UNESCO Biosphere Reserve Una Valley

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Feasibility Study

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by

E.C.O.

UNESCO Biosphere Reserve Una Valley

Feasibility Study for a Transnational Biosphere Reserve in the Una Valley in Bosnia & Herzegovina and Croatia

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Implementation:
E.C.O. Institut für Ökologie Jungmeier GmbH
Lakeside B07 b, 2. OG
A-9020 Klagenfurt
Tel.: 0463/50 41 44
E-Mail: office@e-c-o.at
Website: www.e-c-o.at

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UNESCO Biosphere Reserve Una Valley

Project manager:	DI Anna Kovarovics
Project staff:	DI Anna Kovarovics Larissa Posch, MSc Dr. Andrej Sovinc Dr. Hanns Kirchmeir

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Summary

This document provides an extended summary of the feasibility study for establishing a Transnational UNESCO Biosphere Reserve (BR) in the Una Valley, spanning Bosnia & Herzegovina and Croatia. The summary follows the structure of the original study and highlights all major chapters, while remaining concise and suitable for decision-makers, stakeholders, and funding bodies.

Introduction

The Una River system represents one of the last near-natural, free-flowing river systems in Europe. It is characterized by undammed hydrology, karst tufa cascades, waterfalls, floodplains, and a high diversity of aquatic and terrestrial habitats. These features give the Una Valley outstanding ecological value at the European and global scale.

While the river itself remains largely intact, increasing pressures from settlements, tourism, infrastructure development, and resource use within the surrounding valley threaten its long-term integrity. The study therefore emphasizes that river protection must go beyond the river corridor and include the entire valley landscape.

Tufa cascades in the Una National Park (Bosnia & Herzegovina). (picture: E.C.O./Kovarovics)

Process So Far

A major milestone towards protecting the Una River System is the completed feasibility study for the Una Wild River National Park (UWRNP). This proposal follows international IUCN standards and provides a strong scientific and governance foundation for river protection.

Una Wild River National Park

The proposed Una Wild River National Park covers approximately 351.6 km² and includes around 657 km of river courses. It encompasses the Una River from its source to its confluence with the Sava River, as well as 15 tributaries. The park zoning concept includes strictly protected core zones, natural dynamic river zones, cultural river landscapes, and sustainable development zones.

Map of the Una River System and proposed Una Wild River National Park. (map: Fluvius)

Why a UNESCO Biosphere Reserve?

While national parks provide strict protection for core natural areas, they cannot fully address pressures originating outside their boundaries. The UNESCO Biosphere Reserve concept complements national protection by integrating conservation with sustainable development across entire landscapes.

A Biosphere Reserve allows formal cooperation with municipalities, land users, and economic sectors, ensuring that development activities do not undermine ecological integrity. It also strengthens education, research, monitoring, and participatory governance.

UNESCO Biosphere Reserve Una Valley

What is a Biosphere Reserve?

UNESCO Biosphere Reserves are designated under the Man and the Biosphere (MAB) Programme and pursue three interlinked functions: conservation of biodiversity, sustainable development, and logistic support through research, monitoring, and education.

They are structured into three zones: strictly protected core areas, buffer zones allowing compatible uses, and transition areas where sustainable economic and social development is promoted.

Standard zonation scheme of a UNESCO Biosphere Reserve. Credit: UNESCO/delhambre

Potential for Protecting the Una River

Designating the Una Valley as a Biosphere Reserve would integrate the pristine river system with its surrounding landscapes into a single management framework. This approach allows threats such as hydropower development, unsustainable tourism, infrastructure expansion, and resource extraction to be addressed holistically.

International and Transboundary Examples

The study highlights several successful transboundary Biosphere Reserves, including the Wadden Sea, Šumava–Bavarian Forest, Danube Delta, Vjosa Valley, and the Mura–Drava–Danube Biosphere Reserve. These examples demonstrate that effective governance and cooperation are key to success.

Vjosa Valley Biosphere Region (Albania). (picture: E.C.O./Kovarovics)

Mura–Drava–Danube Biosphere Reserve (picture: wikimedia commons/Misalalic)

Potential of the Una Valley

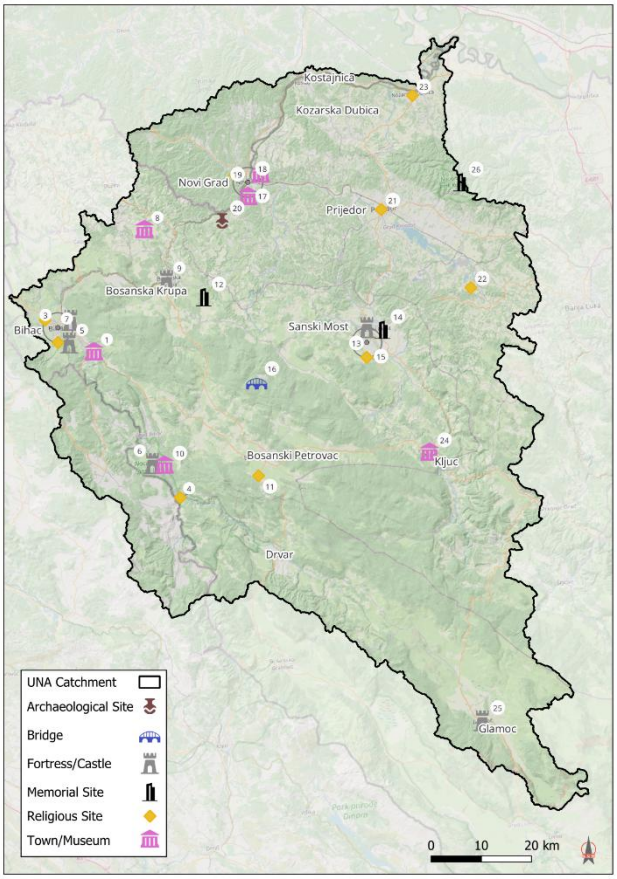
The Una Valley combines exceptional natural values with settlements, agriculture, forestry, and tourism. This mix makes it particularly suitable for a Biosphere Reserve, which is designed to reconcile conservation objectives with human well-being.

Cultural Heritage

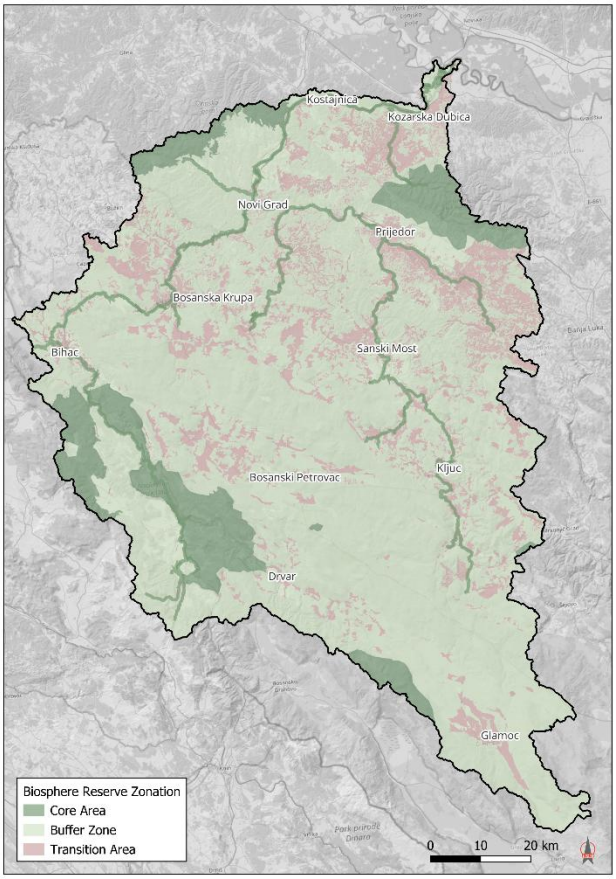
The region hosts numerous cultural and historical sites, including prehistoric settlements, medieval towns and fortresses, religious monuments, and memorial complexes. The Biosphere Reserve framework supports the protection of both tangible and intangible cultural heritage.

