Vjosa Wild River National Park
Mitigation Hierarchy Assessment for the Rural Water Supply IV Project (Lot 1) at Shushica River, Albania

Final Report – Executive Summary, 27 January 2025

A report prepared by IUCN for the Albanian Government

INTERNATIONAL UNION FOR CONSERVATION OF NATURE

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Front cover photo: Shushica River near Lepusha Springs, Vjosa Wild River National Park © IUCN / Sebastian Döbbelt-Grüne

Executive Summary

In June 2024, the Ministry of Environment and Tourism and the Albanian Development Fund commissioned the International Union for Conservation of Nature (IUCN) to produce this Report, with convening and support from the German Embassy to Albania, with KfW. This Report was independently financed by IUCN, and through aligned grant funds from Patagonia and the Gordon and Betty Moore Foundation that contribute to the development of the Vjosa Wild River National Park.

This Report presents the results of a Mitigation Hierarchy Assessment (MHA) for the Vjosa Wild River National Park in Albania (VWRNP, see Chapter 2.2), applying IUCN Standards, including the IUCN Green List Standard and the IUCN Protected Area Category II – National Park criteria. The Report applies the precautionary principle and the ecosystem approach to assess potential impacts of the Rural Water Supply IV Project Lot 1, with the primary objective to maintain the integrity of the National Park (see Chapter 0).

The Rural Water Supply IV Project is a component initiative of a greater water supply and wastewater management initiative, with a focus on the Himara municipality. The project consists of several components (Lot 1 to Lot 4), with Lot 1 focusing on the Himara water supply, including the construction of a new water intake at Lepusha Springs and a transmission main to Himara. The subsequent Lot 2 extends the transmission and distribution systems to settlements while constructing new reservoirs, pump stations, and small hydro power plants as part of the pipeline network (see Chapter 3).

This executive summary provides the headline findings and recommendations of the final report. A reading of the whole report is highly recommended as basis for decision-making, to best understand the complexities and underlying analysis of avoidance and mitigation options.

Biodiversity value (see Chapter 2.2)

The Shushica River and its floodplain hold significant biodiversity value, particularly within its springs and near-natural river stretches and floodplains, including tributaries and torrents. It includes diverse abiotic conditions, habitats, and endemic species, potentially habitat to an array of as-yet unknown biodiversity values, due to the current lack of detailed research data. Specifically, the **Upper Shushica River is classified as a "critical habitat"** according to its high biodiversity importance, including habitats for Critically Endangered or Endangered species. It represents a highly threatened or unique ecosystem, characterized by near-natural free-flowing rivers with dynamic channels and active floodplains. The river supports vital ecological functions necessary for maintaining biodiversity, such as flow dynamics and sediment transport.

Expected impacts (see Chapter 5)

Significant adverse impacts are expected from the Rural Water Supply IV Project under various flow conditions, including current and future variability expected from climate change, including direct, indirect and cumulative impacts, such as reduced flow velocity and habitat loss. Such impacts include potential habitat degradation and reduced biodiversity, with aquatic species being particularly vulnerable to the proposed effects. **Cumulative impacts, including water abstractions mainly for irrigation, sediment and nutrient inputs, compound these challenges. Additional water abstractions** from the Upper Shushica River will **very likely lead to impacts on the river system**, regardless the amount of water abstracted compared to recent conditions.

The original, unmitigated Rural Water Supply IV Project **is expected to have implications for the objectives of the VWRNP**. **As planned, the project water abstraction will not comply with IUCN guidelines for Category II National Parks, potentially affecting the park's integrity and conservation objectives as well as ecosystem services.**

The **lack of detailed data**, and the limited timeframe to conduct a full MHA, hampers a comprehensive impact assessment, including quantification of impacts and mitigation needs.

