UNA

Wild River National Park

save the blue heart of europe



Feasibility study (2026)

UNA

Wild River National Park

Feasibility study



March 2026

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1. TERMS & ABBREVIATIONS

PROTECTED AREA	A clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.
ENVIRONMENT	The biosphere in which different forms of life are manifested and consists of two elements: biotic and abiotic.
SUSTAINABLE DEVELOPMENT	Linkage of environmental issues with the policy for development and planning to fulfill the needs and aspirations of the present without undermining the ability to achieve future needs and aspirations.
SUSTAINABLE TOURISM	Tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities.
UNA RIVER SYSTEM	The Una River System comprises the Una River and all tributaries proposed for inclusion within the boundaries of the future Una Wild River National Park.

LIST OF ABBREVIATIONS

AIIB	Asian Infrastructure Investment Bank
AL	Albania
BiH	Bosnia and Herzegovina
CSO	Civil Society Organisation
EBRD	European Bank for Reconstruction and Development
EIA	Environmental Impact Assessment
EU	European Union
EUR	Euro
FBiH	Federation Bosnia and Herzegovina
FS	Feasibility Study
GIS	Geographic Information System
HPP	Hydro Power Plant
HR	Croatia
HYMO	Hydro-morphological Assessment
IPA	Instrument for pre-Accession Assistance
IUCN	International Union for Conservation of Nature
KfW	Krediteinstalt fur Wiederaufbau (“Credit Institute for Reconstruction”)
LIFE	European Union’s funding instrument for the environment and climate action
ME	Montenegro
NGO	Non-governmental Organisation
NP	National Park
PA	Protected area
RDZ	River Dynamic Zone
RS	Republika Srpska
SDZ	Sustainable Development Zone
SIDA	Swedish International Development Cooperation Agency
SO	Strategic Objective
UNDP	United Nations Development Programme
UNESCO MAB	Man and Biosphere Reserve
UPA	Urban Protected Area
UWRNP	Una Wild River National Park
WBIF	Western Balkans Investment Framework
WDPA	World Database on Protected Areas
WRNP	Wild River National Park

Most rivers in Europe were protected after they were lost. ***The Una River can be protected while it is still wild.***

This is a generational decision.

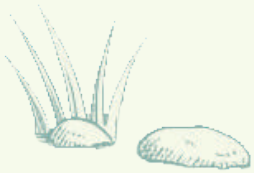
Una Wild River National Park is not only nature conservation. It is cross-border diplomacy, EU Green Agenda alignment, international funding leverage, sustainable tourism potential and long-term water security.

II

351 KM² OF SHARED NATURAL HERITAGE

A single transboundary protected area - Bosnia and Herzegovina and Croatia united by one living river system.







I

657 KM FREE-FLOWING RIVERS

From source to confluence with the Sava - one of the longest protected wild river corridors in Europe.





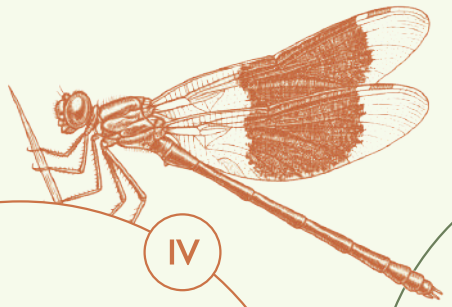


III

OVER 450 SPECIES PROTECTED

Otter. Olm. Black stork. Kingfisher. Stone crayfish. A biodiversity reservoir of continental importance.





IV

DANUBE SALMON STRONGHOLD

The Una hosts one of Europe's last large, self-sustaining populations of *Hucho hucho* (Danube salmon), a Vulnerable IUCN species, disappearing elsewhere across the continent.

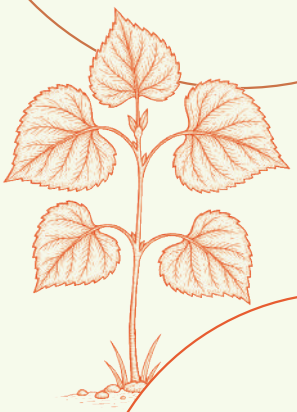
VI

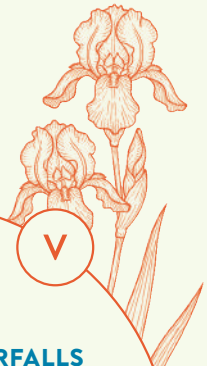
92% BARRIER-FREE CORE CORRIDOR

The park would guarantee a permanent absence of dams and artificial barriers along almost the entire river length - a rarity in modern Europe.









V

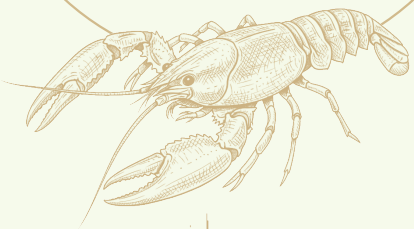
UNIQUE TUFA WATERFALLS

The waterfalls along the Una are not only of scenic beauty - they are fragile geological masterpieces built by mellennia of living river processes.

VII

A SOURCE-TO-MOUTH RIVER PROTECTION VISION

Not a fragmented park. Not an isolated reserve. But a living, continuous river system — protected as one ecological whole.











Protecting the Una River requires a healthy, intact river system. The proposed Una Wild River National Park would therefore safeguard the main river and 15 free-flowing tributaries, totaling 657 kilometers of waterways across Bosnia and Herzegovina and Croatia.

© Bruno D'Amicis

2. EXECUTIVE SUMMARY

The Una Wild River National Park (UWRNP) Feasibility Study (2025) provides a detailed and multidisciplinary evaluation of the potential to establish a transboundary Wild River National Park along the Una River and its tributaries, shared between Bosnia and Herzegovina and Croatia. The study aligns with the International Union for Conservation of Nature (IUCN) Category II guidelines for national parks.

2.1. RIVERS AND CATCHMENT AREA

The proposed UWRNP covers approximately 351,60 km^2 and includes 657,66 km of river courses. The Una River system consists of the Una and 15 tributaries: Dabar, Gomjenica, Japra, Klokot, Korčanica, Krka, Krušnica, Mlječanica, Ribnik, Sana, Sanica, Srebrnica, Sredića, Unac, and Žirovnica. This interconnected karst river network is one of Europe's last free-flowing systems, characterized by outstanding hydromorphological integrity, tufa cascades, waterfalls, and diverse aquatic habitats.



© Bruno D'Amicis

2.2. INCLUDED RIVERS



© E.C.O./Kovarovics

Una River

The Una River stretches over 216 km, with a drainage area of 10.200 km². It originates at 520 m a.s.l. and meets the Sava River at 94 m a.s.l. Its flow regime is pluvio-nival, with spring peaks and winter floods. The upper Una shows a balanced karst flow, while the lower part experiences variations up to 3 m. The river is known for its tuff rock formations, waterfalls, and rich aquatic vegetation. Threats include hydropower development and riverbank housing.



© Ulrich Eichelmann

Srebrnica and Sredica

These two headwaters of the Una (14 km and 10 km long) form wide wetlands and wet grasslands before joining the main river. They are ecologically valuable areas that support diverse habitats.



© Ulrich Eichelmann

Krka

The Krka River, 5 km long with a catchment of 119 km², is a short karst river forming meanders and gravel bars in its valley. It displays a typical karst hydrology.



© Ulrich Eichelmann

Unac

With a length of 46 km and 1,161 km² catchment, the Unac River is a major right tributary of the Una. It originates from complex karst systems, disappears in poljes, and reappears through floodplain forests before entering a gorge at Martin Brod. Some regulation near Drvar affects its natural flow.



© Anna Kovarovics

Klokot

A short (5 km) but water-rich karst tributary with 15 m³/s discharge. It forms a plain north of Bihać and acts as a flood retention area. Main threats include fish farming near its spring and potential construction of houses.



© Anes Halkić

Krušnica

The 7 km long Krušnica (301 km² basin) has an average discharge of 8 m³/s. It flows from an impressive karst spring with a rock wall and cave. Small hydropower plants and intensive fishing pose risks.



© Anes Halkić

Žirovnica

A 24 km long non-karstic tributary with a meandering lowland course, surrounded by floodplain forests and wet grasslands.



© Jan Janković

Mlječanica

The 32 km long Mlječanica is another non-karst river characterized by meandering courses and floodplain forests along its lower reaches.



© Matic Oblak

Sana River

The Sana River flows 141 km, draining 4.189 km^2. Its pluvio-nival regime results in spring and winter high flows. Compared to the Una, it features fewer waterfalls and more floodplains. The tuff riverbed supports rich macrophyte growth in summer. Main threats come from urbanization, especially near Prijedor.



© Anes Halkić

Japra

The Japra River (48 km) is a non-karstic tributary flowing through hilly terrain into plains. Its meandering channels and extensive wet grasslands are ecologically important.



© Sead Badnjević

Dabar

The Dabar River (4 km) is a small karst stream with a narrow valley surrounded by forests. A hydropower plant near its spring affects its natural regime.



© Anes Halkić

Korčanica

The Korčanica (2km) is a short karstic tributary of the Sanica. Known as important spawning ground for salmonid fish species, it is increasingly pressure from fish farming and river regulation.



© Anes Halkić

Ribnik

The Ribnik (5 km) is a short, water-rich karst tributary. Its clear water and forested surroundings are scenic, but a large fish farm in its basin contributes to nutrient pollution.



© Anna Kovarovics

Sanica

The Sanica (20 km) is a tributary of the Sana, known especially for its crystal-clear water and its abundance of wild fish.

2.3. ZONING CONCEPT

The park's zoning concept follows ecological, hydrological, and landscape criteria, ensuring full protection of natural river processes while allowing for sustainable local development. The five proposed zones are:

Zone	Abbreviation	Area (km²)	Description
Core Zone A	CORE A	30,5	Pristine river sections and islands under strict protection.
Core Zone B	CORE B	2,9	Restoration areas within the core zone.
Natural River Dynamic Zone	RDZ-N	160,1	Natural river-floodplain dynamics and hydrological connectivity.
Cultural River Dynamic Zone	RDZ-C	115,3	Areas with traditional land use in balance with nature.
Sustainable Development Zone	SDZ	42,8	Settlements, eco-tourism, and sustainable land use activities.

The proposed Una Wild River National Park covers 657,66 km of rivers and a total area of 351,60 km², with Core Zones A and B comprising 33,4 km², the Natural River Dynamic Zone 160,1 km², the Cultural River Dynamic Zone 115,3 km², and the Sustainable Development Zone 42,8 km².

Maps showing the entire course of the Una River System included in the proposed transboundary Una Wild River National Park are available here: https://shorturl.at/LuNrn

Maps showing sections of the rivers incuded in the proposed Una WRNP are shown in the Annex to this report (in a pdf format).

A 30-meter riparian buffer zone along both banks is recommended to mitigate external impacts such as erosion, nutrient runoff, and traffic. Urban Protected Areas (UPAs) for towns like Bihać, Sanski Most, Prijedor, and Bosanska Krupa will connect communities to conservation and eco-tourism initiatives.

2.4. KEY ECOLOGICAL AND CULTURAL VALUES

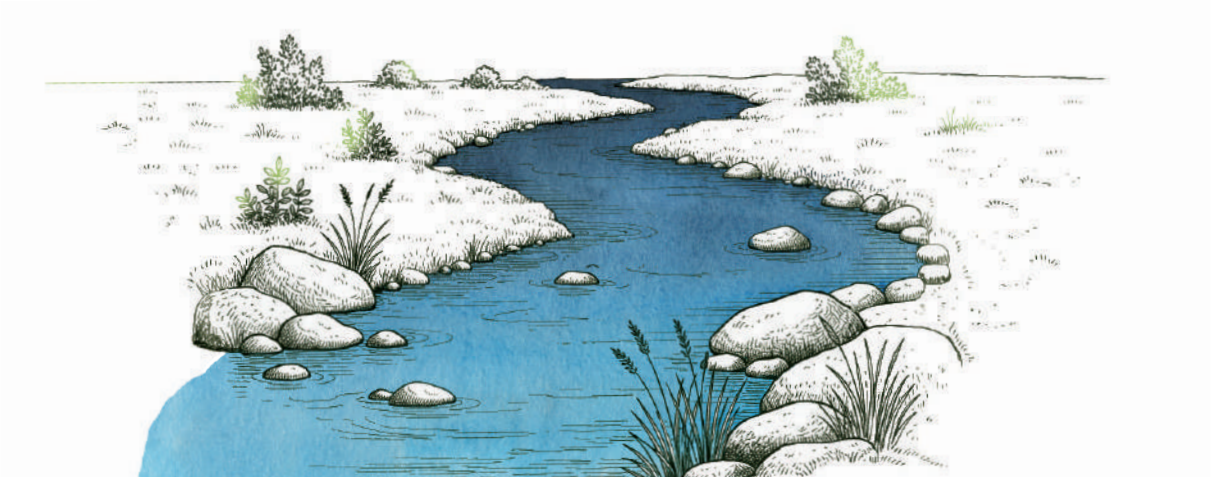
The Una River and its tributaries represent one of the most intact river ecosystems in the Balkans. The ecological values include:

- Free-flowing hydrology without significant artificial barriers.
- Unique karstic tufa cascades, waterfalls, and travertine formations such as Štrbački Buk and Martin Brod.
- Exceptional habitat diversity – from deep pools and rapids to floodplain forests and wetlands.
- Connectivity between aquatic and terrestrial ecosystems supporting high biodiversity.
- Cultural and socio-economic values are equally significant.
- Centuries-old coexistence between local communities and the river, reflected in traditional settlements, water mills, and agricultural landscapes.
- The river as a symbol of identity and unity for people across the Bosnia–Croatia border.
- Potential for sustainable tourism, education, and recreation.
- Contribution to climate resilience and water security for regional populations.

2.5. KEY SPECIES AND BIODIVERSITY

The Una River system supports exceptional aquatic and riparian biodiversity, with several globally or regionally endangered species:

- *Hucho hucho* (Danube salmon) – Vulnerable (IUCN), Annex II Habitats Directive. The Una hosts one of the last large, self-sustaining populations in Europe.
- *Lutra lutra* (European otter) – Near Threatened, Annex II & IV Habitats Directive.
- *Cottus gobio* (Bullhead) – Least Concern, Annex II Habitats Directive.
- *Austropotamobius torrentium* (Stone crayfish) – Annex II & V Habitats Directive.
- *Proteus anguinus* (Olm) – rare cave-dwelling amphibian recorded in the Krušnica River.
- *Ciconia nigra* (Black stork), *Alcedo atthis* (Kingfisher), and numerous bird species dependent on riparian habitats.
- Over 450 recorded species of vertebrates, plants, and invertebrates highlight the global importance of the Una River basin for biodiversity conservation.



2.6. THREATS AND PRESSURES

Despite its high natural integrity, the Una River system faces several existing and emerging threats:

- Hydropower development – existing hydropower plants (e.g., Kostela, Medna) and new project proposals threaten longitudinal connectivity.
- Illegal construction – unregulated tourism and private housing in riparian zones undermine habitat quality.
- Water abstraction – excessive withdrawals for irrigation and industry alter flow regimes.
- Gravel and sediment extraction – localized but harmful to aquatic habitats.
- Pollution – municipal wastewater, agriculture, and small-scale industry contribute to nutrient and chemical pollution.
- Invasive species – particularly along modified floodplains.
- Climate change – altered precipitation and increased drought frequency may reduce flow and habitat resilience.
- Mitigation strategies include stricter permitting, improved wastewater management, transboundary monitoring, and stakeholder engagement.



2.7. FEASIBILITY ASSESSMENT

1. Ecological Feasibility - **HIGH:** The Una River System remains among Europe's best-preserved hydromorphological systems, supporting rich and diverse species and habitats. Its free-flowing regime and biodiversity provide a strong foundation for Category II designation.

2. Legal and Governance Feasibility - **HIGH:** Existing national and EU-aligned legislation supports the establishment of a transboundary protected area. A four-tier governance model (Intergovernmental Commission, Transboundary Park Council, Technical Secretariat, Park Manager) ensures joint management.

3. Financial Feasibility - **MODERATE TO HIGH:** Feasible through state budgets, EU programs (IPA, LIFE, Horizon...), international funding (EBRD, KfW, Sida, UNDP...), and sustainable tourism. Long-term financing could be supported by ecosystem service payments.

4. Socio-Political Feasibility - **HIGH:** Strong stakeholder support and local ownership. The future Una Wild River National Park aligns with cross-border cooperation priorities and the EU Green Agenda for the Western Balkans.

2.8. PROPOSED GOVERNANCE MODEL AND STAFFING

A four-level governance model for the transboundary Una WRNP has been proposed:

Intergovernmental level: Joint Intergovernmental Commission
Management level: Transboundary Park Council
Technical coordination level: Joint Technical Secretariat
Implementation level: Existing PA/Natura 2000 bodies, coordinated by a new **Una WRNP Manager**, ensure daily field implementation across the entire park.

It is also proposed to establish a **Joint Scientific/Advisory Body to advise on management and ensure the involvement of key stakeholders in management. The minimum staffing level is estimated at 42 employees. Seven work programs have been proposed for the management of the Una WRNP.**

2.9. ESTIMATION OF THE UNA WRNP OPERATIONAL COSTS

Rough estimate of Una WRNP management costs is based on the costs incurred on an annual and multi-year basis and a separate capital investment cost category:



Annual recurring costs are fixed, every-year operating expenses, which include salaries for 42 staff and routine operations like utilities, fuel, maintenance, IT, training, etc.

"Not every year's" (or one-off / multi-year) costs cover the costs for irregular program, outreach, infrastructure and equipment development, and planning items whose amounts vary by year.

Total capital investment costs comprise costs for large, one-time capital projects implemented over several years, including the design, permits, construction and equipment for one large visitor's center.

2.10. ROADMAP AND PROPOSED TIMELINES

The steps in the roadmap for establishment of the Una Wild River National Park are illustrated in the diagram below:



Short description of key steps/activities includes:

Preparatory phase:
Professional conservation institutions in both countries prepare a Protection Study that identifies natural values, proposes the protected-area category, and defines baseline protection regimes to justify legal designation.

↓

Legal designation process:
Authorities review national and cross-border legal bases and complete parliamentary procedures, culminating in the legal act establishing the protected area.

↓

Institutional setup:
A dedicated management body (with rangers and core staff) is formed promptly after designation, with coordination links to existing PA/Natura 2000 managers.

↓

Initial management plan, zoning, and regimes:
A provisional plan details zones and permitted /prohibited activities aligned with the founding legal act and existing planning documents.

↓

Stakeholder engagement:
Early, structured involvement of NGOs, scientists, landowners/users, and local communities builds understanding of objectives, zones, and rules and secures participation.

↓

Financing and resources:
Governments ensure core staffing while additional resources come from EU and donors, under a long-term sustainable financing strategy (including own revenues) and staff training.

↓

Pilot actions:
Visible early measures (signage, promotion, participatory activities, eco-tourism pilots) demonstrate benefits and build public support.

↓

Monitoring and evaluation:
A capacity-appropriate monitoring plan enables adaptive management, starting as soon as possible after designation to guide improvements.





In a Una Wild River National Park the rivers would be protected including a 30 m buffer zone on each side. From the source in Croatia to the confluence with Sava.

© Dick Harrewijn

The table below shows a proposed timeline for establishment of the Una Wild River National Park, which is basically conceived as a six-year plan:

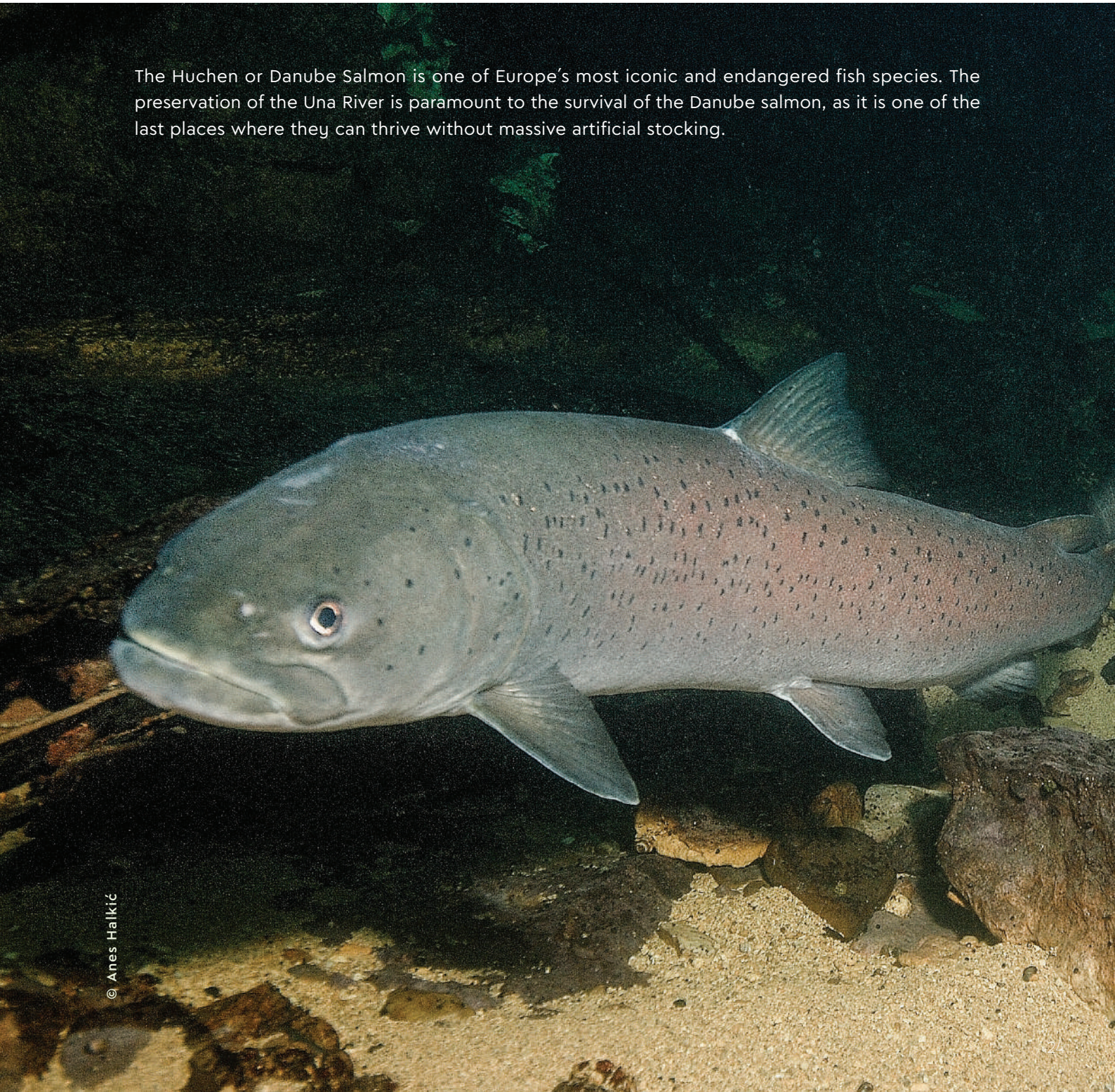
	Year 1/ milestone	Year 2-3 / milestone	Year 4-5 / milestone	Year 6 milestone
Preparatory phase	Protection Study			
Legal designation process		Declaration of the NP		
Institutional Setup			Management authority and staff	
Management plan, zoning, regimes		Management plan with detailed zones		
Financing & Resources			Yearly budget approved	Yearly budget approved
Pilot Actions	Awareness campaign	Awareness campaign	Initial signage completed	Information points
Monitoring & Evaluation		Monitoring program elaborated	Monitoring & adaptive management	Monitoring & adaptive management
Stakeholder engagement	1st round of public participation concluded		2nd round of public participation concluded	

2.11. OVERALL CONCLUSION

The Una Wild River National Park is ecologically justified, legally feasible, financially viable, and socially supported. It represents a pioneering transboundary model for river protection in Southeast Europe. The establishment of the park will safeguard one of Europe's last wild rivers, enhance regional cooperation, and create long-term benefits for both people and nature.

"The Una remains wild – a living symbol of Europe's natural heritage, unity, and the harmony between people and rivers."

The Huchen or Danube Salmon is one of Europe's most iconic and endangered fish species. The preservation of the Una River is paramount to the survival of the Danube salmon, as it is one of the last places where they can thrive without massive artificial stocking.



© Anes Halkić

3. INTRODUCTION

Freshwater ecosystems, such as rivers, lakes, and wetlands, cover less than 1% of the Earth's surface, but harbour 10% of all species on the planet (Strayer & Dudgeon, 2010); these habitats are particularly important for vertebrates, a third of which live in these habitats. Freshwater ecosystems are a source of ecosystem services, i.e. benefits that humans derive from nature, for billions of people (Lynch et al., 2016); these benefits include providing clean water, food and materials, flood control, regulating microclimatic conditions and helping to mitigate climate change, to name but a few.

The threats to freshwater ecosystems can be divided into the following categories (Grill et al. 2019):

- changes in water quantity and flow,
- the loss of connectivity through the construction of dams, barriers, and other infrastructure,
- pollution,
- habitat alteration and degradation,
- overexploitation of species and natural resources,
- invasive species.

Rivers are linear spatial elements, and their length from source to mouth is their most prominent spatial component, although the connections between the riverbed in the vertical direction and in both directions perpendicular to the river course are of crucial importance for both natural and modified habitats and their biota. It is this clearly dominant single dimension of water flow that poses particular challenges for the protection of river ecosystems.

Rivers flow through different ecosystems, through different landscape and administrative units, and often across national borders, requiring a specific approach to achieving river protection and conservation objectives. Surprisingly, given the importance of water as a fundamental component of life on the planet, recommendations to mitigate the global biodiversity crisis have mostly focused on terrestrial ecosystems (e.g., forests, grasslands; Kok et al. 2018) or recommend increasing the size and effectiveness of protected areas (Visconti et al. 2019).

The IUCN classification of protected areas does not provide a specific strategy for the protection and management of river ecosystems, although, as mentioned above, rivers are clearly "linear" and non-spatial elements compared to most other terrestrial (and, of course, marine) ecosystems.



3.1. BALKAN RIVERS UNDER THREAT

Balkan rivers rank among Europe's most intact and biodiverse waterways, yet they face growing pressure. Public concern typically spikes after visible crises - floods, droughts, or obvious pollution - while less visible, chronic threats draw less attention. Thanks to the Save the Blue Heart of Europe campaign, awareness has increased about the damage caused by dams and hydropower. The creation of the Vjosa Wild River National Park in Albania is a landmark example for river protection across the region.

Beyond dams, three under-recognized threats persist:

(1) gravel and sediment extraction from riverbeds for construction,

(2) water abstraction for irrigation, often without effective enforcement of environmental flows and,

(3) unregulated building along riverbanks. On the Una, gravel extraction is less severe due to limited deposits. However, illegal or poorly controlled irrigation withdrawals remain common - "water theft" is culturally entrenched in places, and while tapping aquifers could reduce river pressure, costs deter both users and authorities. Most acute on the Una and its tributaries is unauthorized construction - weekend houses and tourist facilities densely packed into the riparian zone - undermining habitat integrity and river dynamics, together with waer pollution (industry, municipal wasterwater, fish farms).

1

"Vjosa Wild River National Park"
– a precedent to learn from

In March 2023, the Vjosa River in Albania was declared Europe's first Wild River National Park, setting a global precedent for freshwater conservation. This landmark decision protected over 400 kilometres of free-flowing rivers and streams under IUCN Category II standards. The Vjosa success story proves that "source-to-mouth" protection is a viable political and economic model that attracts global visibility and sustainable tourism investment.

While the Vjosa provides a valuable roadmap for corridor-wide zoning and "no-barrier" regulations, the Una WRNP must be adapted to its own unique landscape. Unlike the gravel-bed Vjosa, the Una is a karst river system defined by fragile tufa cascades and complex groundwater interactions. Furthermore, the Una requires a transboundary governance model between Bosnia and Herzegovina and Croatia, a complexity not present in the Vjosa's initial phase. By learning from the Vjosa's success while tailoring management to the Una's specific karst ecology and political borders, the UWRNP can become the next great milestone in European river protection.

3.2. AIMS OF THE STUDY

The aim of this feasibility study is to demonstrate the importance and, above all, the possible solutions for implementing a conservation and management model that preserves the Una and its tributaries, its plant and animal species, its diverse habitats and the entire river ecosystem for future generations. To this end, certain conditions must be met and maintained along the entire course of the river from source to mouth, including all major tributaries and the first floodplain along the river. In practice, this also means co-operation between Croatia and Bosnia and Herzegovina, as the river flows through both countries.

In terms of content, the study is justifying the establishment of a "Wild River National Park", proposing the boundaries of the area under protection, and suggesting a "transboundary management model" with an assessment of the capacity required to manage such a protected area. International protected area standards (IUCN) and best practices were taken into consideration when drafting the study.

Una cateracts in Martin Brod,
inside existing Una National Park.



4. SUMMARY OF THE METHODOLOGY APPLIED

To delineate the outer boundaries and define the zoning of the proposed Una Wild River National Park, an integrated spatial–ecological workflow combining desk-based GIS analysis, targeted field verification, and iterative suitability scoring was applied:

Hydromorphological & habitat base-mapping:

The Una and its major tributaries were mapped as a connected corridor system, classifying in-channel and riparian habitats (e.g., tufa cascades, riffles, islands, oxbows, backwaters, gallery forests) and recording artificial modifications and restoration opportunities. This provided the ecological backbone for boundary options and zone placement.

River-corridor focus area & buffers:

The river network was buffered into nested corridors and subdivided into 1.000 m segments to structure comparison along the system. Segment-level attributes were then analyzed consistently across the study area.

Multi-criteria GIS suitability analysis:

Using existing datasets - OpenStreetMap (roads, buildings) and CORINE Land Cover - each segment was scored for conservation suitability. Roads were quantified as running meters/ha (motorized/high-grade roads reducing suitability; footways neutral/positive), building density reduced suitability, while natural land-cover classes (e.g., broad-leaved forest, inland marshes) increased it. Segment scores were aggregated to identify corridors with high potential for strict protection, buffer protection, or no protection.

Boundary delimitation:

The prospective flood zone of the Una and its tributaries—derived from hydromorphological assessment—framed the park's outer boundary envelope, ensuring inclusion of the functional riparian system while reflecting geomorphic dynamics characteristic of a karst river. Field observations (May 2025) and stakeholder inputs were used to validate and refine edges in areas of higher pressure or restoration potential.

Zoning design & dataset hierarchy:

Zonation was built by assigning mapped habitat/land-use classes to zone types according to their conservation value and sensitivity. Where multiple datasets overlapped, a hierarchy was applied (newly mapped riparian habitats > CORINE > OSM), ensuring the most specific ecological information guided zone placement. The result is a five-zone concept (plus two special-regulation areas) that concentrates core zones on highest-value, least-fragmented habitats and positions buffer/transition zones to absorb pressures while maintaining ecological connectivity.

A detailed, step-by-step description of the methodology (including data schemas, weighting tables, buffer parameters, and examples of segment scoring) is provided in Annex 1: Methodology applied and distribution of tasks.

5. INTERNATIONAL AND NATIONAL POLICY CONTEXT

Croatia (HR) and Bosnia & Herzegovina (BiH) are bound—at different stages—to a common set of conservation and water-management instruments relevant to the Una basin. At the global level, both are Parties to the Convention on Biological Diversity and the Kunming–Montreal Global Biodiversity Framework (30×30, restoration, spatial planning). Regionally, both are Parties to the Bern Convention (with the Emerald Network as BiH's operative site system and a complement to Natura 2000 in the EU).

Within the EU acquis, Croatia must implement the Birds and Habitats Directives (site designation, Article 6 safeguards, appropriate assessment) and the Water Framework Directive (good status, no deterioration, hydromorphology protection, public participation).

BiH, as a pre-accession country, is aligning national law and practice with these directives—designating Emerald sites as a stepping-stone toward Natura 2000 and integrating WFD principles in river-basin planning. These frameworks collectively emphasize free-flowing rivers, riparian habitat conservation, connectivity, and rigorous screening of plans and projects.

Nationally, this translates into Croatia's binding Natura 2000 obligations and River Basin Management Plans that already cover the Una sub-basin, while BiH is expected to transpose comparable safeguards, inventory priority habitats and species, and operationalize Emerald areas with effective management. In both cases, transboundary coordination and joint monitoring are intrinsic requirements for achieving conservation outcomes in shared catchments.

Under these international and national commitments, both countries have an obligation to protect their most valuable natural areas—explicitly including the Una River and its tributaries—and to manage them to maintain or enhance ecological integrity and free-flowing river processes.

6. IUCN STANDARDS AND CATEGORY II NATIONAL PARK – RELEVANCE FOR A WILD RIVER

IUCN assigns categories by primary management objective, not by name; an area must first meet the IUCN protected area definition, and the principal objective should be achieved on ≥75% of its surface. For a Category II river park, conservation has priority over other uses and management must maintain or increase naturalness—safeguarding free-flowing conditions, riparian processes, and longitudinal connectivity. Zoning can accommodate compatible uses only where they do not compromise the Category II objective, while nested areas (e.g., existing sites) may retain their own categories. Applied to Una WRNP, this framework focuses protection on the wild river corridor and its core habitats, with buffers that absorb pressure without undermining the park's conservation purpose.



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7. CONCEPT OF A WILD RIVER NATIONAL PARK

This chapter explains the principles of the 'Wild River National Park' model and its alignment with IUCN Category II objectives, placing free-flowing rivers and their natural processes at the centre of protection efforts. It also outlines the specific conservation goals, zoning principles, and governance approaches required for effective transboundary management.

7.1. EXPLANATION OF FREE-FLOWING RIVERS AND THEIR ECOLOGICAL FUNCTIONS

A river ecosystem is a dynamic and interconnected ecological system comprising:

- the river channel (it serves as the central ecological artery, transporting water, sediments, nutrients, and organisms; the unregulated flow regime is fundamental to sustaining the structure and function of the entire river corridor),
- free-flowing tributaries (they contribute to the hydrological variability, sediment inputs, habitat heterogeneity, enable genetic flow and provide feeding and reproduction zones for aquatic and riparian species),
- associated riparian zones, floodplains, wetlands, groundwater interactions and,
- the full spectrum of native biodiversity, including: fish, macroinvertebrates, and amphibians adapted to the river's natural hydrology and sediment dynamics, native plant communities that depend on seasonal inundation and fluvial disturbance, bird and mammal species that rely on the river corridor and its wetlands and organisms that support nutrient cycling, water purification, and soil development (microbial and soil species).

The natural river ecosystem is shaped by natural hydrological, geomorphological and ecological processes that support a full range of native biodiversity, maintain habitat diversity, and sustain critical ecosystem services.

The key ecological processes include:

- natural flow regimes, with seasonal variability in water flow,
- sediment transport, which is sustained by erosion, transport and deposition processes on islands, gravel bars, banks, side channels, and floodplains,
- longitudinal (upstream-downstream), lateral (river-floodplain), and vertical (surface-groundwater) connectivity, which is vital to species migration, nutrient cycling, and aquifer recharge,
- natural disturbances (such as floods and bank erosion), which are essential for habitat renewal and biodiversity maintenance.

7.2. DEFINITION AND PRINCIPLES OF WILD RIVER NATIONAL PARK

The Wild River protection concept stands apart from traditional models of national parks, which are typically established to protect large, undisturbed natural areas such as forests, wetlands, or mountainous regions. In contrast, this approach is focused specifically on the conservation of river systems, which represent primarily linear spatial features rather than expansive, two-dimensional ecosystems.

In practice, the Wild River protection encompasses mainly the water surface of the river and its immediate floodplain, but also those key spatial components, point features and linear structures in the landscape, that are critical to ensuring sufficient water quantity and ecological function. Linear structures and point features include tributaries, springs, side channels, wetlands along the banks, and sediment sources such as erosion zones, rocky outcrops, gravel beds, and mountain torrents.

The central aim of the river protection management is to ensure that the river remains in a free-flowing state along its entire course—from its source to its mouth—along with all major tributaries.

A free-flowing river is defined by

- the absence of artificial interruptions such as dams, barriers, or impoundments, and
- the prohibition of urbanization or intensive resource use along the riparian corridor.

To maintain this condition, it is essential to strictly regulate or fully prohibit the commercial extraction of mineral resources from the riverbed and its banks. Similarly, water abstraction from the river—for purposes such as irrigation or industrial use—must be limited or carefully controlled to avoid disrupting natural flow regimes.

Preserving the river's free-flowing character is essential for maintaining its original biodiversity, both within the water body and the narrow riparian zone. It also ensures the uninterrupted functioning of all key natural processes that sustain the health of the river ecosystem. These include the natural flow of water, sediment transport, and the river's erosive and depositional dynamics. The integrity of natural river features such as oxbow lakes, deep pools, shallow zones, islands, and undisturbed banks is also preserved under this model, supporting a diverse and resilient ecosystem.

Because rivers are inherently linear in nature, they often cross the boundaries of multiple administrative units, including several municipalities or even countries. This can present challenges in coordination but also unique advantages. One of the key strengths of the Wild River protection model lies in land ownership: while many terrestrial ecosystems in traditional parks (like forests) are privately owned, the majority of riverbeds and their immediate buffer zones are typically public property, owned by the state. As a result, protecting the river ecosystem generally does not require intervention in private property rights. This avoids the common complications of land acquisition or expropriation, making the creation and implementation of the park more feasible and less contentious.

7.2.1. WILD RIVER NATIONAL PARK IUCN CATEGORY II – MANAGEMENT OBJECTIVE

The primary management objective of the IUCN Category II Wild River National Park is as follows:

To protect large-scale ecological processes and the full range of native species and ecosystems associated with a naturally functioning river system, while also providing opportunities for environmentally and culturally compatible visitor use, education, and scientific research.

This designation directly supports the IUCN protected area Category II objective:

"To protect natural biodiversity along with its underlying ecological structure and supporting environmental processes, and to promote education and recreation."

7.2.2. WILD RIVER NATIONAL PARK IUCN CATEGORY II – CONSERVATION GOALS

The most important conservation goals of Wild River National Park can be summarised as follows:

- To preserve the river's ability to flow, flood, erode and meander without human intervention.
- To ensure dynamic habitat succession through unregulated physical processes.
- Maintaining connectivity in the river landscape for ecological and hydrological continuity.
- Providing a reference area for ecological research and long-term environmental monitoring.
- Facilitate public access with low levels of intervention and interpretation to promote understanding and appreciation of wild rivers.