Zonation and Core Areas

Based on spatial analysis, the study identifies potential core, buffer, and transition zones across the 9,661 km² Una Valley. Core areas include the Una Wild River National Park, Kozara National Park, Lička Plješivica, Livanjsko Polje, and virgin beech forests such as Prašuma Lom.



Cultural sites within the Una Valley



Potential Zones of a Una Valley Biosphere Reserve

Factors Affecting the Area

Key pressures include unsustainable construction near riverbanks, hydropower development, water abstraction, illegal logging, hunting, and uncoordinated tourism growth. The study recommends strict spatial planning, sustainable resource management, and effective enforcement.

Construction of a new river crossing within the Una Valley. (picture: Anes Halkic)

Management of the Biosphere Reserve

The management structure proposed for the Una Wild River National Park provides a strong foundation for the future Biosphere Reserve. To manage the entire valley, additional staff and a moderate budget increase of approximately 20–25% would be required.

Steps Toward Designation

The designation process requires joint political commitment by Bosnia & Herzegovina and Croatia, establishment of a transnational committee, preparation of a UNESCO nomination dossier, extensive stakeholder participation, and submission to UNESCO's MAB Programme.

Conclusion

The feasibility study concludes that the Una Valley is highly suitable for designation as a transnational UNESCO Biosphere Reserve. This designation would secure long-term protection of one of Europe's last wild river systems while promoting sustainable regional development and cross-border cooperation.

1 INTRODUCTION

The Una River and its tributaries (Una River System) represent one of the last river systems in Europe with almost no human impact on its natural continuum, such as dams or hydropower plants. The Una River system is therefore one of the few remaining nearly natural river systems in Europe, and proper protection could ensure its preservation in the long term.

Located in Bosnia and Herzegovina and Croatia, the river system is characterized by free-flowing hydrology without major artificial barriers, unique karst tufa cascades and waterfalls, and exceptional habitat diversity.

Figure 1: Tufa cascades in the Una National Park, Bosnia & Herzegovina (picture: E.C.O./Kovarovics)

To protect the river system to a large extend, a national park concept has already been developed, serving as an important first step toward safeguarding the water body itself. However, since a river system consists of more than just the watercourse, a more holistic approach is needed to ensure long-term protection. Eventually, the entire valley area should be included in conservation efforts, as negative impacts can originate from there.

The surroundings of the river system are characterized by settlements, tourism, and industrial development. Tourism numbers are rising, and as a result, infrastructure construction sites are also increasing along the river and within its valley. To ensure sustainable development in the region and to protect the river system from negative impacts caused by its surroundings, these areas should also be included in the conservation efforts.

UNESCO Biosphere Reserves combine strictly protected zones (such as national parks) with cultural landscapes (such as agricultural areas) and sustainable regional development. This approach could ensure the holistic protection of the Una River system, including its people and cultural landscapes into the conservation efforts.

This study aims to examine how the UNESCO Biosphere Reserve concept can be applied to the Una River system and its valley, and it provides a step-by-step approach toward achieving this international recognition.

1_1 PROCESS SO FAR

A first step toward the strict protection of the Una River System has already been taken. A comprehensive feasibility study (Sovinc et al., 2025) outlines how the Una River System could be designated as a national park (IUCN Category II).

The study includes the following elements:

- Description of the application of the international national park model to the Una River System
- Detailed description of the Una River, its tributaries, habitats, and species
- Boundary and zoning proposal for an Una Wild River National Park
- Threats and pressures
- Governance model
- Steps toward establishing the Una Wild River National Park

The establishment of the Una Wild River National Park (UWRNP) represents an important first step toward the holistic conservation of the Una River System. Core areas of UNESCO Biosphere Reserves "comprise a strictly protected zone that contributes to the conservation of landscapes, ecosystems, species, and genetic variation" (UNESCO definition). Therefore, the UWRNP could serve as one of the core areas of the proposed UNESCO Biosphere Reserve Una Valley.

With the overall protection and sustainable development of the entire valley, negative impacts from the river's surroundings can be prevented, enabling long-term protection of the river system.

1_1_1 UNA WILD RIVER NATIONAL PARK

The UWRNP as proposed by Sovinc et al. (2025) covers approximately 351.60 km² and includes 657.66 km of river courses. The national park comprises the Una River from its source to its confluence with the Sava River, as well as 15 tributaries of the Una River System (Dabar, Gomjenica, Japra, Klokot, Korčanica, Krka, Krušnica, Mlečanica, Ribnik, Sana, Sanica, Srebrenica, Sredića, Unac, and Žirovnica).

Figure 2: The Una River System as defined in the Una Wild River National Park feasibility study (map: Fluvius)

The boundaries of the UWRNP include the waterbody itself and the potential floodplain of the river. The river channel serves as the core zone of the national park (strictly protected, consisting of Core Zone A: no-intervention conservation areas, and Core Zone B: restoration areas). The surrounding floodplain is divided into three zones:

- a Natural Dynamic River Zone, comprising (nearly) natural areas
- a Cultural Dynamic River Zone, comprising cultural landscapes (e.g. agricultural areas)
- a Sustainable Development Zone, including settlements, villages, and towns

As already noted, the core areas of UNESCO Biosphere Reserves must be strictly protected at the national level (e.g. nature conservation areas, wilderness areas, natural monuments). Core zones of national parks often serve as core areas of UNESCO Biosphere Reserves, which will also be the case for the UNESCO Biosphere Reserve Una Valley.

1_2 WHY A UNESCO BIOSPHERE RESERVE?

The Una River System and its valley are characterized by natural, in some places even pristine areas, as well as cultural landscapes, human settlements, and industrial sites. Protecting the natural parts of the valley requires influencing the surrounding areas in ways that preserve their natural character and minimize external negative impacts.