Mitigation options (see Chapter 6)

As per the IUCN MHA methodology, **avoidance and alternatives (see Chapter 6.1)** should be prioritized to ensure No Net-Loss of biodiversity, recommending the use of alternative water sources. This report outlines various Mitigation Hierarchy scenarios and options for addressing project-related potential environmental impacts on the Vjosa Wild River National Park (VWRNP) and its objectives, including integrity. **Minimisation (see Chapter 6.2)** options involve reducing water abstraction and implementing comprehensive surveys to evaluate impacts and develop environmental flows. **Rehabilitation and restoration (see Chapter 6.3)** aim to enhance ecological quality and increase resilience by reducing existing pressures, restoring degraded ecosystems and managing procedures. Finally, and as a last option, **offsets (see Chapter 0)** include additional areas in the National Park, implementing buffer zones, and restoring rivers and floodplains. **The report is clear that offsets alone are insufficient for full compensation of potential environmental impacts**.

Long-term solutions (see Chapter 6.5) require integrated management planning of the VWRNP, promoting sustainable water and land use, and stakeholder engagement to support development and address impacts. This must include effective progress in implementing the **Integrated Management Plan**, ratified at the end of September 2024, as a priority task. Similarly, an integrated river basin and water management as well as flood risk management are key instruments, with related initiatives and projects already determined and outlined, respectively. Full commitment by all partners to implement improvements in line with the commitment to **IUCN Green List Standard certification** would ensure that the VWRNP can demonstrate successful conservation outcomes, proving that any mitigation measures are indeed successful, over time, and bringing additional benefits to the National Park and the local communities, e.g. in terms of aligned tourism development.

The assessment recommends **coordinated efforts involving local communities, local authorities, conservation practitioners, stakeholders and the wider public** to implement these strategies and ensure ecological integrity of the VWRNP on a long term.

Scenarios and conclusive recommendations (see Chapter 7)

In general, IUCN recommends using the 'Specific, Measurable, Applicable/Achievable, Relevant, Timebound, Efficient and Effective' SMARTEE approach for implementing mitigation measures as well as applying the EU Taxonomy Regulation and **prioritizing nature conservation and local community water needs over additional uses** according to IUCN Guidelines for Category II National Parks and the IUCN Green List Standard criteria. The MHA Assessment **outlines three scenarios** and provides **recommendations based on evaluating potential impacts and identifying mitigation options per scenario**:

- **Scenario 1 FULL AVOIDANCE (see Chapter 7.1)**, from a nature conservation perspective, should be clearly prioritised to avoid adverse impacts on the VWRNP including its conservation objectives.

- **Scenario 2 MINIMIZATION (see Chapter 7.2)**, achievement of Net Gain or at least No Net-Loss of biodiversity is less feasible, given the baseline conditions characterised by several water abstractions already in place.

- **Scenario 3 MITIGATE / OFFSET HIGH IMPACTS (see Chapter 7.3)** addresses water abstraction impacts with limited mitigation, likely leading to unavoidable adverse impacts on biodiversity and the VWRNP integrity.

Further recommendations in addition to these scenarios:

- **More detailed investigations of alternative water sources (see Annex 4) are recommended** to support a sustainable and integrated water management, reduce risks of climate change and enable mid-term to long-term cost-effective water supply.

- **Long-term solutions (as above) are key to support fostering an integrated management of natural resources in the context of the VWRNP**.

- Based on the "Third National Communication of the Republic of Albania under the United Nations Framework Convention on Climate Change", a **long-term strategy acting as schedule for all activities and projects in the water sector** should be developed to reduce Climate Change related vulnerabilities and risks. This is **particularly relevant for sustainable water management and supply for the environment and local communities in the Shushica Catchment and along the Ionian coast. Alternative water sources should be a key element in such a strategy.**

As a first step, **approximate costs were estimated for a potential use of Borshi Springs to deliver the full calculated drinking water demand to the Himara area (96.6 l/s in 2038), as alternative to an abstraction from Lepusha Springs (see Annex 5)**. It delivers a high-level comparison to the current estimates for Lot 1 and 2 and is based on a very brief desk study. The result is that **Borshi Springs potential alternative can be seen as a worthwhile alternative to the current set up with an abstraction at Lepusha Springs**. The cost comparison shows a potentially more attractive alternative compared to the proposed design within the RWS IV project. Further detailing would substantiate the costing, in particular regarding starting points and limitations underlying the current estimates.

