastal zone management may be seen as a third, outer zone for management purposes, and a more limited buffer zone immediately surrounding the wetland may still be a necessary management planning tool.

59. The Biosphere Reserve zonation concept, in which the site may include up to three zones - core zone, buffer zone (for research and training) and transition zone (for sustainable use) - is potentially applicable to all Ramsar sites, and should be applied whenever feasible and appropriate. Its application is particularly important where a site is designated as both a Ramsar site and Biosphere Reserve, and here the relationship between the Ramsar site boundary and the zonation established for the Biosphere Reserve should be clearly established.

60. Although many Ramsar sites are within protected areas, where the primary land-use within the site is wetland conservation, many are, like Biosphere Reserves, multiple use sites. In the latter, the management objectives for the use of the core wetland are broadly to ensure that the ecological character of the wetland is maintained or enhanced so as to continue to provide its values and functions for people's livelihoods and for biodiversity conservation.

The Dalmatian Pelican should build a stable breeding colony – with at least 50 pairs breeding in 2020 – protected from human disturbance.

Gaining knowledge for conservation, Lake Skadar, 16th June 2008 / photo D. Denac

61. Any zonation scheme should recognize the existing multiple uses of Ramsar sites and their surroundings, and ensure that management objectives for the core zone are designed primarily to maintain the ecological character of the wetland, as well as that those for any form of surrounding buffer zone are consistent with this maintenance of the ecological character. Clear, separate but complementary and mutually supportive management objectives should be established for each zone.

62. Another approach to zonation, and one that is not mutually exclusive to the ‚core/buffer zonation' approach, is that of establishing zonation for a particular use of a site. An example could be the use and development of a wetland for ecotourism. Here, zonation would be used to establish in which parts of a site ecotourism access can occur, where ecotourism infrastructure should be placed (e.g., the sensitive siting of a visitor centre), and from which parts of a site ecotourism should be excluded owing to the sensitivity of those parts of the ecosystem to disturbance. Such zonation schemes will generally cut across the core and buffer zones.

63. The experience of the Man and the Biosphere Programme, under which zonation is recognized as an important part of the delimitation and management of Biosphere Reserves as multiple use sites, is that zonation plays an important role in minimizing user conflicts by separating potentially conflicting activities whilst ensuring that legitimate land uses can continue with minimal conflict.

64. The establishment of a zonation scheme should involve full stakeholder participation from the earliest stage, since it is in ‚drawing the lines' between zones that many conflicts can materialize. Establishing zonation and management objectives for each zone (and hence what activities should and should not be permitted within each zone) is an important part of the process of establishing a close involvement of local communities, indigenous peoples, and other stakeholders in the management of the wetland.

65. Some general rules should be applied when establishing zones, regardless of their type and purpose:

i) zonation should be established with the full involvement of stakeholders, including local communities and indigenous peoples;
ii) a full and detailed rationale should be made to explain the basis for establishing and delineating zones, and this is particularly important when establishing the limits of buffer zones;
iii) a concise description of the functions and/or restrictions applied within each zone must be prepared as part of the management plan;
iv) zones should be identified with a unique and, if possible, meaningful code or name: but in some cases, a simple numerical code may be adequate;
v) a map showing the boundaries of all zones must be prepared;
vi) where possible, zone boundaries should be easily recognizable and clearly identifiable on the ground: physical features (for example, fence lines and roads) provide the best boundaries, and boundaries based on dynamic features, such as rivers, mobile habitats, and

soft coastlines, must be identified with some form of permanent marker; and

vii) on large, uniform sites, or in areas of homogeneous habitat crossed by a zone boundary, fixed permanent markers with locations mapped using a Global Positioning System (GPS) should be used.

4.3 UNESCO Biosphere Reserve

Biosphere reserves are developed to reconcile the conservation of biodiversity with economic development[4]. Biosphere reserves are sites recognized under UNESCO's Man and the Biosphere Programme, which innovate and demonstrate approaches to conservation and sustainable development. They are of course under national sovereign jurisdiction, yet share their experience and ideas nationally, regionally and internationally within the World Network of Biosphere Reserves. There are 531 sites worldwide in 105 countries.

UNESCO believes that utilization and conservation of land and water resources should go hand in hand, and that an interdisciplinary approach and long term vision are key. Biosphere reserves are much like laboratories where new and optimal practices to manage nature and human activities are tested and demonstrated. They outpace traditional confined conservation zones, combining core protected areas with zones where sustainable development is fostered by local dwellers and enterprises. Their governance systems are often highly innovative. In some cases, new legislation can be introduced. Biosphere reserves have three inter-connected functions:

Conservation: landscapes, ecosystems, species and genetic variation.

Development: economic and human and culturally adapted.

Logistic support: research, monitoring, environmental education and training.

They generate knowledge and experience, which can be used in the wider land and seascape. They are tools to help countries implement the results of the WSSD and, in particular, the Convention on Biological Diversity and its Ecosystem Approach. They are "learning sites" for the UN Decade on Education for Sustainable Development.

The Madrid Action Plan for Biosphere Reserves (2008 – 2013) defines the importance of zonation:

ZONATION – LINKING FUNCTIONS TO SPACE (E.2)[5]

According to the Statutory Framework, biosphere reserves should contain one or more core areas, buffer zones, and a transition area to accommodate their multiple functions. Facing new challenges, it is important to shift towards a more integrated zoning. Thus the transition area, in addition to the development function, can also consider conservation/ environmental goals and elements. Equally the core area, in addition to its conservation function, contributes to a range of ecosystem services which, in terms of the development functions, can be calculated in economic terms (e.g. carbon sequestration, soil stabilization, supply of clean water and air, etc.). Employment opportunities can also complement conservation goals (e.g. environmental education, research, environmental rehabilitation and conservation measures, recreation and eco-tourism). While education, research, monitoring and capacity enhancement are seen as components of the logistic or knowledge generation function of biosphere reserves, they are also integral to the conservation and development functions.

Special attention is to be given to the buffer zones. Their role is to minimize negative and external effects of human-induced activities in the core areas. In addition to the buffering function related to the core areas, buffer zones can have their own intrinsic, 'stand alone' functions for maintaining anthropogenic, biological and cultural diversity. Buffer zones can also have an important connectivity function in a larger spatial context, as they connect biodiversity components within core areas with those in transition areas. People live and make a living in transition areas which are characterized by multiple land uses.

[4] http://portal.unesco.org/science/en/ev.php-URL_ID=4801&URL_DO=DO_TOPIC&URL_SECTION=201.html
[5] http://unesdoc.unesco.org/images/0016/001633/163301e.pdf

Transition areas have a central function concerning socio-economic development. In the past, a shortcoming of the transition area was that its outer boundary was not required to be delineated or spatially-defined. But the establishment of cooperation plans and concepts, implementation of co-operation projects and fostering of committed citizenship need clear boundaries that are easy to accept and to understand.
Furthermore, the inclusion of the total area of a biosphere reserve in the WNBR needs to be clearly specified; hence, while acknowledging the arbitrary or fuzzy nature of transition area boundaries, they nevertheless must be specified. Cooperation, however, can extend beyond those boundaries, for sharing best practices, solutions and approaches with

Biosphere reserves are much like laboratories where new and optimal practices to manage nature and human activities are tested and demonstrated.

the wider region, thus fulfilling the role of biosphere reserves as learning sites for regional sustainable development. While countries maintain flexibility at the national levels with regard to the definition of zones, the following actions are to be taken in order to make biosphere reserves more effective in combining conservation, sustainable use of resources and knowledge generation through integrated zonation and collaborative management.

5 Basic Data and Information for the Zonation of Lake Skadar

5.1 Habitat Map

The basic map for the zonation is the habitat map of the Lake. The differentiation of natural habitats and cultural landscape is of particular importance important as far as zonation is concerned.

5.2 Important Sites for Breeding Birds

Since 2008, all bird colonies around the whole Lake have been mapped. This information is important to select core areas and preserve key values of the Lake for biodiversity protection and tourism.

5.3 Distribution of Birds on the Lake

In 2007, first maps were produced by a joint team of people from Lake Skadar National Park, APAWA and EuroNatur. The programme is supported by the MAVA foundation. The distribution maps are important to show the value of the different parts of the Lake in relation to species and time of the year.

5.4 Monitoring of Water Birds (IWC)

To the monitoring of water birds, a special international programme is dedicated, i.e. the International Waterbird Census (IWC)[6].
Here baseline data exist for the whole Lake. The IWC can be used as an indicator for the success of measures and to compare the values of Lake Skadar with other sites at the European and global levels.

5.5 Further Ecological Data

Further important ecological data are needed concerning the values of small sites, e.g. for special plants or endangered animals poorly distributed at the Lake.
Small habitats are, for example, open sandy shores or karst wells. As they can host a variety of different species of flora and fauna, special attention has to be paid to such sites. A good resource for the Montenegrin part is the monograph by Karaman & Beeton (1981)[7].
Sensitive areas, which play an important role in conservation, have to be defined in the zonation concept. A good example is, for example, the wintering sites for fishes already protected by the physical plan of the National Park.
Other areas in need of special protection are spawning grounds for fish or nesting sites of birds of prey, e.g. in cliffs.

[6] http://www.wetlands.org/Whatwedo/Wetlandbiodiversity/MonitoringWaterbirds/tabid/773/Default.aspx
[7] Karaman G S & Beeton A M (1981): The Biota and limnology of Lake Skadar. Titograd.

5.6 Human Use of the Lake

5.6.1 Grassland use

A neglected but very important zone is the flooded area of Lake Skadar, which is used as grassland, both pastures and meadows. In Montenegro, large areas are already unused and overgrown by marsh vegetation.

5.6.2 Visitor management plan

The Zonation of Lake Skadar has to combine nature conservation and human use of the Lake and its adjacent habitats. A visitor management plan is important basic information, as the Lake's natural are an important part of the recreation and tourist capacities.

The zonation concept has to include beaches, landing sites for boats, public trails and those for guided tours, as well as observation points.

Access points to the Lake are important, but they have to be restricted when key values are endangered. Several access points already exist in both countries as harbours, landing places, channels, which are used by the locals, and other points, such as restaurant and private houses. In the zonation concept, sports activities, such as water sports, swimming and angling, have to be considered as well.

5.6.3 Land-use and licences

It is of utmost importance that all planned licenses issued by the National Park (gravel and peat excavation), as well as licences for traditional fishing – definition and ways to limit the use of space – and areas of traditional pasture land and meadows are defined in the zonation concepts and specially marked.

Positive maps as for example "angling is allowed in flowing zones" or "water hiking is restricted to the corridors in the map" make the control and information easy.

Any restoration or management projects for habitats have to be highlighted in the maps. Examples are artificial wetlands for waste water cleaning or afforestation.

5.6.4 Settlements and tourist facilities

All urban zones, settlements or places where tourism facilities are planned have to be clearly marked in the zonation map.

5.6.5 Cultural heritage sites

There are many very important cultural heritage sites around the Lake, which form an ideal basis for the development of tourist capacities inline with the unique lakescape. They have to be marked and identified in the zonation concept and included in the visitor management programme and system.

5.7 The Lake – general guidelines for the use of the water surface

Lake Skadar is protected in Albania and Montenegro. General guidelines are needed as to how this transboundary waters can be developed in a sustainable way. Here, some general proposals are given for the whole Lake surface concerning the access and boating. In the zonation concept, the Lake will be divided into core and buffer zones (see below).

The great impression of Lake Skadar and a Unique Selling Point concerning tourist development is the natural character of the Lake in comparison with many others lakes in Europe. Hardly any boats have been registered on the Lake until now. The sustainable development should be based on this attribute and limit all kind of boat types, which are impacting the Lake's natural assets or landscape. In general, transportation on the Lake should be carried out by ships, which are easy to control and have a small demand concerning the space. The future development of regulations concerning boating should be discussed and prepared in the boating work group (see proposed transboundary commission) as part of the work of the Lake Skadar Preservation Commission.

5.7.1 Hunting

The most important basis for the reduction of impacts by boating on the Lake is the ban of hunting. Flight distances of birds are extremely high in hunting grounds, and each boat or person causes massive disturbance as birds fly off, covering a distances of half a kilometre or more. Each moving boat[8] creates a disturbance corridor up to one kilometre wide. Illegal hunting and poaching also create problems of this kind, as birds cannot distinguish between hunters and other persons on the Lake. If hunting is banned and poaching controlled, birds can accept boats much

[8] Schneider-Jacoby, M. (2001): Auswirkung der Jagd auf Wasservögel und die Bedeutung von Ruhezonen. ANL, Laufener Seminarbeiträge „Störungsökologie" 1/01: 49 – 61.

Working on preventing children from hunting in Albania, Lake Skadar-Shkoder, 15th October 2007 / photo D. Kitonic

better, the flight distance decreases and the chances to observe birds are higher. For environmental education and tourism, hunting ban with strict control of hunting is a precondition. It also helps to allow the water birds to fulfil their role as consumers in the lake ecosystem and reducers of organic material.

For the survival of the Dalmatian Pelican, a strict hunting ban with control of poaching is highly important. The flight distances of this species on the Lake are extremely high and birds can hardly be seen. The Dalmatian Pelican also needs protection of feeding sites at a distance of up to 60 km and more around the colony[9]. At other breeding sites, for example in Greece, the birds are much more tame and easier to observe. The critical situation at Lake Skadar[10] makes a complete ban of hunting and a strict control of poaching at the Lake and feeding sites in the Bojana-Buna delta necessary.

5.7.2 Sailing, surfing, kite-surfing

All types of sailing boats need large areas for their sports activities. The impact on birds is huge, as the sailing boats block parts of the Lake and water birds have to leave these parts of the protected areas[11]. In the case of Lake Skadar, the whole Lake is an important habitat and disturbance should be limited as much as possible. Grebes and Pygmy Cormorants *(Phalacrocorax pygmeus)* use the entire Lake as feeding sites. More boating and especially sailing boats would impact the use of their feeding habitat. All kinds of sailing sports have fortunately not been developed at Lake Skadar except for a few surfers in front of the National Park administration. But as the actual situation concerning water bird protection is already critical, all kinds of sailing activities should be banned from the Lake. This would also limit impacts exerted by building new harbours and other facilities.

5.7.3 Private motor yachting

In Montenegro, only 20 motorboats are registered. In Albania, private large motorboats are forbidden. Several problems are connected with motorboats, such as noise, waves and disturbance, especially when they are driven at high speeds. Concerning the protection of the Lake, it would be important to launch a complete ban on private motor yachts and speedboats. For the already registered boats, the protected areas and the LSPC have to find interim solutions including speed limits and a strict control of emissions.

5.7.4 Official and public motor boats

Water police, border control and the protected area rangers will need boats to control the border, the use of the Lake and the protected zones. Special arrangements will be needed to avoid disturbance and

[9] http://www.rijkswaterstaat.nl/rws/riza/home/publicaties/riza_rapporten/pdf_rapport/rr_2004_002.pdf?

[10] Saveljić, D., B. Rubinić, M. Schneider-Jacoby & O. Vizi (2005): Breeding of Dalmatian Pelican Pelecanus crispus on Skadar Lake (Gnezdenje kodrastega pelikana Pelecanus crispus na Skadarskem jezeru). Acrocephalus 25: 111 - 118.

[11] Schneider-Jacoby, M., H.-G. Bauer & W. Schulze (1993): Untersuchungen über den Einfluß von Störungen auf den Wasservogelbestand im Gnadensee (Untersee/Bodensee). Orn. Jh. Bad.-Württ. 9: 1 - 14.

limit impacts on the environment. In general, electric motors combined if possible with solar energy seem to be a good option for smaller patrol boats. A speed limit is important and should be accepted by public boats as well. In cases of emergency, the speed limit can be exceeded. If possible, small boats with electric motors should be used, for example, for ranger services, fishing inspection and similar tasks like monitoring of water quality.

As different institutions will be needed to control the core zones and the hunting ban, a close cooperation between different state organisations is suggested, for example, as part of the tasks of the Boating WG. Training is also important to raise awareness concerning the natural assets and the preservation of special localities, such as breeding sites of colonial water birds, spawning grounds, and floating vegetation.

5.7.5 Visitor boats

A number of visitor boats are already included in the tourist programme of the Lake. Excursions are an important part of the tourist offer and easy to control by the preparation of a tour plan and the use of special corridors and routes on the Lake. Such arrangements can be planned and integrated with licences. The advantage of such controlled movements on the Lake is that birds and other animals learn to accept the boats, as they know that they will stick to their normal programme. The likelihood to observe birds will be much higher if the access to the Lake is regulated.

A boat shuttle is also important to connect the different anchorage sites and villages around the Lake, as well as bicycles and hiking trails in the western part of the Lake.

The optimal type of boats for Lake Skadar still needs to be assessed. Strict environmental standards and control are important. Solar boats and electric motors have the advantage of being silent and without emissions.

5.7.6 Rowing and canoeing

The use of rowing boats can be regulated by establishing corridors on the Lake and a system of mooring places. Information on protected zones and possible excursion routes has to be displayed at each anchorage place. A development plan is needed to avoid impacts and to create a product, which is accepted by the guests. Canoeing can be integrated with environmental education and, for example, visits by school classes.

5.7.7 Angling

Angling should be limited to special areas along the shore. Angling from boats requires a special licence and has to be limited to the buffer zone. An assessment is needed, whether angling from boats can be forbidden in favour of professional fishing and conservation.

Since 2008, all bird colonies around the whole Lake have been mapped. This information is important to select core areas and preserve key values of the Lake for biodiversity protection and tourism.

5.7.8 Fishing

Professional and licensed fishermen are important users of the fish stock and provide fresh fish to the local market and restaurants. The fishermen will profit from a better protection of the fish stock, and will get special permission for fishing in restricted areas as a traditionally used part of the core zone (zone 1b). On the other hand, they have to respect the strict protected areas.

5.7.9 Access to the Lake

The potential access areas to the Lake are limited by its geomorphology (rocky hills in the south and west with few access roads and large flooded areas in the north). Recently, new mooring places were facilitated in Skadar National Park in small bays and specific habitats, such as beaches. A plan is needed for the whole Lake, where anchorage places are to be developed and for which kind of boats. It is very important that such places are not inside potential core areas, which are needed to create

undisturbed zones for birds and fish. In some cases, mooring places can be connected with the corridor through core areas. Such a regulation is needed, for example, for Plavnica. At Virpazar and the canyon to

Zonation without monitoring and control is like traffic with no police.

the Crnojevica River, the existing navigation corridor guides the boats through the floating vegetation, reed beds and marshes. Both corridors are marked with posts and are a good examples of how the traffic on the water can be canalised. A similar system is needed for the whole Lake to make boating sustainable.

5.7.10 Boating regulations

Regulations, such as speed limit (e.g. 10 km/h) and distance from the shore, have to be stipulated for the protected areas in each country and agreed at the international level. The international regulations should also include all kinds of environmental standards.

6 Monitoring

Monitoring of the Zonation effects is highly important and will also be needed to upgrade the management of the park, the protected the area and the tourism concept. Annual reports are necessary for the whole Lake.

Existing baseline data:

Wintering birds (IWC)
Distribution during autumn, summer and spring (in addition to IWC)
Breeding colonies
Number of rangers and wardens

Additional data are needed concerning:

Tourism (number of visitors, distributions, generated income…)
Boating (number of boats, special regulations, power of motor…)
Fishing (number of fishermen, annual harvest, sport fishing….)
Special monitoring programmes for new core areas
Number of incidents registered annually, and related impacts

Training is a precondition for the monitoring. Rangers and the staff of the protected areas are to take part in the monitoring.

7 Implementation and Supervision

Zonation without monitoring and control is like traffic with no police. Here some examples are given, as how the zonation of Lake Skadar can be monitored and the success of the measures published every year:

- Joint control by the staff of the National Park, inspection, forest directorate with other state organisations, such as border control, police and water police and NGO wardens on and around the Lake – including training, regular exchange of information and team building
- Marking and registration of all boats and users of the Lake
- Clear regulations to fine illegal activities, e.g. unregistered nets or boats are confiscated
- Benefits to the local people in the protected areas by:
  a) agro-environmental schemes for flooded areas
  b) special attention to local fishermen including traditional fishing zones
  c) aid in the marketing of products from the National Park and Lake, such as fish
  d) inclusion of the locals into the visitor management and tourism
- Annual report on the monitoring results, for example during the Lake Skadar conference. The number of successful breeding pelicans and the fledged young should be presented, for example, by the Minister of Tourism and the Environment in Montenegro as one of the most important indicators of successful work in the National Park and UPS.
- Publication of the number of tourist and growing interest in the Lake.

8 Example and Best Practice for Lake Zonation

8.1 Lake Neusiedl – Fertö

The transboundary protected area of Lake Neusiedl – Fertö is an ideal example for the preservation of the border area. On some maps, even no border and only the large core area preserving the best protected sites along the border is shown.[12]
The overall zonation is based on the Biosphere Reserve concept[13].
World Heritage has been used to develop the transboundary Lake Neusiedl - Fertö[14]. The zoning includes all areas, settlements and sites around the Lake and provides an ideal tool for marketing and tourism development.[15]

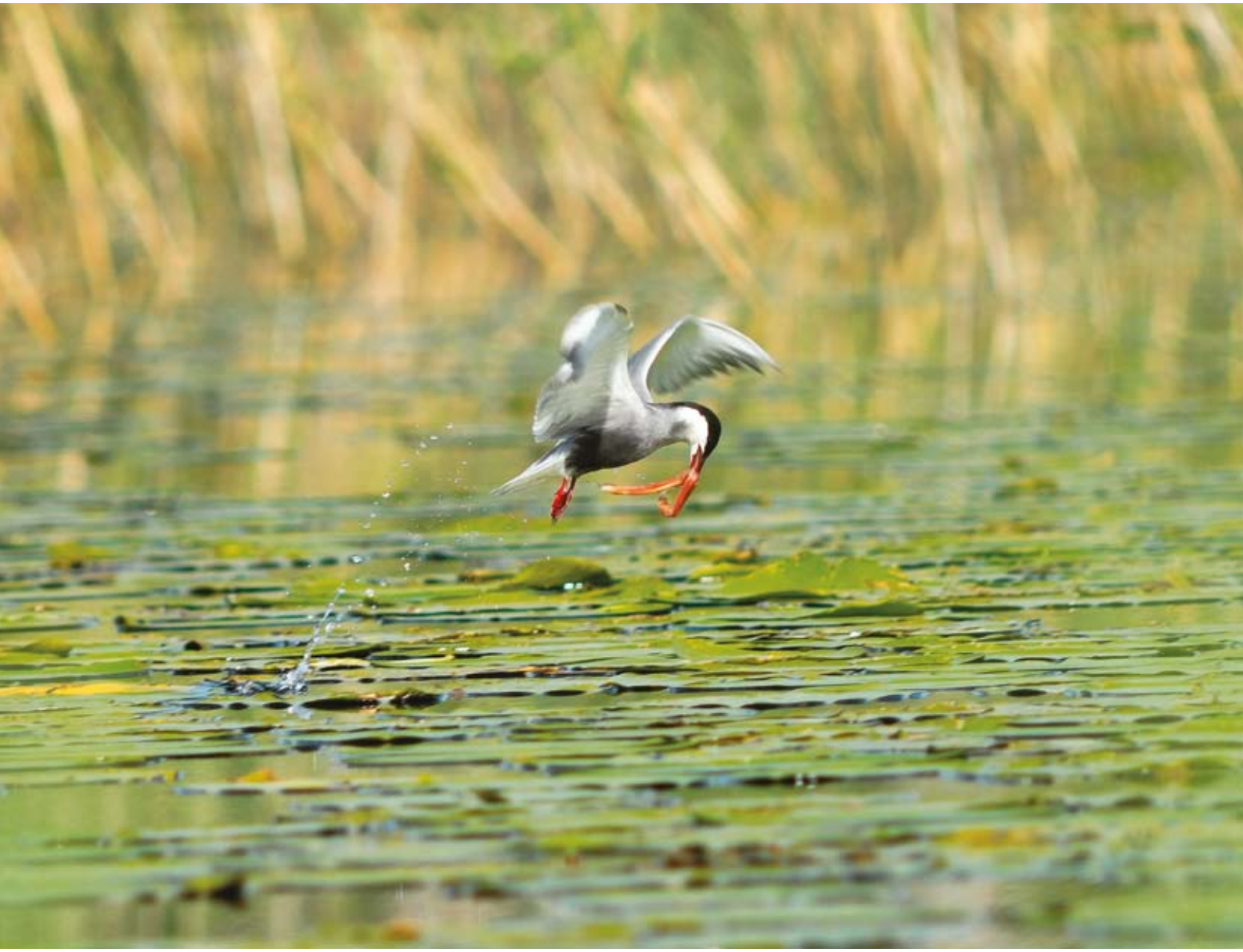
8.2 Lake Constance

Lake Constance, which is shared by three countries, is not protected as a whole. The Lake is used by 50,000 boats, and seven million overnight stays demonstrate the Lake's tourist value.
Since 1979, a zonation concept on the Lake has been developed and implemented step by step by the Ornithological Working Group of Lake Constance (OAB)[16] and the national NGOs. The action is based on a long-term monitoring of breeding birds and monthly waterbird counts from September to April.
The results of this zonation programme can be measured and the implementation of the programme assessed as to **a)** the impacts of boating and tourism, **b)** saved waterbirds as one of the key regulators of the water quality, and **c)** created attractive views of the Lake with thousands of waterbirds near to tourist areas, such as the Mainau Island or Reichenau world heritage site.
Lake Constance is an ideal example for the Albanian part of Lake Skadar.

8.3 National Parks

National Parks can be developed upon strategic decisions and enlarged on a step-by-step basis. An example is the Table Mountain in South Africa[17].
Park Zonation is a standard procedure in every National Park and part of the management or conservation plan. An important first step is that the zoning system is explained[18].
The zonation of Komodo National Park is a fine example how tourism can be integrated into a national park. The water surface is also included in the zoning of this National Park[19].

[12] http://www.kerstinullrich.de/Oesterreich/NeusiedlerSee-map.jpg
[13] http://www.iihr.uiowa.edu/education/international/europe/Hungary/Hungary-scanned/ferto-map2.jpg
[14] http://www.welterbe.org/
[15] http://www.welterbe.org/files/image/original/10.jpg
[16] http://bodensee-ornis.de/img/nsg.gif
[17] http://www.mountainsinthesea.com/parks/table_mountain/conservation/cdmaps.jpg
[18] http://www.pc.gc.ca/pn-np/ab/banff/docs/plan1/chap10/plan1j_E.asp
[19] http://www.komodonationalpark.org/images/zoning3.gif



Whiskered Tern *(Chlidonias hybridus)* hunting on Lake Skadar, 20th June 2007 / photo P. Sackl

Zonation Concept for Lake Skadar-Shkoder and the Bojana-Buna Delta

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1 Introduction to a unique transboundary ecosystem

Lake Skadar is the largest Balkan lake with a sub-tropical character (Karaman & Beeton 1981). Remarkable for Europe are **a)** the changes in size, **b)** the natural water regime, and **c)** the high connectivity with the Adriatic Sea and the hinterland. The actual size of the Lake varies between 370 and more than 600 km^2. The surface is only between 4.7 and 9.8 m above sea level. Dhora and Dibra (s.a.) describe, in their guide, the unique features of Lake Skadar as a beautiful archipelago of 53 islands - several with interesting cultural monuments - and with a huge area of 165 km^2 of lake bottom below sea level.

The northern shore is a unique part of Lake Skadar and deserves, like the entire lake, the status of a Natural or Mixed World Heritage Site. Here, the protection of the natural dynamic process in the Lake is still possible, while nearly all other European lakes are regulated. The wetland complex of Lake Skadar and the Bojana-Buna Delta has a special character and the following *Unique Selling Points* (USP) can be highlighted for the transboundary area between Albania and Montenegro.