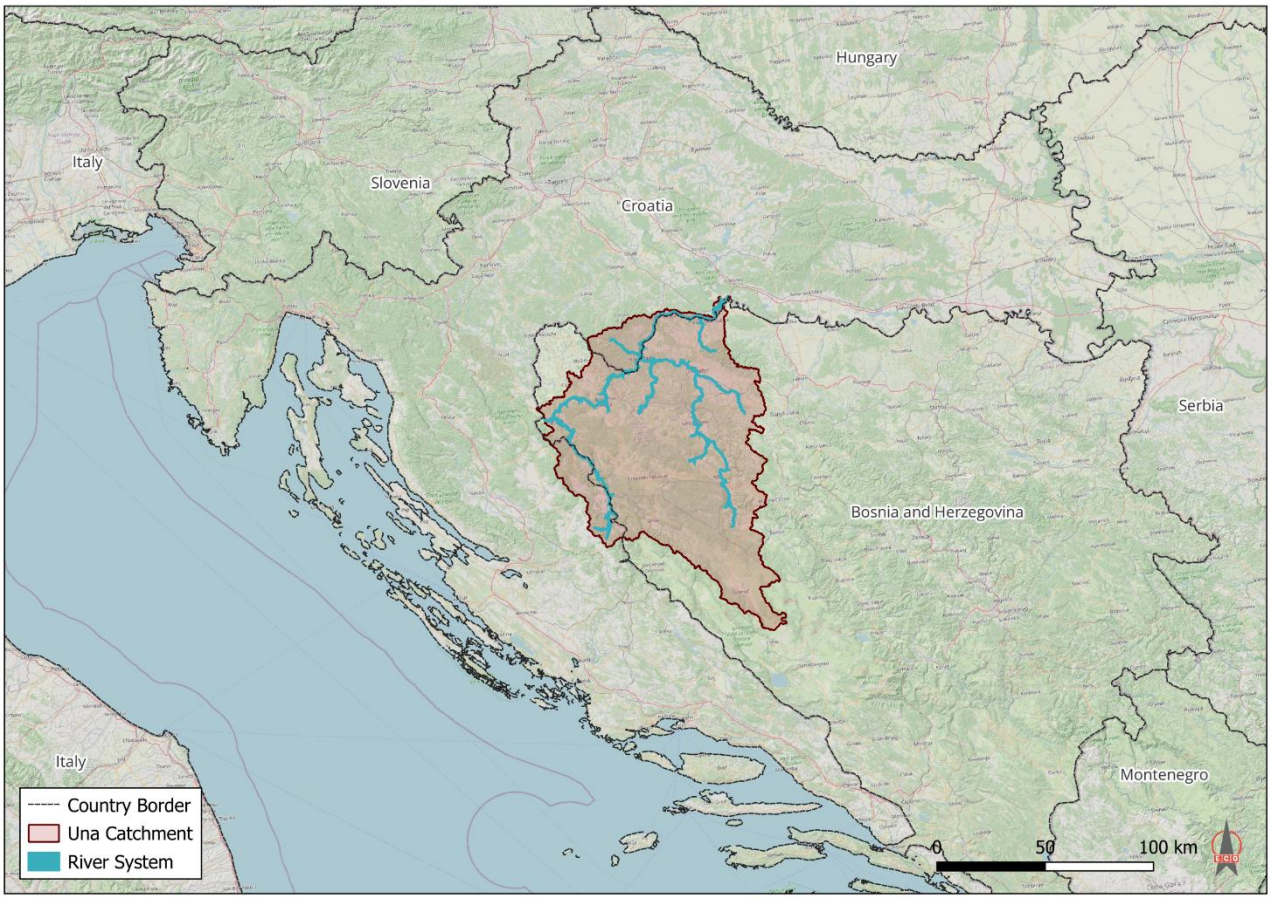


Figure 3: Una River Valley with Una River System (map:E.C.O. Institute of Ecology)

The concept of UNESCO Biosphere Reserves combines strictly protected core zones with sustainably managed buffer zones and promotes both ecological and economic sustainable regional development. It involves local people through education and training and is grounded in scientific monitoring and research.

To effectively protect the Una River System, the people living and working within the river system and its surroundings must understand why protection is necessary—not only for nature but also for their own well-being. This can be achieved through continuous communication and participatory cooperation between local communities, management authorities, and decision-makers.

The UNESCO Biosphere Reserve concept not only enables but requires such a holistic approach. It could therefore serve as the second phase of protection for the Una Valley, following the establishment of the Una Wild River National Park (UWRNP).

2 UNESCO BIOSPHERE RESERVE UNA VALLEY

2_1 WHAT IS A BIOSPHERE RESERVE?

UNESCO's Man and the Biosphere (MAB) Programme defines a Biosphere Reserve as "a large, clearly identified landscape or seascape where nature conservation and human development are pursued together in a way that is fully integrated, collaborative, and forward-looking".

Biosphere Reserves as defined by UNESCO (Statutory Framework World Network of Biosphere Reserves) and the MAB Programme deal with one of the most important questions the world faces today: How can we reconcile the conservation of biodiversity, the quest for economic and social development and the maintenance of associated cultural values?.

To answer these questions, Biosphere Reserves combine three functions, all of which should be present and balanced in all Biosphere Reserves:

- Conservation: Contributes to the conservation of landscapes, ecosystems, species and genetic variation
- Development: Foster economic and human development which is socio-culturally and ecologically sustainable
- Logistic support: Support for demonstration projects, environmental education and training, research and monitoring related to local, regional, national and global issues of conservation and development.

The three different zones of Biosphere Reserves serve different purposes and should have an appropriate size to serve the three functions:

- Core area(s) serve long-term protection,
- Buffer zone(s) surround the core areas, only activities compatible with the conservation objectives of the core area(s) are allowed here,
- Transition area where sustainable resource practices are promoted and developed.

Standard zonation scheme of a UNESCO Biosphere Reserve. Credit: UNESCO/delhambre

Biosphere Reserves are particularly suitable for areas where natural landscapes and human settlements intersect, and where focusing on only one would risk the loss of the other. The Biosphere Reserve concept integrates human development and is therefore a "tool to advance the well-being of human beings and nature" (Technical Guidelines for Biosphere Reserves, UNESCO).

2_1_1 POTENTIAL FOR THE PROTECTION OF THE UNA RIVER

To nominate the Una River System and its valley as an UNESCO Biosphere Reserve can have several positive impacts:

Protect the Una River System from external threats by including the whole valley area

The national park approach represents a crucial first step in protecting the Una River System. Strict protection of the water bodies prevents pressures and negative impacts that typically affect rivers, such as hydropower development, dam construction, and excessive water abstraction. However, threats originating outside the river corridor, such as plans for a nuclear waste facility, tourism infrastructure expansion, unsustainable fish farming, or landslides, cannot be adequately addressed through a national park designation alone.

Because the surroundings of the Una River System consist of settlements, agricultural land, and other human land uses, they are not eligible for inclusion in a national park. These external pressures require a complementary management framework.

Designating the entire valley as a UNESCO Biosphere Reserve integrates the pristine river system and its surrounding landscapes into a single conservation framework. External impacts can then be addressed holistically, improving long-term protection of the Una River System.

Establish management practices for the river surroundings

According to the IUCN, national parks represent one of the strictest protection categories and therefore do not typically include large settlements. Since many threats originate outside protected area boundaries, some national park administrations establish voluntary partnerships with municipalities, landowners, and land users to encourage common management practices. However, such arrangements remain voluntary and rely on stakeholder willingness.

A UNESCO Biosphere Reserve provides a formal framework for managing the wider landscape. In addition to strictly protected core areas, buffer zones are to be "used for activities compatible with sound ecological practices that can reinforce scientific research, monitoring, training and education," and the transition area "is where communities foster socio-culturally and ecologically sustainable economic and human activities" (UNESCO definition).

Thus, the Biosphere Reserve concept offers a broader and more effective management approach for the Una River System and its entire valley.

Include local communities in conservation objectives

Including the entire valley in the UNESCO Biosphere Reserve ensures that people living along the river and within the basin become actively involved in its protection. Their land-use practices, development goals, and decisions directly affect the river system.

A UNESCO Biosphere Reserve integrates people into conservation efforts, promotes sustainable regional and ecological development, and supports these goals through education, training, research, and monitoring. This means the approach not only protects sensitive core zones but also benefits local communities, increasing their motivation to support conservation objectives.

Implement a holistic approach

Biosphere Reserves aim to present the main biodiversity values of a region with their core zones. In the case of the Una Valley this means, also other natural landscapes can be included in the Biosphere Reserves. Unmanaged, natural forests, existing Natura 2000 sites or high ranked protected areas can be included into the Biosphere Reserve and therefore get international recognition.

Additionally, Biosphere Reserves protect not only natural values but also cultural heritage. The region surrounding the Una River System is rich in cultural and historical significance, and these values can also be recognized and managed within the Biosphere Reserve framework. In addition to tangible cultural and historical sites, intangible cultural knowledge and traditions are to be identified and encouraged during and after the nomination process.

Ensure effective protection through a transnational approach

Because the Una River System spans two countries, its long-term protection depends on the commitment of both States Parties. While national protection can secure strict safeguards in each country, joint management remains voluntary. A transnational UNESCO Biosphere Reserve institutionalizes cooperation between the two states. UNESCO guidelines require an appropriate management body for transboundary Biosphere Reserves, meaning a shared governance structure must be established.

Joint management and reporting to UNESCO promote unified conservation standards and ensure consistent protection across the entire Una River System.

Gain international recognition for long-term conservation efforts

The near-natural state of the Una River System is the result of long-term dedication from policymakers, local communities, NGOs, and other stakeholders. Designating the area as a UNESCO Biosphere Reserve provides international recognition for these efforts and highlights the global importance of protecting natural rivers.

This acknowledgment strengthens motivation and support for continued conservation and reinforces the commitment to protect the Una River System into the future.

2_2 EXAMPLES FOR OTHER TRANSNATIONAL UNESCO BIOSPHERE RESERVES

What ultimately determines whether a landscape is well protected is not the title it carries, but how it is managed, enforced, and supported over time. A national park, a Natura 2000 site, a Ramsar wetland or a UNESCO Biosphere Reserve will only achieve their intended purpose if the responsible authorities apply the legal framework consistently, invest in the necessary staff and monitoring systems, and ensure that management objectives are actually implemented. In this sense, the distinction between a nationally protected area and an internationally recognized biosphere reserve is less important than the quality of governance, coherence of management, and continuity of conservation action.

The strength of a biosphere reserve lies not in the designation itself, but in its ability to integrate conservation, sustainable development, and scientific work across a broad landscape - yet the effectiveness always depends on the commitment of the institutions responsible for implementing its objectives.