The lack of detailed information necessitates further data collections and surveys, so additional assessments should be implemented. These are particularly needed to better reflect flow conditions and biodiversity values. Comprehensive hydrogeological surveys are needed to exactly determine the area of the Lepusha springs, the springs type and characteristics, the local aquifer characteristics, and sufficiently predict spring yields including seasonal and multi-year variations and climate change impacts. More detailed hydrological data are mandatory as basis for a reliable impact assessment. **At least one complete hydrological year of surface and subsurface flow/discharge measurements should be undertaken**.

As a starting point, **draft preliminary guidance was identified for an environmental flow and a minimum ecological flow** for the Upper Shushica below Lepusha Springs. Given the lack and reliability of available data as mentioned above, **such preliminary guidance can only be seen as a first estimate, necessitating further research and evaluation including potential amendments of water abstractions accordingly**. In addition, a **physically reduced maximum volume of water abstraction**, as described in Scenario 2, ensures a limitation of flow related impacts.

Further assessments should be implemented before project implementation. Such assessments include Appropriate Assessments under the Habitats Directive, Art 4.7 Applicability Assessments under the Water Framework Directive, comprehensive biodiversity studies as well as an Environmental Impact Assessment (EIA) according to the amended EIA Directive. These assessments are needed under scenario 2 and 3.

If applying recent EU regulations, **the project would likely be required in both Scenario 2 and 3 to undergo an exemption procedure under Art 4.7 Water Framework Directive (WFD) and Art 6.4 Habitats Directive (HD)**, respectively. Prerequisites of applying such exemptions include:

a) **Comprehensive assessment of alternatives** (WFD, HD);
b) **Overriding public interest** (WFD, HD);
c) **Ensuring coherence of Natura 2000** (only HD); and
d) **Implementing all compensatory/mitigation measures** (WFD, HD).

In any case, an update of the knowledge base, in particular regarding flow conditions and planned abstraction volumes, should be shared one year after publication of this report including an evaluation process and amendments as needed.

The paragraphs below highlight the key elements of the three scenarios in question, with a focus on the differences between the scenarios. While **the following table delivers an overview of mitigation options per scenario, the details of each scenario as determined in Chapter 7 should be considered as basis for decision-making.** To further support decision-making processes, **the three scenarios should be sharpened, in terms of costs, timelines and compliance with international standards such as World Bank ESS Standards.**

Scenario 1 (see Chapter 7.1)

Scenario 1 focuses on complete avoidance of water abstraction from the Shushica River and Lepusha Springs, strictly limiting any risk of impediment to the conservation objectives of the Vjosa Wild River National Park (VWRNP). **This scenario should be priority consideration to help avoid adverse impacts on the National Park and its conservation objectives**.

It emphasizes full development of alternative water source options to prevent significant adverse impacts on VWRNP. This scenario would thereby avoid extensive (and costly) project-related monitoring, mitigation and restoration measures as well as potential exemption procedures according to EU Regulations, including their related financial implications. Despite higher initial costs due to inclusion of alternative water sources, the scenario would aim to deliver longer-term ecological benefits and aligns with sustainable water management objectives, as per the EU Water Framework Directive.

The cost estimation (especially longer-term) for scenario 1 offers a worthwhile alternative, likely without significant impacts on water supply costs, especially when considering a potential abstraction from Borshi Springs **(see Annex 5)**.

