Neretva Delta - Croatia/Bosnia and Herzegovina

Feasibility study on establishing transboundary cooperation

Hutovo Blato, Bosnia and Herzegovina
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Prepared within the project *"Sustaining Rural Communities and their Traditional Landscapes Through Strengthened Environmental Governance in Transboundary Protected Areas of the Dinaric Arc"*

MINISTRY FOR FOREIGN AFFAIRS OF FINLAND

ENVIRONMENT FOR PEOPLE in the Dinaric Arc

A Western Balkans Environment & Development Cooperation Programme

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List of acronyms:

CBD PoWPA	Convention on Biological Diversity Programme of Work on Protected Areas
CBD COP 9	9th Conference of the Parties to the Convention on Biological Diversity
IUCN	International Union for Conservation of Nature and Natural Resources
WWF MedPO	World Wide Fund for Nature Mediterranean Programme Office
TBPA	Transboundary Protected Area
UNEP	United Nations Environmental Programme
UNESCO	United Nations Educational Scientific and Cultural Organization

SUMMARY

The Neretva Delta region is a predominantly rural area of approximately 20,000 hectares, shared by Croatia and Bosnia and Herzegovina. The region supports the livelihoods of approximately 60,000 people living in nine municipalities - seven on the Croatian side and two in Bosnia and Herzegovina.

The ecological characteristics of the region are defined by the 225 km long Neretva River, which spreads into an alluvial delta in the final 30 kilometres of its course prior to draining into the Adriatic Sea. The upper part of the river, flowing through Bosnia and Herzegovina, has a strong highland character, and in times of high waters, it brings large quantities of dissolved nutrients and organic substrates, which are deposited downstream to create the very fertile soil of the lower Neretva Valley. Downstream from the mouths of its tributaries, Trebizat and Bregava, the river forms a natural entity with its valley. The 8,000 hectare upper valley, with several lakes and a large marsh complex called Hutovo Blato is located in Bosnia and Herzegovina, while the app. 12,000 hectare lower valley, defined by several regulated branches of the river, lies in Croatia.

The lower, Croatian parts have been significantly altered, mainly by land reclamation works completed in the 1960s. From the original twelve river branches, only three exist today, and associated marshes and small lakes have also disappeared. Only a few fragments of large former Mediterranean wetlands have been left behind, which are isolated by the matrix of cultivated land.

Although Hutovo Blato today is in a more natural state and is better protected than the rest of the wetlands, it also suffered from human impacts in the past. In 1979, a large section of the marsh-lake complex, called Svitavsko Blato was transformed into a 1,300 ha reservoir lake for the hydroelectric power plant built in Capljina. Large segments of marsh vegetation, e.g. wet meadows and floodplain poplar forests, have been destroyed, resulting in a considerable reduction of bird and fish species.

Having a long history extending back as far as the Iron Age, with impacts from a variety of cultures over time—Illyrians, Greeks, Romans, Bogumils, and Venetians—the Neretva Delta also has a significantly rich archaeological heritage. This includes remnants of prehistoric fortifications and settlements, monuments from Roman times (villas, mosaics, epitaphs, etc.), remnants of medieval fortresses from the times of the Ottoman occupation, etc.

Not only are the natural conditions of the area suitable for preserving sites of unique natural value, but they also directly support the livelihood of its human population. Agriculture, hunting and fishing are traditional activities in the area, and due to the lack of other sources of income and recently increased unemployment, they are gaining in popularity. To date, 40–50% of households own land. Farming, especially the production of citrus fruits and vegetables in the lower valley and olives at higher elevations, has become the most widespread economic activity. This is also due to the high fertility of land and the very favourable climatic conditions, which allow several harvests per season for some crops. The Neretva Delta region has great and still unexplored potential for tourism. It is rich in natural, cultural and archaeological values, and the major tourism attractions are in the vicinity. Some of these are the historical city of Dubrovnik in Croatia, the Dalmatian coast, the spiritual site of Medugorje in Bosnia and Herzegovina, and the historic Old Town of Mostar, which was recently included on the UNESCO's World Heritage List. Although tourism currently holds a relatively small share in the local economy, the development and proper marketing of new alternative tourism products could result in significant contributions to the sector, bringing additional income sources for the local population. Besides these significant local economic features, the region is also a crossroads for major existing and planned transportation routes. Traffic along the Dalmatian coast crosses the lower parts of the region, while transport corridors through the valley have an important role in linking Bosnia and Herzegovina with the Adriatic Sea and the Port of Ploce. The Adriatic-Ionian motorway and the highway between Ploce and Budapest are still in the planning phase. However, once constructed, they will have a major impact on the area, both economically and ecologically.

BACKGROUND OF THE STUDY

This study represents the preliminary assessment analysis of one of the six project sites of the project "Environment for People in the Dinaric Arc".

Project *"Environment for People in the Dinaric Arc"*

The project "Environment for People in the Dinaric Arc" began in 2009 and is funded by the Ministry for Foreign Affairs of Finland. The project is expected to last three years. It represents a joint development initiative by IUCN (International Union for Conservation of Nature) implemented by IUCN Regional Office for Pan-Europe and IUCN Programme Office for South-Eastern Europe, in partnership with World Wide Fund for Nature - Mediterranean Programme Office and SNV – Netherlands Development Organisation.

The project was developed to support the political commitments of the Dinaric Arc countries towards enhancing cooperation on protected area establishment and management within the framework of implementing CBD PoWPA. In this context, the most important step was the "Big Win" commitment for the Dinaric Arc, jointly signed by Albania, Bosnia and Herzegovina, Croatia, Montenegro, Serbia, and Slovenia in May 2008 during the 9th Conference of the Parties to the Convention on Biological Diversity (CBD COP 9) in Bonn. The commitment includes the general statement of all signatories to build an effective network of protected areas, based on the recognition of the natural and cultural wealth of the Dinaric Arc region. It also includes a list of specific national and regional priorities for each country. These priorities include the establishment of 13 new protected areas and the evaluation of the contribution the protected areas could make to the local and national economies. They also include strengthening regional collaboration by creating a series of transboundary natural resource management areas (i.e. transboundary protected areas), which shows a general awareness that protecting this natural and cultural wealth can only be achieved through the close cooperation of the Dinaric Arc countries.

The EU perspective is currently the main political driver, since EU accession is the principal objective for the countries of the region. Strong economic growth and progressing integration into the EU are set to bring the stability, security, and prosperity that the peoples of the region are hoping for. In this context, establishing transboundary collaboration on environmental and development issues is of interest to all the western Balkan countries.

The "Environment for People in the Dinaric Arc" project aims to transform this political commitment into a concrete action for the Dinaric Arc region. In short, the goal of the project is to improve the sustainable development of rural communities on the basis of conservation of biological diversity and traditional landscapes in transboundary regions by enhancing regional cooperation and strengthening environmental governance, including participation and empowerment of civil society and local communities (IUCN, 2008).

Why transboundary cooperation?

The need for establishing transboundary collaboration is based on the idea that natural systems straddling political boundaries can be most effectively managed as functional units at the regional landscape scale and would therefore benefit from appropriate mechanisms for long-term transboundary co-operation. While the establishment of transboundary protected areas (TBPAs) for integrated conservation and development can enhance environmental protection,

Hutovo Blato, Bosnia and Herzegovina
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it can also reinforce political security and provide multiple benefits to local communities.

The existence of TBPAs and their buffer zones can help reduce tension, rebuild divided communities, promote freedom of movement and create new opportunities for sustainable development, including low-impact regional tourism. Such areas can also give an important contribution to regional biodiversity conservation programmes, especially in areas where they form a coherent ecological network. Neighbouring states, which often have different levels of technical expertise, knowledge, capacity, and financial resources, can benefit by combining their respective strengths through transboundary cooperation (IUCN, 2008).

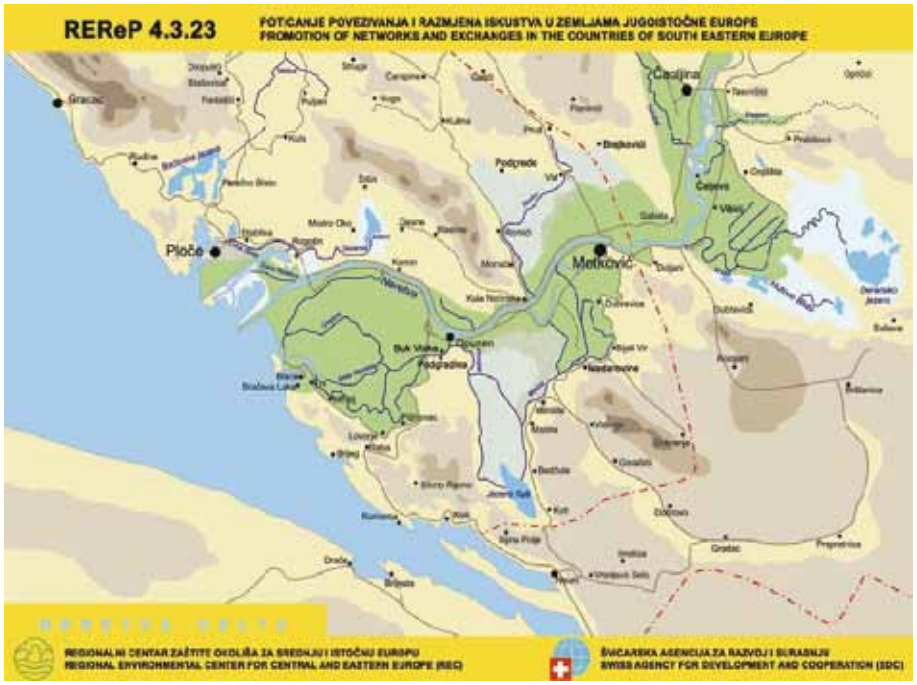
Purpose of the Assessment

The purpose of this assessment was to feed the project with necessary information and provide directions towards an increased level of transboundary collaboration by taking advantage of the opportunities and overcoming the difficulties identified in this report.