This becomes clear when looking at some of the world's most emblematic natural areas that are simultaneously UNESCO Biosphere Reserves with core areas declared as national parks. In the United States, several of the most famous national parks also hold MAB status, including **Yellowstone**, **Yosemite**, **Great Smoky Mountains**, **Everglades**, and **Olympic National Park**. These landscapes are globally iconic not because they carry the "biosphere reserve" label, but because they are consistently and effectively managed, monitored, and legally safeguarded. Beyond the United States, some of the world's most recognizable natural wonders also function as biosphere reserves. The **Galápagos Islands** in Ecuador - a symbol of global biodiversity; the **Serengeti** in Tanzania - one of Earth's most renowned wildlife landscapes - all combine strict conservation functions with UNESCO's wider biosphere reserve philosophy.

Figure 4: Vjosa Valley Biosphere Region, Albania (picture: E.C.O./Kovarovics)

In Europe, several of the continent's most emblematic and ecologically significant landscapes are organized as **transboundary biosphere reserves**, reflecting long-standing cooperation between neighboring countries. The **Wadden Sea,** shared by the Netherlands, Germany, and Denmark, forms one of the world's largest and most important coastal wetland systems and is both a MAB Biosphere Reserve and a World Heritage Site. The **Šumava-Bavarian Forest** complex, shared by Czech Republic and Germany, is often referred to as the "Green Roof of Europe" and represents one of the continent's largest continuous forest wilderness areas. The **Krkonoše/Karkonosze mountains** between Czech Republic and Poland show how two adjoining national parks can operate successfully within a unified biosphere reserve framework. Similarly, the **Danube Delta**, managed jointly by Romania and Ukraine, demonstrates how MAB status can complement other international instruments in one of Europe's most ecologically valuable wetland systems.

Alongside these well-known large protected landscapes, the **Vjosa River in Albania**, one of the last wild rivers in Europe, was recently recognized as a Biosphere Reserve at the valley scale, representing a landmark achievement in river conservation. Meanwhile, in Montenegro, the **Morača River** system is currently undergoing the process of establishing a basin-level biosphere reserve, reflecting growing recognition of the ecological importance of free-flowing rivers across the continent.

Figure 5: Mura Drava Danube Biosphere Reserve, Croatia (picture: wikimedia commons/Misalalic)

Finally, Europe also offers another direct parallel to the Una case through a major transboundary river example: the **Mura-Drava–Danube Biosphere Reserve**, shared by Austria, Slovenia, Croatia, Hungary and Serbia, often called the "Amazon of Europe." It illustrates how a free-flowing river system can be jointly protected through a combination of national protected areas and a unifying biosphere reserve framework. This example shows clearly that when management is strong and cooperation is well structured, a transboundary biosphere reserve can become a powerful tool for safeguarding entire river ecosystems-precisely the ambition envisioned for the Una River valley.

2_3 POTENTIAL OF THE UNA VALLEY TO BE NOMINATED AS AN UNESCO BIOSPHERE RESERVE

As already described above, the Una Valley is characterized by a combination of natural landscapes and human development. To protect high-value natural areas such as the Una River System, their surroundings must also be included. Biosphere Reserves are specifically designed to combine conservation efforts with sustainable regional development, ensuring that natural core areas are properly protected from negative external impacts. Therefore, applying the Biosphere Reserve concept to the Una Valley would strengthen protection against threats and prevent further unsustainable use of natural resources in the region.

2_3_1 CULTURAL SITES OF THE REGION

Biosphere reserves combine cultural and natural values, fostering traditional practices while protecting natural processes. The Una Valley is rich not only in natural areas but also in cultural sites and long-standing traditions.

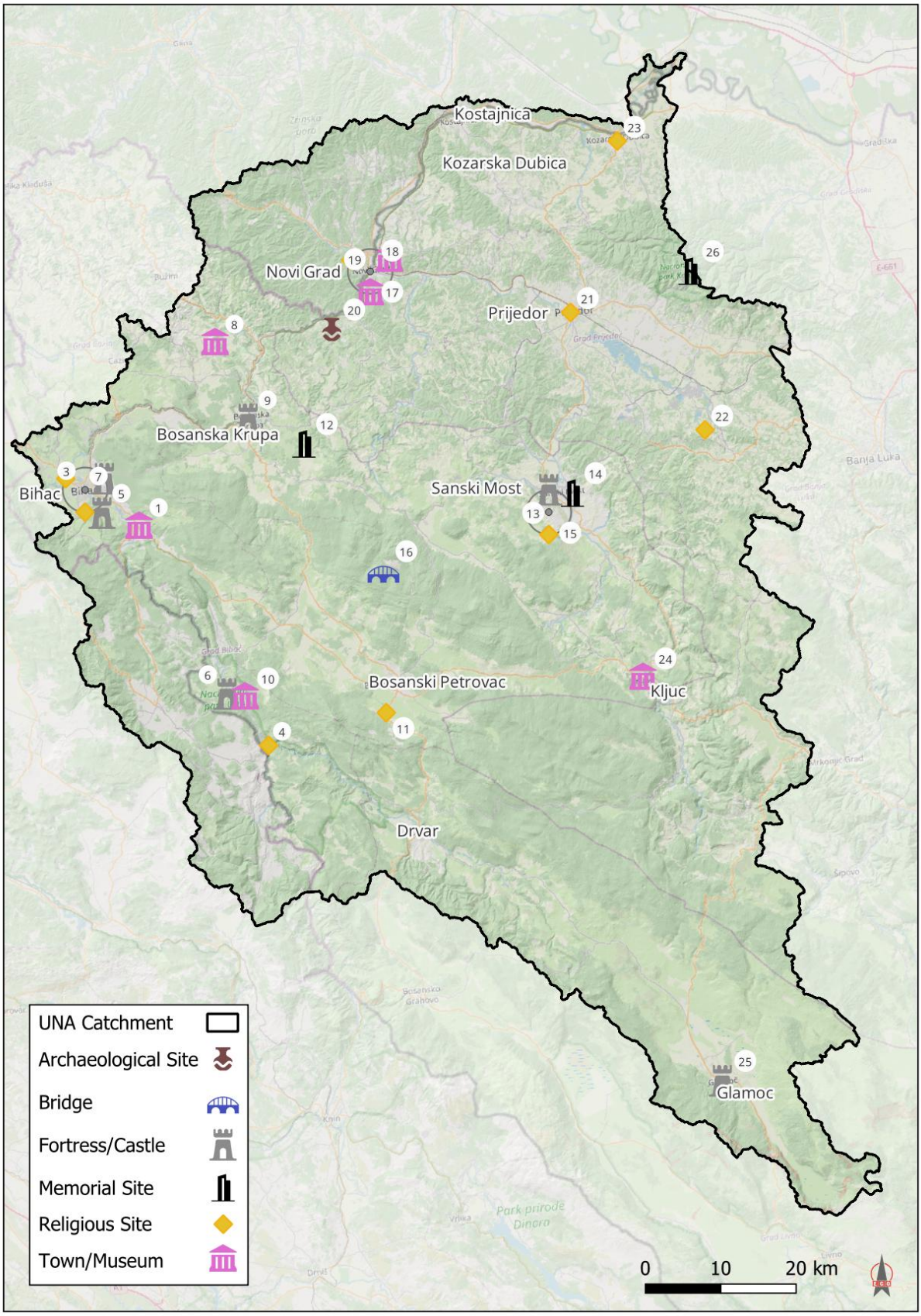


Figure 6: Some examples for cultural sites within the Una Valley (detailed list, see table below)