2

Recreation and tourism in IUCN ctg. II national parks
(Dudley, 2008)

The primary management objectives of an IUCN category II national park naturally include recreation, which generally does not require any additional intervention in the area (e.g. construction of recreational facilities), is primarily based on human movement (and not on the use of motorised vehicles), is carried out quietly and not on a large scale, and whose main criterion is not sporting performance but well-being and health.

Tourism is – even if it often seems otherwise – subordinate to the primary goal of nature conservation in a national park. It can be practised to an extent and in a manner that does not run counter to the primary objective of protecting unspoilt biodiversity and ecological (natural) processes, namely to the extent that it "supports sustainable economic development, primarily through recreation and tourism, which can contribute to the local and national economy and in particular to local communities."



Famous waterfall Štrbački Buk, a favourite site for tourists. Recreation is part of the national park concept, but only to the extent that nature is not adversely affected.

7.2.3. APPLICATION OF THE IUCN '75% RULE' IN THE CASE OF THE WILD RIVER NATIONAL PARK

The special feature of the Wild River National Park concept is that its primary conservation objectives are focused on protecting a key ecosystem type—namely, the river ecosystem—which is distinctly »one-dimensional« or »linear« in comparison with other ecosystems present in the broader area of influence. This specificity has important implications for how the general IUCN guideline is applied, particularly the principle that "at least 75% of a protected area should be managed in accordance with its primary management objective (Dudley et al., 2008).

In the case of river ecosystems, this principle is interpreted in relation to their linear nature. Therefore, it is considered that at least 75% of the total river flow - including water surfaces and the narrower habitats crucial to river functioning, such as floodplains, islands, gravel bars, erosion zones, and subterranean springs—must be managed according to the »no-take« principles, characteristic for the primary management objective for the IUCN ctg. II sites. This includes safeguarding the river's hydrological regime, all related ecological processes (e.g. unimpeded flow, sediment transport), and the natural biodiversity both in the water and in the narrow impact zone (floodplains or river banks) along its course.

3

The Una Wild River National Park vision – A source-to-mouth solution

The proposed UWRNP introduces a pioneering transboundary model specifically designed to capture the dynamics of a free-flowing karst river. Unlike traditional land-based parks, the UWRNP would safeguard 657 kilometres of the Una and its 15 key tributaries as a single, living ecosystem. This 'source-to-mouth' approach creates a protected area of international significance, ensuring that the main river and the streams that feed it are managed as one inseparable unit. Crucially, this free-flowing model serves as the region's best defence against climate change; a healthy, unobstructed river is a natural sponge, absorbing floodwaters and maintaining essential groundwater levels during periods of extreme drought.

By applying the IUCN Category II "75% primary objective" rule, the park establishes a Core Zone along 92% of the river's length to ensure a permanent absence of artificial barriers. This core is surrounded with a mandatory 30-meter forested buffer strip.

Declaring the UWRNP would also bring a strong international dimension to the initiative, significantly increasing its visibility and credibility and, in turn, improving the chances of securing international funding and donor support.

This modular approach ensures that the 75% target is respected both within the linear river corridor system and within more spatially extensive terrestrial components of the protected area, if added to the territory of the 'wild river national park'.

7.2.4. WILD RIVER NATIONAL PARK IUCN CATEGORY II VERSUS OTHER PROTECTED AREA CATEGORIES

With the exception of Category III, which includes natural features, Category IV, which includes habitats and plant and/or animal species, and Category V, which is based on long-term interaction between humans and nature that has altered "man-made" ecosystems or cultural landscapes on land and at sea, the remaining management categories refer to natural ecosystems. Category VI includes natural ecosystems whose conservation is also ensured to a small extent by the application of sustainable use principles, while Categories I and II refer to natural and unmodified (or only slightly modified) natural ecosystems.

IUCN protected area category II can effectively protect a complex, intact and free-flowing river ecosystem with all important ecological processes (such as natural river flow, sediment transport and ecological connectivity) within a larger populated landscape.

8. DESCRIPTION OF THE AREA

This chapter describes the catchment area of the River Una. Within the concept of establishing a "Wild River National Park", it is crucial that the boundaries of the protected area focus on the narrower river ecosystem and not on the wider areas and different landscape units within the wider river catchment. Therefore, the description focuses more on the hydrological characteristics of the river and its tributaries.

The data for the area of the Una River and its tributaries (Una River System) are modest in content, scattered and mostly cover only individual sections of the watercourses.

Finally, data is also provided on existing protected areas and ecological connectivity areas. Here too, the areas covering parts of the Una and its tributaries are of particular importance.

The Una River and its tributaries in a nutshell

- Length of the main river: 212 km, length of all rivers proposed for inclusion in the UWRNP: 657,66 km,
- Size of the catchment area: 9.400 km^2,
- Average altitude of the main river: 546 metres above the sea level,
- The lowest point: mouth of the Una River into Sava at 92 metres above the sea level,
- Average discharge of the main river: 240 m^3/s (at the confluence with the Sava River),
- Main tributaries: the Sana (the biggest tributary: 141,28 km long with a catchment area of 3.782 km^2), the Unac, Klokot, Krušnica and Dabar (Bosnia and Herzegovina) and Korana and Glina (Croatia),
- Total length of watercourses in the catchment area: 10.190 km (4.177 km permanent; 6.012 km intermittent).

River types in the Una catchment

Most rivers in the Una catchment flow through single-thread channels in confined valleys, with only limited floodplain development. Broader floodplains with meandering channels are found mainly in the final 10 km of the Una before its confluence, in the lower Sana and Prijedor basin, and along several non-karst tributaries. The middle and upper Una are distinguished by numerous tufa terraces, cataracts, rapids, and islands. Overall, karst rivers in the region show confined channels with restricted lateral movement, in contrast to rivers with fine sediments that develop more dynamic meandering forms.

These geomorphological features make the Una a distinctive karst river system where habitat diversity is generated primarily by in-channel structures such as tufa terraces.

8.1. GEOGRAPHICAL DESCRIPTION

The Una River, with a length of 212 km, has its source in the karst area near Donja Suvaja in Croatia. The source is called Vrelo Une, one of the deepest springs in Croatia, more than 200 metres below the surface. The section in Croatia stretches only a few kilometres before entering Bosnia and Herzegovina, still on the karst substrate; the Una River forms the natural border between the two countries. Before it flows into the Sava at Jasenovac, the Una reaches Croatian territory again for a few kilometres; however, the river flows at a much lower altitude here. The upper part of the Una is considered a fast-flowing river, as rivers in mountainous regions often are. In the lower part, before the confluence with the Sava, the Una becomes a typical lowland river with much slower velocities and meanders.

The catchment area, largely limestone-dominated, stretches across western Bosnia and Herzegovina and central Croatia, is 9.400 km² in size and is part of the Danube catchment area. It is clearly a hilly and even mountainous area. The altitude of the catchment area decreases from south to north. The average altitude is 598,98 metres. The Una River flows at an average altitude of 546,03 metres. The tributaries of the Una River have the highest elevations – the Unac River has the highest average elevation of the basin at 933,5 m, while the Sana tributary has an elevation of 587,1 above the sea level. There are large differences in altitude throughout the basin – the highest point is Klekovača Mountain at 1,961 m, while the lowest point is the mouth of the Una River into the Sava at 92 m (Korjenić et al., 2017).

Steeper slopes occur on mountain peaks, in ravines and in areas with severe erosion. The lowest slopes are found in karst areas, river terraces and alluvial plains. The average slope of the entire area is 6,57° (Korjenić et al., 2017). Areas with higher relief energy exhibit greater erosion, while areas with lower relief energy represent accumulation areas that influence the occurrence of floods in the river catchment (Korjenić et al., 2017). On average, the river catchment has a moderately dissected relief – such areas make up around 55% of the river catchment. Flat and less dissected areas make up 40% of the entire catchment area. Only around 4.8% of the area has a highly dissected relief (Korjenić et al., 2017).

Due to various combinations of hydrogeographical factors (land cover, relief, rocky substrate), individual flood types usually only occur in certain areas (Trobec, 2016 and Korjenić et al., 2017).

The largest part of the catchment area is occupied by areas with north-western exposure, followed by areas with south-western exposure. Most mountain ranges and river valleys have a dinaric orientation in a northwest-southeast direction (Korjenić et al., 2017).

The free-flowing hydrology, karst geology in the upper parts and well-preserved riparian habitats make the Una a rare European river that has preserved its character as a wild river and is also known as a river of great biodiversity.

8.2. HYDROLOGICAL DESCRIPTION

Hydrologically speaking, most of the Una is a karst river fed by numerous karst springs, underground springs and tributaries. Precipitation in the catchment area averages 1.200–1.600 mm per year. The average discharge of the river at its confluence with the Sava is about 240 m^3/s.

The largest right tributary is the Sana (141,28 km long with a catchment area of 3.782 $km^{2)}$. Other important tributaries are the Unac, Klokot, Krušnica and Dabar from Bosnia and Herzegovina and Korana and Glina from Croatia (see Figure 1). Karst springs such as Klokot and Krušnica are characteristic karst springs that cool the main river with cold water from underground.



Figure 1: Map of the Una River and its main tributaries (Fluvius, 2025, based on Google Earth image).

The table below lists the length of the Una river and its tributaries (Fluvius, 2025).

River / tributary	Length (km)	River / tributary	Length (km)	River / tributary	Length (km)	River / tributary	Length (km)
Dabar	3,85	Korčanica	1,74	Ribnik	5,20	Sredica	9,81
Gomjenica	43,73	Krka	5,09	Sana	141,28	Una	215,59
Japra	48,42	Krušnica	7,51	Sanica	20,39	Unac	45,65
Klokot	4,58	Mlječanica	31,54	Srebrnica	13,99	Žirovnica	24,12

Table 1: Una River System - an estimation of its length (in km); Source: Fluvius, 2025

The total length of watercourses which are included in the proposed boundaries of the future Una Wild River National Park is 657,66 km, which would make it the longest in the Balkans.

The upper part of the Una River is fed by numerous karst springs that flow directly into the riverbed. The upper and middle parts of the catchment form a karst-carbonate complex with limited surface contact and more pronounced subsurface contact. The green line on Figure 2 shows the boundary between the karst (southern) and non-karst (northern) parts of the Una River basin.

The central part of the catchment belongs to a sedimentary-metamorphic complex with predominantly surface contact, while its northern parts are in contact with a molasse structure with limited subsurface contact (Schwarz, 2025).

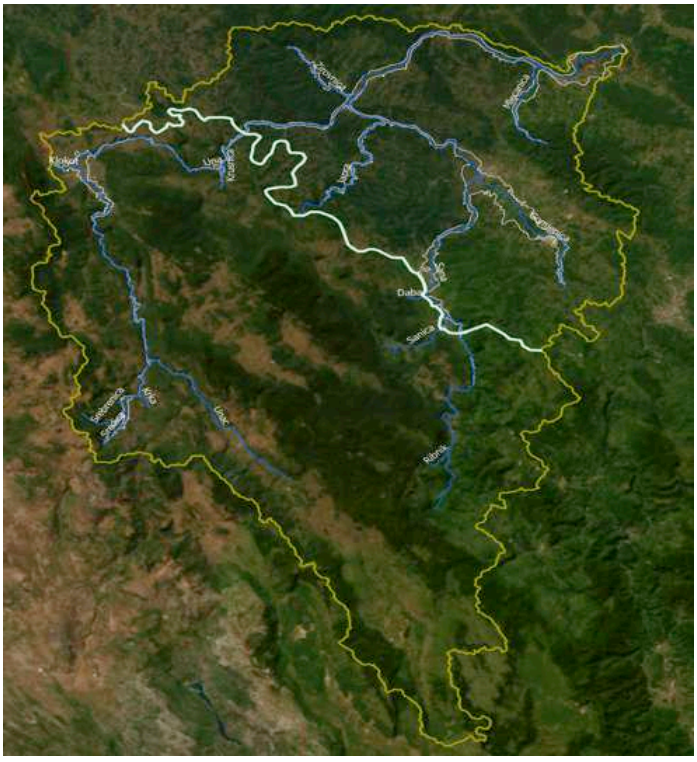


Figure 2: Catchment area map with rivers, floodplain and karst boundary (bold white; Karst is south of the boundary); (Fluvius, 2025, based on Google Earth image).

8.2.1. HYDROLOGICAL REGIME OF THE UNA RIVER

The Una River has a characteristic hydrological regime characterised by low summer flows and high spring and winter flows, which is called the "Posavina variant of the pluvio-nival water regime" (according to the classification established by Ilersic (1947)); this regime is characterised by the fact that the river has its highest discharges in March and April (due to snowmelt in the mountains, more precipitation and greater saturation of the soil with water) and its lowest discharges in August and September due to high evaporation (Gnjato et al, 2021 and Gnjato et al., 2024); there is little precipitation in July, August and September (Korjenić, 2014). In general, there are two specific periods in the Una river regime – a period of extremely low water levels (from June to October) and a period of high water levels (from November to May). The low water period is continuous, during the high water period in the winter months (January and February) the water level is slightly lower. The biggest tributaries of the Una – the Sana and the Unac – have almost the same water level regime. The water level depends on the morphological characteristics of the riverbed and the properties of the valley floor as well as the limestone barriers (Korjenić, 2014).

Water runoff also depends on the amount and distribution of precipitation and evaporation due to high air temperatures. For this reason, runoff is higher during periods of low precipitation in spring. The Una is characterised by pronounced seasonal fluctuations in discharge and the fact that the river has virtually no artificial regulation. These two features create the conditions for a rich biodiversity, which is supported by intact natural processes.

8.2.2. LONGITUDINAL PROFILE OF THE UNA RIVER

From its source to its mouth in the Sava, the Una has an irregular and gradual longitudinal profile. The largest breaks are in the upper upper reaches of the Una, where the gradient of the valley paths is 0.23%. Significant waterfalls were created in this section, which originated in initial breaks and were later enlarged by tufa deposits, such as the Martin Brod and Štrbački waterfalls. The irregular longitudinal profile of the Una is due to the numerous rapids in the riverbed through which the water flows.

8.2.3. HYDROMORPHOLOGICAL ASSESSMENT (HYMO)

In order to promote and emphasize the proposal of establishment of the potential Wild River National Park, the core analysis approach utilizes the drainage network and dams/barriers to identify larger free-flowing rivers and their catchments. This approach is primarily focused on assessing the hydromorphology (HYMO) of these free-flowing rivers.

HYMO assessment of the River Una and its tributaries exposes that there are only four hydropower plants and three reservoirs on the main rivers in the catchment area, which, with the exception of the two larger ones (Kostela on the Una and Medna on the Sana), have only a moderate impact on the overall HYMO status. The other two hydropower plants are located on the Krušnica River and inside of the city of Bihac on the Una river. Outside of the large cities and mining areas, frequent development has an impact on the riverbanks along the Una and Sana.

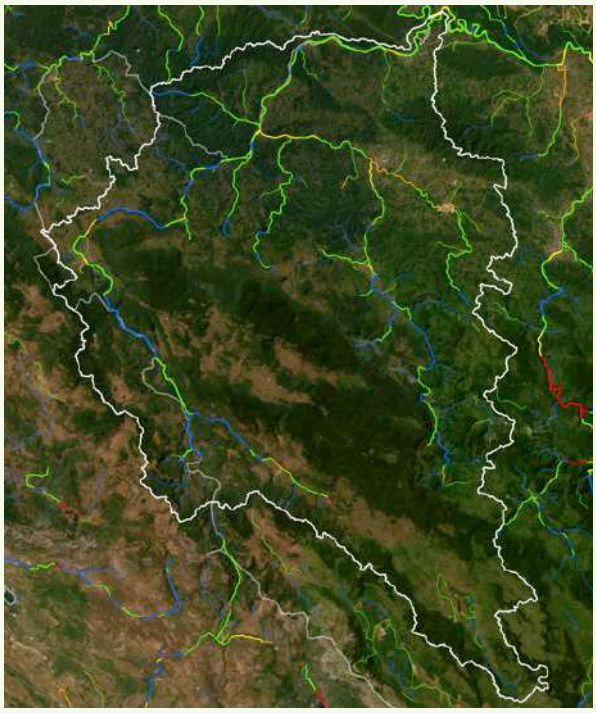


Figure 3: HYMO assessment for the Una catchment area (Schwarz 2025): Blue colour means pristine conditions (class 1), green (2), yellow (3), orange (4) up to red (5), completely modified rivers, mostly impoundments (Fluvius, 2025, based on Google Earth image).

Figure 4a: HYMO assessment including all small rivers in the catchment area (1,023 km). Less than 10% of all rivers are significantly altered (classes 3-5)

Figure 4b: HYMO assessment for larger rivers (573 km). With still almost 90% in the top two classes, the Una catchment should be considered one of the most intact catchments of this size in the Balkans.

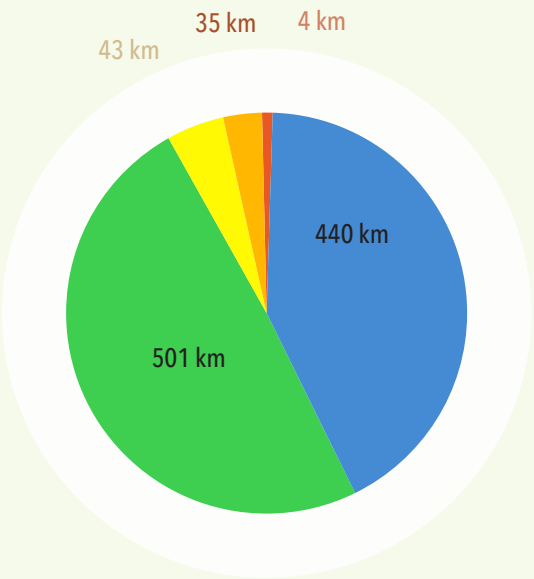


Figure 4a

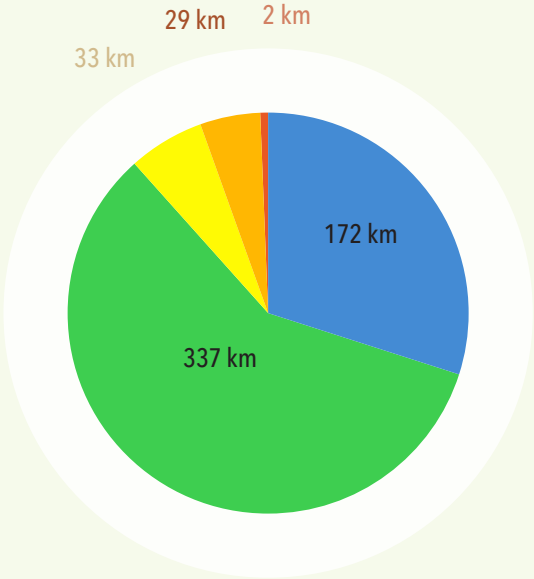


Figure 4b



Figure 5: Medna power plant on upper Sana river is one of 4 hydropower plants in the Una basin. It is not included in the Wild River National Park.

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8.3. "WILD RIVERS" OF THE BALKAN AND THE POSITION OF THE UNA RIVER

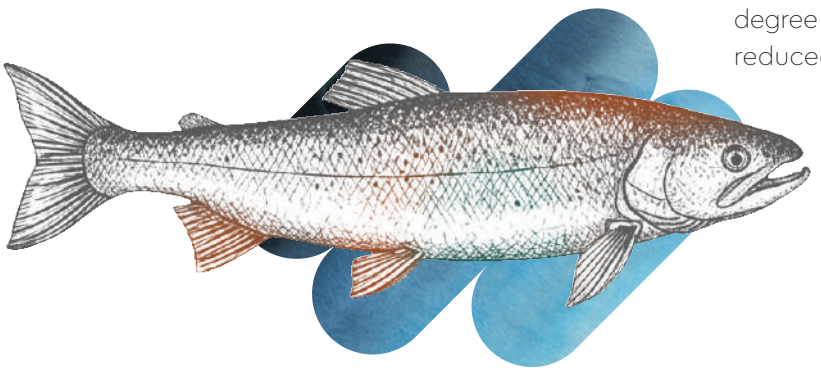
Schwarz (Fluvius, 2024) has developed a methodological approach and criteria to assess which rivers in the Balkans best fit the concept of 'wild river'. It used descriptions of biological and physical characteristics (including the minimum length of the river), the river's place in the larger land use pattern, its potential conservation status, and available data on its socio-economic and cultural significance. This approach enabled a consistent comparison of rivers across the Balkan region. The main parameters he compared in his analytical work include data on the hydromorphological status of rivers, their value in terms of biodiversity and landscape diversity, and data on the inclusion of watercourses or sections of watercourses in existing protected or conservation areas.

The socio-economic importance of rivers was assessed primarily on the basis of data on the traditional use and cultural values of the area and the role of rivers in providing ecosystem services such as flood protection and water purification. Other important assessment factors were existing and potential threats, in particular hydropower plants and dams, sediment removal from the riverbed, and urbanisation of the banks.

Particularly important are parameters that check the hydromorphological integrity of the river (whether the movement of water masses and sediments in the river is not impeded by structures such as weirs or dams, whether the river is in a natural or canalised or artificially reinforced bed, whether the original ecological structures such as pools, islands and gravel banks in the channel and whether there are still natural meanders, oxbow lakes, and parallel channels in the floodplain areas.

The biodiversity parameters were assessed on the basis of the most important aquatic and riparian species, especially those considered endangered or listed in the annexes of the Habitats and Birds Directives, and on the basis of the diversity of habitat types.

The results for each river are presented in a scoring matrix; the highest score is given to rivers that have the highest hydromorphological integrity (e.g., that they are truly free-flowing, that they are not fragmented, and that their first floodplain is as well preserved as possible, with a higher occurrence of endangered, rare and endemic species and habitats, and the possible legal status of a protected area), while threats such as hydropower or a high degree of urbanisation of the banks and floodplain reduced the overall score.



8.3.1. COMPARATIVE ASSESSMENT OF 'WILD RIVER' CANDIDATES IN THE BALKANS

The table below summarizes the assessment of three top-ranking Balkan rivers - Vjosa, Una, and Morača - based on the criteria applied in the 2024 Fluvius study. The scoring system ranges from 2 to 15, combining four key parameters: free-flowing length, catchment fragmentation, hydropeaking, and hydromorphology (HYMO).

River / Country	Free-flowing length (km)	Length Score (1–5)	Fragmentation Score (1–5)	HYMO Score (1–5)	Total Assessment Score
Vjosa (AL)	656	5	3	5	13 (Top Rank)
Una (BA/HR)	512 (incl. Sana)	3	2	5	10 (High Rank)
Morača (ME)	501	5	1	5	10 (High Rank)

Table 2: Assessment of three top-ranking Balkan rivers

Brief observations and conclusion:

- Vjosa scored the highest possible (13), reflecting its long free-flowing stretch and excellent hydromorphology.
- Una also ranked among the top due to its intact hydromorphology and connectivity with tributaries (e.g. Sana), though fragmentation reduced its score.
- Morača achieved a high naturalness score, but fragmentation and hydropeaking risks lowered its overall assessment.

All three rivers were identified as prime candidates for Wild River National Park designation due to their exceptional naturalness and free-flowing character. Following successful preparations, the Vjosa River in Albania has already been established as the first Wild River National Park in Europe.

However, it must be added that, despite certain similarities between the Vjosa, Una, and Morača rivers, both in terms of natural and social characteristics, there are also many differences and specific situations, so the approach applied to the Vjosa River in Albania cannot simply be transferred to other Balkan rivers. Nevertheless, we believe that this feasibility study is the first valuable justification towards the establishment of the Una Wild River National Park.

8.3.2. ELEVATION ZONES AND VEGETATION

The vertical profile of the Una River has seven altitudinal zones: supra-mediterranean, submontane, montane, supramontane, subalpine, alpine and subnival (Lakušić et al., 1991). The submontane zone predominates among all types. The characteristic vegetation in this area is mesophilic forests of oak and hornbeam (Epimedio-Carpinetum betuli (Ht. 1938) Borhidi 1963) (Horvat, 1949 and Boršić et al., 2012). At the mouth of the river, floodplain forests of black alder (Alnion glutinosae Malcuit 1929) and floodplain forests of willow and poplar (Salicion albae Soó 1930 and Populion albae Br.-Bl. 1931) predominate.

Along the lower course of the Una River (central Croatia), 20 main habitat types or mosaic areas with two or more different habitat types were mapped. The most common are rural mosaic landscapes, where cultivated fields, grasslands, hedges, shrubs, woodlands and rural areas alternate (Boršić et al., 2012; Jelić and Karaica, 2011).

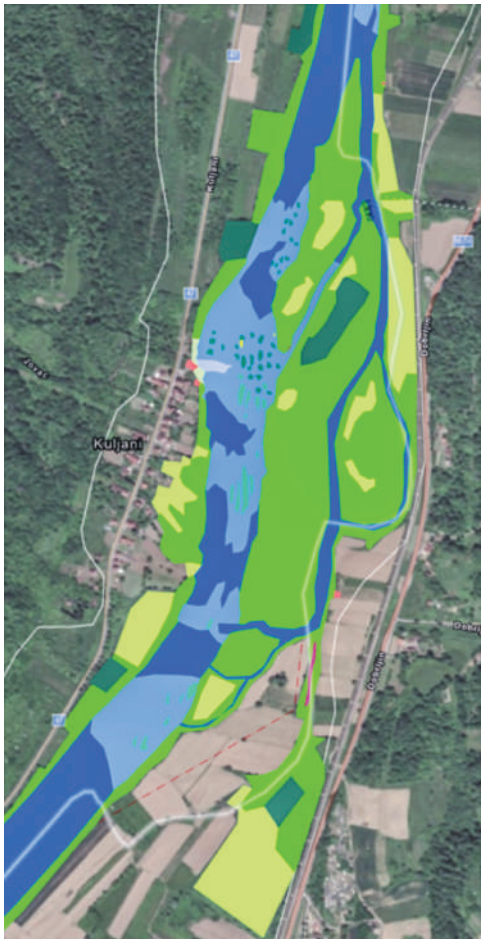
Figure 6: Succession of the Sana River; years 2013, 2016, 2019 and 2023 (Google Earth image).



8.5. HABITAT TYPES AND FEATURES IN RIVERINE AND RIPARIAN AREAS

Habitat types (as stated on the Annex I to the Habitats Directive; * indicates priority habitat types) on the Una River System are presented in the Annex 10. A total of 17 habitat types from Annex I of the Habitats Directive have been identified along the Una and its tributaries and are listed in Annex 10 to this Feasibility Study.

For the purposes of this study, the habitat types that were mapped in detail were adapted to the specific characteristics of the watercourse and its surrounding area. A total of 42 habitat types were identified. Figure 7 shows a selection of all mapped habitat types (42 in total) on the right, and an example of such mapping on the left.



- 01 River
- 02 Shallow river submerged tuff rock macrophytes
- 03 Tuff riffle, cascade waterfall
- 04 Tuff rock tree bars
- 05 Oxbow backwater
- 06 Gravel sand bars islands
- 07 Pioneer bars islands
- 08 Riparian forest
- 09 Riparian grassland
- 10 Ravine slope forest
- 11 Other slope forest
- 12 Reed swamp vegetation
- 13 Bankstrip nitrophilouse vegetation
- 14 Temp shallow sedges flood grass bars
- 15 Abandoned grassland
- 16 Other forests plantations woods amorpha
- 17 Rip corridor small tributaries
- 21 Small scale africulture
- 22 Arable fields
- 31 Riprap bank reinforcement
- 32 Gravel mining deposition
- 33 Filled gravel pit fish ponds
- 34 Reed succession fish ponds
- 41 Buildings settlements
- 42 Park sport recreation garden

Figure 7: Habitat types mapped along the Una River and all major tributaries; an excerpt from the habitat mapping is shown on the right (based on Google Earth image).

8.5.1. FEATURES AND HABITATS IN RIVER AND RIPARIAN AREAS THAT ARE OF PARTICULAR CONSERVATION VALUE

Certain elements in river courses and riparian areas are of particular conservation value. These areas have been specially mapped.

Within river courses these are:

- the river itself (main river and all tributaries are categorised as 'river'). Examples are shallow rivers with tufa, mosses, aerophytes and macrophytes; in the upper reaches also fast-flowing, shallow gravel and rocky banks,
- sintered rock trees (not in the sense of terrestrial habitats, but as a specific feature of tufa lakes and cataracts),
- cataracts, waterfalls,
- temporarily overgrown (tufa) bars (mosses, sedges, flood grass). Examples are sections of the Sana River that sometimes cover half of the river course at low water; in the upper reaches there are also permanently overgrown flat bars,
- sand/gravel bars and pioneer bars (rare in the Una, only common on the upper Sana),
- oxbows.

The analysis of mapping of the river features and habitats covers 12.881 polygons with a total area of 15.608 ha. It was found that deep waters cover 58% of the area, while shallow waters cover 35%. The remaining habitat types naturally cover significantly smaller areas; cataracts and waterfalls around 3%, shallow sand /gravel and pioneer bars around 2%, oxbows around 2%, and the rest even less.

The results of river habitat type mapping are shown in detail in the diagram below.

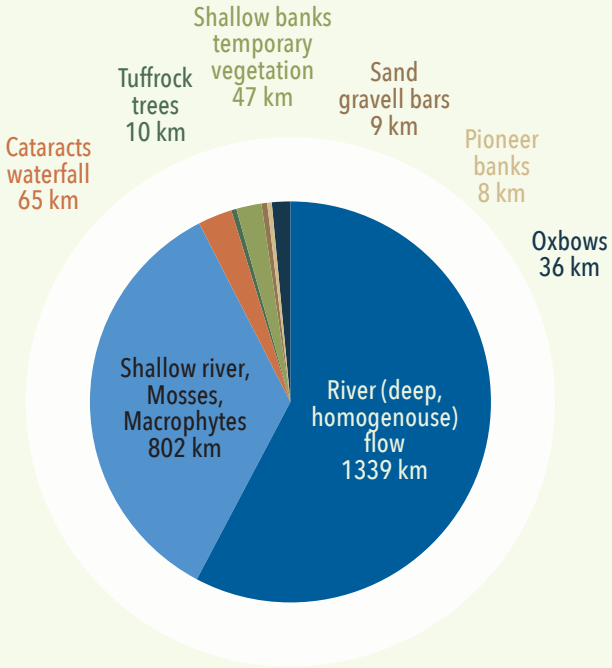


Figure 8: River features, the core of the proposed Una WRNP (totalling 2.316 ha).



Figure 9: Example of the main river type: the Sana river flows gently after a sharp bend with islands (background)



Figure 10: Example on the Una (Novi Grad to Bosanska Krupa).



Figure 11: Example of distinctive and larger gravel bars on upper Sana.



Figure 12: Due to the rather small lateral displacement and dynamics of the Una karst river, large oxbow lakes can only be found near the confluence with the Sava.

Elements in riparian areas of particular conservation value are

- riparian forests
- riparian grasslands
- reeds and marshy vegetation in the floodplain
- abandoned grassland
- riparian corridor of small tributaries
- ravine and slope forests

Riparian forests cover 52%, riparian grassland 34%, abandoned grasslands 9%, ravine forests 4% and reed and marsh vegetation 1% of the riparian areas. The results of river habitat type mapping are shown in detail in the diagram below.

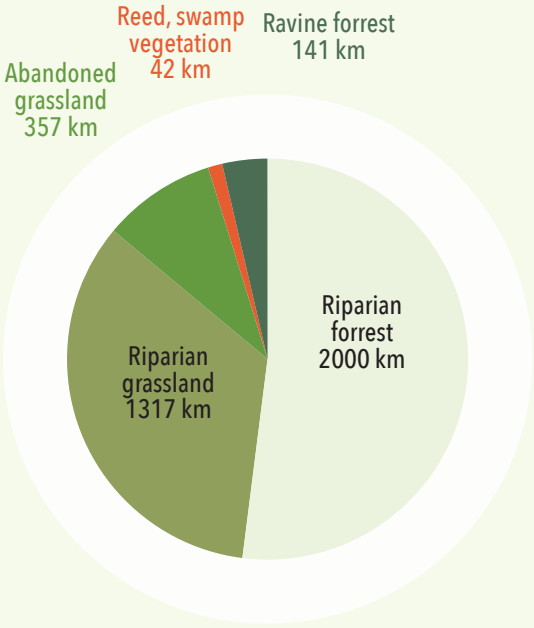
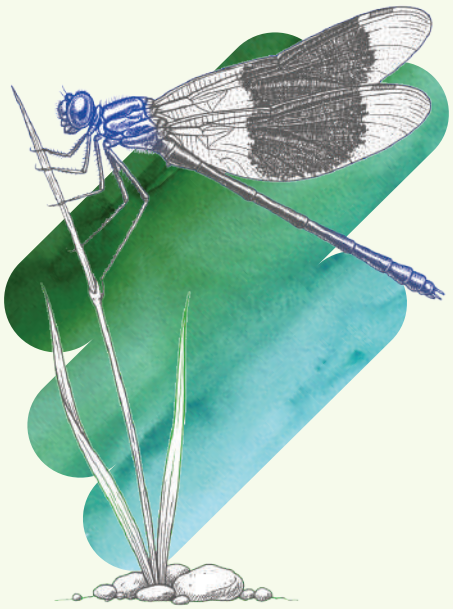


Figure 13: The overall distribution of habitat classes in the floodplains



8.5.2. TUFA PHENOMENOM

Spahić et al. (2014) described the genesis and development of the tuff as calcium-carbonated sediment of utmost importance for the river type and cascades:

"From its source to its confluence with the Sava River, the Una displays an uneven and gradual longitudinal profile. The biggest fractures are recorded in the Una's upper source flow where falls on thalwegs amount to 0.23%. On this segment, significant falls have emerged, originating in initial fractures, later on increased by tuff accumulation, such as the Martin Brod (the largest tuff waterfall in Bosnia and Herzegovina, 54 m of height, approximately 63 m^3/s of water flow) and Štrbački waterfalls (most attractive waterfall, consisting of three tuff sections, with a width of about 40 m and a total height of 23,5 m).

The uneven longitudinal profile of the Una River developed as a consequence of numerous rapids in the riverbed through which the water gushes. People call the Una rapids "bukovi".

In this segment of the Una's longitudinal profile, waterfalls ("slapovi"). Cascades are in fact waterfalls, with the first ones being higher and belonging to later accumulative monomorphic tuff accumulations. Natural waterfalls (both "slapovi" and "bukovi") in the Una's upper longitudinal profile represent unique natural value, giving the river its name Una – the one and only.

Accumulation and erosion of the Una waterfalls, as is the case with other cascades on tuff rivers in Bosnia and Herzegovina, are successive and temporally limited, among other factors, by changes in natural conditions, which may also be anthropogenic.

In seeking a common explanation for tufa formation, several interlinked factors can be identified. Tufa develops in rivers whose waters originate from limestone or dolomite layers and therefore contain sufficient soluble calcium bicarbonate. Its precipitation is triggered when carbon dioxide is released from this solution, a process often occurring in turbulent zones of the river, along breaks in longitudinal profiles, or where waters interact with hydrological collectors and isolators. The growth of tufa requires clear, well-oxygenated waters with a stable chemical composition throughout the year, and without frequent fluctuations in water level or flow regime. Aquatic vegetation, especially cyanophytes and mosses, plays a crucial role in initiating and sustaining the deposition of carbonate material. Under these conditions, the characteristic cascades, riffles, and moss-covered tufa beds of karst rivers are gradually formed.

Tufa barriers that form large vegetated barriers between rivers in the karst areas of the Dinaric Alps. The vegetation is rich in algae, bryophytes and ferns (Eucladio-Adiantetum), and the tufa is actively deposited."

8.6. BIODIVERSITY VALUES

The biodiversity values of the future Una Wild River National Park are rooted in the exceptional ecological integrity of the river and its floodplain. The free-flowing Una and its tributaries provide a continuum of habitats ranging from fast-flowing rapids and deep gorges to wetlands, riparian forests, and meadows, supporting high species richness and intact ecological processes.

The area serves as a refuge for rare and endangered species of fish, birds, amphibians, and mammals, while also ensuring connectivity along one of the last largely unregulated river systems in the region. This combination of pristine habitats and diverse species assemblages makes the Una landscape a stronghold of regional biodiversity and a vital contribution to European natural heritage.

The collection of data on various plant and animal species has not yet been completed. It is particularly important that the lists should refer primarily to the narrower area of the proposed transboundary Una Wild River National Park, which is very difficult to extract from the various inventories. As a rule, these refer to wider areas, and data on aquatic and riparian areas usually refer only to specific groups (e.g., fish, amphibians). There are also virtually no comprehensive reviews of animal or plant groups that would cover the entire course of the Una River and its tributaries. Sources usually refer only to part of the area and do not cover data from both countries.

The description and assessment of the biodiversity significance of the Una River and its tributaries will be supplemented. For now, we are only listing the total number of recorded species by individual groups, but we would like to add that the lists are far from complete. Only for fish a special analysis been made of the importance of the Una and its tributaries in relation to the highly endangered and undoubtedly flagship and charismatic species Hunchen.

For the available data for individual groups, an analysis was also made of the status of species according to the categories of threat in the IUCN Red List and the presence of species in the annexes to the Birds and Habitats Directives and the Bern Convention.

The abbreviations in the IUCN Red List system of threatened species mean:

CR – Critically Endangered
EN – Endangered
VU – Vulnerable
NT – Near Threatened
DD – Data Deficient
LC – Least Concern

Together, CR, EN and VU are considered the "threatened categories" of the IUCN system.
The preliminary lists for various plant and animal species are presented in the Annex.

8.6.1. VEGETATION AND FLORA

The list currently includes 146 vascular plants that have been identified in the area of the planned cross-border Una Wild River National Park.

The most important plant species in terms of nature conservation and their conservation status are the following: *Adiantum capillus-veneris* - IUCN LC; not listed in Habitats/Birds Annexes.

- *Gentiana lutea* - IUCN LC; Habitats Directive Annex V.
- *Leontopodium nivale subsp. alpinum* (syn. *Leontopodium alpinum*) - IUCN LC; not listed in Habitats/Birds Annexes.
- *Pinus mugo* - IUCN LC; not listed in Habitats/Birds Annexes.
- *Iris reichenbachii* (incl. var. *bosniaca*) - IUCN NE; not listed in Habitats/Birds Annexes.
- *Campanula cf. unensis* - IUCN NE; not listed in Habitats/Birds Annexes (taxonomic status uncertain).
- Diatoms (*Bacillariophyta* spp.) - IUCN NE; not listed in Habitats/Birds Annexes



8.6.2. FISH

The list currently includes 25 fish species that have been identified in the area of the planned cross-border Una Wild River National Park.

