



## **International Cooperation in Wild River Ecosystem Research for Integrated Water Management and Sustainable Catchment Development of the Vjosa River (the VjoSusDev Project)**

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# Why VJOSA River?

It is one of the last wild (free flowing)  
rivers in Europe





## Vjosa, an important transboundary river



Length: 272 km; 80 km in Greece, 192 km in Albania

Catchment: 6710 km<sup>2</sup>; 4365 km<sup>2</sup> in Albania, 2345 km<sup>2</sup> in Greece

Average discharge: 204 m<sup>3</sup>/s

Main source: Pindus, Greece

River mouth: Adriatic Sea, Albania

## European Ecoregions: (6) Hellenic Western Balkan



**European Green belts and  
Albania**  
12,500 km



## Vjosa, as a “unique” river!



- In its near-natural state, the river is of high value for flood mitigation, water purification processes and the maintenance of a very rich biodiversity.

- From a social and economic point of view, it provides excellent opportunities for future developments, especially eco-tourism.

- Vjosa flows entirely unobstructed all the way through Albania to the Adriatic Sea (such conditions of unobstructed flow have been already lost in big rivers of Europe).

- Vjosa river is an asset to Albanian heritage and represents a precious natural laboratory of significance at European scale.

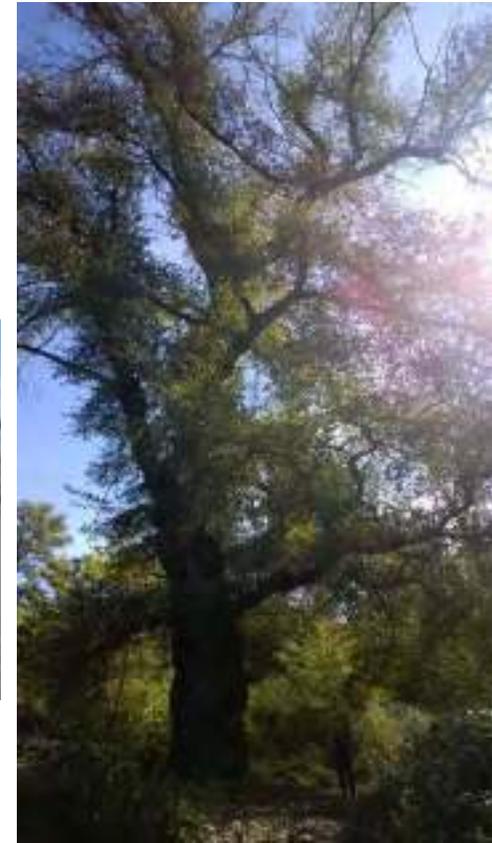


## River's morphological diversity:

main river channel, side arms, oxbows, canyons, gravel bars, floodplain, islands, rocky parts, pools, swamps, thermal springs ...



# Important habitats (according to EU directives)



# High richness and biogeographic value for aquatic invertebrates and fish.



## Rich terrestrial and wetland fauna



# High potential for sustainable development

Organic agriculture, farming, wind energy, tourism, sports, research and educational activities ...