Methodology

This analysis is based on a questionnaire completed by two local consultants, one for each side of the border of the project site. The questionnaire was developed by Mr. Zbigniew Niewiadomski, the UNEP Regional Consultant on Transboundary Protected Areas. The UNEP kindly approved making the questionnaire available for the benefit of our project and allowed its author, Mr. Niewiadomski, to assist us. The initial questionnaire was slightly adjusted to focus on the specific needs of this project and the specificities of the pilot sites.

The questionnaire consists of 168 questions. Regional consultants were given a three month period to give their responses, with the assistance of other regional experts, local administrations, internet research about the region, scientific articles and personal discussions. However, it would have also been desirable to include a comprehensive overview of the traditional landscape and social background of the area, and the situation in local law enforcement.



CONTEXT FOR TRANSBOUNDARY COOPERATION

Main environmental issues

Various forms of human behaviour in the region have often led to depletion of natural resources, making sustainable development in the region particularly difficult.

Current outstanding environmental issues are outlined below.

- **The water regime** of the river is disturbed by hydropower infrastructure. There are four hydropower plants on the Neretva River and one on a tributary in the upper Neretva course, all with associated water reservoirs. The integral Trebisnjica hydropower system in Eastern Herzegovina is one of the most complex multipurpose hydropower projects in the Dinaric karst region and exerts a massive impact on the Neretva Delta. Seven dams, six artificial reservoirs and six tunnels with a total length of 74 km provide multipurpose use of water resources, from an elevation of 900 m to sea level. It decreases the sedimentation and productivity of the Neretva River and increases erosion of the river bed. Dam operations change water level frequently and rapidly, which has a severe impact on endemic fish, especially during spawning periods. Flooded meadows are disappearing due to mismanagement of water causing loss of migratory and nesting birds.
- **Uncontrolled intensive exploitation of sand and gravel excavation** along the Neretva River bed commenced long ago, in the 1970s and 80s as excavated gravel exceeded more than 20 times the amount of natural gravel brought by the Neretva to replace the dug-out quantities. This has led to the deepening of the Neretva riverbed and, together with dam construction upstream, has considerably disturbed the transport of heavy sediments (mostly gravel).
- **Lack of communal sewage systems** in most towns and villages causes significant pollution of water surfaces, as many settlements discharge their sewage directly into

Neretva delta, Croatia
© Tomo Rogošić

the Neretva. It is only due to the amazing natural self-purification processes that the Neretva River can still be considered relatively clean.

- **Illegal waste disposal** along the river banks and in the general area is not just an aesthetic problem, but is also a threat to water quality. The Neretva runs through a karstic landscape area, characterized by its porosity and numerous underground canals that take all waters from the watershed to the river. This means that rain flushes all toxic substances from illegal waste disposals into the Neretva current.
- **Changes in land use** and loss of habitat have been caused by expansion of human settlements, melioration of the terrain to obtain agricultural land, and the development of large transport infrastructure.
- Reliance of the local population on primary activities such as **hunting and fishing** caused by the lack of sufficient alternatives for local economic development makes these sources of livelihood increasingly important and inevitable, but often results in their overuse.
- **The quantities of pesticides and artificial fertilisers** used in intensive agriculture, especially in the lower Croatian parts of the delta are relatively low, though the area is extremely sensitive due to the widespread network of channels running in the immediate surroundings of agricultural plots, without any buffer strips between watercourses and agricultural land, and the porous limestone bedrock of the whole region.
- Generally **low environmental awareness** of the local population.

Socio-economic context

Mostar in Bosnia and Herzegovina is the largest city in the Neretva Valley with population of 102,000. The total population of the Neretva Valley is approximately 303,000.

The overall demographic situation in the area is stable. The total population in the Croatian part is 35,000. There are seven towns and municipalities in the Croatian part of delta: the towns of Metkovic (13,500), Ploce (11,500) and Opuzen (3,500), and the municipalities of Kula Norinska (2,000), Slivno (1,900), and Zazablje (1,000). The majority of the population lives in the delta area (85% in 28 settlements). There are considerably fewer people living in the coastal region (6% in 7 settlements), while very few people (8%) live in remote rural settlements, which are located in the hilly region along the edges of the alluvial valley.

The demographic situation in the Capljina municipality in Bosnia and Herzegovina has stabilised after migrations of populations during the war (1991–1995). However, there are no reliable statistical data available on this matter for Bosnia and Herzegovina. According to the available data, the largest settlement in the area of the delta in Bosnia and Herzegovina is the municipality of Capljina, with a population of 20,000. The municipality of Stolac has a population of 12,000 but it only partly belongs to the Neretva Delta, as does Ljubuski with a total of 20,000 inhabitants.

As in other areas in the region, the Neretva Delta witnessed a dramatic economy collapse, especially in Bosnia and Herzegovina. Its physical capital was partly destroyed. The process of economic reforms, which began in 1991, was halted. The companies that had operated before the war stopped their production. All main activities of the region, such as industry, agriculture, and tourism, were affected.

However, the most promising possibilities for improvement of

Neretva delta a view to the port of Ploce, Croatia
© Nenad Jasprica

economic prosperity of the region could be further development of tourism, considering that this region has extraordinary conditions for coastal and Mediterranean, cultural and historic, religious, hunting and fishing, rural, transit and congress tourism.

Before the war, economic growth had frequent negative environmental impacts. In summer months, the population of the area was several times higher than usual, which affected the environment. Agricultural activities, such as fishing and aquaculture, lacked proper planning. Their environmental impact is therefore unknown. Furthermore, new tourist resorts and infrastructure, especially illegal construction of houses, expansion of construction sites, release of wastewater, or burning of vegetation, negatively affected the environment of this area. Industrial plants for food processing, wood, metal and the aluminium industry in particular have released untreated wastewater into Neretva, considerably altering the flora and fauna of the delta area. Before the war, an urban development plan intended to resolve these issues was prepared, though it was never adopted due to inadequate functioning of the responsible institutions.

Control of municipal wastewater quality is not a common practice. During the war, control was not carried out and even today it is rarely the case. There are plans for sewage systems in Mostar and Konjic; however, other towns and villages in Bosnia and Herzegovina have no sewage systems. The issue of water pollution in the Neretva Delta will, therefore, remain unresolved in near future.

A burning problem is the disposal, processing and recycling of municipal solid waste. Illegal waste disposal is increasing, while the equipment used for collection and transport of waste is in very poor condition. Decreased industrial production means reduced quantities of industrial waste. Accordingly, the water quality in some rivers improved after the war. However, water quality in the Neretva is only slightly better. Control and measurement of wastewater quality is partly carried out only on the discharge of industrial wastewater into natural water streams.

Potential conflicts could arise between stakeholders supporting different strategies for development of the area. The analysis has shown that the management of the Neretva Delta area is not satisfactory. In order to improve the situation, certain changes need to be introduced, and a number of documents should be adopted to secure a legal framework for undertaking measures and setting foundations for establishing sustainable development in the entire area. This is especially important since the area of the Neretva Delta represents a very complex system of interconnected and shared resources. One of the most important facts to be taken into account is the total carrying capacity for different activities in the area.

Hydrosystem Trebišnjica, layout, Source: Hydropower plants on Trebisnjica

UNIFYING ELEMENTS

Natural conditions

The Neretva Delta provides habitat for diverse communities of plant and animal species, a fact recognised by nature conservationists at both the national and international level. When compared to other European wetlands of international importance, the Neretva Delta proves to be richer in the overall number of species, but somewhat poorer in the number of nesting waterfowl species. The area is also important as a European resting place for migratory birds, and as a wintering ground.

Approximately 45% of the area (9,031 ha in the two countries) is officially protected under national nature conservation regulations, and almost the entire area (11,500 ha in Croatia and 7,411 ha in Bosnia and Herzegovina) is recognised as a wetland of international importance under the Ramsar Convention. According to the Physical Planning Strategy of the Republic of Croatia and its National Biological and Landscape Diversity Strategy and Action Plan, the entire Neretva Delta is anticipated for protection as a nature park. In Bosnia and Herzegovina, Hutovo Blato was included in the national system of protected areas as a nature park in 1995.