The most important fish and crayfish in terms of nature conservation and their conservation status are the following:

- *Hucho hucho* - IUCN VU; Habitats Directive Annex II (natural populations);
- *Cottus gobio* - IUCN LC; Habitats Directive Annex II;
- *Austropotamobius torrentium* - Habitats Directive Annex II & V.

The importance of the Una River and its tributaries for the survival of huchen (*Hucho hucho*)

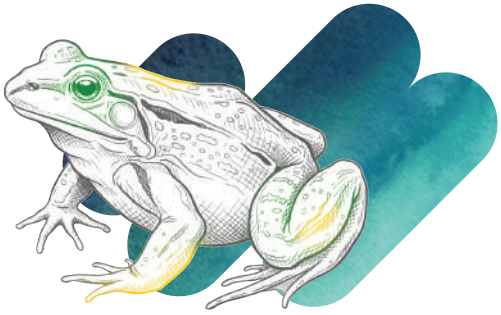
The Una River and its tributaries are of exceptional importance for the conservation of the globally endangered huchen (*Hucho hucho*). While the species has lost much of its historical range across Europe, the Balkans today represent one of its last strongholds. The Una is among only a handful of rivers worldwide that still provide more than 100 km of continuous, high-quality habitat, hosting one of the largest and healthiest self-sustaining populations. In the context of the species' global decline, this makes the Una system a critical refuge whose conservation status will significantly influence the overall survival prospects of the huchen. Planned hydropower projects and habitat alterations pose the greatest risks, as their realization could eliminate or fragment much of the remaining suitable habitat. Safeguarding the free-flowing character and ecological integrity of the Una River is therefore not only a national priority but a contribution of global importance to the preservation of this iconic Danube salmon.

8.6.3. AMPHIBIANS

The list currently includes 17 amphibia species that have been identified in the area of the planned cross-border Una Wild River National Park.

The most important amphibians in terms of nature conservation and their conservation status are the following:

- *Triturus cristatus* - IUCN LC; Habitats Directive Annex II & IV;
- *Salamandra salamandra* - IUCN LC; not listed in Habitats Annex II/IV;
- *Pelophylax ridibundus* - IUCN LC; not listed in Habitats Annex II/IV.



8.6.4. REPTILES

The list currently includes 19 reptile species that have been identified in the area of the planned cross-border Una Wild River National Park.

The most important reptiles in terms of nature conservation and their conservation status are the following:

- *Emys orbicularis* - IUCN NT; Habitats Directive Annex II;
- *Vipera ammodytes* - IUCN LC; not listed in Habitats Annex II/IV;
- *Iberolacerta horvathi* - IUCN NT; Habitats Directive Annex IV.



8.6.5. BIRDS

The list currently includes 183 bird species that have been identified in the area of the planned cross-border Una Wild River National Park.

The most important birds in terms of nature conservation and their conservation status are the following:

- *Ciconia nigra* - IUCN LC; Birds Directive Annex I;
- *Alcedo atthis* - IUCN LC; Birds Directive Annex I.

8.6.6. MAMMALS

The list currently includes 80 mammal species that have been identified in the area of the planned cross-border Una Wild River National Park.

The most important mammals in terms of nature conservation and their conservation status are the following:

- *Lutra lutra* - IUCN NT; Habitats Directive Annex II & IV;
- *Canis lupus* - IUCN LC; Habitats Directive Annex II & IV;
- *Ursus arctos* - IUCN LC; Habitats Directive Annex II & IV;
- *Lynx lynx* - IUCN LC; Habitats Directive Annex II & IV.

8.6.7. FLAGSHIP SPECIES

Flagship and legally protected taxa present in the Una River System include

- Danube salmon / huchen (*Hucho hucho*) (IUCN Vulnerable; Habitats Diretive Annex II – natural populations only),
- European otter (*Lutra lutra*) (Habitats Directive Annex II & IV),
- Bullhead (*Cottus gobio*) (Habitats Directive Annex II), and
- Stone crayfish (*Austropotamobius torrentium*) (Annex II/V) recorded in the Una basin.

8.7. LANDSCAPE AND CULTURAL VALUES

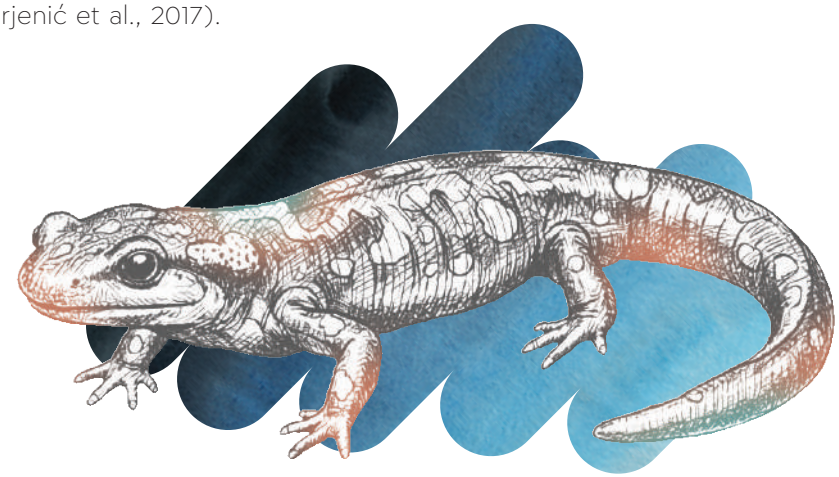
The landscapes in the Una catchment area are very diverse. In its upper and middle reaches, the river cuts deep gorges through limestone, with forests, rapids and famous travertine waterfalls such as Martin Brod and Štrbački Buk. Further downstream, it flows through wider valleys and alluvial plains, forming meanders and wetlands before reaching the Sava (Korjenić et al., 2017).

8.7.1. LANDSCAPE VALUES

The landscape values of the future transboundary Una Wild River National Park lie in the exceptional harmony between its free-flowing river system and the surrounding cultural and natural mosaic. The Una and its tributaries form the heart of this landscape, shaped by clear, fast-flowing waters, dynamic gorges, waterfalls and meanders that create a unique sequence of habitats.

The first floodplain provides a rare space where natural processes such as flooding, sediment deposition, and shifting river channels sustain diverse wetlands, riparian forests, and grasslands, supporting rich biodiversity and ecological connectivity.

The surrounding area, foreseen as a narrow sustainable development zone, frames the river corridor with traditional rural settlements, historic sites, and small-scale agriculture that have coexisted with the river for centuries.



These values create a landscape of outstanding scenic beauty and integrity, where nature and culture remain closely interlinked, offering opportunities for sustainable livelihoods and sensitive tourism while ensuring that the river and its ecosystems continue to function in their natural, unregulated state for future generations.

8.7.2. CULTURAL VALUES

The cultural values of the future Una Wild River National Park are deeply rooted in the long-standing relationship between people and the river. The Una has shaped the identity of local communities through history, reflected in traditional settlement patterns, vernacular architecture, and agricultural practices adapted to the river landscape.

Archaeological sites, medieval fortresses, bridges, and sacred places testify to centuries of cultural exchange and cross-border ties, while oral traditions, folklore, and festivals celebrate the river as a source of life and inspiration.

The preservation of these cultural values not only safeguards tangible and intangible heritage but also highlights the Una as a symbol of unity between communities in Bosnia and Herzegovina and Croatia, offering a foundation for cross-border cooperation and sustainable development that respects both tradition and nature.

8.8. SOCIO-ECONOMIC CONTEXT

The description of the socio-economic context refers to the Una River basin and provides insight into the additional development opportunities offered by the establishment of the cross-border Una Wild River National Park.

Population and Settlements

The Una River flows through a region characterised by medium-sized towns and smaller rural communities. On the Bosnian side, the city of Bihać (approx. 60.000 inhabitants) is the most significant urban centre, located directly on the Una. Other towns such as Bosanska Krupa, Cazin, Sanski Most, and Novi Grad contribute to a dispersed settlement pattern along the main river and its tributaries (Krušnica, Sana, Klokot, Unac).

In Croatia, settlements are smaller and more rural in character, with the notable cross-border town of Hrvatska Kostajnica. Demographically, the area faces out-migration of young people, aging populations in villages, and relatively low population density in upstream sections, which reduces development pressure but increases socio-economic vulnerability.

8.8.1. ECONOMIC ACTIVITIES

The Una basin's economy is traditionally based on agriculture, forestry, and small industry, supplemented by a growing tourism sector. Agriculture is practiced on floodplain terraces, with crops (maize, potatoes, vegetables) and livestock grazing. While largely subsistence or small-scale commercial, pressures exist where fields extend directly to the river edge, increasing erosion and nutrient runoff. Forestry remains important in upland areas, but timber harvesting within the envisaged Una WRNP core zone is limited. Industry is relatively minor, consisting mainly of food processing, wood products, and construction materials. However, some industrial facilities, including quarries and small factories, are located near tributaries, creating point-source pollution risks. Hydropower plays a role in local energy supply, particularly through the Kostela HPP in Bihać and several small plants, though new projects face strong opposition due to ecological concerns.

8.8.2. TOURISM AND RECREATION

Tourism is one of the most dynamic sectors of the Una valley. Una National Park (BiH) already attracts over 130.000 visitors annually, with key attractions including Štrbački Buk and Martin Brod waterfalls. Popular activities include rafting, kayaking, fishing, hiking, and cultural tourism linked to medieval fortresses and Ottoman heritage. On the Croatian side, the river corridor is less developed but holds potential for eco-tourism and cross-border packages. Challenges include unregulated visitor numbers, insufficient infrastructure (campgrounds, wastewater treatment), and aggressive mass events that threaten the wilderness character.

4

Are fishing and swimming allowed in the UWRNP?

One of the primary goals of the UWRNP is to reconnect people with a healthy river. Traditional, low-impact activities are not only allowed but encouraged, provided they do not compromise the river's long-term health. Access is managed through a clear, zone-based system:

In Core zone: Swimming is generally permitted as a non-extractive activity, though specific spots may have seasonal or time restrictions to protect sensitive tufa formations or fish spawning sites. Fishing is managed through a strict licensing system, with regulations tailored to protect spawning sites and seasons and to maintain healthy populations of species such as the Danube salmon. Areas designated for fishing will be defined, and fish sanctuaries will be established where fishing is prohibited.

8.8.3. INFRASTRUCTURE AND SERVICES

Basic infrastructure is uneven. In Bihać and other larger towns, water supply and electricity are well established, but wastewater treatment coverage remains low (Bihać has one plant, others such as Cazin lack facilities). Solid waste management is inconsistent, with illegal dumps near rivers. Road connections are adequate, with main routes linking Bihać to Sarajevo and Zagreb, but secondary riverbank roads fragment habitats. Croatia's part of the basin benefits from EU-funded infrastructure upgrades, while BiH sections remain underdeveloped, highlighting disparities between the two systems.

8.8.4. SOCIO-CULTURAL VALUES

The Una has deep cultural significance for local communities. It is considered a symbol of regional identity, frequently appearing in folklore, literature, and traditional practices. Rivers and tributaries support community life through fishing, small watermills, and spiritual associations with springs and waterfalls. Local populations value the Una as a source of clean water, recreation, and pride, but pressures from unregulated building, tourism, and economic development risk eroding these cultural assets.

8.8.5. KEY SOCIO-ECONOMIC OPPORTUNITIES AND RISKS

The creation of a transboundary Una WRNP offers opportunities for sustainable tourism development, job creation in eco-tourism and park services, improved branding of local products, and access to EU and international funding.

Risks include

- conflicting land-use priorities,
- weak law enforcement, and
- uneven governance capacity between Croatia and BiH.

Effective socio-economic integration will depend on community participation (importance of education and awareness raising activities!), equitable distribution of benefits, and investments in infrastructure and education.



8.9. EXISTING PROTECTION

There are numerous protected areas and (in Croatia) Natura 2000 sites in the Una river basin. The table lists 60 of them (in reality there are slightly fewer, as some, such as Plitvice Lakes, have multiple statuses, e.g. national park, Natura 2000 site (under the Birds and Habitats Directives) and World Heritage Site). However, most of these areas lie outside the boundaries of the proposed Una Wild River Transboundary National Park. As numerous as the sites are, their categorisation (many sites are not classified in any of the IUCN categories), governance and their size (from 0.01 km^2 to 1.210.75 km^2) vary.

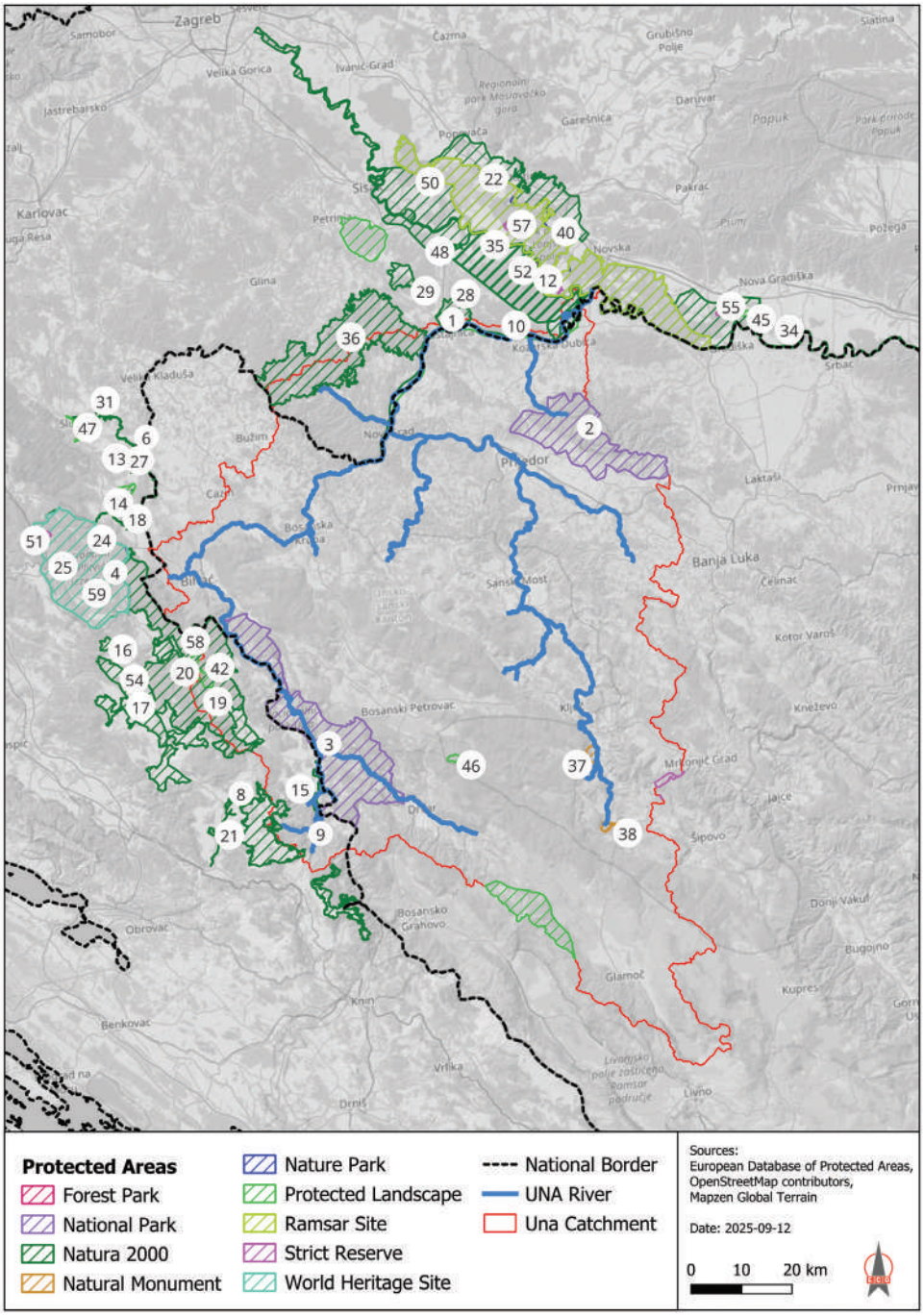




Figure 14: Protected areas and Natura 2000 sites in the Une River basin

A table with detailed data for all protected areas and Natura 2000 sites in the Une River basin and a map are shown below.

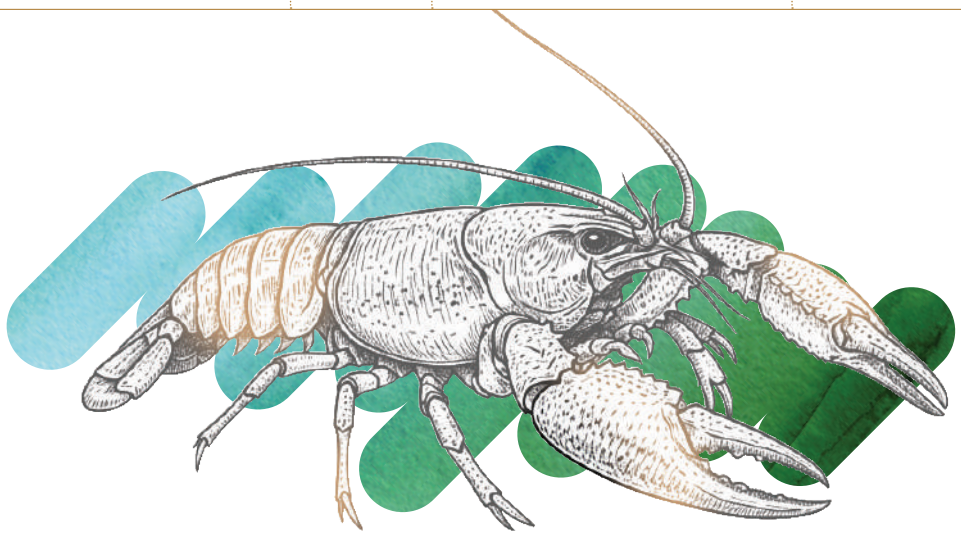
Table 3: List of existing protected areas in the surroundings of the proposed UWNRP (source: World Database of Protected Areas)

NR	Name	Category	Designation Nationally	IUCN Category	Area (km²)
1	Brdo Djed	Forest Park	Forest Park	Not Reported	0,28
2	Kozara	National Park	National Park		226,52
3	NP UNA	National Park	National Park (FBIH law)	II	366,22
4	Plitvička jezera	National Park	National Park	Not Reported	295,84
5	Bjelopolje	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	9,54
6	Božićeva špilja	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	0,01
7	Bruvno	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	1,18
8	Bulji	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	2
9	Dabašnica – Srebrenica	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	0,05
10	Dolina Une	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	42,73
11	Donja Baraćeva	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	0,01
12	Donja Posavina	Natura 2000	Special Protection Area (Birds Directive)	Not Reported	1210,75
13	Dumenčića špilja	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	0,01

NR	Name	Category	Designation Nationally	IUCN Category	Area (km²)
14	Gornji tok Korane	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	2,23
15	Kanjon Une	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	8,3
16	Krbavica	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	4,25
17	Krbavsko polje	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	140,42
18	Kukuruzovićeva špilja	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	0,01
19	Lapačko polje	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	22,28
20	Lička Plješivica	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	366,58
21	Lisac	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	92,03
22	Lonjsko polje	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	511,35
23	Međugorje – Stružnica	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	4,2
24	Nacionalni park Plitvička jezera	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	297,99
25	NP Plitvička jezera	Natura 2000	Special Protection Area (Birds Directive)	Not Reported	297
26	Otuča	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	0,35
27	Panjkov ponor-Varićakova špilja sustav	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	0,01

NR	Name	Category	Designation Nationally	IUCN Category	Area (km²)
28	Područje oko Hrvatske Kostajnice	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	29,22
29	Područje oko špilje Gradusa	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	18,12
30	Područje oko sustava Matešićeva špilja - Popovačka špilja	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	3,07
31	Ponor pod Kremenom	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	0,01
32	Poštak	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	27,38
33	Radočaji	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	0,01
34	Sava nizvodno od Hrušćice	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	131,56
35	Sunjsko polje	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	195,75
36	Zrinska gora	Natura 2000	Site of Community Importance (Habitats Directive)	Not Reported	307,83
37	Jama Ledana	Natural Monument	Natural Monument		6,09
38	Vrela Sane	Natural Monument	Monument of nature and natural features IIIb (FBIH law)	III	3,21
39	Vrelo Une	Natural Monument	Natural Monument	Not Reported	0,1
40	Dinara	Nature Park	Nature Park	Not Reported	629,6
41	Lonjsko polje	Nature Park	Nature Park	Not Reported	511,46
42	Baraćeve špilje	Protected	Significant Landscape	Not Reported	5,2

NR	Name	Category	Designation Nationally	IUCN Category	Area (km²)
43	Bijeli Potoci - Kamensko	Landscape Protected	Significant Landscape	Not Reported	11,48
44	Kotar - Stari gaj	Landscape Protected	Significant Landscape	Not Reported	53,8
45	Livanjsko Polje (Livno karst field)	Landscape Protected	Protected Landscape	Not Reported	78,21
46	Pašnjak Iva	Landscape Protected	Significant Landscape	Not Reported	2,68
47	Prašuma Lom (virgin forest)	Landscape Protected	Protected cultural landscape V.2 (RS law)		2,96
48	Slunjčica	Landscape Protected	Significant Landscape	Not Reported	1,48
49	Sunjsko polje	Landscape Protected	Significant Landscape	Not Reported	202,74
50	Una	Landscape Protected	Protected Natural Landscape V.1 (RS law)	V	28,64





In Bosanska Krupa, the houses above the water still carry the marks left by the last flood.

© Bruno D'Amicis

NR	Name	Category	Designation Nationally	IUCN Category	Area (km²)
51	Lonjsko Polje Nature Park	Ramsar Site	Ramsar Site, Wetland of International Importance	Not Reported	511,48
52	Čorkova uvala	Strict Reserve	Special Reserve	Not Reported	0,73
53	Jelas ribnjaci – dio	Strict Reserve	Special Reserve	Not Reported	1,32
54	Krapje Đol	Strict Reserve	Special Reserve	Not Reported	0,26
55	Laudonov gaj	Strict Reserve	Special Reserve	Not Reported	0,29
56	Prašnik	Strict Reserve	Special Reserve	Not Reported	0,54
57	Prasuma Janj	Strict Reserve	Special Nature Reserve		5,23
58	Rakita	Strict Reserve	Special Reserve	Not Reported	1,49
59	Velika Plješivica - Drenovača	Strict Reserve	Special Reserve	Not Reported	0,04
60	Plitvice Lakes National Park	World Heritage Site	World Heritage Site (natural or mixed)	Not Applicable	296,29

9. BOUNDARIES PROPOSAL FOR THE UNA WILD RIVER NATIONAL PARK

The figure below (Figure 15) shows the proposed outer boundaries of the future Transboundary Una Wild River National Park. An explanation of the internal zoning and protection regimes and recommendations is provided in chapter 10 of this study.

The area of the protected area under this proposal covers 351,6 km².

In addition to the Una River, the proposal also includes the following watercourses (in the alphabetical order): Dabar, Gomjenica, Japra, Klokot, Korčanica, Krka, Krušnica, Mlječanica, Ribnik, Sana, Sanica, Srebrenica, Sredica, Unac, Žirovnica
The total length of the watercourses included in this proposal is 657,66 km.

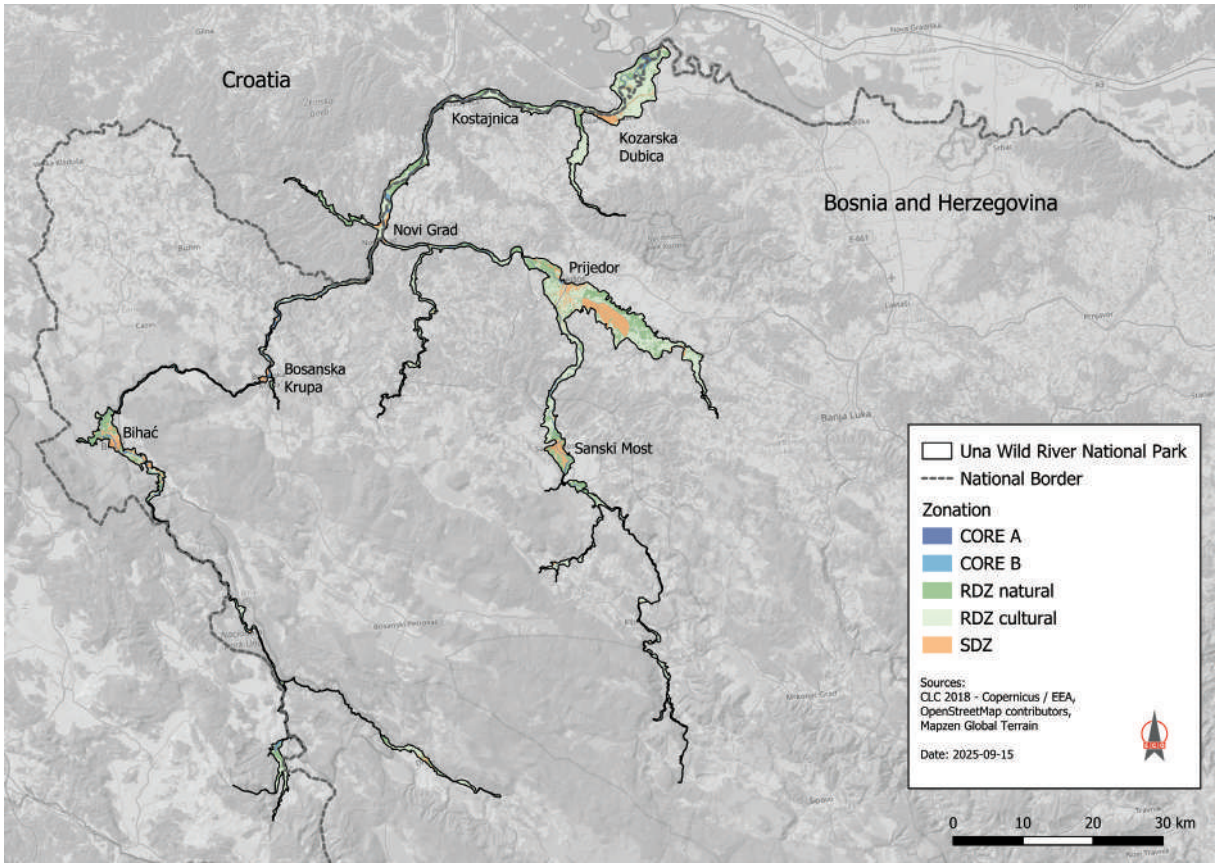
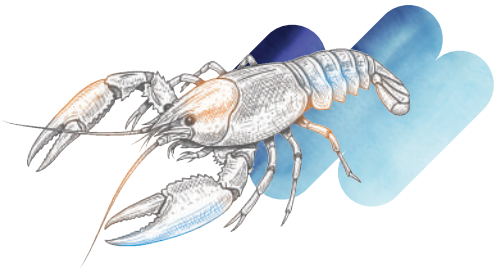


Figure 15: Proposed boundaries of the future Transboundary Una Wild River National Park, see detailed map in Figure 22.

Maps showing the entire course of the Una River System included in the proposed transboundary Una Wild River National Park in a readable size are marked as ‘map index’ - they are available here: https://shorturl.at/aiN5u

The establishment of the Una WRNP is envisaged as a process in which it will be possible to add remaining tributaries to the network of included watercourses (and in individual cases also ‘tributaries of tributaries’), provided that there is political will and consensus among the population.





A Danube barbel in a swarm of spirlin. The Una’s remarkable biodiversity stems from a largely pristine network of rivers, encompassing a rich variety of river types.

5

Key objectives of the Una Wild River National Park (UWRNP)

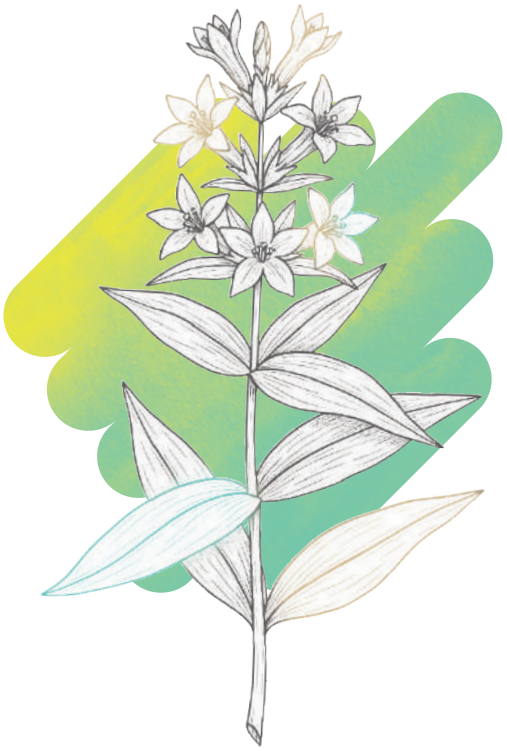
The UWRNP's core objective is to keep the Una River alive and healthy by safeguarding the entire river system - from headwaters to mainstem and tributaries. It does so through:

Protection of the entire river with its floodplains, and surface–groundwater connections to sustain sediment transport and species movement (=ecological connectivity).

Establishment of the strict core zones and riparian buffers to prevent hydrotechnical alteration and fragmentation, and to guide monitoring and adaptive restoration.

Enable quiet, non-motorised recreation and environmental education under coordinated BiH - Croatia governance, ensuring local benefits through high-quality visitation.

This FS presents the concept of establishing the WRNP, together with the principles for internal zoning and protection regimes in individual zones, and we do not consider this process to be final at this stage. In principle, the only major requirement for the inclusion of other watercourses in the Una WRNP is that they are free-flowing watercourses.



9.1. INCLUDED RIVERS IN THE PROPOSED UNA WILD RIVER NATIONAL PARK



© E.C.O./Kovarovics

Una River

The Una River stretches over 216 km, with a drainage area of 10.200 km². It originates at 520 m a.s.l. and meets the Sava River at 94 m a.s.l. Its flow regime is pluvio-nival, with spring peaks and winter floods. The upper Una shows a balanced karst flow, while the lower part experiences variations up to 3 m. The river is known for its tuff rock formations, waterfalls, and rich aquatic vegetation. Threats include hydropower development and riverbank housing.



© Ulrich Eichelmann

Krka

The Krka River, 5 km long with a catchment of 119 km², is a short karst river forming meanders and gravel bars in its valley. It displays a typical karst hydrology.



© Ulrich Eichelmann

Srebrnica and Sredica

These two headwaters of the Una (14 km and 10 km long) form wide wetlands and wet grasslands before joining the main river. They are ecologically valuable areas that support diverse habitats.



© Ulrich Eichelmann

Unac

With a length of 46 km and 1.161 km² catchment, the Unac River is a major right tributary of the Una. It originates from complex karst systems, disappears in poljes, and reappears through floodplain forests before entering a gorge at Martin Brod. Some regulation near Drvar affects its natural flow.



© Anes Halkić

Krušnica

The 7 km long Krušnica (301 km² basin) has an average discharge of 8 m³/s. It flows from an impressive karst spring with a rock wall and cave. Small hydropower plants and intensive fishing pose risks.



© Anna Kovarovics

Klokot

A short (5 km) but water-rich karst tributary with 15 m³/s discharge. It forms a plain north of Bihać and acts as a flood retention area. Main threats include fish farming near its spring and potential construction of houses.



© Anes Halkić

Žirovnica

A 24 km long non-karstic tributary with a meandering lowland course, surrounded by floodplain forests and wet grasslands.



© Jan Janković

Mlječanica

The 32 km long Mlječanica is another non-karst river characterized by meandering courses and floodplain forests along its lower reaches.



© Anes Halkić

Japra

The Japra River (48 km) is a non-karstic tributary flowing through hilly terrain into plains. Its meandering channels and extensive wet grasslands are ecologically important.



© Matic Oblak

Sana River

The Sana River flows 141 km, draining 4.189 km^2. Its pluvio-nival regime results in spring and winter high flows. Compared to the Una, it features fewer waterfalls and more floodplains. The tuff riverbed supports rich macrophyte growth in summer. Main threats come from urbanization, especially near Prijedor.



© Sead Badnjević

Dabar

The Dabar River (4 km) is a small karst stream with a narrow valley surrounded by forests. A hydropower plant near its spring affects its natural regime.



© Anes Halkić

Korčanica

The Korčanica (2km) is a short karstic tributary of the Sanica. Known as important spawning ground for salmonid fish species, it is increasingly pressure from fish farming and river regulation.



© Anes Halkić

Ribnik

The Ribnik (5 km) is a short, water-rich karst tributary. Its clear water and forested surroundings are scenic, but a large fish farm in its basin contributes to nutrient pollution.

National park Una



© Anna Kovarovics

Sanica

The Sanica (20 km) is a tributary of the Sana, known especially for its crystal-clear water and its abundance of wild fish.



© Dick Harrewijn

10. ZONING PROPOSAL FOR THE UNA WILD RIVER NATIONAL PARK AND ITS VISION

This chapter defines the proposed zoning principles and basis for protection regimes for the transboundary Una Wild River National Park. The box 3 summarises the UWRNP Vision:

10.1. DESCRIPTION OF THE UNA WILD RIVER NATIONAL PARK ZONES

As there currently exists only one Wild River National Park in the world (the Vjosa Wild River National Park), and the protected river there (the Vjosa in Albania) differs significantly from the Una River System, the concept of such a Wild River National Park needed to be adapted to the situation along the Una River System. Therefore, the consortium prepared a new concept for Wild River National Parks (see chapter 7), which was then applied to the Una Wild River National Park, taking into account the following factors:

- The biggest value of the Una Wild River National Park lies in its free-flowing character; therefore, strict protection of the river, especially from in-stream barriers and bank protection, is of utmost importance.
- The initial potential analysis showed the surroundings of the Una River System are mostly populated and human-impacted. Even on the rivers themselves, several activities take place (e.g., fishing, rafting).
- This human influence on the river system demonstrates that there is high local interest in it (e.g., for tourism). To ensure the protection of the river, the surrounding areas must also be taken into account and engaged in protecting the Una River System.
- The zonation must ensure strict protection of the river while still supporting the sustainable development of the region, taking into account both the river's values and its protection needs.

To consider all the above-mentioned factors, the following zones were developed and used for the Una Wild River National Park:

10.1.1. CORE ZONES

Strong protection of the river will be ensured through two zones: Core A and Core B. These strictly protected zones apply only to the water bodies and the surrounding islands of the Una River System. They ensure strict protection of the river and safeguard its free-flowing character. No in-stream barriers and bank protections (outside of cities) are allowed in the Core Zones.

Core Zone A

Core Zone A applies to the most natural parts of the river, including the water body and wild islands. It covers at least 75% of the Una River System. No in-stream barriers may be built, and other activities must be carried out in line with the management objectives and relevant regulations.

For example, fishing may still take place, but regulations must be developed that define which species can be fished, where fishing is allowed (to avoid sensitive areas such as spawning grounds), and when fishing is permitted (e.g., during daytime and throughout the year). Fishermen must apply for fishing licenses, which will be supervised by the protected area management.

Other activities currently taking place on the river and its tributaries (e.g., rafting) must also be regulated according to the management objectives.

The management objective of this zone is to preserve the natural state of the Una River, its tributaries, and islands, and to protect them from negative impacts (see chapter 12).

A regular monitoring system must be developed and implemented to assess the impacts of each activity and to adapt the regulations accordingly.

Figure 7: Natural river sections to be included in Core Zone A; The Una river



Core Zone B

Core Zone B also applies only to the river, its tributaries, and islands, but includes those parts of the river where activities are still taking place that are not in line with a strict protection regime. Examples include agriculturally used islands within the stream or areas where neophytes are spreading (e.g., Amorpha stands). These areas must be restored to their natural state within 5–10 years so that eventually the entire river can be designated as Core Zone A and the same protection regime applied to the whole river.

The management objective of Core Zone B is to restore the natural character of these areas within 5–10 years and transfer them into Core Zone A.

Figure 18: Parts of the river which are not in natural state to be included in Core Zone B to be restored within the next years; the Krušnica river



10.1.2. ZONATION OF THE RIVER SURROUNDINGS

As already mentioned above, the surroundings of the Una River and its tributaries is strongly populated and in use. Agricultural land makes nearly 60% of the land use in the whole study area. To protect the river properly and to be able to develop the whole potentially flood area in a sustainable way and in favor of the management objectives of the core zones, the surroundings must be included into the Una Wild River National Park. This will be ensured by applying three zones:

Natural River Dynamic Zone

The Natural River Dynamic Zone applies only to the surroundings of the Una River and its tributaries, outside the water body. It includes all land uses that predominantly display natural characteristics, such as forests, grasslands, and shrubs.

This area is expected to be flooded regularly, and no bank protection should prevent the river from overflowing into it, as flooding is part of the natural river dynamics.

The management objectives of this zone are to allow the natural succession of these areas towards their ecological potential (e.g., riparian forests, floodplains). Where necessary, restoration projects shall be implemented to accelerate the process of returning them to their natural state. These areas must not be converted into cultural landscapes or building sites but should instead be restored to and maintained in a natural condition.



Figure 19: Parts of the river which are not in natural state to be included in Core Zone B to be restored within the next years; areas along the Klokot river are example of the natural succession processes.

Cultural River Dynamic Zone

The Cultural River Dynamic Zone applies to cultural landscapes in the surroundings of the Una River and its tributaries outside the water body. It includes all cultural landscapes such as pastures, meadows, agricultural land, and planted forests. The management objectives of this zone are the sustainable management of areas that are still in use (e.g., regulating fertilizer application, supporting extensive agriculture, avoiding intensive agriculture, and promoting traditional practices and local fruit varieties). If the current cultural use is discontinued, these areas shall be transferred to the Natural River Dynamic Zone and restored to, and maintained in, a natural condition.

Ideally, cultural landscapes should not border the water body directly but maintain a forested buffer strip of at least 30 m. This helps to avoid negative impacts of land use on the river and prevents flooding of the cultural area. For further details, see the corresponding chapter.