Scenario 2 (see Chapter 7.2)

Scenario 2 proposes minimizing the Project's water abstraction from the Shushica River and Lepusha Springs, with a complementary consideration of alternative water sources to supplement demand and incorporating real-time adaptive management. It requires comprehensive surveys and studies to more accurately assess impacts and mitigation needs prior to implementation. Parallel pathways of surveys and implementation would induce the need for defining scheduled actions, including evaluation, re-assessments, and adjustments of key building blocks. Under this scenario, an achievement of Net Gain or at least No Net-Loss of biodiversity is less feasible, given the baseline conditions characterised by several water abstractions already in place.

However, an integrated approach might enable a net gain pathway when considering water demand of local communities in the Shushica Valley and improvements of related supply systems to reduce water losses and increase efficiency, in combination with a comprehensive set of mitigation measures and integrated management effectively implemented and monitored. Such an **integrated system of reduced water abstraction (see box in Chapter 7.2)** could be achieved through combining flows for local irrigation and water use with the RWS IV project water abstraction intake and transmission main. The existing irrigation channel could be abandoned under this approach while improving water supply for local communities with alternative technical solutions improving irrigation efficiency and reducing water losses**. Additional flow-related impacts compared to the baseline could be minimised considering a water abstraction maximum of recent abstraction volumes already in place**.

Developing and implementing an environmental flow[1] (see M3, Chapter 6.2) is a key requirement under this scenario. Such a water regime including thresholds ultimately define river flow conditions protecting both environmental and local community needs considering the VWRNP and its objectives to maintain the Shushica River ecosystem and its services and provide a **framework for deriving maximum water abstraction volumes over space and time**. The planning and design of the Lepusha water intake structure is required to be updated, including removing the drainage pipe in the riverbed of the Shushica River and removing the retaining concrete wall (see M5, Chapter 6.2) to reduce habitat loss, degradation and impacts on subsurface flows.

Overall, Scenario 2 involves extensive mitigation measures, updated planning and designs, project-related survey and monitoring, and adaptive management, increasing project cost implications.

Scenario 3 (see Chapter 7.3)

Scenario 3 assumes water abstraction with minimal deviation from the original project plan, likely leading to unavoidable adverse impacts on biodiversity and the VWRNP and its objectives. It necessitates extensive minimization, restoration, and offset measures to mitigate adverse impacts. Climate change effects are expected to significantly increase the risk of water supply limitations and environmental impacts, which requires additional management and mitigation actions. However, even without such additional impacts, the **Scenario 3 would require much more substantial restoration measures and offsets compared to Scenario 2**.

Developing and implementing a **minimum ecological flow[2] (see M3, Chapter 6.2)** as a basic requirement induces adjustments of existing planning and design.

[1] "Environmental flow" according to Dyson et al. (2008), Arthington et al. (2018).
[2] "Minimum ecological flow" according to Article 39 of the Law no.11/2012 "On Integrated management of water resources"; it provides that: 2. Every water user is obliged to allow the minimum ecological flow in the natural flow, not including it in the amount of water he is authorized to use.

This scenario involves comprehensive studies, extensive monitoring, as well as updated planning and designs, which increases costs of the project. OBJ

Summary table of scenario mitigation options, based on Table 7, Chapter 7:

Mitigation measures identified for each of the three scenarios: ("X" = mitigation measure included in scenario as part of a mitigation package, Blue-shaed "X" = mitigation measure with highest priority in scenario; "-" = mitigation measure not relevant within scenario)