Protected areas in the Neretva Delta

This area has been poorly researched in terms of biodiversity, although it is well known for the large number of endemic and rare species. The ichthyofauna of the Neretva Delta is rich in endemic species. There are 18 endemic species overall, 3 of which are endemic to the Mediterranean, 13 to the Adriatic basin, and 2 to Croatia. Species such as Adriatic brook lamprey (*Lethenteron zanandreai*), Adriatic trout (*Salmo obtusirostris oxyrhynchus*), Neretvan spined loach (*Cobitis narentana*), Neretvan nase (*Chondrostoma knerii*), Neretvan dace (*Squalius svallize*), Neretvan roach or Basak (*Rutilus basak*), Imotski gaovica (no english name exist - *Delminichthys adspersus*), Makal (local name with no descriptory meaning - *Squalius microlepis*), Neretva dwarf goby (*Knipowitschia croatica*) have a narrow distribution range. They inhabit only the Neretva River and certain lakes and tributaries of the area, representing the rare endemic ichthyofauna of Croatia. There are three endemic species of amphibians in the lower Neretva: Olm (*Proteus anguinus*), Dalmatian yellow-bellied toad *(Bombina variegata kolombatovici)*, and Dalmatian smooth newt *(Triturus vulgaris dalmaticus)*. The olm is endemic to the Dinaric karst or eastern Adriatic coast, while the toad and newt are endemic sub-species of the Dalmatian coastal region. There are several endemic species of reptiles in the lower Neretva. The sharp-snouted rock lizard (*Archeolacerta oxycephala*) is endemic to the coastal region of the Adriatic. Other species have a wider range, and thus the Dalmatian algyroides (*Algyroides nigropunctatus*), Dalmatian wall lizard

Neretva delta, Croatia
© Tomo Rogošić

(*Podarcis melisellensis*) and Balkan whip snake (*Coluber gemonensis*) are eastern-Adriatic endemic species, i.e. species endemic to the Dinaric karst. The European glass lizard (*Ophisaurus apodus*), and Three-lined lizard (*Lacerta media*) are endemic to the Balkan Peninsula. Endemic species with a wider range are the Leopard snake (*Elaphe situla*) and Montpellier snake (*Malpolon monspessulanus*), species endemic to the Mediterranean. Among the mammals of the lower Neretva, species endemic to Dalmatia (eastern-Adriatic endemic species) are the Dalmatian garden dormouse (*Eliomys quercinus dalmaticus*) and Mediterranean long-eared bat (*Plecotus kolombatovici*). Though the Neretva Delta is an important European migratory bird corridor and is rich in bird species, there are no endemic species.

Hydrological characteristics of the area are very complex due to the mixing of rivers, streams, karst springs and tidal seawater. The area is interspersed with springs of underground karstic waters and a network of currents, springs and lakes on both sides of the Neretva River.

The entire basin is under the influence of the Mediterranean climate, whose impact rapidly declines with the increase in altitude of the mountain massifs. Air temperature varies in relation to distance from the sea, openness towards the sea and altitude. The average annual air temperature, depending on the altitude, varies between 7 and 15°C. The annual average precipitation in the basin ranges between 1,150 and 1,800 mm. Precipitation is heaviest during the winter months, when it often causes flooding of agricultural fields, while the vegetation period is characterized by a shortage of water.

In the Neretva Delta, there are eumediterranean, submediterranean and Mediterranean-mountainous vegetation and climatic belts. The Mediterranean climate penetrates into the mainland up the Neretva Valley, enabling the dispersal of eumediterranean and submediterranean flora and fauna elements far inland. The opposite also occurs: species with a continental range, especially those with a preference for wetland habitats, are dispersed towards the coast.

Due to its specific location, climate, complex water regime, etc., the Neretva Delta has high diversity of habitats, especially aquatic and wetland: lakes and ponds, rivers, reedbeds, wetland

Name of the site	Conservation category	Size	Country
Pod Gredom	Ornithological reserve	587,79 ha	Croatia
Prud	Ornithological reserve	149,73 ha	Croatia
Orepak	Ornithological reserve	103,21 ha	Croatia
Mouth of Neretva River	Ornithological & ichthyological reserve	585,73 ha	Croatia
Modro Oko/Desne Lake	Protected landscape	276,00 ha	Croatia
Parila Lake	Proposed ornithological & ichthyological reserve	740,00 ha	Croatia
Kuti Lake	Proposed ornithological reserve	511 ha	Croatia
Hutovo Blato	Nature park (since 1995)	7,411 ha	Bosnia and Herzegovina
Trebizat	Proposed nature park	6,750 ha*	Bosnia and Herzegovina
Neretva Delta	Ramsar site (since 1992)	11,500 ha	Croatia
Hutovo Blato	Ramsar site (since 2001)	7,411 ha	Bosnia and Herzegovina

*approximately one third of the territory of the future Nature Park Trebizat belongs to Neretva Delta area.

meadows, poplar and willow forests, marine shore and rocky slopes with ancient forests and various types of degraded rocky habitats. Also, there are many man-made habitats, such as hay meadows, agricultural fields, citrus orchards and vineyards, canals, dams and dykes.

The Neretva Delta forms the boundary for the ranges of several Eastern Mediterranean and Western Mediterranean species of amphibians, reptiles and mammals. South-east of the Neretva, there is a refuge area with endemic fauna. This area is under the influence of the Middle East and even North African fauna. The north-eastern part is known for the Eastern Adriatic endemic species and is under the influence of the Central European continental fauna.

Flora

Water and wetland communities are the basic ecosystems in the Neretva Delta, comprised of the Kuti, Modro oko and Bacinska Lakes, the Norin spring and Hutovo Blato Nature Park with their connecting canals. The basic factor influencing the vegetation types is the level of groundwater. It is interesting that the wetland vegetation does not differ much from the continental wetlands, despite the strong Mediterranean influence. Wetland communities are dominated by plant species having a eurosiberian and holarctic range. The plant community *Scirpo-Phragmitetum* represents the largest part of wetland vegetation. *Myriophyllo-Nupharetum* and *Nymphoidetum-peltatae* are also common communities. The plant association *Fimbristylion dichotomae* can today be found only in fragments, due to disappearance caused largely by land reclamation. On the mud flats in the Neretva estuary, there are halophytic meadows of the type *Salicornietum herbaceae*. Grazed meadows near the sea are more or less saline, covered by *Juncetum maritimo-acuti* and grassland of the *Agropyro-Rumicion* type. Although the habitats have been

Basic Facts	
Location:	Neretva Delta, including the river catchment from Pocitelj to the river mouth
The area:	
Total area	app. 20,000 ha
Population:	60,000 inhabitants
Largest settlements:	Capljina (Bosnia-Herzegovina, pop. 19,900); Metkovic (Croatia, pop. 13,500)
Climate:	Mediterranean climate, with highest amounts of precipitation in winter
Neretva River	
Catchment size:	10,110 km^2
Total length:	225 km (203 km in Bosnia-Herzegovina, 22 km in Croatia)
Natural values:	
Main biotopes:	Open waters with *Myriophylleto-Nupharetum*, *Ranunculeto-Callitrichetum vernae* communities, reedbeds, *carex*-meadows, wet meadows, willow bushes and forests, forests of *Quercus pubescens* and *Carpinus orientalis*, degraded sub-mediterranean forests, rocky areas with poor vegetation, cliffs and regulated wetlands for agriculture.
Species diversity:	34 freshwater and >100 marine fish, 7 amphibians, 16 reptiles, >300 birds (115 nesting), 52 mammals.
Some important species:	Dentex trout, Neretvanian nase (Chondrostoma kneri), Neretvanian cobits, Small goby, Pygmy cormorant (*Phalacro-corax pygmaeus*), ferruginous duck (*Aythya nyroca*), Bearded parrotbill (*Panurus biarmicus*), Great bittern (*Botausurs stellaris*), Kentish plover (*Charadrius alexandrinus*).
Ramsar areas:	9,031 ha (7411 ha in Bosnia-Herzegovina, 1,620 ha in Croatia)

significantly altered, the Neretva Delta still represents the largest and the most valuable remains of Mediterranean wetlands in both Croatia and Bosnia and Herzegovina, giving it significant value for the entire Mediterranean region.

There is a wealth of data on the flora and vegetation of the Hutovo Blato region, though these data suffer from a lack of detailed information prior to the construction of hydropower plants in the 1960s. Current surveys have catalogued just over 700 species of ferns and other vascular plants throughout the park. Of algae, the genera *Nitella* and *Chara* are common members of water plant communities. *Fontinalis antipyretica* is the most frequent moss in communities found along the path of the area's cold springs.