1.1 Network of Protected Areas

The wetland complex along the Albanian-Montenegrin border is unique in Europe and a potential Nature World Heritage Site (Schneider-Jacoby et al. 2006a). It is an important part of the European Green Belt (Schneider-Jacoby 2006b). Most of the wetland site and even large buffer zones are protected already. Only in Montenegro, the Bojana-Buna Delta has not been declared an enlargement of Lake Skadar National Park as decided in the Physical Plan of Montenegro (Ministry of Economic Development 2008) or managed as a regional park as rendered by the environmental assessment of the World Bank GEF project. Only Velika Plaza is a Natural Monument (since 1968) (500 ha) and the coastal zone, including Ada Island and the Bojana-Buna River with its floodplain, is protected as coastal estate (morsko dobro). Solana Ulcinj is part of the EMERALD Network in Montenegro and an Important Birds Area (Saveljic et al. 2007). In addition, it is a private hunting ban area and a nature park (Republika Crna Gora 2005, compare Stumberger et al. 2008)

The remaining wetlands areas are included in Lake Skadar National Park in Montenegro (40,000 ha) and Lake Shkoder and the Buna River Ramsar Site in Albania. The Managed Nature Reserve of Lake Shkoder has a surface of 26,535 ha, while the Protected Water/Land Landscape of the Buna River covers 23,027 ha. The whole protected area now covers more than 90,000 ha on both sides of the border. There is a great need for transboundary management and development schemed to adjust nature and water management and to stimulate sustainable tourism, such as transboundary trails.

1.2 Pristine Water Vegetation

The gradient of the different water plant associations is well described in the Lake Skadar monograph (Karaman & Beeton 1981). Unique is the size of the Water Chestnut *(Trapa natans)* carpets in Europe, but even more beautiful are the different species of flowering water lilies, e.g. White Water-lily *(Nymphaea alba)*. Macrophyte carpets cover 30 km^2 of the Lake's surface (compare Figs. 1 and 2).

It is important to know that this special habitat is not restricted to the National Park in Montenegro but that Albania, too, hosts large pristine habitats of these plants. The recent research carried out by the National Park, EuroNatur, APAWA and Natural History Museum Podgorica (Stumberger, Denac, Vizi & Dubak Vesovic, in lit.) has confirmed, by using the Whiskered Tern *(Chlidonias hybridus)* as an indicator, the great ecological value of the northern part of Lake Skadar on both side of the border and of the natural areas near to Shkodra (Fig. 1).

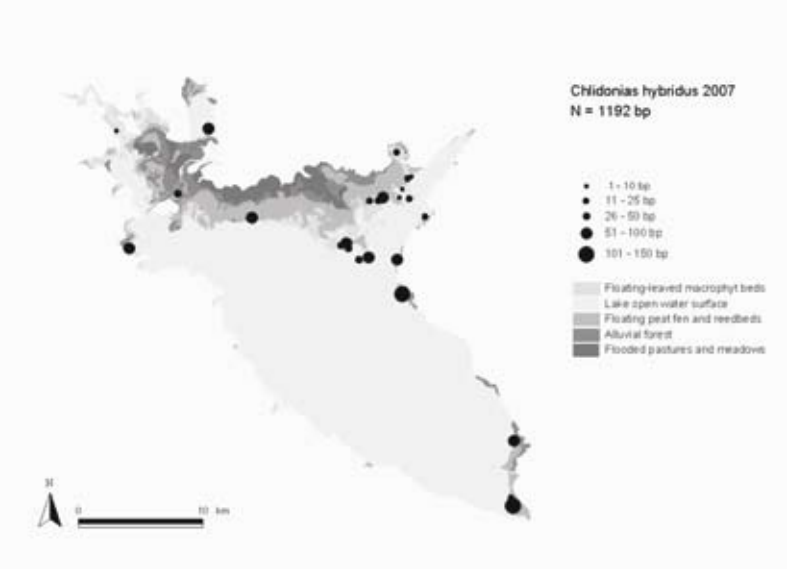

Figure 2: Colonies of Whiskered Terns *(Chlidonias hybridus)* at Lake Skadar (Stumberger, Denac, Vizi & Dubak Vesovic in lit.)

1.3 Reed Beds and Alluvial Forests

Although the reed beds and alluvial forest are much larger in Montenegro, it is very interesting that important stands have been preserved in Albania as well. They were preserved by local people long before the protected area had been established. It would be interesting to learn more about the local or even private conservation systems.

For years, the area of Pančeva oka / Syni i Pacit has been known as the most natural area hosting the Dalmatian Pelican *(Pelecanus crispus)* colony and large populations of other breeding birds, such as Pygmy Cormorants *(Phalacrocorax pygmeus)* and herons. The alluvial forests are an important "green lung" for the surrounding dry areas especially in summer when they evaporate large quantities of

Figure 1: Floating vegetation in Lake Skadar National Park / photo O. Vizi

water. The water quality is also linked to the large natural filters in the submersed as well as in the flooded plain vegetation.

The riverine gallery forest, spread out along the Bojana-Buna River, and the unique patches of alluvial virgin forest in its delta have been preserved, for example, on Ada Island and in the "knetas", brackish wetlands in the former large lagoon in Montenegro, now partly used as Solana Ulcinj.

1.4 Floating Peat Land

Beside Livanjsko polje, Lake Skadar is the largest peat land in south-east Europe. The huge layers of remaining organic materials are a great carbon sink and need long-term preservation. A part of the huge wetland zone is floating with the oscillations of the Lake, as can be seen on the picture below (Fig. 3), during spring high water level. The yellow stems of the Common Reed *(Phragmites communis)* in the front of the picture are fully visible below the water surface, while in other areas only the higher bushes are green. It is interesting how large these floating peat land islands are and how they are distributed in the northern part of the Lake.

1.5 Karst Springs and Good Water Quality

The clear karst springs in the north of Lake Skadar are of great ecological, tourist and economic value.

Adjacent to the long-term flooded natural marshes, Lake Skadar is surrounded by a belt of alluvial cultural landscape.

While in the south and west the deep "okos" are famous, the north has till now not been known for the huge number of beautiful springs in Albania and Montenegro. In the municipality of Tuzi, seven spring areas are known, some of them with several openings active during the different water levels of the Lake.

For Albania, a new survey is available, prepared by Rakaj (2006) who mapped 28 karst springs along the Albanian lakeside in the north of the lake. The springs are important habitats, as they provide places with running water throughout the year and water with stable temperature and high oxygen content. Some of the key functions are:

a) spawning areas for the rare trout species of the Lake and other fish species ,
b) wintering area for specialist and endemic fish species,
c) entrance and exit points for the huge underground water system as habitats of endemic and specialized species. Even the Olm *(Proteus anguinus)* has been seen in the springs at the Lake (Dh. Dhora in lit).

The human use values are numerous and are based on the good water quality (drinking water, recreation) and the flow (mills). The spring areas are often used as access points to the Lake, e.g. in Podhum / Warhelmi), as the boats can follow the streams coming out of the ground through the wide jungle of water plants. Few areas are already used as recreation sites, but have not been suitably developed.

1.6 The Bojana-Buna corridor and Delta

The connectivity of Lake Skadar with the Adriatic Sea is high. The Bojana-Buna River forms a natural connection and is an excellent migration corridor for fish. The habitat network of the delta adds many important wetlands types to Lake Skadar. The different habitats are described in the Rapid Assessment of the Ecological Value of the Bojana-Buna Delta (Schneider-Jacoby et al. 2006c). It is important to note that the Delta is of global importance for more waterbirds species than the much larger Lake (Stumberger & Schneider-Jacoby this publ.). The Solana Ulcinj is a key site in the system, as it provides sand and mud flats and is not impacted by tourism (Stumberger et al. 2008).

1.7 Cultural Landscape

Adjacent to the long-term flooded natural marshes, Lake Skadar is surrounded by a belt of alluvial cultural landscape. This area is much wider in the north than at other parts of the Lake. Especially in Montenegro, the private plots of land are fringed by hedgerows (Fig. 4). Such landscapes have a very high aesthetic and cultural value and are promoted as hedgerow landscapes. The main use in the flooded area of the Lake concerns grassland. Partly domestic animals

Figure 3: The unique marshlands and floating reeds with softwood vegetation in the northern part of Lake Skadar, swimming on peat layer / photo M. Schneider-Jacoby

Figure 4: Hedgerow landscape around the village of Podhum / Warhelmi during high water level in spring / photo M. Schneider-Jacoby

graze here after floods, but even more important is the hay-making for livestock in the surrounding villages, where hay stacks can be seen with winter fodder.

The hedgerow landscape spreads along the Bojana-Buna River on the Montenegrin side of the delta. The Albanian cultural landscape is characterized by large pastures.

1.8 Stone Steppe near Koplik

Very few areas in Europe can be compared with the steppe areas connected with Lake Skadar. While in Montenegro only relict habitats have remained in the Zeta plain, which need to be investigated and protected, the Albania lakescape offers a uniquely wide view over the steppe plain called Fostopoja. Gravel originating from the mountains spreads out right to the Lake between Koplik and Bajsha forming a stone steppe. In Europe, such habitats have an outstanding conservation value, as for example La Crau in South France. The recent observation of a Little Bustard *(Tetrax tetrax)*, one of the key indicators for such steppe areas in Europe, gives hope that this impressive steppe bird is still not extinct (Dhora & Kraja 2006). The habitat inside the Lake Skadar Ramsar Site and along the road to Theth from the town of Koplik is an impressive example and perhaps the best preserved habitat of this kind in Europe.

The experience from La Crau shows how ecological guidelines can help to protect such steppe areas. Very important are the traditional practices, such as pasturing, to preserve the typical flora and fauna[1]. The southern European landscape with medicinal herbs, partly also planted, is a very attractive tourist location, which can be marketed with the related products such as herbs, honey and excellent meat from the local animals.

1.9 Karst Hills

Lake Skadar is surrounded by a chain of karst hills, reaching to the very edge of the water. These hills are used as pastures and are overgrown with Mediterranean shrub. Trees are rare. As the hills are not populated by humans, they add another wide semi-natural habitat as a buffer zone to the protected area system of Lake Skadar. Directly above the Lake, these hills provide not only unique viewing points, but also good habitats for many species form the Lake, such as large flocks of dragonflies. As a habitat for reptiles and with a rich flora they are worthy of protection.

[1] http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6WJ7-4JJ84FB-2&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_version=1&_urlVersion=0&_userid=10&md5=3f450a54e7b4bcf7b80b71d83115a1b9

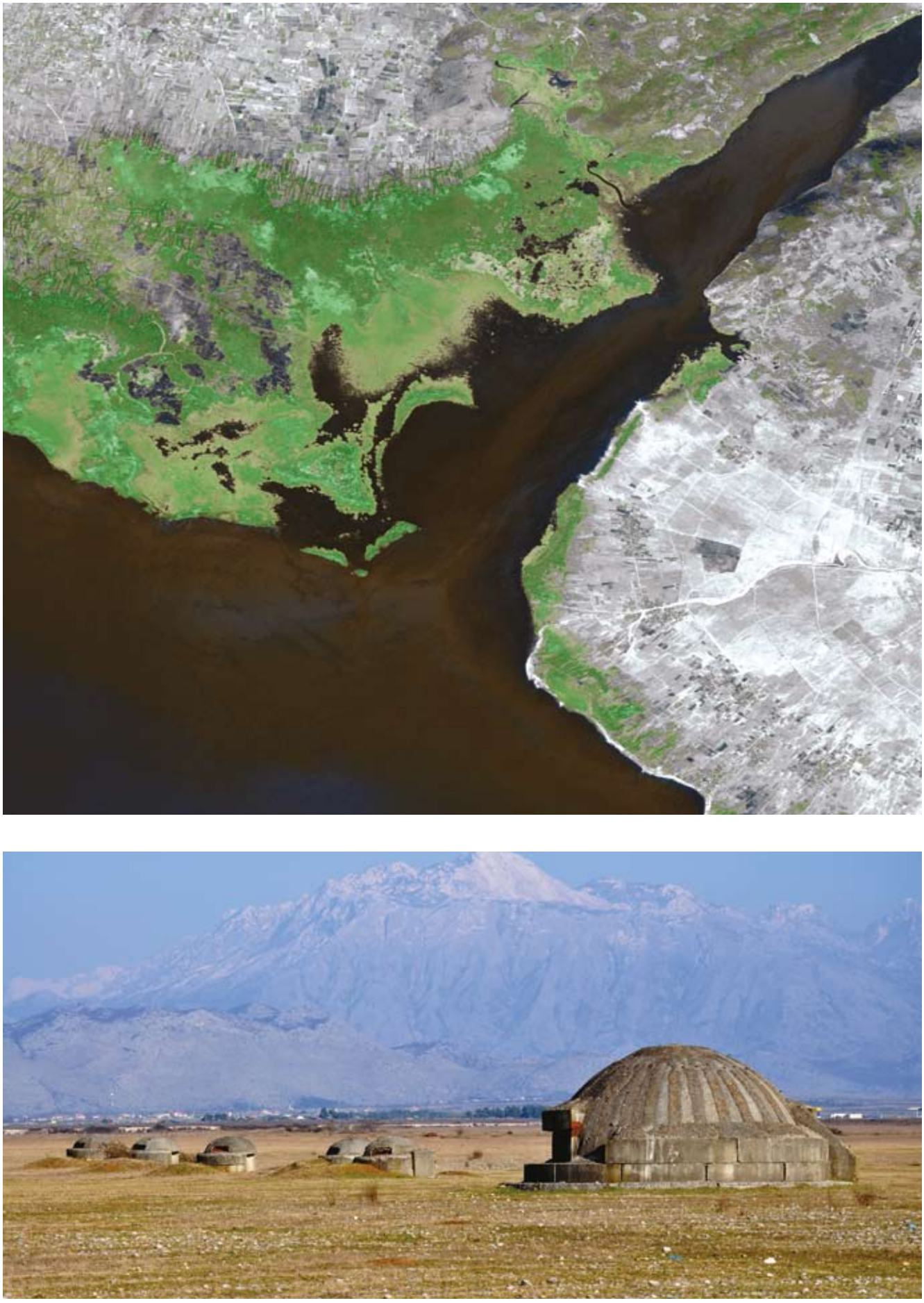

Figure 5 a, b: The stone steppe shaped as a delta by the mountain streams (a) adds a unique habitat to the landscape of Lake Skadar - Shkoder and is a gate to the mountains (b) / photo EuroNatur Spot image and M. Schneider-Jacoby

Figure 6: Zonation concept for Lake Skadar – Shkoder, Bojana-Buna Delta and Drin

This karst hill spread from the Rumija massif in the south of Lake Skadar to Albania, forming two corridors like rips inside the Bojana-Buna Delta. This garrique and maccie habitats are described as migration corridors in the zonation below, as they are important natural areas suitable for large mammals and birds of prey as habitat. Peaks, such as Možura above Ulcinj or the fringe of karst hills above the Viluni lagoon, are also important as souring places for birds of prey and fantastic view points for nature tourism.

1.10 Hinterland

The hinterland of Lake Skadar provides additional tourist capacities and hosts a number of outstanding habitats.

One of the well known features is the Cijevna / Cemi River and its canyon. Three small national parks exist already in Albania and more protected areas are planned. The physical plan of Montenegro has already adopted the idea of creating a chain of protected areas along the border as part of the European Green Belt initiative (compare Schneider-Jacoby *et al*. 2006a,b). The communities along the northern part of Lake Skadar have the opportunity to connect their development with the capacities offered in the mountains and at the Lake. And perhaps even more important, they can attract businesses by offering a great place to live like, for example, Lake Constance between Switzerland, Austria and Germany.

2 Proposed Zonation for Lake Skadar-Shkoder and the Bojana-Buna Delta

2.1 Core Zone (Zone I): Pristine Natural Habitats and Wilderness Areas with high natural value on the European and global scales

General goal: Strict protection and preservation of natural processes

Zone Ia – Natural Habitats and Wilderness Areas without human use and access, strictly protected

Zone Ib – Natural Habitats and Wilderness Areas strictly protected, but with low-impact traditional use, such as traditional fishing, extensive pasturing or restricted and guided tourism

Zone Ic – Natural Habitats with high restoration in the Bojana-Buna River (marshes, floodplains), important for flood retention

Core areas as well as natural resources are, in general, not used or exploited in national parks like Lake Skadar in Montenegro. Only extensive use based on traditional activities, such as grazing, is allowed. Environmental education is well organised and

strictly bound to the visitors and the park system. At Lake Skadar, large core zones are needed with no access by humans and no kind of exploitation in order to preserve the wilderness areas and the natural dynamics (zone I). They are also important to preserve the fish populations and their spawning grounds. The actual core zones in the physical plan of Lake Skadar National Park are important, but too small. In the Ramsar Site in Albania and in the Bojana-Buna Delta, core zones are needed to develop sustainable tourism and to preserve the unique natural habitats.

Only through establishment of larger strictly protected core zones, the impact of the growing number of visitors can be mitigated and the importance of Lake Skadar for birds re-established. At the same time, the measures will help to improve bird watching and preserve the fish populations from overfishing. In parts of the core area (zone Ib), professional fishermen can be allowed to fish and tourist can be guided along marked trails to special observation points. In addition, pasturing of natural habitats is allowed in zone Ib. Examples are the large natural pastures near Žabljak and the steppe areas of Fostopoja near Koplik.

In the case of Lake Skadar and the Bojana-Buna Delta, the following areas should be protected as core zones:

2.1.1 Lake Surface

The Lake surface is an important habitat for birds and fish. The actual situation with a dramatic decrease in resting birds and with the flagship species Dalmatian Pelican nearly extinct needs far reaching measures to rehabilitate the ecological importance of the Lake and the function of the water birds in the consumption of organic material from the Lake.

In general, all shallow water areas are in need of special preservation. As the whole Lake is shallow, a plan is needed, as to where boating should be banned and where this activity could be still allowed. A large area should be protected with no boating (zone I) allowed at all, while in some parts organised environmental education and professional fishing could be carried out (zone Ib). In zone Ib, professional fishermen can get a limited access on the basis of their licence. Guided tourism can be developed, based on a special programme with well defined trails and routes as well selected observation points.

2.1.2 Floating Vegetation

The floating vegetation with large carpets of White Water-lily and Water Chestnut is a special habitat on Lake Skadar and should be included in the core zone of the protected areas in total (zone I). One of the key indicators is the Whiskered Tern, which breeds on floating leaves and is sensitive to disturbance and artificially induced waves by motor boats, as well as other rare animals living in this habitat, such as the Ferruginous Duck *(Aythya nyroca)* and the Four-lined Ratsnake *(Elaphe quatuorlineata)*.

At Lake Skadar, large core zones are needed with no access by humans and no kind of exploitation in order to preserve the wilderness areas and the natural dynamics.

In addition to the preservation of the habitat itself, core areas can be defined in several small bays, especially those without human settlements or access roads. Examples are:

a) the bay of Raduč, where an observation tower has already been built,
b) the small bays below Kormarni,
c) the south edge of Prevlaka,
d) Gornje Malo Blato Lake,
e) the area north of Podhum and Božaj, and
f) the border area between Kamice-Flaka and Gashaj near Hani i Hotit in Albania.

2.1.3 Sublacustrine Springs (okos)

The greatest depth of Lake Skadar has been recorded in karst springs. The deepest reaches 60 metres in depth (55 metres below sea level). All these springs are a unique phenomenon of Lake Skadar and important for the preservation of fish. They are also retreats for

species that require clean and good quality water, and low water temperature. All springs have to be classified as core zones, including a wide enough area around the natural phenomenon to avoid impacts.

2.1.4 Islands

Islands are important refuge areas and breeding sites for colonial water birds. The large floating peat island "Pančeva oka" has been identified as a core zone of Lake Skadar National Park. Here, the largest colony of cormorants and the last few remaining pelicans are breeding at the moment.

Several other rocky islands at the south shore are also important breeding sites. At the moment, colonies of gulls, terns and herons can be found here. There are also data that pelicans used the island Grmožur (ruins of a Turkish prison) as a breeding site. The island is also one of the rare and recent breeding site of the Common Tern (*Sterna hirundo*) in the National Park. Due to the growing impact of leisure boating and angling, all islands have to be preserved as resting and breeding sites.

Due to the importance of the islands, they have to be declared as core areas and access to them enabled only for research purposes. In addition, a zone is needed around them to avoid disturbance. As hunting is forbidden on the Lake, 300 m seems to be enough as a buffer zone without boating. In special cases, this surrounding protection belt should be marked with signs.

Due to the importance of the islands, they have to be declared as core areas and access to them enabled only for research purposes.

The islands are also significant landmarks for the creation of core zones especially along the southern shore of the Lake and in the border area between Albania and Montenegro.

Important areas, where core zones around islands and between the islands and the mainland could be created, are:

a) the border area between Zogaj (Albania) and Martići (Montenegro) with a corridor for the mooring site of Cklja. Several small islands, such as Gorica, Tophala and Gradac, can be included in the zone. The Lake between the mainland and the islands would be strictly protected (core zone);
b) the zone between Bez and Bobovišta, including the marshes and islands;
c) the zone west of Murići to Krnjice, including the islands (e.g. Moračnik);
d) Grmožur and part of the bay of Godinje.

The inhabited islands and monasteries need a special treatment, but visitor access should be limited to the special zones and to the mooring places on the island.

2.1.5 Reed Beds, Softwood Forests and Marshes, which are not used as pastures

Large flooded areas, especially in the National Park in Montenegro and in some places in Albania, are natural and un-used. These areas in the contact zone between the Lake and the terrestrial area are important natural habitats. Depending on the water level, certain fish species such as the Wild Common Carp *(Cyprinus carpio)* spawn here.

In general, all these natural areas should be treated as the core area. The same goes for the Albanian side, where large areas with natural vegetation can be found between Shkodra and Grili as well as in the border area.

In the Bojana-Buna Delta, Ada Island and the Velipoja Reserve are characterized by these habitats. Still, large parts of the Velika Plaza and flooded areas are also covered by natural vegetation.

2.1.6 Coastal Habitats

To preserve the sensitive dune vegetation and the great number of endangered bird species breeding in this dynamic habitat, strict protected zones should be delineated to stop the growing tourism pressure (Schneider-Jacoby *et al*. 2006). The damages of the unregulated access are already discernible, as the erosion has destroyed several dunes.

The Viluni Lagoon, as the only currently functioning lagoon in the Bojana-Buna Delta, is of great importance for several species. As a core zone, it

should be protected as a spawning area and important resting site for birds. The actual situation with tourist facilities at the mouth has to be strictly controlled to mitigate impacts on the connectivity between the sea and the lagoon.

2.1.7 Parts of the Mediterranean Garigue, Macchia and Natural Forests

Wherever possible, forests and shrub in the terrestrial area bordering the Lake, should be included in the core zone management. Areas, which are today unexploited, should get the highest protection status possible. In each part, a decision has to be made whether extensive grazing should be allowed with a special half-open character of the landscape (zone II) even retained, or whether the area should be strictly protected without human use (zone 1). Especially important is the protection around the strictly protected zones along the southern bank of Lake Skadar, as access from land should be restricted in these cases.

A core zone can be, for example, directly situated at the border between Albania and Montenegro along the south shore. Also the hills at the Lake, such as in Vranjina, would be ideally protected as a core zone, where the access is strictly regulated by a system of trails from the village and the National Park office to the one of the two peaks and the monastery.

At Lake Šas (Šasko jezero), the steep southern bank with natural vegetation could be easily included in a core zone. This would also retain the view from the old town or the new town over this spectacular natural lakescape.

2.1.8 Cliffs

Steep cliffs are important breeding sites for birds of prey and owls. Inside the National Park, such sites should be strictly protected. An assessment is needed for the Lake Skadar region, for its cliffs are important breeding sites and in need for better protection. Historical breeding sites, e.g. former vulture colonies near Tuzi, could also be included in this kind of protection programme. In the Bojana-Buna Delta, important breeding sites, for example of the Golden Eagle (*Aquila chrysaetos*), have to be protected.

2.2 Buffer Zone (Zone II: preservation of the semi-natural habitats, the cultural landscape and the villages around the Lake)

General Goal: active protection of the traditional land-use, the architecture, cultural monuments and the related natural and ethnological heritage

Zone IIa – semi-natural habitats, cultural landscapes and lakescape outside the core zone including small rural settlements and cultural heritage sites

Zone IIb – managed protected areas such as Solana Ulcinj, flooded pastures in Albania and fishpond area near the village of Reci, as well as Migration Corridor over the karst hills through the Bojana-Delta to Rumija mountain

The damages of the unregulated access are already discernible, as the erosion has destroyed several dunes.

The buffer zone or landscape protection zones help to preserve important habitats and sustainable, traditional use. In this area, building is restricted and habitats should be protected from transformation (e.g. no transfer of grassland in arable land). The management measures are needed, for example, to maintain meadows and pastures.

2.2.1 Lake Surface

The remaining water surface of the Lake outside the strictly preserved core zone should be treated as a landscape protected area or a buffer zone to avoid impacts. Boating should be regulated according the guidelines given in the general guidelines for the use of the Lake (GTZ 2007).

2.2.2 Flooded Areas and Pasture Land

In Montenegro, the use of the flooded area bordering Lake Skadar has sharply decreased during the past two decades. The large area of grassland is today

fallow land and in need of special management. In the zonation concept, areas have to be defined, where pastures and meadows should be preserved, as they are important habitats for many endangered and rare plants and wild animals. The management can be integrated with the protection of old breeds, such as the *buša* cattle, or riding as part of the offered tourist capacities. Some potential to become attractive areas is attributed particularly to the northern flooded areas of Lake Skadar, located near the capital.

A part of these important grassland habitats is still not protected in Montenegro, although it is part of the Lake. The main area, which is regularly flooded, is situated between Virpazar and Sozina. For the management plan and the zonation concept of the Lake, a map is needed to identify the different grassland habitats and the most important indicators such as orchids or other endangered plants. Flooded grassland habitats are also important feeding sites for birds and spawning ground for fish such as the Wild Common Carp (*Cyprinus carpio*).

The large area of grassland is today fallow land and in need of special management.

In Albania, grazing is still widespread and pastureland in the periodically flooded zone well maintained or even overused. All flooded areas are part of the Lake Skadar Managed Protected Area. The maintenance and protection of these areas are important and should be included in the buffer zone.

2.2.3 Riverine Corridors

The riverine corridors connect the Lake with the hinterland and the Adriatic Sea. They form important migration corridors and are part of the Lake Ecosystem.

In Montenegro, the river canyon and the landscape from Virpazar over Rijeka Crnojevića to Cetinje is an important landscape and ecological corridor of national importance.

The second important connection is the Morača. The river has a wide bed between the flood protection dikes. This also holds true for Podgorica, where the Morača River is still a natural habitat. It is a very important migration corridor not only for fish, but also for mammals such as the European Otter *(Lutra lutra)* and birds. The Morača also connects the different tributaries, such as the Cjevna and Ribnica, with Lake Skadar. The riverbeds and the riverine habitats need a protection status of a buffer zone.

In Albania, the riverine corridors form the mountains to the Lake are still important open landscape structures, with fewer impacts of illegal building on plants and animals' migration corridors. Very important and well-protected area is the wide delta of the Thate River between Koplik and Hoti. This area is partly situated in the protected area, unlike its northern part with the great stone desert of Fostopoje between the mountains. Urgent measures are needed to preserve this unique stone steppe and to include it in the protection scheme of Lake Skadar. The area is also important for tourism, as it is used partly for medical herb plantations, e.g. Lavender *(Lavandula* spp.*)*, and a unique habitat in Europe comparable to the Crau in south France and the Rhone and Durance Deltas. For Koplik, the town linking the Lake and the mountains, the maintenance of the open landscape corridor free from building will be an important asset for the development of its specific character.
Most important is the connection of the Lake with the Adriatic Sea through the Bojana-Buna River. The river is already protected in Albania, but its mouth in Shkodra is impacted by all kinds of illegal landfills and new building activities.
For tourism, the larger rivers have a high potential such as biking, hiking and canoe trails. While the use of the dikes and parallel-going trails is less impacting, boating on the Lake itself requires special management plans. For example, river islands are important breeding sites for birds and mooring places should be identified.

