THE GREEN TWIN CITY LIFE-LINE
CROSS-BORDER CONSERVATION CONCEPT AUSTRIA – SLOVAKIA
ALONG THE DANUBE

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"Cross-border Conservation Concept Austria – Slovakia along the Danube"

„Cross-border Conservation Concept im slowakisch-österreichischen Grenzraum entlang der Donau“

The Green Twin City Life-Line

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Deutsch-Wagram, February 2012
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1. Introduction

1.1. Initial Situation

Within the project ETC-SEE DANUBEPARKS – Danube River Network of Protected Areas a Cross-border Conservation Concept involving the border region between the existing Donau-Auen National Park and the city of Bratislava will be created together with the project partners Donau-Auen National Park/Austria and BROZ/Slovakia (Activity 4.1.3).

1.2. The Cross-border Conservation Concept – the idea behind the concept

The loss of natural habitats and the fragmentation of the remaining ones due to the industrialisation of agriculture, restructuring of land use or the expanding of transport networks led to isolated islands of natural habitats in many regions (Jongman et al. 2004). The smaller and the more isolated these islands are, the more likely species associated with these islands are declining (Jongman et al. 2004).

Especially organisms that react sensitively to habitat change and degradation and whose movements and even survival are limited in heavily-disturbed landscapes depend on the maintenance of connectivity between undisturbed habitat islands (Bennett 1998).

Therefore also on the European level, ecological networks are one of the most important objectives in the Pan-European Biological and Landscape Diversity strategy: “Conservation, enhancement and restoration of key ecosystems, habitats, species and features of the landscape through the creation and effective management of the Pan-European Ecological Network” (Council of Europe et al. 1996).

Landscape connectivity can be achieved by managing specific habitats that facilitate movement through an otherwise unsuitable habitat. These habitats may be in form of stepping stones of various sizes and spacing or habitat corridors that provide a continuous connection of favoured habitat (Bennett 1998).

Although stepping stones of protected areas of different conservation status do already exist on the Austrian and on the Slovakian side (Fig. 1 and Fig. 2), a continuous corridor of protected habitats along the Danube river and its associated riparian vegetation would be a more efficient ecological linkage between Vienna and Bratislava.

This ecological linkage will be embedded between two pulsating conurbations, characterised by a vast economic expansion and population growth during the last
years. As a consequence the urban areas expanded, involving a deconcentration of population, production, administration and trade in the urban core area while suburban areas increased. This also gave rise to a growing demand for local recreation opportunities in the closer surrounding of Vienna and Bratislava.

Fig. 1: Overview on protected areas (Natura 2000, national nature reserves, nature reserves or protected sites) around Vienna and Bratislava, along the rivers Danube and Morava.
Fig. 2: Protected areas (Natura 2000, national nature reserves, nature reserves or protected sites) around the areas involved in the Cross-border Conservation Concept.
1.3. Objectives to be reached

By the implementation of the Cross-border Conservation Concept the increasing demand for local recreation opportunities in the suburban areas between Vienna and Bratislava can be satisfied. Especially the local population will then have the possibility to spend its free time right next door, in close touch with nature and across human-made borders for example due to the creation of an international cycling track between Austria and Slovakia.

Furthermore the cities of Vienna and Bratislava – already grown together on an economical level – can deepen their relationship also on an ecological level. The natural environment between the two Central European metropolises will be connected by a protected area of uniform, internationally accepted conservation status. A continuous protection corridor will then be established, preserving drinking water and nature and situated right within the Alpine-Carpathian corridor, representing a traditional wildlife migration route of European importance.

The relationship between Vienna and Bratislava will not only grow on an ecological, but also on a social level: the concept will reinforce and expand the bilateral cooperation, coordination and consultation across human-made borders based on the general idea of the Danube River Network of Protected Areas.

Due to this efficient transborder linkage between Vienna and Bratislava a Green Twin City Life-Line along the Danube will be established, highlighting once again the importance of conservation via international cooperation. Common effort and common management will help to enjoy the Green Twin City Life-Line.

2. The new protection zones of the Green Twin City Life-Line

2.1. Definition of the focal area

The new protection zones of the Green Twin City Life-Line cover a total area of ca. 2,020 ha (Fig. 3). Of this 2,020 ha 59.3 % (1,197.81 ha) are covered by riparian forests, 18.9 % (381.51 ha) are covered by cultivated fields, 6 % (121.62 ha) are covered by meadow and grassland. Furthermore 15.8 % (319.48 ha) of the new protection zones are covered by the main water body of Morava and Danube.
Fig. 3: New protection zones needed for implementing the Green Twin City Life-Line between Vienna and Bratislava.
2.2. Official fundaments, protected areas

Around 450 ha (22.3 %) of the new protection zones have already been designated as areas for enlargement of the Donau-Auen National Park according to the Bundesgesetzblatt (28th January 1997), article 2 (Fig. 4).

![Fig. 4: Areas already integrated in the Donau-Auen National Park (= Anfangsphase) and areas defined for the enlargement of the National Park (= Ausbauphase). Areas needed for realizing the new protection zones of the Green Twin City Life-Line are marked by red borders. Source: Bundesgesetzblatt 28th January 1997, slightly modified.](image)

The Cross-border Conservation Concept is just focussing on the parts east of the Donau-Auen National Park for developing a continuous and international corridor of protected areas between Austria and Slovakia. However for ensuring an effective conservation of the Danube and its riparian vegetation a further enlargement of the already existing National Park is necessary (Fig. 5).