Most plant species found in the park belong to typical Mediterranean floral elements. Terrophytes, annuals requiring a single summer from germination to seed and using a shortened vegetation period, are the dominant type. The most numerous families of these are grasses (fam. *Poaceae*), legumes (fam. *Fabaceae*), and asters (fam. *Asteraceae and Cichoriaceae*), all of which confirm the flora's Mediterranean character.

Euhydrophytes dominate among the aquatic plants. These include both submerged plants and those rooted in the riverbed, with vegetative organs developing either in upper water layers or on the water surface itself.

Twenty-eight plant species in Hutovo Blato have been added to Bosnia and Herzegovina's List of Rare, Endangered, and Endemic Plant Species in 1994. The largest number of these (22) is classified as vulnerable (V). Another five – three of which are endemic – are categorised as rare (R). Plants in this last group are usually members of small populations that have not been endangered yet, but that may not be far from being so.

Water purslane (*Ludwigia palustris*) is the sole endangered species (E). This means that it is threatened with extinction should its habitat continue to be subject to deleterious factors which, in this case, is primarily reduction of water flow and subsequent habitat drying up (Jasprica 2009).

Fauna

The fauna of the Neretva Delta has not been thoroughly researched and the compiled data are fragmented. There are seven species of amphibians and 16 species of reptiles (two tortoise species, eight snake species and six lizard species). A literature review showed that there are 34 species of freshwater fish and more than 100 species of marine fish in the Neretva Delta, as well as 52 species of mammals. In the last 100 years, some 310 species of birds (35 of which are waterfowl) have been recorded in the area, and of these, 115 nest here. The reason for such a variety of birds is the productivity and diversity of the area, as well as its location on the migratory rout taken by European birds towards Africa. Some of the nesting species are the great bittern (*Botaurus stellaris*), ferruginous duck (*Aythya nyroca*), Kentish plover (*Charadrius alexandrines),* endangered at the European level, and the bearded parrotbill (*Panurus biarmicus),* rare in the region.

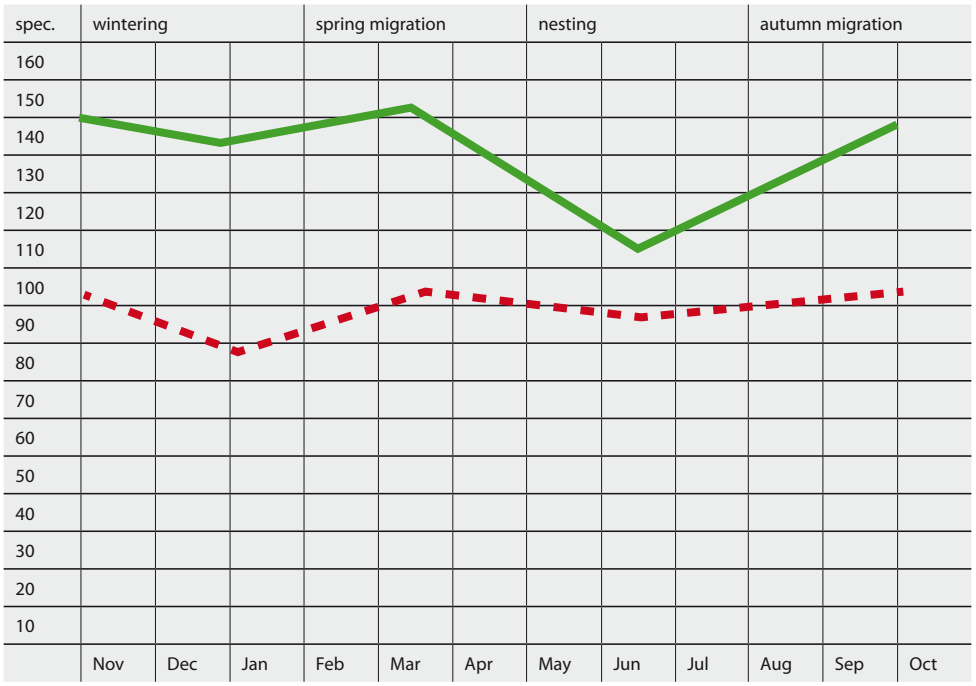
Source: REC Metkovic

Dr. Svjetoslav Obratil conducted an ornithological study of Hutovo Blato in the period from January to December 2000 in the framework of the LIFE project "New policy of management of wetlands of Hutovo Blato". He compared the results from 2000 (red dotted line in graph below) to the results from 1979 (green line – prior to construction of hydropower plant Capljina and its infrastructure). The main conclusions are as follows:

- the total number of recorded species decreased by 31% and number of families decreased by 19%;
- the species distribution over time indicates a decrease of species during migration (spring migration by 31%, autumn migration by 33%, winter by 40%) and during the nesting period (by 13%);
- the decrease of species in space demonstrates the degradation of bird habitats, and flooded meadows in particular; the number of recorded species decreased by 48%;
- the most striking data are for the duck family *Anatidae*, which decreased by 56%, followed by *Charadriidae* 47%, and *Accipitridae* and *Falconidae* 21%;
- the census of the nesting bird population of Hutovo Blato shows a decrease of little egret (*Egretta garzetta)* by 67% and black-crowned night herons (*Nycticoraz nycticorax)* by 60%.

During the spring, autumn and winter migration, the birds of the northern Europe use the area of the Neretva Delta and the Hutovo Blato wetlands as stopover places in search of food and rest. Ornithological monitoring of migratory birds from northern to southern Europe showed that the area of the Neretva Delta and Hutovo Blato wetlands are among the most frequently visited sites in our coastal area for migratory birds. Long-term monitoring of bird migration showed that migratory birds of Continental Europe and part of Asia use for rest and food those biotopes that are ecologically similar to those in their native range. They avoid eumediterranean pinewoods and prefer arable land, flood meadows, lake water surfaces, alluvial valleys (muddy parts of the coast and river mouth) and sandbanks. The abundance of food (worms, crabs, tadpoles, frogs, insect larvae, fish spawn, etc.) and grains on meadows and arable land (maize, wheat, millet, grass seeds, water plants and seeds, etc.) is the main attraction for birds to the area during certain periods. Some of the environmental factors in the delta coincide with environmental elements on the northern shores of Europe and Asia and some bird populations of the northern regions regularly migrate south, using similar areas to rest and feed.

Since the 1950s, five nesting bird species have disappeared from the area, as Neretva Delta was its only nesting site in the area for four of these species Black-necked grebe (*Podiceps nigricollis)*, Dalmatian pelican (*Pelecanus crispus)*, White-tailed eagle (*Haliaeetus albicilla)* and Tufted duck (*Aythya fuligula*). The number of ducks, terns and other birds has decreased over the past



Source: dr. Svjetoslav Obratil, research of bird population of Hutovo blato in period January – December 2000 compared to 1979 data.

century, especially after extensive land reclamation and hydro-power dam construction. The numbers of birds have also decreased due to hunting and intrusive human activities. The otter is threatened by hunting and intrusions, and also by reduced fish stock.

Organic pollutants concentrate in benthic invertebrates thus reducing their populations and speeding up incorporation into the food webs. Consequently, populations of predator fish also decrease and become unsuitable for human consumption. The canals in the Neretva Delta can contain high concentrations of herbicides that adhere to suspended sediment and are carried long distances, thus increasing their potential impact on other aquatic organisms and humans. Organic pollution also deteriorates water quality, making it unfit for most water use purposes.

Mammals have never been thoroughly researched. Currently 53 species of mammals are present (of which 24 species are bats), though further research would likely discover more species. There are ten species of carnivores and nine species of rodents. Some of these species live in marginal areas in the upper parts of the valleys, on the slopes and plains, and are listed on the Red List of Croatian fauna. Several species of mammals including wolf (*Canis lupus*), wild cat (*Felis silvestris*), otter (*Lutra lutra*) and all the bats except the pipistrelle bat (*Pipistrellus pipistrellus)* are strictly protected and listed under Annex II of the Bern Convention. The Eastern European hedgehog *(Erinaceus concolor)*, all the species of the family *Soricidae*, the pipistrelle bat (*Pipistrellus pipistrellus)*, all dormice, the beech marten *(Martes foina)*, least weasel *(Mustela nivalis)*, and European polecat (*Mustela putorius)* are included in Appendix III of the Bern Convention.

In many religions, fish are a symbol of water and the carrier of life. Numerous folk beliefs are associated with fish and fisheries. Historically, fish and fisheries have always been present in the daily life and local diet of the Neretva Delta and Hutovo Blato. The area was used for an intensive eel and carp fishery and as a hunting ground for birds and wild boar. The economic value of native fish species, excluding eel, is not high and the fishery value was not significant. Thus, over the last century, the introduction of non-native fish species was a common practice. It started in the 19th century with the introduction of common carp (*Cyprinus carpio*). The introduction and constant stock enhancement has been very frequent in the past 40 years. The main reason was the failure of introduced carp to establish stable populations, due to unsuccessful spawning. In order to support constant production, stock enhancement was practised almost on an annual basis. This led to introduction of other species, such as tench or herbivorous carps, which were utilised as useful resources. However, due to the lack of adequate scientific studies and state body control, stock enhancement led to the introduction of unwanted and invasive species, such as pumpkinseed (*Lepomis gibbosus*), and goldfish (*Carassius auratus auratus*). The boom of these species, especially pumpkinseed in the period after 1992 was formidable, one possible reason being lack of

Neretva delta, Croatia
© Nenad Jasprica

effective management during the war years (1991–1995).