	Scenario 1	Scenario 2	Scenario 3
Avoidance / Alternatives (A)			
A1: Use of alternative water sources (exclusively)	X	-	-
A2: Adjust planning and re-design of the RWS IV project on a high level (beyond Lot 1)	X	X	-
Minimisation (M)			
M1: Physically reduce maximum volume of water abstraction	-	X	-
M2: Manage water abstraction	-	X	-
M3: Develop and implement an "*environmental flow*" framework including thresholds	-	X[2]	-[3]
M4: Use of alternative water sources (supplementary)	-	X	X
M5: Adjust planning and re-design of Lepusha water intake	-	X	X
M6: Adjust planning and re-design of pipeline route in the Shushica valley	-	X	X
M7: Design and implement a comprehensive hydrogeological survey in the Upper Shushica Valley including Lepusha springs	-[1]	X	X
M8: Design and implement a comprehensive hydrological survey on the Upper Shushica River	-[1]	X	X
M9: Minimize environmental impacts from construction works already implemented (e.g. through restoration of habitats), monitor and report environmental impacts	X	X	X
M10: Minimize environmental impacts during planned construction phase (e.g. on water, soil, habitats and species), monitor and report environmental impacts	-	X	X
M11: Design and implement a continuous project-related monitoring (at least 10 years)	-[1]	X	X
M12: Design and implement a comprehensive biodiversity study	-[1]	X	X
Rehabilitation / Restoration (R)			
R1: Manage existing water abstractions and reduce water demand	-[1]	X	X
R2: Enhance ecological quality of degraded river reaches and floodplain areas in the Shushica catchment	-[1]	X	X
R3: Reduce nutrient inputs from point sources	-[1]	X	X
R4: Reduce nutrient inputs from diffuse sources	-[1]	X	X
R5: Reduce inputs of pollutants from point sources	-[1]	X	X
R6: Reduce inputs of pollutants from diffuse sources	-[1]	X	X
R7: Manage and optimize current land use practices	-[1]	X	X
R8: Reduce erosion and fine sediment inputs	-[1]	X	X
R9: Implement environmental flow in Smokthina downstream of HPP abstraction	-[1]	X	X
Offsets (O)			
O1: Include additional area(s) in the National Park	-[1]	X	X
O2: Implement buffer zones around the National Park	-[1]	X	X
O3: Restore rivers and floodplains in other parts of the National Park	-[1]	X	X
O4: Protect endangered species	-[1]	X	X
O5: Develop and implement miscellaneous offset measures	-[1]	X	X

	Scenario 1	Scenario 2	Scenario 3
O6: Enhance fast-track investments into the National Park	-[1]	X	X
Other long-term solutions (L)			
L1: Implement the National Park Management Planning	X	X	X
L2: Integrated River Basin and Flood Risk Management Planning	X	X	X
L3: Integrated water management for the coastal area based on a sustainable long-term vision	X	X	X
L4: Inclusive, transparent and extensive stakeholder consultations	X	X	X
L5: Avoid any further increase of pressures and impacts	X	X	X
L6: Long-term monitoring of river, floodplain and catchment conditions of the Shushica River but also the wider river basin	X	X	X
L7: Alignment of water legislation for permitting processes with IUCN Category II criteria	X	X	X
L8: Apply the IUCN Green List Standard including benchmarking assessment	X	X	X

Footnotes:
1 Rehabilitation/Restoration and offset measures are in general useful measures for all scenarios including Scenario 1, but these measures are not required in Scenario 1 to mitigate project-related significant adverse impacts.
2 Includes an “environmental flow” according to Dyson et al. (2008), Arthington et al. (2018).
3 Scenario 3 includes a “minimum ecological flow” according to Article 39 of the Law no.11/2012 “On Integrated management of water resources” but not an “environmental flow” according to Dyson et al. (2008) and Arthington et al. (2018) as in Scenario 2.