Figure 20: Agricultural land shall be included into the Cultural River Dynamic Zone and managed extensively and sustainably.

Sustainable Development Zone

The Sustainable Development Zone applies only to the surroundings of the Una River and its tributaries, outside the water body. It comprises infrastructure, populated areas, buildings, and recreational areas within settlements.

The management objectives are to ensure the sustainable development of the area while respecting the management objectives of the other zones of Una Wild River National Park.

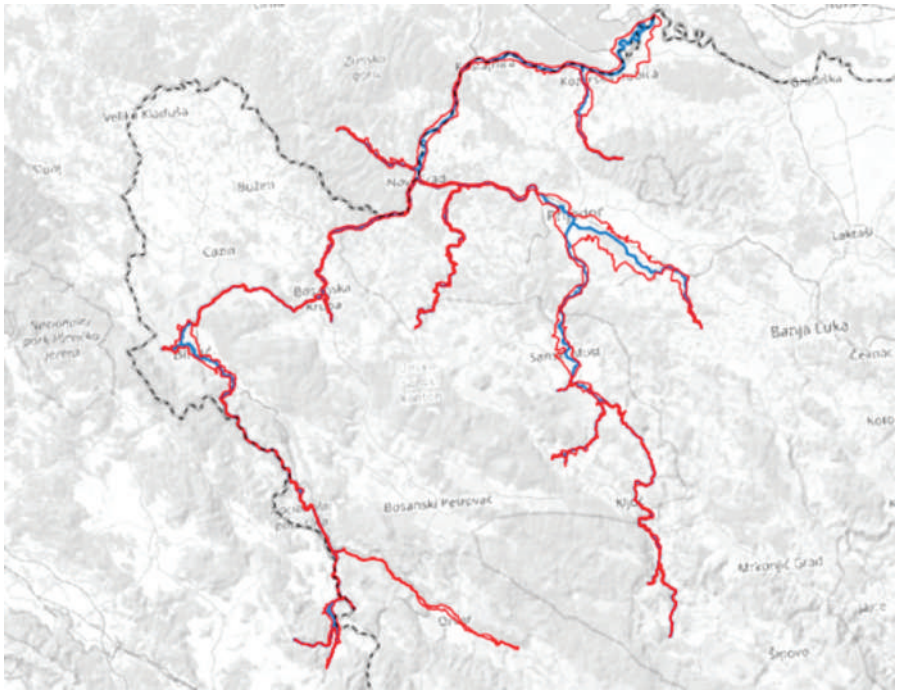
The local population shall be informed about the protection objectives of Una Wild River National Park and its different zones (as described above), support the conservation of the river and its surroundings, and actively contribute to the sustainable development of the region.

Figure 21: Cities, settlements and buildings are to be included in the Sustainable Development Zone.



10.2. PROPOSED ZONATION OF THE UNA WILD RIVER NATIONAL PARK

The overall area of the proposed Una Wild River National Park covers the Una River, and its tributaries (see list below) including the potential flood area surrounding those rivers. List of tributaries (and their location on the map) included in the proposed Una Wild River National Park:



- Dabar
- Gomjenica
- Japra
- Klokot
- Korčanica
- Krka
- Krušnica
- Mlječanica
- Ribnik
- Sana
- Sanica
- Srebrenica
- Sredica
- Unac
- Una
- Žirovnica

Figure 22: Study area of the feasibility study (Una river and tributaries in blue, potential flood area in red).

The zonation of Una Wild River National Park was prepared according to the zones described in chapter 10. The proposed boundaries for the future Una Wild River National Park include the rivers and tributaries listed above, which are included in their entirety, from source to mouth.

The exception is the shorter headwaters section of the Sana River, where a hydroelectric power plant is located, and the area of the existing Kostela hydroelectric power plant is marked as a section for which a decision will be made at a later date as to whether it will be included as a special zone within the Una WRNP or whether this section will be excluded from the park.

The detailed map (Figure 23) shows an excerpt of the zonation along the lower section of the Una River. It illustrates the Core Zones A and B (Core A and Core B in the legend), the Natural River Dynamic Zone (RDZ-N), the Cultural River Dynamic Zone (RDZ-C), and the Sustainable Development Zone (SDZ).

Maps of the whole proposed UWRNP can be found in the Annex and online at https://shorturl.at/xpC6K

Maps showing sections of the rivers included in this proposal, are presented in the Annex to this study (Map Index).

The zonation is based on existing datasets (CORINE and OpenStreetMap) and on habitat mapping carried out by Fluvius for this feasibility study. For the Core Zones, the water body and included islands were selected. All surrounding area was assigned to the three surrounding zones (River Dynamic Zones Natural & Cultural, Sustainable Development Zones) according to their landuse type.

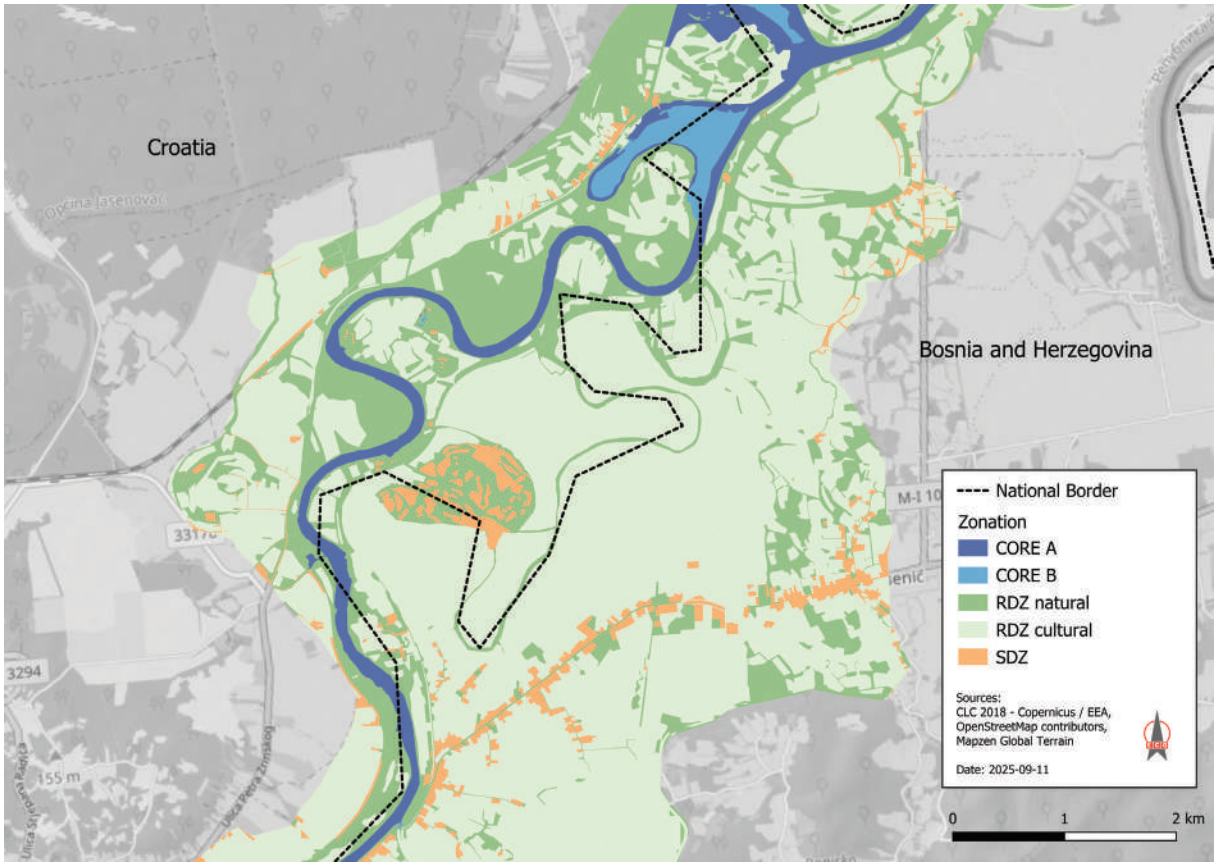


Figure 23: Detailed map of proposed zonation of Una Wild River National Park

The proposed Una Wild River National Park covers 657,66 km of rivers and a total area of 351,6 km², with Core Zones A and B comprising 33,4 km², the Natural River Dynamic Zone 160,1 km², the Cultural River Dynamic Zone 115,3 km², and the Sustainable Development Zone 42,8 km².

Table 4: Area of Zones Una Wild River National Park

Zone	Abbreviation	Area
Core Zone A	CORE A	30,5 km²
Core Zone B	CORE B	2,9 km²
Dynamic River Zone natural	RDZ natural	160,1 km²
Dynamic River Zone cultural	RDZ cultural	115,3 km²
Sustainable Development Zone	SDZ	42,8 km²
Total		**351,6 km²**

The proposed Core Zones of Una Wild River National Park comprise the water body and in-stream islands of the Una River and its selected tributaries. Core Zone A applies to natural sections of the river, while Core Zone B covers areas whose condition is currently not consistent with their natural features (e.g., agriculturally used land on islands).

Core Zone A comprises 92% of the river, while Core Zone B accounts for 8%. In total, the core zones of the proposed UWRNP cover 33,4 km². Land uses in the core zones consist mainly of river water bodies (81%), forests (12%), and grasslands and shrubs (4%). In addition, there are agricultural areas (in Core Zone B) as well as residential areas (e.g., buildings on islands within the rivers). Figure 13 shows the detailed habitat types included in the core zones of UWRNP.

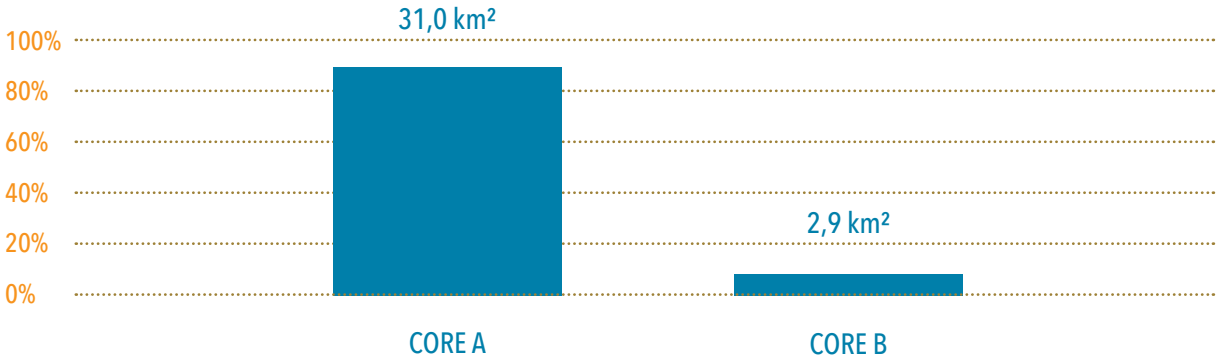


Figure 24: Area distribution in the Core Zones

10.2.1. FURTHER RECOMMENDATIONS FOR THE AREA WITHIN THE PROPOSED UNA WILD RIVER NATIONAL PARK

Since human-influenced land directly borders the water body of the Una River and its tributaries (e.g., agricultural land), and because there are relatively large cities within the area (e.g., Prijedor with nearly 100.000 inhabitants), two additional management regimes are recommended for implementation within the Una WRNP. These areas do not constitute specific zones of the national park but rather span across several zones, formulating specific management approaches and objectives throughout these different zones.

30 m Buffer Strip

As rivers are strongly influenced by external factors, and as human-influenced areas directly border the water body of the Una River and its tributaries, a forested 30 m buffer strip is recommended. According to a meta-study by Sweeney & Newbold (2014), forested buffer strips of "≥30 m width are needed to protect the physical, chemical, and biological integrity of small streams."

To ensure proper protection of the Una River and its tributaries from external threats (e.g., fertilizer input, traffic disturbances, erosion), it is recommended to specifically manage the first 30 m of land bordering the Core Zones (it is therefore included in the proposed boundaries of the Una WRNP, but not as a separate management zone, but a buffer strip). The purpose of this strip is to protect the river from outside impacts and to safeguard activities from river dynamics (e.g., natural riverbank erosion).

This 30 m Buffer Strip shall be forested with naturally occurring species and shall not be used for economic purposes. No buildings or other infrastructure shall be constructed in this zone, and agricultural use is not recommended.

Currently, several zones and land uses are located within this 30 m strip (located inside the proposed Una WRNP boundaries). This means that, in the near future, the management authority must organize the mapping of areas bordering the water body on both sides, identify non-forested areas and their current land uses, and develop concepts for afforesting these areas according to potential natural forest types and species.

As shown in Figure 25, 40% of the proposed 30 m buffer strip is already forested. In these sections, forest mapping is required to assess the naturalness of the forest and to elaborate measures for restoring it in line with natural forest types and species. However, another 40% of the strip is currently used for agricultural activities. These areas should also be assessed to determine how a 30 m forested strip could be implemented.

This process must be organized in a participatory manner, in close communication with landowners and users, and compensation payments must be offered.

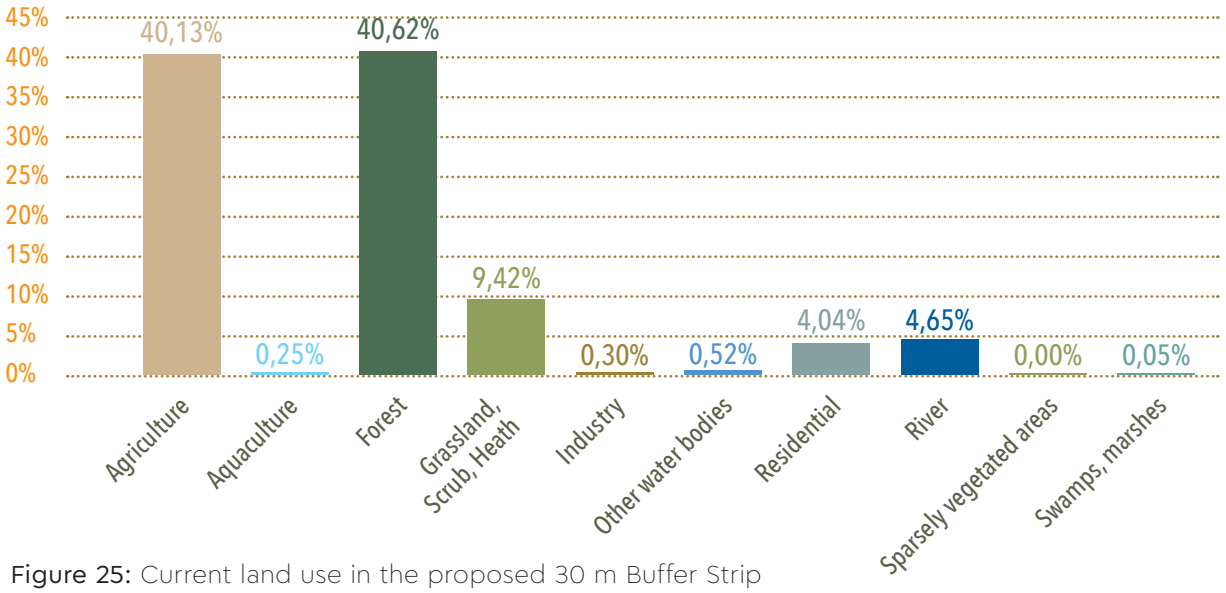


Figure 25: Current land use in the proposed 30 m Buffer Strip

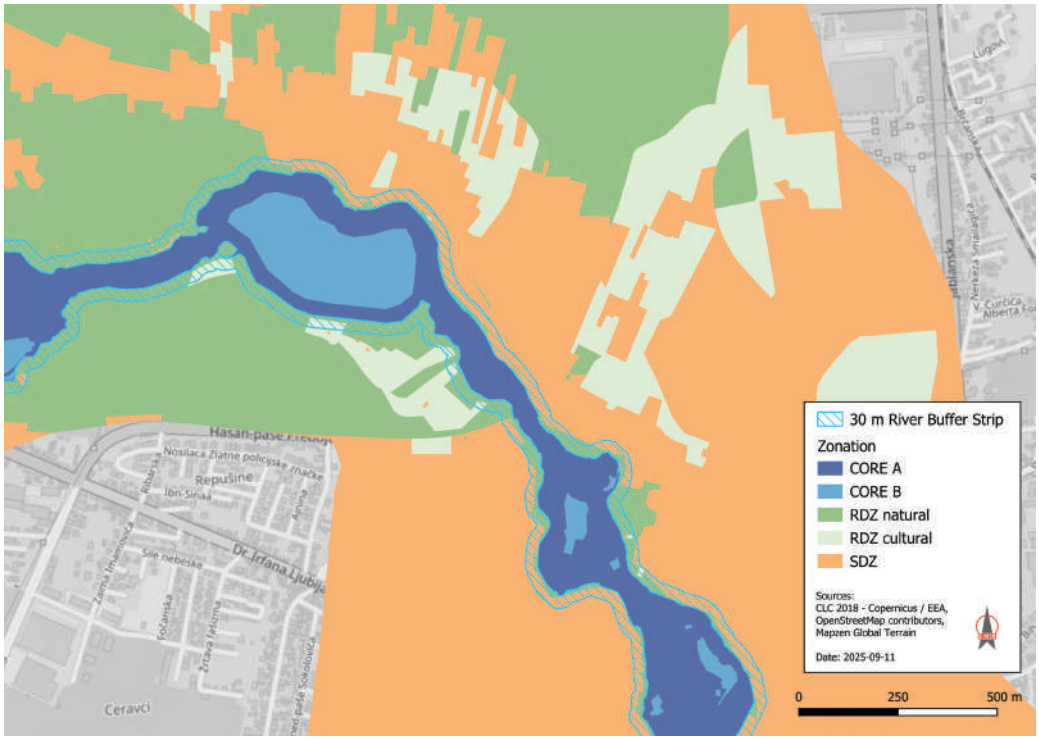


Figure 26: Proposed 30 m Buffer Strip on both sides of the river.

Urban Protected Areas

Several large cities (e.g., Prijedor, with nearly 100.000 inhabitants) surround and border the Una River and its tributaries. To ensure proper protection of Una Wild River National Park, the local population should be actively involved in conservation activities. Awareness campaigns shall focus on these cities, and participatory approaches shall strengthen understanding of the protection objectives.

According to the concept of Urban Protected Areas (see chapter 10.3) and its management objectives, this concept was applied to four cities within the proposed Una Wild River National Park:

- Bihać, Prijedor, Sanski Most, Bosanska Krupa

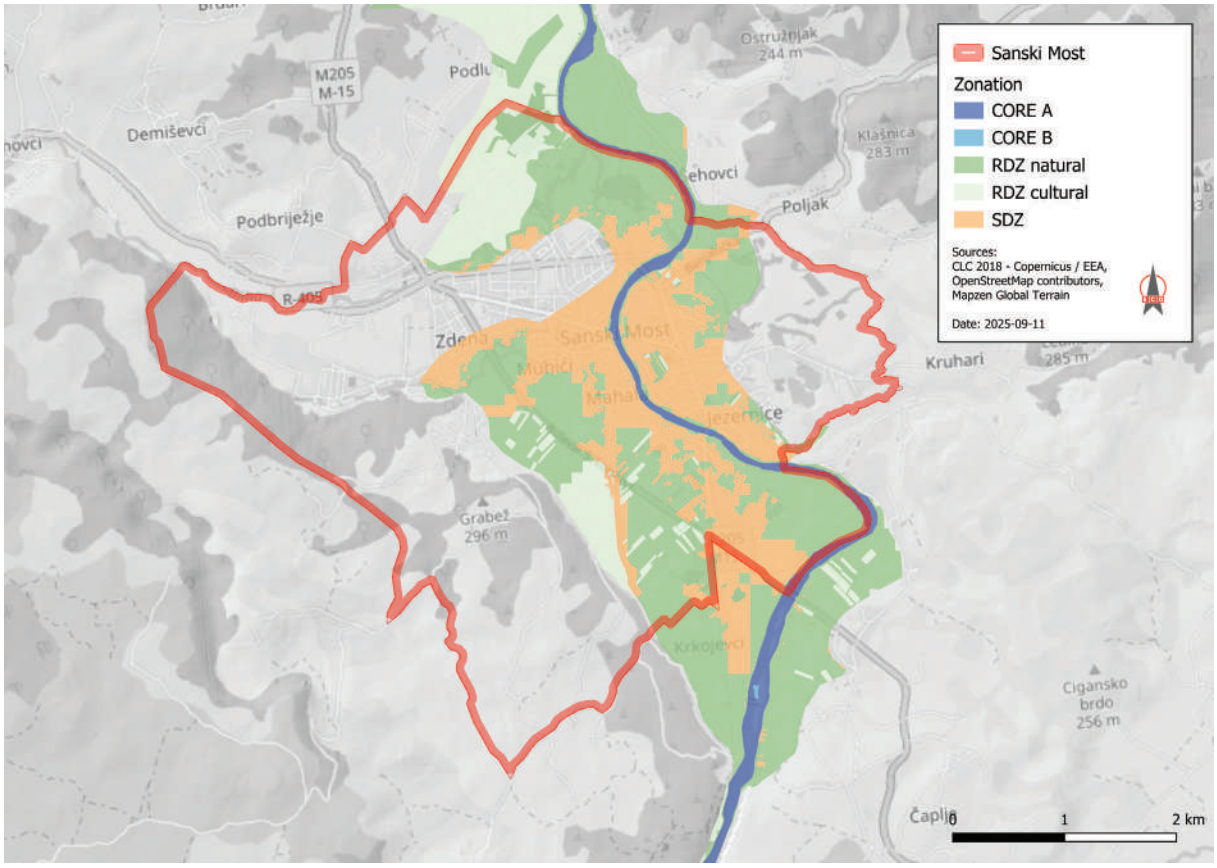


Figure 27: Proposed Urban Protected Area in Sanski Most.

10.3. URBAN PROTECTED AREA APPROACH IN THE UNA WILD RIVER NATIONAL PARK CONTEXT

For the sections of the Una and its tributaries that flow through urban areas, we propose the establishment of a so-called Urban Protected Area (UPA), which is defined by the IUCN as follows: a protected area that fulfils the IUCN definition (Dudley et al, 2008) and for which the following applies: the protected area is designated on the basis of a primary management objective that is implemented on at least 75% of the area of the protected area and where this objective manifests itself as nature conservation taking precedence over other uses of the area, and where, in the event of conflict with other uses, the interests of nature conservation take precedence over these uses.

The core area of UPAs in cities with a river flowing through them consists exclusively of the river and its narrow riparian zone, but not of the surrounding urban areas.

Similarities between urban parks and urban protected areas

- they are located in (or on the outskirts of) cities,
- recreational opportunities,
- provision of ecosystem services,
- facilitation of visits,
- usually managed by public organisations,

Differences between urban parks and urban protected areas; in UPAs:

- conservation is the primary management goal, recreation is a secondary one,
- not all forms of recreation are applied,
- natural succession is prioritised,
- the cultivation of non-native plants and the regular, intensive mowing of green areas is not favoured,
- the blocking of river courses is prohibited,
- numerous large and noisy events are avoided.

10.4. PRINCIPLES FOR THE INCLUSION OF EXISTING PROTECTED AND CONSERVED AREAS IN AN OVERARCHING UNA WILD RIVER NATIONAL PARK

Individual sections of the Una and its tributaries are already included in established protected areas (e.g. Una National Park, Una Nature Park, etc.); for the full list please see Table 3. In Croatia, there are two Natura 2000 sites covering mostly sections of the Una River (Vrelo Une and Kanjon Une), and several sites have been proposed for protection in both Croatia and Bosnia and Herzegovina. Most of these protected areas usually cover larger areas and do not only include the riverbed and the riparian zone.

The basic rule for the establishment of a Wild River National Park, as in the case of the Una River and its tributaries, is that the status of existing protected areas and ecological networks should be preserved.

The establishment of a Wild River National Park thus represents an 'umbrella designation', in which other protected areas are also included. In practise, this means that in the case of existing protected areas, these may be much larger or include different (terrestrial) ecosystems.

Of course, it is very likely that the protection regimes in these existing protected areas will need to be modified in sections that include the target river and its tributaries in order for these sections to fulfil the primary management objectives for IUCN Category II protected areas. In simple terms, this means that 'no-take' conservation regimes need to be introduced in the core zones of these sections. The remainder of this chapter presents analyses of the suitability of some existing protected and conserved areas (Una National Park, Una Nature Park, two Natura 2000 sites) for inclusion in the concept of the Una Wild River National Park and discusses the needed changes to protection regimes / zoning these designations to meet IUCN Category II Wild River National Park standards.

10.4.1. UNA NATIONAL PARK AND NECESSARY CHANGES TO THE FOUNDING ACT

Una National Park

The Una National Park was established in 2008 with the aim of protecting, enhancing and sustainably utilising the natural and cultural values of the Una and Unac rivers.

The park is located in the municipality of Bihać and is divided into two main (sub)areas: Strict and Targeted Protection Area (about 2/3 of the park area or 13.000 ha) and Development Area (1/3 of the park area or 6,800 ha), which together cover 19.800 ha. This means that two thirds of the park is under "strict protection" (including zones A and B), while one third is under a softer, development-friendly regime.

The management objectives in the Strict and targeted protection sub-area are the protection of ecosystems, and biodiversity as well as the facilitation of scientific research and education and environmentally friendly recreation. The areas for Targeted Protection are aimed at the sustainable use of natural resources (agriculture, and forestry), local products, and tourism. The sustainable use of natural resources is not defined in more detail. Other traditional uses (fishing and fish production are considered as one of the traditional uses) are also permitted.

Zone A (in which agriculture and forestry are permitted) and Zone B (in which fishing, fish farming, and rafting are permitted) are defined within the two sub-areas. Even though this is understandable for the Development Area sub-area, it definitely does not comply with the international protected area standards (IUCN) for the Strict protection sub-area and is in direct contradiction to the purpose of strict protection or the core zone of the IUCN ctg. II zone.

Activities that are not permitted within the national park and that are of particular importance to the Wild River National Park concept include:

- fishing and hunting in the strict and targeted protection sub-zone,
- extraction of mineral resources (including sand and gravel),
- alteration of the course and bed of the river,

- changes in the river flow and in wetlands,
- construction of new buildings and infrastructure for both residential and tourism purposes, and
- construction of large infrastructure projects (roads),
- other prohibitions (the ban on pollution, littering, dumping waste, washing cars, driving outside the designated roads, making fires and camping).

However, the management plan may authorise the carrying out of certain activities like fishing and rafting in certain areas and in defined times, even if these are generally prohibited.

Suggested modification of the Una National Park zonation and protection regime to comply with the Wild River National Park criteria.

In order to fully comply with the IUCN guidelines for protected areas, only the Strict and Targeted Protection sub-area are proposed for inclusion in the core protected zone of the proposed UWRNP, but only if subject to certain necessary adjustments to the IUCN guidelines, as explained below.

The law divides the two main sub-areas, including the Strict and Targeted protection sub-area, within the park into Zone A and Zone B, which is inconsistent with IUCN guidelines and good practise when referring to strict protection as the core area of a national park, which according to IUCN guidelines should comprise 75% of the total area of the protected area, as there should be no "extractive use" in the core area of a national park. The use of the term "strict protection" in Bosnian legislation is therefore not in line with the IUCN understanding of this term, as according to the IUCN guidelines for PA Category II (Dudley, 2008), the core zone of a national park is managed with the aim of preserving natural processes and biodiversity. Agriculture, forestry, fish farming etc. are activities that dramatically alter natural processes and are therefore not suitable for the core zone of a national park, at least not to an extent that goes beyond the utilisation for the own needs of individual houses or small settlements, already present.

In practise, this means that the current Strict and Targeted protection sub-area of the Una NP would be designated as a core zone in the proposed UWRNP but only with the necessary changes to the existing regulation in the sense that there would be no internal zoning of zones A and B within the core zone of the UWNP in the area of the existing Una NP.

This means that the activities permitted by the current zoning within the strictly protected sub-zone (traditional agriculture, forestry, fishing, fish farming, rafting, etc.) would be generally prohibited in the Una WRNP core zone, although individual exceptions or the authorisation of certain currently permitted activities would be possible to a very limited extent within the framework of the management plan, in accordance with the following principle: "traditional, low-impact uses in the core zone of the national park (e.g. hay meadows, light forestry, limited and controlled fishing and rafting) may only be permitted if they are demonstrably compatible with the objectives of biodiversity and do not impair natural processes".

With an area of almost 20.000 ha, extensive naturally preserved areas and, natural sections of the Una and Unac rivers, the Una National Park is the "backbone" of the proposed Una Wild River National Park.

10.4.2. UNA NATURE PARK AND NECESSARY CHANGES TO THE FOUNDING ACT

Una Nature Park

The Una Nature Park extends over 2.700 ha and is located in four municipalities (Novi Grad, Kozarska Dubica, Krupa na Uni, Kostajnica; urban areas (the municipalities of Novi Grad, Kozarska Dubica, Kostajnica) are excluded from the protection measures. The park was established in 2019 by a decision of the Government of Republika Srpska. The aim of the park is to protect the exceptional natural values of the Una River – including the water with its travertine formations (tufa), rapids, waterfalls, river islands, and riparian vegetation (the focus is only on the vegetation, not on the floodplain areas). At the same time, the park ensures sustainable utilisation and ecotourism. The park is not divided into different protection zones (the legal framework provides for zones I, II and III, but the entire area within the boundaries of the nature park falls under protection regime III (sustainable use with provisions to protect the environment: traditional land use and certain economic activities (see protection regimes in the table below)). The entire park is therefore in a single zone, which means that there is no core protection, but also that the potential negative impacts of human activities outside the park have no buffer.

Why is the existing "Una National Park" not enough to safeguard the Una River?

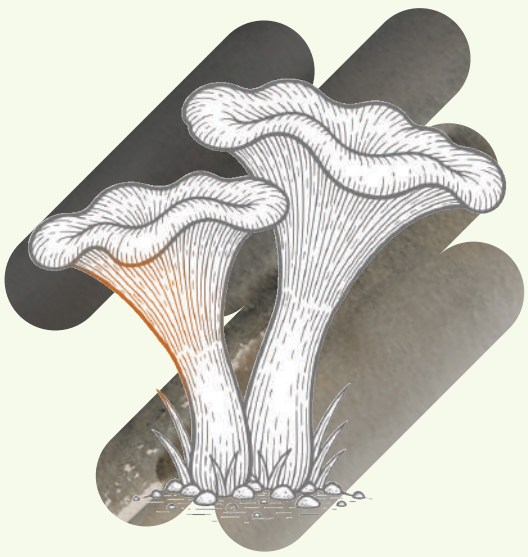
Protection of the Una River is fragmented and does not treat the river as a continuous living system. While Una National Park (BiH) and Una Nature Park (Croatia) protect certain sections, large parts of the middle and lower river and key tributaries remain vulnerable to hydropower development, illegal construction, and water abstraction.

Even within Una National Park, management often falls short of IUCN standards: activities such as commercial forestry, agriculture, and fish farming are permitted in supposedly "strict" protection zones. This piecemeal approach ignores the river's transboundary nature and lacks harmonised no-take zones and effective buffer strips.

Activities such as forestry, hunting, agriculture, controlled fishing, and ecotourism are allowed within the park and are regulated by the management plan (which has not yet been drawn up /approved). The management objectives reflect the described goal of establishing the park: they include maintaining the ecological integrity of the Una river corridor, preventing harmful development, and supporting traditional land uses, tourism, education, and recreation in a way that is compatible with conservation.

Prohibited activities are:

- industrial, hydrotechnical, and infrastructural projects that could affect habitats,
- extraction of sand, gravel, or other mineral resources from the river,
- damming or alteration of the course of the Una,
- pollution, uncontrolled waste disposal, and discharge of wastewater into the river,
- introduction of alien or invasive species,
- felling of trees in the riparian forests and destruction of habitats,
- use of motorboats with more than 6 hp,
- construction of new buildings within 20 metres of the riverbank,
- driving heavy machinery in the riverbed,
- uncontrolled burning of vegetation, camping, and making fires.



Permitted activities are:

- sustainable forestry, hunting, and agriculture in accordance with the park's management plan,
- scientific research, education, ecotourism and recreation,
- controlled collection of medicinal and aromatic plants, mushrooms, and forest fruits,
- traditional land use by local communities (cattle breeding, orchards, agriculture);,
- sport fishing with rods and equipment for recreation; and,
- use of small traditional boats ("unačkі/novski /petrinjski čamac"), that are limited in size and design, and made of wood, aluminium or fibreglass.

The management of the park will be entrusted to a public organisation jointly established by the four municipalities, and based in Novi Grad. Until this organisation is formally established, the municipality of Novi Grad will be temporarily responsible for its management. According to the law, a complete management plan must be drawn up within two years of designation.

The table below summarizes the three protection regimes (I–III) defined in the Law on Nature Protection of Republika Srpska. It compares their core purposes, allowed activities, prohibitions, and typical protected area categories (aligned with IUCN).

Table 5: Protection regimes defined in the Law on Nature Protection of Republica Srpska

Regime	Core Purpose	Allowed Activities	Prohibited Activities	Typical PA Categories (IUCN)
Level I (Strict Protection)	Preservation of natural areas in a completely natural state; maintaining ecosystems and species without human influence.	• Scientific research under special approval • Limited educational activities (without disturbance)	• Any economic use • Resource exploitation • Construction, forestry, hunting, fishing, agriculture, grazing • Any activity that changes ecosystems	Strict nature reserve, special reserves (IUCN Ia/Ib)
Level II (Active Protection)	Protection of areas with significant ecosystems, habitats, species, and landscapes, allowing controlled use.	• Scientific research, education, eco-tourism, recreation (regulated) • Traditional land use in limited form • Maintenance interventions necessary for conservation	• Large-scale exploitation (mining, industrial projects) • Activities harmful to habitats or species • Construction outside of designated zones • Introduction of invasive/alien species	National parks, nature parks, special reserves (IUCN II–IV)
Level III (Sustainable Use)	Conservation of areas with important natural values while allowing sustainable economic use and traditional practices.	• Forestry, hunting, agriculture, fishing (according to management plans) • Tourism, recreation, education, research • Controlled collection of plants, mushrooms, fruits • Traditional land use by locals	• Activities causing habitat degradation • Pollution and waste dumping • Harmful hydrotechnical interventions • Industrial / infrastructure projects that endanger nature	Protected landscapes, natural monuments, regional parks (IUCN V–VI)

Suggested modification of the Una Nature Park zonation and protection regime to comply with the Wild River National Park criteria

The Una Nature Park in its current form (fully under protection regime III) cannot simply be imported into the core zone of the proposed Una Wild River National Park (UWRNP) — however it has to be noted that it already contains many prohibitions that are actually fully compatible with a core zone.

This is because many of the prohibitions already listed under Regime III are identical to what the UWRNP requires for its core zone:

- No construction of hydrotechnical facilities that jeopardise natural values,
- No change in land use or deterioration of the habitat,
- No felling of trees in riparian forests,
- No hydrotechnical interventions or damming of the Una river,
- No construction work within 20 metres of the river bank etc.

Proposed changes primarily include the introduction of an internal zoning system/protection regime within the Nature Park.

To align with the Una WRNP concept, the Una Nature Park should be re-zoned into the core zone (strict protection under the Una WRNP; establishment of the Regime I protection regime /zone), which includes the river corridor of the Una itself, including the riparian belt and the most valuable floodplain habitats, and the buffer/ transition zone, which includes the remaining parts of the current areas within the nature park and where traditional land use, forestry, hunting, and tourism can continue under Regime III.

Formally upgrading the river corridor to a stricter zone, would ensure legal harmonisation with IUCN Category II ('no-go' framework in which no extractive use, no intensive forestry, agriculture and urbanisation and no (or only strictly limited and controlled) fishing (in designated areas areas) are permitted). In short, the river corridor and riparian belt of the Una River within the park (perhaps 30–40% of the park area, depending on the exact delineation) should be harmonised with the core zone of the Una WRNP. This zone would be upgraded from Regime III to a stricter regime (effectively Regime I or with some exceptions to Regime II), so that it would conform to the principles of the IUCN Category II core zone.

The remaining part of the Una Nature Park (mountain forests, agricultural areas, settlements) would remain under Regime III, and act as a buffer zone of the Una WRNP, where traditional activities and uses of natural resources would continue according to the existing rules of the Nature Park.

For urban areas excluded from the Nature Park (the municipalities of Novi Grad, Kozarska Dubica, Kostajnica), it is proposed to establish of an Urban Protected Area model (see chapter 10.3).

10.4.3. NATURA 2000 AREAS IN CROATIA AND THEIR INCLUSION IN THE UNA WILD RIVER NATIONAL PARK ZONING AND MANAGEMENT CONCEPT

Currently, two sections of the Una River have been included in the European network of Natura 2000 sites of ecological importance: HR2001069 Kanjon Une (for the section of the Una at its mouth) and HR 2000463 Dolina Une (for the last kilometres of the Una before it flows into the Sava). Both Natura 2000 sites were designated on the basis of the species and habitats described in the Annex to the Habitats Directive.

Based on the rationale for the establishment of the Una Wild River National Park, which focuses primarily on the functional protection of the river ecosystem, aquatic organisms and habitats are of particular importance as target species in both Natura 2000 sites in Croatia.

The target species in both Natura 2000 sites are fish (*Barbus balcanicus*, *Cobitis elongata*, *Cobitis elongatoides*, *Hucho hucho*, *Romanogobbio kesslerii*, *Rutilus virgo*, *Sabanejewia balcanica*, *Zingel streber*) in the Dolina Une Natura 2000 site and Cottus gobio in the Kanjon Une Natura 2000 site. Both Natura 2000 sites also harbour insect species dependent on the aquatic environment (*Coenagrium ornatum* and *Lycaena dispar*), while the Kanjon Une site is also very important for the aquatic habitat type 32A0 Tufa cascades of karst rivers of the Dinaric Alps.

Maintaining the favourable conservation status (FCS) of the fish listed on the annexes to the Habitats Directive, as well as other aquatic species and rare habitat types (tufa cascades), requires a 'no-take' approach, and, above all, no changes to the continuity of water flow and sediment transport must be allowed. It is extremely important for both aquatic life and the tufa habitat type to ensure high water quality and prevent water and soil pollution. The preservation of the first floodplain zone along rivers and watercourses is also crucial for aquatic and riparian organisms.