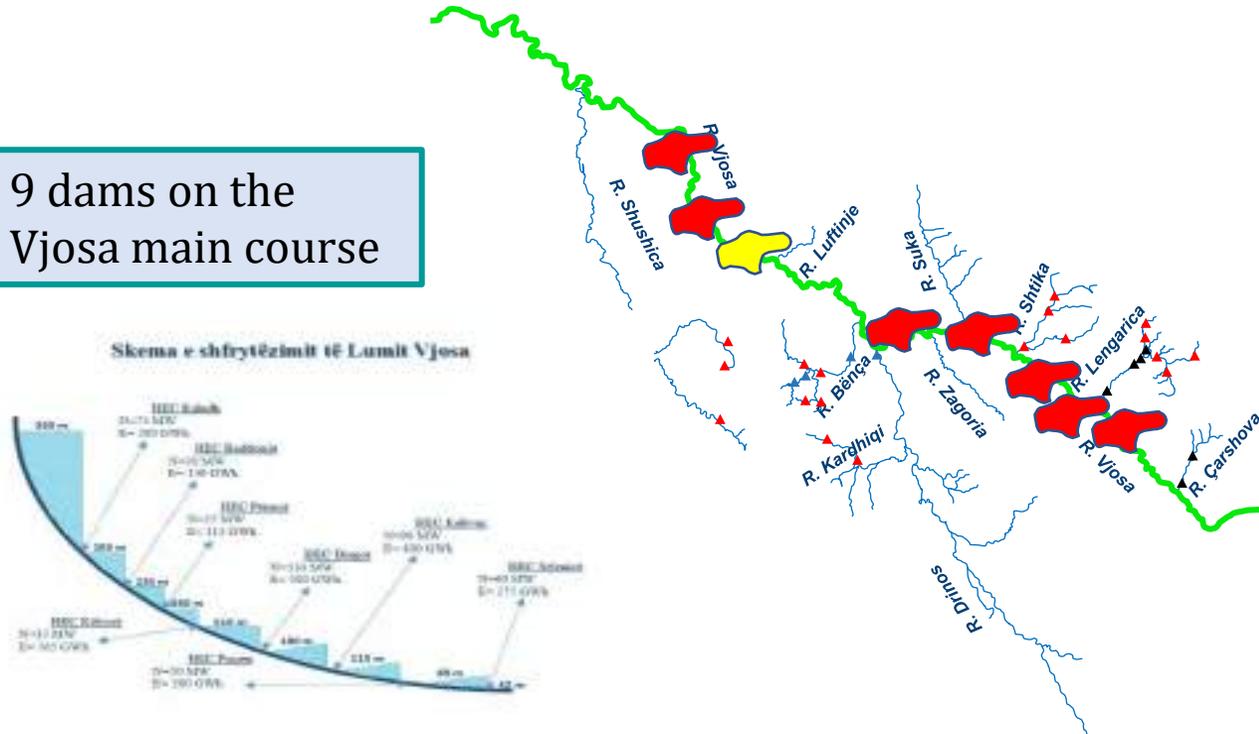
# Increased international interest on Vjosa research and conservation, especially since 2014.



40 HPPs were initially planned to be built in the Vjosa basin, starting from 2014.

9 dams on the Vjosa main course

31 dams on its tributaries





## VjoSusDev Project:

Environmental assessment of the Vjosa riverscape as the basis for an integrated water management and sustainable catchment development  
(May 2022 – April 2026)



# VjoSusDev

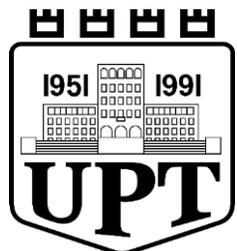
## Project partners



University of Tirana (UT)



University of Natural Resources and  
Life Sciences, Vienna



Polytechnic University of Tirana (PUT)



University of Vienna



Agriculture University of Tirana (AUT)





## Project aim



- The VjoSusDev Project aims for a comprehensive, cooperative, interdisciplinary and long-term study of the Vjosa river system in Albania, as the basis for evaluating management options in view of a sustainable development of the riverine landscape and its human use.
- Additionally, the project aims for a mutual strengthening of an interdisciplinary and translational approach at all involved research institutions.