2.2.4 The Mountain Areas

A transboundary mountain of great natural and landscape values forms the southern shore of Lake Skadar. The Rumija (MN) and Tarabosh Mountains (AL) are proposed for protection as regional parks

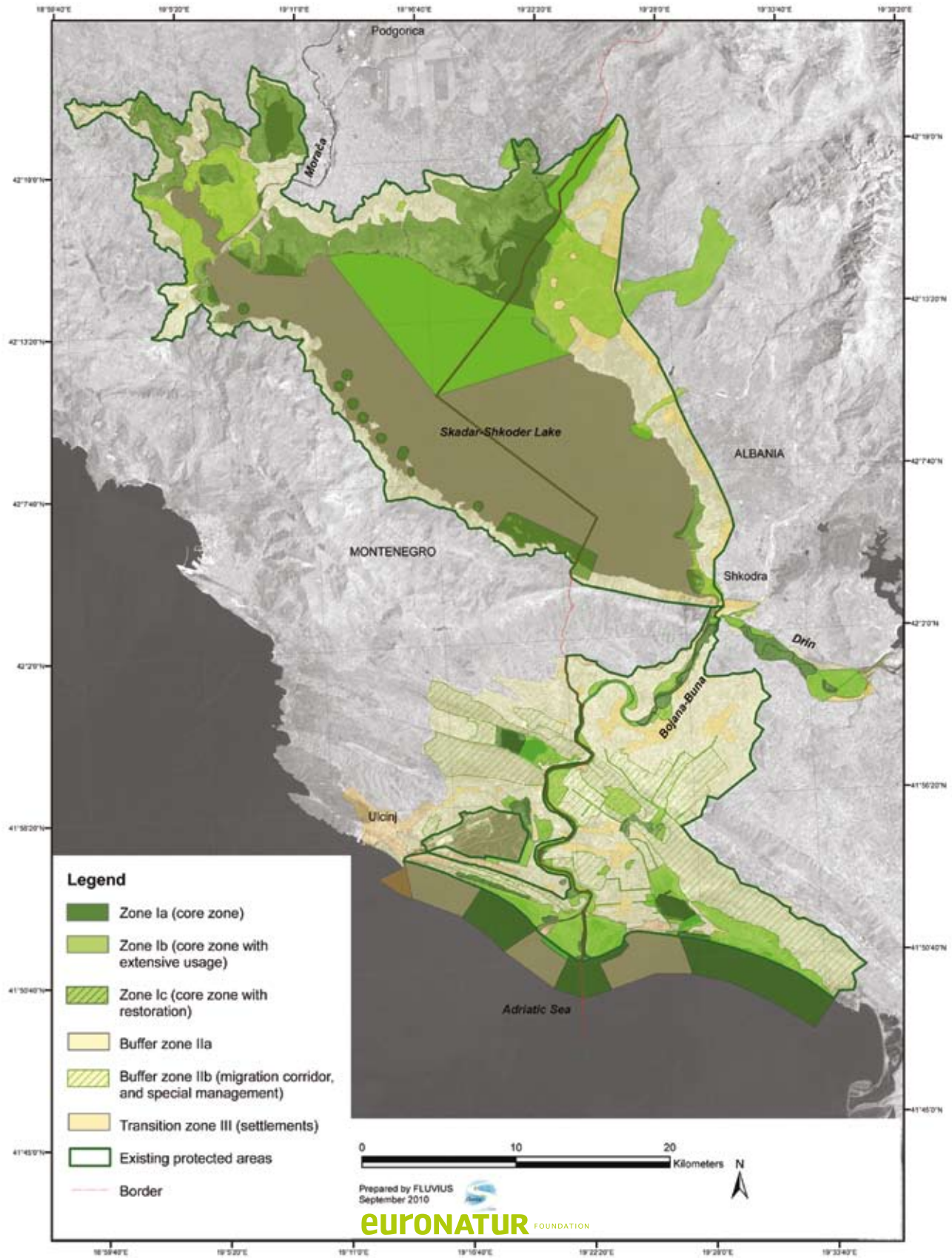

Figure 7: Map of the Ramsar Site Lake Shkoder and the Buna River, proclaimed in 2006 in Albania. The zonation concept has already been drafted for the Bojana-Buna Delta, while zonation for Lake Skadar - Shkoder needs some clarification to preserve the great natural assets and to develop sustainable tourism.

in Montenegro. Of great landscape values are, for example, the chestnut forests, unique in Europe, as well as different viewpoints. The area is ideal for hiking and biking.

In the north of the Lake, beside the riverine corridors and steppe areas, the border belt between Albania and Montenegro offers a great opportunity to delineate a buffer zone connecting the high ground of Prokletije Massif and the Albanian Alps with Lake Skadar.

2.3 Transition Zone (Zone III)

General Goal: Sustainable development around the protected areas

Zone III – Town and intensively used area surrounding the protected areas

The most important task of zonation is delineation of urban areas and a clear border between rural areas and settlements. The buffer zones are the most important tool to protect the open landscape around the Lake.

Urban areas of the towns of Shkodra and Koplik are part of the transition zone, while small settlements, especially if they are of great cultural value, could be included in the buffer zone as an important part of the country's cultural heritage.

The transition zone has to be based on urban and detailed plans. It is important to discuss the area within the framework of each community, but it is even more important to stop any impacts being exerted on the landscape. The landscape along Lake Skadar, as well as the coastal zone of Ulcinj and Velipoja, are threatened by construction of houses. Here, clear concepts are needed to save the attractive tourist destinations and important animals' and plants' habitats.

3 Conclusion

As envisaged in the GTZ (2007) concept for cross-border development, a transboundary zonation of Lake Skadar and the Bojana-Buna Delta is possible regardless the differences in the protected area system. The proposed zonation based on the international guidelines (Schneider-Jacoby, this pub.) offers a good platform to develop a transboundary protected area. Most important is the preservation of the USP, which will attract many tourists and limit the impacts of s motor boating, illegal building and traffic infrastructure, such as the planned highway through Lake Skadar National Park or the coastal corridor to Velipoja in Albania.

The Bojana-Buna Delta is of global importance for more birds species than Lake Skadar, although the area is much smaller (Stumberger & Schneider-Jacoby, this pub.). The Solana Ulcinj is a unique site for bird watching in Europe and of great importance for tourist destination development. The zonation of the Buna River Ramsar Site in Albania is a good example (Fig. 7) of how the proposed zonation can be transformed into a legal protection. The Velipoja tourist destination will profit in future from the strict protection of the beaches, the Velipoja reserve and the Viluni lagoon. It is important that in Montenegro, too, the World Bank GEF project is implemented.

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Stone-curlew *(Burhinus oedicnemus)* - only a successfully implemented zonation concept can prevent its extinction in the Neretva Delta / photo P. Sackl

Transboundary Zonation concept for the Neretva Delta including Hutovo Blato

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1 Introduction

For several years, a transboundary protected area has been promoted in the Neretva Delta, as this important wetland is shared by Bosnia and Herzegovina and Croatia (Croatia & Bosnia and Herzegovina 2003, REC 2001, 2002). Both countries have declared mayor parts of the wetland as Ramsar Sites, protecting large areas on both sides of the border at the national scale (Tab. 1). The key question, i.e. do these protected areas form a transboundary protected area, has never been discussed.

Based on the vegetation map (Schwarz this pub.) and bird counts (e.g. Stumberger et al. 2009), we have prepared a zonation concept for the Neretva Delta to answer the following questions:

- Is it possible to form a transboundary protected area Neretva Delta and which habitats should be integrated into this transboundary conservation concept?
- Which habitats need to be better protected due to their natural values and indicator species, e.g. for the EU Natura 2000 network.
- How to develop sustainable tourism using the MAB criteria for transboundary biosphere reserves according to UNESCO to protect birds and nature as a special asset.

2 Selected Results of the Bird Surveys

The value of the different habitats in the Neretva Delta can be described not only by habitats, but also by selected indicator species. We have chosen birds (Stumberger et al. 2009), as the area is well known for their international value (Dalmatin 2009, Kitonic 2007 – 2010, Rucner 1954, 1959 and 1963), although there are many other groups of fishes or reptiles that can easily document the value of the Neretva Delta's different parts and habitats (compare Drzavni Zavod 2007, Lijepa nasa 2009), including the rivers and channel system, as well as the cultural landscape.

2.1 Short-toed Eagle *(Circaetus gallicus)*

The density of Short-toed Eagle well surpasses comparable areas in the Western Balkans. Two different habitats form excellent preconditions for the bird's hunting grounds: both areas, the wetlands of the Delta and the surrounding karst hills, are important reptile habitats.

Table 1: Existing protected areas in the Neretva Delta

Name	Country	Size (ha)	Protection status / Category
Ramsar Site Neretva Delta	HR	11,500	Wetland of International Importance
Ramsar Site Neretva Delta	BA	7,411	Wetland of International Importance
Usce Neretve	HR	250	Ichthyological-ornithological Reserve
Modro oko i Jezero Desne	HR	370	Significant Landscape
Orepak	HR	100	Ornithological Reserve
Pod gredom	HR	587	Ornithological Reserve
Prud	HR	250	Ornithological Reserve
Park prirode Hutovo blato	BA	8,000	Nature Park

As the Short-toed Eagle is a priority species of the EU Bird Directive, the planned impacts of roads, wind parks and melioration areas have to be reviewed with regard to the species' dense population.

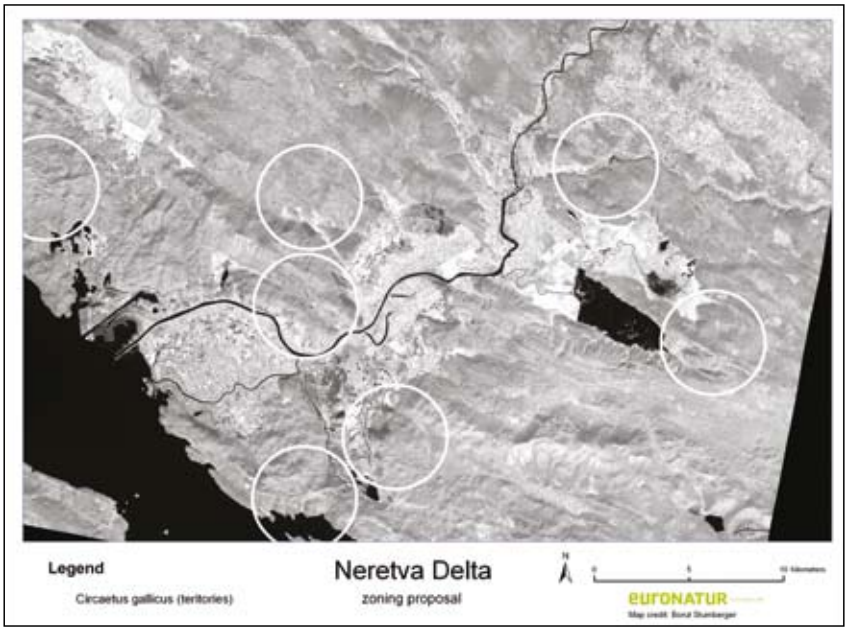


Figure 1: The Short-toed Eagle's *(Circaetus gallicus)* territory distribution across the Neretva Delta during the 2007 – 2010 period

The Short-toed Eagle can be seen often and is an attractive bird for visitors. Hutovo Blato Nature Park and the proposed nature park in Croatia are well designed, as the surrounding hills are included in the protected areas.

As the Short-toed Eagle is a priority species of the EU Bird Directive, the planned impacts of roads, wind parks and melioration areas have to be reviewed with regard to the species' dense population.

These eagles can be easily seen by guests. The location of the Nature Park administration Karaotok is regularly visited by hunting Short-toed Eagles, their hunting grounds being the entire Delta with its channels and dikes. The map indicates the location of territories where pairs and displaying birds have been observed during the recent years (Fig. 1).

2.2 Great Bittern *(Botaurus stellaris)*

The Great Bittern is a priority species of the EU Bird Directive. With its 44 booming males in 2001 (Stumberger 2001), 18 in 2008 and 15 in 2010, the species is the best indicator for the large reed beds in the Neretva Delta (Fig. 2). The recent population decline is alarming and reflects the need for better protection of the Great Bittern habitats.

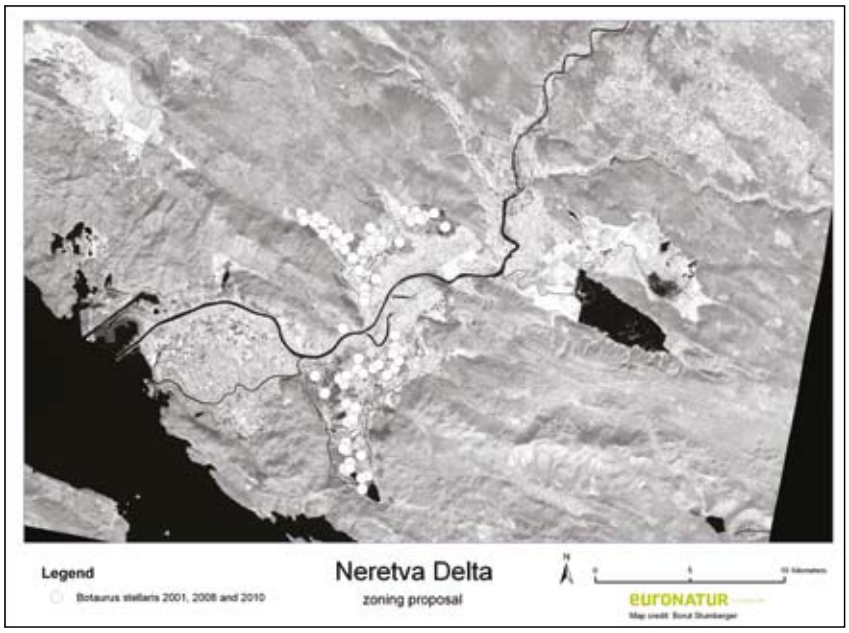
Full protection off the whole reed bed complex is necessary to maintain the population of this species. The actual size of the protected reed beds and marshes does not cover the priority habitats (structured reed beds on peat layers) for the protection of the large bittern population. It is also important to use the Great Bittern as an argument against the still pending melioration and drainage programs in the Delta (compare Physical Plan for the Dubrovnik Neretva counting).

Great Bittern has been observed in Hutovo Blato Nature Park, too, but its breeding status is doubtful. The establishment core zones will help to mitigate the impacts of fishing and poaching. The goal is to stabilize the population of 50 booming males in the Neretva Delta and to create new territories in Hutovo Blato Nature Park.

The booming by this bird is a great tourist attraction in the Neretva Delta. Very attractive is Vid, from where the large reed beds can be seen from above and the Bittern's calls heard during day and night time in spring.

2.3 Lesser Grey Shrike *(Lanius minor)*

The value of the Neretva Delta and the cultural landscape is characterized not only by indicators of the cultural landscape, but by wetland indicators as



The booming by this bird is a great tourist attraction in the Neretva Delta.

Figure 2: Great Bittern *(Botaurus stellaris)* booming males during the 2001, 2008 and 2010 surveys

well. A priority species of the EU Bird Directive is the Lesser Grey Shrike. Fig. 3 presents breeding sites in the Neretva Delta, which are distributed mostly along dryer river levees. These levees, called "greda", are river deposits on the banks of the Neretva River and its branches. The census of the breeding population of the Lesser Grey Shrike is still incomplete, as some areas especially between Gabela and Čapljina in Bosnia and Herzegovina have been not controlled.

3 Proposed Zonation

Zone 1: Core Area – Wilderness Area – restricted use, natural processes

1a Natural Landscapes and Wilderness Area (without human use)

The proposed core areas include natural habitats in the Neretva Delta, which are currently protected only in part or generally as Ramsar Sites without special management. Key habitats are the large karst lakes, such as Deransko Jezero and Lake Kuti, and the marshes and reed beds (Fig. 4). The uniqueness of the delta depends on the protection of these natural and pristine areas. In addition, natural streams and rivers are important habitats in the Neretva Delta, and simply have to be protected. In the core areas, only a limited and guided access is possible for the visitors and research and environmental education. Very important is the protection of the colonial waterbirds' breeding sites in Hutovo blato (Pygmy Cormorant *Phalacrocorax pygmeus*, Great Cormorant *P. carbo*, Grey Heron *Ardea cinerea*, Little Egret *Egretta garzetta*, Squacco Heron *Ardeola ralloides*), the marshes and reed beds NE from Opuzen (Purple Heron *Ardea purpurea*) and in the Neretva mouth (Common Tern *Sterna hirundo*, Little Tern *S. albifrons*, Black-winged Stilt *H. himanthopus*, etc.). Each year in the 2001-2010 period, colonies in the mouth of the Neretva and in the marshes NE Opuzen were disturbed or even destroyed, as there are still no guarded core zones protecting the breeding sites of the priority species.

Further at the coast, there is an urgent need for better protection of the core areas. Several rare and endangered breeding birds like Kentish Plover *(Charadrius alexandrinus)* and Oystercatcher *(Haematopus ostralegus)* are impacted there due to disturbance. Only if strict protected core zone is implemented, the breeding colonies and shorebird populations can be re-established. The Parila lagoon is of great importance as a shallow bay. It has been

The proposed core areas include natural habitats in the Neretva Delta, which are currently protected only in part or generally as Ramsar Sites without special management.

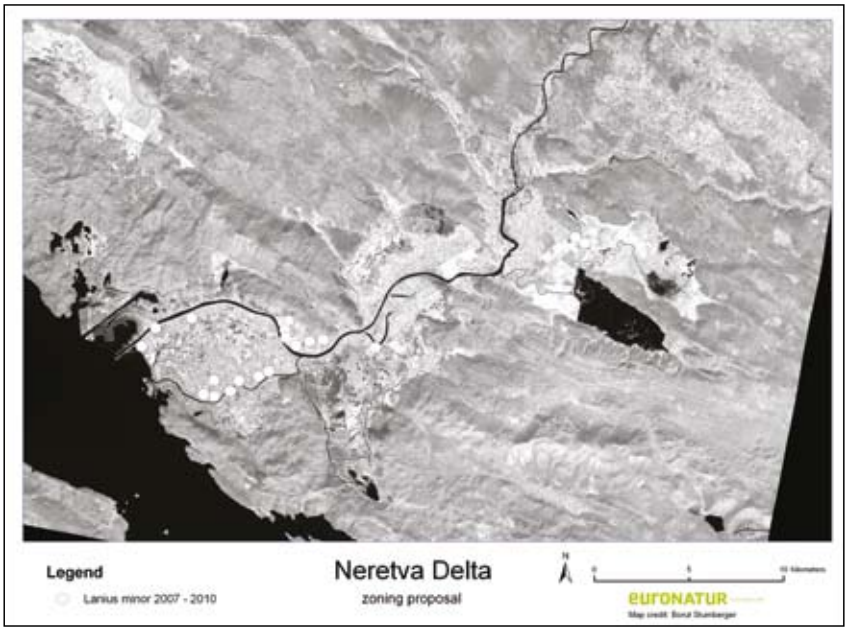


Figure 3: The Lesser Grey Shrike *(Lanius minor)* distribution (breeding sites) in the Neretva Delta during the 2007 – 2010 period

proposed for protection years ago due to its high natural role.

Most important is protection of the reed beds in Croatia, which are impacted by illegal excavation (plantation, hunting pools). It is quite unbelievable that unique sites such as Lake Kuti are not protected as Ramsar Sites, and even melioration of large areas is mentioned in the recent Physical Plan. Very important is the protection of the riverine corridors to save the connectivity between the protected areas in Bosnia and Herzegovina and Croatia. A good example is the Krupa, Trebižat and the Bregava River corridor, which is linked to the Neretva. Only if the natural riverine habitats are protected, the commercially important fish such as the European Eel *(Anguilla anguilla)*, or endemic species such as the Neretvan Nase *(Chondrostoma knerii)* can migrate between the different habitats (compare Glamuzina 2009). Other animals, such as the European Otter (*Lutra lutra*), also need secure migration corridors to survive in the Delta.

The Neretva Delta is a unique and very attractive landscape at the European level if not on the global scale. The proposed core areas are an important Unique Selling Point (USP) for Bosnia & Herzegovina and Croatia. There is no comparable karst Delta worldwide. Only if the mixed landscape of cultivated land and natural areas is supplied by enough fresh water, all use values of the Delta including fishing, fresh water and tourism will be maintained (compare ERSAF 2006, Lijepa nasa 2009).

1b Natural Landscape with low pressure grassing

In the past, wetlands in the Neretva Delta were used in the traditional way. Large areas at the edge of the flood plains were exploited as meadows and pastures. Today, open grasslands are rare in the Delta. Grassland use is still practiced in Hutovo Blato Nature Park, where meadows are maintained around Deransko Jezero, but totally abandoned in some other areas (compare Dalmatin 2009). A regularly flooded meadow between the Krupa River and the karst hills is an important resting site for ducks, gulls, terns, herons and the Glossy Ibis *(Plegadis falcinellus)* during migration (Bem 1990, Stumberger 2009).

In Croatia, only small areas are still grazed. A good example is the Luke area, north of Opuzen. But in the last 10 years, the periodically flooded pastures almost disappeared, like those in Mlinište. In the large depression between Metković and Vid, ideal wetlands for large scale grazing projects can still be

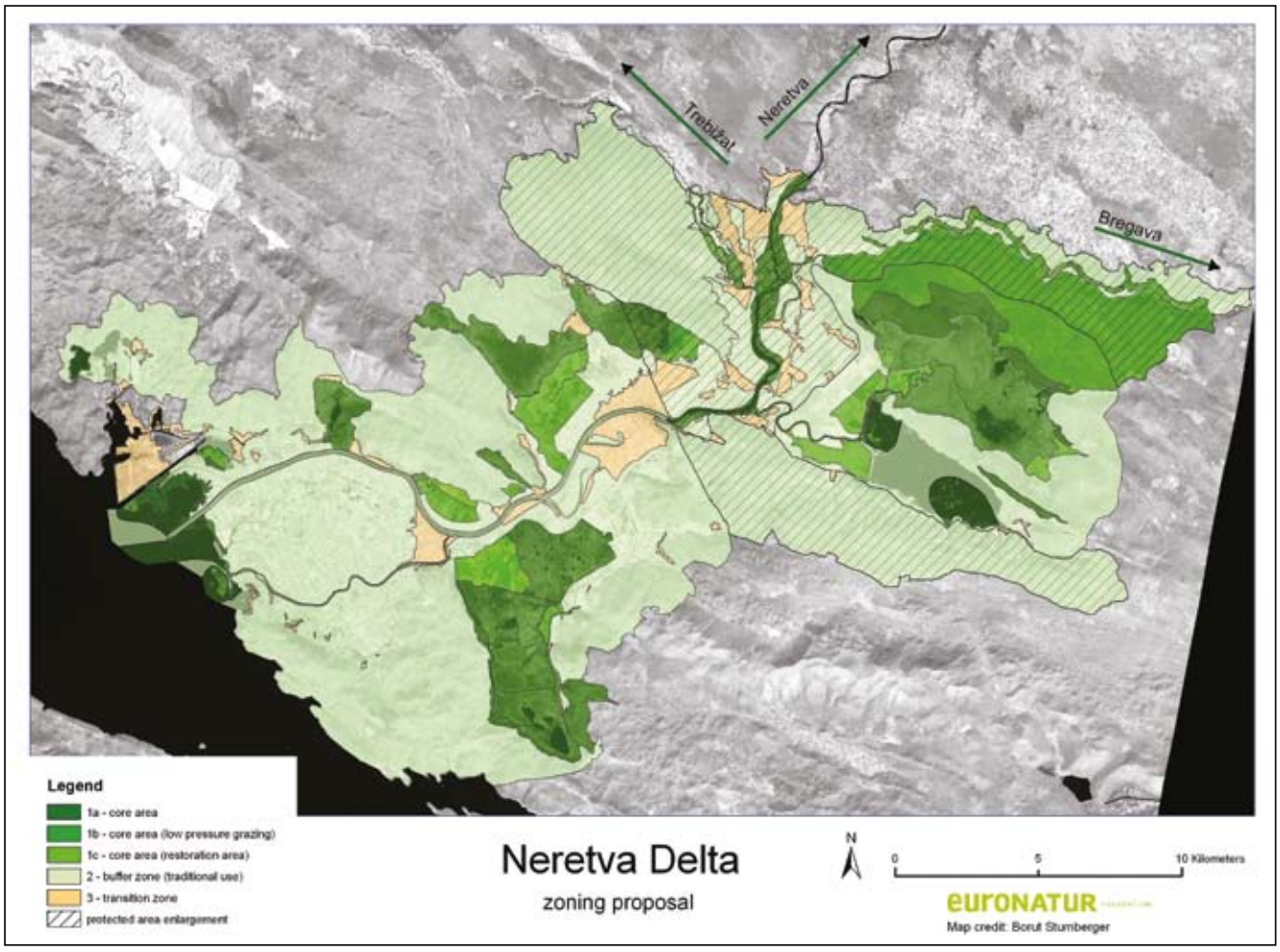


Figure: 4: Zoning proposal for the Neretva Delta based on the Biosphere Reserve concept (MAB)

found. Such areas would be very attractive not only for birds, but for tourists as well.

1c Natural Landscape with high restoration potential

Lake Kuti in Croatia and the area between Metković and Opuzen is still the largest reed complex in the whole Delta. The area is impacted by dikes and channels as well as by many excavated hunting pools and numerous plantations. The progressing illegal land reclamation can be seen during each visit and on Google Earth. The high conservation value of this area is indicated by a small Purple Heron colony and a great number of Great Bittern territories. Here an area is proposed for restoration to complete the unique habitat complex on the Ramsar Site.

Zone 2: Buffer Zone – Landscape Protection – Cultural Landscape – traditional use

2 Protected Landscape with traditional use in the Delta as well karst hills and surrounding landscape

Cultivated land in the Delta is rich in channels and different smaller larger waters such as oxbow, old meanders and canals around the new fruit plantations. Karst hills consist of maccie and garrigue including rock and cliff vegetation. Both landscapes are proposed as landscape protected zones, to buffer the natural habitats and to counter impacts.

The landscape protection zone will help to maintain the attractive landscape of the Neretva Delta and the rich fauna and flora with several priority species.

The habitat mosaic formed by the old arm channels of the Neretva, canals, gallery vegetation and large reed beds is the basis for the high biodiversity. A development concept is needed for adapted agriculture to preserve the water quality and natural elements in the landscape.

The karst hills around the Delta are not only important habitats, but are also significant for the landscape values of the whole area. Impacts, such as those exerted by the recently built highway connection to Ploče, need strategic environmental assessments

Several rare and endangered breeding birds like Kentish Plover *(Charadrius alexandrinus)* and Oystercatcher *(Haematopus ostralegus)* are impacted there due to disturbance.

to define the most suitable corridors. In general, crosscutting of the Delta should be avoided by traffic corridors.

Zone 3 Transition Zone – Settlements (in the Ramsar Site)

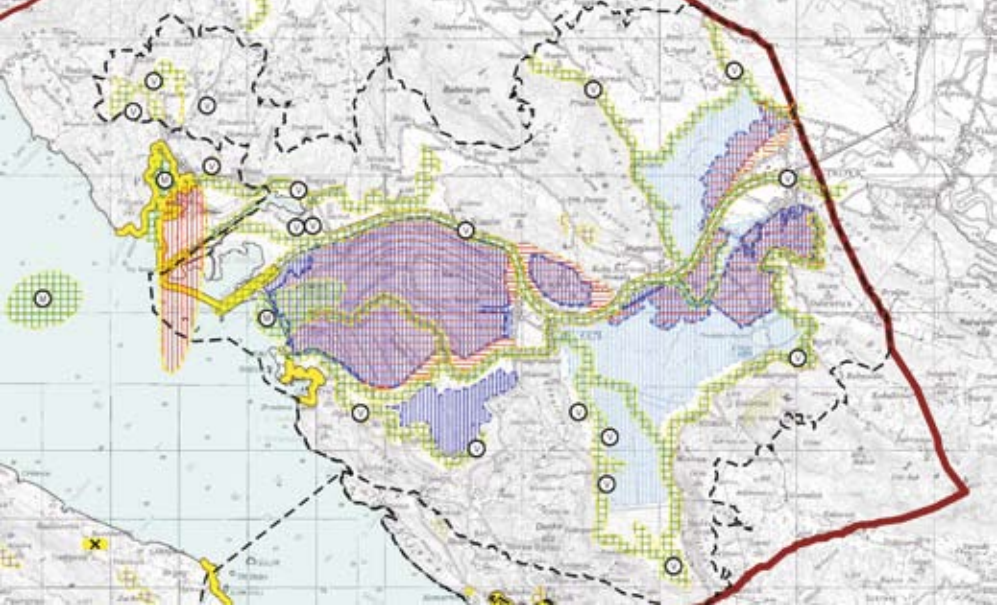
Habitats: Urban areas and larger settlements
The goal of the zoning is a clear delineation of the urban areas. The growing industrial zones and new facilities already impact large parts of the Delta (e.g. compare Stumberger and Sackl this pub.). Here concepts are needed, where and how urban areas can be placed without impacting the landscape. Further landfills in wetland areas, such as reed beds, should be avoided.