65.45 % (1,322 ha) of the new protection zones have already been designated as protected areas (Tab. 1, Fig. 6).

Within these protected areas the Danube-Morava-angle is included, representing a unique river delta in Austria. Beside the two rivers Danube and Morava, also the smaller rivers Rußbach and Stempfelbach flow together. However river engineering activities during the last hundred years changed the landscape in a massive way.
As part of the planned core area the Morva-Thaya-Auen are characterised by a high diversity of habitats and species. In 1983 this area was nominated as RAMSAR-site and in 2007 it was designated as the first trilateral RAMSAR-site worldwide.

The Green Twin City Life-Line

Fig. 5: Overview on the already existing Donau-Auen National Park (dark green), the new protection zones of the Green Twin City Life-Line (light green) and further suggestions for an enlargement of the Donau-Auen National Park (yellowish).

Tab. 1: List of protected areas located in the areas involved in the Cross-border Conservation Concept (AT = Austria, SK = Slovakia) along the rivers Danube and Morava, indicating if they are part of the planned core area and/or buffer zone.

<table>
<thead>
<tr>
<th>Country</th>
<th>Key number</th>
<th>Name of protected area</th>
<th>New protection zones (ha)</th>
<th>Number in Fig. 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>AT</td>
<td>AT1202000</td>
<td>March-Thaya-Auen</td>
<td>402</td>
<td>4</td>
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<tr>
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<td>AT1204000</td>
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<tr>
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<tr>
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<td>AT</td>
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<td>13</td>
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<tr>
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<td>Blumengang-Sutte</td>
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<tr>
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<td>SKUEV0312</td>
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<td>1</td>
</tr>
<tr>
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<td>Bratislavské luhy</td>
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<tr>
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<td>Devínske alúvium Moravy</td>
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<td>11</td>
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<tr>
<td>SK</td>
<td>SK</td>
<td>Slovanský ostrov</td>
<td>34</td>
<td>12</td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td>693</td>
</tr>
<tr>
<td>Slovakia</td>
<td></td>
<td></td>
<td></td>
<td>629</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td>1,322</td>
</tr>
</tbody>
</table>
Fig. 6: Protected areas inside the new protection zones of the Green Twin City Life-Line. For an explanation of the numbers used in the map see Tab. 1.
2.3. Characterization of the natural environment

The new protection zones reach from the south of Marchegg, bounded on the North by an old railway bridge, along Morava and Danube to the outer borders of Bratislava, bounded on the East by a highway bridge. From the south of Marchegg to the mouth of the Morava river, where it is building a continuous corridor with the already existing Donau-Auen National Park, the new protection zones are covered by the Morava river and its associated riparian vegetation.

Especially between Markthof and the mouth of the Morava river also larger parts of open country (Blumengang, parts of the Loimersdorfer Wiesen) are included (Fig. 7). Although still located along the Morava river this section is already under the strong hydrological influence of the Danube river (Zuna-Kratky et al. 2000) and therefore differs clearly in the general appearance and species composition from the rest of the Morava river.

The second part of the new protection zones reaches from the mouth of the Morava river (Fig. 8) - building a continuous corridor with the already existing Donau-Auen National Park - to a highway bridge at the outer borders of Bratislava (Fig. 9).
Fig. 8: Flooded open areas near the mouth of Morava river, south of Devin (Foto: Nationalpark Donau-Auen).

This part mainly covers the Danube river with its associated riparian vegetation. Compared to the riparian forests along the Morava the riparian forests along the Danube are denser and not scattered by patches of sparse vegetation. The whole core area is affected by the hydrological influence of the Danube river: the dynamic rise and fall of water levels leads to a constant recreation and reforming of the landscape surrounding the Danube river, creating different habitats for a wide range of organisms.

Fig. 9: Highway bridge across the Danube at the outer borders of Bratislava, building the east border of the new protection zones of the Green Twin City Life-Line (Foto: Nationalpark Donau-Auen).
3. Benefits derived from the Green Twin City Life-Line

3.1. Local recreation

Due to rapid economic growth the surroundings of Vienna and Bratislava are characterised by urban sprawl, leading to population growth also in suburban areas. As a consequence there’s a growing need for local recreation opportunities in the surrounding of the two cities. This need can be satisfied by cycling, jogging or hiking possibilities on marked trails within the new areas of the Green Twin City Life-Line. So a wide variety of recreational activities will be provided to the visitors - local population as well as tourists - to spend their free time in close touch with nature.

3.2. Ecotourism

The wetland landscape of the Green Twin City Life-Line can be explored on land or water by offering guided tours. Furthermore also workshops and seminars can be offered to address a broad public, such as families, school classes or tourist groups. Due to the establishment of info points further information can be provided and visitors can be guided through the landscape of the Green Twin City Life-Line. So tourism should be increased to enjoy the Life-Line.

Combining this unique cross-border nature experience with a city trip to Vienna and/or Bratislava will represent an attractive mix of nature and culture in one journey.

3.3. Natural environment

By creating a continuous corridor of protected habitat, situated within the Alpine-Carpathian corridor, the Green Twin City Life-Line will represent an important ecological linkage.