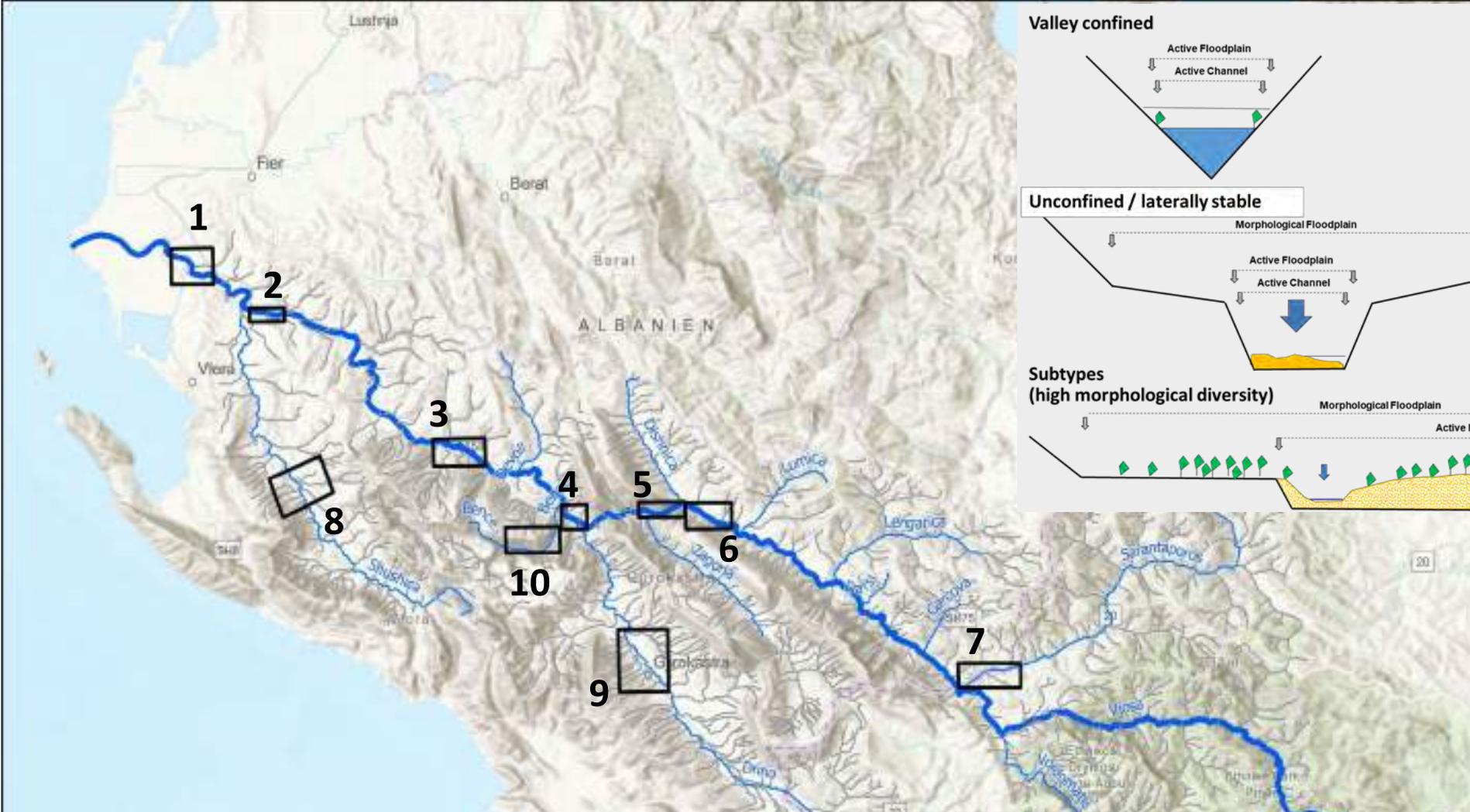


## Work packages and research topics

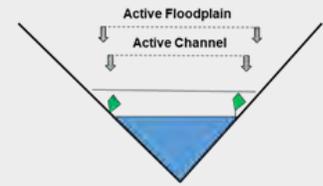
- 1) Monitoring and understanding the fundamental physical regime governing the Vjosa riverscape.
- 2) Maintaining the Vjosa riverscape's ability to support biodiversity.
- 3) Ecosystem dimensions behind clean water provisioning, a key fluvial ecosystem service.
- 4) Science and Society interactions for sustainable development.