Protected Area Enlargement: Core -, Buffer - and Transition Zones

The zonation concept proposes a number of areas, which have not been included in a protected area as yet. As in Croatia, the whole Delta is already protected as a Ramsar Site, in 1992 proposed as a nature park and currently included in the Ecological Network (CRO-NEN) to complete the EU Natura 2000 network. Quite different is the situation in Bosnia and Herzegovina. Here we have identified several areas suitable for the establishment of transboundary protected areas. Most important are, as follows: the wetland and marsh area between Vid, Metković and Gabela, already protected as a core zone in Croatia, the rivers and streams that form the backbone for the connectivity in the Delta, and the areas that could be included as a landscape protected area in the Karst hills linked to the proposed Croatian Neretva Delta Nature Park. Hutovo Blato Nature Park hosts large areas of pristine natural landscape, such as Deransko Jezero and karst landscape. Enlargement of the Park, for example up to the Bregava River, would be a great opportunity to upgrade the nature park into a national park.

4 Conclusions

The Neretva Delta is still characterized by its unique habitats and offers a great potential for nature conservation in the Mediterranean region. The two already existing Ramsar Sites Neretva Delta (Croatia) and Hutovo Blato (Bosnia and Herzegovina) are an excellent basis to protect the ecological values. The classification of core and buffer zones based on habitats and priority species is important to prevent a further loss of biodiversity and wetland areas. In contrast to our proposal, the recent physical plan for the Dubrovnik – Neretva County (Dubrovacko-Neretvanska Zupanja 2010) proposed large areas for melioration and land reclamation (Fig. 5). According to our distribution maps, these proposed projects would impact key habitats of the Ramsar Site in Croatia and have major transboundary impacts. The land re-parcelling would destroy important cultural landscapes and endanger species such as Short-toed Eagle or Lesser Grey Shrike (compare Figs. 1 and 3. with Fig. 5.). The areas proposed for melioration (Fig. 2) are important breeding sites for the Great Bittern and Nature 2000 priority sites, such as Estuaries (Natura 2000 code = 1130), Coastal lagoons (1150 *) and Calcareous fens (7210 *) with *Cladium mariscus* (European Commission 2007). We hope that our



It is quite unbelievable that unique sites such as Lake Kuti are not protected as Ramsar Sites, and even melioration of large areas is mentioned in the recent Physical Plan.

Figure 5: The Neretva Delta Section on the Physical Plan Map 12 (k12_dio4) of the Dubrovnik-Neretva County (2010). Dark blue hatched areas are already meliorated, while the light blue areas are proposed for exploration. Red hatched zones are planned for land re-parcelling.

findings will lead to a thorough review of the Physical Plan. The environmental impact assessment, which is needed for all these proposed projects in the Neretva Delta as a part of the ecological network of the country, will hopefully take our mapping results into consideration.

Establishment of a transboundary protected area is still possible, I as the existing protected areas are linked by natural habitats, which can be protected both as core and buffer zones. The main connection is provided by the Neretva River and the Krupa tributary – this is most important as it is the outflow of Hutovo Blato Nature Park and the intact karst lakes – Bregava and Trebižat (compare Lijepa nasa 2006). Only in Metković, the Neretva river bed is heavily impacted by the embankment and the harbour. In Bosnia-Herzegovina, the river bed of the Neretva is still natural, although impacted by landfills. A growing number of embankments and regulation works are visible at different places. Here a better protection of the river and its dynamic landscape is needed to save the connectivity and territories of priority species such as Common Kingfisher *(Alcedo atthis)* and Stone-curlew *(Burhinus oedicnemus)*.

A special transboundary protection site is needed between Gabela and Vid. Here the large reed beds and, besides Livanjsko polje, the only Great Bittern pairs in Bosnia and Herzegovina indicate the need to establish a transboundary wetland core zone.

The zonation concept for the Neretva Delta envisages inclusion of karst hills in the wider conservation concept to form a transboundary Neretva Delta Biosphere Reserve, which will serve as a brand not only to stimulate tourism, but also to label the products. Establishment of Nature Park administration is crucial for the management of the Delta in Croatia and the transborder cooperation in the protected area management of the whole Delta. The benefits of such transboundary protected areas have been demonstrated on many sites (IUCN, SNV & WWF 2010).

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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

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. Hagemeijer & Blair 1997). Following more intensive studies, even higher breeding number may be found at Livanjsko Polje.

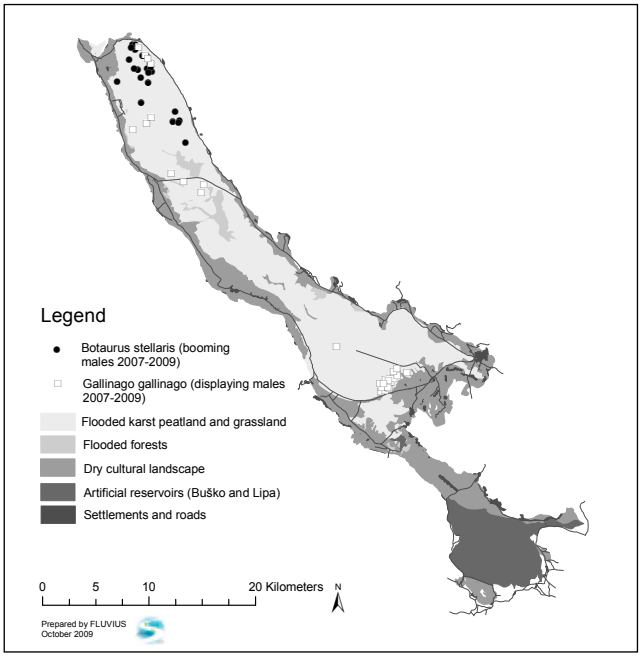

Figure 1: Distribution of booming Great Bitterns *(Botaurus stellaris)* and displaying Common Snipes *(Gallinago gallinago)* at Livanjsko polje, 2007 – 2010

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 Crake 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.)

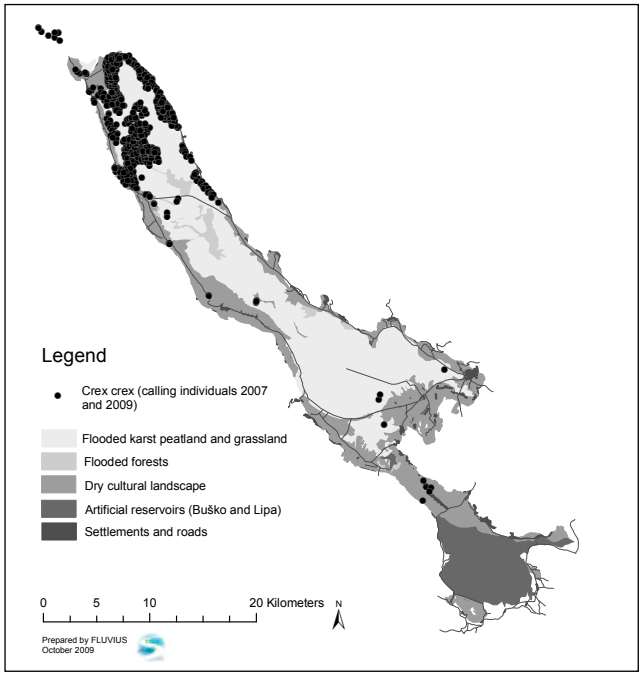

Figure 2: Distribution of Corn Crakes *(Crex Crex)* (calling males) at Livanjsko Polje in 2007 and 2009

2.2 Corn Crake *(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

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

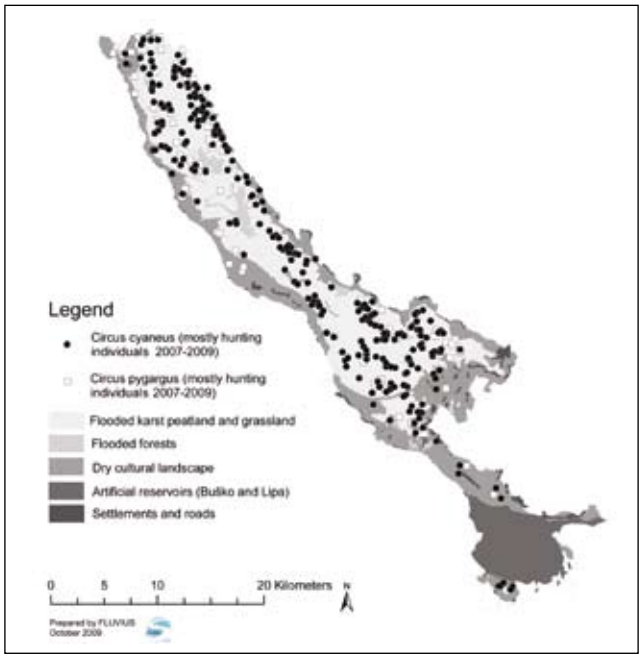

Figure 3: Distribution of Montagu's Harrier *(Circus pygargus)* and Hen Harrier *(Circus cyaneus)* at Livanjsko polje, 2007 – 2010

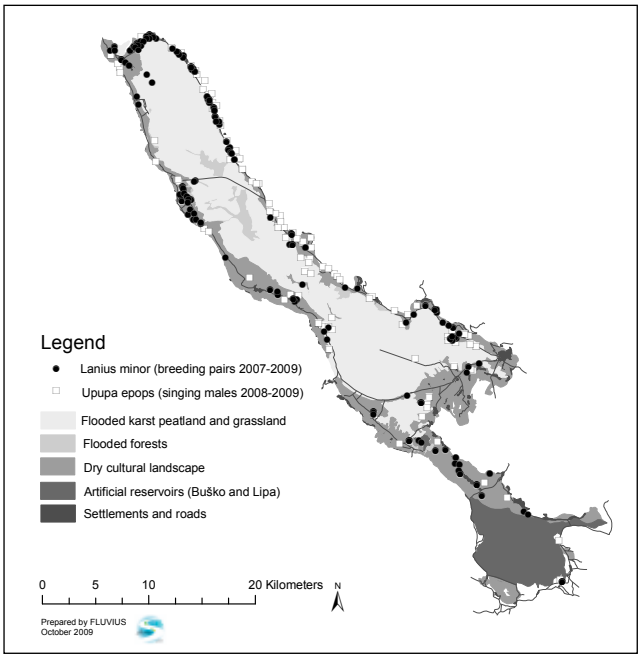

Figure 4: Distribution of Lesser Grey Shrike *(Lanius minor)* and Hoopoe *(Upupa epops)* at Livanjsko polje, 2007 – 2010

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 Zdralovac, Mali Zdralovac and Zdralovcic (literally: Great, Small and Little Crane swamp, respectively!), including grassland areas for smoothening 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.

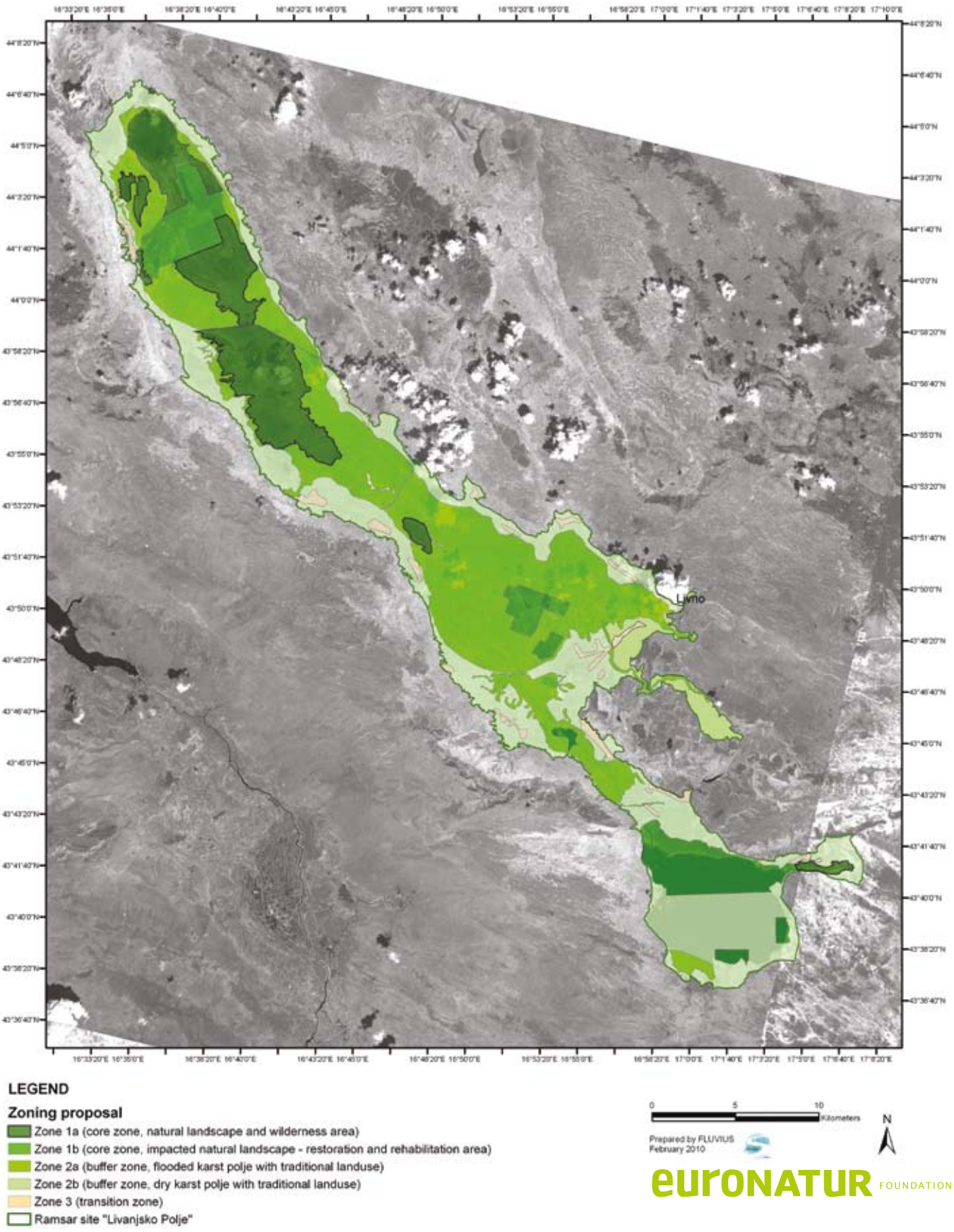

Figure 5: The proposed zonation of Livanjsko polje

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
TOTAL*			**45,873**	**100.00**

*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
Total	**11960**	

Livanjsko polje, Veliki Ždralovac, 1st June 2009 / photo B. Stumberger

River Drin / photo M. Schneider-Jacoby

Rapid Assessment of the planned Hydropower Plants on the Drin River near Ashta (southeast of Shkodra)

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Preface

EuroNatur is implementing, together with WWF MedPo, the project entitled "Protection of Priority Wetlands for Bird Migration (Adriatic Flyway) in the Dinaric Arc Ecoregion through Integrated Site and River Basin Management". Lake Skadar-Shkoder and the Bojana-Buna Delta are priority wetlands impacted by the hydropower project.
This short report is based mostly on available data sources and published reports. For the basic habitat assessment, different data sources such as historical maps, SPOT 5m and Google Earth data were included for the analysis. The assessment cannot substitute more detailed investigations related to flora and fauna as well as hydrological, hydraulic and sedimentological assessments.

1 The planned hydropower stations

On the Drin River near the village of Ashta (some eight km southeast of Shkodra and Lake Skadar-Shkoder), two new hydro power stations are planned. The Austrian Verbund has already signed a contract with the Albanian Government[1].
The construction of the first power station, Ashta 1, which is located on the existing weir Spathara (compare Fig. 1, right lower corner of the main satellite map), started already in late 2009, while works on Ashta 2 began in 2010. The latter is located some five km downstream near of the outlet of the bypass canal, which is yet to be constructed (see Fig. 1 in black colour).

Some main technical figures:

- Installed capacity: 48.2 MW (for discharge of 530 m³/s) for 230 million kWh/a
- Costs: about 160 Mio €
- The hydro-dams should start working from 2012 onwards.
- The electricity produced should be provided for KESH (Albanian national energy company), at least for about 15 years.

2 Short description of the Drin River

The Drin is the largest tributary of the western Adriatic Sea with a 15,000 km² large catchment (including the Lake Ohrid system) and an annual average discharge of 270 m³/s. The river is characterised by a long narrow breakthrough and even canyon stretches before leaving the mountains near Shkodra. In the early 1970s, three huge dams were built in this middle river section, considerably changing the hydrological, hydraulic and sediment regime of the river. Both White and Black Drin headwaters feed the huge reservoir "Liqeni i Fierzës" with 72.5 km² surface and a 152 m high dam with a capacity of 2.5 billion m³ and an installed power of 500 MW. Further downstream, the "Liqeni Komanit" dam is followed by the "Liqen i Vaut të Dejës" with 24.7 km² surface and a maximum depth of 52 m).
The gravel-loaded river, which in the lower reaches builds, after leaving the mountains, large braided river sections in the plain, often changed its course in the ancient times. Until 1848, the Drin flew in its entirety into the Adriatic Sea near Leza, about 25 km east of today's Bojana-Buna Delta. Flood events in

[1] http://www.verbund.at/cps/rde/xchg/internet/hs.xsl/8525.htm (link in German only).

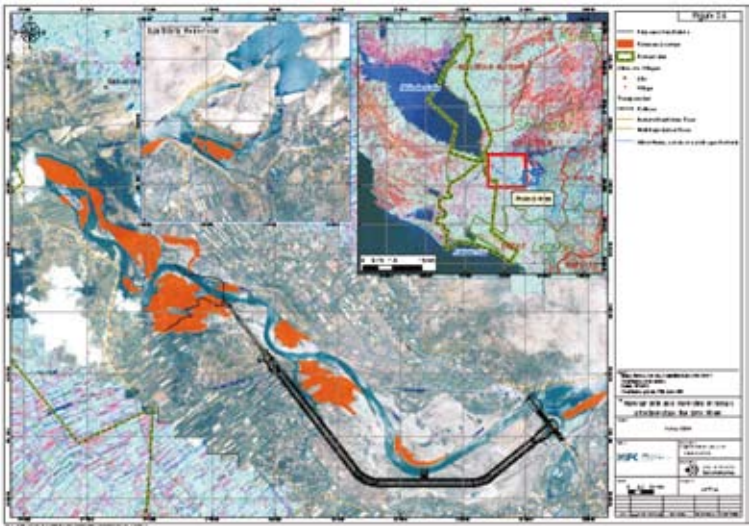

Figure 1: The project site on the Drin River close to Lake Skadar-Shkoder with the bypass canal in black including the two hydropower stations (Ashta 1 at the Spathara weir, and Ashta 2 close to the outlet of the bypass canal) (Malltezi in lit. 2008).

1848, 1858 and 1896 made the river to break through to the Buna River (drainage of Lake Skadar-Shkoder) by the natural channel shift supported by canals to use hydropower for mills south of Shkodra. The 1896 flood was estimated at 7,000 m³/s, which is tremendous for a catchment of this size (the Albanian Alps have very high precipitation values). Due to the breakthrough, the water level of Lake Skadar-Shkoder rises in the flood season by up to 3 meters. During specific conditions, the Drin water can enter even the Lake itself (Worldbank 2006).

The Buna leaving Lake Skadar-Shkoder has a mean annual discharge of about 300 m³/s (the discharge through the Bojana-Buna delta into the Adriatic Sea is about 584 m³/s).

The last northern Drin tributary is the Kir, which in 1750 shifted its course from west of Shkodra town directly into Lake Skadar-Shkoder to the Buna (southeast of the castle, today into the Drin after its breakthrough in 1896 as described above) by destroying northern suburbs of the city (compare Boskovic 2004).

3 Impacts of the existing Hydropower Dams

a) The Drin was transformed from highly dynamic braided river sections with huge gravel bars and islands into very slow flowing to stagnant (during the low-water period) reservoirs, changing all habitats and species compositions (from a fast running river into a chain of lakes).
b) Due to the volume of the five large dams of more than 2.8 billion m³ (in comparison, Lake Skadar-Shkoder varies between 2 billion m³ during low water and 3.57 billion for maximum water level), the overall hydrological regime was changed in particular for low-water periods (possible diversion of discharge during draughts, increasing discharge, e.g. for irrigation) and a significant decrease of small flood events (1-10 years) by retention in the chain of dams. Those smaller flood events are important to afford the typical highly dynamic braided river zones with their specifically adapted flora and fauna that have become very rare in the past 150 years in central Europe (e.g. Tagliamento in Italy is still a good example). There is no evidence that the dams strongly influence the extreme flood events, however, the magnitude of the impact can be more dangerous further downstream after large flood waves are released (compare the example of Kamp flood in 2002, where the flood diversion from the dams in the upper course failed). Due to the rather high retention volume of the dams, it is estimated that floods of about 5,000 m³/s can be reduced to about 2,000 m³/s downstream from the last dam (if the dams are not filled with water). In spring 2010 large parts of the lower Drin floodplains were inundated not only by high precipitation in the catchment but also by mismanagement of dam operation.
c) The sediment balance is considerably impacted by the retention of coarse substrate, mostly gravel and bedload in the reservoirs. Unfortunately, no data are available for storage and original sediment transport within this sections, although examples from the upper Tagliamento, its most important tributary Fella flowing through a similar very narrow alpine valley, indicates the importance of gravel availability and transport. Dams on the gravel reach of the upper Danube in Austria show the significant decrease of nearly 90% of bedload transport after the construction of dams. During floods, only suspended load is transported through the dams. Missing or drastically reduced coarse sediment transport limits the erosion forces of the channels and succession takes place on higher

Figure 2: The Ada beach on the main delta island of the Bojana-Buna during the 1980s and recently (credit Google Earth). A considerable loss and erosion of the beach have been noted in the delta in the last 25 years. In the meantime, the loss of sediment supply due to the retention in the large Drin dams is an important factor of delta degradation.

sediment bars and islands, stabilizing the river course. This tendency will be considerably enforced by the absence of small flood events that occur every 1-10 years. This can be observed downstream of the last Drin dam (compare Figs 3 and 5).

d) In the long-term perspective, the Bojana-Buna Delta's loss of sediments will increase coastal erosion and salt water intrusion. Here the important tourist beaches are endangered in the long run. This is important for the renovation of hotel facilities on Ada Island, for example, as they are situated on the coast itself (Schneider-Jacoby 2006).

4 Basic habitat survey for 1966 and today

Originally, the river stretch under consideration was a typical braided river having numerous unvegetated gravel bars and islands regularly rebuilt, eroded and accumulated during floods and inhabited only by spare pioneer vegetation (annual flora), followed by higher islands with typical pioneer species Tamarisk (*Tamarix* sp.) and Willow (*Salix* sp.) and finally willow softwoods with sparse Poplar (*Populus* sp.) in the higher and sandy stands (for similar alpine river, the following FFH types occur: 3220, 3230, 3240, 7240, 91E0*, compare Tockner 2005, and EAWAG 2001-2003). Figures 3 and 4 show this near-natural stage (until the end of the 1960s) with a large shallow water surface (during low-water conditions, only the deepest and largest channels were discharged, as the huge gravel deposits retain a large quantity of water). The total size of the Lower Drin corridor is about 2,500 ha.

The dams in the Lower Drin mountainous stretch changed first of all the hydraulic flow conditions and hydromorphological characteristics:

The 2006 mapping is more precise and has more classes due to the better data situation. Basically, the still large gravel exploitation area (628 ha) remains in the active floodplain and could be partially restored. The complex discharge situation after the breakthrough to the Buna created different erosion and accumulation pattern in both rivers, however, the strongly diminished flood dynamics in the lower Drin corridor today lead to the decrease of typical habitats. Due to the sediment trapping behind the dams, the river began to erode its main channel, and the latter

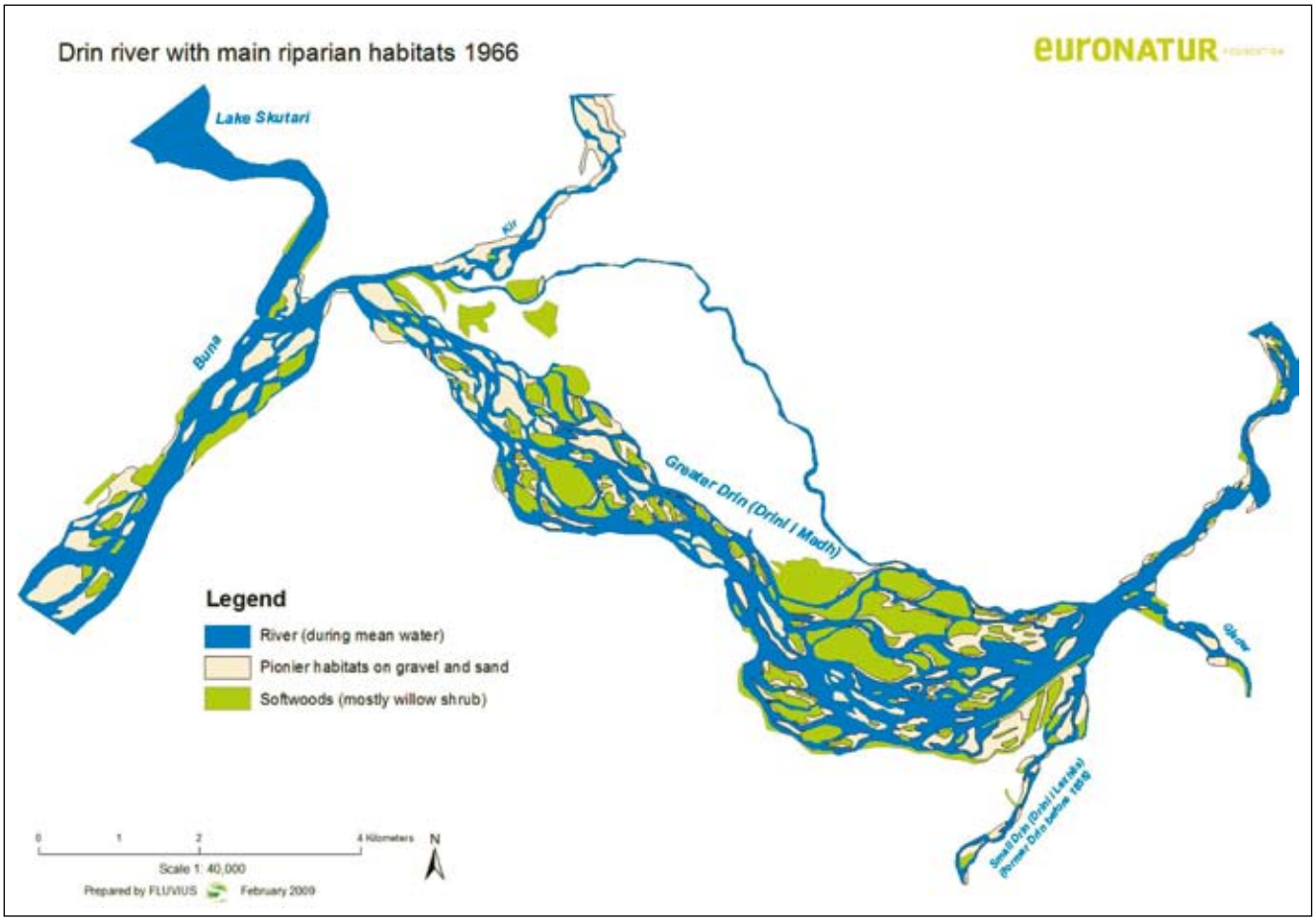

Figure 3: The Drin River and its riparian habitats in 1966 (after the breakthrough to the Buna River in the second half of the 19th century with the remaining regulated outflow into the former Drin river bed (so-called Drinit, on the left lower corner) and before the construction of large reservoirs upstream in the early 1970s)

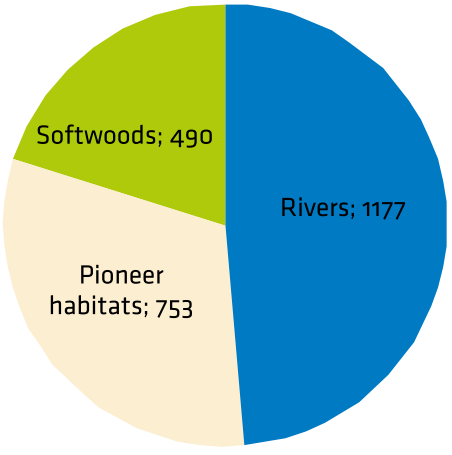

Figure 4: The main habitat distribution in 1966 of the Lower Drin corridor. The distribution of river channels and pioneer habitats (unvegetated gravel bars) is rather variable. In fact, softwoods and mostly willow shrubs covered less than 25% of the former active floodplain.

was transformed from a typical braided channel into the so-called anabranching river type with mostly one main channel only. The Buna, which had to take the whole discharge of the Drin after the breakthrough, initially extended its river bed and then accumulated sediments due to the decreasing slope towards the delta. Due to channel narrowing and regulation for flood protection reasons downstream from Shkodar, the incision starts even if the Drin is still able to recharge its own sediments from the corridor (but no new sediments are coming from the Drin reservoirs). Therefore, the system can be understood and assessed only as a whole. Long-term monitoring and sediment transport model should be installed to find the best solution for the ecological functionality and flood protection (see last chapter, too).