Table 1: List of cultural sites in the Una Valley

	Name of National Monument	Local Authority (Municipality)	Type of National Monument	Short Description
1	Ripač	Bihać	Town/Museum	Prehistoric and ancient Japodian settlement
2	Fethija Mosque with harem	Bihać	Religious Site	Former church later converted into a mosque
3	Captain's Tower	Bihać	Fortress/Castle	Fortification structure of the old town
4	Rmanj Monastery	Bihać	Religious Site	Serbian Orthodox monastery in Martin Brod
5	Prehistoric hillfort and Sokolac Fortress	Bihać	Fortress/Castle	Multi-layered prehistoric and medieval fortification
6	Ostrovica – Ostrovica Fortress	Bihać	Fortress/Castle	Medieval fortress above the Una River
7	Jewish Cemetery	Bihać	Religious Site	Historic cemetery of the Jewish community
8	Jezerski Old Town	Bosanska Krupa	Town/Museum	Medieval fortified town
9	Bosanska Krupa Fortress	Bosanska Krupa	Fortress/Castle	Ottoman period fortress
10	Bjelaj (Bilaj) Old Town	Bosanski Petrovac	Town/Museum	Medieval fortified town
11	Crkvina site in Kolunić	Bosanski Petrovac	Religious Site	Remains of a medieval church and stećci necropolis
12	Tito's Train – Oštrelj	Bosanski Petrovac	Memorial Site	World War II partisan memorial
13	Kamengrad Musalla with cemetery	Sanski Most	Religious Site	Religious and burial complex
14	Šušnjar Memorial Complex	Sanski Most	Memorial Site	Memorial area dedicated to victims of fascism
15	Kamengrad Old Town	Sanski Most	Fortress/Castle	Medieval fortress
16	Roman Bridge in Stari Majdan	Sanski Most	Bridge	Stone bridge of Roman origin
17	Town Hall	Novi Grad	Town/Museum	Former municipal administrative building
18	City Gallery	Novi Grad	Town/Museum	Cultural heritage building
19	Jablanica Harem	Novi Grad	Religious Site	Islamic cemetery complex
20	Mekota – Gornji Rakani	Novi Grad	Archaeological Site	Archaeological remains
21	Čaršija Mosque remains	Prijedor	Religious Site	Remains of the old town mosque
22	Wooden Orthodox Church in Jelićka	Prijedor	Religious Site	19th century wooden church
23	Harem of the Town Mosque	Kozarska Dubica	Religious Site	Historic Islamic burial ground
24	Ključ Old Town	Ključ	Town/Museum	Medieval fortified town
25	Glamoč Old Town	Glamoč	Fortress/Castle	Medieval fortress
26	Kozara Memorial Complex – Mrakovica	Prijedor / Kozarska Dubica / Gradiška	Memorial Site	Central World War II memorial complex on Mount Kozara

2_3_2 POTENTIAL AREAS FOR THE THREE ZONES OF AN UNESCO BIOSPHERE RESERVE

Biosphere Reserves consist of three zones that should be applied according to the characteristics of the area.

The strongest level of protection is provided in the **core area(s)** of the Biosphere Reserve. Here, natural processes should remain intact, and natural dynamics should be allowed to occur. A Biosphere Reserve may contain one or several core areas, which should represent the ecological character of the region and include areas of high biodiversity value. In addition, the core areas must be strictly protected under national legislation and managed accordingly.

To protect the core areas from negative impacts from the outside they should be embedded in **buffer zone(s)**. Here, only activities compatible with the conservation objectives take place. The main focus of the buffer zone is to allow management techniques to be developed, explored and learned about, in order to maintain semi-natural ecosystems including their biodiversity.

Settlements, industry and intensive cultural landscapes are included in a transition area, where sustainable resource management practices are promoted and developed.

To identify potential areas for these three zones within the Una Valley, a spatial analysis of the region was carried out using existing datasets. The map below does not show a final zonation, but rather the potential for core areas, a buffer zone, and transition areas within the Una Valley under current conditions.

Although UNESCO recommendations do not specify the minimum size of individual zones, it is generally accepted that a zone must be large enough to ensure that the three aims of biosphere reserves are met. For the Una Valley, with a total size of 9,645.80 km², the zones could potentially span over these areas:

- Core Area 1,014.46 km² 10%
- Buffer Zone 7,007.10 km² 73%
- Transition Area 1,624.23 km² 17%

Table 2: Share of areas and zones

	Croatia	Federation of Bosnia and Herzegovina	Republika Srpksa
Buffer Zone	829,73 km²	3728,71 km²	2448,67 km²
Core Area	311,70 km²	454,21 km²	248,55 km²
Transition Area	10,93 km²	746,24 km²	867,06 km²
TOTAL	**1152,35 km²**	**4929,15 km²**	**3564,29 km²**

The proposed areas and zones are based on existing and available data and will need to be further developed during the elaboration of the final zonation of the biosphere reserve. The final zonation must also be discussed and coordinated with the local population, stakeholders, decision-makers, and experts. A broad participation process must be implemented to ensure the involvement of all stakeholders and to provide the best possible information to all people affected by the establishment of a biosphere reserve.

Protected Areas within the Valley

Protected Areas within the Una Valley were distributed to the core areas or the buffer zones. Their classification was chosen according to their protection status (what type of protected area) and their conservation goals (managed/unmanaged habitats, species).

The following protected areas could potentially be included in the buffer zone of the proposed Biosphere Reserve:

- Bijeli Potoci - Kamensko-Protected Landscape
- Brdo Djed-Forest Park
- Dolina Une-Natura 2000
- Donja Posavina-Natura 2000
- Jama Ledana-Natural Monument
- Kanjon Une-Natura 2000
- Lapačko Polje-Natura 2000
- Lisac-Natura 2000
- Područje oko Hrvatske Kostajnice-Natura 2000
- Sunjsko polje-Natura 2000 & Protected Landscape
- Una-Protected Landscape
- Vrela Sane-Natural Monument

- Vrelo Une-Natural Monument

Those protected areas that represent potential core areas for the proposed Biosphere Reserve are described in more detail in the chapter below.

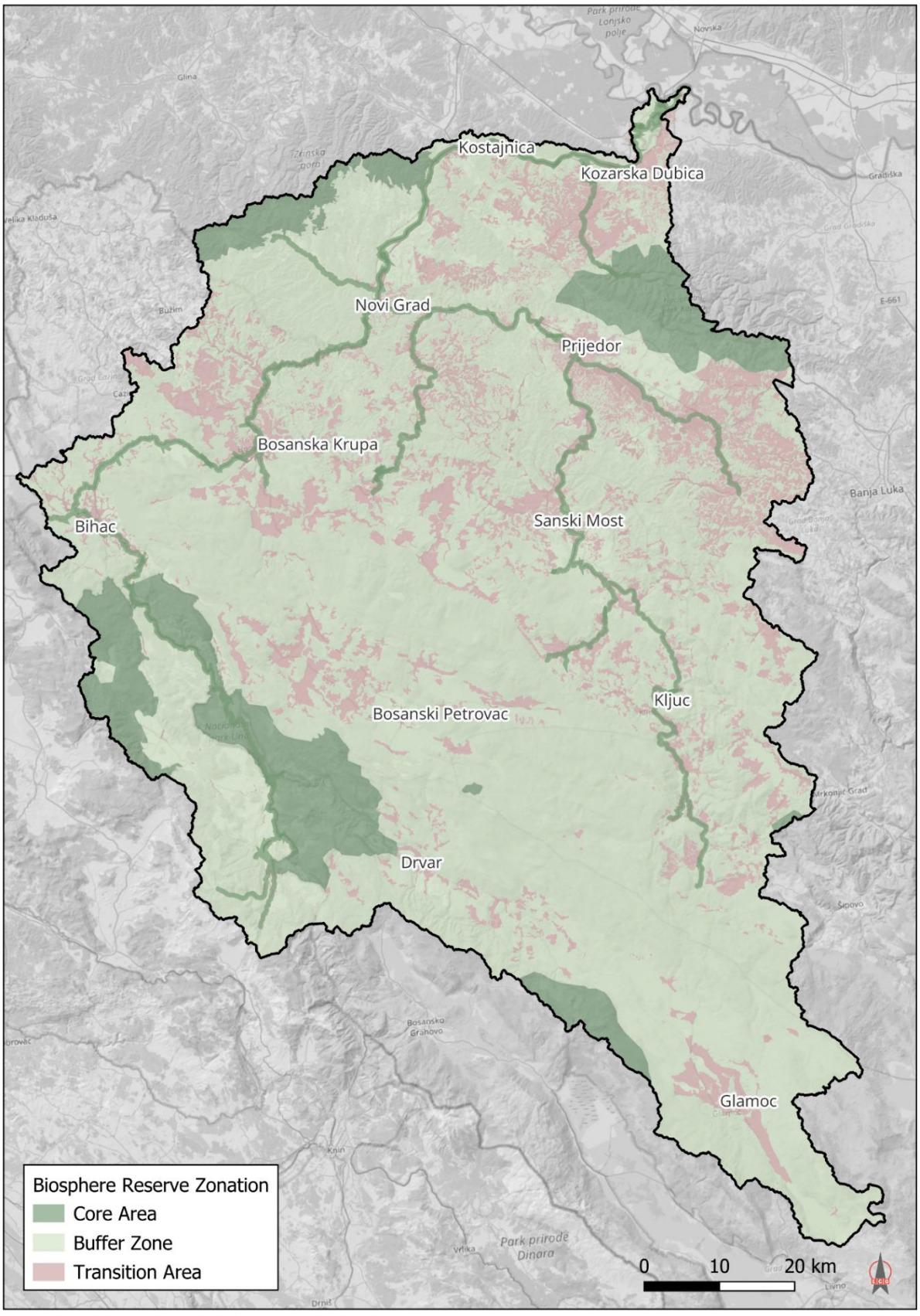


Figure 7: Potential areas for the three zones of biosphere reserves within the Una Valley

2_3_3 WHAT DO THE CORE AREAS STAND FOR?