Map 1: Overview of Shushica river catchment

Legend

- Shushica
- Main tributaries
- Small and intermittent tributaries
- Canal (irrigation, drainage)
- Hydropower abstraction pipeline Smokthina
- Pipeline Himara project RWS IV (Lot 1)
- Reservoirs
- Water sources (l/sec)
  - 1
  - 10
  - 100
  - 1000
- Lepusha Springs
- Vjosa basin
- Shushica subbasin merged
- Himara coastal catchments
- Vjosa Wild River National Park

Mitigation Hierarchy Assessment Shushica

Shushicë
Armen
Hekal
Mallakastër
Damës
Vlore
Kutë
Selenicë
Kotë
Qesarat
Tepe
Ilias
Himara
Karaburun
Llogara
Vranisht
Lepusha Springs
HPP Lepenice
Brataj

Vllahina
Vllahinë
Sklapi
Brushnja
Qelbur
Pisha
Fishku
Trubull
I Madh
Smokthina
Bolena
Amulli
Vranishit
Pajame
Zelishti
Shushica
Cerga
I Thate
Shuri i Kucit
Pipeline Himara Lot 1
Hydropower abstraction pipeline Smokthina

SH77
SH76
SH100
SH8
K100
K77
K76
K8
E853

1911 m
2135 m
2044 m

N
W
E
S

0 2.5 5 10 Kilometers

Map 2: Project area at Upper Shushica

Legend

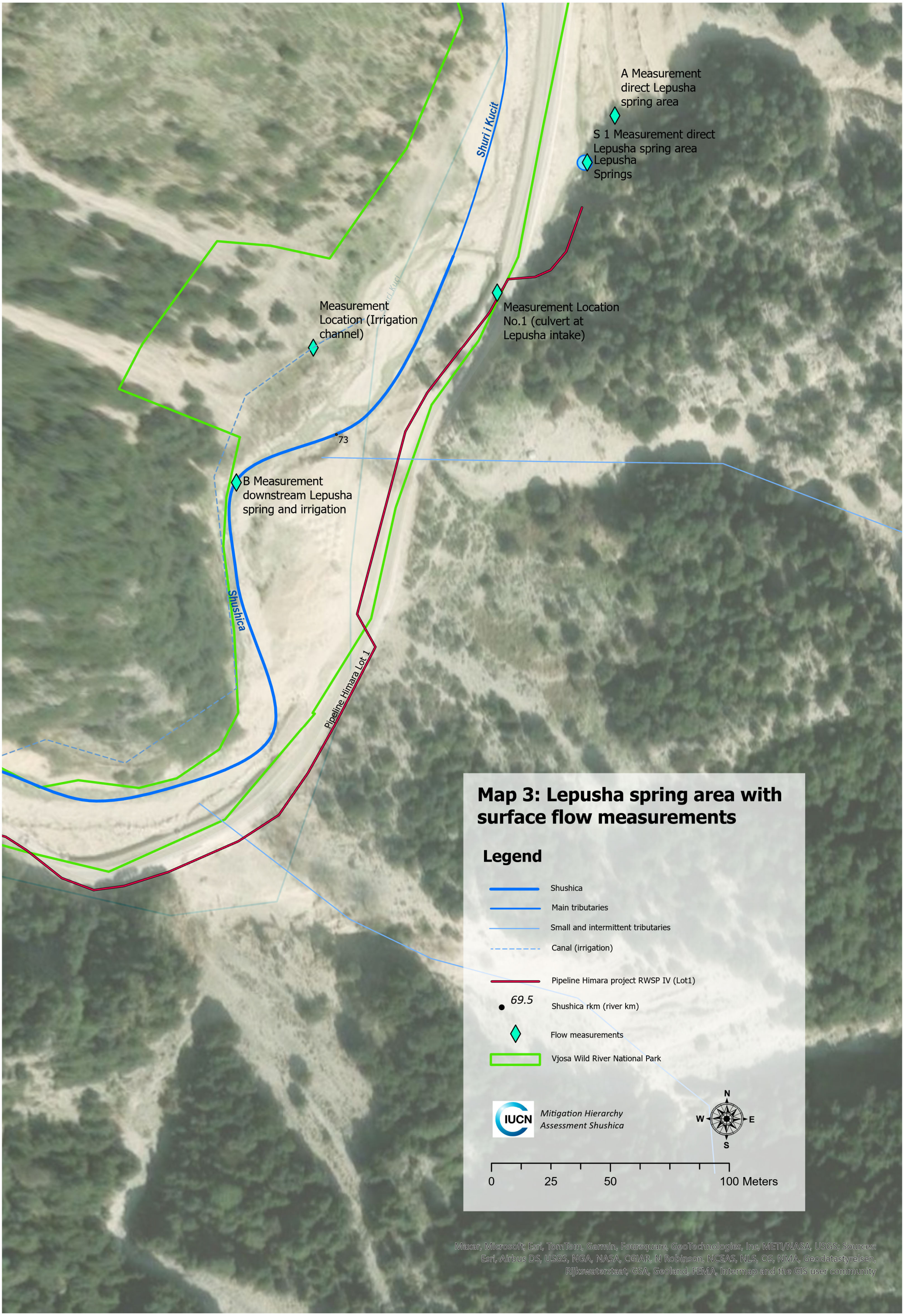
- Shushica
- Main tributaries
- Small and intermittent tributaries
- Canal (irrigation, drainage)
- Pipeline project RWS IV (Lot 1) with abstraction site
- 69.5 Shushica rkm (river km)
- Vjosa Wild River National Park