Moreover the Danube - embedded by the new protection zones - will create a dynamic lifeline from Vienna to Bratislava, covering a wide range of protected habitats that in turn may satisfy the requirements of a wide range of organisms to their environment. Among these also endangered species, which can already be found in the close vicinity of the Green Life-Line, will benefit from the Cross-border Conservation Concept.

Among the endangered bird species for example the White-tailed Eagle (*Haliaeetus albicilla*), the Imperial Eagle (*Aquila heliaca*), the Black Stork (*Ciconia nigra*), the Common Kingfisher (*Alcedo atthis*) or different species of Woodpeckers (Piciformes) will benefit from the new protection zones covering riparian forests and flood plains.
Endangered bird species benefitting from the new protection zones covering a more open landscape will be the Saker Falcon (*Falco cherrug*) or different species of migrating waders. Beside different bird species also other endangered species such as the European Pond Turtle (*Emys orbicularis*), different species of dragonflies (Odonata), fishes (Pisces) or large branchiopods (Branchiopoda) will benefit from the new protection zones.

### 3.4. Best practice

The Cross-border Conservation Concept arised from a conglomeration of many other ideas or projects already implemented, such as conservation actions focussing on the floodplain forests of the river Danube on the Slovakian side within two projects (*Project LIFE03NAT/SK/000097 „Conservation and management of Danube floodplain forests“, 2003 – 2007, BROZ - Regional Association for Nature Conservation and Sustainable Development, State Nature Conservancy of Slovak Republic, Administration of the Protected Landscape Area Danube floodplains and National Park Donau-Auen (Austria); Project EN „Conservation of the Danube floodplain as an important European centre of biodiversity“, 2008 – 2011, BROZ - Regional Association for Nature Conservation and Sustainable Development). And in turn the concept can also evolve other projects and ideas, respectively, focussing on certain aspects in more detail (Raab & Julius 2011).

### 4. A rough concept for future management

Due to the high affinity of habitat structures of the new protection zones to the habitat structures already involved in the Donau-Auen National Park, the management actions of the Donau-Auen National Park – based on 15 years of experience and associated positive results – can be adopted for the most part to the new protected areas.

#### 4.1. Management of the natural environment

##### 4.1.1. Main water body (319.48 ha)

The visionary guiding principle of the renaturation measures of the Donau-Auen National Park is the morphological and hydrological restoration of the river Danube before its regulation in the 19th century. To approach this main objective, the
Donau-Auen National Park has already realised water engineering projects within LIFE projects in cooperation with via donau (via donau Österreichische Wasserstraßen – Gesellschaft mbH) and the city of Vienna – Municipal Department 45 (Water Engineering). This successful management will be continued in the future and involves among others the following water engineering activities:

- The reconnection of backwaters to the river Danube to enable the development of dynamic water bodies and at the same time the removal of traverses (or at least making them more controllable) in the side arms to additionally enhance the dynamic of these water bodies.
- The restoration of the riverbank by removing elements strengthening the bank of the Danube in an artificial way, such as boulder or stone material; this allows the development of a natural and structurally diverse riverbank landscape.
- The removal of ditch and/or watercourse crossings, that weren’t needed any longer; therefore the ecological disadvantages of these barriers, such as the interruption of the water flow or the blockation of water bodies for organisms using them as corridors, were removed.

Also the part of the Danube water body involved in the core area of the new protection zone should be integrated in the water engineering activities of the Donau-Auen National Park.

4.1.2. Riparian forest (1,197.81 ha)

The main objective of forest management should be a natural degeneration of forest habitats due to natural, self-adjusting processes. In areas where this degeneration would take a very long time due to massive human impacts, the renaturation of forest habitats could be supported by targeted measures.

Based on the management plan of the Donau-Auen National Park, restoration of forest habitats may include the following actions:

- Stocks that no longer represent the original forest structure especially in terms of species composition may partly be restructured (e.g. hybrid poplars Populus spp.).
- Start of rejuvenation in areas of dominant hybrid poplar stocks through “gamete boosting”: in areas of low tree species diversity seed trees of missing species will be reintroduced and supported.

- No measures should be carried out in stocks of native tree species typical for the riparian habitat (e.g. White Willow Salix alba, Black Poplar Populus nigra, White Poplar Populus alba, Common Oak Quercus robur, Common Ash Fraxinus excelsior). However within these stocks shrubs and trees of introduced species and/or showing strong proliferation (e.g. Locust Tree Robinia pseudoacacia, Ash-leaved Maple Acer negundo, Green Ash Fraxinus pennsylvanica) should be removed to support forest composition typical for riparian habitats.

- No measures should be carried out on neophytic tree species showing low tendency to spread (e.g. Horse Chestnut Tree Aesculus hippocastanum, Black Walnut Juglans nigra), as long as they are negligible concerning forest composition.

- To enrich forest habitats with coarse woody debris, felled trees and deadwood may partly be left in the forest.

4.1.3. Meadows, grassland (121.62 ha)

The main objective of the management should be the preservation of these habitats due to regular mowing and/or grazing.

Based on the management plan of the Donau-Auen National Park, the following points should be considered within the preservation of natural grassland habitats:

- Mowing twice a year is essential: the first time in Juni and the second mowing should take place in August. On grassland of low productivity mowing only once a year in Juni is enough. However the actual timing of the mowing is also depending on the (ground) water level and can therefore be delayed because of flood waters.

- Cutted grass or hay should be removed from the meadows and not be deposited in the bordering forests.