Presently, the value of fishery is insignificant because of the dominance of detrimental introduced species to the autochthonous fish community. Due to the lack of funding for the development of adequate fishery management plans including fish ponds construction, the future situation is not promising.

The Adriatic ichthyological region is rich in endemic species, which are threatened by allochthonous species from the Danube River Basin. Two of freshwater species, Lombardy brook lamprey (*Lethenteron zanandrai)* and Canestrini's goby (*Pomatoschistus canestrinii*) are listed in Annex II of the Bern Convention. There are 11 species listed in Annex III of the Bern Convention and there are 25 freshwater fish species listed on the Red List for the Neretva basin. It is assumed that one of the most endangered European species, the European sturgeon (*Acipenser sturio)* could be found here in the past, but is now believed to be regionally extinct. The Neretva Delta is inhabited by 49 fish species, of which 12 are alien. Five of the allochthonous species: Common carp (*Cyprinus carpio*), tench (*Tinca tinca*), Grass carp (*Ctenopharyngodom idella*), Silver carp (Hypophthalmichthys molitrix) and Gambusia (*Gambusia affinis*) were intentionally introduced, whereas some others such as Sunfish (*Leposim gibossus*), Prussian carp (*Carassius auratus gibelio)* and Brown bullhead (*Ictalurus nebulosus*) were introduced by human negligence. They disturbed the harmony of the autochthonous fish species in Hutovo Blato. The delta is characterized by two migratory fish: Grey mullet (*Mugil cephalus*) and Eel (*Anguilla anguilla*). After spawning, grey mullet migrates to freshwaters, whereas eel spawns in the Sargasso Sea. The family *Cyprinidae* is most numerous, accounting for 50% of all species, followed by the trout family (*Salmonidae*) accounting for 18% of the total number of fish. Three endemic fish species from the trout family: Soft-mouth trout (*Salmothymus obtusirostris oxyrhynchus*), Marble trout (*Salmo marmoratus)* and Dentex trout (*Salmo dentex)* have significantly declined in number and are largely threatened.

The invertebrate fauna of the Neretva Delta is not well researched. Current entomological research has described 104 families with 307 species of beetles, 135 species of butterflies (about 250 to 350 more assumed to be present in the area). The most important butterfly species are from the family *Papilionidae*, such as swallowtail (*Papilio machaon)*, scarce swallowtail (*Iphiclides podalirius)* and southern festoon (*Zerynthia polyxena)*. The first two are protected under the Nature Protection Act in Croatia.

The subterranean invertebrate fauna is very important in terms of biodiversity but it is poorly researched. It is highly endemic and threatened by anthropogenic changes of the water regime (level, quality and quantity of subterranean waters).

Organic productivity of these waters has not been systematically studied, although it is of vital importance for fish fauna. The impact of the tide reaches beyond the town of Metkovic and the waters in the river are stratified, with saline water in the bottom and freshwater spreading over top. Surface and subterranean waters in the Lower Neretva downstream from Metkovic are more or less brackish. Due to climate change, the impact of the sea will become even more pronounced. It has been noted that at several locations the wetlands are shrinking inland as the hydro power dams are hindering sediment flow. Various anthropogenic activities and structures cause large changes in the water regime, such as change in speed and oscillations of water flow, sediments quantity, temperature, oxygen availability and concentrations of nutrients in water, as well as groundwater levels and subterranean flows.

Fishing and bird watching in Neretva delta, Bosnia and Herzegovina
© Edward Parker / WWF-Canon

HUMAN IMPACTS

The Neretva Delta is under intense anthropogenic pressure. There are nine hydropower plants that use waters upstream of the Neretva Delta in the Neretva and Trebisnjica catchments (Jablanica, Rama, Grabovica, Salakovac, Mostar, Capljina, Grancarevo, Gorica and Plat). On one hand, the hydropower plants help to balance the water regime during high waters, but on the other hand, they prevent sedimentation, decrease productivity of the river, increase erosion of the riverbed and increase dyke fragility. They also changed groundwater levels and water regime in springs and streams of the surrounding area (Doljane, Vrelo Glušci, Mliniste, Mislina, Badula, Kuti-Metkovic, Londza, Drijen, Orah, Jelim, etc.).

One of the primary contributors to the degradation and decline of Neretva Delta freshwater habitats is hydrological alteration, defined as changes in the magnitude and pattern of water flow regime caused by the storage, regulation, diversion of water by dams and other infrastructure. The wetlands of the Neretva Delta prevent salt water intrusion, purifying water that enters the Adriatic Sea and representing an important habitat for numerous species. This area depends on waters that are discharged from upstream hydropower plants. Even though current studies indicate that there is decrease in biodiversity and the wetland area is becoming drier, no agreement has been reached on how to secure more water of adequate quality in certain periods of the year.

The WWF Mediterranean Programme has initiated the process of identification of the water flows for Hutovo Blato. The basic idea was that water flows for Hutovo Blato should mimic natural ones. Still, this idea is very vague, mainly because there is very little left of the natural flows, and the natural water regime is very complex. Therefore, certain simplifications are deemed necessary. Biodiversity studies have recognised that restoration of flooded meadows in the five hotspots within the park would stop biodiversity loss. In order to fill in the gaps in data for these five hotspots, WWF has developed monitoring plans for water quantity, quality, ichthyology, ornithology, and flora. In parallel with setting up the monitoring scheme, the WWF project team has identified 11 solutions that could secure favourable conditions in the five hotspots. However, implementation of the solutions that would secure environmental flows would require commitment of different stakeholders.

Pelicans
© Tomo Rogošić

These stakeholders are from two entities of Bosnia and Herzegovina holding different development strategies for the area. They come from different sectors, sometimes with opposing interests. It will, therefore, be essential to investigate the main drivers of certain stakeholder preferences and come up with a solution that would satisfy all interests.

The dykes on the Neretva are the main tool for flood control. In Opuzen, on the Mala Neretva River, several dams have been built to regulate high waters and the inflow of tidal marine waters into Mala Neretva during irrigation. Up until now, approximately 32 km of streams have been regulated. Land reclamation of the Neretva Delta was based on draining the wetlands, closing off oxbows and introducing artificial irrigation. Desalinisation of soil and creation of fertile fields have not been completed, as the fields were created far from sources of freshwater. This is why extensive agriculture prevails. Other man-made structures are concrete riverbeds, e.g. of Trebisnjica River and a water tunnel (pipeline) at Rastok and Jezero which directly lead some of the waters to the Adriatic Sea. Erosion of riverbeds is further aggravated by uncontrolled gravel and sand extraction.

Current management of water accumulations is poor and uncoordinated. There is a lack of monitoring and communication of water flow to users downstream, i.e. water management companies, farmers and inhabitants. Flood control is very expensive and difficult to organise. All water use permits have expired and require extension. Meanwhile, the process of issuing permits meeting the required terms and conditions should be revised.

Such alterations in the water regime and quality heavily influence the flora

Figure 6. Hutovo Blato, Layout of general scheme of Multipurpose Hydrosystem Trebišnjca. Area of Upper Horizons - in circle. Area of Hutovo Blato - in cicrle

1. Altitude; 2. Temoporary flow; 3. Permanent flow (river or canal); 4. Tunnel route; 5. Dam or dam site; 6. Power plant (operational); 7. Power plant (designed.)