Compared to the management objectives of the IUCN ctg. II protected area (national park), it becomes clear that the conservation objectives for both Natura 2000 sites directly target aquatic species and habitats in the Una River and its tributaries are fully in line with the management objectives in the core zone of the national park. It is therefore entirely logical and consistent that the core zone of the river and the narrow riparian strip, including the aforementioned Natura 2000 sites, should be included in the core zone of the Una Wild River National Park.

For the inclusion of the above-mentioned Natura 2000 sites on the Una River (in Croatia), it is proposed that both sites retain their EU Natura 2000 status(i.e., maintaining the Natura 2000 status also ensures the monitoring of the status and achievement of the conservation objectives for the target species and habitats at the EU level) and that the Natura 2000 site — or at least the parts containing the water body and the coastal strip - is included in the core zone of the Una Wild River National Park.

In concrete terms, this means that the riverbed, together with the first floodplain within those Natura 2000 sites, will be included in the core zone of the national park. As conservation objectives have been set for each of the two Natura 2000 sites, it is proposed that these be taken into account when determining the protection regimes for the future Una Wild River National Park.

This will contribute to the IUCN requirement that the primary management objective is realised in at least 75% of the National Park while at the same time meeting the requirements of the Habitats Directive (see Article 6.3 of the Directive).

11. THREATS AND PRESSURES

The table below presents the threats to the Una Wild River National Park as classified according to the IUCN classification of threats (first column). Each threat is grouped under the relevant IUCN threat category, with indication of its intensity and examples of concrete cases or locations Red – high threat; Orange – medium threat, Green – low threat).

The list of threats in the table below is not exhaustive; in particular, the list of specific locations and the individual threats at these locations needs to be completed. Furthermore, the table only addresses those threats that are directly within or dependent on the proposed boundaries of the Una WRNP transboundary.

For a more complete overview of threats, we are still waiting for data to be provided by representatives of local communities and NGOs from the Una River Basin area.

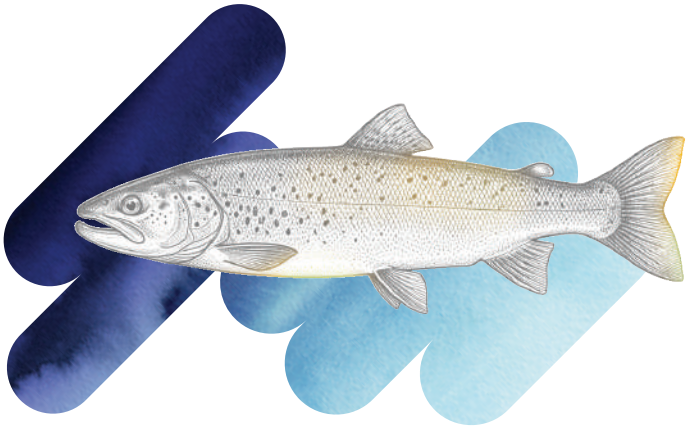
Therefore, the table does not include threats that are geographically further away but could also have a significant impact on the achievement of the Park's objectives; one such example is the proposed site for a repository for nuclear waste from the Krško nuclear power plant.

Table 6: Threats to the future Una Wild River National Park

Threat Group (IUCN)	Specific Threat	Intensity	Concrete Example /Location
Residential & commercial development	Vacation homes / illegal housing	High	Dense clusters along Una and Sana rivers in BiH
	Urban expansion	Medium	Urbanisation pressures near Bihać, Bosnian side; low in Croatia
	Tourism facilities	High	Mass tourism in NP Una, Regata event; restaurant plan near Štrbački Buk; walking path 'Zeleni otoci' (B.Krupa)
	Landfills	Medium	Industrial zone landfill, limestone quarry near Una; Sana downstream of Prijedor

Threat Group (IUCN)	Specific Threat	Intensity	Concrete Example /Location
Agriculture, aquaculture & forestry	Non-timber Crops	Medium	Agricultural fields extending to riverbanks on both sides
	Livestock farming	Medium in Croatia, Low in BiH	Pastures along Una islands, Klokot floodplain
	Fish farming / aquaculture	High	Fish farms at Martin Brod, Ribnik, Saničani, Gomjenica, Klokot (BiH)
Energy production & mining	Hydropower	High	Existing Kostela HPP (BiH), possible enlargement, HPP Medna on the Sana River, 2 small HPP on the Krušnica spring, 2 small HPPs in Bihać
	Mining & quarrying	Medium	Three mining areas in Sana catchment; planned 700 ha coalmine near Novi Grad
	Renewable Energy	Low	Solar/wind projects not yet significant
Transportation & service corridors	Roads	Medium in BiH, Low in Croatia	Riverbank roads in BiH; abandoned railway
	Utility Lines	Low	Electricity and pipelines, minor impact
Biological resource use	Hunting & Poaching	High	Poaching of otters, amphibians, waterfowl in BiH
	Fishing (over-exploitation)	High	Tourism-based fishing pressure in BiH; lower in Croatia
	Logging	Low	Small poplar plantations on Croatian side
Human intrusion & disturbance	Law enforcement weakness	High	Illegal immigration and smuggling in BiH; weak ranger presence
	Recreational disturbance	Low-Medium	Off-road vehicles, mountain biking in sensitive areas

Threat Group (IUCN)	Specific Threat	Intensity	Concrete Example /Location
Natural system modifications	Large dams		Potential enlargement of Kostela HPP (BiH)
	Groundwater abstraction	Medium	Housing and agriculture demand in BiH
	Land reclamation & rip-rap	Medium	Some shoreline stabilisation in BiH
	Pasture abandonment & succession	Medium	Lower Una islands, Klokot pastures
Invasive & problematic species	Alien fish introductions	Low	Risk from fish farms (BiH)
Pollution	Urban Wastewater	High	Bihać WWTP of uncertain efficiency; no plants in Cazin and other towns
	Municipal solid waste	Medium	Illegal disposal sites in BiH, gravel pits with debris
	Agricultural Pollution	Medium	Nutrient loads and pesticide runoff
Geological events	Landslides	High	Occasional landslides along riverbanks
Climate change & severe weather	Floods, droughts, extremes	Medium (emerging)	Hydrological changes anticipated across basin



11.1. DESCRIPTION OF THE MOST IMPORTANT THREATS

11.1.1. HYDROPOWER PROJECTS

The existing hydropower plants in the Una river basin are: Kostela HPP, HPP Medna on the Sana River, one small HPP on the Krušnica spring and two small HPPs in Bihać. The small hydroelectric power plant on Krušnica was built at the beginning of the 20th century and is one of the oldest hydroelectric power plants in Bosnia and Herzegovina.

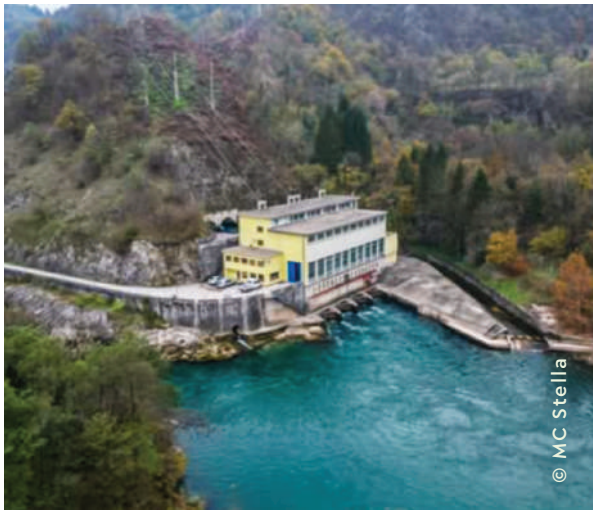


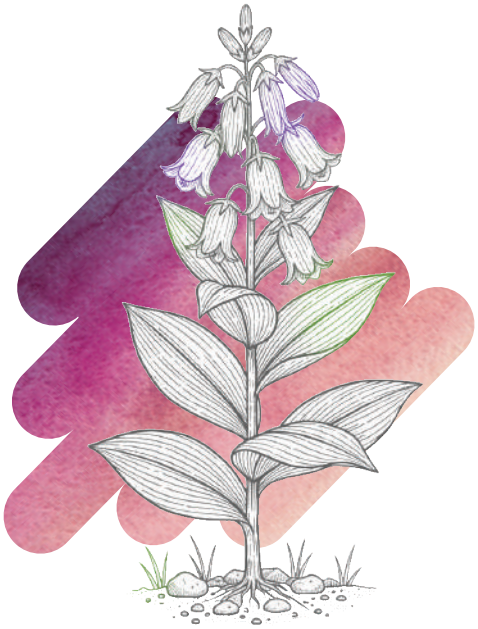
Figure 28: HPP Kostela



Figure 29: HPP Kostela with the impoundmnet is excluded from the proposed Una WRNP boundaries (red line). (Fluvius, 2025, based on Google Earth image).

All HPPs, with the exception of Kostela, are located at the sources of rivers or tributaries and are therefore excluded from the proposed boundaries of the Una Wild River National Park. However, the authors of the study have designated the Kostela HPP area as a section for which a decision must be made in the future regarding its status (a separate zone inside the protected area or excluded from the protected area boundaries)in relation to the proposal to establish a Wild River National Park.

Despite the comparable low number of existing dams, the potential pressure of new projects is high. There is an evidence of 36 new hydropower projects planned in the river system.



Some of these plants would flood attractive canyons, while others would divert the water away from the river, leaving large parts of the riverbed dry. Most of the projects do not have a concession contract and are only planned, the ones who have a concession, permits are not issued yet, while one of them - on Vojskova river - was under construction, but the process has been stopped for now.

There are also plans to raise the dam and thus increase the impoundment area of the existing Kostela HPP, which could greatly jeopardize the uninterrupted flow of water and sediments and thus also conflict with the nature conservation objectives of the Una Wild River National Park.

7

Managing legacy infrastructure: Kostela HPP

Built in the 1950s and expanded after 2014, the Kostela Hydropower Plant is a major break in the Una's river continuity. It is excluded from the park's boundaries and from the Core A (Wild River Core) designation.

The UWRNP framework still treats Kostela as legacy infrastructure that must not expand and must be steered toward improved ecological performance. The long-term objective is to restore connectivity - either through eventual removal, or interim mandatory reconstruction to enable fish passage and sediment transport.

11.1.2. POLLUTION

Wastewater management and the lack of sewage systems is one of the problems that impairs the condition of the waters. However, the water quality of Una is still good and it has improved due to the collapse of a large industry after the war, but today there is a lot of influence of waste water due to the lack of a purification system or sewage system in general which increases every year due to intensive and uncontrolled tourism. As a result of mining at the surface coal mine in the villages of Kamengrad and Fajtovci, near Sanski Most, accidental situations often occur where Bliha river is highly polluted.

This is especially visible in the most attractive location of this river, which is its 56 m high waterfall. The reason for the pollution of the Bliha river is that a large amount of tailings from the mine has been released into the river several times.

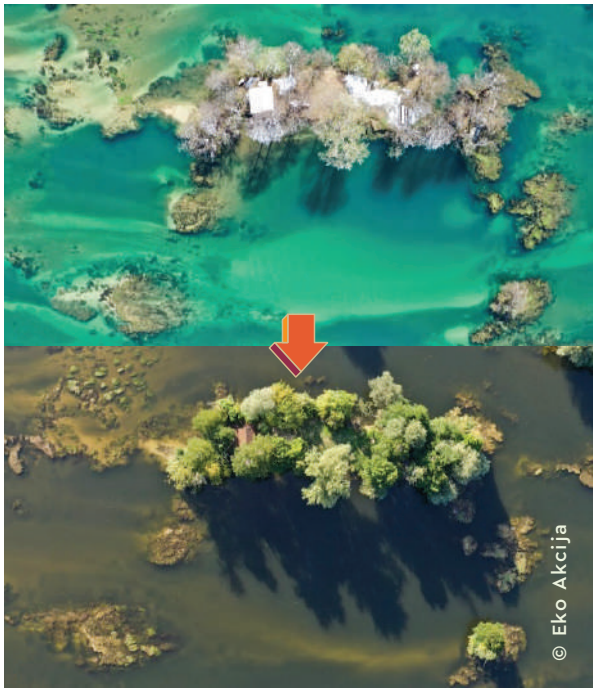


Figure 30: Una river near Bihać; above before pollution, bellow after the pollution in August 2025.

11.1.3. DISPOSAL OF RADIO-ACTIVE WASTE

The Republic of Croatia is planning to build a storage facility for the disposal of nuclear waste in Trgovska gora at the lower part of Una, in Croatia, but right at the border with Bosnia and Herzegovina. The nuclear waste is foreseen to come from the Krško Nuclear Power Plant, and it would be disposed of by Slovenia and Croatia. This project would pollute the groundwater, contaminate the Una river and threaten the health of 250,000 residents in 13 municipalities around the river. The current status of the project is “planned”, it seems to be on hold. There has been resistance from local communities and citizen associations for many years.

11.1.4. ILLEGAL CONSTRUCTION

On the banks of the rivers Una and Sana, more and more illegal buildings are being constructed. There are different types of restaurants, hotels, weekend houses, as well as different concrete terraces, which greatly damage the uniqueness of these rivers and the natural environment. Another problem is, that the water management continues to fix the natural banks with concrete walls. Unfortunately, the regular inspections, which aim to stop this invasion of construction, are not strong or are barely existent.

This study identifies 1.380 buildings within a 30 m buffer along the riverbanks, excluding the main villages and town areas. Using a 10 m buffer, the number is halved to 695. There are at least 600 “new” buildings within the 30 m buffer (on both sides of the river) or 300 within the 10 m buffer since 2012, based on high-resolution images available in Google Earth (see the image pair below upstream from Sanski Most). This equates to up to 50 or 25 new buildings per year along the rivers, which I consider a realistic figure and still quite significant, though the distribution is uneven. The most affected stretches are in the Bihac basin and along the Sana between Prijedor and Sanski Most, but essentially all areas near larger villages or settlements are impacted.



Figures 31 and 32: Buildings upstream from Sanski most (red). (Fluvius, 2025, based on Google Earth image) and near Bihač.



11.1.5. FISH FARMS

The fish farm in Martin Brod covers about two hectares and is located at the confluence of the Unac with the Una, inside the Una National Park. This facility is engaged in intensive breeding of rainbow trout and brown trout and is owned by a private company. The pond has been active for several decades. This intensive farming method pollutes the river system of the Una National Park. This often leads to the death of fish in the river.



Figure 34: Martin Brod fishponds.



Similar to HPP, the largest fish farms (Martin Brod, Ribnik, Saničani) are also considered incompatible with the appropriate nature conservation objectives in Una Wild River National Park and are therefore excluded from the proposed boundaries of the protected area.

Figure 35: Dead fish found in the Unac river, dowstream of th eoutflow from the fish farm in Martin Brod.

11.1.6. POLITICAL OBSTACLES

The idea of establishing a transboundary wild river national park in the Una River System will require numerous coordination efforts and political decisions. The situation is particularly complicated due to the internal arrangements in Bosnia and Herzegovina, as well as the fact that the Una River originates in Croatia, flows through the territory of Bosnia and Herzegovina, and re-enters Croatia where it flows into the Sava River. Despite the complicated situation, through the process of creating something new in Croatia and in Bosnia and Herzegovina, the transboundary Una Wild River National Park can be a chance to bring people closer together and unify.

12. FEASIBILITY ASSESSMENT

The feasibility assessment is based on four components: ecological, legal and governance, financial, and socio-political feasibility.

12. 1. ECOLOGICAL FEASIBILITY

The Una and its tributaries form one of the last free-flowing karst river systems in Europe. The river's crystalclear waters and natural water cycles are crucial for flood regulation, water supply and the provision of other ecosystem services. The free-flowing character of this river, supported by the smooth functioning of important natural processes (such as the free transport of water and sediments) with floodplains and riparian forests, provides the conditions for rich biodiversity and plays an important role in carbon sequestration and climate change mitigation.



Main threats to the Una River
The Una faces four converging pressures that could permanently degrade its ecosystem:

Hydropower and fragmentation (dozens of planned projects, plus expansion of existing sites, risk dams, bank works and gravel extraction that disrupt sediment transport and fish movement).

Riparian encroachment and tourism sprawl (illegal buildings and concrete terraces on riverbanks are narrowing floodplains and destroying the riparian strip).

Water quality and pollution (weak wastewater treatment, agricultural runoff and aquaculture nutrient loading increasingly stress the river).

Resource depletion and external risks (low-flow water abstraction is rising, and long-term threats include the planned Trgovska Gora nuclear waste facility).

12.2. LEGAL AND GOVERNANCE FEASIBILITY

Croatia already protects sections of the Una River under Natura 2000 and is preparing proposals for national protected areas for some river sections, while Bosnia and Herzegovina has already established (or is preparing proposals for new protected areas) a national park, a nature park and other national protected areas.

The IUCN category II classification is fully compatible with the proposed zoning, which is based on the 75% rule for the natural state of rivers. The management foresees four levels: intergovernmental level (Joint Commission), management (Park Council), technical level (Secretariat) and implementation level (existing protected area institutions complemented by a new Una WRNP Manager).

12.3. FINANCIAL FEASIBILITY

Base funding is expected from the budgets of the states and entities of Bosnia and Herzegovina and Croatia. There are significant opportunities for support from international donors, including EU IPA, World Bank, EBRD, KfW, Sida/WBIF, UNDP and AIIB. Croatia also has access to the EU funds LIFE, Horizon and Cohesion. Sustainable tourism, including rafting, fishing and visitor fees, offers further revenue potential, but care should be taken to ensure that commercial and mass activities do not jeopardise the primary conservation objectives of the Una Wild River National Park.

12.4. SOCIO-POLITICAL FEASIBILITY

The socio-political feasibility is favourable, with strong local support but requiring careful planning for land tenure, tourism management and cross-border governance.

The communities and settlements in both countries, the rafting and fishing associations, local NGOs and the administration of the existing Una National Park strongly support the establishment of the Una Wild River National Park. Socio-economic benefits include an increase in eco-tourism, new jobs, access to EU funding for conservation and community development. Challenges include issues of private land ownership, the risk of overcrowding due to increased tourism and the need for effective cross-border coordination.

12.5. OVERALL FEASIBILITY ASSESSMENT

The Una Wild River National Park is both possible and necessary – a globally valuable river that can be protected through sound management, sustainable funding and strong local support:

- Ecological feasibility is high: The Una is of global value for biodiversity and ecosystem services.
- Legally and institutionally feasible, provided that the entities of Bosnia and Herzegovina coordinate and bilateral agreements are reached with Croatia.
- A mixed model combining core budgets, international donor support and park revenues ensures sustainable funding.
- The socio-political feasibility is favourable, with strong local support, but requires careful planning for land ownership, tourism management and cross-border administration.

12.6. RISKS AND MITIGATION STRATEGIES

The table presents the main risks to the successful realisation of the conservation objectives for the Una Wild River National Park together with the proposed basic mitigation measures to protect the ecological character of the river and its biodiversity:

Table 7: Main risks and proposed mitigation measures

Risk	Proposed mitigation measures
Conflict of Development and Land-uses vs. Conservation Objectives (Construction and infrastructure, tourism and unsustainable recreation,…& agriculture, aquaculture, water management / anti-flooding)	"no-take" concept for the core zone of the Una WRNP
	Full EIAs required for any projects
	Promote and use the 'nature-based solutions' concept
	Strict enforcement
Pollution (urban, industrial, agricultural)	Water quality monitoring
	Strict enforcement
	Education and communication
Inefficient enforcement and inspections	Increase the number of well-equipped and trained park staff
	Reorganise the municipal and state inspection system
	Effective system for penalising violations
	Training programmes and provision of equipment for rangers
Weak cooperation between the two countries and resistance from local communities	Establishment of joint political, administrative and technical cooperation bodies
	Development of the joint Una WRNP management plan
	Stakeholder involvement
	Education and communication campaigns
	Incentives/subsidies for sustainable land use and start-up projects

13. MANAGEMENT VISION AND OBJECTIVES FOR THE UNA WILD RIVER NATIONAL PARK

The management vision and objectives for the Una Wild River National Park provide the overarching framework for long-term conservation of the river and its tributaries.

13.1. UNA WILD RIVER NATIONAL PARK – THE VISION

The long-term vision for the preservation of the Una River and its tributaries should take into account the following components:

- To ensure that the Una remains wild forever and that the natural river ecosystem is preserved.
- To unite communities across Croatia and Bosnia and Herzegovina with a common vision to protect and restore the Una River across borders and to show that people and natural areas can benefit from cross-border co-operation.
- Honouring the cultural heritage and identity of the entire region, which stems from the deep connection people have with their river and the surrounding landscape.
- Creating opportunities for sustainable employment in agriculture, forestry and other industries throughout the region, while maintaining the free-flowing character of the river and its tributaries.
- Promote well-considered tourism that is sensitive to the river and the environment, and protect the river and the floodplains from extractive activities and large-scale development.
- Support future generations through the benefits of a healthy ecosystem, such as water purification, flood regulation and climate resilience, as well as the restoration of degraded areas.
- Position the free-flowing Una as a model of European wild rivers, demonstrating how ecological integrity and cross-border cooperation can inspire river conservation elsewhere in the Balkans and beyond.

13.2. UNA WILD RIVER NATIONAL PARK – THE STRATEGIC OBJECTIVES

The strategic objectives for Una WRNP, which are aligned with the long-term vision, consist of the following components: “natural processes, biodiversity, connectivity, communities, research, monitoring, and education.”

Strategic objectives (SO) could be defined as follows:

1. Protection of the Una River with tributaries as a free-flowing river, ensuring that natural hydrological and geomorphological processes are maintained.
2. Conservation of biodiversity and habitats that depend on intact river dynamics and natural processes.
3. Ensuring natural succession in the riparian zone and restoration of degraded habitats where needed.
4. Maintaining ecological connectivity across the river landscape and its tributaries.
5. Enabling the experience of nature and non-invasive forms of recreation while strengthening environmental education on the importance of river conservation.



The Una originates near the village of Srb in Croatia. With a depth of over 240 meters, the spring - known as Vrelo Une - is one of the deepest in the world. From there, the river beginns its journey, shaping unique ecosystems with hundreds of waterfalls, rapids, deep pools and wetlands.

© Arthur de Bruin

6. Cooperation with local communities and stakeholders in the planning and implementation of nature-friendly forms of tourism and sustainable development.
7. Support for research and monitoring as the basis for adaptive management and long-term conservation success.

The above strategic objectives are in line with the primary management objectives for IUCN Category II sites (Dudley et al., 2008):

- **SO 1** is a direct contribution to the primary objective for IUCN Ctg. II sites »to protect natural biodiversity together with the underlying ecological structure and supporting environmental processes" by maintaining natural river processes without regulation or fragmentation.
- **SO 2** is in line with the primary objective of IUCN Ctg.II "to protect, conserve and restore species and ecosystems" by addressing the protection of biodiversity (= species and habitats).
- **SO 3** is related to the IUCN Ctg. II primary objective "Maintaining ecological integrity and supporting the restoration of degraded ecosystems" by emphasising the importance of ecological integrity and restoration.
- **SO 4** aims to strengthen the role of the national park in achieving IUCN Ctg. II primary objective: "Contribution to regional networks of protected areas and ecological corridors".
- **SO 5** focuses on the realisation of the primary management objective of the IUCN Ctg. II site "to provide a basis for environmentally and culturally sustainable spiritual, scientific, educational, recreational and visitor opportunities" by combining conservation and nature-based visitor experiences.
- **SO 6** is fully consistent with the knowledge and monitoring functions of Ctg. II ("Facilitating research, environmental monitoring, education and information exchange") by emphasising support for research and monitoring as a basis for adaptive management.



Una canyon upstream of Bosanska Krupa.

14. PROPOSED GOVERNANCE MODEL FOR THE UNA WILD RIVER NATIONAL PARK

Governance model 'explains' who makes the decisions relevant to the management of the protected area. For the Una Wild River National Park, the governance model proposes a model of cooperation between Croatia and Bosnia and Herzegovina in achieving the conservation goals.

14.1. FOUR-LEVEL GOVERNANCE MODEL

Modelled on best practice in the management of transboundary protected areas (such as the Krkonoše Biosphere Reserve between the Czech Republic and Poland) or transboundary water resources (such as the Danube), it makes sense to design a four-level governance model for the transboundary Una WRNP:



It is also proposed to establish a Joint Scientific/ Advisory Body to advise on management and ensure the involvement of key stakeholders in management.

14.1.1. TRANSBOUNDARY BIOSPHERE RESERVE UNA

The model for establishing a cross-border UNESCO Man and Biosphere Reserve (MAB) appears to be an appropriate long-term form of nature conservation and sustainable development for the protection of river ecosystems. The MAB concept is based on a core conservation area, which must be identified and managed with the primary objective of preserving biodiversity and all natural processes necessary to achieve this goal (such as the IUCN category II site).

In the case of a river ecosystem, this primarily means ensuring unaltered water flows and sediment transport, as well as an intact riparian zone. In the Una River System, this role would be performed by the proposed transboundary Una Wild River National Park.

In the Wild River National Park model, it is crucial that sustainable development in the local environment is directed towards the wider area at the river basin level. We can say that, in the case of the Una, the MAB concept would upgrade the basic nature conservation requirements for river protection with development potential for the local community at the river basin level, from which the impacts (and threats) to the river ecosystem originate.

In addition, the Una River and its tributaries are of international conservation value, primarily as one of the last major rivers in the Balkans that has retained its pristine character, and as such, it also needs international recognition and a framework for protection. The concept of establishing an international MAB area also enables the active participation of civil society in the management and monitoring of the achievement of the objectives of establishing a protected area,

14.2. COMPOSITION AND POWERS OF THE BODIES AT EACH DECISION-MAKING LEVEL AND IMPLEMENTATION OF THE DAY-BY-DAY MANAGEMENT

The membership and key responsibilities of the decision-making and management bodies are described in this chapter, together with a presentation of how day-to-day management activities are carried out within the park.

14.2.1. JOINT INTERGOVERNMENTAL COMMISSION FOR UNA WRNP

The Joint Intergovernmental Commission is responsible for all strategic and political decisions related to the Una WRNP and for delegating responsibilities and tasks to subordinate decision-making bodies (i.e. at the management level). This commission also adopts a multi-annual transboundary strategy and a transboundary management plan for the entire Una WRNP, i.e. for both countries. The Commission is made up of representatives from the most important ministries in both countries (including the ministries responsible for nature conservation and water).

14.2.2. TRANSBOUNDARY PARK COUNCIL

Members of the Transboundary Park Council from Croatia should be the heads of the relevant public institutions responsible for the management of state protected areas (national parks, nature parks) and the public institutions managing the existing Natura 2000 sites at county level. According to this proposal, the mandate for the management of those sections of the Una River and its tributaries in Croatia that do not yet have the status of a protected area (national park or nature park) or Natura 2000 site should be transferred to one (or more) public institutions(s) ('Javna ustanova') that manage nearby protected areas or Natura 2000 sites through the elaboration of 'ecological network management plans'.

In Bosnia and Herzegovina, it would be most effective (and legally feasible) to transfer the management tasks of the Una WRNP in existing protected areas (national park, nature park) through public institutions that manage these protected areas and whose (territorial) management competences would be extended to sections of the river and its tributaries that are not yet protected.

14.2.3. UNA WILD RIVER NATIONAL PARK MANAGER

The administrative bodies already responsible for Natura 2000 sites along the Una River in Croatia and for the designated protected areas in Bosnia and Herzegovina will continue to exercise their statutory tasks within their jurisdictions. To ensure coherent and coordinated field management across the entire transboundary park, a dedicated Una WRNP management body will be created.

This body will act as the central implementing authority, harmonising activities between the existing institutions and assuming direct responsibility for those stretches of the Una and its tributaries that currently fall outside of formally protected or Natura 2000 areas. In this way, day-to-day conservation, monitoring, visitor management, and local cooperation measures will be consistently applied throughout the whole Una WRNP territory.

14.2.3. JOINT TECHNICAL SECRETARIAT

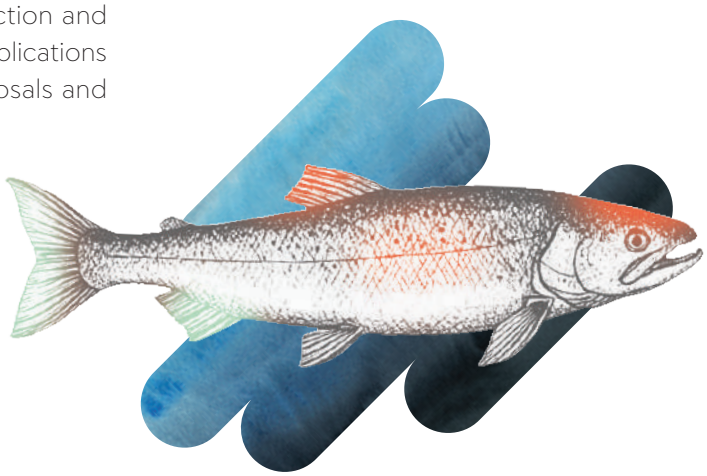
Joint Technical Secretariat prepares and implements the work programme of the Una WRNP in its area of competence, prepares the necessary secondary legislation and specifies the zoning and the permitted and prohibited activities in the park. It also coordinates the implementation of surveillance, visitor management and monitoring programmes.

The Joint Technical Secretariat, which consists of smaller offices in each of the two countries, is also responsible, among other things, for the preparation of annual management plans, the collection and exchange of data, the preparation of applications for joint projects through calls for proposals and communication activities.

14.2.4. IMPLEMENTATION OF THE DAY-BY-DAY MANAGEMENT ACTIVITIES

The existing administrative bodies managing the Natura 2000 sites on the Una River in Croatia and the protected areas in Bosnia and Herzegovina will continue to fulfil their tasks.

A special Una WRNP manager (management body) will be established to coordinate management activities with the aforementioned protected area and Natura 2000 management authorities and to manage the sections of the Una and its tributaries that currently do not have protected area or Natura 2000 status. The Una WRNP transboundary management body will therefore serve as the ‘umbrella organisation’ for the management of the Una Wild River Transboundary National Park. Its role, required capacities and resources are described in the following chapter.



15. ASSESSMENT OF THE MANAGEMENT CAPACITIES AND ESTIMATED COSTS FOR TRANSBOUNDARY UNA WILD RIVER NATIONAL PARK

This chapter provides a minimum estimate of the capacities and costs required to manage transboundary Una Wild River National Park. As this is a feasibility study, we can only provide very approximate estimates of the capacities and costs required for implementation at this stage.

15.1. UNA WILD RIVER NATIONAL PARK ASSESSMENT OF THE MANAGEMENT CAPACITIES AND COSTS

An assessment of the minimum capacities required and a concept for establishing a management unit with employees has been prepared for the management of the Una Wild River National Park.

15.1.1. ESTABLISHMENT OF THE UNA WILD RIVER NATIONAL PARK MANAGEMENT BODY

The Una WRNP management body will be established to take into account that individual sections of the Una River and its tributaries already have their own protected area managers in Bosnia and Herzegovina (Una National Park, Una Nature Park) and Natura 2000 areas in Croatia (Una Valley, Una Canyon). The role of the Una WRNP management body has a characteristic of an 'umbrella organisation', and the model is designed to allow for a high degree of co-management by employees from both sides of the border.

A special feature of the model is the proposal that all employees in management positions (director and seven program managers) should rotate every two years, with employees from both countries alternating in these roles. The model represents a minimum rather than an optimal design for effective management.

The minimum staffing level is estimated at 42 employees. These include the director (who changes every two years; if a representative from Croatia is at the head of the park for two years, he is replaced by a representative from Bosnia and Herzegovina for the next two years). Due to the pronounced coordinating and umbrella role of this management body, we propose the establishment of seven work programs, each with its own manager, who is replaced according to the same principles as the director, i.e., every two years and according to an "interstate key."

15.1.2. PROGRAMS WITHIN THE MANAGERIAL BODY

The programs within the transboundary Una WRNP include:

- Finance & administration program, which has two accountants in addition to the program manager, one for the Croatian part and one for the Bosnian part (three jobs).
- Ecotourism & public relations program, which has two employees in addition to the program manager (a public relations expert and an ecotourism expert), one for the Croatian part and one for the Bosnian part (three jobs).



Floodplains along rivers and streams are extremely valuable in terms of biodiversity

- Management & planning program, which has two employees in addition to the program manager, whose main task is to coordinate with the implementers of management programs already underway on the Croatian and Bosnian sides (three jobs).
- Community and local development program, which has two employees in addition to the program manager (a stakeholder engagement expert and a regional development expert; their role is also that of project managers), one for the Croatian part and one for the Bosnian part (three jobs).
- Education & visitor management program, which has two employees in addition to the program manager (an education expert and a visitor management expert), one for the Croatian part and one for the Bosnian part (three jobs).
- Monitoring & research program, which has four employees in addition to the program manager (a GIS expert, a zoologist, a botanist, and a freshwater ecologist), whose work is to be carried out on both sides of the state border (five jobs).
- Law enforcement & patrolling program, which has three employees in addition to the program manager, who coordinate field supervision and enforcement work in Croatia (10 staff) and Bosnia and Herzegovina (separately for the Federation of BiH (5 staff) and the Republika Srpska; 5 jobs).

The proposed employment and work program scheme within Una WRNP is shown below:

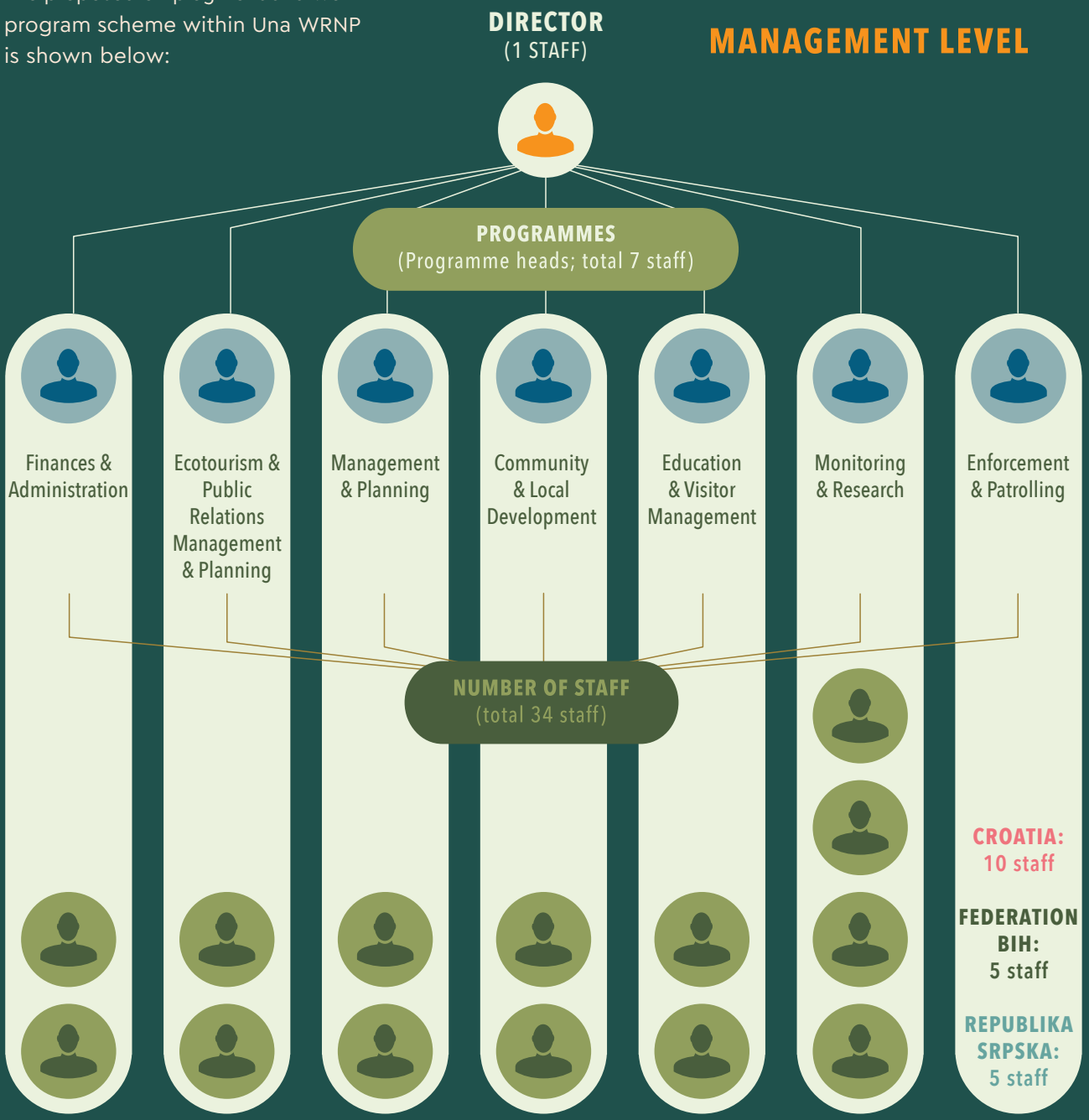


Figure 36: Organizational chart of UWRNP management

Required work profiles (position, main tasks, main qualifications) for the Una WRNP are presented in the annex. The number of employees as rangers takes into account that certain staff are already employed in protected areas in Bosnia and Herzegovina; the figures in the table represent an increase on the existing number of employees.

15.1.3. ROUGH ESTIMATE OF THE UNA WILD RIVER NATIONAL PARK MANAGEMENT COSTS

Rough estimate of Una WRNP management costs is based on the costs incurred on an annual and multi-year basis and a separate capital investment cost category.

- Regular annual Una WRNP management costs include staff costs, operational and running costs.
- One-off or multi-year costs include communication and outreach costs, infrastructure and equipment development costs, program and planning costs; the value of these items varies from year to year and is not fixed.
- The possible establishment of a single visitor center is classified as a one-off capital investment cost, which will be implemented over several years.

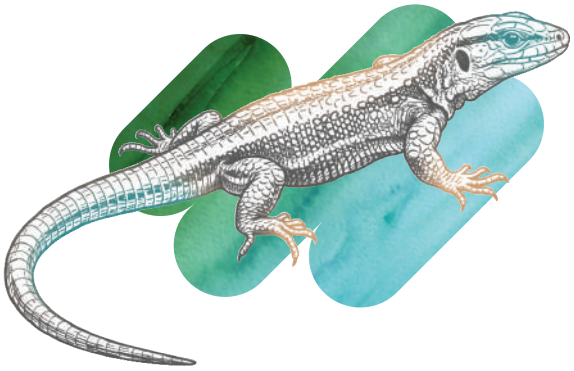
The cost categories are shown in the simplified table below.