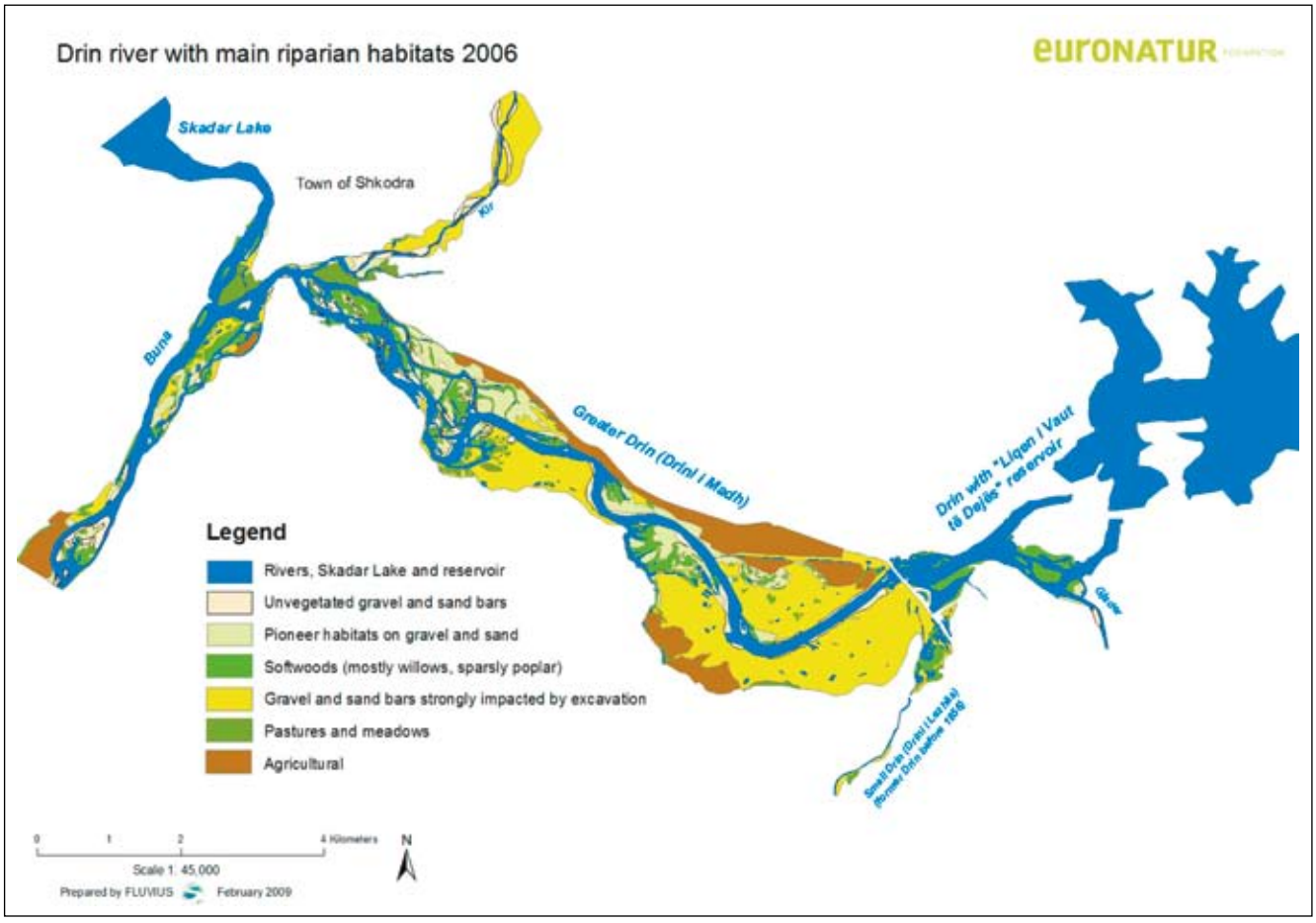

Figure 5: Major changes after the construction of huge dams in the river's upper course in the early 1970s, and the excessive gravel exploitation just downstream of the main dam. The typical habitats have shrunk substantially (rivers, gravel and sand bars, pioneer habitats and softwoods).

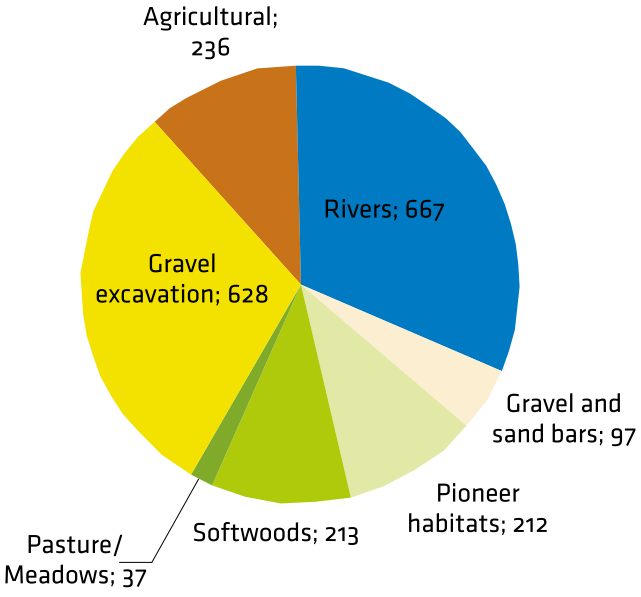

Figure 6: The Drin river and its riparian habitats in 2006 after the construction of large reservoirs upstream and the still ongoing excessive gravel exploitation, and before the construction of the proposed hydropower plant near Ashta

5 Impacts of the planned hydropower stations

Figs. 3 and 5 indicate a major transformation of the formerly braided river into the so-called anabranching river system with the loss of dynamic pioneer habitats (the upper part is heavily impacted by excessive gravel exploitation and can be seen not as typical; in this section, the river was additionally regulated).

The expected consequences:

- The upper part of the stretch with residual water will remain only as a high flood river bed falling nearly dry over longer periods.
- Further drastic depletion of the formerly braided, high dynamic river reaches down to Shkodra, even if some three km remain downstream from the bypass hydropower canal inlet.

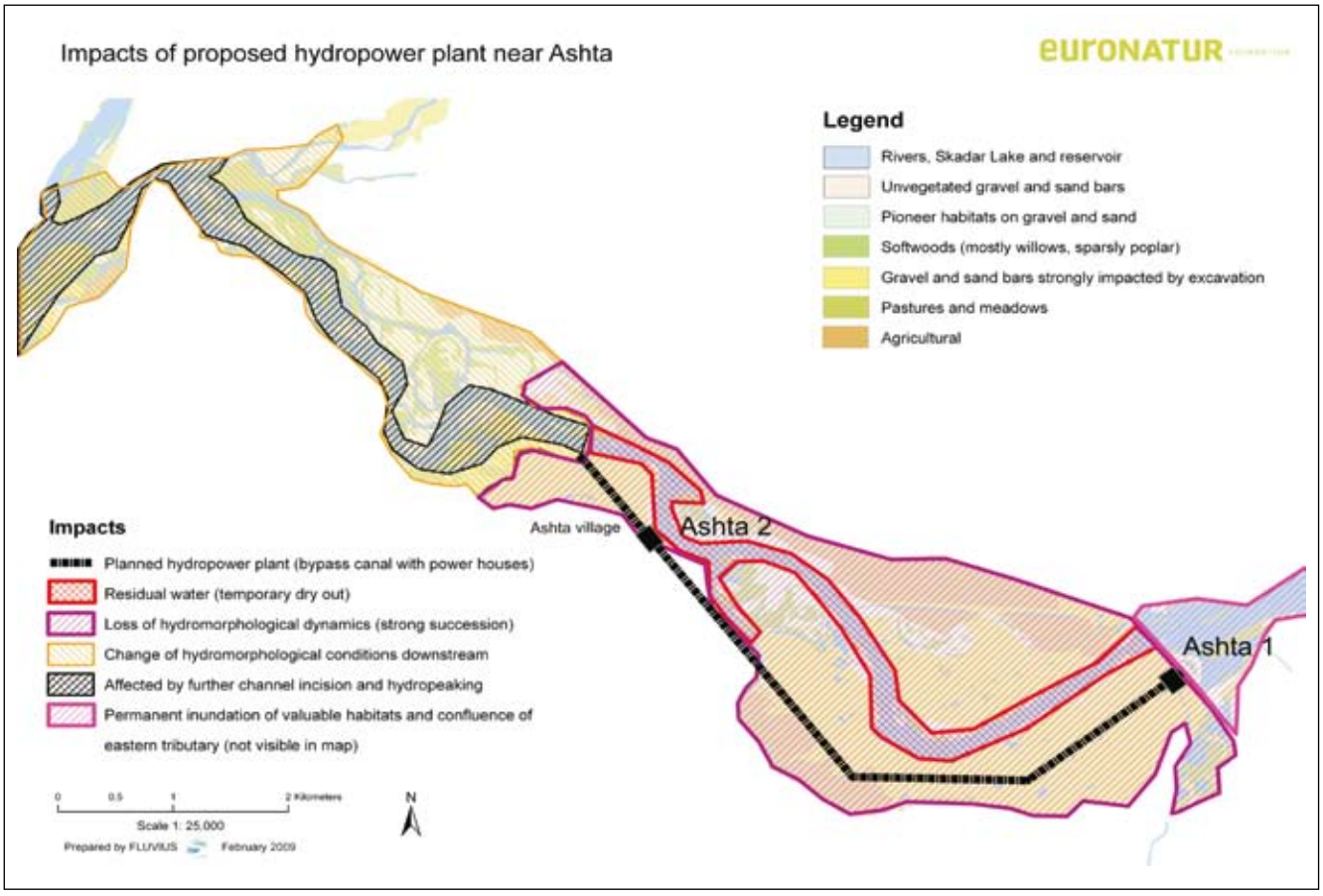

Figure 7: The proposed hydropower plants near Ashta and expected impacts on the main riparian habitats

- The remaining reduced free flowing stretch downstream to the Buna confluence will not be sufficient for the typical free flowing reach for nature protection purposes and ecosystem services such as groundwater feeding which is strongly reduced by the sealed bypass canal.
- Erosion will increase below the hydropower canal inlet in the main channel.
- Permanent inundation of valuable habitats and confluence of eastern tributary (not visible in map) by impoundment of Ashta 1.

6. Riverine landscapes of the Drin, Bojana-Buna and Laguna complexes

The system of mountainous river sections, unique lake outflow and tectonically active landscape and relief leading to very complex discharge situations particularly during floods, makes it necessary to assess the whole riverine landscape and to discuss impacts on the system. Flood protection of Shkodra should be provided by the bypass via the former Drin channel (Drinit), which could serve as natural channel towards Leshe.

Furthermore, a complex solution for flood control is needed for the whole Bojana-Buna Delta. A good example of such a programme is the Central Sava Basin (Brundic et al. 2001). Here, the protection of the flooded areas as a retention area, combined with release channels and conservation programmes, provides optimal conditions for the area's safety and economic development. In the entire area, all flooded sections and potential retention areas have to be defined (see Fig. 8) and combined. Before further hydropower dams, such as Ashta, are planned, a sustainable solution for the flood control has to be designed.

- The former Drin channel could serve as a bypass.
- The Drin channel must retain its full width and length as a retention area.
- The Kir torrent must remain free of any settlements.

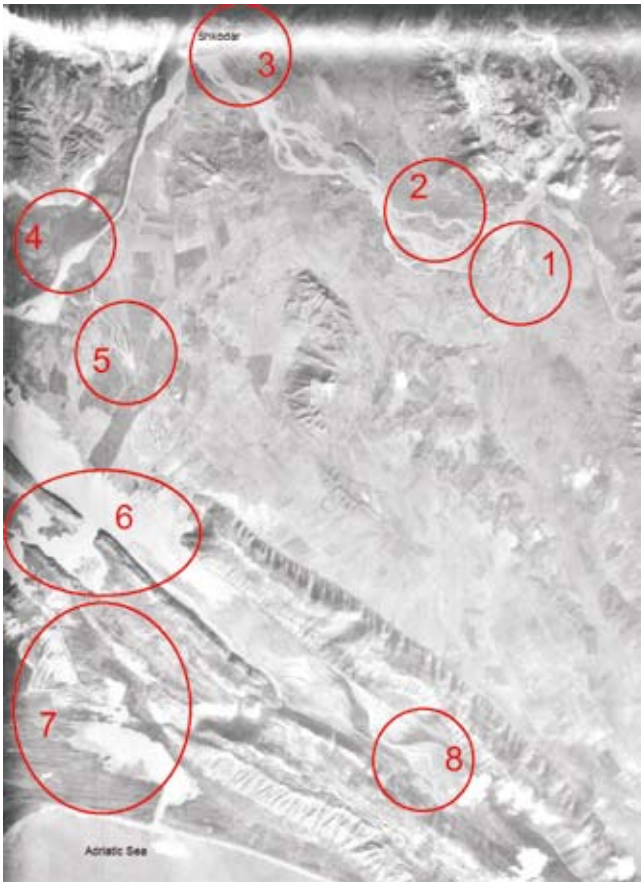

Figure 8: Corona picture from 1966 (copyright National Reconnaissance Office US), showing the region during a flood event and indicating the most endangered parts of the floodplain, which should be kept as a retention area

- The Buna retention on Montenegrin side must be of sufficiently large dimensions.
- Land overflow along former channels should be suitably managed.
- Former Buna breakthrough will be necessary in future as well, to keep the maximum flood conveyance to the sea, as the recent Buna breakthrough is narrow and a serious obstacle for floods.
- The lagoon environment has to be protected to be capable to receive and mitigate flood waves.
- The former flood conveyance direction towards the former Drin channel should be reconsidered.

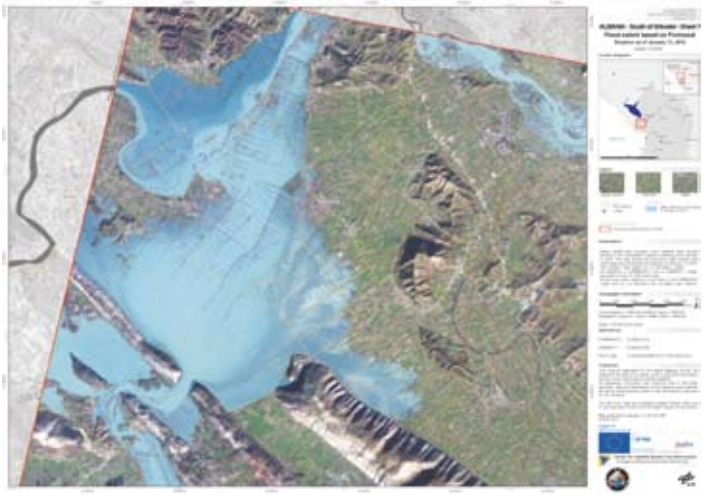

Figure 9: Flood in 2010, source http://www.zki.dlr.de/article/1188 (copyright DLR)

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Young Marsh Harrier *(Circus aeroginosus)* chasing Common Coots *(Fulica atra)*, Ulcinj salinas, 17th March 2010 / photo D. Bordjan

The importance of the Adriatic coast for waterbird migration

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The Adriatic coast is an important stepping stone of the Black Sea/East Mediterranean flyway used by waterbirds. Flyways are areas covered by migrating waterbirds and, to be more precise, the total area covered throughout the annual cycle by a population or species or group of species or the entire group of waterbirds. Coastlines are known to be of key importance for migratory birds concentrations and sites where waterbirds congregate in huge numbers, if conditions allow. Apart from endangered species, which occur in the region as breeding birds such as the Dalmatian Pelican *(Pelecanus crispus)*, Ferruginous Duck *(Aythya nyroca)* or the Pygmy Cormorant *(Phalacrocorax pygmeus)*, huge numbers of many other waterbirds cross the region of the Adriatic coast in large numbers on their way from Northern Europe and Arctic Russia towards their wintering grounds around the Mediterranean, North Africa or further south. Along the coast of the Adriatic and inland, there are several large wetlands that showed their international importance when hunting was banned for fear of bird flu, as they shelter huge staging flocks of waterbirds. Few millions of waterbirds are thought to cross the region and the Adriatic coast, but many cannot effectively use the wetlands along the Adriatic coast due to disturbance, hunting pressure and urbanization.

Wetlands International has been championing the development and raising awareness about flyways concept and the conservation of flyway populations. The first ever atlas of flyways started back in the 1990s with the publication of the Anatidae Atlas (Scott & Rose 1996). These atlases are based on huge numbers of data on distribution, migration patterns, areas of breeding, wintering or roosting and staging during migration. Studies as the satellite tagging of waterbirds, like some endangered species as the Lesser White-fronted Goose *(Anser erythropus)* (www.piskulka.net) and some other goose species like Barnacle *(Branta leucopsis)* and Brent Geese *(Branta bernicla)* (www.wwt.org), boosted with other waterbirds satellite tagging during the bird flu crisis, and along with the data gathered from colour ringing schemes, provide the source of information that compiled give the picture of the population flyways. New to this knowledge is the recently published Waders Flyway Atlas (Delany et al. 2008) revealing our current knowledge of the flyways of wader populations and the key sites for their conservation. The flyway conservation concept is a baseline for the international instrument called African-Eurasian Waterbird Agreement. This has put political binding character of the efforts for conserving the migratory birds across Eurasia and Africa. Wetlands have huge economic value for people delivering invaluable ecological services. Waterbirds have their unique requirements bound to a scarce, limited and vulnerable habitat and they can serve well for indicators of the wetlands ecological health. The waterbirds have their tendency for congregatory behaviour and number of sites can hold considerable portion of the flyway or the whole global population of a species or subspecies. Most populations of migratory waterbirds in the African-Eurasian region are tightly constrained by ecological factors in their breeding, wintering and/or stopover areas. Many sites are needed along the entire migration routes of these birds to maintain their populations. This complex web of sites form a chain in which each link is essential for maintaining viable and healthy populations of migratory waterbirds along the entire network. This brings in the concept of ecological networks of sites, network of key sites for waterbird conservation. This is a concept laid down in the creation of the Ramsar Convention on Wetlands aiming at protecting wetlands and key sites for congregatory waterbirds. The protection of such a network of critical sites therefore requires concerted national and transboundary conservation actions. Through joining into such international instruments, countries can effectively contribute to the conservation of waterbirds across the national borders.

Few millions of waterbirds are thought to cross the region and the Adriatic coast, but many cannot effectively use the wetlands along the Adriatic coast due to disturbance, hunting pressure and urbanization.

One major pillar of the Wetlands International (WI) work that contributes to these international conservation instruments and to waterbird knowledge and conservation is the International Waterbird Census (IWC). This gives us an extensive knowledge about waterbirds. Since its start in 1967, more than 14,000 volunteers have taken part covering over 100 countries in 4 regions of the globe. The Adriatic countries and the region fall within the East Mediterranean/Black Sea region of the IWC. Though amongst the Adriatic countries many have not been contributing regularly to the IWC scheme in recent years, countries like Bosnia-Herzegovina, Slovenia and some others are submitting regular and valuable data from their countries. The data results show that the East Mediterranean / Black Seas region is the one in the whole of Europe that has caused the greatest concerns in recent years with most of the population showing slight or moderate decline of up to 15%. However, there are various possible explanations for these declines. They could be due to loss of key sites and important habitats due to tourist and other development and wetlands deterioration, or might be driven by climate change causing warmer and milder winters in the region. The IWC scheme needs more regular and more stable inflow of data from the region to be able to determine better trends and pinpoint the hotspots of conservation concern. Therefore WI needs its local partners in the scheme to submit their data annually to help build a bigger picture.

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Protecting migratory birds along their entire flyway: why others should do it

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What people do, depends on what they know, what they are able to do (economically) and what they want to do (socially). If you want to convince people to protect birds, you have to make sure that they *know* enough about birds, that they are economically *able* to protect them, and that they *want* to protect them. If you want to convince other people to do something, you also have to start from their point of view. Many people, whose assistance is needed to protect birds, don't have a great interest in birds. Their point of view is often 'what can I, or my electorate etc., earn from birds?'

Birds are often hunted for food or pleasure, or to control their numbers. Hunting migratory birds is particularly attractive because they often congregate in large numbers at fixed times each year at particular places (e.g. mountain passes, sea crossings, wetlands). In the countries in and surrounding the Mediterranean, some 10 million hunters shoot or catch an estimated 500 million birds each year, mostly passerines. How much the hunters spend is not known, but just the value of the birds at 50 cents each would already be € 250 million. In developing countries, hunting for subsistence and the market also claims many birds. In the USA, 3 million hunters spend $ 1.4 billion annually to shoot 19 million ducks and 3.5 million geese. Bird eggs, down, feathers and droppings (guano) are valuable products as well.

Italian hunters with duck decoys and playback equipment, Velika plaža, 1st March 2008 / photo M. Schneider-Jacoby

Big numbers, but in the USA (migratory) bird watching has an annual turnover 20 times greater than bird hunting: $ 32 billion in retail sales, contributing $ 86 billion to economic output, and creating 863,000 jobs. In South Africa two environment-friendly tourist birding routes generate $ 6.4 million annually. In Costa Rica ecotourism, including bird watching, generates $ 400 million per year. There are migratory hotspots and bird migration festivals on all continents that profit from bird tourism.

Birds also provide ecological services. In 1921 it was estimated in the USA that (migratory) birds reduced insect damage to crops and trees by $ 440 million annually. In the USSR 25 million nest boxes for starlings were installed so they could help keep insect damage under control. Storks and swallows etc. are appreciated for the same reason. Birds can also help with pollination, seed dispersal, nutrient concentration and finding fish at sea, and as indicators of unwanted chemical pollution, land use change and climate change. (Migratory) birds also provide services in falconry, as inspiration for scientific and technical innovation (flight, camouflage), and as a reason for protecting habitats that also have important other values to mankind (e.g. wetlands, forests).

Children guided at excursion in Škocjan Inlet Nature Reserve, Slovenia, 5th October 2009 / photo I. Brajnik

Thirdly, (migratory) birds have great cultural significance. As symbols of freedom, happiness, long life, etc. As national symbols, including on coins, notes and stamps. In visual arts all over the world, from cave paintings to modern depictions. In dances, music, literature and proverbs and expressions. And as announcers of the changing of the seasons.

Nevertheless, migratory birds face threats all along their annual flyways. As an example, Montagu's Harriers *(Circus pygargus)* have lack of safe habitat and lack of prey in parts of their breeding distribution in northern Europe; they face hunting threats on their migration over the Mediterranean region, and they face persecution as raptors and destruction of their habitat in their wintering areas south of the Sahara. Protecting them in only one part of their annual range will not be enough. At the same time, Montagu's Harriers are appreciated for their beauty and fascinating life cycle, and as predators of grasshoppers in Africa.

We must play to the strengths of migratory birds to encourage their protection in a coordinated fashion along their entire flyway, through e.g. species action plans, habitat protection and international agreements. And we must ensure the involvement of all stakeholders through pointing out the economic, ecological and/or cultural interest that migratory birds have for them, too. Hunters as well, if they want to continue their cultural tradition, must help ensure that populations are maintained. Migratory birds are, after all, a shared heritage and shared responsibility.

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The Eurasian Spoonbil *(Plataela leucorodia)* on the left was ringed as chick in Hungary in 2005 and recovered at 28th September 2006 in Ulcinj salinas (this picture) / photo M. Tiefenbach

The role of a single stopover for the conservation of an endangered migratory waterbird population

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Long distance migratory waterbirds have an energetically expensive strategy, since they annually travel some thousands of kilometres and can only rely on a few areas for food. These patchy and scattered suitable landscape also include several ecological barriers (i.e. non-profitable areas for refuelling) between stopovers that have to be surpassed in order to successfully complete their migration. Therefore, many waterbird populations depend on the conservation of several different wetlands along their flyways.

In this context, the majority of waterbird populations with known trends are in decline at the beginning of the 21st century. Here I discuss the role of a single stopover wetland (Santoña Marshes, N Spain) for the conservation of the north Atlantic population of Eurasian Spoonbill *(Platalea l. leucorodia)* migrating between its main breeding areas at the Wadden Sea islands towards its wintering quarters, i.e. northwestern African (Banc d´Arguin and Senegal Delta) and southwestern European (Doñana and Odiel marshes) wetlands. For this purpose, I analyzed factors influencing stopover duration during four consecutive migrations of PVC-ringed birds with known wintering quarters (Dutch Spoonbill Working Group Database; on behalf of O.Overdijk).

During autumn, 35-40% of the north Atlantic Spoonbill population made a stopover at Santoña Marshes, just before crossing the Iberian Peninsula, which represents some 850 km of non-profitable land for refuelling. In the study area, there were favourable wind conditions to follow the direct route during most migrations (80% of the days with tailwind conditions). Thus it seems that Spoonbills broadly use the assistance of wind, deciding to make a stopover if they have not enough fuel stored to continue towards, at least, the next potential stopover.

Overall, the African wintering Spoonbills arrived some days earlier and stopped for a longer time (plus 44%) than those wintering at southwestern European wetlands. These differences were consistent between years. Stopover duration was not significantly affected by the age of the bird. However, there was a significant reduction as the migration period advanced. This suggests that Spoonbills develop different stopover strategies depending on the remaining distance to the overwintering area. Furthermore, at least some African wintering birds might take advantage of the high energy load to 'skip' those south Iberian wetlands, where their conspecifics overwinter, to perform a non-stop bout from Santoña to the northwestern African wetlands.

In conclusion, loss and degradation of stopover habitats can have a serious impact on the conservation of migratory waterbirds by a differential effect on distinct fractions of a given population.

In addition, the majority of adults (70%) had currently used the stopover area before the arrival of the majority of yearlings (60%) in the last week of September, when overall stopover duration had markedly decreased. Therefore, adults could minimize the potential effects derived from density-dependent processes by avoiding stopover in the last part of the migration period, in particular African wintering birds. Inversely, yearling Spoonbills that arrive towards the end of the migration period, especially those wintering in Africa, increased the probability of dying during the long migration, which could be viewed as an evolutionary issue regulating this long-distance migratory bird population.