IUCN *Mitigation Hierarchy Assessment Shushica*

N W E S

0 0.25 0.5 1 Kilometers

Zelishti
Shuri i Kuqit
Lepusha Springs
66.5
67
67.5
68
68.5
69
69.5
70
70.5
71
71.5
72
72.5
73
Pipeline Himara Lot 1
Shushica
I Thate
Kuç
457 m
Esri, Intermap, NASA, NGA, USGS, Maxar, Microsoft, Esri, TomTom, Garmin, Foursquare, GeoTechnologies, Inc, METI/NASA, USGS


A Measurement direct Lepusha spring area
S 1 Measurement direct Lepusha spring area
Lepusha Springs
Shuri i Kucit
Measurement Location (Irrigation channel)
Measurement Location No.1 (culvert at Lepusha intake)
73
B Measurement downstream Lepusha spring and irrigation
Shushica
Pipeline Himara Lot 1
Map 3: Lepusha spring area with surface flow measurements
Legend
Shushica
Main tributaries
Small and intermittent tributaries
Canal (irrigation)
Pipeline Himara project RWSP IV (Lot1)
69.5
Shushica rkm (river km)
Flow measurements
Vjosa Wild River National Park
IUCN
Mitigation Hierarchy Assessment Shushica
N
W
E
S
0
25
50
100 Meters
Maxar, Microsoft; Esri, TomTom, Garmin, Foursquare, GeoTechnologies, Inc, METI/NASA, USGS; Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community

Map 4: Upper Shushica with surface flow measurements and water abstractions

Legend

- Shushica
- Main tributaries
- Small and intermittent tributaries
- Canal (irrigation, drainage)
- Kuc water abstractions
- Flow measurements
- Pipeline Himara project RWSP IV (Lot1)
- 69.5 Shushica rkm (river km)
- Vjosa Wild River National Park
- Assessment reaches discharge

IUCN *Mitigation Hierarchy Assessment Shushica*

0 0.25 0.5 1 Kilometers

N W E S

Kuc station 1974-1990

Measurement Location No.3 (Ura e Laskos)

Measurement Location No.2 (Kuc Buronja)

A Measurement direct Lepusha spring area

Measurement Location No.1 (culvert at Lepusha intake)

Lepusha Springs

B Measurement downstream Lepusha spring and irrigation

Measurement Location (Irrigation channel)