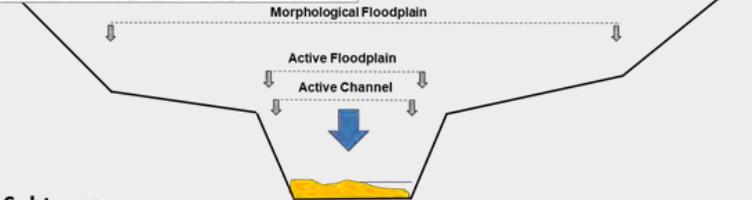
# Study areas



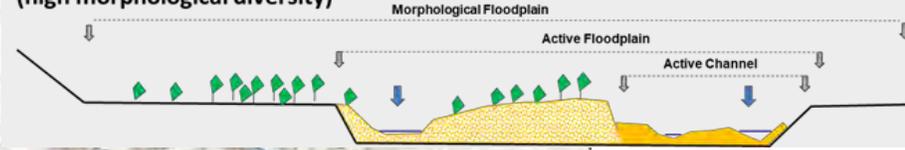
Valley confined



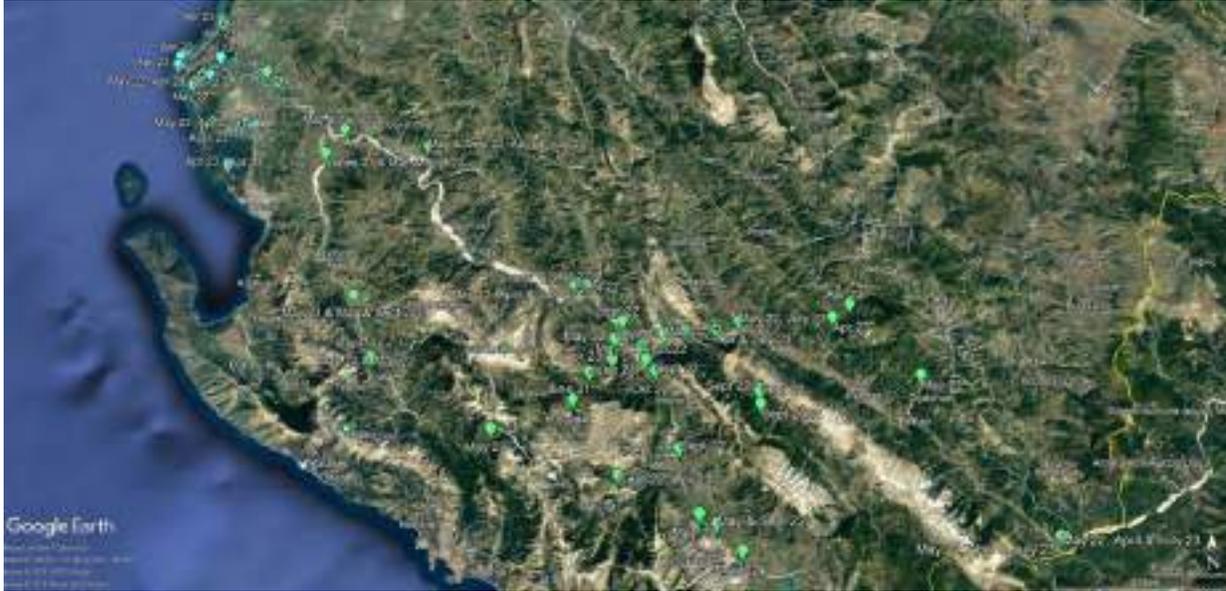
Unconfined / laterally stable



Subtypes (high morphological diversity)



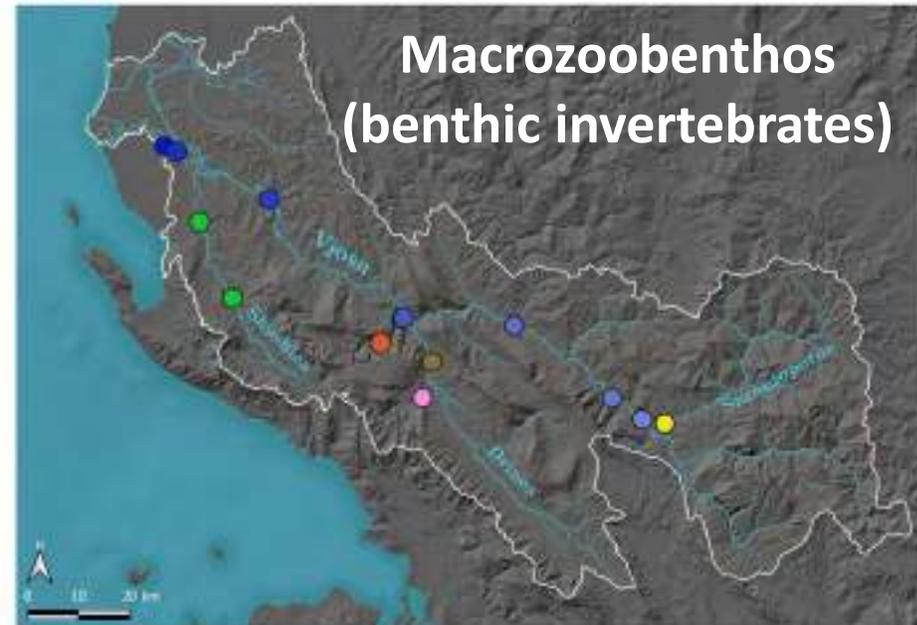
# Sampling sites for different research subjects