Source: Petar Milanovic

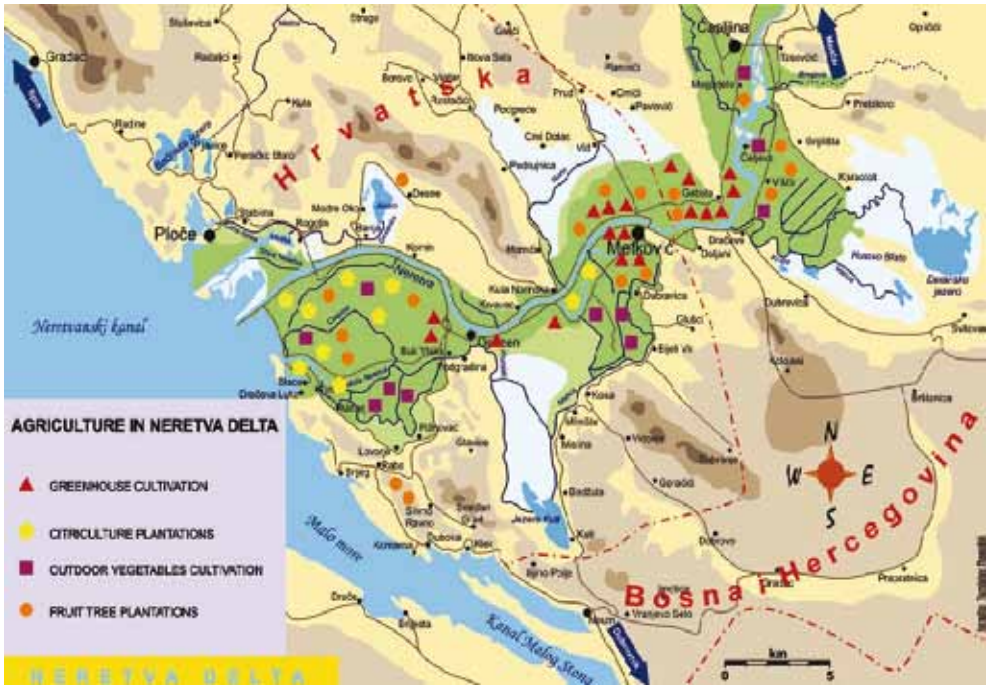
and fauna of the Neretva Delta. Certain types of plankton communities that had not previously been present in the delta have developed. The benthic fauna is increasing in both number and biomass and is causing the creation of mud. Sedimentation causes loss of aquatic plants and consequently of approximately 20 fish species of great economic value, as well as some waterfowl species. Fish and bird species are additionally influenced by land reclamation and damming.

The Neretva Delta is a wetland area with significant ecological integrity that is unique in the Adriatic and the Mediterranean. With its biodiversity and migratory bird routes, it is an area of exceptional natural heritage. Wetlands are very complex ecosystems and small changes in the water regime can have significant impact on them and the entire catchment. As a result, water management is the main factor affecting biodiversity in the Neretva Delta and is an extremely responsible activity. In order to protect and prevent biodiversity loss in the delta, it is necessary to set up a permanent monitoring system not only for biodiversity but also for the negative factors affecting the structure and size of Neretva fish and bird populations. Such factors could be various kinds of industrial pollution, dams on the river, reclamation, drainage, pumping fresh water from the springs, and ecologically unacceptable fluctuations of the river levels, as well as the introduction of alien species.

None of the human settlements in the Neretva Delta area have a sewage system and wastewater treatment plant, and all wastewaters are released directly into the streams and subterranean systems, reducing water quality. It is necessary to establish sewage systems and waste water treatment facilities in all urban areas, and ensure pre-treatment of industrial wastewaters and permanent control of all landfills. It is also necessary to reduce water pollution from agriculture and introduce strict control of pesticide use.

In order to protect biodiversity values, it is necessary to conduct a range of measures at the international level:

- Stop further degradation of remaining wetland habitats and, if possible, carry out restoration of lagoon and highly productive areas. Functionally broaden and strictly protect the presently protected areas, and ensure the lawful protection of the entire lower Neretva River under the category of nature park.
- Develop a bilateral management plan that would cover the Neretva Delta in Croatia and Hutovo Blato wetland in Bosnia and Herzegovina. Provide a framework for bilateral co-operation between the two states for the conservation of wild taxa that regularly migrate across national boundaries, and co-ordinate research, management and conservation measures such as habitat protection and hunting regulation.
- It is especially important to implement various traditional agriculture methods to



Source: Meri Rogosic (project: Transboundary management of shared natural resources)

quantitatively increase bird and fish populations.

- Conduct scientific research of the fauna in the lower Neretva River, and increase survey activities for specific species of vertebrates, and prepare and execute conservation action and restoration plans.
- Establish and carry out a monitoring system (water quantity and quality, sediment, fish, etc.).
- Set up the Emergency Warning System Centre (floods, droughts, accidental pollution, etc.).

Agriculture

Due to land reclamation, marshy areas of the Neretva River have been transformed into fertile farmland. Mandarins, tangerines and vegetable crops prevail and farming is highly intensive, with high intakes of agrochemicals (mineral fertilizers and pesticides). Mild climate, rich alluvial soil and plenty of water (the irrigation system in the Neretva Valley is well set up) make as many as three crop harvests per year possible in the open and even more in greenhouse plantations.

The intensive agriculture in the Neretva Delta is detrimental to the quality and quantity of the available water supply. Water is largely used for irrigation and is polluted through mineral fertilization, pesticides and veterinary medicine components. Agriculture is also the cause of water pollution and the victim of its shortage. Agricultural (hydro) irrigation has changed and undermined the water regime of a number of landscapes. Before agricultural irrigation started, the habitats of various animals, plants and microorganisms had been linked into a single functional integrated unit. Transforming it to cultivated humid habitats, clearing hedges and other low vegetation, changing the courses of water streams and introducing irrigation, disturbed the integrity of the area. These interventions made the proliferation of plants, migration of animals and circulation of water, food and energy through the system more difficult or even impossible.

Most agricultural activities have a negative impact on natural processes and equilibrium, particularly on biological and landscape diversity. Pesticide spraying, introduction of monocultures, clearing of woods and hedges, and irrigation are only a few. On the other hand, farmland, especially wet meadows and pastures, arable land and permanent crops, could be biologically rich if managed sustainably.

Numerous studies indicate that when compared to conventional agriculture, organic agriculture has a positive impact on water quality, and on biological and landscape diversity. The presence of plant and animal species in eco-farms is usually twice that of conventional farms and the content of nitrates, pesticides and heavy metals in surface and underground waters is significantly lower. Therefore, ecological agriculture offers a valuable model that enables protection of nature and the environment along with profitable production.

Mandarin orange plantations are the predominant crops in the Neretva Delta, with an annual production of 20,000 to 30,000 tonnes. This production exceeds the needs of both the Croatian and Bosnia and Herzegovina markets.

As export is still insignificant, a large share of these mandarin oranges is disposed of every year. Other fruits, especially plums, apricots, nectarines, peaches and apples cover about 750 hectares of land. The Neretva Delta produces about 15,000 tonnes of vegetables, mostly onions, lettuce, leeks, tomatoes, peppers, carrots, spinach and beans. Animal husbandry is least developed, although there are several pig and poultry farms. Most agro-technical measures and interventions in the Neretva Delta have had a negative impact on the quality of soil, water and air. They endanger

Neretva Delta, Croatia
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the equilibrium and biodiversity of water and marshy flora and fauna. Agriculture in the Neretva Valley is extremely intensive and uses large quantities of mineral fertilizers and pesticides. Most of the local experts are concerned that the application of agrochemicals in the Neretva Delta is practically out of control. Inspection services do not carry out their task properly and infringements go virtually unregistered.

There is neither systematic monitoring of the state of the environment in the Neretva Delta, nor any details on these matters. However, even without expensive and time-consuming testing, it is obvious that the state of the Neretva environment is far from favourable.

Although the Neretva Delta used to represent a positive example of farmland maintenance (land reclamation, irrigation systems and the like) by the state, the situation has since been completely altered. Neither Croatia nor Bosnia and Herzegovina properly maintain the irrigation system in the Neretva Delta. Without systematic maintenance, which requires substantial funds, the reclaimed land becomes marshy area covered by natural vegetation.

There are numerous problems and reasons for the poor maintenance of farmland in the Neretva Delta. One of the major issues is ownership. Legal relationships among the land owners are very complex and as a result it is not clear who owns a large share of the land. Therefore, current users of the land do not pay for water and other utilities, which could be a source of funding for the maintenance of the present irrigation system, the canals, collectors, etc. Due to the lack of funds, land reclamation has been suspended. Another problem is unorganised private land reclamation, which is carried out without a sufficient level of expertise.

Salinification of the land and freshwater in the Neretva Delta is one of the major environmental problems. Salt penetrates inland due to the poor water regime and inadequate management of the water and land resources not only in the delta, but in the Neretva River in general. Salinification is mostly due to the insufficient inflow of water from the accumulation lakes upstream. It should also be pointed out that salting occurs due to intensive irrigation of crops.

Saltwater penetrates the Neretva Delta in two different ways:

- through ebb and tide, via the existing watercourses, and
- through ground pressure and strata containing mineralised seawater with high salt concentrations.

The water regime of the Neretva River and its tributaries includes

saltwater penetration from the sea and underground to a large extent. There are two different hydrological periods of high and low waters, in winter and summer, respectively. Saltwater intrusion is fastest and the most prominent through the Neretva profile. In winter, high levels of freshwater push the saline groundwater further towards the sea. In summer, quite the opposite occurs: this is the period of minimal freshwater flow, and the sea, through ebb and tide, wedges deeply up into the watercourses and groundwater. The water flow is minimal during summer and freshwater flows only in the surface stratum of variable thickness. As precipitation becomes less intensive, the water level in the fissure system of the surrounding karst mountains lowers. This also occurs in the alluvial valley, which again lowers the pressure on the deep saline waters. As a consequence, the water rises towards the surface. On the other hand, during the rainy seasons and as a consequence of excessive irrigation, previously accumulated salt from the upper strata is washed out. The non-porous strata of dust and dusty clay play an extraordinary important role in this process. In the direction of salt rising from the depth, these strata can have a protective function. In the opposite direction they form a barrier, upon which salt is accumulated and which prevents more intensive washing out of the upper soil strata. Saltwater intrusion is a natural process resulting from the freshwater flow pouring from the surrounding higher karst area down into the valley via ground watercourses and springing out on the surface as brackish water.