Table 8: Cost categories of UWNRP

ANNUAL RECURRING COSTS		SMALL INVESTMENT COSTS*			CAPITAL INVESTMENT COSTS
Staff costs	Operations & running costs	Communication & outreach costs	Infrastructure, equipment: development costs	Programme & planning investments	Visitor centre
€ 830.000	€ 420.000	€ 25.000	€ 393.000	€ 82.000	€ 6.000.000
Director, Heads of Departments, Rangers, Administration, Other / Monitoring / Technical positions. **Total:** 42 staff	Includes maintenance of equipment and park's infrastructure, IT equipment, web page maintenence, phones, rent, software licences, vehicles (fuel, maintenance, insurance), utilities, staff training, insurance, …	**Year 1:** Includes awareness campaigns, interpretation, publications, website, branding.	**Year 1:** Includes boats, monitoring equipment (drones, tablets, projectors), vehicles (purchase), PCs (hardware), phones (contracts, mobile /office), database setup/licences	**Year 1:** Includes visitor guidance system, school programmes:, official clothing for rangers/staff, external contracts, basic signage…	One common visitor centre (technical documentation, permits, construction and equipment)
TOTAL ANNUAL RECURRING COSTS:		TOTAL SMALL INVESTMENT COSTS FOR EACH OF THE FIRST FIVE YEARS:			TOTAL CAPITAL INVESTMENT COSTS:
€ 1.250.000		€ 500.000			€ 6.000.000

* "Small Investment Costs" are calculated in detail only for Year 1. For subsequent years, we have assumed that the amount will be roughly the same, but will be allocated to other investment items.

The value of 'annual recurring costs', which include labor costs, is fixed for each year (1.250.000 EUR). For the costs in the 'small investment costs' column it is estimated that the value of these costs will remain roughly the same each year during the initial years of operation of the Una WRNP and will amount to 500.000 EUR per year. Small investment costs are added to annual recurring costs and this allows us to arrive at the necessary investment value for the management of Una WRNP for a period of five years. This amounts to EUR 1.750.000 per year. In a 5-year period the costs of operation of the Una WRNP are estimated at EUR 8,75 million.



It looks like Caribbean, but these islands are in the Una River.



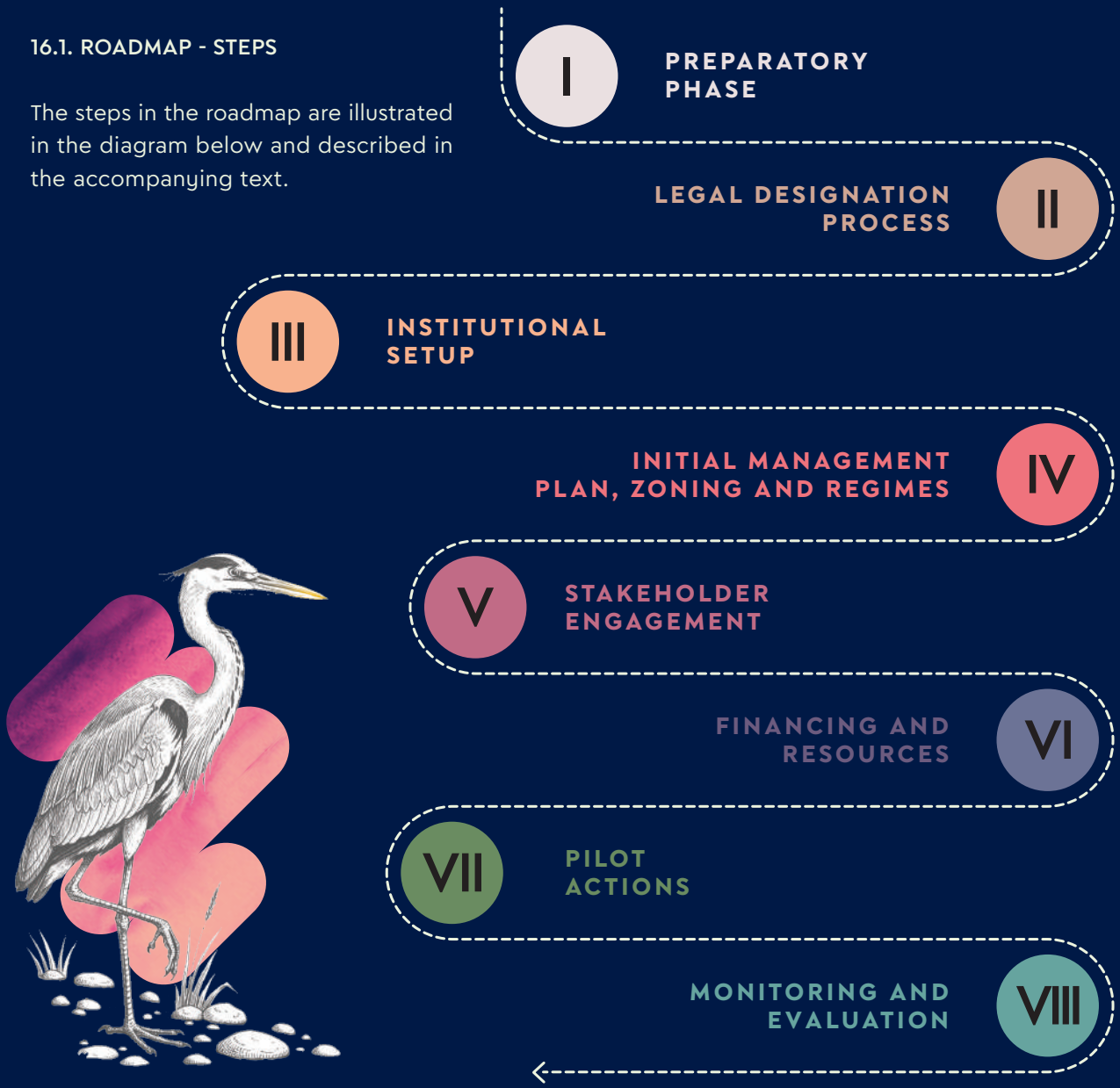
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16. ROADMAP FOR ESTABLISHING THE UNA WILD RIVER NATIONAL PARK

In this chapter, the step-by-step roadmap for the establishment of the transboundary Una Wild River National Park (WRNP) is presented by phases of the process. The roadmap is illustrated in the diagram below and described in the accompanying text.

16.1. ROADMAP - STEPS

The steps in the roadmap are illustrated in the diagram below and described in the accompanying text.





Sana Pecka *Trichoptera*

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16.2. BRIEF DESCRIPTION OF STEPS

The efforts of civil society and professional bodies to establish a protected area could be described as a 'pre-phase'. NGOs/CSOs play a key role in this process, as they must present their ideas to the local and wider public, as well as to decision-makers.

- **Preparatory phase:** in both countries (Croatia and Bosnia and Herzegovina), the process of establishing a protected area is led by professional institutions in the field of nature conservation. They must prepare a Protection Study, which, among other things, highlights all the natural values that make it sensible or necessary to protect a certain area, and also determine the appropriate category of protected area and, on the basis of national legislation in the field of nature conservation and protected areas, determine the basic protection regimes that derive from this proposed category of protected area. This is therefore a professional study (the present Feasibility Study will be of great help in its preparation). Once this study has been approved, the preparation of the legal document that forms the basis for the establishment of the protected area can continue.

- **Legal designation process:** while the preparatory phase focuses on preparing the justification for why a certain area deserves special protection status, this phase requires a careful review of the legal basis and parliamentary procedures for establishing protected areas. In the case of Una, the situation is particularly complex, as it is also necessary to review the provisions of the national legislation of each country for the establishment of cross-border protected areas. This step will be completed with the drafting of a legal act establishing the protected area.

- **Institutional setup:** the establishment of a protected area does not in itself bring any benefits for nature conservation – without a management body, a protected area is just

a 'paper park'. Therefore, it makes sense to establish a management body with a sufficient number of employees (including rangers) to carry out management tasks at this stage, or as soon as possible after the legal declaration of the protected area (first, job advertisements must be prepared and the staff recruitment process carried out). In the case of Una WRNP, it will be particularly important to establish links with existing management bodies for protected areas in Bosnia and the managers of Natura 2000 areas in Croatia.

- Initial management plan, zoning, and regimes: based on the legal act establishing the protected area, which generally defines the category of the protected area with management objectives and divides the area into zones, it is necessary to prepare (at least a provisional) management plan and specify in detail the internal zones and permitted and prohibited activities in each zone. These zones must also be linked to existing planning documents.

- Stakeholder engagement: the early involvement of stakeholders (including NGOs and scientists), landowners and users, and local communities in the establishment and subsequent management of the protected area is a prerequisite for the successful achievement of the objectives for which the protected area was established. The first step is to identify the actors and familiarize them with the management objectives, zones, and regimes in the area. This requires considerable effort, particularly in terms of organization, promotion, and ensuring stakeholder participation in the process.

- Financing and resources: governments must provide at least the basic resources for employees in the protected area, while other management resources can be provided through EU calls for proposals and cooperation with foundations and donnors. At the same time, a strategy for long-term sustainable financing of the protected area must be prepared, partly also with own revenues, such as entrance fees. The costs should also include appropriate professional training for employees.

- Pilot actions: in addition to their basic purpose of nature conservation, pilot actions also have great psychological significance in ensuring public support for the protected area. Examples of such activities include protected area signage with information boards, carrying out promotional campaigns, involving stakeholders in the activities of the protected area, etc. Ideally, the benefits that the local population will derive from the protected area should be demonstrated, for example through carefully planned eco-tourism development.

- Monitoring and evaluation: the park manager must prepare a monitoring plan that is adapted to the available capacities and at the same time robust enough to enable an adaptive management approach, where the manager defines and implements specific measures to improve the situation based on the monitoring results. It makes sense to start monitoring as soon as possible after the establishment of the protected area.

16.2. PROPOSED TIMELINE

The table below shows a proposed timeline, which is basically conceived as a six-year plan with one-year time reserves added to some phases, mainly due to the complexity of the steps and the demanding nature of the process.

Table 9: Proposed timeline for the establishment

	Year 1/ milestone	Year 2-3 / milestone	Year 4-5 / milestone	Year 6 milestone
Preparatory phase	Protection Study			
Legal designation process		Declaration of the NP		
Institutional Setup			Management authority and staff	
Management plan, zoning, regimes		Management plan with detailed zones		
Financing & Resources			Yearly budget approved	Yearly budget approved
Pilot Actions	Awareness campaign	Awareness campaign	Initial signage completed	Information points
Monitoring & Evaluation		Monitoring program elaborated	Monitoring & adaptive management	Monitoring & adaptive management
Stakeholder engagement	1st round of public participation concluded		2nd round of public participation concluded	

17. CONCLUSIONS AND RECOMMENDATIONS

Based on the analyses performed, the following conclusions and recommendations can be drawn from the Feasibility Study:

17.1 CONCLUSIONS

1. The Una River system (including 15 tributaries) is among Europe's best-preserved free-flowing karst river networks, with outstanding tufa cascades, high hydromorphological integrity, and exceptional habitat diversity; the proposed WRNP covers 351,60 km² and 657,66 km of river courses.

2. Key biodiversity features include Annex-listed and/or threatened species such as *Hucho hucho* (IUCN VU; Habitats Annex II), *Lutra lutra* (Annex II & IV), *Cottus gobio* (Annex II), *Austropotamobius torrentium* (Annex II & V), and significant riparian bird assemblages (e.g., *Ciconia nigra*, *Alcedo atthis*). These provide strong legal triggers for designation.

3. Pressures are real but manageable: existing/proposed hydropower, illegal riverside construction, water abstraction, gravel extraction, pollution sources, invasives, and climate-driven low-flow risk.

4. The zoning concept (Core A/B, Natural & Cultural River Dynamic Zones, Sustainable Development Zone) and a recommended 30 m riparian buffer can safeguard processes while accommodating traditional uses and visitor access.

5. Feasibility is rated high ecologically and legally/governance-wise; moderate to high financially (via state budgets + EU/IFI instruments + sustainable tourism); and high socio-politically given stakeholder support and cross-border alignment. Overall feasibility is positive for IUCN Category II designation.

6. A four-level transboundary governance model (Intergovernmental Commission, Transboundary Park Council, Joint Technical Secretariat, Park Manager) provides a workable structure for day-to-day management and long-term coordination.

7. The model for establishing a cross-border UNESCO Man and Biosphere Reserve appears to be an appropriate form of nature conservation in the strictly protected area represented by the Una Wild River National Park and for guiding sustainable development in the wider Una River basin. The concept of establishing an international MAB area also enables the active participation of civil society in the management and monitoring of the achievement of the objectives of establishing a protected area.

17.2. RECOMMENDATIONS

1. Launch the transboundary process for a Wild River National Park (IUCN Cat. II), using the study's boundary and zoning proposal as the technical basis for the draft legal acts.

2. Enshrine zones (Core A/B, RDZ-N/RDZ-C, and SDZ) in the legal act; introduce a 30 m riparian buffer on both banks to reduce erosion, nutrient runoff, and traffic impacts.

3. Enforce a moratorium on new hydropower and extraction of the natural resources within core and river-dynamic zones; require strict connectivity and environmental-flow safeguards for any water abstraction.

4. Address priority pressures, starting with upgrading municipal wastewater and regulation of fish-farming hotspots; tackling illegal construction in riparian zones via enforcement and restoration measures.

5. Constitute the Intergovernmental Commission, Transboundary Park Council, Joint Technical Secretariat, and appoint a Park Manager with clear mandates and shared SOPs.

6. Combine state allocations with EU (IPA, LIFE, Interreg/Horizon) and international funding support (EBRD, KfW, Sida, UNDP), plus visitor-ready, low-impact tourism; explore payments for ecosystem services for long-term stability.

7. Track hydromorphology, environmental flows, water quality, Annex species/habitats, and visitor pressure; publish an annual public report.

8. Use the study's stepwise roadmap, including stakeholder engagement, legal drafting, consultation, institutional set-up, capacity and cost planning - to reach proclamation of the Una Wild River National Park within the proposed timeframe.

18. SOURCES

Bajramović E., Islamović F., Toroman A., Kudumović D., Džaferović M. (2013). The influence of humans on the quality of the river Una environment. 5th International Conference. Ergonomics 2013. June: 12-15.

Bakrac A., Rimceska B., Bilbija B., Atanackovic A., Dzaferovic A., Nikolic V., Markovic V. (2021). Aquatic Macroinvertebrates Diversity in the Upper Stretch of Una River (Una National Park, SW Bosnia and Herzegovina). Ecologia Balcanica. Vol. 13, Issue 1: 131-141.

Bognar A. (2005). Upper Part of the Una River Valley Between Martin Brod and Pritoka – Geomorphological Characteristics. Hrvatski geografski glasnik 67/2: 21 – 38.

Borsic et al. (2012). Flora along the lower course of the Una River (Central Croatia). In.

Boršić I., Posavec Vukelić V., Alegro A. L. (2012). Flora along the lower course of the Una River (central Croatia). Nat. Croat. Vol. 21, No. 1: 1 – 20.

Ćaleta, M., Mustafić, P., Mrakovčić, M. i Marčić, Z. (2009): Studija inventarizacije ihtiofaune donjeg toka rijeke Une. Hrvatsko ihtiološko društvo.

Dudley, N. (Editor) (2008). Guidelines for Applying Protected Area Management Categories. Gland, Switzerland: IUCN. x + 86pp. WITH Stolton, S., P. Shadie and N. Dudley (2013). IUCN WCPA Best Practice Guidance on Recognising Protected Areas and Assigning Management Categories and Governance Types, Best Practice Protected Area Guidelines Series No. 21, Gland, Switzerland: IUCN.

Dumbović, V., Posavec Vukelić, V., Duplić, A., Katušić, L., Jelić, D., Boršić, I. i Partl, A. (2009). Studija inventarizacije flore i faune rijeke Une i priobalnog pojasa. Sisačko-moslavačka županija, Sisak.

Duplić, A., Ćaleta, M., Marčić, Z., Zanella, D., Mrakovčić, M. i Katušić, L. (2012). Raznolikost dvadeset godina (report and zonation maps for existing Una NP), Sarajevo.

Federalno ministarstvo prostornog uređenja BiH (2014): Prostorni plan područja

Franković, M. (2009). Znanstvena analiza vrste vretenaca (Odonata) s Dodatka II Direktive genus Cobitis and related genera in Croatia. Folia Zoologica. 57, 1-2; 35-41.

Gnjato S., Leščešen I., Basarin B., Popov T. (2024). What is happening with frequency and occurrence of the maximum river discharges in Bosnia and Herzegovina?. Acta Geographica Slovenica. 64-1: 129-149.

Google Earth (2025): Satellite images worldwide. Maxar 2023. http://www.earth.google.com.

Grill, G., Lehner, B., Thieme, M. et al. (2019). Mapping the world's free-flowing rivers. Nature 569, 215–221 (2019).

Jelić D., Karaica D. (2011). First data on the fauna of amphibians and reptiles of the lower Una River and its coastal area. Hyla: herpetological bulletin. Vol. 2011. No. 2: 22-41.

Jelić, D. (2012). New data on the distribution of *Cottus gobio* (Scorpeniformes; Cottidae) in Croatia with special overview of the Adriatic Basin. Croatian Journal of Fisheries. Vol. 70., No. 1.

Kamberović J., Gligora Udović M., Kulaš A., Tapolczai K., Orlić S., Jusufović A., Gajić A., Žutinić P., Ahmić A., Kalamujić Stroil B. (2024). The Diatom Diversity and Ecological Status of a Tufa-Depositing River through eDNA Metabarcoding vs. a Morphological Approach—A Case Study of the Una River (Bosnia and Herzegovina). Microorganisms 2024, 12, 1722.

Koren, T. (2012). Istraživanje distribucije i statusa narančastog poštara (*Colias myrmidone*) i kataksa (*Eriogaster catax*) u Hrvatskoj. Hrvatsko društvo za biološka istraživanja, Zagreb.

Korjenić A. (2014). Basic characteristics water regime and water balance of the river Una. Acta geographica Bosniae et Herzegovinae 2014, 2: 65 – 75.

Korjenić A., Sivac A., Banda A. (2017). Application of GIS in quantitative geomorphological analysis of the Una river basin (Bosnia and Herzegovina). Dela 48: 77-94.

Kovarovics, A., Posch, L., Kirchmeir, H. (2025). Feasibility Study Una Wild River National Park - Zonation and Management E.C.O. Institute of Ecology, Klagenfurt, 26 S.

Ministarstvo gospodarstva i održivog razvoja Republike Hrvatske (2023). Plan upravljanja područjem ekološke mreze dolina Une.

Mrakovčić, M., Brigić, A., Buj, I., Ćaleta, M., Mustafić, P. i Zanella, D. (2006). Crvena knjiga slatkovodnih riba Hrvatske. Ministarstvo kulture Republike Hrvatske, Državni zavod za zaštitu prirode.

Mrakovčić, M., Ćaleta, M., Mustafić, P., Marčić, Z., Zanella, D. i Buj, I. (2010). Izvješće za potrebu izrade prijedloga potencijalnih Natura 2000 područja - slatkovodne ribe. Sveučilište u Zagrebu, Prirodoslovno-matematički fakultet. Biološki odsjek.

Mrakovčić, M., Duplić, A., Mustafić, P. i Marčić, Z. (2008). Conservation status of the genus *Cobitis* and related genera in Croatia. Folia Zoologica. 57, 1-2; 35-41.

Pavlinić, I. i Đaković, M. (2010): Znanstvena analiza dvanaest vrsta šišmiša s Dodatka II Direktive o zaštiti prirodnih staništa i divlje faune i flore za potrebe prijedloga potencijalnih NATURA 2000 područja za šišmiše. Hrvatski prirodoslovni muzej. Zagreb.

Pažur, K., Habeković, D. i Popović, J. (1982). Dinamika rasta mladice (*Hucho hucho*) u vodama Hrvatske podrucjem ecoloske mreze dolina Une: Plan upravljanja područjem ekološke mreže dolina UNE. SMZ.

Schwarz U. (2024). Potential Wild River National Parks on Balkans Assessment of freeflowing rivers on the Balkan Peninsula. Fluvius, Wien.

Schwarz, U. (2025). UNA WRNP mapping and delineation. Technical report. Fluvius, Wien.

Segulja, N., Ilijanić, Lj., Marković, L. (1996). Prikaz i analiza flore Zrinske Gore. Act Bot. Croat. 55/56 pp. 65-99.

Sovinc, A. (2021). Protection study of the Vjosa River Valley based on IUCN protected area standards, Belgrade, Serbia: IUCN.

Sovinc, A. (2023). Protection study of the Aoos River Basin based on IUCN protected area standards. Gland, Switzerland: IUCN.

Spahić, M. Korjenic, A. & Hrelja, E. (2014). Problems of genesis, evolution and protection of the Una tuff in Una National Park. In: eco.mont - Management & Policy Issues, Volume 6, Number 2, pp.61-67.

Strayer, D.L. and Dudgeon, D. (2010) Freshwater Biodiversity Conservation: Recent Progress and Future Challenges. Freshwater Science, 29, 344-358.

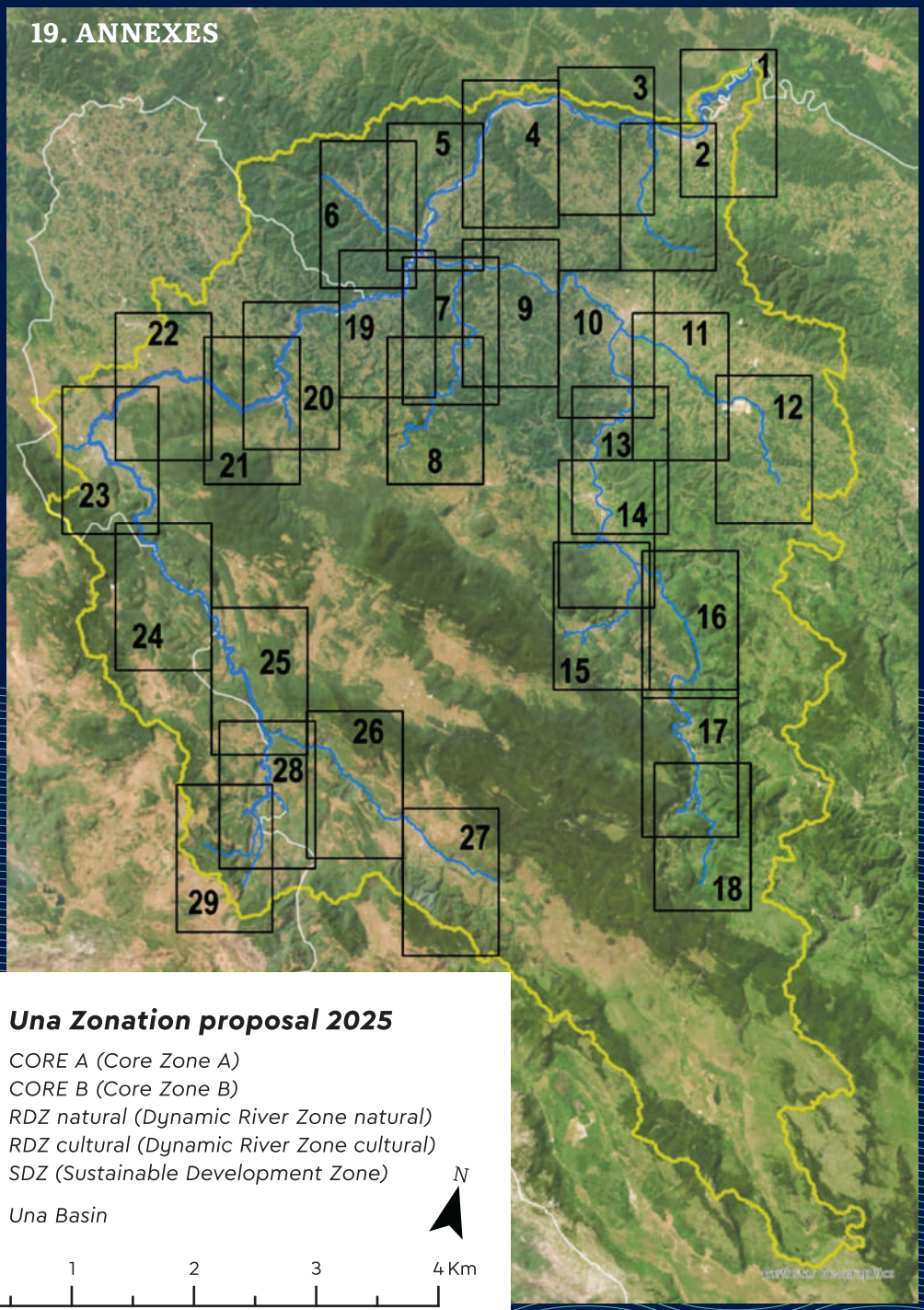
Šašić-Kljajo, M. i Mihoci, I. (2009): Znanstvena analiza vrsta noćnih i danjih leptira s Dodatka II Direktive o zaštiti prirodnih staništa i divlje faune i flore za potrebe izrade prijedloga potencijalnih NATURA 2000 područja. Hrvatski prirodoslovni muzej, Zagreb.

Tickner D, Opperman JJ, Abell R, Acreman M, Arthington AH, Bunn SE, Cooke SJ, Dalton J, Darwall W, Edwards G, Harrison I, Hughes K, Jones T, Leclère D, Lynch AJ, Leonard P, McClain ME, Muruven D, Olden JD, Ormerod SJ, Robinson J, Tharme RE, Thieme M, Tockner K, Wright M, Young L. (2020). Bending the Curve of Global Freshwater Biodiversity Loss: An Emergency Recovery Plan. Bioscience. 2020.

Trzyna, T. (2014). Urban Protected Areas: Profiles and best practice guidelines. Best Practice Protected Area Guidelines Series No. 22, Gland, Switzerland: IUCN.

Visconti, B.P., S.H.M. Butchart, T.M. Brooks, P.F. Langhammer, D. Marnewick, S. Vergara, J.E.M. Watson. (2019). Protected area targets post-2020. Science. Vol.70, No.1.

19. ANNEXES

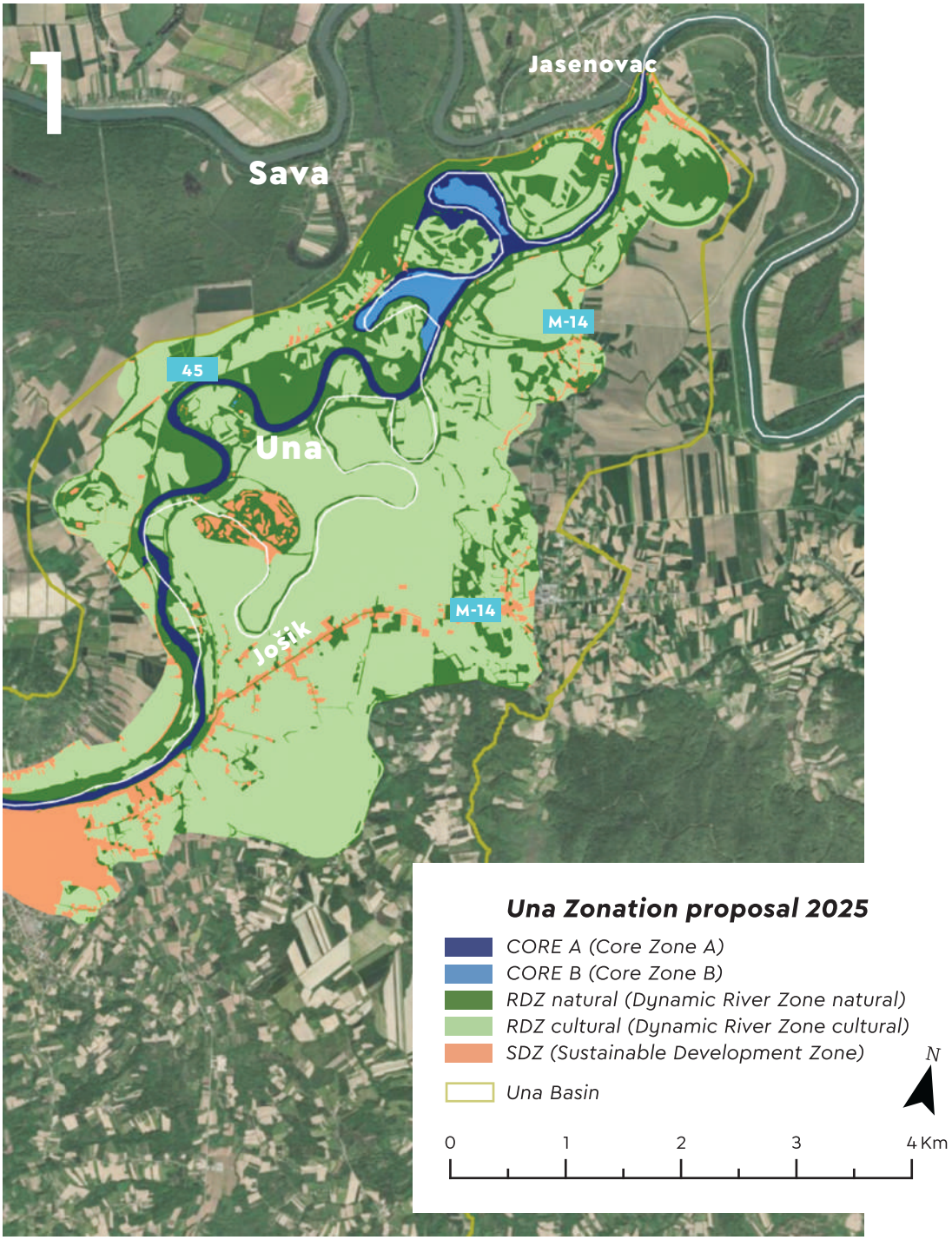


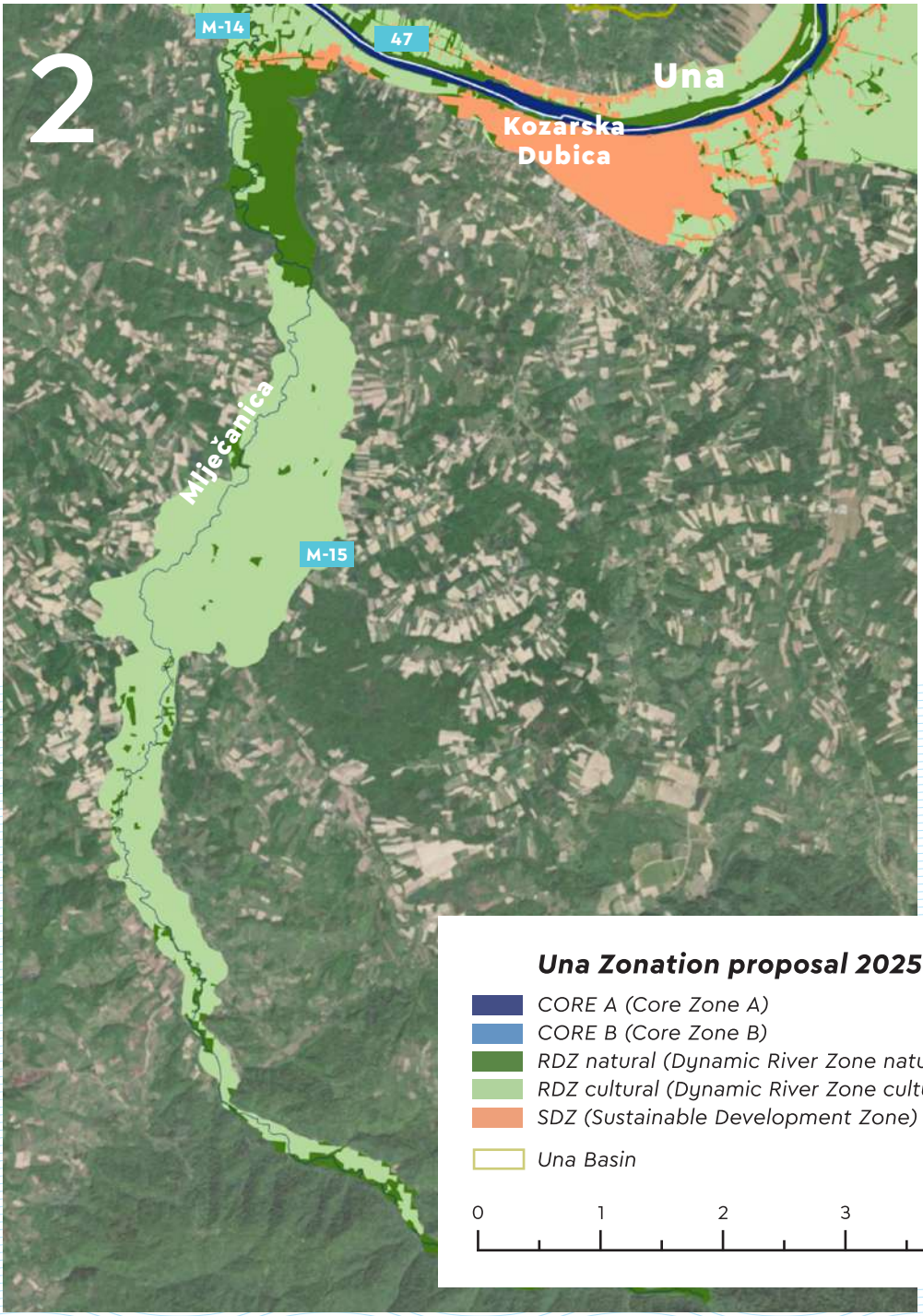
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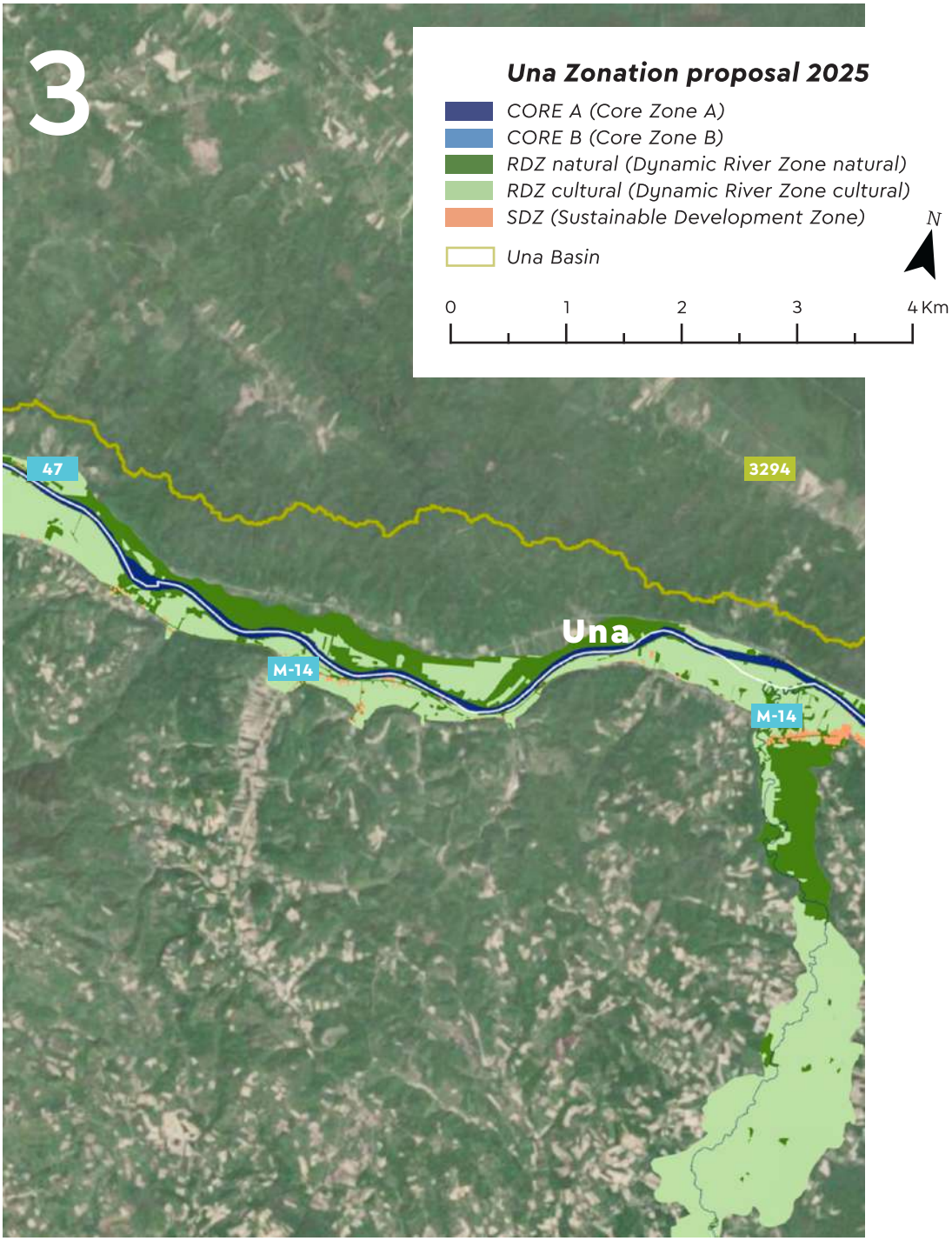
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- *CORE B (Core Zone B)*
- *RDZ natural (Dynamic River Zone natural)*
- *RDZ cultural (Dynamic River Zone cultural)*
- *SDZ (Sustainable Development Zone)*
- *Una Basin*