**Microalgae (diatoms)**



**Water quality, groundwater ecology,  
self-purification processes**



**Macrozoobenthos  
(benthic invertebrates)**



## Expected outcomes of the project

- A comprehensive whole catchment-orientated analysis of the environmental conditions of the Vjosa river system.
- A significant improvement of the database and profound understanding of river functioning on catchment scale, as a basis for an in-depth evaluation of future management options.
- A substantial change of routines in terms of official monitoring programs, as requested by the different EU-directives, on:
  - hydrology,
  - geomorphology,
  - biodiversity,
  - water quality.



## Expected outcomes of the project

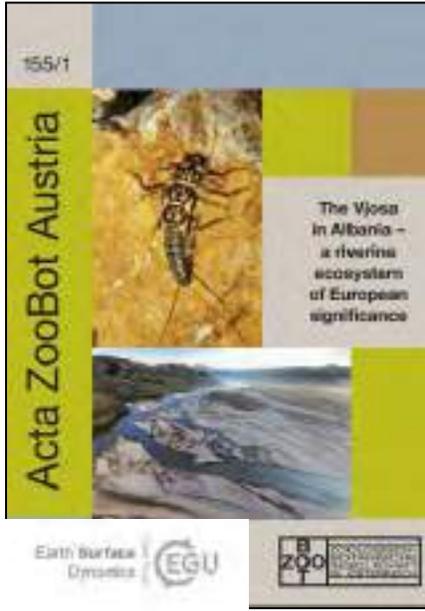
- A continued exchange and discussion process with governmental institutions, local representatives, public and NGOs.
- Raised knowledge base for decision making, public and institutional awareness on water governance.





## Project beneficiaries

- ✓ **Governmental institutions:** the Ministry of Environment and Tourism, the National Agency for Protected Areas, the National Environmental Agency, the Agency for Water Resources Management, the National Agency of Territorial Planning, the National Agency of Natural Resources, the National Tourism Agency, the Ministry of Agriculture and Rural Development, the Ministry of Infrastructure and Energy.
- ✓ **The local government (municipalities):** Vlore, Selenice, Fier, Mallakaster, Memaliaj, Tepelene, Kelcyre, Permet, Gjirokaster, Libohove, Dropull.
- ✓ **The local community in Vjosa watershed** (the long-term provisioning of high-quality water supply, irrigation, flood protection, a solid basis for sustainable economic growth, ecological tourism, rural tourism).
- ✓ **National and local NGOs interested in Vjosa river and its watershed** (by obtaining evidence-based arguments for their activities, as well as experience of a platform for science - stakeholders interface).
- ✓ **Academic institutions in Vjosa catchment area:** the University of Vlore and the University of Gjirokaster (by obtaining increased knowledge and enlarged networking and collaboration).



# Dissemination of project results

- International open access journals
- Local Albanian journal
- Monographic publication
- Dissemination workshops, fostering dialogue and visibility
- Social media
- Press conferences
- Newspaper reports
- Radio and TV interviews



## Sediment source and sink identification using Sentinel-2 and a small network of turbidimeters on the Vjosa River

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**Abstract.** Measurement of suspended sediment concentration (SSC) at a high water table is a time-consuming process at natural rivers. However, it does not give a full spatial picture on possible sediment pathways within the landscape. Spatially resolved estimates of SSC along river networks are needed to identify sediment sources and sinks, to track erosion problems, and identify anthropogenic effects on catchment-scale sediment production, e.g., by dam construction or erosion control. Here we explore the use of high-resolution Sentinel-2 satellite images for this purpose in a semi-urban catchment with complex topography, river confluence, and ground station visibility, using the calibration and validation by a European large-scale river profile measurement. The study is carried out on the Vjosa River in Albania, which is one of the last major large river systems in the region. We developed a method to estimate river turbidity profiles from Sentinel-2 imagery, including atmospheric, cloud cover, and dispersion corrections for the period May 2019 to July 2021 (180 images). In situ turbidity measurements from four in-situ sensors in the mid and low Vjosa River provided ground truthing. A semi-empirical regression model between turbidity and reflectance was derived for this data. The resulting longitudinal river turbidity profiles were subsequently validated with near-daily in-situ river turbidity measurements at 14 km. The satellite-derived river turbidity revealed variability in turbidity along the reach also with a strong seasonal signal, with the highest mean turbidity in winter along the entire length of the river. When comparing satellite-derived river turbidity profiles with in-situ river turbidity profiles, both the turbidity and turbidity profiles of the Vjosa. The river basin and network acted as a sediment source area of the river and significant sediment storage. Sediment storage was mostly observed following heavy rain events, but the fine-scale storage in river beds and banks was also possible. Finally, we used the data to quantify the river source of the sediment yield of the river at 20 km of the river (25–5000 t) in the catchment station. This study shows the importance of the Vjosa River as an important sediment source for the delta. Our study provides a proof of concept that space-based hydrological and data have potential for improved sediment quantification and could be large-scale but also in-situ studies. The potential applications are many, including identifying erosion hotspots, sediment action processes, local point sources, global response signals, and sediment fluxes in river basins, with a necessary future research focus on improving accuracy and reducing uncertainty in such studies.