- Special mowing techniques, such as mowing from the inside outwards are useful because of wildlife conservation reasons.

- Also grazing without supplementary feeding can be carried out to maintain open grassland areas, but may be difficult to realize on regularly flooded areas.
Fertilizer and pesticides should not be used on grassland areas involved in the Cross-border Conservation Concept.

4.1.4. Cultivated fields (381.51 ha)
The cultivation of the existing fields of the core area and the buffer zone should be stopped in the future and may be integrated in the meadow-management based on the management plan of the Donau-Auen National Park (2.5.3.).

4.2. Visitor management
Recreational activities should take place in a way that the protected area is preserved in a natural or near-natural condition.

4.2.1. Recreational exploitation of the Green Twin City Life-Line

Marked footpaths
On the basis of the already existing track system marked footpaths should be established, guiding visitors through the protected areas of the Green Life-Line in close touch to nature. A concentration of visitors on these ways is desired, leaving other areas of the Green Life-Line nearly undisturbed.

New marked footpaths of the Green Life-Line should be connected with already existing marked footpaths. On the Austrian side these are:

- **NLW** (Niederösterreichischer Landesrundwanderweg): leading within the Green Life-Line from Schloßhof along the Morava to Markthof
- **07** (Ostösterreichischer Grenzlandweg), **E4** (Pyrenäen-Balaton) and **E8** (Nordsee-Karpaten) leading within the Green Life-Line north of the Jägerhaussiedlung along the Danube to Wolfsthal

A restriction of the already existing system of marked footpaths is not necessary. An expansion of the existing system of marked footpaths within the new protected areas may especially be suggestive around the Blumengang-depression and from the Wolfsthaler forest eastwards to the outer borders of Bratislava.
Cycling tracks

Fig. 10: Overview on the already existing and planned system of cycling tracks around the new protection zones of the Green Twin City Life-Line.
Cycling is only allowed on marked cycling tracks. Within the Green Twin City Life-Line the already existing cycling tracks can be used. On the Austrian side the Danube cycling track touches the Wolfsthaler forest in the south within the Green Twin City Life-Line (Fig. 10).

On the Slovakian side the Morava cycling track leads within the Green Twin City Life-Line from Devínska Nová Ves along the Morava and west of Devín to Bratislava (Fig. 10). An expansion of the already existing system of cycling tracks is planned in the vicinity of Markthof, creating a 45 km circular path around the new protection zones of the Green Twin City Life-Line (Fig. 10).

**Horse-riding**

Like in the Donau-Auen National Park horse-riding is forbidden in the protected areas of the Green Twin City Life-Line.

**Water activities**

Bathing can be allowed at certain sections of the Danube bank. At these sections also the landing of motorised and non-motorised sport boats is allowed. Certain side arms of the Danube can also be opened to non-motorised sport boats all year round. The access to side arms that are very sensitive in terms of their natural environment should however be restricted to certain times of the year/ of the day. Also only continuously navigable side arms should be involved in water activities. Small, completely unconnected side arms, making the transport of boats through the protected areas, away from existing tracks necessary, should be excluded from water activities.

Within the protected areas motorised boats are just allowed at the Danube.
4.2.2. Services and information for visitors

Visitor guidance system

Within the Green Twin City Life-Line footpaths and borders of the protected areas should clearly be marked.

Outside the borders of the Green Twin City Life-Line visitors should be guided from public transport systems, parking lots, town centres etc. to the protected areas of the Green Twin City Life-Line by appropriate labelling.

Visitor facilities

Visitor facilities should offer information and educational opportunities to the public.

For the new protected areas the already existing visitor facilities such as the Kulturfabrik Hainburg or Schloss Orth – the visitor centre of the Donau-Auen National Park – can be used on the Austrian side to present relevant topics and give further information on fauna and flora of the Green Twin City Life-Line.

Also on the Slovakian side the establishment of a visitor centre will further promote public outreach.

Excursion programme

Through excursions within the protected areas of the Twin City Life-Line visitors have the unique opportunity to take part in an impressive cross-border experience of nature, on land as well as on water.

At the same time visitors have the absolute certainty that within their excursions they take care of the sensitive flora and fauna of the protected areas as there are guided by trained specialist staff (rangers), on the Austrian as well on the Slovakian side.

5. First steps towards the realisation of the Green Twin City Life-Line

5.1. Implementation and funding

At the moment there’s a loose system of different types of protected areas located between Vienna and Bratislava. Therefore one aim of the Cross-border Conservation
Concept will be the establishment of a continuous protected area of uniform conservation status between Vienna and Bratislava, but still under the control of the national administration of Austria and Slovakia. Therefore a meeting of the Austrian and Slovakian authorities involved in the concept is necessary for implementing the Cross-border Conservation Concept.