Shushica 1

Shushica 2

Shushica 3

Pipeline Himara Lot 1

Zelishti

Shurri i Kucit

Cerga

Shushica

Thate

64 64.5 65 65.5 66 66.5 67 67.5 68 68.5 69 69.5 70 71 71.5 72 72.5

Esri, Intermap, NASA, NGA, USGS, Maxar, Microsoft

Map 5: Habitats at Upper Shushica

Legend

- Shushica
- Main tributaries
- Small and intermittent tributaries
- Kuc water abstractions
- Pipeline Himara project RWSP IV (Lot1)

Riparian habitats within the VWRNP

- *AC (Active Channel):*
  FFH 3220 "Alpine Rivers")
- *AFr (Active Floodplain riparian):*
  Partially FFH 92C0 "Riparian
  Platanus woods", galleries and grassland
- Vjosa Wild River National Park

IUCN *Mitigation Hierarchy*
Assessment Shushica

N W E S

0 0.25 0.5 1 Kilometers

Zelishti
Shushica 3
Shushica 2
Shushica 1
Lepusha Springs
Shuri i Kuçit
Shushica
Rruga Kuç-Qesaro
Thate
Kuç
457 m
66.5
67
67.5
68
68.5
69
69.5
70
70.5
71
71.5
72
72.5
73

Map 6: Sampling sites – Shushica river

Legend

SamplingType

- *Amphibians, Reptiles, Otters, other Mammals*
- *Beetle*
- *Birds, Dragonflies, Scorpionflies*
- *Carabidae*
- *Fish*
- *HYMO*
- *MZB*
- *Mollusc*
- *Habitats, partly vegetation*

Assessment reaches

- Shushica 1
- Shushica 2
- Shushica 3
- Shushica 4
- Shushica 5
- Shushica 6

Mitigation Hierarchy Assessment Shushica

Shushica 6:

MZB, Fish, Amphibians, Reptiles, Otters, other Mammals, Beetles, Carabidae, Mollusc, HYMO, Habitats

Shushica 5:

MZB, Fish, Amphibians, Reptiles, Otters, other Mammals, Beetles, Carabidae, Mollusc, HYMO, Habitats

Shushica 4:

Beetle, Habitats

Shushica 3:

MZB, Birds, Dragonflies, Scorpionflies, Fish, Habitats

Shushica 2:

Mollusc, Amphibians, Reptiles, Otters, other Mammals, Fish, Habitats

Upstream Lepusha Springs:

Habitats

Shushica 1:

MBZ, Amphibians, Reptiles, Otters, other Mammals, Fish, Habitats

Hydropower abstraction pipeline Smokthina

Lepusha Springs

Esri, Intermap, NASA, NGA, USGS; Esri, TomTom, Garmin, Foursquare, GeoTechnologies, Inc, METI/NASA, USGS

0 2.5 5 10 Kilometers

Map 7: Potential alternative water sources

Legend

- Shushica
- Main tributaries
- Small and intermittent tributaries
- Canal (irrigation, drainage)
- Pipeline Himara Lot 1
- Proposed potential alternative main with abstraction at Borshi Springs
- Potential alternative water sources
- Vjosa river basin
- Shushica subbasin
- Adjacent coastal catchments
- Vjosa Wild River National Park

Mitigation Hierarchy Assessment Shushica

N W E S

0 1.25 2.5 5 Kilometers

Lepusha Springs
Kuc, Buronje
Vuno
Ilias
Shkolla 9-vjeçore Gjik Bixhili
Pilur
Jale
Himara Fshat
Livadhi
Himara
Potam
Kudhes
Qeparo Fshat
Qeparo
Borsh
Borsh
Fterre
Tatzat
Sasaj
End of Lot 1
Shushica
Vranishit
Zelishti
Cerga
Trapi
I Thate
Shuri i Kucit
Kalinori
Shkoza
Brodani
Gribat
Corre
Lugu
Kulperi
Pamja
Honi
Ftera
Pinu
Galishti
Zhuri
Qeparoi
Gufina
1582 m
1389 m
1818 m
399 m
2044 m
K8
K76
SH8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