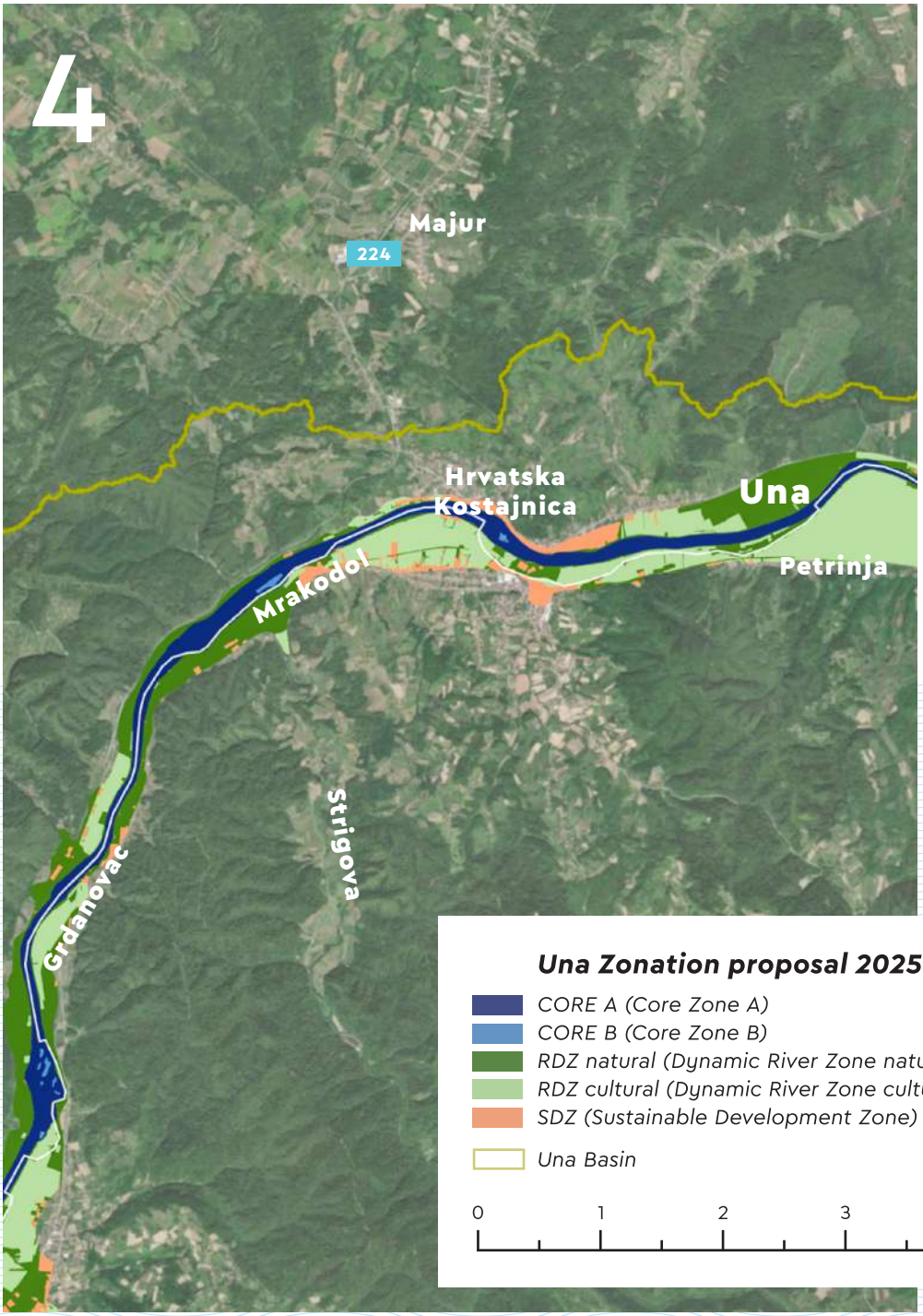
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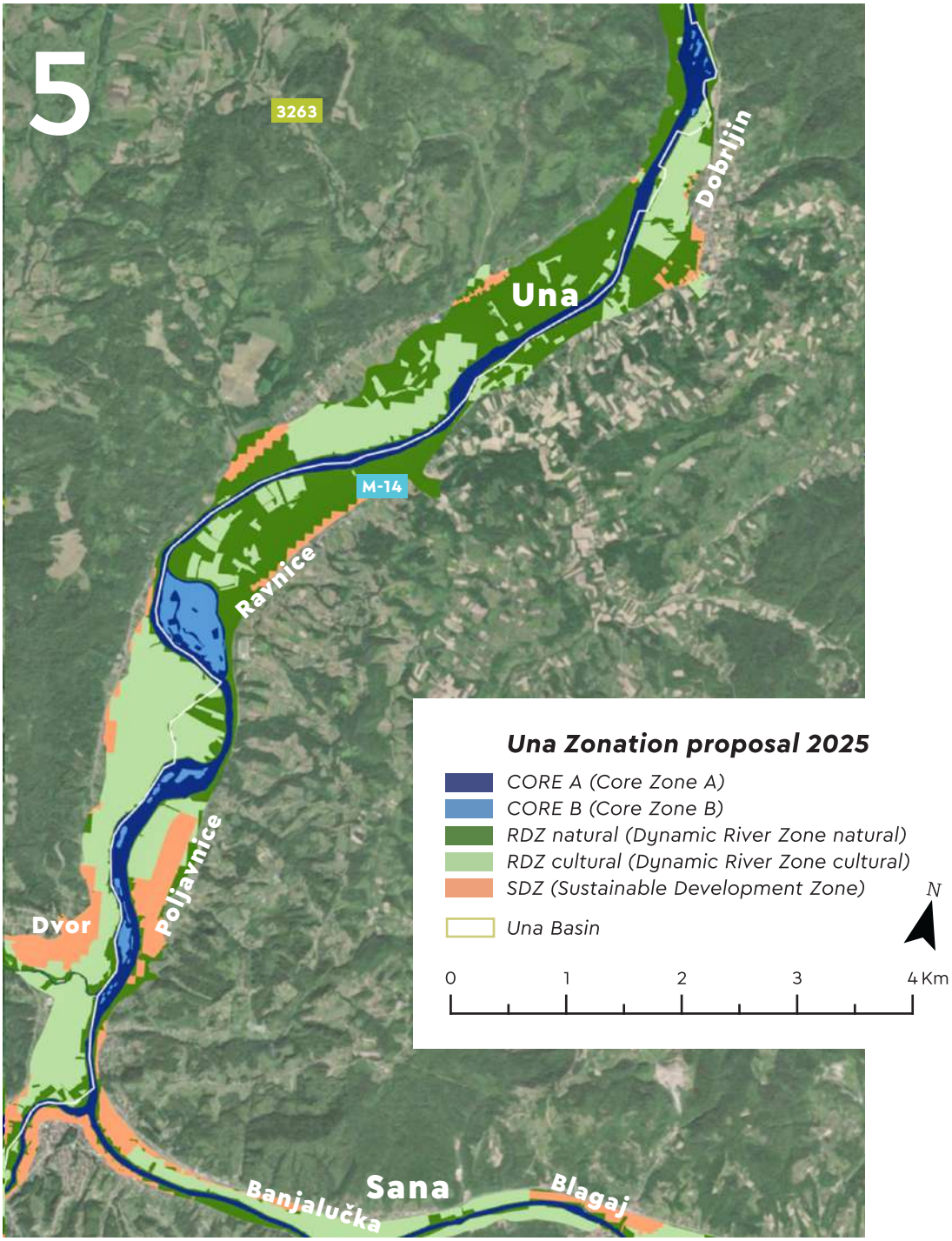
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SDZ (Sustainable Development Zone)
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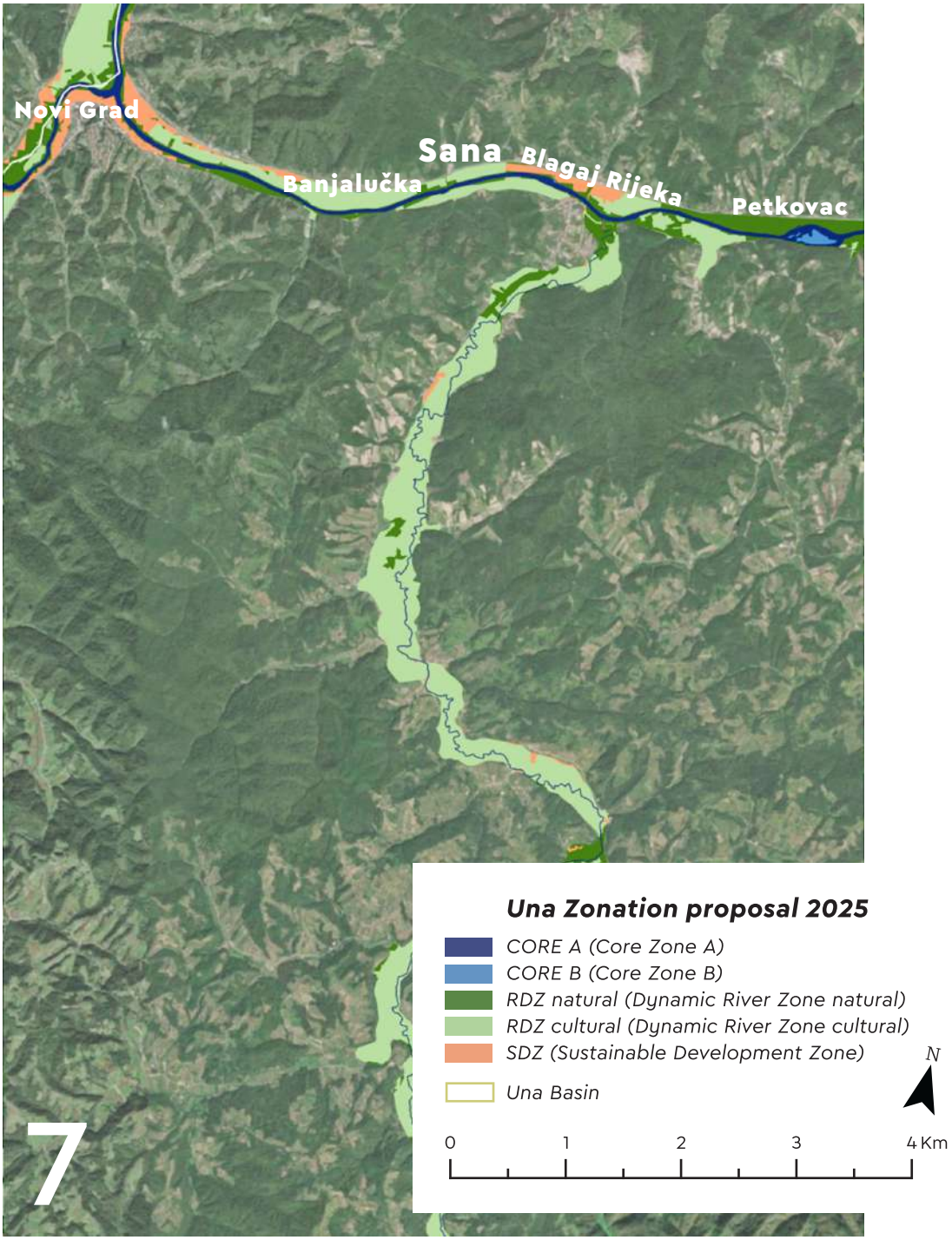

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Mlječanica
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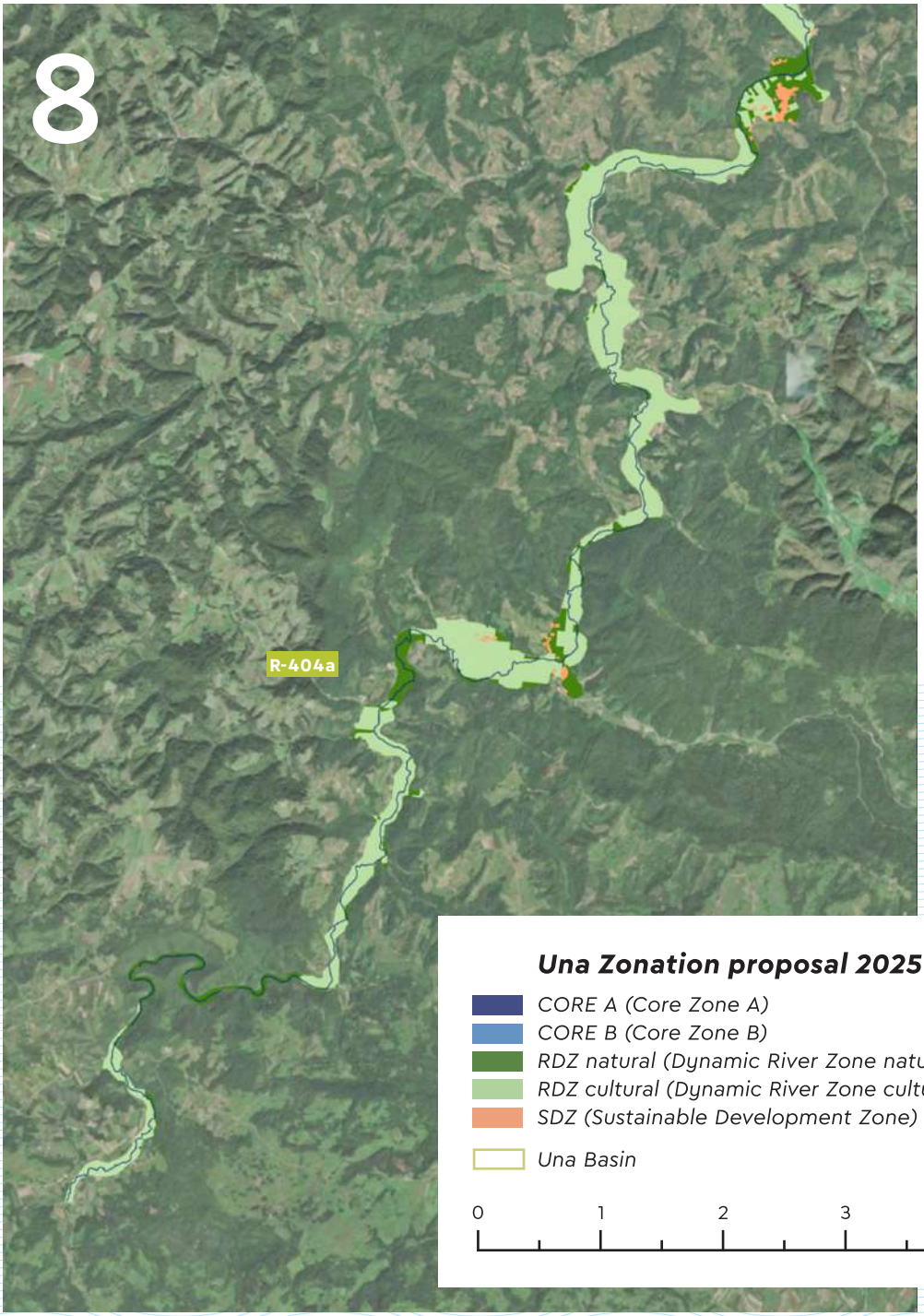

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Hrvatska Kostajnica
Una
Petrinja
Mrakodol
Strigova
Grdanovac
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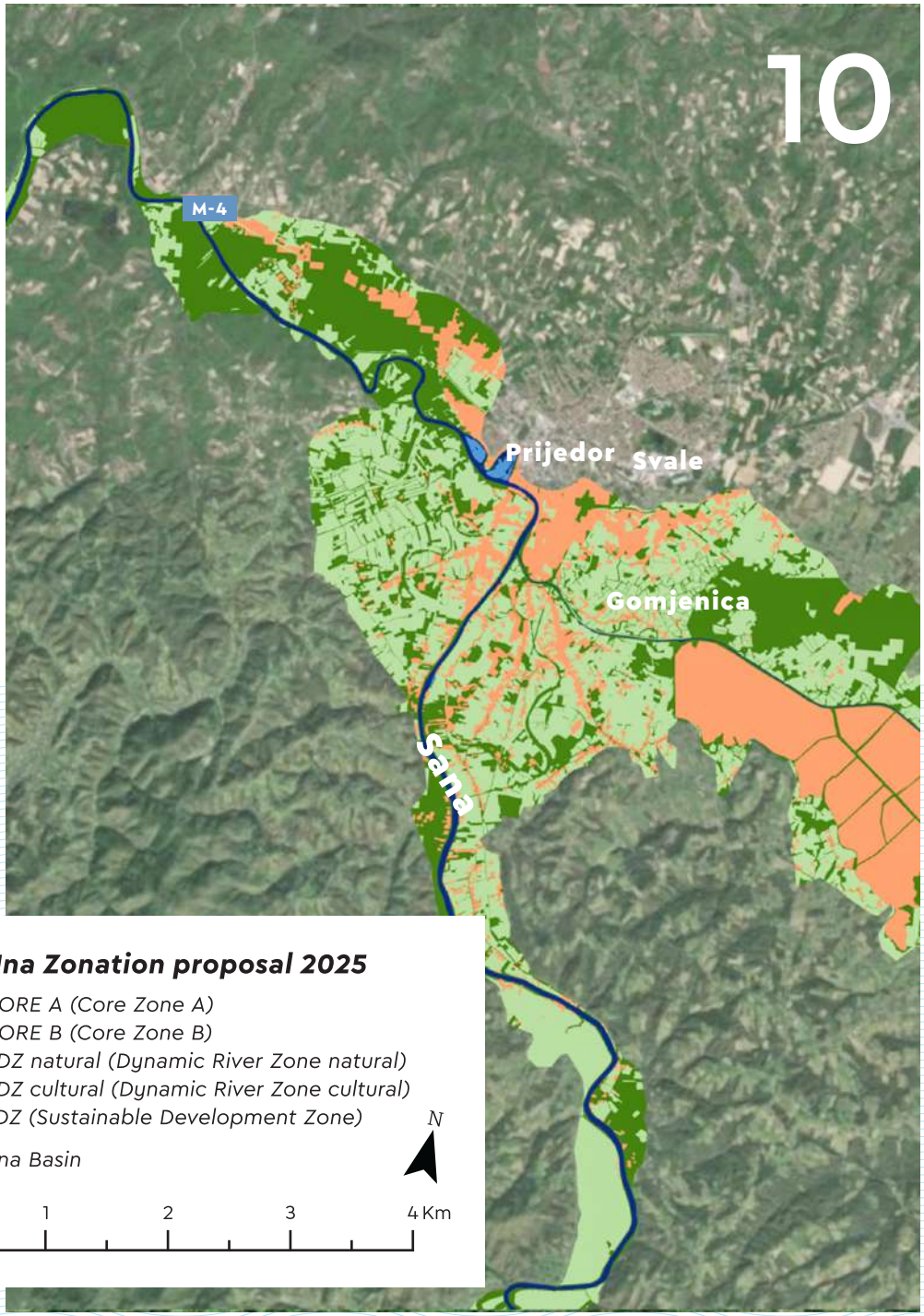

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Blagaj
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CORE B (Core Zone B)
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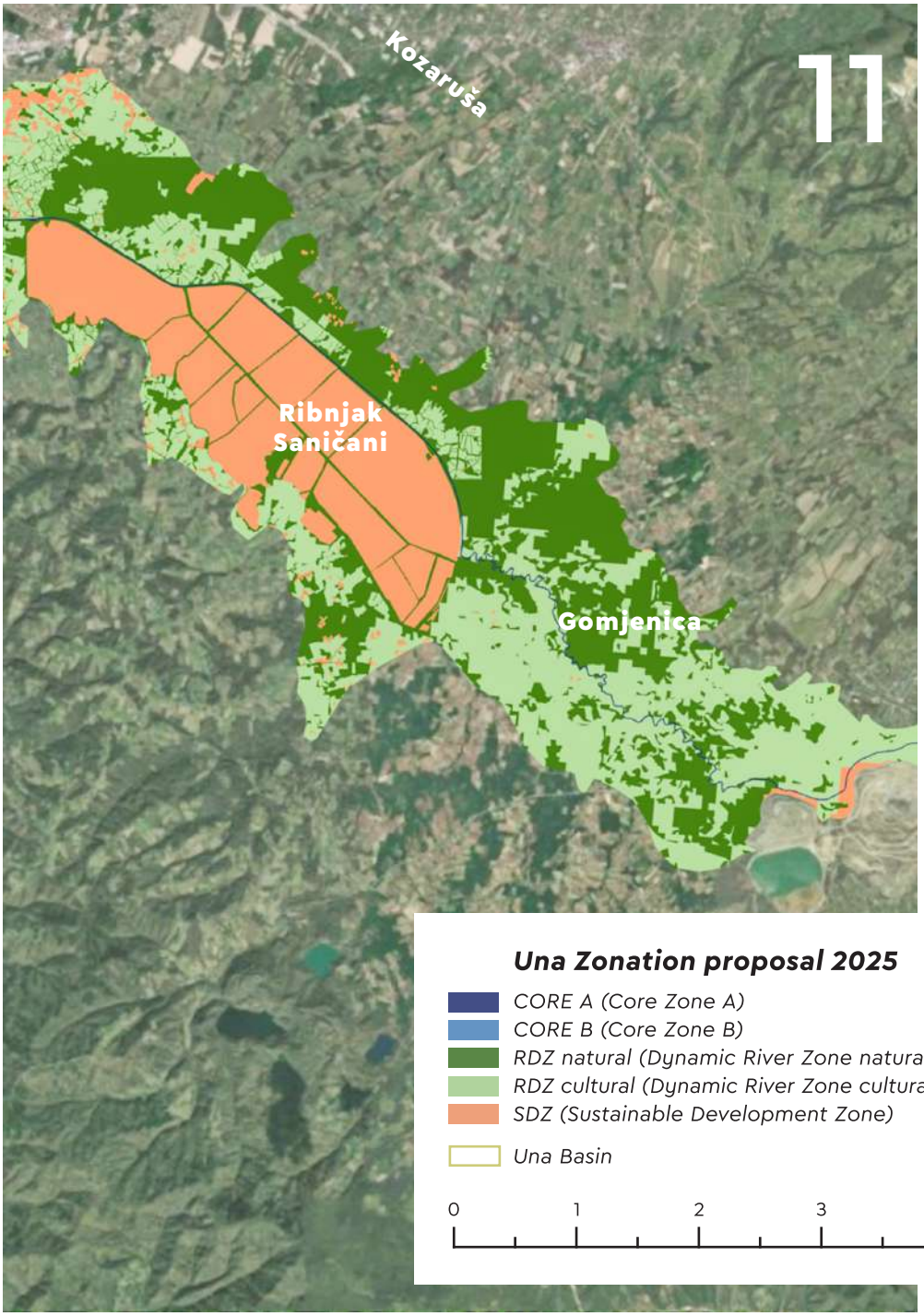

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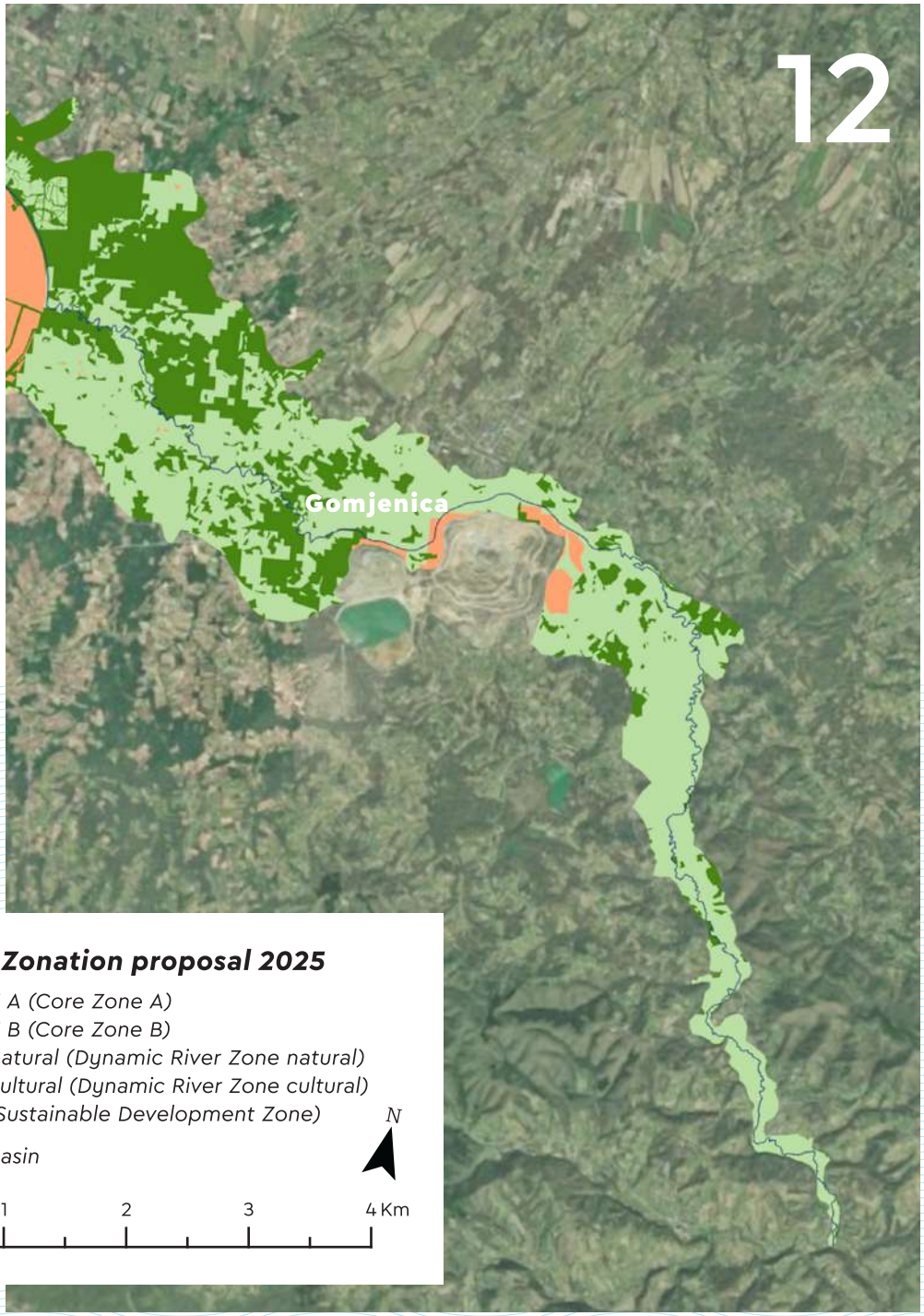

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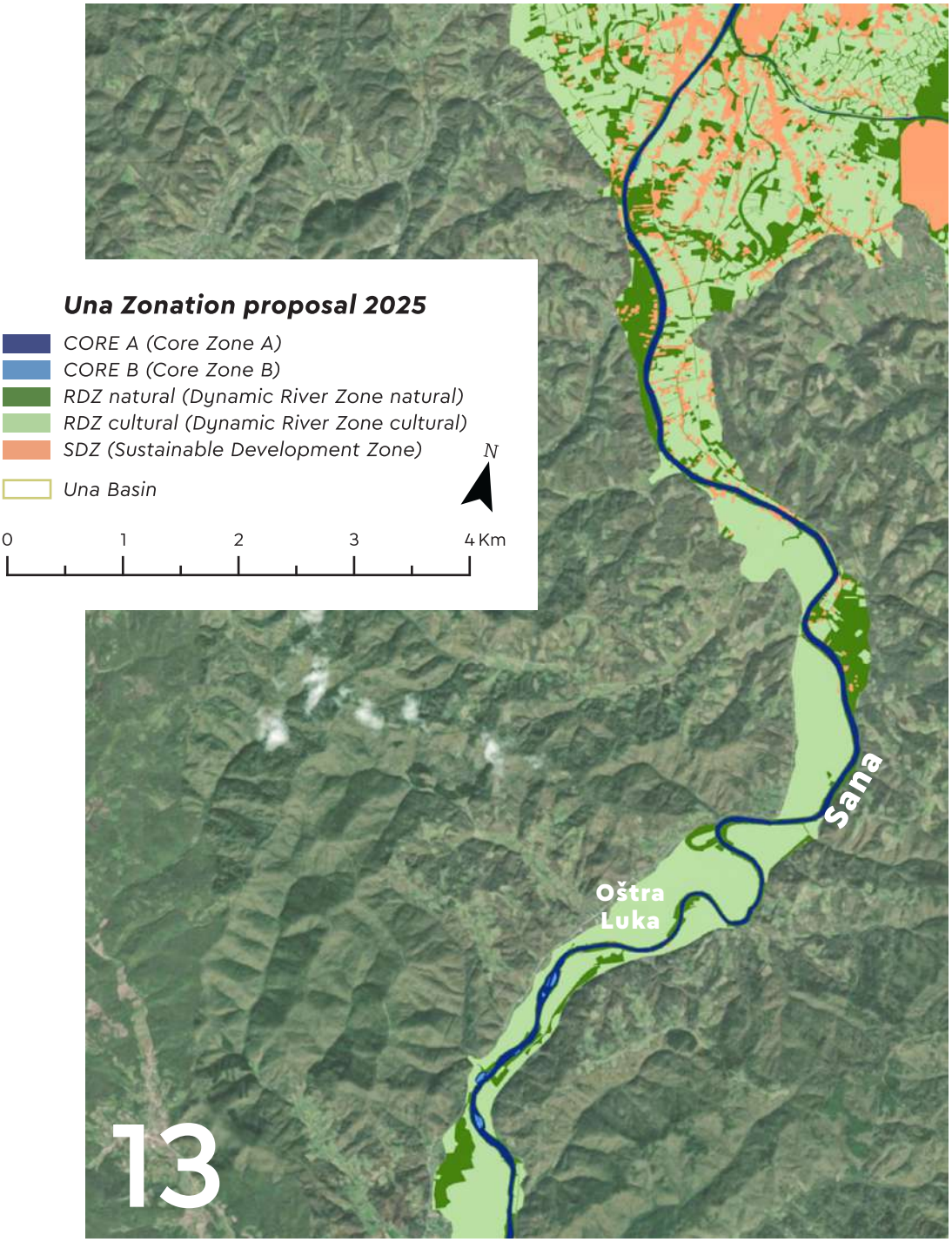

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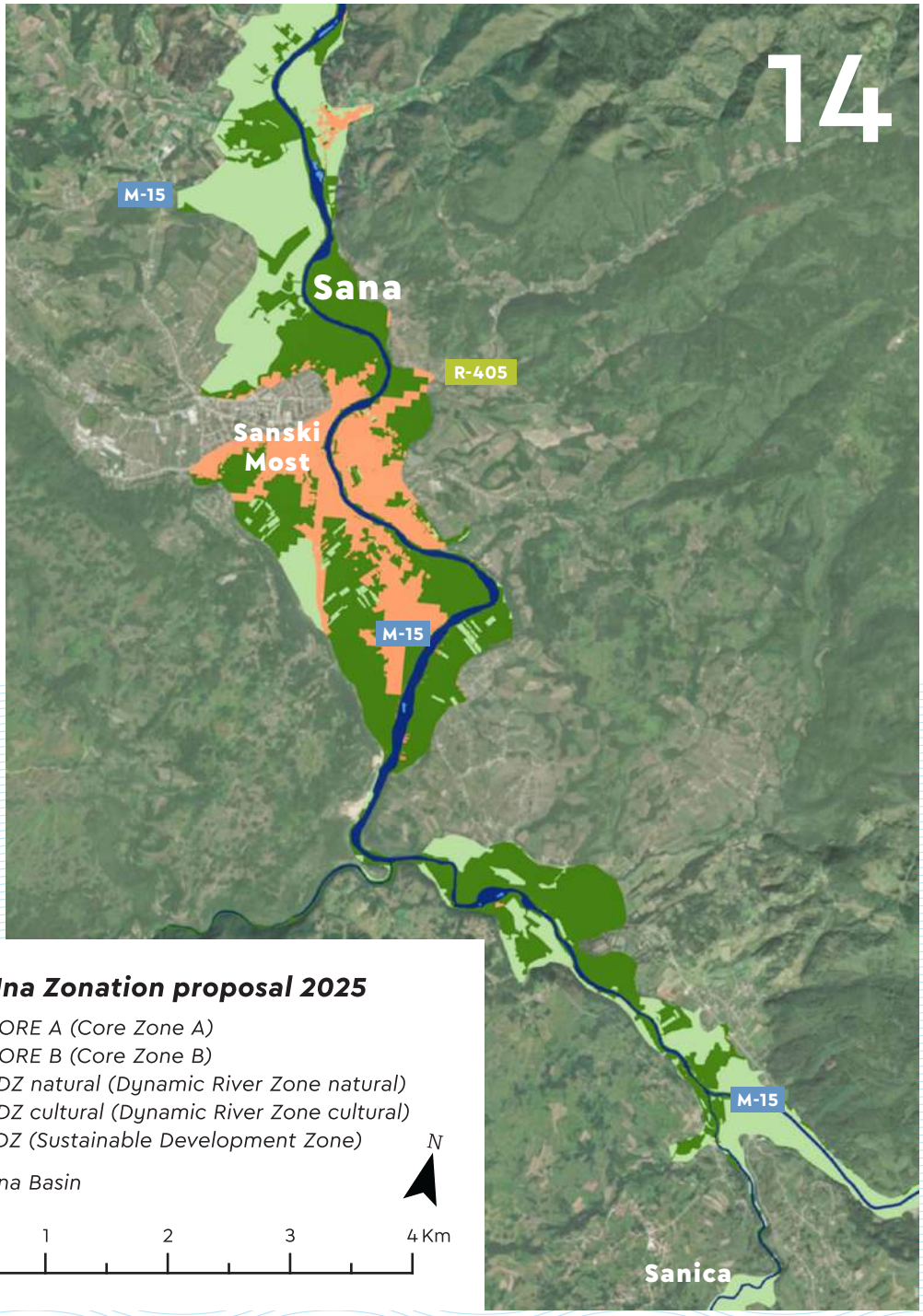

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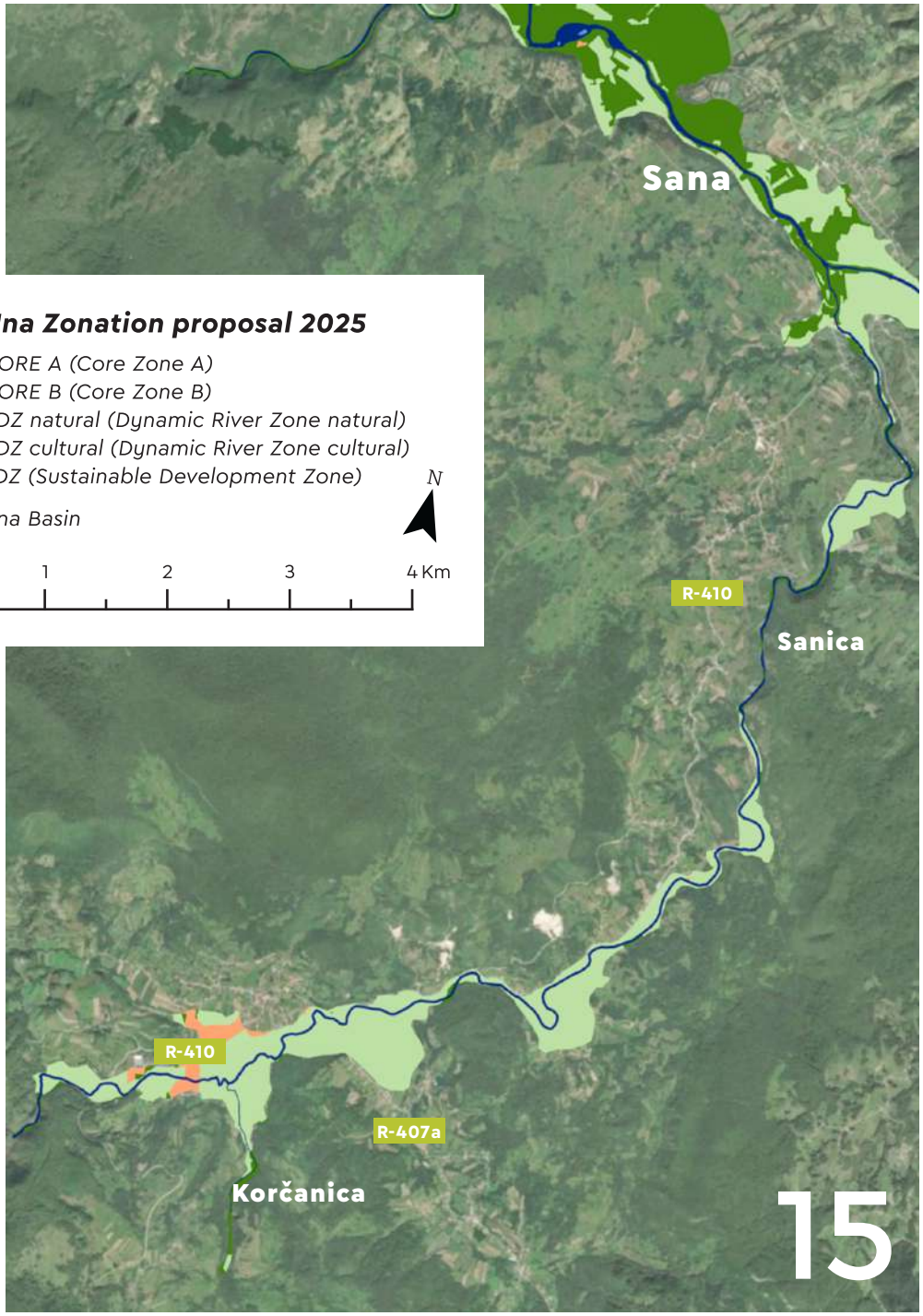