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City District Bratislava-Devínska Nová Ves
Mestská časť Bratislava-Devínska Nová Ves
Novoveská 17/A
843 10 Bratislava 49
City District Bratislava - Karlova Ves
Miestny úrad Karlova Ves
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State Water Management Enterprise, Bratislava - Dunaj
Slovenský Vodohospodársky podnik, š.p.
OZ Bratislava – Závod Dunaj
Vlčie Hrdlo 82
824 19 Bratislava

State Water Management Enterprise, Bratislava - Šamorín
Odštepný závod Bratislava
Správa vnútorných vôd Šamorín
Bratislavská 47
931 01 Šamorín

Forests of the Slovak Republic, state enterprise - Palárikovo
Lesy SR
závod Palárikovo
Remeselnícka 48
941 11 Palárikovo

Forests of the Slovak Republic, state enterprise - Smolenice
Lesy SR
Also on further meetings and discussions about new projects these people/authorities should be involved, building an international platform of experts.
After the reconciliation of the concept with the involved authorities, a long-term conservation of the areas included in the concept is needed to ensure the preservation of the Green Twin City Life-Line between Vienna and Bratislava. Therefore a long-term rental of the proposed areas on the Austrian side by the Donau-Auen National Park and BROZ on the Slovakian side would be the best solution to implement the Cross-border Conservation Concept. This leads to Twin City Danube National Parks in Austria and Slovakia, forming the first “Inter-national park” in Central Europe (Fig. 11) and worldwide the first protected Green Twin City Life-Line between two capital cities.

**Fig. 11: The first “Inter-national park” in Central Europe between Austria and Slovakia.**

### 5.2. National and international co-operation

The following institutions will be working together to realize the Green Twin City Life-Line between Vienna and Bratislava:

**Donau-Auen National Park**

Schloss Orth  
2304 Orth a. d. Donau  

The Donau-Auen National Park was founded in 1996 and covers more than 9,300 hectares. It extends from Vienna along the Danube to the mouth of the Morava and therefore protects the last remaining major wetland environment in Central Europe.
The Bratislava regional conservation association (BROZ) was founded in 1997. Its activities are mainly focused on practical nature conservation and promoting sustainable development in western Slovakia.

**Ministry of Life**
Stubenbastei 5
A-1010 Wien

**Government of Lower Austria**
Nature Protection
Landhausplatz 1
3109 St. Pölten

**Municipality of Engelhartstetten**
Obere Hauptstraße 2
2292 Engelhartstetten

**Urban community of Hainburg an der Donau**
Hauptplatz 23
2410 Hainburg a. d. Donau

**Municipality of Wolfsthal**
Hauptstraße 42
2412 Wolfsthal
6. Summary of the concept

6.1. English

Within the project ETC-SEE DANUBEPARKS – Danube River Network of Protected Areas a Cross-border Conservation Concept involving the region between the existing Donau-Auen National Park and the city of Bratislava will be created together with the project partners Donau-Auen National Park/Austria and BROZ/Slovakia (Activity 4.1.3).

Although stepping stones of protected areas of different conservation status already exist on the Austrian and on the Slovakian side, a continuous corridor of protected habitats along the Danube river and its associated riparian vegetation would be a more efficient ecological linkage between Vienna and Bratislava.

As a consequence the cities of Vienna and Bratislava – already grown together on an economical level – can deepen their relationship also on an ecological level. The natural environment between the two Central European metropolises will be connected by a protected area of uniform, internationally accepted conservation status, situated right within the Alpine-Carpathian corridor, representing a traditional wildlife migration route of European importance.

Also a lot of endangered species, that can already be found in the close vicinity of the new protection zones, will clearly benefit from these new protected areas, such as the White-tailed Eagle (Haliaeetus albicilla), the European Pond Turtle (Emys orbicularis) or large branchiopods (Branchiopoda).

Furthermore the concept will reinforce and expand the bilateral cooperation, coordination and consultation across human-made borders based on the general idea of the Danube River Network of Protected Areas.

Also the increasing demand for local recreation opportunities in the suburban areas between Vienna and Bratislava will then be satisfied, for example due to the creation of an international cycling track between Austria and Slovakia.

Due to this unique transborder linkage between Vienna and Bratislava a Green Twin City Life-Line along the Danube will be established, highlighting once again the importance of conservation via international cooperation.

The new protection zones of the Green Twin City Life-Line cover a total area of ca. 2,020 ha. Of this 2,020 ha more than 50 % are covered by riparian forests, the rest is covered by cultivated fields, meadow and grassland and the main water body of Morava and Danube. Around 450 ha (22.3 %) of the new protection zones have already been designated as areas for enlargement of the Donau-Auen National Park.
according to the Bundesgesetzblatt (28th January 1997), article 2. Furthermore around 65 % have already been designated as protected areas.
Because of the high affinity of habitat structures of the new protection zones to the habitat structures already involved in the Donau-Auen National Park, the management actions of the Donau-Auen National Park – based on 15 years of experience and associated positive results – can be adopted for the most part to the new protected areas.

6.2. German
Obwohl bereits einzelne Trittsteine geschützter Habitate von unterschiedlichem Schutzstatus sowohl auf österreichischer als auch auf slowakischer Seite bestehen, stellt ein kontinuierlicher unter Schutz stehender Korridor entlang der Donau und der flussbegleitenden Vegetation eine effizientere ökologische Verbindung zwischen Wien und Bratislava dar.
Auch viele gefährdete Tierarten, die in der näheren Umgebung bereits nachgewiesen werden konnten, würden von dem neuen Schutzgebiet profitieren, wie zum Beispiel der Seeadler (Haliaeetus albicilla), die Europäische Sumpfschildkröte (Emys orbicularis) oder Brachiopoden (Branchiopoda).
Zudem würde das Konzept die bilaterale Kooperation, Koordination und Beratung über die Landesgrenzen hinaus verstärken, basierend auf der Idee des Danube River Network of Protected Areas.
Auch die steigende Nachfrage nach Naherholungsmöglichkeiten in den suburbanen Regionen zwischen Wien und Bratislava könnte besser gedeckt werden, z. B. durch
die Schaffung eines internationalen Radweges zwischen Österreich und der Slowakei.