In conclusion, loss and degradation of stopover habitats can have a serious impact on the conservation of migratory waterbirds by a differential effect on distinct fractions of a given population. Furthermore, I stressed that the conservation of a single and little (roughly 1,200 hectares) stopover site emerges as crucial for an adequate preservation of intraspecific diversity in an endangered long-distance migratory waterbird population.

Within the Adriatic Flyway, therefore, an adequate conservation and management (e.g. hunting banning) of some strategically located stopover wetlands (e.g. the Bojana-Buna Delta and Ulcinj Salina, Livanjsko Polje, Neretva Delta ...) should be thus crucial for many waterbird populations to successfully reach their African wintering grounds as well as to complete their homeward journey. This may be especially important for several endangered long-distance migratory waterbird populations (e.g. Slender-billed Curlew *Numenius tenuirostris*, Black-tailed Godwit *Limosa l. limosa,* Eurasian Spoonbill), some of them in urgent need of our conservation efforts.

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The far southern end of the Adriatic Flyway: important wintering sites in North and sub-Saharan Africa

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From Tunisia, the prevailing direction of migration in spring, as demonstrated by many ringing recoveries, is to the north east. Among the species which move northeast in spring, raptors and soaring birds are of special importance. Birds concentrate at Gibraltar and the Bosporus, to avoid long sea crossings; but many also hop from Cape Bon via Sicily and the Italian mainland to the Adriatic. In autumn, on the other hand, migration is less striking in North Africa. After the long Mediterranean summer, most sites are dry and offer little food. Many birds (especially passerines) put on extra weight in southern Europe, then cross the Mediterranean and Sahara in one hop. Then winter visitors appear in North Africa in large numbers, fleeing the cold centre of Eurasia: Greylag Goose *(Anser anser)*, Eurasian Wigeon *(Anas penelope)*, Song Thrush *(Turdus philomelos)* and Common Starling *(Sturnus vulgaris)*.

The Tunisian Government has set up a network of National Parks and Nature Reserves to conserve the habitats of these migrants.

The Tunisian Government has set up a network of National Parks and Nature Reserves to conserve the habitats of these migrants. Wetlands are well represented: 20 Ramsar sites covering over 725,000 hectares have been designated, with another 21 sites in preparation. Important wetlands in Tunisia include: Lake Ichkeul (with Doñana, Camargue and El Kala in Algeria) is one of the four most important freshwater wetlands of the western Mediterranean, Gulf of Gabes (the only major tidal area in the Mediterranean – apart from the Venice Lagoons - with a tidal range of two metres). Among important wetland types, the following may be mentioned: huge closed saline basins ("sebkhets") providing winter habitat and sometimes breeding sites for Greater Flamingos *(Phoenicopterus ruber*), Black-winged Stilts *(Himantopus himantopus)* and Avocets *(Recurvirostra avosetta)*, many saltpans especially Thyna near Sfax, and newly built shallow reservoirs which provide habitat for endangered water birds such as Marbled *(Marmaronetta angustirostris)*, White-headed *(Oxyura leucocephala)* and Ferruginous Ducks *(Aythya nyroca)*.

AAO (the Association des Amis des Oiseaux), a non-government organization (NGO), the official Tunisian BirdLife International partner, has supported the implementation of Important Bird Areas (IBAs) in Tunisia. There are currently 46 IBAs in Tunisia, which all enjoy legal protection of some kind (either protected status, or non-hunting areas). AAO is carrying out regular monitoring of bird populations at the IBA sites in Tunisia.

Hunting pressure in North Africa is, in general, lighter than in southern Europe: the principal quarry species in Tunisia are hare, wild boar and partridge. There is also winter trapping and shooting of Common Starling and Song Thrush, which can cause great damage to olive crops. AAO has organized for BirdLife International a study of hunting pressure in the south and east Mediterranean.

Four flagship species illustrate the role of sites in northern and sub-Saharan Africa in the southern part of the Adriatic Flyway.

Eurasian Spoonbill *(Platalea leucorodia)*: There are three separate European breeding populations of Spoonbills: Atlantic, Central European ("Pannonic"), and East European. AEWA has recently drawn up an Action Plan for Spoonbills in its area, with much input from observers in northern Africa. The central European population

Ruffs *(Philomachus pugnax)* / photo P. Sackl

Cape Bon / photo H. Azafzaf

Lake Ichkeul / photo H. Azafzaf

nests regularly in Austria, Hungary, Croatia and Serbia, and has nested in Montenegro. Thanks to observations of colour-ringed Spoonbills, their migration routes from breeding colonies in central Europe to wintering areas in North Africa are becoming better known. By the end of 2008, 35 ringed Spoonbills from Croatia, 47 from Hungary, 53 from Italy and 24 from Serbia had been recorded in Tunisia. By late 2008, three from Hungary, one from Italy, two from Serbia and one from Slovakia had been recorded from Libya. (But we need many more observers and better coordination of the ringing system)! A few Spoonbills which nest in Central Europe cross the Sahara to winter in Lake Chad and the Inner Niger Delta in Mali, but most stay in the Mediterranean, largely around tidal areas in southern Tunisia and Libya. However, Atlantic and East European breeding Spoonbills habitually go much further south, to the Senegal Delta or southern Egypt and Sudan.

Common Crane *(Grus grus)*: Cranes are iconic birds of strange shape, with weird ghostly calls; in many countries they feature in folklore. Cranes breed in large marshes in northern Europe, and pass through Hungary and southeast Europe in October en route to North African wintering areas. They winter in large numbers from November to March in North Africa, feeding in open steppe areas and roosting round lakes. In Tunisia, wintering cranes may number many thousands in the plains round Kairouan; they roost at the Sebkhet Kelbia Ramsar site. In Libya, recent winter surveys, carried out by the Libyan Environment General Authority in conjunction with the UNEP Regional Activities Centre (RAC/SPA), have recorded up to a thousand wintering cranes, often in extremely dry sites on the fringe of the desert.

Garganey *(Anas querquedula)*: Many ducks cross the Sahara to winter, in particular Northern Shoveler *(Anas clypeata)* and Northern Pintail *(Anas acuta)*. But Garganey is extraordinary, the only Palearctic duck whose entire population crosses the Sahara twice a year. Garganey winter (with some Shoveler and Pintail) on the great floodplain wetlands of Sahelian Africa: the Sudd, Lake Chad, the Inner Delta of the Niger in Mali and the Senegal Delta. When the floods of the great Sahelian rivers begin to drop in January and February, Garganey start to move north. They pass through North Africa and the Mediterranean in March. (Garganey is called ("marzaiola" – the March bird – in Italian). Most breed in central/northern Europe. In autumn, they return to Africa by a different route, through the Levant and along the Nile, carrying out a "loop" migration. Countries of the Mediterranean therefore play a specially important role for Garganey just during a brief period in spring.

Ruff *(Philomachus pugnax*): Many waders, which breed in the northern tundra or in more temperate latitudes of Eurasia, migrate in large numbers through the Mediterranean. Some species winter in the Mediterranean, others cross the Sahara, some (e.g. Curlew Sandpiper *Calidris ferruginea* or Little Stint *Calidris minuta*) going as far as South Africa. Some Ruff winter in the Mediterranean, some cross the Sahara to winter in the Sahel. In some years, Ruff winter in considerable numbers in Tunisian salt lakes, like Sebkhet Sejoumi, very close to the city of Tunis. From February to April, Ruff which have wintered in the Sahel appear on Tunisian wetlands, not staying long. After breeding in Europe, Ruff appear from late June to August, often staying to moult before

continuing their migration to west Africa. During the 1960s and 1970s, good numbers of Ruff were ringed in Tunisia (Rades Ringing Station) and recovered throughout central Europe. It would be good to resume this ringing programme.

Some conclusions: (1) The strongly-marked Adriatic flyway is important for a variety of migrant birds. (2) This flyway continues southwards into North Africa, and indeed goes beyond, to the Sahel and as far as South Africa. (3) More regular exchanges are needed between those working on conservation of birds and their habitats along the Adriatic flyway. (4) Improved national data bases, for collection, storage and analysis of bird records are a high priority.

WWF's actions to protect wetlands along the Adriatic Flyway

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Mediterranean wetlands have almost disappeared in the past century, now accounting to 28,500 km^2 from a total of 1,300,000 km^2 surface area at the beginning of the twentieth century. This is not surprising, since the reasons behind this sharp decline are land reclamation for agriculture, urban expansion, sanitation of areas considered unhealthy for people, changes in the hydrological regime through building of dams, diking and flow diversions.

The countries covered by the Adriatic Flyway are in the process of joining the European Union and they all signed the Stabilization and Association Agreement. This implies that eventually they will be liable to adopt European standards. The water laws of these countries in fact have been all adjusted to the EU Water Framework Directive, which requires a basin level approach to water management and ultimately to achieve good ecological and chemical status of all the water bodies and prohibit their deterioration. WWF is supporting the application of such a basin level approach in the Adriatic flyway, particular in order to eliminate the impacts threatening priority wetlands.

The wetlands identified as priorities for WWF are: (1) the Lower Neretva in Bosnia and Herzegovina, (2) Livanjsko polje in the Cetina basin in Bosnia and Herzegovina, (3) Lake Skadar in Montenegro. The three basins are transboundary, which adds complexity to the picture.

The WWF's approach in the Adriatic Flyway is twofold with actions at the policy level (a) and field level (b).

a) In Bosnia and Herzegovina, the WWF Mediterranean Programme is supporting the water administrations to develop the bylaw that prescribes the environmental flow to be maintained in their rivers. This requirement is stipulated by water laws. Several methodologies have been screened and the most suitable for the context tested in the field. On the basis of the findings, a bylaw has been drafted and is currently being assessed by the authorities for adoption in the Parliament. At the regional level, an initiative towards sustainable hydropower is being launched. The aim is to bring forth innovative approaches in the region to increase the sustainability of water infrastructures dedicated to the power production. The main message is that a careful design and operation of hydropower infrastructures can provide for development and economic needs with minimal impact on the people and natural assets of the Dinaric Arc.

b) In the *Neretva field project*, a team of experts has been set up to i) assess biodiversity values and their ecological needs ii) have a full understanding of the hydrology of the area and to understand the water flows. A sensitive area has been chosen, the Hutovo Blato wetland, which is a crossroad of waters of the whole basin and releases water in the downstream delta. The assessments, together with a complex monitoring of water flows and levels, yielded indications as to what are the needs of the water body to return to a healthy conservation status, currently disrupted by the many water infrastructures and diversions implemented through time. A dialogue among stakeholders is underway to find a way to provide the right amount of water at the right time for nature. Assessments and reports have been prepared. In Lake Skadar, an analysis of threats at the basin level revealed a very urgent need to build four dams on the Moraca River, the main tributary of the lake. Scientific assessments of the biodiversity values and their ecological needs and the hydrology of the lake have been made. They have provided clear insights on the impacts expected by the construction of these dams. The information is being used to influence the "dams project", taking part to the consultation of the Strategic Environmental Assessment, informing the key stakeholders and maintaining a dialogue with the

View from Veliki Trovro hill (114 m a.s.l.) to the main Neretva mouth / photo M. Schneider-Jacoby

government, investors and financing institutions. At Livanjsko polje, the Ramsar nomination has been achieved thanks to WWF and Euronatur's efforts. Nevertheless, an analysis of threats has shown that there are several potential impacts affecting the area, which is characterized by a very poor economy hence in need of development opportunities. Among the threats (potential and current) are the hydropower dams, peat and coal extraction, thermo-power plants, intensive agriculture, decreased livestock farming. A coalition of NGOs, currently numbering nine local NGOs and called Partnership for the Environment (PfE), has been created to mobilize the civil society around a sustainable path of development. Together with the PfE and international partners like EuroNatur, SNV and FAO, WWF has proposed the local government to establish an ecocanton, which would introduce rules for a sustainable development addressing all current and potential threats. The ecocanton is about to be approved by the local Parliament.

Among the threats (potential and current) are the hydropower dams, peat and coal extraction, thermo-power plants, intensive agriculture, decreased livestock farming.

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Black-headed Gulls *(Larus ridibundus)* and Oystercatchers *(Haematopus ostralegus)*, Velika plaža, 18th March 2010/ photo D. Bordjan

Adriatic Flyway - The Benefits of Travelling Birds for Tourism

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People travel to regenerate in a new and different environment, but not all people ask for the same recreation facilities during their holidays. There are many different interest groups today and the market is split up in many sectors. Montenegro, for example, has decided in the new "Politika and Strategija" to develop tourism before and after the main tourist season and to keep the number of guests lower in summer in the future, as beaches and coastline have limited capacities. To achieve this goal, different groups of guests have to be attracted to the country and new facilities created. The new slogan of Croatia "The Mediterranean As It Once Was" and Montenegro's "Wild Beauty" label prove the value of intact landscape and rich nature for the tourist sector.

The lack of resting sites is negative not only for the birds themselves, but impacts tourism as well.

Travelling birds during the annual migration is a common phenomenon in nature. Many species migrate and there is a special UN convention to preserve migrating animals, the Bonn Convention. Unluckily, three important countries of the Adriatic Flyway - Bosnia and Herzegovina, Montenegro and Serbia - have not signed this important convention. Best known is the migration of birds, some of them travelling more than 30,000 kilometres each year. But butterflies migrate as well, and the famous Monarch can be seen even in the Bojana-Buna Delta in Montenegro. People, too, were migrating with their animals in earlier times, for example in summer to the mountain pastures and back to the valleys in winter. Today, these important movements, called transhumance, are becoming increasingly rare. Only few families still use the mountains cottages – the katuns in Montenegro for example - during summer time in the mountain regions of the Dinaric Alps.

While the advantage to go up to the mountains in a dry and hot summer, where fresh grassland for the sheep is abundant, is clear, the reasons for the birds to migrate far north are not so obvious. Why do they not stay in mild areas all the year round, for example near the equator? What is the benefit of travelling thousands of kilometres to the North of Europe? Those who have been, in June, at the border point between Finland, Norway and Russia in Inari-Pasvik Trilateral Park understand very well, why many bird species move so far north. It is easier here to raise young and feed them: 24 hours of sunlight make it possible to gather enough food for the young and raise them in short time. Food, as fresh plants or insects, are common during these short and intensive summers. But this paradise lasts only for a very short time, for as soon as light diminishes in September, the lake will be frozen until the end of May in the following year – and for few weeks the sun will totally disappear.

What connects the Adriatic Coast with Scandinavia?

The Adriatic Flyway Conference[1] will connect the far north of Europe with Montenegro in two ways. First, 20 years of the fall of the Wall in Berlin has to be celebrated. The European Green Belt Initiative[2] is promoting

[1] http://www.euronatur.org/Adriatic-Flyway-Conference-2009.899.0.html
[2] http://www.europeangreenbelt.org/

In Europe, the global organization for bird preservation, BirdLife International, has a partnership consisting of 42 conservation organizations with almost 3,000 staff.

the protection of all the natural areas, beautiful landscapes and cultural heritage along the old border line between East and West Europe. The Cold War and the Iron Curtain left some unique sites and untouched areas from the Barents Sea to the Adriatic, where transboundary protected areas, such as at Lake Skadar, can now be established and new cooperation promoted. Here the European Green Belt initiative has been active during the last years. The border area of Montenegro with Albania is one of the most important attractions in this 6,800 kilometre long rural development corridor through Europe, which crosses 22 countries. The European Green Belt initiative is a good tool to promote the Adriatic coast and the unique beach of the Bojana-Buna Delta with Lake Skadar and the massive of the Southern Alps between Albania and Montenegro, as it puts this great destination running from the 2,700 m high peaks of the mountains to the sea in an European context.

At the same time, new satellite research has proved that birds from the Green Belt areas in Finland and Russia migrated south over the Baltic Sea, through Hungary, Vojvodina and over Bosnia, Montenegro and Albania to Tunisia. The cranes follow the migration corridor and fly over the Adriatic Sea[3]. Until now, no large resting sites could have developed along the Adriatic East Coast, where 15,000 (Slano Kopovo near Novi Becej) to 50,000 (Hortobagy National Park) cranes gather in Central Europe in a single place. The reasons, such as lack of protection and the impact of shooting at these spectacular birds and many other species, will be discussed during the Adriatic Flyway Conference. To experience the "wild beauty" and to feel "the Mediterranean as it once was" it is important to watch the flocks of birds coming from Africa in spring or leaving Europe in late autumn.

The lack of resting sites is negative not only for the birds themselves, but impacts tourism as well. This can be demonstrated by comparing the Baltic Coast in East Germany with Albania, Bosnia-Herzegovina, Croatia or Montenegro. Here the community of Zingst[4] has an extra holiday season due to the crane migration and their stop at the Vorpommersche Boddenlandschaft National Park in September and October. The crane watching season alone is longer here than the whole summer season on the Adriatic Coast today!

Bird Watching – an important leisure activity?

The importance of bird watching in Europe is not known, as no studies on the economic importance have been made so far. In Europe the global organization for bird preservation, BirdLife International, has a partnership consisting of 42 conservation organizations with almost 3,000 staff. 1.9 million members are organised in the organisation and more than 6,000 reserves managed. I myself have been working as a volunteer since 1971 and, in some years, as a site manager for BirdLife Germany in the Ramsar Site Wollmatinger Ried at Lake Constance in Germany, the buffer zone of the Monastic Island of Reichenau. The study „Use Nationally of Wild Resources Across Europe" (UNWIRE)[5] suggests that participation in wildlife activities generally increased during 1996-2006 by up to 17% for bird-watching, while hunter numbers fell by 12-15% overall. There are about 6 million bird-watchers in the EU according to this study.

But while the number of bird watchers is still not known in Europe, some very interesting studies have been made in North America. In 2001, a study "Birding in the United States" carried out by U.S. Fish & Wildlife Service identified 46 million birdwatchers or birders, 16 years of age and older, in the United States[6] – a little over one

[3] http://www.satelliittikurjet.fi/engl_index.html
[4] http://www.zingst.de/kranichrast.html
[5] http://www.gemconbio.eu/downloads/gemconbio_unwire_april_2008.pdf
[6] www.fs.fed.us/outdoors/naturewatch/start/economics/Economic-Analysis-for-Birding.pdf

Traditional cheese from Livanjsko polje, Bosnia and Herzegovina / photo M. Schneider-Jacoby

Education is an important apostolate of nature reserves, Škocjan Inlet, Slovenia, 2nd June 2009 / photo I. Brajnik

in five people. The National Survey used a conservative definition. To be counted as a birder, an individual must have either taken a trip a mile or more from home for the primary purpose of observing birds and/or closely observed or tried to identify birds around the home. So people who happened to notice birds while they were mowing the lawn or picnicking at the beach were not counted as birders. Trips to zoos and observing captive birds also did not count.

Backyard birding or watching birds around the home is the commonest form of bird-watching. Eighty-eight percent (40 million) of birders are backyard birders. The more active form of birding, taking trips away from home, is less common with 40 percent (18 million) of birders partaking.

If we use this study to explain nature tourism we have two different groups. A smaller group will be interested in special birding tours, while many guests will enjoy observing birds during their holidays. Nevertheless, the study has found out that every fifth American is interested in birds and that the birding created 863,406 jobs in the United States. If the countries along the Adriatic Flyway could enter this market with special offers, this could create some great benefits.

The Adriatic East Coast in a leading position

There are about 6 million bird-watchers in the EU according to this study.

The countries along the Adriatic East coast have a geographic advantage to create bird watching tourism. First of all, many different habitats can be found in the countries in a small area. The distance from coastal zones, for example from the Bojana-Buna Delta or Neretva Delta up to the Alpine zone with species as Chamois *(Rupicapra rupicapra)*, Capercaillie *(Tetrao urogallus)* or Alpine Accentor *(Prunella collaris)* , is often only 20 to 80 km. Between Slovenia and Albania, different wetlands can be found, such as rivers, lakes, Karst poljes, lagoons and six salinas. This diversity is a guarantee for many species of breeding birds, from the tropical bee-eater and roller at Velika Plaza to the tree-toed woodpecker in the natural forest of the mountains.

But the biggest advantage is bird migration. The Adriatic coast is situated in the heart of the Mediterranean – Black Sea Flyway and is the core area of the Central European migration route to North Africa and Central Africa. Birds have to rest during the flight to refill their energy. About 2 billion birds winter in the Sahel south of the Sahara and many of them have to cross the Dinaric Mountains in autumn and are looking for place to rest on the Adriatic East coast.

After flying over the Adriatic Sea in spring, many bird species settling down on the coastland can be observed. These arriving birds are heading to many places far North and East in Eurasia. The remaining sites, such as the Bojana-Buna Delta, Neretva Delta, Lake Skadar or the Croatian islands, offer them an ideal way to regenerate before continuing their migration. Only the birds, which can find good sites to rest – the so-called stop-over sites – will survive and have a good breeding success. In addition, the mild weather along the Adriatic coast during winter and at Lake Skadar or Vranjsko Jezero, which are normally ice free, provides ideal wintering conditions for birds, which have to leave central Europe. The number of species, which can be seen there, is extraordinary.
Until now, only few offers have been made for real birders to see the treasures of the Adriatic East coast. The Travelling Naturalist, U.K.,[7] offers a 10-day trip from Dubrovnik to Durres for £ 1,692. *"The unknown Adriatic in Spring"* is the title of the birding tour. Highlights are Solana Ulcinj – a unique place for many rare birds even on the global scale – Lake Skadar, and Durmitor. Liberty Bird, a Swiss agency,[8] and Dr. Koch Reisen, based in Germany,[9] are other new specialized nature travel managers, who have had the coastline included in their programmes in the last few years. But much more important is the promotion of countries such as Albania, Croatia and Montenegro and of the different natural areas through these agencies. After the years of embargo, the image as a paradise for birders has to be re-lunched first.

New Findings discussed with international Audience

The Adriatic Flyway Conference[10] will highlight all the different aspects of bird preservation, monitoring and the great potential value of bird preservation and intact habitats for nature tourism. Several invitations to the Conference have already been published in a wide range of journals and web pages, promoting the Adriatic East Coast as a new destination of nature tourism. The Adriatic Flyway will be discussed as well as the needs of the birds to stop and regenerate at different sites and habitats, such as the Neretva Delta, Livanjsko Polje, Lake Skadar, Bojana-Buna Delta with Solana Ulcinj or Tivat Solila.

The countries along the Adriatic East coast have a geographic advantage to create bird watching tourism.

Representatives from the main international organization will take part at the conference and offer the people from Montenegro and the neighbouring countries a good opportunity to discuss all different aspects of conservation and nature tourism. The conference - http://www.adriaticflyway.com - is an ideal opportunity to get first hand information on the value of the habitats and the potential offers, which can be created throughout the year. In Germany, the whole North Sea coast including all islands from Denmark to The Netherlands is a trilateral National Park and at the same time the most important tourist destination for people to visit not only in summer, but in winter as well.

Many steps have to be taken to create this type of tourism along the Adriatic coast. Before 1990, the well preserved beaches of Velika Plaza had already been an attraction from April to November, with special offer at Ada Island. The natural undeveloped dunes preserved since 1968 are a symbol for the successful tourism on the Adriatic coast and a heritage of European importance. Not only birds can be seen here by guests, but also daffodil (Narcissus) meadows and wine and olive festivals visited in autumn. The Adriatic Flyway Conference offers a first step to reinvent the tourist destination. More steps, such as the Bojana-Buna Delta Regional Park[11] will be needed to present this unique offer to the world-wide tourism market. Transboundary cooperation

[7] http://www.naturalist.co.uk/tours/montalbania.php
[8] http://www.liberty-bird.com
[9] http://www.dr-koch-reisen.de
[10] http://www.euronatur.org/Adriatic-Flyway-Conference-2009.899.0.html
[11] Rapid Assessment of the Bojana-Buna Delta: http://www.euronatur.org/Publications.411.0.html
[12] http://www.texel.nl/index_en.html

The Adriatic Flyway Conference offers a first step to reinvent the tourist destination.

between Albania and Montenegro is the key to the successful promotion. The same is true for other sites, such as the Neretva Delta with Hutovo Blato. Only Slovenia has developed suitable capacities for bird watching by opening two sites to visitors: the Škocjan Inlet (Škocjanski zatok) near Koper and Sečovlje salinas (Sečoveljske soline). Both sides show a growing interest in nature tourism and bird watching. Examples like the island of Texel in the Netherlands prove that it is possible to combine a nine kilometres long beach, a National Park with all natural habitats preserved, 30,000 beds and tourism throughout the year[12]. Even people, who are not visiting the island for bird watching, are impressed by the different species they can see during their holidays. We hope that soon this kind of sustainable tourism development will help to preserve the birds along the Adriatic Flyway as well and help the countries to prolong the tourist season.

Monarch *(Danaus chrysippus)*, Ulcinj salinas / M. Schneider-Jacoby

Migrating Dunlins *(Calidris alpina)*, Ulcinj salinas, 29th September 2006 / photo M. Tiefenbach

Birds and wind farms: Can they coexist?

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Three adverse effects on birds have been described regarding wind farms: 1) direct habitat loss during the construction of the wind farm; 2) disturbance during construction and post-construction (more problematic); and 3) bird mortality for collision with turbine blades. The rate is the number of bird collisions with a turbine blade per year, and they are relatively low, although in some cases the amount could cause concern. To prevent bird collision in newly build wind farms is a critical issue.

When a wind project is proposed, an environmental impact assessment (EIA) is required by Environmental Authorities, and must include a section assessing the impact that the development is likely to have on the development site's bird populations (EIA Directive 97/11/EC). The baseline data collection must be adjusted to different requirements depending on the areas, so a fixed baseline survey is not possible. The EIA should include, as a minimum, a 12 month baseline field survey to determine the bird populations that use the study area during an annual cycle (Langston & Pullan 2003). The first phase concerns the site-specific avian surveys conducted on facility site to give information about the presence of endangered species, the local bird migration pathways and the areas where birds or other wildlife are highly concentrated. The second phase includes the evaluation of potential collision risk quantifying the bird numbers, the amount of time they spend in the area in which they may be affected, and data on flight activity and height in order to calculate the numbers that may pass through the wind farm.

According to the EIA, the Government emits a Declaration of Environmental Impact (DIA) with three possibilities: negative, positive, or positive under certain conditions. Some of these conditions are in post-construction phase: 1) search bird collisions around turbines every day; 2) stop the turbines blades manually when the birds get dangerously close to the turbine; and 3) hide and to remove carrions to avoid the vultures eating them.

To prevent bird collision in newly build wind farms is a critical issue.

We studied the mortality data of two wind farms and the bird abundance (de Lucas et al. 2008). Our results show the mortality was constant throughout all study period, and the mortality was not in relationship with the abundance. Griffon vulture *(Gyps fulvus)* was the species most frequently killed. We used failure time analysis to known what variables were more important in mortality. So the results were the species-specific flight behaviour, weather conditions and topography around the wind farm.

Other study is about the relationship between risk assessment studies and recorded mortality in post-construction. We have the dangerous index of several species in different areas pre-construction, the bird abundance and density, the number of bird flights at blades height and the mortality data every day for 2 years. And our results indicate there is no relationship between the birds in risk in pre-construction and the mortality data in post-construction.

So what happens, and are there solutions? We think the first solution could be improved EIA. It is necessary to take all variables during the pre-construction phase (with all of the most frequent kinds of winds) and knowing the exact position of the turbines.

Other solution could be to predict griffon vulture flight trajectories to avoid mortality in wind farms (in preconstruction state), using simulated wind currents. We simulated three different types of wind and we noted the main trajectories. Afterwards, we compared these main trajectories with the real griffon vulture

A new windpark "Farma vetrenjača Ulcinj" is planned on Možura Mt just above Ulcinj salinas and Bojana-Buna Delta / photo M. Schneider-Jacoby

movements in the same area. And we found no statistical differences between the observed griffon vultures' flight trajectories and the three wind passages observed in our wind tunnel model.
And when the wind farms are constructed, it is possible to automatically stop the turbines blades, in real time, when detecting and positioning in a three-dimensional space a bird-like moving object, when birds are moving closer to the turbines.