## Key activities implemented

- Remote survey techniques and modelling of hydrology, geomorphology, vegetation pattern and land-use of the catchment;
- Joint field missions to study river structure, habitat distribution, habitat turnover rates, vegetation, groundwater, ecosystem processes and aquatic and terrestrial fauna and flora of the riverine landscape in 10 river reaches;





## Key activities implemented

- A continued monitoring program on hydrology, water quality and nutrient and carbon flow processes in the riverine corridor, and of the fauna and flora at up to 19 selected sites representing 10 river reaches of the Vjosa and its major tributaries (Drino, Shushica, Bënça, Sarantoporos, Langarica, Kardhiqi, Zagoria);
- Studies on groundwater ecology, habitat use, nutrient cycles, fish and benthic invertebrate ecology, etc. on the floodplains of the Vjosa in using the field station at Tepelena for continued research;





## Key activities implemented

- Consultation and dissemination meetings and workshops, as well as data integration workshop, with governmental institutions, local representatives, and NGOs in Albania;
- Combine and integrate VjoSusDev activities with other ongoing projects on Vjosa (ESPID4Vjosa, EUSIWM, EU4Rivers).
- Training of students and young researchers (master theses, PhD theses, summer school, field and lab training, mobilities between Albania and Austria).





## Key outputs of the project

1. Geomorphology, hydrology and sedimentology as basis for sediment transport and flood models (WP 1).
2. Habitat distribution and habitat turnover based on satellite images and ground assessment (WP 1).
3. Comparative vegetation characteristics at reach scale and terrestrial fauna in the flood plain area (WP 2).
4. Biodiversity assessment of aquatic fauna: benthic invertebrates, meiofauna, groundwater fauna and fish (WP 2).