The potential core areas of the Una Valley Biosphere Reserve include the proposed Una Wild River National Park in its entirety, as well as those Natura 2000 sites that contain natural habitats and strict reserves. Each potential core area provides high biodiversity values, important habitats, and (near-)natural conditions.

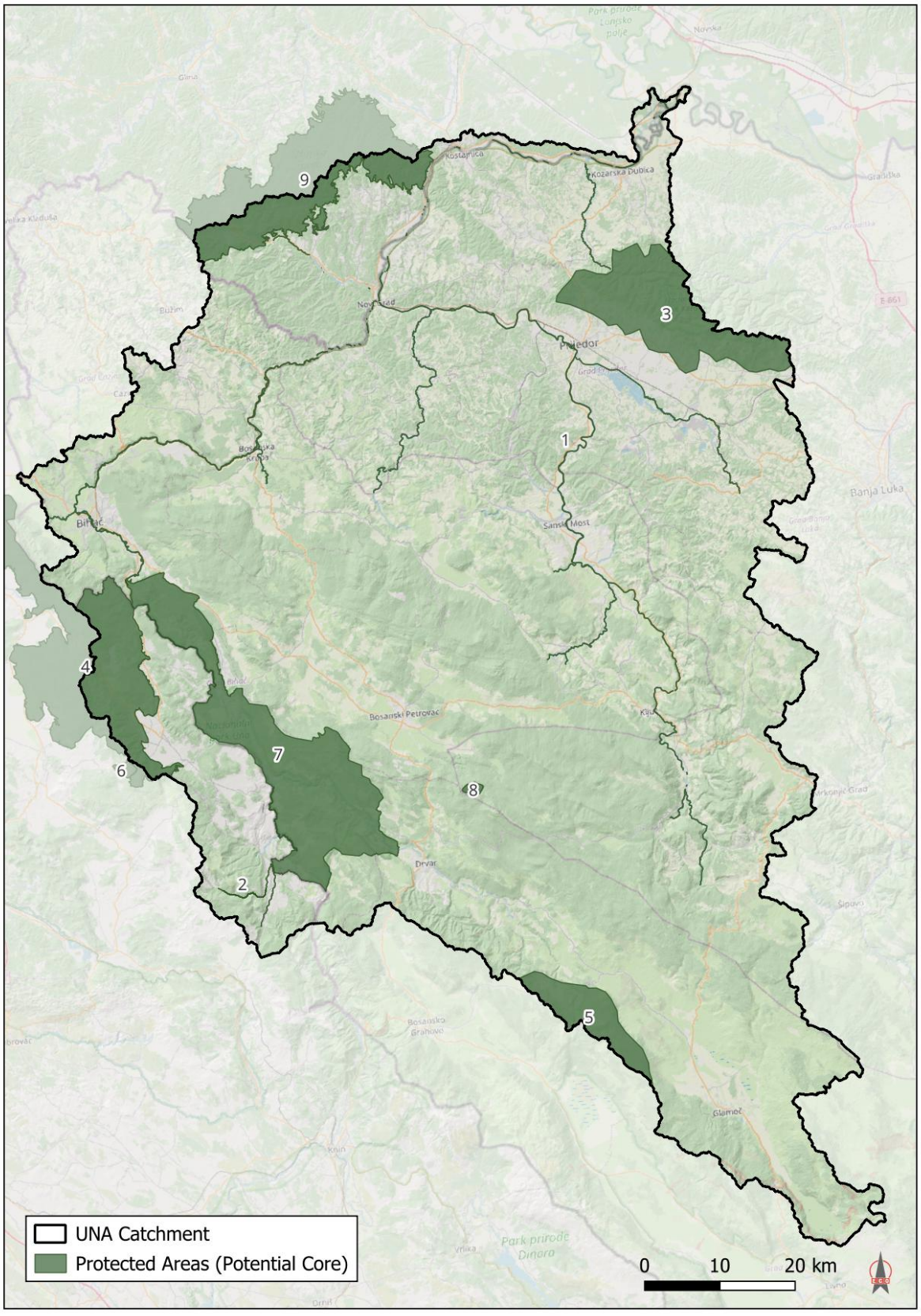


Figure 8: Existing protected areas with core area potential within the Una Valley

In the next phase of developing the Una Valley Biosphere Reserve, it must be determined whether these potential core areas should be included in the final zonation in full, or whether only specific parts of them are suitable as core areas of a biosphere reserve. This assessment will depend on their conservation values, existing management approaches, and current zonation (e.g., national park core zones).

Additionally, it must be determined whether those protected areas that extend beyond the boundaries of the Una Valley—where only parts of the protected areas are currently included in the proposed biosphere reserve—should be incorporated in their entirety, and whether the biosphere reserve should therefore be expanded to match their full extent.

1. Potential Core Area Una Wild River National Park

Figure 9: Potential core area Una Wild River National Park (picture: E.C.O./Kovarovics)

The main and most significant core area within the Una Valley Biosphere Reserve comprises the Core Zones of the proposed Una Wild River National Park (33 km^2). This potential core zone is characterized by the free-flowing character of the Una River System, natural landscapes and high biodiversity. Unique karstic tufa cascades, waterfalls, and travertine formations such as Štrbački Buk and Martin Brod can be found there and a high habitat diversity, from deep pools to floodplain forests and wetlands are present. Key species include the Danube salmon (*Hucho hucho*), the European otter (*Lutra lutra*), and the Olm (*Proteus anguinus*). Overall, over 450 species highlight the global importance of this river system.

Figure 10: Danube salmon (picture: A. Hartl)

Figure 11: Fish otter (picture: wikimedia commons/Bernard Landgraf)

Figure 12: Olm (picture: wikimedia commons/Arne Hodalič)

2. Potential Core Area Dabašnica - Srebrenica-Natura 2000 (part of UWRNP)

This river strech is part of the Una River System and protected as a Natura 2000 site. It is part of the proposed core zone of the UWRNP, the Stone crayfish (*Austropotamobius torrentium*) is present. This species is protected by the EU Habitats Directive listed in Annex II & V Habitats Directive.

Figure 13: Stone crayfish (picture: wikimedia commons/Misa.stefanovic.07)

3. Potential Core Area Kozara-National Park

Kozara National Park (IUCN Category II), located in Republika Srpska in the northeastern part of the Una Valley, covers nearly 4,000 ha and includes incised valleys, mountain slopes, ridges, and isolated peaks. Approximately 80% of the national park is forested, dominated by beech and fir forests, with oak and hornbeam forests occurring in the lower areas of the park.

Figure 14: Kozana National Park (picture: wikicommons/Ljubica K-R)

4. Potential Core Area Lička Plješivica-Natura 2000 & Velika Plješivica – Drenovača-Strict Reserve

Figure 15: Lička Plješivica (picture: wikicommons/Andreja T)

The Lička Plješivica Natura 2000 site is a mountainous area comprising habitats such as alpine and subalpine grasslands, alpine and boreal heaths, as well as calcareous and calc-schist screes from the montane to alpine levels. About 40% (15,000 ha) of the site is located within the Una Valley, while nearly 60% lie outside it. Within the included part, the strict reserve Velika Plješivica – Drenovača is present.