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Habitat use by Whinchat *(Saxicola rubetra)* on spring migration at the stopover site on the SE Adriatic coast

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Whinchat *(Saxicola rubetra)* is a long distance passerine migrant with poorly known migration strategy. Habitat use by Whinchats on spring migration was studied at the stopover site in mosaic cultural landscape on the Montenegrin coast (SE Adriatic). The habitat use was viewed from two aspects: (a) probability of foraging behaviour with respect to flocking, and (b) physiognomic characteristics of foraging patches.

The Whinchats were occurring as solitaries, in twos, or in groups, here referred to as *Whinchat units*. 71 Whinchat units of 1 to 29 individuals were registered between 5th and 24th April 2007 at the stopover study site. Behaviour of each unit was observed for 5 minutes and the units classified as foraging or non-foraging. The proportion of foraging units increased with unit size. There were no differences in proportion of foraging and non-foraging units with respect to date, time of the day or habitat type.

The probability that a patch within the habitat was used by Whinchats for foraging was modelled with logistic regression. Five independent physiognomic variables of patches were used in the modelling: (a) natural outstanding structures (NOS), (b) artificial outstanding structures (AOS), (c) high herbal vegetation (HHV), (d) open shrubby vegetation (OSV), and (e) physiognomic heterogeneity (PH). All possible additive models and the null model were constructed. The models were ranked by information-theoretic approach, according to the second-order information criterion AIC_C. The relative importance of each physiognomic variable was calculated. Two models had substantial support in the data, including variable(s) (a) NOS and (b) NOS + AOS. Five other models had considerably less support and the rest essentially no support at all (nine models). The relative importance weights of physiognomic variables NOS, AOS, PH, HHV and OSV were 1, 0.38, 0.24, 0.13 and 0.13, respectively.

Whinchat *(Saxicola rubetra)* / photo D. Tome

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Migrating Common Cranes *(Grus grus)*, Sečovlje salinas, 30th December 2008 / photo P. Sackl

Ring recoveries and possible migration routes of Garganey *(Anas querquedula)*, Common Snipe *(Gallinago gallinago)*, Common Crane *(Grus grus)* and Common Quail *(Coturnix coturnix)* from the Balkans

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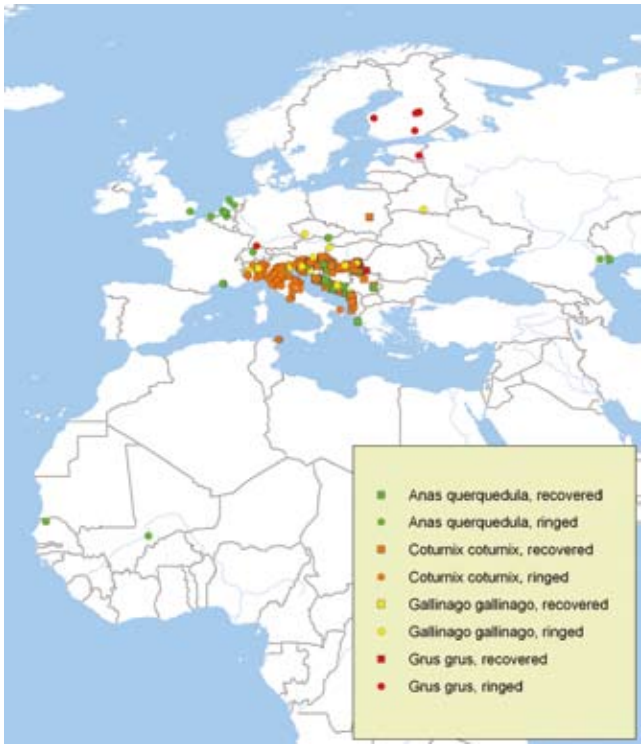
In conservation biology, the knowledge about population dynamics of the species, specifically about the impacts of different natural and anthropogenic factors that act upon it, is fundamental. Intrinsically, four population processes influence the dynamics of all populations – fecundity, mortality, immigrations and emigrations. For many migratory birds, especially long-distance migrants, migration itself with all the risks for the bird and conditions in the wintering grounds, ultimately influence their mortality and thus their population dynamics. Migration studies can therefore give us the most important insight into the species' life strategy. Despite the new tracking methods, e.g. satellite telemetry, bird ringing is still the most widespread method for bird migration study.

We analysed ring recoveries of Garganey, Common Snipe, Common Crane and Common Quail from the Balkans with the aim to infer to possible migration routes in the area. We used all the data on birds' ringing and recovery published in the Larus volumes (data for Croatia from 1910-1997), Acrocephalus volumes (data for Slovenia from 1927-1982) and Ciconia volumes (data for Yugoslavia/Serbia and Montenegro/Serbia from 1993-2007). Besides, unpublished data for Slovenia (from 1983-2008), Bosnia and Herzegovina (D. Kotrošan *in litt*.) and Albania (G. Jorgo *in litt.*) were included in the analysis, too. All the data were entered into an Access database and were analysed with the ArcMap 9.2 software.

The number of ringed Garganeys in the Balkans was relatively low – in Croatia and Slovenia, altogether 26 birds were ringed between 1910 and 2008 and one recovery made (3.8%) – an individual ringed in Croatia on 20 July 1958 was recovered in Greece on 27 Sept 1960. Altogether 31 birds ringed abroad were recovered; they were mainly ringed in France (10; 32%) and in the Netherlands (7; 23%). The most distant countries from where ringed birds were recovered were Mali, Senegal and ex Soviet Union (Astrakhan). Among the recoveries, only three can be interpreted as direct ones – three individuals ringed in Tour du Valat (France) on 7 and 8 March 1961 were shot on 21 March 1961 on Lake Rakitna (Slovenia). For the rest, the time interval between ringing and recovery was too long to allow inference on migration route. The majority of recoveries (75%) comprise birds on spring migration with modus in March, which is the month of the main northward passage of the Garganeys through Europe. One of the species' names in the Balkans even originates from these characteristics – patka martovka – literally meaning »the March duck«. Garganey is one of the most heavily hunted species in the Balkans, which is reflected in the very high percentage (88%) of recoveries made due to hunting.

In 78%, recoveries were gained from shot birds.

Out of 154 Quails ringed in the Balkans, two (1.3%) were recovered – an individual ringed on 14 May 1935 was recovered on 20 September 1935 in Poland, and an individual ringed on 12 June 1935 in Vojvodina was recovered in Vojvodina again on 1 May 1935. A total of 135 birds ringed abroad were recovered in the Balkans, and they were almost exclusively ringed in Italy (129; 95%). Among them, 18 were recovered less than 60 days after the ringing. These birds were ringed in April-June during the migration in Italy and recovered in May-August mainly as breeders or migrants in Croatia and Slovenia. Direct recoveries therefore originate from the spring migration only. On the contrary, the largest numbers of Quails were recovered in the Balkans on their autumn



Ring recoveries of Garganey *(Anas querquedula)*, Common Snipe *(Gallinago gallinago)*, Common Crane *(Grus grus)* and Common Quail *(Coturnix coturnix)* from the Balkans

migration – in September, which is the month of the most intensive autumn migration in Central Europe. In 78%, recoveries were gained from shot individuals. This figure fits well into the overall migration pattern of the Quail and supports general conclusions based on the recoveries from birds ringed in Italy, which happens to be situated in the middle of the Quail's migration route. Birds ringed in NE Italy are recorded mainly in the upper latitudes of Central, Western and Eastern Europe, but birds ringed on the Italian Adriatic coast are migrating, in general, to the Balkans or they continue their migration to E Europe. They cross the Adriatic Sea and regularly stop on Croatian islands. Quails migrate from the wintering sites in Sahel and N Africa in a wide front to reach the breeding sites in Europe.

Among all four studied species, the number of ringed Common Snipes in the Balkan is the largest (217). Four of them (1.8%) were recovered – two birds ringed in Slovenia were recovered in Italy, and two birds ringed in Croatia were recovered in Croatia and Montenegro. Besides, five birds ringed abroad (mainly E Europe) were recovered, too. Four recoveries can be interpreted as direct and they all originate from birds on autumn migration (ringed in August, September in Hungary, Vojvodina, Slovenia, recovered in October, November in Croatia and Italy) migrating in W or SW direction. The data support current knowledge on Common Snipe migration. In general, it is a short-distance migrating species migrating from the continent in a wide front, concentrating on coasts in W and SW Europe.

Nine Common Cranes ringed abroad were recovered (8 in Vojvodina, 1 in Slovenia). Seven of them were ringed in Finland, one in Estonia, and one in Germany. They were recovered in November (1), December (4), January (1), and March (3). Three recoveries from Vojvodina can be interpreted as direct ones: (1.) Crane ringed on 23 July 2006 in Finland and recovered on 27 December 2006 – 2,000 km, (2.) Crane ringed on 22 July 2006 and recovered on 27 December 2006 – 2,000 km, and (3.) Crane ringed on 5 July 2002 in Estonia and recovered on 18 December 2002 – 1,500 km. According to the current knowledge supported by this data, the Eastern European population migrates S and SW to N Africa and the Middle East using a migration route that crosses the Balkans.

We thank Mr. Grigor Jorgo (Bird Ringing Society of Albania) and Mr. Dražen Kotrošan (The National Museum of Bosnia and Herzegovina) for their kind help and sent data.

ANSER2 project "Adaptive management of Adriatic waterbird populations: from trophic relationships to sensitivity and vulnerability factors"

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Project ANSER2 is the first attempt to provide an integrated coastal wetland adaptive management system, as a standard tool for the Adriatic region, based upon the main food chains status and functionality and on different pressures exerted on these habitats. Given the expected rise in economic activity and the correlated land use changes, this issue becomes a necessity in the 'congested' programme area. In fact, the Adriatic wetlands suffer from severe and ongoing anthropic pressures so that, nowadays, they are one of the most endangered habitats in the Mediterranean context. The ecosystem-based approach will enable us to improve protected area management, taking into account at the same time the human economic development. Given the large amount of available data gathered by our partnership from previous projects, including project ANSER, the project focuses primarily on waterbirds because they are a transnational resource and sensitive indicators of environmental conditions. The problems that the project is planning to address, as prosecution of the ANSER project (www.anserproject.it) and according to the EU policy, are: 1) to identify and monitor the coastal ecosystem health status; 2) to elaborate and adopt common strategies and methodologies in the Adriatic area that reinforce the conservation of wetlands and transitional environments, and to reduce the geographical and management fragmentation; 3) to capitalize and implement the advices of scientific research in the fastest and most effective way. The project involves 12 Beneficiaries from 5 Countries, distributed throughout the eligible area, and the main Adriatic coastal wetlands. The partnership consists of Research Institutions, Universities, Environmental Agencies and Regional Authorities. This organization allow us to capitalize the previous experience and ANSER2 results, and to ensure a rapid information transfer from monitoring and scientific research to active management of natural reserves and waterbird populations, through direct involvement of Regional Administrations. Nonetheless, the broad partnership will allow us to consider the Adriatic as a whole area, to weigh the intrinsic geographical variability of the transitional ecosystems, to increase the scientific knowledge on waterbirds and their habitats, to foster the co-operation and know-how transfer in managing natural assets, to ensure the overall coherence and complementarity of the protected areas and to address the problems of connectivity of the Adriatic wetlands. The project is organized into seven work packages and sets the following main objectives: to analyse the functionality of the coastal transitional ecosystems and the main pressures; to develop a sharing monitoring scheme of waterbird species in the Adriatic region; to elaborate suitability and vulnerability maps of the Adriatic wetlands; to define standard forms in managing natural assets and protected areas in the Adriatic area; to improve the scientific basis for decision-making.

The ecosystem-based approach will eneble us to improve protected area management, taking into account at the same time the human economic development.

Squacco Heron *(Ardeola ralloides)* / photo P. Sackl

Raptor migration across the Mediterranean Sea: how, where and when

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

Thanks to simultaneous observations carried out at many migration bottle-necks in the last 15 years, the knowledge of the main migratory routes of raptors crossing the Central Mediterranean has greatly improved. Due to the abundance and the complexity of its migration strategies according to age and season, the European Honey-buzzard *(Pernis apivorus)* is the most studied species. Thousands of birds cross the Adriatic Sea and the Sicily Channel during both migrations. Other well-studied species are the Marsh *(Circus aeroginosus)* and Montagu's Harriers *(Circus pygargus)* that migrate on broad front. The Black Kite's *(Milvus migrans)* flyway has no connection with the Balkans, while the flyways of the Short-toed *(Circaetus gallicus)* and the Booted Eagles *(Hieraaetus pennatus)* show a strong connectivity with the Iberian Peninsula. The main threats for these populations along the migratory route are misplaced windfarms, habitat destruction and poaching. In particular, a big windfarm planned to be built in the Important Bird Area (AL010) of Karaburun Peninsula (Albania) could be a serious danger for the thousands of raptors belonging to the Eastern European population that crosses the Otranto Channel, especially during spring migration.

The main threats for these populations along the migratory route are misplaced windfarms, habitat destruction and poaching.

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Great White Egret *(Egretta alba)* and Little Egret *(Egretta garzetta)* / photo D. Bordjan

Bird migration and wintering on Gruža Reservoir – Central Serbia

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Gruža Reservoir (43°56' N; 20°40' E) is an artificial ecosystem of 934 ha surface area and was made to provide drinking water for city of Kragujevac, and water for the needs of industry. The reservoir holds a significant place among aquatic ecosystems in Serbia and is on the list of habitats of national importance (IBA) with criteria for the list of internationally important bird habitats. Material for this study has been collected by the author during the implementation of the national project entitled "Monitoring of aquatic migratory birds for prevention of avian influenza" as well as through field research carried out by the Ecological Research Association "Mladen Karaman" from Kragujevac. During the survey, 184 bird species were registered on this reservoir, with the highest number of wintering water birds. During this research, a total of 107 new bird species were documented for the Gruža Reservoir checklist, compared to 77 previously known. The reservoir is so precious that all possible legal conservation measures should be taken to protect its birds. This study shows that the numbers of individuals and species are significantly larger on Gruža Reservoir, compared to the rivers and other reservoirs in Central Serbia. Reasons for this lie in habitat structure (large water surface, lesser water movements, weaker water current and macrophyte vegetation suitable for resting and nesting), plus the rich food offer. The largest number of water birds has been recorded on December 2005 with around 14,000 individuals during the monitoring carried out within the framework of the national project "Monitoring of migratory waterbirds for prevention of avian influenza 2005-2007". These data show a great significance of the reservoir as a wintering ground for water birds, especially for cormorants, herons, ducks and geese. The research pointed out the fact that during migration bird numbers on the reservoir are indeed smaller, but that the numbers of species are greater. A total of 184 species have been registered and 127 out of them are legally protected by the Serbian natural rarities protection law, while 175 bird species are internationally important. Also, three species Glossy Ibis *(Plegadis falcinellus)*, European Spoonbill *(Platalea leucorodia)* and Arctic Skua *(Stercorarius parasiticus)* are the rarest recorded on the reservoir. The Ferruginous Duck *(Aythya nyroca)* (SPEC 1 status, European species of global importance) and the Pygmy Cormorant *(Phalacrocorax pygmeus)* (the largest numbers in the Šumadija region) use the reservoir as a migratory and wintering ground. Therefore, this report is attempting to evaluate the research on the reservoir and to survey all bird species of national and international importance. With all its natural wealth, Gruža Reservoir can serve as an exceptional research station for scientists, researchers, students, and pupils.

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Black-headed Gulls *(Larus ridibundus)* / photo D. Bordjan

Abundance and community composition of waterbirds during a yearly cycle in three coastal wetlands of Southern Croatia

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A waterbird coordinated monitoring scheme has been implemented within the international ANSER project. Materials and methods are described by the project website (www.anserproject.it, see 'Project areas' and 'Project contents'). The community structure of the three study areas in Croatia was analyzed for the December 2006 – November 2007 period, taking the highest of the two monthly counts available for each species into consideration. The communities in the three areas were described by several parameters.

The overall abundance of the annual community in Prološko blato (43°28' N; 17°06' E) reached 885 individuals, and it varied between December (n=7) and July (n=184). Low values of bird counts in autumn and winter might be related to the water depth and surface area, which were always very deep and small, respectively, during the research period, but these results are not characteristic of every year. The community is composed of 23 species, 6 of which are dominant - Common Coot *(Fulica atra)*, Northern Shoveler *(Anas clypeata)*, Mallard (*Anas platyrhynchos)*, Grey Heron (*Ardea cinerea)*, Little Grebe *(Tachybaptus ruficollis)* and Common Teal *(Anas crecca*) and three subdominant - Great Cormorant *(Phalacrocorax carbo)*, Eurasian Wigeon *(Anas penelope)* and Little Egret *(Egretta garzetta)*. The IUT index indicates that the species that characterise the biotope for the extent of presence over time are: Great Crested Grebe *(Podiceps cristatus)*, Little Grebe, Little Egret, Common Coot and Yellow-legged Gull *(Larus michahellis)* (IUT>4).

The overall abundance of the annual community in the Neretva (43°01' N; 17°26' E) was estimated at 3,721 individuals and it varied between June (n=61) and January (n=872). Taking the annual community abundances into consideration, the community is composed of 45 species, 3 of which are dominant - Common Teal, Pygmy Cormorant *(Phalacrocorax pygmeus)* and Eurasian Wigeon and 6 subdominant - Little Egret, Shag *(Phalacrocorax aristotelis)*, Black-headed Gull *(Larus ridibundus)*, Common Tern *(Sterna hirundo)*, Black Tern *(Chlidonias niger)*, Eurasian Curlew *(Numenius arquata)* and Dunlin *(Calidris alpina)*. In the winter period, from December to February, the community is mainly composed of Ducks, Cormorants, waders and Herons. From March on, the community collapses in terms of abundance: the ducks disappear, with only Cormorants, Herons, waders and Grebes remaining there. The IUT index indicates that the species that characterise the biotope for the extent of presence over time are Little Egret, Shag and Grey Heron (IUT>8). Among waders, Eurasian Curlew, Dunlin and Common Redshank *(Tringa totanus)* are extensively present. The rather high index of utilization of the Eurasian Spoonbill *(Platalea leucorodia)* (3.96) is also to be noted.

The overall abundance of the annual community in Pantan (43°41' N; 16°16' E) reached 1,747 individuals, and it varied between May (n=6) and December (n=501). Taking the annual community abundances into consideration, the community is composed of 27 species, 2 of which are dominant (Common Coot and Common Teal) and 6 subdominant - Black-headed Gull, Yellow-legged Gull, Mallard, Moorhen *(Gallinula chloropus)*, Little Grebe, Pygmy Cormorant and Eurasian Wigeon. From October to March, the Pantan waterbird community is characterised by the presence of ducks and the Common Coot. Gulls are present from March to April and from June to August. The remaining taxonomic groups are present with very small numbers of individuals. The IUT index indicates that the species that characterise the biotope for the extent of presence over time are Little Grebe, Grey Heron, Moorhen, Mallard, Shag, Little Egret, Black-headed Gull and Eurasian Wigeon (IUT>4). Thanks to: Ivan Gabelica for collaboration in data collecting.

Bax-Rrjoll, Bojana-Buna Delta, Albania, April 2004 / photo B. Stumberger

Abundance and community composition of waterbirds during a yearly cycle in two coastal wetlands of Albania

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A waterbird coordinated monitoring scheme has been implemented within the international ANSER project. Materials and methods are described in the project website (www.anserproject.it, see 'Project areas' and 'Project contents'). The community structure of the two study areas in Albania was analysed for the July 2006 – May 2007 period (Karavasta) and September 2006 – May 2007 period (Patoku), taking the higher of the two monthly counts available for each species into consideration. The communities in the three areas were described by several parameters.

The overall abundance of the annual community in Karavasta (40°55' N; 19°29' E) was 97,100 individuals and greatly varied between May (n=1,181) and September (n=21,177). The community is composed of 85 species, 5 of which are dominant - Eurasian Wigeon *(Anas penelope)*, Mallard *(Anas platyrhynchos)*, Common Teal *(Anas crecca)*, Common Coot *(Fulica atra)*, Black-headed Gull *(Larus ridibundus)* and 5 subdominant - Northern Shoveler *(Anas clypeata)*, Northern Lapwing *(Vanellus vanellus)*, Dunlin *(Calidris alpina)*, Common Redshank *(Tringa totanus)*, Little Stint *(Calidris minuta)*. In August and September, the community is chiefly composed, in order of abundance, of rails (Common Coot), waders, gulls, ducks, herons and terns, with the Common Coot and waders considerably dominant. In winter, the duck component increases, the wader component remains numerous, whereas rails and herons are evenly spread. Among Pelecaniformes, Phalacrocoracidae are present all year round in small numbers (from 10 individuals in May up to 170 in January). The Dalmatian Pelican *(Pelecanus crispus)* was present during the entire monitoring period with a number of individuals that varied between 62 (February) and 119 (January), and with 70-80 individuals recorded during the reproductive season. The IUT index indicates that the species that characterise the biotope for the extent of presence over time are Dalmatian Pelican, Eurasian Curlew *(Numenius arquata)*, Little Egret *(Egretta garzetta)*, Little Stint, Common Redshank, Grey Heron *(Ardea cinerea)*, Water Rail *(Rallus aquaticus)*, Black-headed Gull, Sandwich Tern *(Sterna sandvicensis)*, Common Sandpiper *(Actitis hypoleucos)*, Kentish Plover *(Charadrius alexandrinus)*, Caspian Gull *(Larus cachinnans)* and Great Cormorant *(Phalacrocorax carbo)* (13 species with IUT>6).

The overall abundance of the annual community in Patoku (41°37' N; 19°35' E) was 28,016 individuals and varied between May (n=518) and November (n=9,645). Taking the annual community abundances into consideration, the community is composed of 76 species, 4 of which are dominant (Black-headed Gull, Common Coot, Eurasian Wigeon, Northern Lapwing) and 4 subdominant (Eurasian Curlew, Dunlin, Common Redshank, Little Stint). There is low species richness during the months that follow the reproductive season. The unexpected values recorded in September and October may be assumed to be due to the "lack of cover" during the initial monitoring phases. The overall abundance of the waterbird community in Patoku area shows a bimodal distribution with a very pronounced peak during the autumn migration months (maximum in November) and a less pronounced peak in the central month of winter (January). In November, the Patoku waterbird community is chiefly composed of, in descending order, ducks, gulls, rails, herons and cormorants. In January, the proportions change and the community is composed, still in order of abundance, of waders, gulls, ducks and rails. The IUT index indicates that the species that characterise the biotope for the extent of presence over time are Grey Heron, Eurasian Curlew, Great Cormorant, Caspian Gull, Sandwich Tern, Common Redshank, Avocet *(Recurvirostra avosetta)*, Grey Plover *(Pluvialis squatarola)* and Black-headed Gull (9 species with IUT>6).

Pintail *(Anas acuta)* decoys, Ulcinj salinas, 27th March 2010 / photo T. Mihelič

The experience of ANSER project for waterbird integrated monitoring in Adriatic coastal wetlands: from data integration to result dynamic presentation

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A continual waterbird monitoring program was coordinated by the Friuli Venezia Giulia Region and carried out through more than 430 monitoring surveys by local workgroups in the June 2006-May 2008 period in several Adriatic coastal wetlands of Italy (Friuli Venezia Giulia and Emilia-Romagna), Croatia and Albania within the ANSER project (www.anserproject.it, see 'Project contents'). Data were collected, validated and stored by workgroups using common field data sheets and customized packages of the same Access database, which were sent three-monthly to the coordination centre. Data packages were incorporated in a master database and data rechecked and finally validated (48,431 records were processed in first 18 project months). The following stage was carried out for Friuli Venezia Giulia only, integrating Daylight Time and Roost Counts (DTC+RC) and Aerial Survey counts (AS) in a new database (DTC+RC/AS). 33,200 records resulted in the first 18 project months. Monthly mean abundance values for each 1x1 km unit recorded in the integrated database were extracted and uploaded in a MySQL database in the project website, where a web application based on Microsoft Silverlight technology generated real-time dynamic maps of single species abundance and specific richness. These maps can be considered as a monthly atlas of specific richness and single species abundance throughout the yearly cycle. A graph is attached to each map, showing monthly variation of richness and abundance. We carried out activities towards two parallel but integrated directions. On the one hand, a common and constant effort waterbird qualitative and quantitative monitoring scheme was adopted for the first time between Italian, Croatian and Albanian wetlands. On the other hand, we experimented further integrated monitoring techniques in Friuli Venezia Giulia, in order to test their future applicability in a wider territorial context.

Common Coot *(Fulica atra)* / photo D. Bordjan

Importance of the temporary former course of the Western Mostonga River for birds during autumn migration near Sombor (NW Serbia)

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Many continual water habitats are excellent stop-overs for migrating birds, but temporary ponds can potentially be an important resting place, too. Some studies have shown that temporary ponds in the Mediterranean are of great importance to many species. Last but not least, they are important environments for many migratory birds that use these spots as a resting place during their journey (Grillas 2004b, Madhyastha 2000). During 2005 and 2006, there was a temporary pond formed that had once been a part of the former course of the Western Mostonga River (Milošev 1998). The temporary pond was situated about 5 km northwest from Sombor (NW Serbia) (UTM CR47; UTM CR48) and was about 7-8 km long. The width of the pond varied between 30-60 m, the depth from 30 to 100 cm. In the deeper parts of the pond, submerse water plants were growing, while the shallow part near the bank was mostly overgrown with vascular swamp vegetation. The locality was visited during August and September 2006, when 25 bird species were registered. The most abundant species were Common Coot *(Fulica atra)* and Mallard *(Anas platyrhynchos)*. Except for the before mentioned two species as well as for Little Ringed Plover *(Charadruis dubius)*, Ferruginous Duck *(Aythya nyroca)* and Northern Pintail *(Anas acuta)*, the share of species was under 5%. The water surface drop was followed by decreasing number of birds (R = 0.79, *NS*). The temporary pond was visited by 241 to 1,178 birds per fieldwork day. I realized that the former course of the Western Mostonga River had an important role for migrating birds. They used this ephemeral water habitat as a resting and feeding place. The problem of temporary ponds in northwest Serbia is that they do not appear every year and do not show regular periodic reiteration, because they depend mostly on precipitation. Research is possible only in years when there is enough precipitation to form a temporary pond. Further studies should present similar results like in this study.

I realized that the former course of the Western Mostonga River had an important role for migrating birds.

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Great Reed Warbler *(Acrocephalus arundinaceus)* / photo K. Kravos

The Importance of the Adriatic Flyway for the Great Reed Warbler *(Acrocephalus arundinaceus)* during migration

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The Central European Great Reed Warbler (GRW) *(Acrocephalus arundinaceus)* population spends the winter in Africa south of the Sahara. Studies showed that, during migration, the great number of Central European GRWs pass the Carpathian basin and Dinaric Mountains. During their journey they often use Adriatic wetlands as stopover sites (Kralj et al. 2007). In the Carpathian basin, the ringing of birds began generally about 100 years ago, but for GRW only data on the last 30 years are at hand. We used recovery data from the ringing centres of Budapest (Hungary), Zagreb (Croatia), Belgrade (Serbia) and Euring Database. We analyzed only recoveries of birds ringed and recaptured during the same migration season. From the total of 393 recoveries, 119 were selected. Most of the individuals were ringed as flying birds (77.3 %), much fewer as nestlings (22.7%). From 119 recovered birds, two used the Iberian and one the East Mediterranean route. The recaptures showed that the Adriatic Flyway is the most important route for GRW (116 individuals). Most of the individuals choose direction from N-NE to S-SW, passing over the Adriatic Sea. Probably many of them do not cross the Adriatic Sea, resulting with the recoveries of birds moving in the northwest direction along the coast of the Adriatic Sea. Many birds move south through Italy. There were also two recoveries of individuals, which moved in the opposite direction during the autumn migration (Croatia → Hungary; Slovenia → Hungary). The majority of the recovery data are from the autumn migration period (89.91%). This is because the ringing activities are much livelier in autumn than in spring. Also, the number of birds during autumn migration is higher and the migration is slower with longer stopovers. However, the Adriatic Flyway seems to be equally important during the spring and autumn migrations. The ringing data showed that the most intensive migration over the eastern Adriatic coast in spring occurs during late April and early May, while during the autumn migration the peak is reached in August. There are still not enough data to answer the question whether GRWs always use the same migration route. There is only one individual, which once used the Iberian and once the Adriatic Flyway during its journey.