7. References


8. Appendix

8.1. Protected areas in the vicinity of the Green Life Line

In the proximity of the areas involved in the Cross-border Conservation Concept 14 protected areas are located on the Austrian side, 3 protected areas are located on the Hungarian side and 39 are located on the Slovakian side (Fehler! Verweisquelle onnte nicht gefunden werden., Fig. A1, Fig. A2, Fig. A3, Fig. A4).

Tab. A 1: List of protected areas located near the areas involved in the Cross-border Conservation Concept (AT = Austria, HU = Hungary, SK = Slovakia) along the rivers Danube and Morava.

<table>
<thead>
<tr>
<th>Country</th>
<th>Key number</th>
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<th>Category of protection*</th>
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Fig. A1: Overview on landscape protection areas around Vienna and Bratislava, along the rivers Danube and Morava.
Fig. A2: Landscape protection areas around the areas involved in the Cross-border Conservation Concept.
Fig. A3: Overview on RAMSAR sites around Vienna and Bratislava, along the rivers Danube and Morava.
Fig. A4: RAMSAR sites around the areas involved in the Cross-border Conservation Concept.
8.2. Buffer zones – protective shields against the surrounding

Protected areas are often just parts of larger ecosystems and thus sometimes exclude habitats that are needed to ensure the maintenance of essential ecological processes (Hansen & DeFries 2007). Agriculture, settlement or other human land uses in the unprotected area of an ecosystem can influence the ecosystem, which in turn leads to changes within the protected areas (Hansen & DeFries 2007). One of the ecological key mechanisms by which land use of the surrounding unprotected landscape may influence ecological processes and biodiversity within the borders of protected areas is the “crucial habitat” (Hansen & DeFries 2007). The “crucial habitat” includes the whole spectrum of habitats used by an organism to meet the requirements of its life history (Hansen & DeFries 2007). Beside daily (breeding vs. feeding habitat) or annual (breeding vs. wintering habitat) changes in habitat use, an organism can also spend different stages of its life cycle in different habitats (for example dragonflies). Therefore not only the availability, but also the interlocking of different habitat types within a protected area is essential.

Furthermore also human presence and associated higher levels of disturbance through intensification of land use, growing transport networks etc. in the periphery of protected areas can cause changes in ecosystem processes and biodiversity within the borders of protected areas (Hansen & DeFries 2007).

Such edge effects are especially powerful forces when fragments are irregularly shaped, leading to high shape index values (Laurance & Yensen 1991) or if the gradient between natural and modified habitats is steep (Ranney et al. 1981).

To keep the influence of edge effects on the Green Twin City Life-Line as low as possible especially the inclusion of the open inundation areas between Jägerhaussiedlung and Wolfsthal and between Wolfsthal and the highway D2 - adjoining the irregular borders of the Life-Line - is essential (Fig. A5). Besides mitigating the negative influence of edge effects on the Green Twin City Life-Line, the buffer zone – involving larger areas of open land – can additionally serve as important habitats. Birds breeding in the riparian forests of the Life-Line for example may use these nearby undisturbed open areas as foraging habitat, such as the Black Stork (*Ciconia nigra*). Therefore a larger

![Fig. A5: Parts of the buffer zone of the Green Twin City Life-Line south of the Jägerhaussiedlung (Foto: Nationalpark Donau-Auen).](image-url)
proportion of the “crucial habitat” of many species can be protected by creating a buffer zone around the Green Life-Line. The buffer zone surrounding the Green Twin City Life-Line covers 698 ha and mainly consists of cultivated fields (Fig. A6). Interlocking different habitat types to enlarge the “crucial habitat” of species within a protected area or reducing negative edge effects due to land use intensification or growing transport networks by creating a buffer zone would also revalue the already protected areas of the Donau-Auen National Park. One possibility for creating new buffer zones is to include parts of the existing Landscape protection areas.
8.3. Habitat types of the new protection zones of the Green Twin City Life-Line

Fig. A6: Overview on the new protection zones of the Green Twin City Life-Line and on the proportion of the different types of habitat cover within the protection zones.
Fig. A7: Core area and buffer zone needed for implementing the Green Twin City Life-Line between Vienna and Bratislava, distinguished between Austria and Slovakia.
8.4. Characterization of the natural environment/Protected habitats

Within the floodplain areas involved in the new protection zones also softwood alluvial forests of *Salicion albae* (91E0) as well as riparian mixed forests of *Ulmenion minoris* with *Quercus robur*, *Ulmus laevis*, *Ulmus minor* and *Fraxinus angustifolia* (91F0) can be found, both protected habitat types according to the Habitats Directive (92/43/EEC) and therefore of European importance (Fig. A8).

Within the areas of open country involved in the new protection zones (for example East of Markthof) also alluvial meadows of *Cnidion dubii* (6440) can be found, a highly endangered habitat type in Austria (Essl et al. 2004) and also protected according to the Habitats Directive (92/43/EEC).