When finalizing the zonation, it should be decided whether the outer boundaries of the Una Valley Biosphere Reserve should be extended to also include the entire Lička Plješivica Natura 2000 site.

Species such as the Wolf (*Canis lupus*), Lynx (*Lynx lynx*), and Brown Bear (*Ursus arctos*) are present within the site.

Figure 16: Wolf (picture: wikicommons/Mikkel Houmøller)

Figure 17: Lynx (picture: wikicommons/Jeanne Menjoulet)

Figure 18: Brown bear (picture: wikicommons/Charles J. Sharp)

5. Potential Core Area Livanjsko Polje (Livno karst field)-Protected Landscape

Livanjsko Polje is one of the largest karstic fields in the world and a RAMSAR wetland site. It includes seasonally flooded agricultural land and alluvial forest, seasonal marshes and ponds, permanent streams such as the Bistrica, Sturba and Žabljak, karst springs such as the Duman, numerous sinkholes, and the largest peatland in the Balkans.

Given its global importance, it is a potential core area for the proposed biosphere reserve, although its current protection status (protected landscape) is not sufficiently strict and should be strengthened in the future.

Figure 19: Livanjsko Polje (picture: wikicommons/Tarik Alimanović)

6. Potential Core Area Međugorje - Stružnica-Natura 2000

This potential core area is protected under the Habitats Directive and is mainly located outside the Una Valley, with only a very small portion lying within the valley area. Nevertheless, the protected area represents a potential core area for the proposed biosphere reserve, as it includes valuable habitats such as eastern sub-Mediterranean dry grasslands.

7. Potential Core Area NP UNA-National Park

One of the two existing national parks within the Una Valley is the Una National Park (IUCN Category II), located in Bosnia and Herzegovina. Beech forests cover the majority of the park's area, and valuable sections of the Una River are also included within its boundaries. However, the core zones of the national park are currently not located along the river. To include these river sections in the proposed Una Wild River National Park, the zonation should be adapted accordingly.

The overall value of the forests, river stretches, and habitats within the existing Una National Park makes these areas potential core zones for the proposed biosphere reserve. For the final zonation, the detailed internal zonation and regulations of the Una National Park should be examined to ensure that only those areas that are appropriately regulated and managed are included.

Figure 20: Waterfall Štrbački Buk in the Una National Park (picture: E.C.O./Kovarovics)

8. Prašuma Lom (virgin forest)-Protected Landscape

Prašuma Lom Protected Landscape contains virgin and ancient beech forests, making it a site of global significance. Although it covers only 300 hectares respectively, it should be included as core area in the future biosphere reserve. However, the level of protection should be increased.

Ancient and virgin beech forests are rare across Europe and therefore require strict protection. They serve as important steppingstones for rare species such as the Alpine longhorn beetle, lungwort lichen, and other organisms that depend on the presence of standing and fallen deadwood.

Figure 21: Alpine longhorn beetle (picture: wikicommons/Skot)

Figure 22: Lungwort lichen (picture: wikicommons/Bernd Haynold)

Figure 23: Virgin beech forests in Bosnia & Herzegovina (picture: E.C.O./Kirchmeir)

9. Potential Core Area Zrinska gora-Natura 2000

About 40% of this Natura 2000 site is included in the Una Valley and therefore a potential core area for the proposed biosphere reserve. Beech forests, alluvial forests with Alnus glutinosa and Fraxinus excelsior as well as Illyrian oak-hornbeam forests are located within this protected area.

2_4 FACTORS AFFECTING THE AREA

Several factors are present in the Una Valley that could potentially have negative impacts on the core areas of the proposed biosphere reserve and/or should be adapted to more sustainable approaches in the future.

This analysis is based on currently available data and will need to be further refined during the nomination process for the proposed biosphere reserve. The map and descriptions below provide an initial overview of factors affecting the area, but they do not represent an exhaustive list of all factors within the Una Valley.

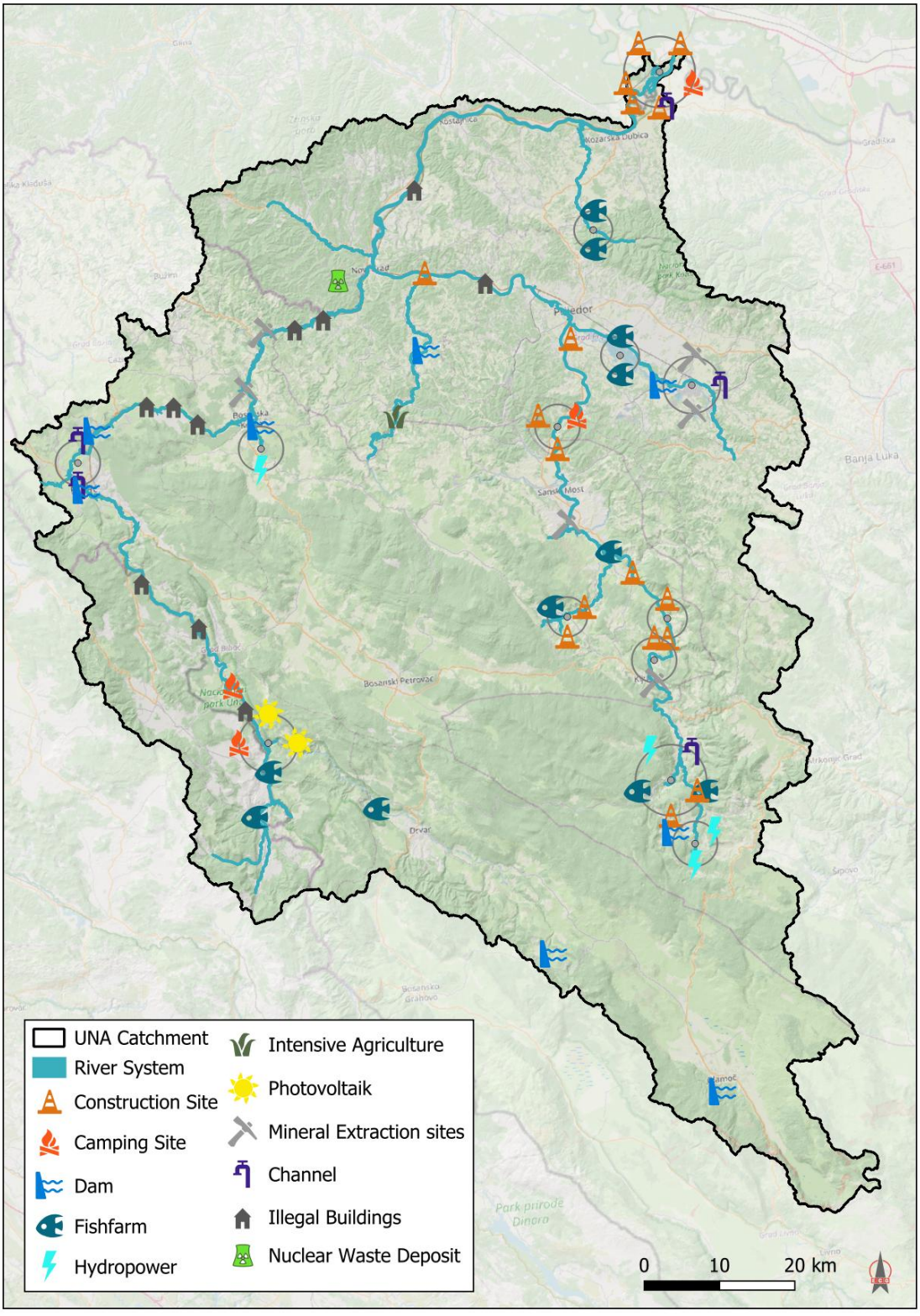


Figure 24: Overview of some of the existing factors affecting the Una Catchement

2_4_1 UNSUSTAINABLE REGIONAL DEVELOPMENT

Especially along the rivers in the valley, **construction activities** close to the water bodies are increasing, and **illegal buildings** are present. To display this factor in the map (Figure 24), several icons were placed close to the river. However, this factor is present along the entire Una River System. To ensure the long-term protection of the Una River System while also safeguarding the local population, no construction should be permitted within 15–30 meters of the riverbanks.