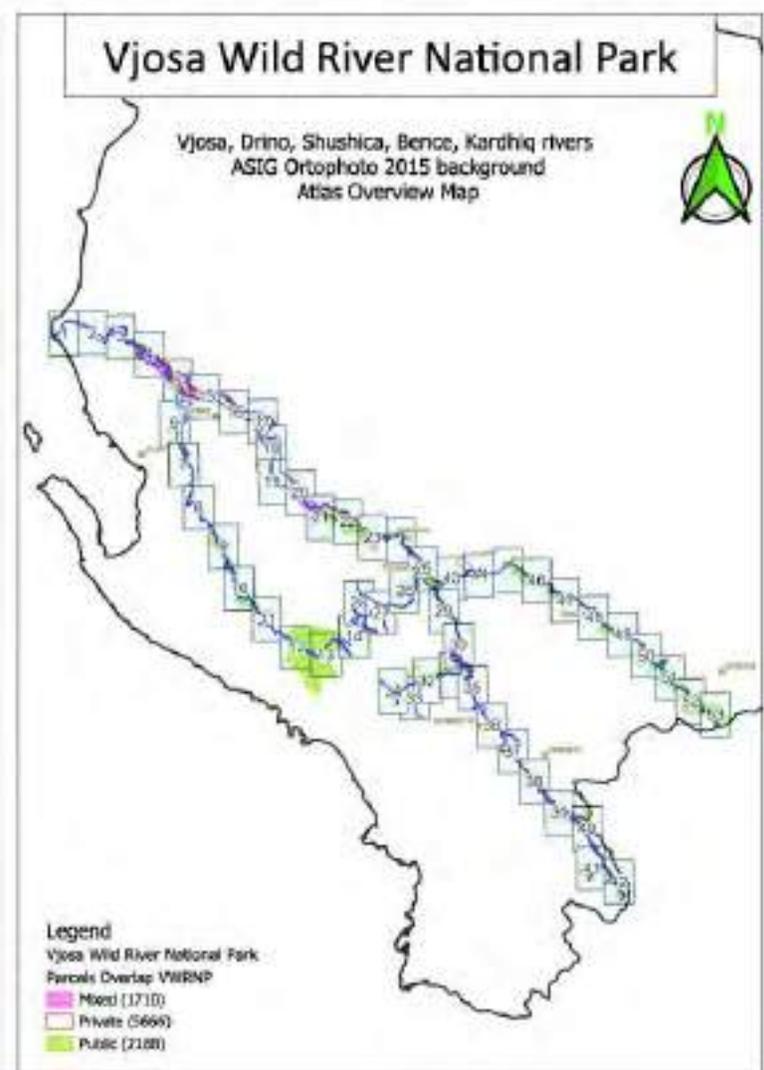




## Key outputs of the project

5. Habitat linkages, habitat requirements, life history traits (WP 2).
6. Monitoring scheme for water quality assessment (WP 3).
7. Self-purification processes in the river network (WP 3).
8. Establishment of the Vjosa Research Center (in Tepelena) as science hub and communication centre with governmental institutions and other stakeholders (WP 4).





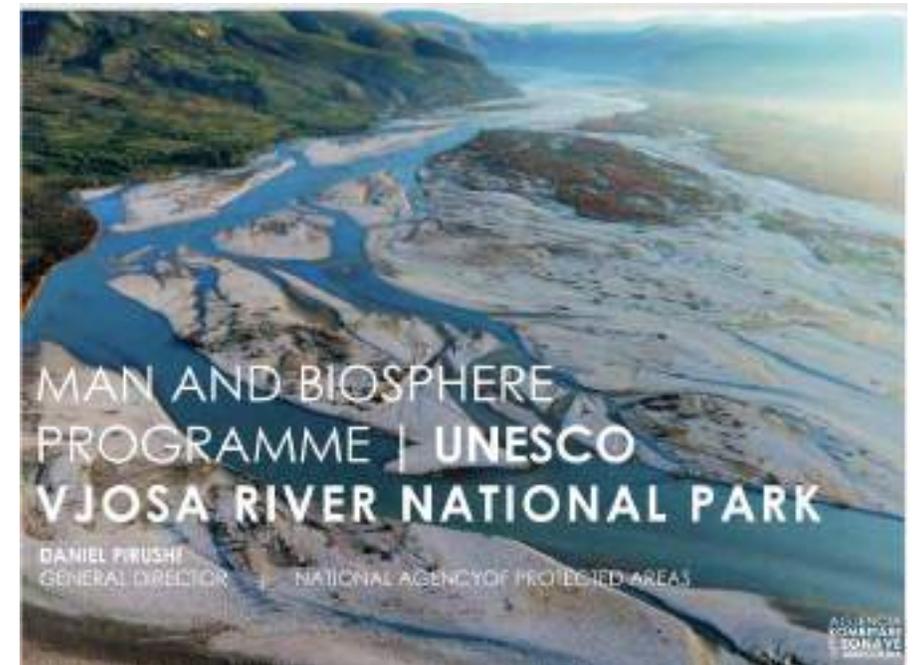
# Proclamation of the Vjosa River National Park (March 2023)

**VJOSA WILD RIVER NATIONAL PARK**  
DESIGNATION PROJECT

AKZM patagonia IUCN

**Vjosa Wild River National Park  
A Management Plan  
2024-2033**

- Management Plan for the Vjosa River NP (2024 – 2033).
- Proclamation of the Vjosa River as an UNESCO site (September 2025).





Faleminderit!  
Thank you!



**SUSTAINABLE WATER MANAGEMENT IN A Changing Climate**

13<sup>th</sup> BALKANS JOINT CONFERENCE AND EXHIBITION



**SHUKALB**  
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11-12-13 NOVEMBER 2025  
DURRËS, ALBANIA