During their journey they often use Adriatic wetlands as stopover sites.

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Black-winged Stilts *(Himantopus himantopus)* and Common Redshanks *(Tringa totanus)* / photo P. Sackl

Important bird species in Sečovlje Salina Nature Park

Iztok Škornik and Brane Koren

Sečovlje Salina Nature Park, SOLINE Pridelava soli d.o.o., Seča 115, SI - 6320 Portorož, Slovenia; iztok.skornik@kpss.si

When water bodies began to be cleared due to the ever-increasing urbanisation in Slovene Istria as well as in the Mediterranean in general, the Sečovlje salt-pans began to gain, through years, on their significance as a bird sanctuary. A great role in this respect has also been played by the abandoned salt-making in the southern half of the pans. The salters indeed stopped gathering salt there, but they still maintained the levees, regulated the water level in salt basins and thus conserved the different natural living environments. An important role has also been played by the processes of natural forces, which formed a series of similar but different enough environments, which have been eventually inhabited by birds with different dietary and breeding demands. Seawater, which runs deep into the pans through salt-pan channels, brings to the basins large amounts of food that can be easily reached by birds in the shallow basins of the abandoned part of the pans. These are primarily planktonic organisms, tiny invertebrates, and fry. In springtime, the pans that function as a widened boundary between the land and the sea as far as birds are concerned, become an important nest-site for numerous birds. To date, 291 bird species have been recorded in the Sečovlje Salina Nature Park, of which 44 are breeding species. Several waterbird species, the Common Shelduck *(Tadorna tadorna)* (3 breeding pairs), Avocet *(Recurvirostra avosetta)* (3 breeding pairs) and Little Tern *(Sterna albifrons)* breed only here, while the Black-winged Stilt *(Himantopus himantopus)*, Kentish Plover *(Charadrius alexandrines),* Common Tern *(Sterna hirundo)*, Common Redshank *(Tringa totanus)* (1-2 breeding pairs) and Yellow-legged Gull *(Larus michahellis)* are important at the national level and breed in the salina and in some other Slovene wetlands. Each year, the numbers of the breeding species are increasing. The overwintering and migrating bird species are most numerous here as far as the Slovene coast and Slovenia in general are concerned. During migration period, the Sečovlje salt-pans host the nationally significant populations of different species.

Although not a breeding species, the Mediterranean Gull *(Larus melanocephalus)* occurs here in high numbers from August till end of October. Accurate counts and monitoring of the Mediterranean Gull flocks have shown that the area of the Slovene coast is flown over by thousands of Mediterranean Gulls during their autumn migration. Together with smaller Strunjan Saltpans, the Sečovlje Salina is the most important stop-over site for this species. Observations of the colour-ringed birds have shown that this species is using same places almost every year. The Yellow-legged Gull is the largest and commonest gull species at Sečovlje Salina, which is the only larger breeding site in Slovenia. In the summer, the breeding birds are joined by thousands (over 25,000 in some years) of other Yellow-legged Gulls from the neighbouring countries. In recent years, the Yellow-legged Gulls have greatly increased in their numbers all over the Mediterranean.

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www.kpss.si

Bird decoys, Ulcinj salinas, 27th March 2010 / photo T. Mihelič

Guidelines for waterbird monitoring in Adriatic coastal wetlands and wetland management for the Friuli Venezia Giulia (NE-Italy) coastal area

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The project ANSER (www.anserproject.it) was aimed at evaluating the ecologic role of coastal wetlands for waterbirds. Waterbird counts, GIS analyses and studies on ecology and physiology of target species allowed us to draw up monitoring guidelines for the entire project area and management guidelines for the Friuli Venezia Giulia, as a useful tool for the whole Adriatic region. Waterbird surveys were carried out during spring high tides twice a month from June 2006 to May 2008 in 47 Adriatic wetlands. Data were organised in a shared database. The monthly distribution of waterbird species was defined, and the spatial and temporal habitat use analysed in relation to food resources availability and local disturbances, using the radio-telemetry technique. The effect of abiotic (total nitrogen, orto-phosphates, salinity and deposit classes) and biotic factors (benthos communities and sea grass meadows) on the abundance of waterbirds was assessed through a GIS elaboration. Finally, the waterbird physiology was analysed to obtain an index of body condition and information on metabolic state.

Monitoring guidelines - (1) Waterbird monitoring: base high tide daylight/night roost counts on two Sample Units: wetland and 1x1km UTM ED50 grid; combine ground counts with aerial counts in wide and patchy areas; test=low tide counts in sample areas; base monitoring schemes on a 2 weeks maximum periodicity; coordinate and train local observers before monitoring; investigate the status of breeding species through specific surveys; build up a ringing network to define seasonality of migratory populations and monitor health emergencies; analyse local dynamics in relation to habitat use and human disturbance in order to weight the reliability of the different count techniques. (2) Data management: create a shared inventory of Sample Units; define the spatial coverage of monitoring activities; organise a web system for data input, management and validation; create predictive models as reference tools for management purposes.

The project ANSER (www.anserproject.it) was aimed at evaluating the ecologic role of coastal wetlands for waterbirds.

Management guidelines – (1) Sea grass meadows: adopt sustainable fishing techniques; ban seashell farming and collection with seabed-ploughing tools; control boat traffic. (2) Intertidal mudflats or sand flats: protect benthic component in waders foraging areas by limiting or denying human interventions on substrate. (3) Lagoon fishing farms: limit winter hunting activity to one day per week; reduce waterfowl artificial feeding; maintain water levels in spring and summer according to ecological requirements of migratory and breeding species; create evaporating pools and mudflats with halophytes vegetation. (4) Fishing activity: sustain traditional short-range fishery. (5) Hunting activity: reduce hunting days, giving priority to resident hunters; set new shelter areas. (6) Human disturbance: plan specific research to estimate the effect of human activities on waterbirds; extend SPA IT3340006 to the western part of the 'Banco della Mula di Muggia', which hosts one of the main roost area for waders; set rules for kite surfing; extend SCI IT3340001 and SPA IT3341002 in order to include the whole reedbed of the "Lisert" area. (7) Sea ingression: investigate the status of transitional helophytic habitat in the Marano lagoon; reduce freshwater used for agriculture; create artificial saltmarshes. (8) Special Protection Areas: carry on SPA management plans; identify the Functional Units through ecological studies.

European Bee-eater *(Merops apiaster)* / photo P. Sackl

International research of the Sand Martin *(Riparia riparia)* population in the Central Danube Floodplains

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We started to investigate the Sand Martin *(Riparia riparia)* population (1999-2008) of the region along the river Danube and its floodplain south of Kecel (Hungary), north from Apatin (Serbia) and Osijek (Croatia), and in approximately 100 km long and 30-40 km wide belt along the river, with different intensities in the past ten years in three countries. Aims of the study were to investigate the breeding habits of the Sand Martin, in order to explore connections and movements between the colonies and regions, to describe threats to the populations, in order to substantiate protective measures and to adjust the efforts in all the involved countries. We visited all the colonies twice at the beginning of the breeding season, and once more in the fledgling period for ringing. Since 2006, the following threats occurred in the area: flooding, river training stabilization of the banks, foxes dig out the nests, rain destroys the wall, without sand mining wall becomes overgrown and mining destroys the nests. We ringed 14,725 Sand Martin individuals in the region: 8,439 in Hungary, 6,295 in Serbia and 550 in Croatia, at 23 settlements, 34 colonies – out of which 5 were in natural river banks. 176 adult individuals changed colonies within the breeding period, which proves that there is significant movement among different colonies. The distance varied between 3 km and 118 km. In many cases, the reasons are still not understood, as disturbance was not noted in all of these colonies. We realized that the most important threats are the same in every colony, and similar problems require adjustment of the preparation for habitat protection as well. From 11 long distance recoveries, seven individuals passed the Adriatic Flyway during the migration. Two flew in direction of the Aegean Sea, another two in direction of Asia Minor. Considering the results, we concluded that the Adriatic Flyway is the most important migration route for the Carpathian basin Sand Martin populations.

From 11 long distance recoveries, seven individuals passed the Adriatic Flyway during the migration.

Mr Joost Brouwer facilitated preparation of the Ulcinj declaration during the Adriatic Flyway Conference, 14-17th April 2009 / photo B. Stumberger

Participants of the Monitoring Migration Over the Adriatic Sea working group, Ulcinj, 16th April 2009 / photo Euronatur archive

THE ADRIATIC FLYWAY CONFERENCE

Ulcinj, Bojana-Buna Delta 14. - 17. April 2009

euronatur Black Mountain MEDITERAN MAVA MONTENEGRO

www.adriaticflyway.com

The Ulcinj Declaration

An International Statement on the Protection of Migratory Birds along the Adriatic Flyway

Preamble

Birds are an integral part of our natural heritage. They have enormous economical, ecological and cultural value.

Worldwide more than 11% of bird species are threatened in their existence, through human actions and through global change, according to research by BirdLife International and IUCN, the International Union for the Conservation of Nature. Many long distance migratory birds in particular are showing serious declines in numbers. Migratory birds are also a shared heritage between nations, and a shared responsibility, whose well-being depends on national and international cooperation along their migratory routes or flyways.

During the Johannesburg summit on sustainable Development in 2002, all countries present committed themselves to halting the current rate of loss of biodiversity by 2010. Halting the rate of loss of migratory birds is an obvious part of that commitment.

Only if each and every country recognizes its responsibility for the well-being of migratory birds and their habitats, and only if countries work together in an open and positive manner, sharing knowledge and resources with those less fortunate than themselves, can the decline of migratory birds be halted. And can we continue to enjoy them and benefit from them.

Declaration

The following declaration, hereafter referred to as "The Ulcinj Declaration", was adopted by the 120 participants in the first Adriatic Flyway Conference hosted by EuroNatur in Ulcinj, Montenegro, from 14-17 April 2009. The participants represented national conservation institutes and organisations from all countries on the East Adriatic Coast and its hinterland, which is the region of the Adriatic Flyway.

Participants also represented the international Multilateral Environmental Agreements of the Ramsar Convention on Wetlands, the Convention on Migratory Species CMS, the African-Eurasian Migratory Waterbirds Agreement AEWA and the Bern Convention of the Council of Europe; the international NGOs Wetlands International and Birdlife International; and the international bird research and habitat management community from other European and North African countries.

Those present at this international conference are:

RECOGNISING the importance of the Adriatic Flyway to birds that migrate between Eurasia and Africa,
RECOGNISING the declining numbers of many species that migrate along the Adriatic Flyway and the continuing threats that they face,
RECOGNISING the past, present and possible future deterioration and disappearance of the habitats these migratory species depend on, including crucial stopover sites that are critical for a successful journey to their wintering quarters and back to their breeding grounds,
AWARE OF the major commitments made by the countries on the East Adriatic coast and its hinterland to the Convention on Biological Diversity, the Bern Convention, the Convention on Migratory Species and the Ramsar Convention on Wetlands,
AWARE OF the value that migratory birds have for sustainable economical, ecological and cultural development,
AWARE OF the values that migratory birds have as indicators of environmental well-being and change,
AWARE that sustainable hunting practices and bird conservation have compatible goals,
AWARE that in Europe there are more than 6 million birdwatchers, and that BirdLife Europe has more than 2 million members,
AWARE that in countries where bird watching is well developed, birdwatching generates up to twenty times as much economic activity as does bird hunting, a matter of billions of Euros each year,
CONCERNED for the future of migratory birds along the Adriatic Flyway and their habitats,
CONCERNED for the well-being of the people with whom these birds share the environment,
RECOMMENDING THAT national governments along the East Adriatic coast and its hinterland, other European countries, the European Union, International Multilateral Environmental Agreements, international NGO's, if and where appropriate, do what is within their power to

1. adjust, where still necessary, national legislation along the East Adriatic coast and its hinterland, including land use planning legislation, so that it is in harmony with the European Union's Bird, Habitat and Water Framework Directives
2. see to the effective implementation of such legislation, and, when necessary, its enforcement

3. recognize that migratory birds and their habitats have an important role to play in sustainable economic development, including through the encouragement of birdwatching-oriented tourism
4. make the hunting of migratory birds sustainable and fully in compliance with the European Union's Bird Directive and international legal obligations
5. eliminate illegal hunting and establish and enforce strict no-hunting areas to secure the stop-over sites for migratory birds
6. ensure that no birds hunted or trapped along the East Adriatic coast and its hinterland are imported into the European Union
7. ensure that national energy strategies include the obligation for the development of wind parks that their location is based on sensitivity maps for bird movements
8. designate as Wetlands of International Importance all those sites that meet the relevant criteria
9. complete identification as Important Bird Area of all sites that meet the criteria, and use that identification as an IBA as a starting point for legal and effective protection of those sites
10. preserve and restore wherever possible the remaining wetlands along the Adriatic Coast by promoting integrated river basin and coastal management
11. encourage cross-border cooperation for the protection of migratory birds along the Adriatic Flyway, at government as well as non-government level
12. recognize and facilitate the role of national NGOs and international NGOs in protecting migratory birds and their habitats in the East Adriatic region
13. assist in the development of national NGOs committed to bird conservation, including their organizational capacity, scientific knowledge collection and distribution, and public relations
14. where applicable urge countries to ratify the CMS and/or its relevant agreements as important instruments for the protection of migratory birds along their entire flyways, in particular the African Eurasian Migratory Waterbird Agreement AEWA and the Migratory Raptors' MoU
15. encourage environmental education in relation to migratory birds and their habitats, their value and the threats they face
16. request the EU and possible donor countries and organizations to support the implementation of this declaration by providing financial or in kind support.

Adopted by the participants of the first Adriatic Flyway Conference, Ulcinj, Montenegro, 17th April 2009.

Opening of the Livanjsko polje exhibition, Livno, 25th September 2008 / photo D. Kulier

Adriatic Flyway Exhibitions

The four exhibitions set up by the EuroNatur Foundation mark significant social, cultural and conservationist events and stimulate local environments in the search of their identity, both inwardly and across the borders. Nature is no doubt important development capital – alas often overlooked owing to the well known everyday troubles and asperities. The main objective of EuroNatur is nature conservation in collaboration with people: in this sense, the four exhibitions closely link numerous individuals and organisations and are opening new possibilities for development and future cooperation.
The exhibitions are dedicated to the pioneering work in the bird faunas of the Balkan Peninsula, including the Neretva Delta, Livanjsko polje and the Bojana-Buna Delta, carried out by Othmar Reiser (1861 – 1936).

Livanjsko polje – Evropska prirodna baština
(Livanjsko polje – European natural heritage)

Partners: Franciscan Museum and Gallery Gorica Livno, The National Museum of Bosnia and Herzegovina, Youth Centre Livno, Ornithological Society «Naše ptice» - Our Birds, Ministarstvo poljuprivrede, vodoprivrede i sumarstva Hercegbosanske zupanije, Livno (Bosnia and Herzegovina), Landesmuseum Joanneum Graz (Austria), WWF MedPo, Roma (Italy)

On display: *September 2008 – April 2009, Livno; October 2009 – March 2010, Sarajevo*

Pictures: We thank Günther Bachmeier, Manuel Calderon Carrasco, Bruno Dittrich, Joachim Flachs, Hans Glader, Alfred Limbrunner, Ralph Martin, Willi Rolfes, Jürgen Schneider, Martin Schneider Jacoby, Ulrich Schwarz, Wolf Steiger, Borut Stumberger (other EuroNatur/Fluvius and Franciscan Museum)

Design: Rajmond Condric

Authors: Borut Stumberger and Martin Schneider-Jacoby in cooperation with Josip Gelo, Ulrich Schwarz and Peter Sackl

IZLOŽBA FOTOGRAFIJA I KARATA:
"LIVANJSKO POLJE - EVROPSKA PRIRODNA BAŠTINA"

Slika / Bild / Photo : Martin Schneider Jacoby

Slika / Bild / Photo : Bruno Dittrich

euronatur STIFTUNG

Franjevački Muzej i Galerija Gorica

Delta Neretve – spona između Jadranskog mora i Dinarida (Neretva Delta – melting point of Adriatic Sea and Dinaric Alps)

Partners: Ornithological Collection Metkovic, Croatian Society for the Protection of Birds and Nature – HDZPP, Association "Vodomar" – Kingfisher, (Croatia), Ornithological Society «Naše ptice» - Our Birds, Ecological Association »Lijepa Nasa« Capljina (Bosnia and Herzegovina), Landesmuseum Joanneum Graz (Austria)

Pictures: We thank Davorka Kitonic, Sonja Ratzbor, Peter Rey, Peter Sackl, Martin Schneider Jacoby, Ulrich Schwarz, Jan van der Straaten – Saxifraga, Borut Stumberger, Arhiv Ivo Veraja (Metkovic), Ondrej Vizi (other EuroNatur/Fluvius)

On display: *from April 2010 on in the Ornithological Collection Metkovic, June – July 2010, Capljina*

Design: Natasa Mikulic

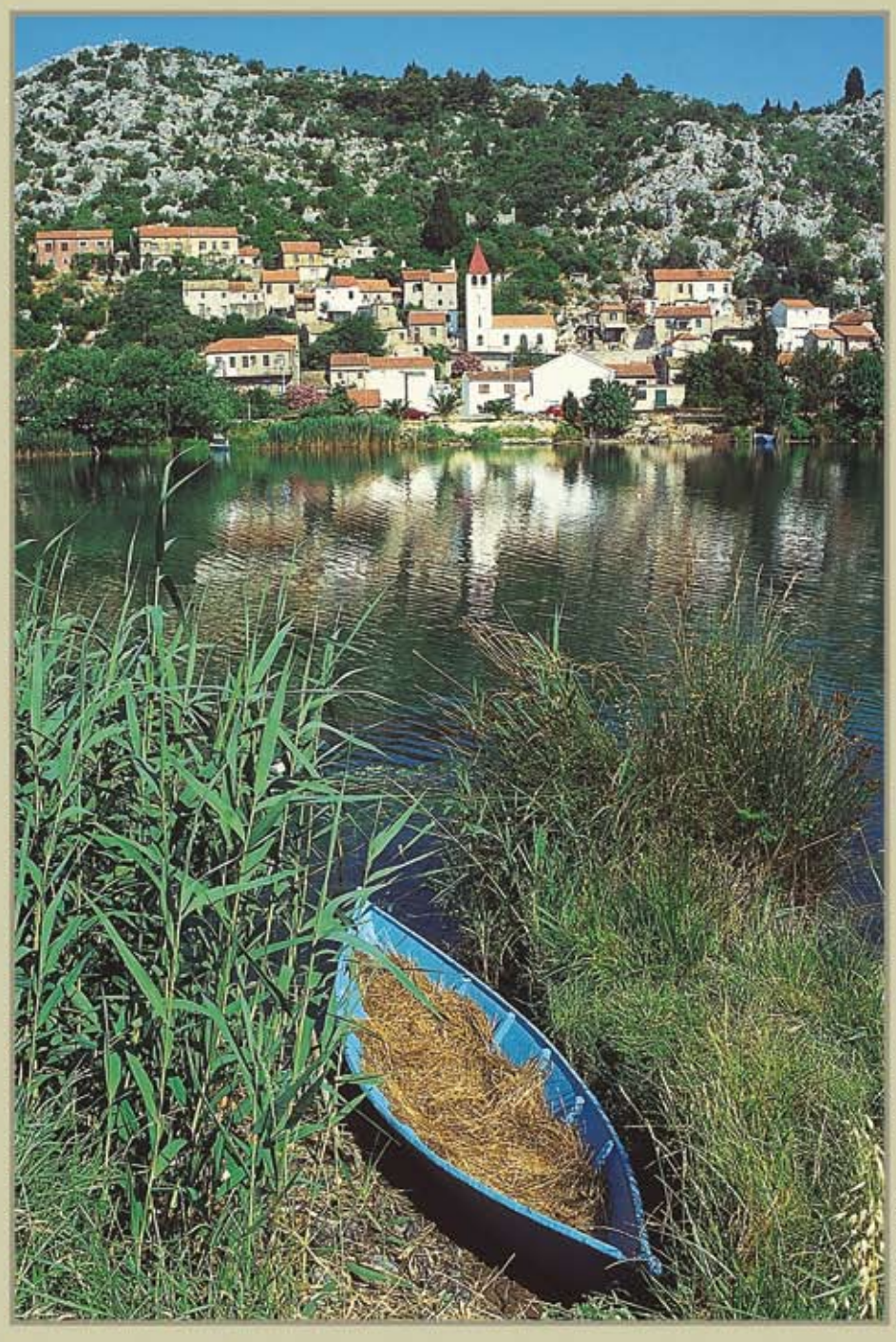
Authors: Borut Stumberger and Martin Schneider-Jacoby in cooperation with Ulrich Schwarz and Peter Sackl

Delta Neretve – spona između Jadranskog mora i Dinarida

Neretva Delta – Wo Dinariden und Adria verschmelzen

Neretva Delta – melting point of Adriatic Sea and Dinaric Alps

Delta Neretva



Martin Schneider Jacoby

MAVA
FOUNDATION POUR LA NATURE

EURONATUR FOUNDATION

Solana Ulcinj
(Ulcinj Salina)

Partners: Solana Ulcinj, Natural History Museum of Montenegro, Institute for Protection of Nature of Montenegro, Centre for the Protection and Research of Birds – CZIP (Montenegro), Association for the Protection of Aquatic Wildlife of Albania – APAWA (Albania), Landesmuseum Joanneum Graz (Austria)

On display: *permanent exhibition from April 2006 onwards in the Ulcinj Salina "Solana Museum", Ulcinj*

Pictures: We thank Luka Bozic, Damijan Denac, Nill Dietmar, A. Ebert, Wolfgang Einsiedler, H.P. Fischer, B. Hölzel, Davorka. Kitonic, Alfred Limbrunner, Tina Loncar, Ralph Martin, Iztok Geister, Vaso Radovic, Peter Sackl, Horst Schneider, Jürgen Schneider, Martin Schneider-Jacoby, Iztok Skornik, Borut Stumberger, Michael Tiefenbach, Ondrej Vizi, Snezana Vuksanovic, B. Weherle, R. Windisch, Zuber + Siegrist (other EuroNatur/Fluvius)

Design: Jasna Andrić

Authors: Borut Stumberger, Martin Schneider-Jacoby, Vaso Radovic, Darko Saveljic, Snezana Vuksanovic, Ulrich Schwarz, Ondrej Vizi and Peter Sackl

Ekološka specializacija

Specialiteti ekologjik | Ecological specializations

Dužina kljuna svake ptice je prilagođena hvatanju različitih vrsta plijena u blatu | Gjatesia e sqepit te çdo shpendi eshte adaptuar te kap gjahe te ndryshem ne kenete | The lenght of each birds bill is adapted to catching different prey items in the mud

Izvor | Burimi | Source: After Dick Jones in Sadoul, N., Walmsley, J. & Charpentier, B. (1998): Salinas and nature conservation. Tour du Valat. Page 51.

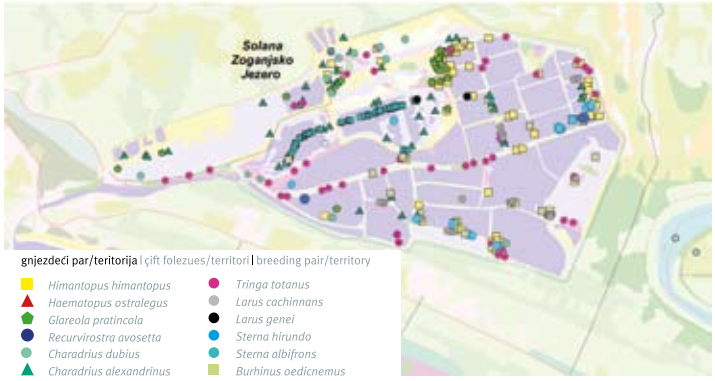
Kljun i dužina nogu ptica je prilagođena ishrani u različitim dubinama vode
Sqepet dhe kembet e shpendeve jane adaptuar per tu ushqyer ne thellesi te ndryshme te ujit | The beaks and legs of birds are adapted to feeding in different water depths

Izvor | Burimi | Source: After Serge Nicolle in in Sadoul, N., Walmsley, J. & Charpentier, B. (1998): Salinas and nature conservation. Tour du Valat. Page 48.

Rasprostranjenost šljuka, galebova i čigri u solani u vrijeme gniježđenja 2003

Shperndarja e qyrylyket, pulebardhat dhe dallendyshet e detit qe folezojne per vitin 2003 brenda kripores

Breeding distribution of waders, gulls and terns in the Ulcinj salinas, 2003



Gnjezdarice

Shpendet folezues | Breeding birds

Vlastelica | Kaloresi | Black-winged Stilt | *Himantopus himantopus* (15)

Ostrigar | Laraska e detit | Oystercatcher | *Haematopus ostralegus* (20)

Zijavac | Dallendyshe deti | Collared Pratincole | *Glareola pratincola* (15)

Sabljarka | Sqepbiza | Avocet | *Recurvirostra avosetta* (17)

Žalar sljepić | Vraponjesi i vogel | Little Ringed Plover *Charadrius dubius* (15)

Morski žalar | Vraponjesi gushebardhe | Kentish Plover *Charadrius alexandrinus* (20)

Lumi Buna – Bojana Dhe Delta
(Bojana – Buna River and Delta)

Partners: Association for the Protection of Aquatic Wildlife of Albania – APAWA, Ministry of Environment, Forests and Water Administration, Directory of Forestry Service Shkoder (Albania)

Pictures: We thank Norbert Schäffer, Helmut Göthel, Dietmar Nill, Jürgen Schneider, Telse Meyer/Dirk Blumenberg, Martin Schneider-Jacoby, Borut Stumberger, M. Rakaj (other EuroNatur/Fluvius)

Design: Printing house »Shkodra«

Authors: Martin Schneider-Jacoby and Dritan Dhora

BOJANA – BUNA RIVER AND DELTA
LUMI BUNA – BOJANA DHE DELTA

1900

1972

2002

Delta Bojana - Buna is a perfect natural entrance to the hydrological system of the Drini River situated in five Balkan countries including Lake Ohrid, Lake Prespa, Lake Shkodra/Skadar and the Bojana – Buna river.
The delta complex comprises of the recent river delta, Viluni lagoon, the Solana Ulcinj, freshwater lakes, tropical riverine and costal landscapes.
The development of the delta complex is based on high sediment loads transported by Drini River, which are formed by wind and wave activities and sea level changes at the Adriatic Coast into special coastal formation as dunes and barriers as well as by tectonic processes.

Delta Buna - Bojana është një hyrje natyrore e persosur në sistemin hidrologjik të lumit Drin, i cili shtrihet në pesë vende të Ballkanit, e që përfshin edhe liqenet e Ohrit, Prespës, Shkodrës, si dhe lumin Buna/Bojana.
Kompleksi i Deltës përfshin deltën aktuale të lumit, lagunën e Vilunit, kriporen e Ulqinit, liqenet dhe peisazhet e brigjeve.
Zhvillimi i kompleksit të Deltës është realizuar prej një sasie të madhe sedimenti, të transportuar nga lumi Drin, të perpunuar në bregun e Adriatikut nga era, dallgët dhe ndryshimet e nivelit të detit si formacione të veçanta bregdetare, duna dhe barriera, ashtu edhe nga proceset tektonike.

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MINISTRIA E MJEDISIT,PYJEVE DHE ADMINISTRIMIT TË UJRAVE
DREJTORIA E SHERBIMIT PYJOR SHKODËR

Organism index

According to our estimations, far more than 2 million birds are shot each year along the Adriatic Flyway. The assumed reasons for such state of affairs are intensive hunting activities by more than 200,000 hunters plus many poachers and guests, inadequate legal frameworks concerning bird hunting in most countries as well as insufficient control of the existing laws in the countries located along the Adriatic Flyway. The only exemption is Slovenia.

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