Overall, **spatial development** of settlements, villages, towns, and riverfront areas should follow a sustainable approach that considers ecological requirements as well as urban development objectives. A coordinated spatial plan should be developed, identifying designated areas for settlement expansion, tourism infrastructure, and industrial development. Such a plan must be created in cooperation with stakeholders, decision-makers, and the local population and, equally important, it must be effectively enforced.

Figure 25: Newly built crossing (picture: *Anes Halkic*)

Unsustainable cultural approaches, such as **intensive agriculture** and unsustainable **fish farming**, should be monitored, and sustainable practices must be established that allow economic activities without harming the environment.

Addtionally, plans are present for the development of an interim **storage facility for nuclear waste** in the region. It is of utmost importance to conduct a thorough Environmental Impact Assessment of this proposed facility, taking into account ecological aspects and potential impacts on flora and fauna.

2_4_2 UNSUSTAINABLE USE OF NATURAL RESOURCES

As described in chapter 2_3_3, the main ecosystems in the potential core areas are forests and rivers/wetlands.

Therefore, the unsustainable use of natural resources derived from these ecosystems represents one of the main factors affecting the conservation objectives of the proposed biosphere reserve.

Hydropower use and **dams** exert numerous negative effects on rivers, their natural characteristics, and their associated species. Water flow is altered and slowed, and dams act as barriers that cannot be overcome by many species within these ecosystems. Additionally, the transport of gravel and other debris (e.g. deadwood) is heavily disrupted. New dams and hydropower plants should be avoided, and existing ones should be monitored, removed, or improved in order to enable natural processes along the Una River System.

Figure 26: New hydropower plant in the Una Valley (picture: *Anes Halkic*)

Other negative impacts on water bodies and wetlands are caused by **water diversion and extraction**. All extraction points along the Una River System should be mapped, monitored, and where possible closed. If closure is not feasible, the permissible amount of water extraction must be defined and regulated accordingly.

Fishing also affects the aquatic ecosystem of the Una River System. Clear regulations are needed to define which species may or may not be caught, when and where fishing is permitted, and who is authorized to fish. Again, effective enforcement is crucial.

In forest ecosystems, both within the potential core areas and beyond, (illegal) **logging** and **hunting** are major threats. It must be ensured that sustainable forestry practices are enforced throughout the entire valley, and that illegal hunting and logging are identified and addressed.

2_4_3 UNSUSTAINABLE TOURISTIC ACTIVITIES

Tourism is increasing in the region and provides an important new source of income for the local population. Currently, however, tourism development does not follow any coordinated legal plan or concept. Individual tourism companies, protected area administrations, and independent providers develop their own activities and offers, resulting in **uncoordinated tourism expansion**. This leads to unmanaged activities along and on the rivers, which may negatively impact the ecosystem and certain species. In addition, the establishment of new campsites and accommodations in close proximity to water bodies not only poses a risk in the event of flooding but also affects the ecosystem and its species.

To enable a coexistence between tourism development and nature conservation, a sustainable tourism plan should be developed for the region. This plan should consider ecological requirements, conservation objectives, and the carrying capacities of the most visited sites within the Una Valley.

2_5 MANAGEMENT OF THE UNESCO BIOSPHERE RESERVE UNA VALLEY

The management model proposed for the Una Wild River National Park is designed to function as a robust and

comprehensive unit capable of coordinating conservation, monitoring, enforcement, visitor management, and community engagement across the core protected area. For this purpose, the park would require a staff of 42 employees and an annual operating budget of approximately €1.25 million. These resources represent the minimum needed to ensure effective day-to-day management of the national park, including its cross-border coordination tasks, specialized monitoring teams, rangers, administrative services and technical staff.

However, once this same management structure is expected to assume responsibility for the entire Una River Valley Biosphere Reserve, additional capacity becomes necessary. A biosphere reserve extends far beyond the borders of a national park and carries a different set of responsibilities: coordinating with municipalities and communities throughout the transition zone, supporting sustainable development initiatives, facilitating scientific research across the whole valley, developing partnerships with businesses and civil society, and meeting the reporting, monitoring and governance obligations required under UNESCO's Man and the Biosphere Programme. These functions require dedicated personnel who operate at the landscape scale rather than solely within the protected core.

To fulfil these broader obligations, the management unit would need to expand by an additional six to eight specialized staff members, bringing the total to between 48 and 50. These new positions would cover areas such as UNESCO liaison and governance, valley-wide monitoring and data management, socioeconomic and municipal partnerships, green economy support, and transboundary sustainable development coordination.

The expansion of responsibilities would also require a moderate increase in financial resources. The additional personnel, together with increased operational needs for coordination, communication, stakeholder engagement, and joint project development across the wider valley, would require an estimated €300,000 to €400,000 per year, in addition to the already estimated yearly budget for the Una WRNP management.

In practical terms, this estimation means that extending the Una WRNP management model to cover the management of the biosphere reserve represents an increase of roughly 20–25% in annual operating costs. This is a relatively modest adjustment given the substantial enlargement of responsibilities - from managing a protected core area to coordinating an integrated, cross-border, valley-wide biosphere reserve. The foundational structure of the national park thus offers a strong starting point, requiring only targeted additions to fully meet the requirements of the future Una River Valley Biosphere Reserve.

2_6 STEPS TOWARDS AN UNA VALLEY UNESCO BIOSPHERE RESERVE

Biosphere reserves are nominated by national governments and designated by UNESCO's Director-General following a decision of the MAB International Coordinating Council (MAB-ICC). A comprehensive document, the nomination dossier for the Una valley transboundary biosphere reserve, must be prepared for consideration by the MAB-ICC. For transboundary biosphere reserves (TBRs), there is a joint transboundary nomination form with a detailed description of the area, its evaluation, and specific requirements regarding process, governance, zonation, maps, and stakeholder participation.

The creation of a UNESCO Biosphere Reserve in the Una valley does not require a special legal act establishing such a designation in either Croatia or Bosnia and Herzegovina. Instead, it relies on existing nature protection laws, including the legal acts that establish the National Commissions or Committees for UNESCO and the MAB Programme, in accordance with general rules for international cooperation and transboundary protected areas.

Relevant political authorities and UNESCO structures that should be involved in preparing the nomination dossier are the National Commission for UNESCO (state level), the National MAB Committee (MAB focal point in Bosnia and Herzegovina), and the competent ministries responsible for environment, sustainable development, and protected areas.

The governments of Bosnia and Herzegovina and Croatia will need to sign a declaration (such as a Letter of Intent) expressing their joint will to establish the Una transboundary biosphere reserve, their commitment to a participatory process, and to give an official mandate to existing UNESCO national authorities to lead the process. A transnational Committee for the establishment of the Una River Valley Transboundary Biosphere Reserve (hereafter: the Committee), a political body, should be established to coordinate activities at the national level and in communication with the MAB-ICC.

The Committee should nominate the Technical Steering Group, which will refine the existing feasibility study and enhance its components, such as detailed zonation of each of the three obligatory zones of the biosphere reserve, address gaps in the feasibility study (including detailed descriptions of the natural, cultural, and socio-economic characteristics, vision and objectives for all three goals of biosphere reserves – conservation, sustainable development, and logistics and research), governance structure and coordination mechanisms, and – particularly important in light of preparing the

proposal for establishment of the transboundary Una Wild River National Park, which should form the core zone of the future potential biosphere reserve – clarify the relationship with existing and planned protected areas, based on assessment of national legislation in both countries.

In parallel with the technical work, national and local consultations on draft boundaries and zonation of the future biosphere reserve should be conducted.

Approval of the nomination dossier should first be confirmed by the national MAB bodies (MAB Committees, UNESCO Commissions), followed by both governments' approval of the nomination and joint submission of the nomination dossier to the UNESCO MAB Secretariat.

After submission of the dossier, the MAB Secretariat will check its completeness and may request clarifications. The nomination will be examined first by the Advisory Committee and then by the MAB-ICC, which may decide to designate the biosphere reserve directly, request more information (deferral), or reject the submission. The decision on establishment of the biosphere reserve will be taken at one of the next annual MAB-ICC sessions. of Nomination for UNESCO.