On the Slovakian side water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation (3260), natural eutrophic and mesotrophic lakes with Magnopotamion or Hydrocharition – type vegetation (3150), alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) (91E0*) and riparian mixed forests of *Quercus robur*, *Ulmus laevis* and *Ulmus minor* and *Fraxinus angustifolia* (91F0) can be found as habitat types protected according to the Habitats Directive (92/43/EEC).
Fig. A8: Overview on protected habitat types (91F0, 91E0, 6640) on the Austrian side.
8.5. Protection zones of drinking water around the Green Twin City Life-Line

Fig. A9: Overview on the drinking protection zones around the Green Twin City Life-Line.
8.6. Ownership status of areas involved in the new protection zones

Fig. A10: Map indicating the land ownership of the areas involved in the Cross-border Conservation Concept (grouped by ownership: private, agricultural communities, municipal, national, other and unknown).
On the Slovakian side the main owners are:

**State:** Forests of the Slovak Republic, state enterprise (Lesy SR), managing forest land; State Water Management Enterprise, state enterprise (SVP) managing Danube river, water bodies and flood protection dikes

**Public:** Bratislava Waterworks Company, joint stock company (BVS), in charge of drinking water wells and their strict protection zones; City/ Magistrat of Bratislava

**Unknown forest land:** managed mostly by Forest of SR

**Private forest land:** managed mostly by Forest of SR

**Church**

### 8.7. Endangered species of riparian forests and flood plains benefitting from the new protection zones

**White-tailed Eagle (Haliaeetus albicilla)**

White-tailed eagles prefer to settle near wetland areas offering on the one hand sufficient food supply as their diet mainly consists of fish beside waterfowl such as coots and mallards and on the other hand providing suitable breeding habitats (Parrag 2010). Most of their nesting sites are located in softwood or hardwood gallery forests and oakwoods, but also in hybrid poplar forestations (Parrag 2010).

Due to intensive conservation actions this endangered bird species is now breeding in the Donau-Auen National Park. Therefore it will clearly benefit from the Cross-border Conservation Concept, offering further protected areas of suitable habitat to a species occupying large territories.
Imperial Eagle (*Aquila heliaca*)

The Imperial Eagle originally bred on old isolated trees in plains of Central and Southeast Europe, but retreated subsequently to large forests as a result of persecution and habitat alteration (del Hoyo et al. 1994). For hunting it uses open, often cultivated, areas (del Hoyo et al. 1994). In Slovakia and Hungary, where Imperial Eagles are well protected, they were starting to reoccupy former habitats (del Hoyo et al. 1994). After 200 years also the Donau-Auen National Park was re-occupied by a young breeding pair of the Imperial Eagle, benefiting from the old-growth, undisturbed riparian forests along the Danube. Offering further protected areas of undisturbed habitat may support the recovery of this highly endangered species in Austria.

Black Stork (*Ciconia nigra*)

As a forest-dwelling species the Black Stork inhabits old, undisturbed, open forests scattered by shallow streams, pools, damp meadows or flood-plains used for foraging (del Hoyo et al. 1992). In Austria the horst is mainly built on pine trees, followed by copper beech and spruce (Sackl 1993) and is commonly reused in successive years (del Hoyo et al. 1992).

In the forest of Wolfsthal – part of the core area of the Cross-border Conservation Concept - there could already be found a horst in 2009 (Vukić and Tunić 2009, see Fig. on the right), indicating the high quality of the habitat for this species.

Common Kingfisher (*Alcedo atthis*)

The Donau-Auen National Park is the most important breeding ground for the Kingfisher in Austria. Other important breeding areas in Austria include other sections of the Danube Valley, the March-Thaya wetlands, some Danube tributaries and rivers in eastern Styria and southern Burgenland. Categorized as *Vulnerable* according to the Red List of Austria (Frühauf 2005), the loss of suitable
habitat due to river regulation measurements is a major threat to this species. Further threats are the water pollution by toxic chemicals, eutrophication or overfertilization. Therefore creating new protection zones along the Danube and its associated riparian forest will certainly have positive effects on the Common Kingfisher population as the Donau-Auen National Park already represents the stronghold of the Austrian population.

**Woodpeckers (Piciformes)**

Woodpeckers have a stronger affinity to forest and woodlands than any other bird taxa. Most woodpeckers are dependent on trees for nesting sites and many of them forage on trees and dead wood (Mikusiński et al. 2001), making them attractive indicator species for forest habitats (Roberge and Angelstam 2006). In the Donau-Auen National Park up to five woodpecker species co-occur per 16 ha, indicating a high habitat diversity and habitat quality (Riemer 2009). Furthermore densities of Great Spotted Woodpecker (*Dendrocopos major*), Lesser Spotted Woodpecker (*Dendrocopos minor*), Green Woodpecker (*Picus viridis*) and Black Woodpecker (*Dryocopus martius*) in the national park are comparatively high (Riemer 2009).

Therefore an enlargement of protected areas along the Danube and its unique riparian forests will also have positive effects on the woodpecker species living there.

**European Pond Turtle (*Emys orbicularis*)**

The European Pond Turtle inhabits stagnant and slowly-floating waters offering sufficient opportunities for thermoregulation (Rössler 2000). For sunbathing mainly tree trunks, but also embankments and floating leaves of aquatic macrophytes are used (Rössler 2000). For burrying their eggs female pond turtles prefer xerothermic, sandy meadows up to 800 m away from water (Rössler 2000). The European Pond Turtle is the only autochthon-occuring turtle species in Austria and may be found throughout the entire Donau-Auen National Park. So due to further
protected areas along the Danube and its backwaters the Austrian stronghold of the European Pond Turtle can be strengthened and maybe even expanded.