Most farmers do not take water samples for chemical analysis to estimation water salinity. Rather, they water their crops until the soil becomes white with salt. Experienced farmers will taste the water, whereas some, for example people from the village of Komin, put floating devices on the water surface, which helps them keep the water with a higher concentration of salt closer to the top. There are no records on total quantities of salt brought into the soil in this way; however, the water from the drainage channels used for irrigation often causes significant damage to various fruit and vegetables, resulting, for instance, in complete withering of certain perennial crops.

A number of wells used by agriculturalists to derive water for irrigation further contribute to lowering of the water level. This irrigation method is especially popular in Bosnia and Herzegovina. Available statistics on the number of wells used to obtain water by the local population were analysed for the villages of Gnjilista and Celjevo.

Farmland covers about 18,000 hectares in the Neretva Delta with still about 2,000 hectares not converted into arable land but which could be transformed with minor investments. It is estimated that presently not more than 7,000 hectares are being cultivated. There are numerous reasons for the present situation, but one of the most significant is the collapse of former the state co-operative PIK Neretva. Its successor, Neretva d.d., has not succeeded in revitalising agriculture and has failed to come up with attractive models of cooperation with individual producers. Although this situation is unfavourable from the economic point of view, it gives definite advantages in the protection of natural resources and the environment. Uncultivated areas stay out of reach of intensive agricultural production and consequently create the prerequisites for the restoration of former relationships within the ecosystem.

Hunting and fishing

Hunting and fishing are traditional activities in the area. Due to increasing poverty and lack of sources of income, the role of hunting and fishing seems to also be increasing, as many people generate additional income by selling

Traditional boat in Neretva delta, Croatia
© Tomo Rogošić

Educational trail in Nature Park Hutovo Blato, Bosnia and Herzegovina
© Tomo Rogošić

fish and meat of wild animal species, birds in particular. A number of problems are associated with hunting and fishing, i.e. illegal and/or excessive hunting and fishing, and the low level of control on hunting and fishing associations. Since ancient times, hunters in the Neretva Delta were focused on hunting wetland birds. The first hunting club was established in Metkovic at the beginning of the 20th century. Not only was man's reliance on fish and birds as food source a question of survival, but it became part of the local tradition and customs and even a symbol of prestige. The tradition of hunting in the Neretva Valley has led to the creation of the largest ornithological collection in Croatia, on display in Metkovic. This collection today serves as a teaching aid and educational tool for students.

A routine practice throughout the Neretva area is coot and duck hunting by imitating bird calls and songs, which might be banned if the Neretva is designated as a nature park. For this reason, the initiative to proclaim the Croatian part of the Neretva Delta a nature park has been met with strong opposition from local hunters. Hunters believe that deprivation or abolishment of their right to hunt is unacceptable. In the neighbouring Hutovo Blato Nature Park in Bosnia and Herzegovina, hunting is prohibited though poaching continues to pose a great problem. Poaching is so widespread that the ban on hunting in Hutovo Blato could be considered non-existent. Hunters in Croatia insist that the responsible institutions should consider local hunters and other stakeholder needs in the future Neretva Delta Nature Park.

Tourism

Tourism seems to be a promising economic activity, especially in the current economic and social crisis. A specific type of tourism, promoting the area's natural and environmental characteristics could also compensate for the reduction of other economic activities that have a negative impact on the environment. There are plenty of opportunities offered by the area, but they remain undeveloped. The main reasons behind this are the failure to recognize tourism as

Hunter in Neretva delta, Croatia
© Nenad Jasprica

an important economic activity, lack of marketing focus on specific potential tourist products and their "market", inadequate financial and political support and lack of human capacity and infrastructure (adequate education, interpretation of natural and cultural values relevant for tourists, etc.). There are several popular destinations in the immediate proximity of the Neretva Delta region, which can meet "mainstream demands", while the delta itself can offer good opportunities for alternative forms of tourism. These can target very specific demands and can be carried out with minimal impact on nature and biodiversity. Bird watching tourism, speleological tourism, nature tourism based on eco-trails in wetlands and rural tourism have been identified as the most relevant. The surroundings of the Neretva Delta offer a rich collection of different karstic phenomena, such as open limestone ridges, karst fields, caves, abysses and pits. Not only are caves—such as the famous Vjetrenica Cave, explored and described over a length of 5.8 km, or the Ravlic, Vjestica, Marko and Sarajic Caves, attractive for their natural beauty, but also representing an important habitat for a number of species. The delta also has a rich cultural heritage with many remnants from a variety of cultures (Illyrian, Greek, Bogumil, Venetian). The cultural heritage, combined with unique natural beauty, ensure great potential for tourism development in the area. Tourism potential is also related to tourism development along the Dalmatian coast. Tourism plays an important role in the economy of towns on the coast in vicinity of the Neretva Delta, e.g. Podaca, Brist, Gradac, Ploce, Blace, Komin, Duboka and Klek. Altogether, they account for approximately 95% of all tourist capacities in the Croatian part of the delta. These, along with the religious centre Medugorje, with more than a million visitors a year, and Mostar in Bosnia and Herzegovina are tourism destinations that potential visitors to the Neretva Delta can visit. Due to its wealth of natural, speleological, cultural and archaeological values, and the proximity of major tourism attractions, the Neretva Delta region has great potential for tourism development. Although tourism today has a relatively small share in the local economy, the development and proper marketing of new alternative tourism products could result in a significant contribution of the sector and bring additional income for the local population. However, in order to prevent potential harmful effects, tourism development has to be preceded by proper visitor management plans.

A major task for the future is economic valuation of the existing values and potential of the area and their distribution among different sectors. Presently, the agricultural activities have the highest contribution to the total economic value of the area amounting to 80%, with the remaining 20% included in all other sectors. Wetland areas are perceived negatively by the majority of the population today, which should be changed because they play an important role in the area and are considered valuable due to their "naturalness", and their biological, social and economic functions.

Different actors should be stimulated and supported in their activities, such as representatives of different ecological associations, those engaged in the start of organic agriculture, those engaged in activities to strengthen environmental awareness of the population environmental protection, and development based on sustainability principles.

Bacina lakes, Croatia
© Tomo Rogošić

Mogorjelo, Bosnia and Herzegovina
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NATURE AND ITS PROTECTION IN THE REGION OF THE TRANSBOUNDARY AREA

The authorities responsible for nature conservation in transboundary area of the Neretva Delta in Croatia are:

- Town and municipality authorities of Metkovic, Ploce, Opuzen, Kula Norinska, Pojezerje, Slivno, Zazablje;
- Public Institution for Protected Natural Values Management of Dubrovnik-Neretva County;
- State Institute for Nature Protection of the Republic of Croatia;
- Ministry of Culture of the Republic of Croatia; Ministry of Environment Protection, Physical Planning and Construction of the Republic of Croatia, Government and the Parliament of the Republic of Croatia.

In Bosnia and Herzegovina, the responsible authorities are:

- Municipalities of Capljina, Ljubuski, Stolac;
- Ministry of Trade, Tourism and Environment of Herzegovina-Neretva County, Ministry of Environment and Tourism of the Federation of Bosnia and Herzegovina, Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina.

Designation procedures for protected areas in Bosnia and Herzegovina and Croatia

There is no legal procedure for establishing transboundary protected area in Bosnia and Herzegovina, though a nature protection act is currently (2010) under development to define these procedures. Article 22 of the Nature Protection Act of Croatia regulates the procedures for the designation of protected areas. The State Institute for Nature Protection of the Republic of Croatia is to produce a feasibility study for designation. The Ministry informs the public and provides all documentation in a transparent way, ensuring that the documentation is available for at least 30 days to all that might be interested. The Institute is obliged to incorporate all public comments into the feasibility study. According to the Croatian law, transboundary protected area of the Neretva Delta would respond to the category of regional park; however, the nature protection law in Bosnia and Herzegovina does not include the category of regional park.

There are ambitious plans for nature protection on both sides of the border. The feasibility study for proclamation of the Neretva Delta Nature Park has been drafted by the State Institute for Nature Protection of the Republic of Croatia. A pre-feasibility study has been drafted for proclamation of the Trebizat Nature Park in Bosnia and Herzegovina. There is also an initiative to expand the current boundaries of Hutovo Blato Nature Park. If all these initiatives are successful, more than 20,000 ha of the Neretva Delta transboundary area will be protected as a nature park in both countries.