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SDZ (Sustainable Development Zone)
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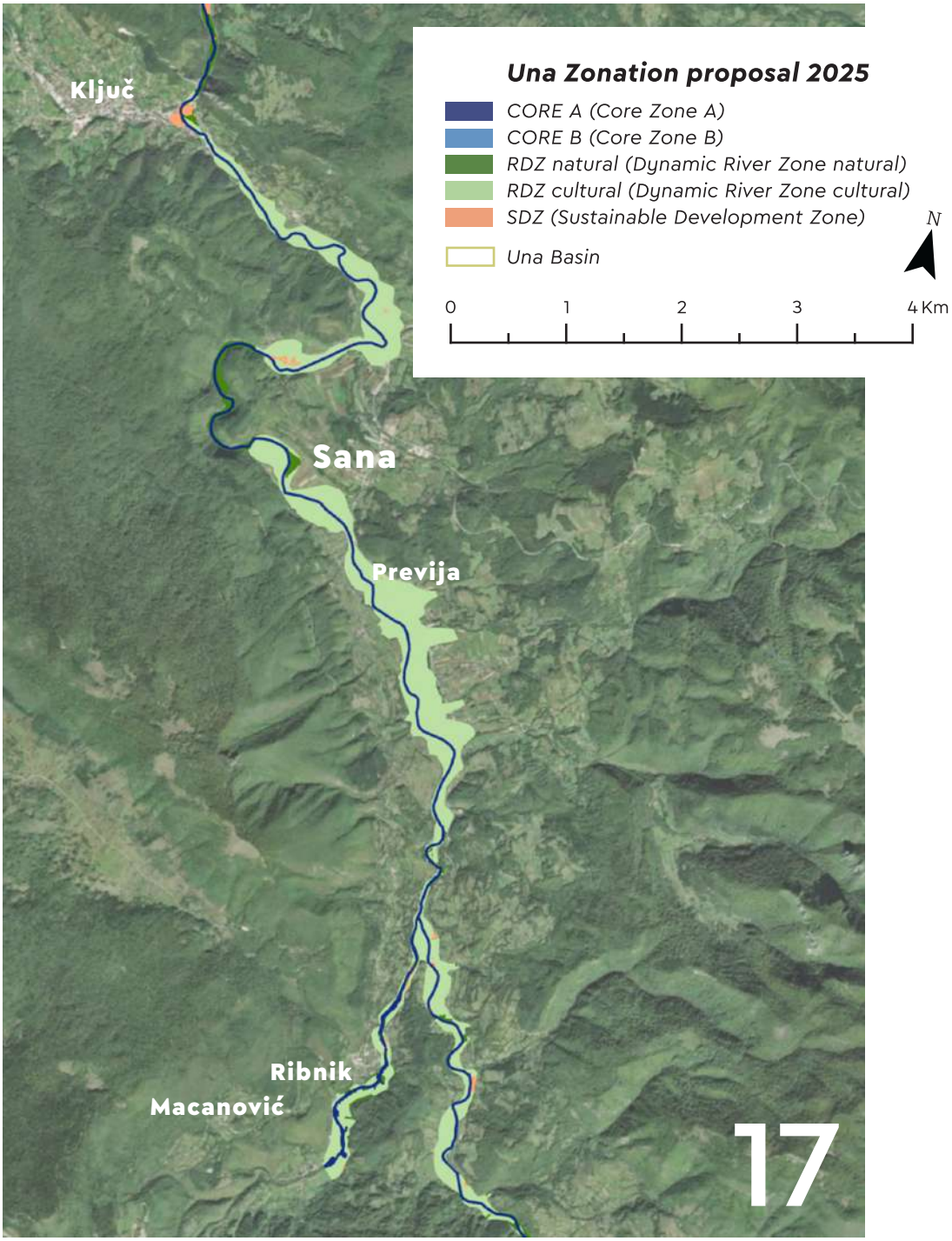

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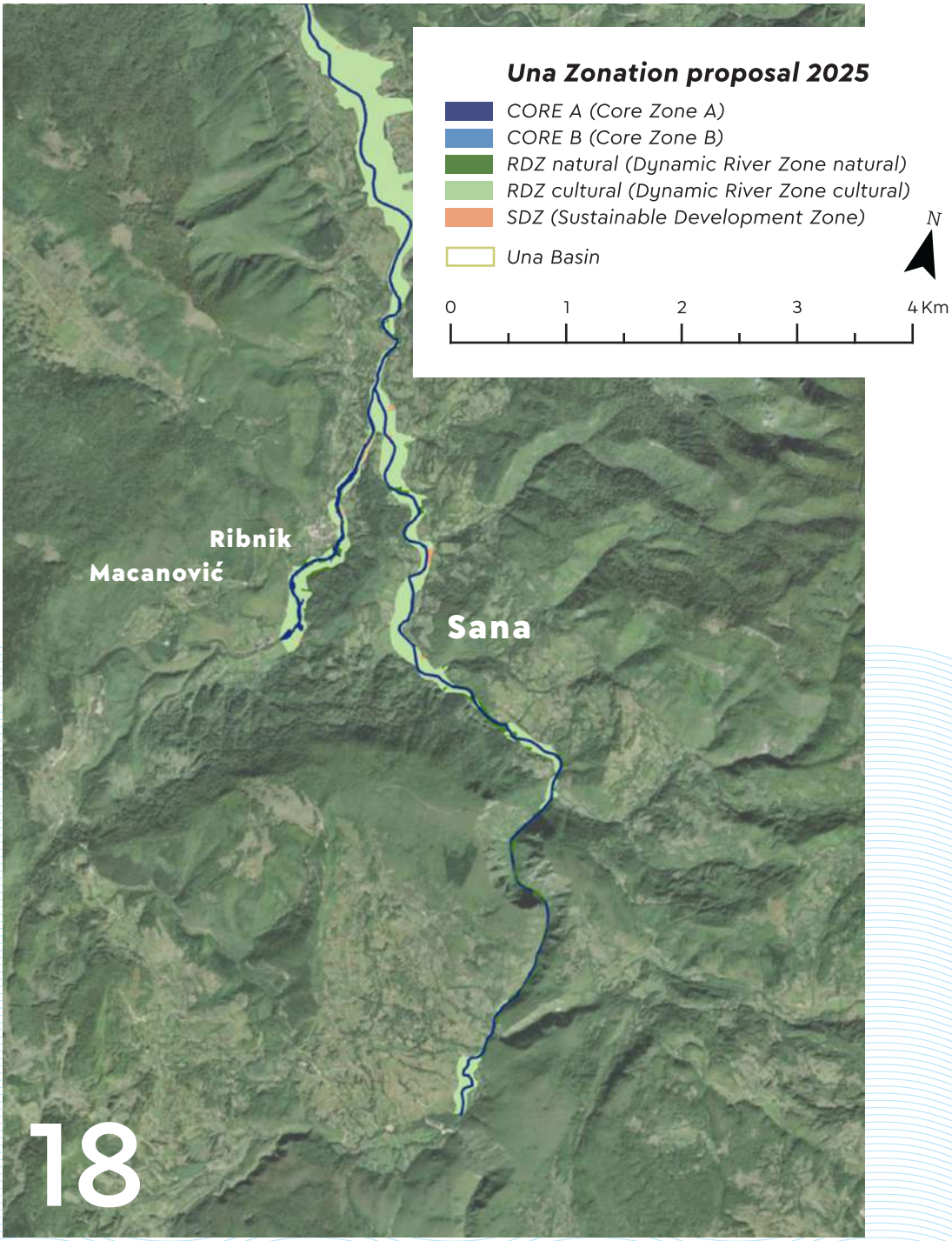

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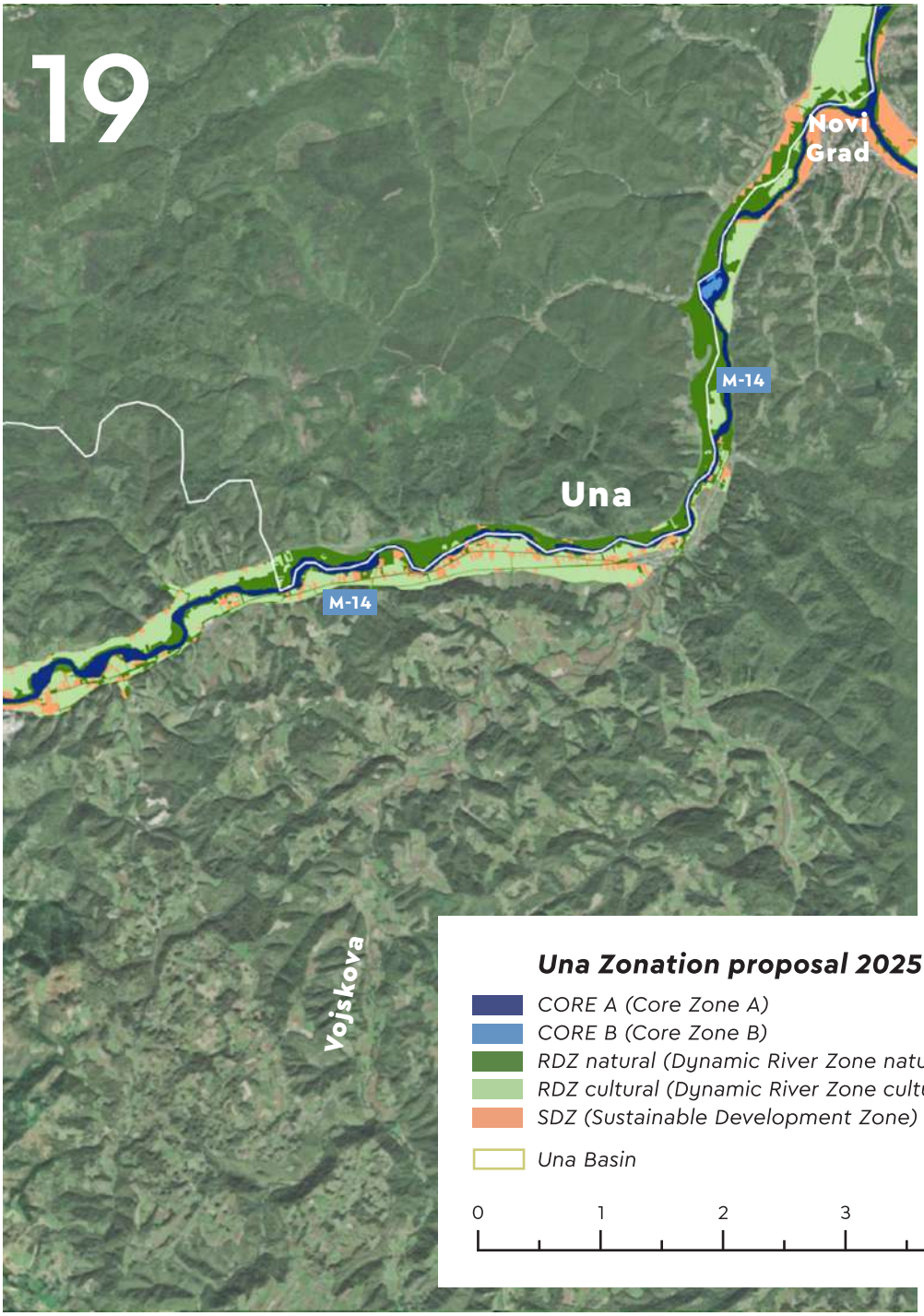

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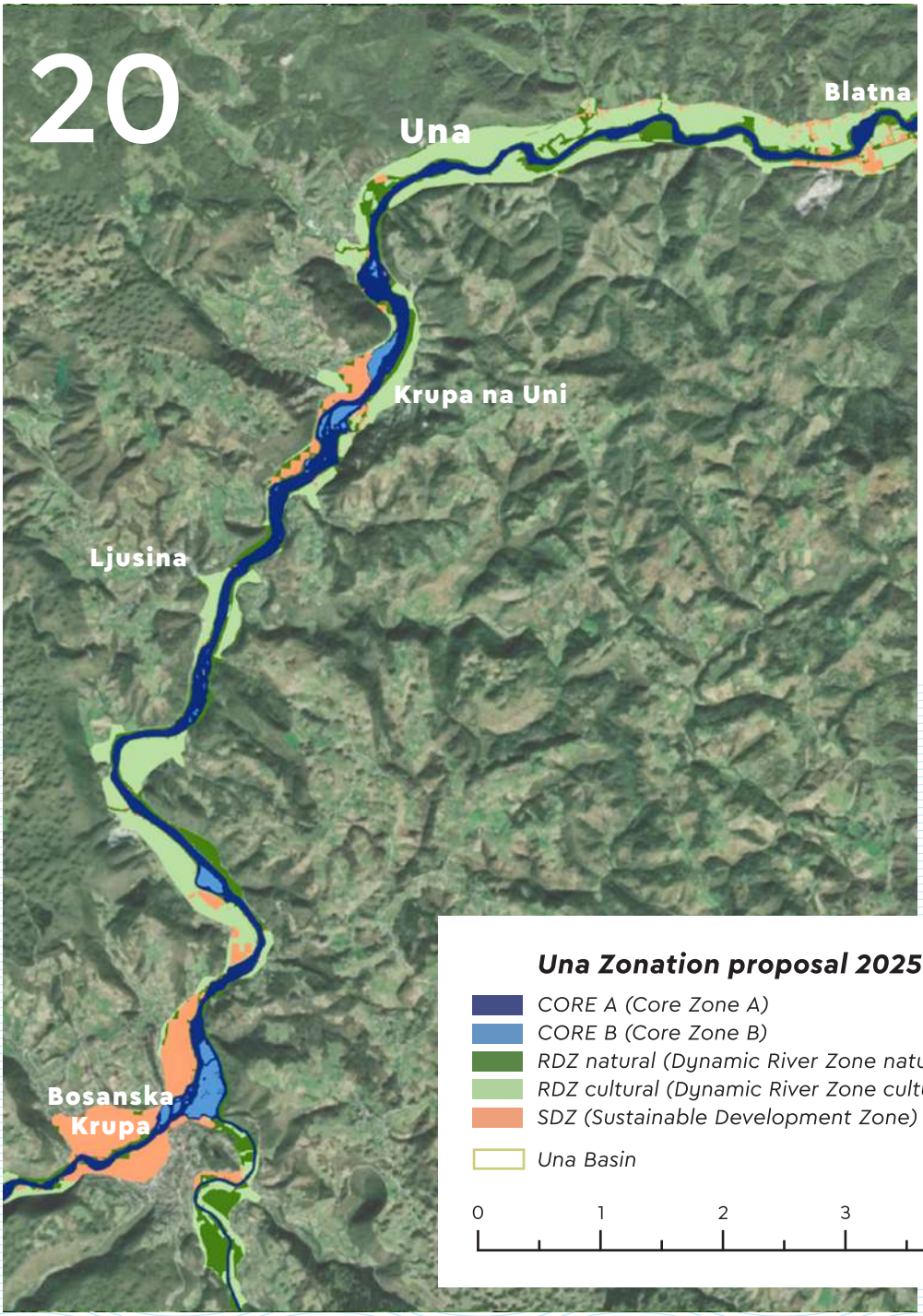

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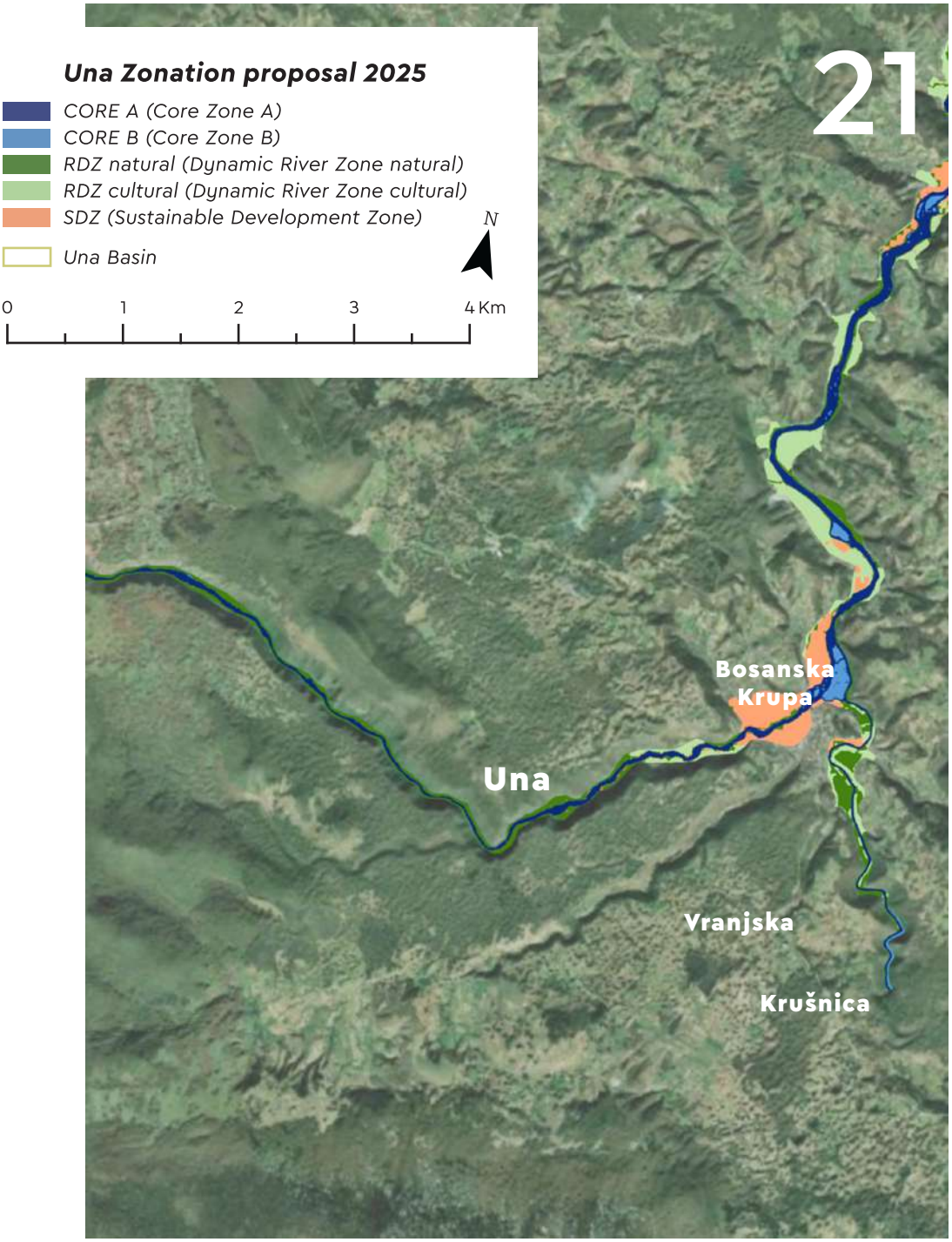
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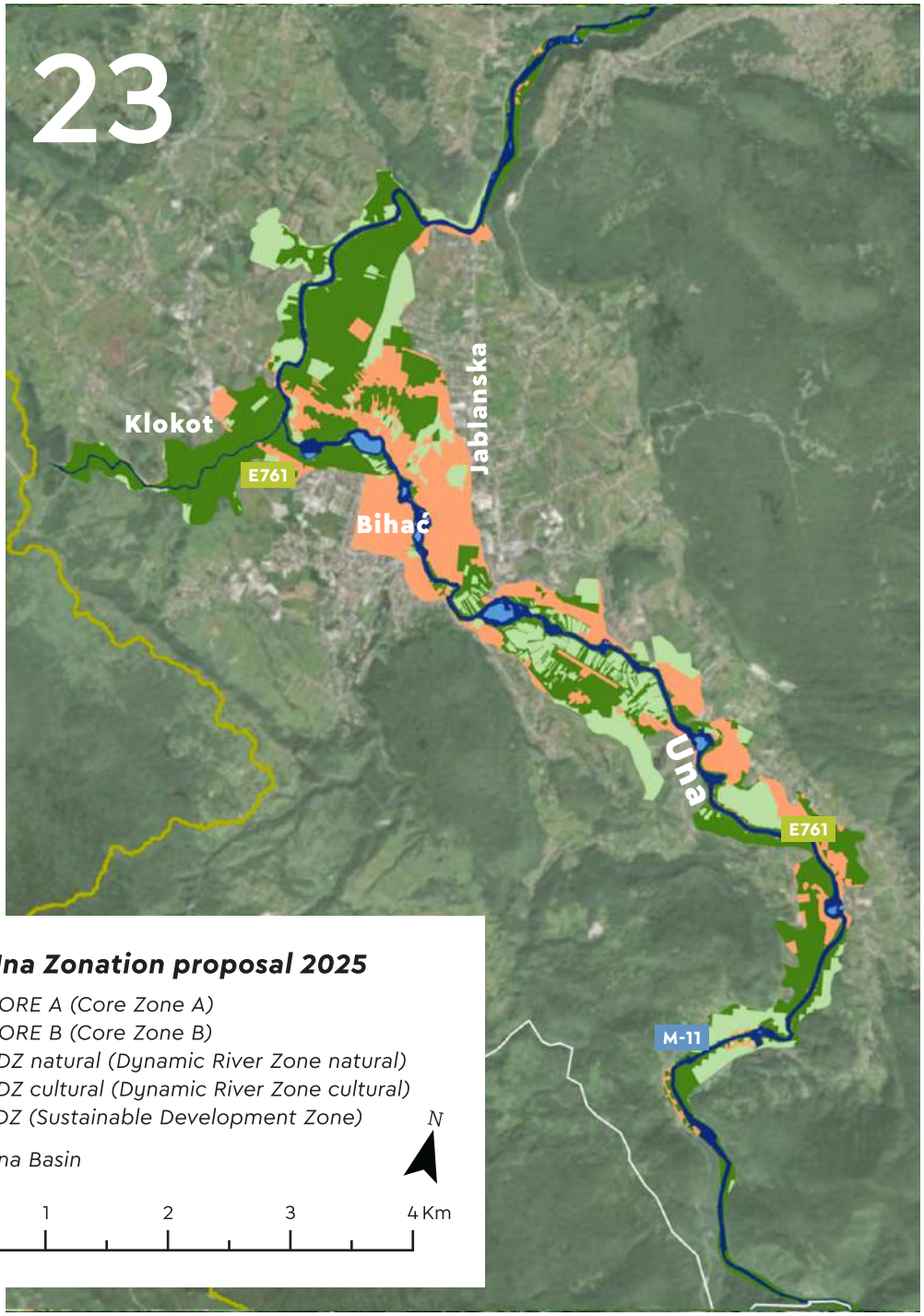

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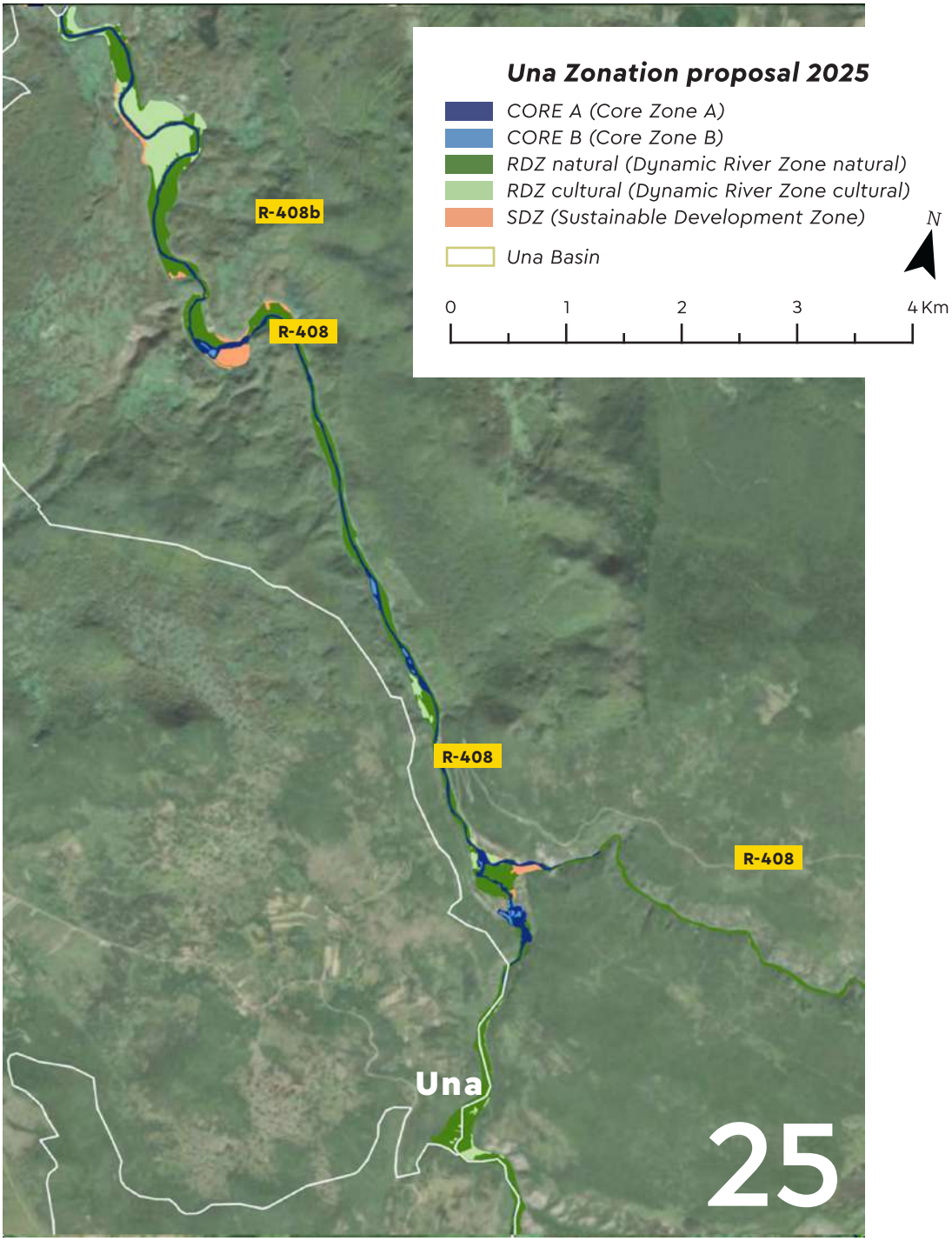

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Bosanska Krupa
Una
Vranjska
Krušnica


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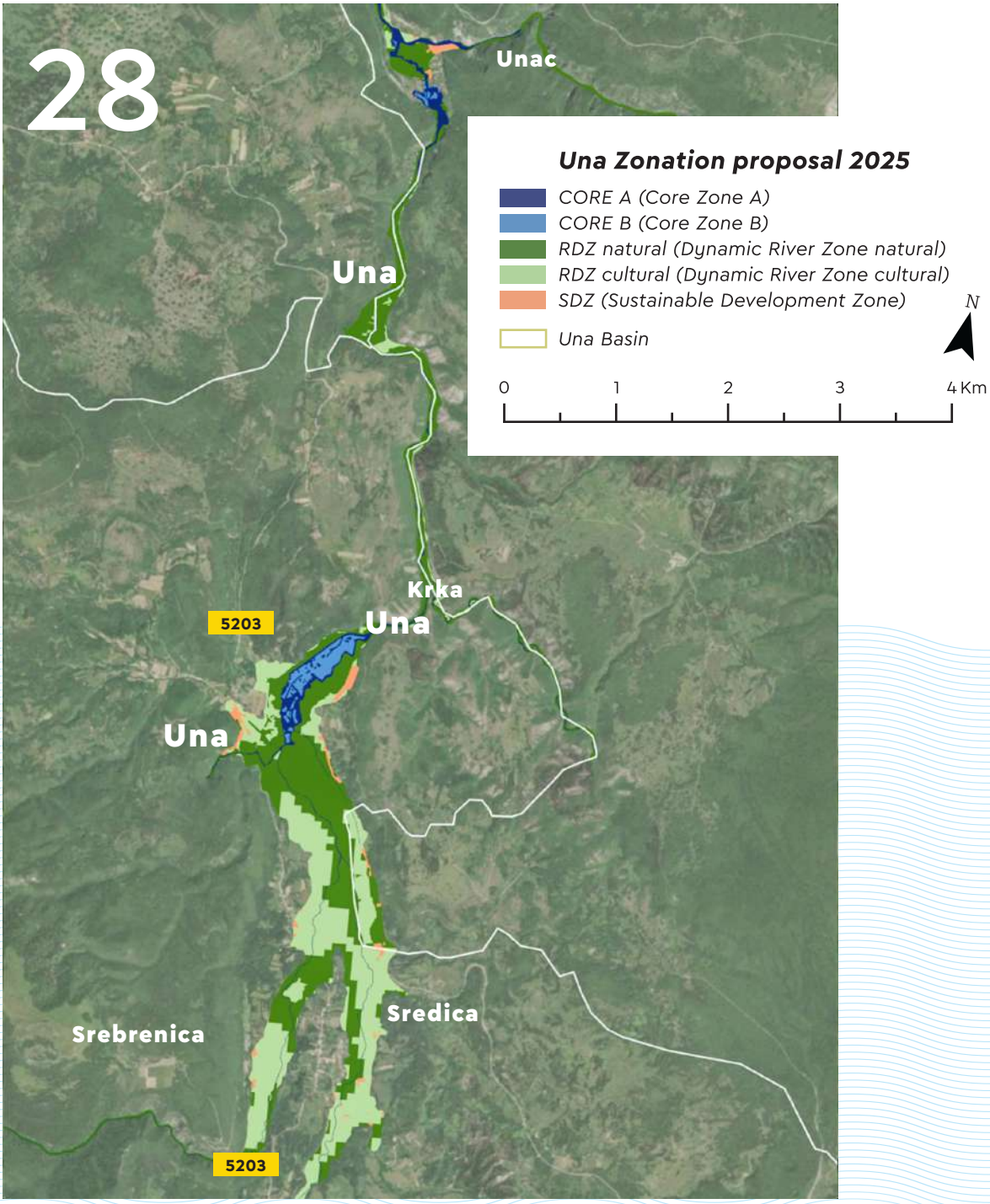

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RDZ cultural (Dynamic River Zone cultural)
SDZ (Sustainable Development Zone)
Una Basin
N
0
1
2
3
4 Km

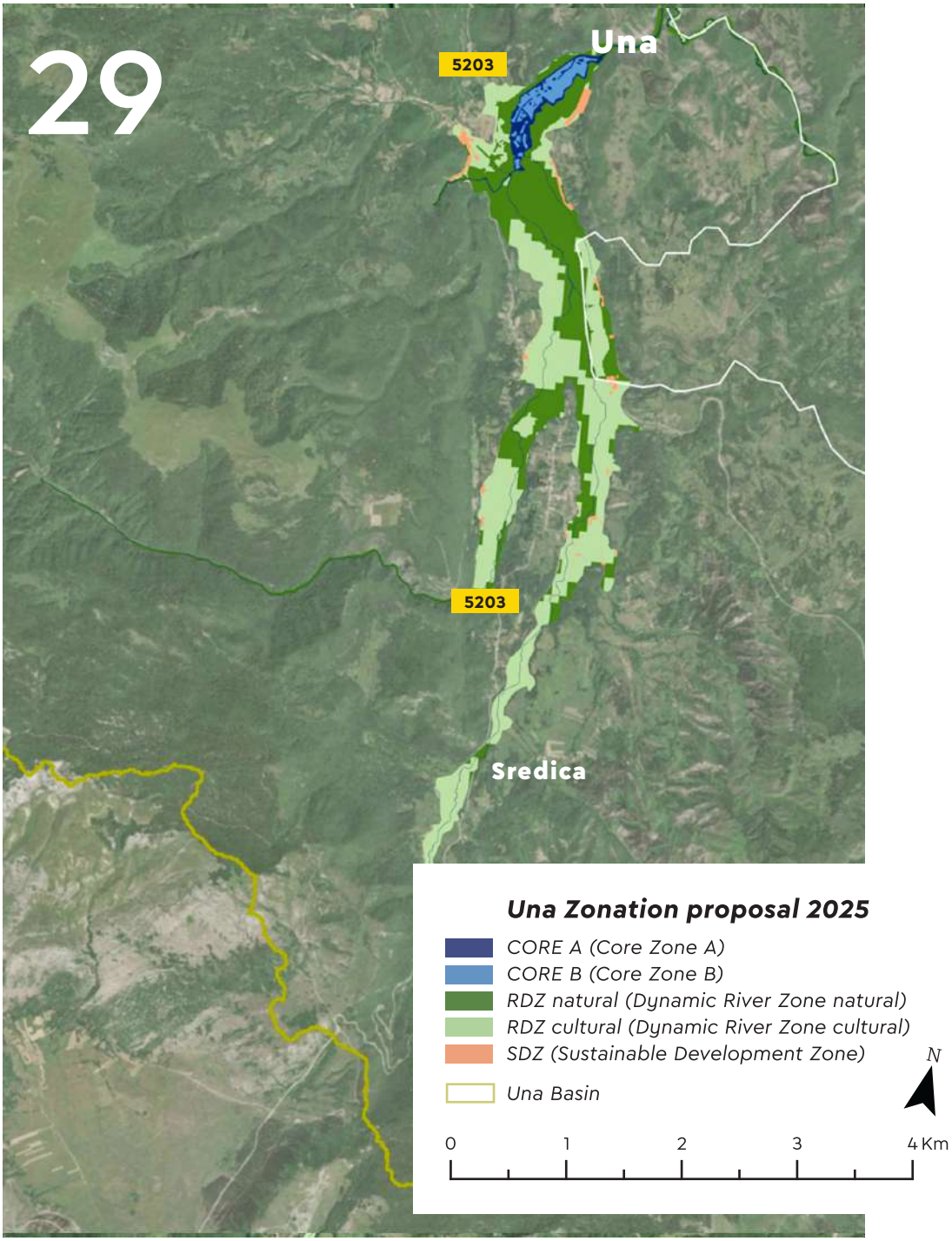

24
E761
Una
R-408
218
Una
R-408
Una Zonation proposal 2025
CORE A (Core Zone A)
CORE B (Core Zone B)
RDZ natural (Dynamic River Zone natural)
RDZ cultural (Dynamic River Zone cultural)
SDZ (Sustainable Development Zone)
Una Basin
N
0
1
2
3
4 Km


Una Zonation proposal 2025
CORE A (Core Zone A)
CORE B (Core Zone B)
RDZ natural (Dynamic River Zone natural)
RDZ cultural (Dynamic River Zone cultural)
SDZ (Sustainable Development Zone)
Una Basin
N
0
1
2
3
4 Km
R-408b
R-408
R-408
R-408
Una
25

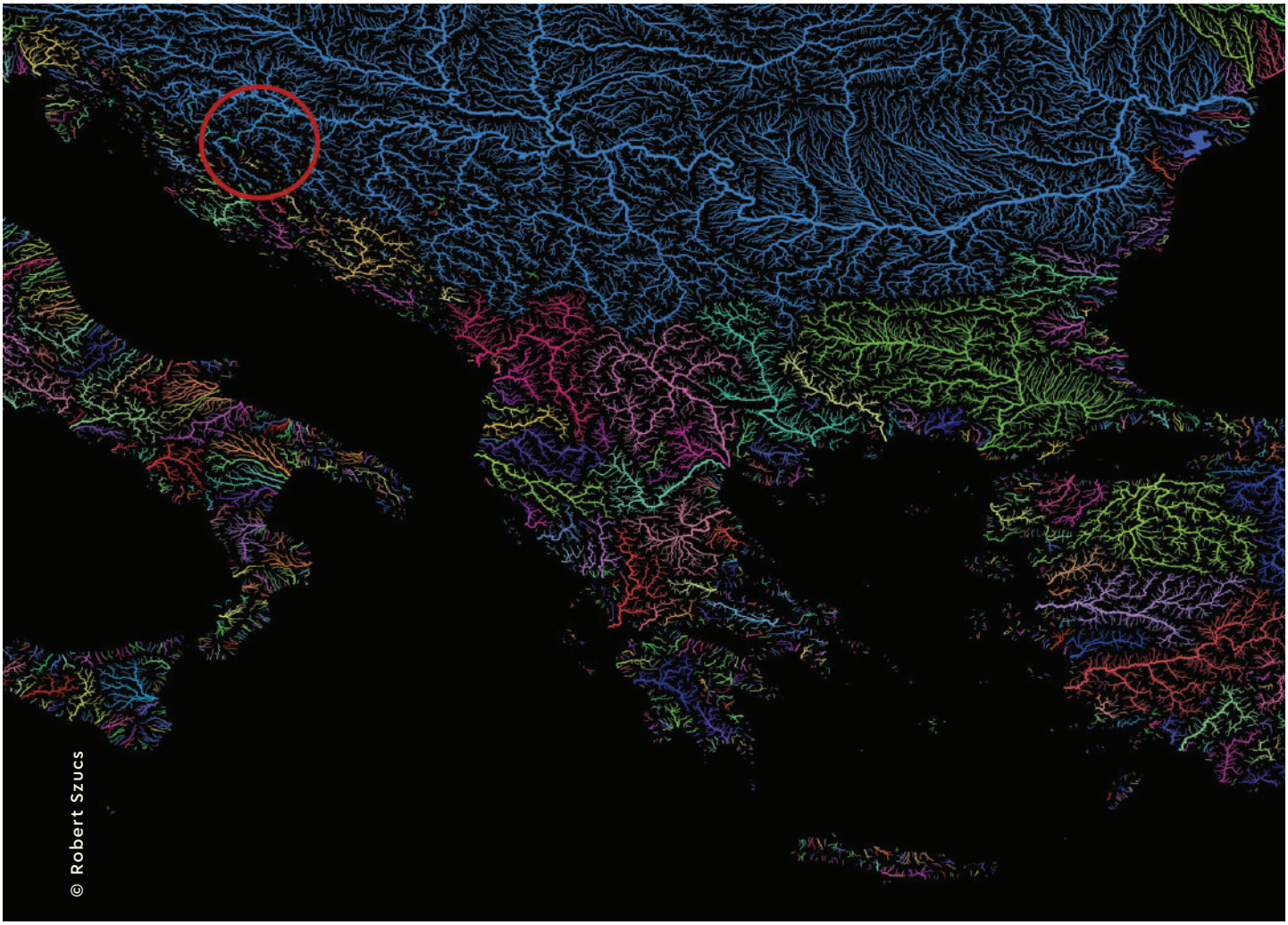

26
R-408
M-14.2
Una Zonation proposal 2025
CORE A (Core Zone A)
CORE B (Core Zone B)
RDZ natural (Dynamic River Zone natural)
RDZ cultural (Dynamic River Zone cultural)
SDZ (Sustainable Development Zone)
Una Basin
N
0
1
2
3
4 Km


27
Drvar
Una
Mrđe
Una Zonation proposal 2025
CORE A (Core Zone A)
CORE B (Core Zone B)
RDZ natural (Dynamic River Zone natural)
RDZ cultural (Dynamic River Zone cultural)
SDZ (Sustainable Development Zone)
Una Basin
N
0
1
2
3
4 Km


28
Unac
Una
Krka
5203
Una
Una
Srebrenica
Sredica
5203
Una Zonation proposal 2025
CORE A (Core Zone A)
CORE B (Core Zone B)
RDZ natural (Dynamic River Zone natural)
RDZ cultural (Dynamic River Zone cultural)
SDZ (Sustainable Development Zone)
Una Basin
N
0
1
2
3
4 Km


29
Una
5203
5203
Sredica
Una Zonation proposal 2025
CORE A (Core Zone A)
CORE B (Core Zone B)
RDZ natural (Dynamic River Zone natural)
RDZ cultural (Dynamic River Zone cultural)
SDZ (Sustainable Development Zone)
Una Basin
N
0
1
2
3
4 Km





The different river basins in the Balkans. The Una river system in red circle.

Grasshopper
GEOGRAPHY

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