**Green Snaketail (Ophiogomphus cecilia)**

Its preferred habitat consists of rivers, brooks and dynamic side arms with a gravelly or sandy bottom and a minimum width of 3 m (Raab et al. 2007). The water bodies show no or just sparse vegetation of aquatic plants and are oxygen-rich (Raab et al. 2007). At least one of the banks should offer patches of bare, sandy or loamy ground fully or at least partly exposed to sunlight, used for thermoregulation (Raab et al. 2007).

*Ophiogomphus cecilia* can be found along the Morava and the Danube, representing two of the most important habitats of this endangered species in Austria (Raab et al. 2007). Due to the new protection zones the Green Snaketail will not only benefit from new protected habitats nearby the Danube river and its riparian vegetation, but also from the open areas bordering the riparian forests, an ideal habitat for imagines during their maturing flights.

**River Clubtail (Gomphus flavipes)**

This endangered species inhabits the middle or under reaches of larger rivers, where also deposits of mud, loam or sand can be found (Raab et al. 2007). In these habitats the larvae live in shallow, low-flowing areas such as river dams or trees fallen in the water, where they can hide from strong streaming (Raab et al. 2007).

The most important habitats of this highly endangered species can be found in Austria along the Morava between Baumgarten and the mouth of the Morava river and along the Danube near Regelsbrunn (Raab et al. 2007). Creating protected areas in suitable habitat near or around the few observation points of this species will certainly contribute to the preservation of the River Clubtail in Austria.
European Weather Loach (*Misgurnus fossilis*)

The European Weather Loach can be found in natural, dynamic, stagnant to slowly floating water with muddy ground (Käfel 1993). The loss of suitable habitat represents the main threat to this endangered species. Therefore it would clearly benefit from new protected areas along the Danube – one of the last strongholds of this species in Austria.

Bitterling (*Rhodeus sericeus amarus*)

The Bitterling can be found in stagnant and slowly floating waters. In Austria it inhabits lakes and oxbow lakes along large rivers such as Danube, Inn, Morava-Thaya, Mur or Lafnitz (Ellmauer 2005). The main threat to this endangered species is the loss of suitable habitat (Ellmauer 2005). As the females lay their eggs in mussels, also a sufficient availability of these bivalves is necessary for reproduction (Ellmauer 2005).

Goldside Loach (*Sabanejewia aurata*)

Less is known about this species, found for the first time in Austria just a few years ago (Kainz 1991) and looking similar to the Spined Loach (*Cobitis taenia*). The main distribution of this species in Austria is located in the Southeast (Ellmauer 2005). Its conservation status is 'unknown' (probably not favourable) in Slovakia and in Austria its status is considered 'unfavourable-bad' (http://biodiversity.eionet.europa.eu/article17).

8.8. Endangered species of open land benefitting from the new protection zones

**Large branchiopods**

The large Branchiopods are a group of crustaceans largely confined to ephemeral aquatic habitats (Hamer & Martens 1998). In Austria these “primeval shrimps” can mainly be found in the flood plains of the rivers Morava and Danube and at the
shallow alkaline pans of the Seewinkel region in Burgenland (Eder et al. 1997). All of the sixteen species occurring in Austria are endangered (Eder & Hödl 2002). Despite their ability of producing drought-resistant resting eggs (Wiggings et al. 1980), the drainage or filling up with substrate of wetland and swamps due to agricultural reasons is the major threat for the branchiopods in Austria (Hödl & Eder 1996a).

The core area includes the Blumengang-site, an area of highest priority for the conservation of the large branchiopods. In 1994/1995 six (!) species could be recorded there, turning the Blumengang-site into a nature reserve/“Naturdenkmal” (Hödl & Eder 1996b). But also the open land areas of the buffer zone may serve as suitable habitat for the endangered branchiopods.

**Migrating waders**

On migration waders can follow a 'hop, skip or jump migration' strategy (Piersma 1987). Whereas the 'jumping' and 'skipping' strategy involves just one or a few stops at often traditional stopover – sites, 'hoppers' make stopovers at several sites, travelling just short distances between each stop (Piersma 1987). Especially for those short-distance hoppers maintaining a network of wetlands along their migration route would be an important conservation measure (Muraoka et al. 2009), as most wader populations show declining trends all over the world (Stroud et al. 2006). Migrating waders such as Ruffs *Philomachus pugnax*, Redshanks (*Tringa totanus*) etc. will clearly benefit from the open areas included in the Cross-border Conservation Concept, using them – when flooded – as stopover site on their migration.
The Saker Falcon breeds in forest-steppes, grasslands, agricultural areas, hills or open mountain ranges (Nagy & Demeter 2006). For hunting the bird prefers open grassland, wetlands and even cultivated land offering sufficient food supply such as more or less dense populations of diurnally active small and medium-sized rodents or birds for rearing young (Nagy & Demeter 2006). In Austria the Saker Falcon is a breeding bird of the pannonian landscape breeding in riverine forests, deciduous forests in foothill zone and in open agricultural land where its nest is often located on electric pylons (Nagy & Demeter 2006). Classified as Critically Endangered according to the Austrian Red List (Frühauf 2005), this species will benefit from the protected areas of open land, especially around the forest of Wolfsthal, where it could have already been observed hunting (G. Frank pers. comm.).

8.9. References


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