The most recent initiative was the project proposal submitted to IPA funds for designation of the Neretva Delta transboundary area as a biosphere reserve. It is, however, still not certain if this initiative will be funded at all. The main driving forces behind this transboundary initiative are local environmental NGOs (Lijepa Nasa from Capljina, Bosnia and Herzegovina, and Modrozelena from Metkovic,

Celebration of Hutovo Blato Day, Bosnia and Herzegovina
© Stojan Lasić

Croatia) with support of the State Institute for Nature Protection of the Republic of Croatia and the Ministry of Environment and Tourism of the Federation of Bosnia and Herzegovina. A MoU for cooperation in the field of nature conservation was signed in the frame of the Environment for People in the Dinaric Arc project.

Prior to this initiative, the Ministry of Environment Protection, Physical Planning and Construction of the Republic of Croatia, together with Ministry of Environment Protection, Physical Planning and Construction of the Herzegovina-Neretva Canton in Bosnia and Herzegovina implemented the project "Transboundary management plan for the Lower Neretva Valley" in 2001/2002 through the Ramsar Small Grants Fund. This project created an inventory database of the natural values of the Neretva Delta, tested the MedWet Database tool, and involved the local communities in the process of wetland evaluation, planning and decision making. A few years after this initiative, the Mediterranean Wetlands Committee (MedWet) initiated the signing of a Memorandum of Understanding on transboundary collaboration in environmental protection in the area of the Neretva Delta, between representatives of the Ministries of Environment from both countries and several key stakeholders, such as Hutovo Blato Nature Park and water management agencies.

The Regional Environmental Centre for Central and Eastern Europe (REC) through the project "Transboundary cooperation through the management of shared natural resources" discussed the vision of sustainable development of the Neretva Delta with key stakeholders.

Several joint transboundary activities were developed in the sectors of tourism, agriculture, education, water management, etc. The establishment of the Neretva Delta Forum is considered one of the most important results and achievements of this project. The Neretva Delta Forum was established in Bosnia and Herzegovina and Croatia in order to become the cross-border communication and coordination platform.

The most recent transboundary project is the GEF/World Bank Neretva Trebisnjica River Basin project. Its implementation began in 2009 and will continue until 2014. This project covers the entire Neretva and Trebisnjica basin and has a broader scope than the Neretva Delta, though the Neretva Delta is an important component of the project.

Potential obstacles to the development of the transboundary cooperation can be mitigated by:

- more regular and frequent information exchange among local and national authorities;
- improved communication at all levels among all stakeholders;
- establishment of the Neretva Delta Nature Park in Croatia;
- adoption of a nature protection act in BiH;
- promotion of the Neretva Delta as a unique transboundary area at the local, national and international levels;
- education of local farmers and other stakeholders that consider designation of protection as a potential threat to their regular activities.

A detail from Hutovo Blato, Bosnia and Herzegovina
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FURTHER STEPS IN TRANSBOUNDARY COOPERATION

The main opportunities for transboundary cooperation in the Neretva Delta are following (Fritsch & Galland 2008):

Sustainable management of transboundary protected areas offers very good grounds for establishing collaboration and simultaneously raising local environmental awareness. It plays a significant bridging role in politically and economically difficult situations.

Structures such as transboundary forums offer a platform for cross-border dialogue with shared natural resources as a common starting point.

Gaps in governmental structures can be filled on a short-term basis at both the local and national levels.

Awareness of ecological benefits from nature protection, but also of environmental risks e.g. increasing salinity, water pollution, uncontrolled waste disposal and natural hazards (e.g. floods).

Push for innovative mechanisms and a pioneer role in the promotion of transboundary protected areas and ecosystem approach.

Valuation of ecosystem functions and associated values.

There is real added value and multiple benefits from transboundary collaboration at the local level. It raises the profile of marginal areas, attracting the attention of national authorities, donors and potential investors, and gives access to new mechanisms such as Euroregions or other EU initiatives. However, local capacities are limited and may challenge sustainability. Transboundary cooperation may also open doors for non-sustainable projects that threaten the natural environment.

Improving the image, promoting the values of protected areas and making them visible to the local society (e.g. maps, pictures, access), giving access to international agreements, treaties and initiatives.

Cross-border harmonization of the levels of protection and development of joint natural resource management strategies.

Linking "dead-end" remote areas by drawing more attention to their socio-economic development at the national and international level.

Capacity building and information exchange through joint trainings, education courses, seminars, exhibitions, etc. for authorities, schools, associations and NGOs.

The biggest challenge for transboundary projects lies in the transition from

Kuti lake, Croatia
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dialogue-based cooperation to a broadly based and largely recognized institution. Transboundary collaboration starts with the willingness of local people for cross-border dialogue. However, it also requires institutionalized structures at the national and international level, and a legal framework to implement the activities resulting from the dialogue.

The transboundary dialogue rapidly fosters the creation of organizations and structures. For this, the initial dialogue platforms have to be transferred into more institutionalized bodies or forums, with a clear mandate, mission, structure and operational basis. Depending on their mission, those transboundary organizations have either a consultative or a decision-making role; in either case they should maintain an independent position.

Transboundary collaboration is twofold: at the national level it facilitates and supports national actions and projects, creating added value for the local population, while at the international level it creates access to EU development mechanisms (e.g. Euroregions) and other sources of funding - an important contribution to the EU-integration of regions.

The implementation of EU legislation and bilateral projects and programmes require a stable framework of laws, regulations and services. This creates opportunities for sustainable regional development.

Different levels of intervention have to be considered in all transboundary projects, though the primary level of intervention varies from project to project; neither exclusively bottom-up nor top-down processes can achieve long-term results and reach sustainability.

Transboundary collaboration relies in all cases on a combined bottom-up/top-down approach; it must be assured that transboundary components are considered at all levels.

Projects starting with a bottom-up approach integrate local interests create local ownership and shared responsibilities between involved stakeholders, and have proven to be successful and contributed to scaling-up local interests to the national level.

National structures and regulations are needed to provide for long-term benefits of transboundary collaboration to local populations.

Transboundary collaboration requires a parallel approach relying on both personal relations and on building and reinforcing official governmental and non-governmental structures and organizations.

Transboundary projects foster collaboration between different governmental services and authorities at the national level. It may offer a significant contribution to decentralization processes and a ground for implementation of good governance practices. However, the frequent personal turnover of state institutions may slow the processes and delay the necessary institutional settings.

Transboundary collaboration attracts the attention of large circles of institutions and stakeholders; accordingly, a growing demand for efficient coordination, communication and transparency among partners is observed.

Flexibility of transboundary forums allows for adjustment to institutional differences and for the substitution of a lack of formal communication among institutions, at both the national and international level.

Transboundary collaboration is most successful when linked by natural elements, and when populations have a strong relation to their territory, natural resources and culture. These links allow for overcoming other administrative constraints.

Any activity is somehow related to the territory. When the dialogue

Hutovo Blato, Bosnia and Herzegovina
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starts being transferred into concrete actions, territorial issues become a crucial linking factor in the areas of spatial planning with legal assignment of protected areas, zoning of agricultural land, industrial zones and residential areas, regulation of private landownership, transparent and participatory planning and decision-making procedures for road construction, tourism infrastructure, etc.

Territories, people, natural and cultural resources form an integrated unit and have to be considered as such in transboundary projects. Willingness to cooperate and communicate across the border on territorial planning of cultural and natural resources management issues contributes to the success of transboundary projects.

The most convincing mechanisms and actions that would convince local communities to support the Neretva Delta as a transboundary protected area would be: recognition of internationally agreed guidelines for transboundary cooperation, i.e. those embedded in the work of the Transboundary Conservation Specialist Group of the World Commission on Protected Areas (WCPA).

Establishment of common management of the transboundary protected area of the Neretva Delta.

Development of a joint strategy for sustainable development of the Neretva Delta.

Opening possibilities for fundraising at the national and international levels.

Cooperation on developing management plans for particular protected areas and for the entire transboundary area.

Coordination of protective measures concerning threatened, protected and migratory species, rare habitats and endangered ecosystems.

Joint promotion of tourism and recreational potential, and marketing of visitor services available on each side of the state border.

Providing assistance in acquiring international designations (e.g. Biosphere Reserve, World Heritage Site, European Diploma, transboundary certificate of excellence by EUROPARC).

Developing common publications and publicity material including joint maps, brochures, exhibits, and video materials.

Cooperation in environmental education programmes, organisation of youth exchanges and joint volunteer camps.

Establishing common funding mechanisms for transboundary cooperation.

Key directions for TRANSBOUNDARY COOPERATION in the NERETVA DELTA:

- Strengthening existing forms of transboundary cooperation, and assessing possibilities for establishing a long-lasting institutional foundation for such in the future;
- Supporting the implementation of priorities identified by local stakeholders through larger scale local initiatives in the fields of water management, environmental education and environmental investments;
- Direct support to sustainable agriculture, such as a local eco-label for local agricultural products and pilot actions for organic production;
- Developing concrete sustainable tourism products, i.e. bird watching tourism, speleological tourism, eco-villages, etc.;
- Designation of protected areas and support for the development of harmonised management approaches for protected areas.

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