

ON SPRING BIODIVERSITY AND NATURE CONSERVATION IN THE VJOSA BASIN, ALBANIA

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Abstract

The Scientific Week in the Vjosa Basin was organized during the period 27 April – 02 May 2026, as a joint initiative between the Department of Biology, Faculty of Natural Sciences, University of Tirana (DB, FNS, UT) and EcoAlbania, with the support of the Swiss Foundation Sylvia & Reinhard Bachofen, the VjosSusDev Project (2022–2026), and FNS, UT. Up to 30 participants took part, mainly students from the MSc in Environmental Biology and the Bachelor program in Natural and Environmental Sciences of the DB. Five working groups, experts and students, collected water samples (algae, invertebrates, including eDNA) and assessed hydrogeology, geomorphology, riparian plant and animal biodiversity (vertebrates), ecological state, and human impact. In the afternoons, the laboratory facilities of the Vjosa Research Center (VRC) in Tepelena were used for preliminary analyses, while additional examination was conducted in Tirana or is still ongoing. Assessment and sampling were conducted at 20 stations in total. The most significant and worthily noted biodiversity findings and other observations are presented here by the leading experts of the working groups, co-authors of this paper. Overall, 184 species were recorded, including 144 plant species (algae, mosses, ferns, and flowering plants) and 40 vertebrate species (amphibians, reptiles, birds, and mammals). A complete species list is

provided, highlighting the most abundant taxa as well as species of particular natural and ecological interest. For 64 species, photographs from the field or microscopic observations are also included. Several species are reported for the first time in the Vjosa Basin. The following are considerations for habitats with high biodiversity, human impact, etc. Achieving a balance between nature conservation and sustainable development across economic sectors remains a major challenge for the administrations responsible for these protected areas and local stakeholders.

Key words: Vjosa Basin; biodiversity; protected areas; scientific week; ecological situation; nature conservation.

Përmbledhje

Gjatë periudhës 27 Prill - 2 Maj 2026, u organizua në Pellgun e Vjosës Java Shkencore si një nismë e përbashkët midis Departamentit të Biologjisë, Fakulteti i Shkencave të Natyrës, Universiteti i Tiranës (DB, FShN, UT) dhe EcoAlbania, me mbështetjen e Fondacionit Zvicëran Sylvia & Reinhard Bachofen, Projektit VjosSusDev (2022–2026) dhe FShN, UT. Morën pjesë deri në 30 pjesëmarrës, kryesisht studentë nga Programi Master në Biologji e Mjedisit dhe Programi Bachelor në Shkenca Natyrore dhe Mjedisore i DB. Pesë grupe pune, me ekspertë dhe studentë, punuan për mbledhjen e mostrave ujore (alga, invertebrorë, përfshirë eADN-në) dhe vlerësimin e hidrogjeologjisë, gjeomorfologjisë, biodiversitetit bimor dhe shtazor lumor (vertebrorë), gjendjes ekologjike dhe ndikimit të njeriut. Në disa pasdite u përdorën për analiza paraprake mjediset laboratorike të Qendrës Kërkimore të Vjosës (VRC) në Tepelenë, ndërsa vëzhgime shitesë u kryen në Tiranë ose janë ende në vazhdim. Gjithsej u bënë hulumtime dhe kampionime në 20 stacione. Këtu sillen të dhënat mbi gjetjet më në zë mbi biodiversitetin dhe mbi vëzhgimet e tjera nga ekspertët drejtues të grupeve, bashkëautorë në këtë punim. Gjithsej, u gjetën 184 lloje, 144 bimë (alga, myshqe, fiere dhe bimë më lule) dhe 40 vertebrorë (amfibë, reptilë, shpendë dhe gjitarë). Këtu jepet lista e plotë, të cilat janë llojet më të bollshme ose me interes nga ana natyrore apo ekologjike. Për 64 lloje jepen edhe fotot nga terreni ose nga mikroskopi. Disa lloje hasen për herë të parë për Vjosën. Në vijim jepen konsiderata për habitatet me biodiversitet të lartë, për ndikimin e njeriut etj. Mbetet sfidë për administratat përkatëse të këtyre zonave të mbrojtura dhe pushtetin vendor për të balancuar mbrojtjen e natyrës dhe zhvillimin e qëndrueshëm në gjithë sektorët e ekonomisë.

Fjalë kyçe: Pellgu i Vjosës; biodiversitet; zonat e mbrojtura; javë shkencore; gjendja ekologjike; ruajtja e natyrës.

Introduction

The Science Week on River Monitoring and Conservation took place during 27 April - 02 May 2026 in the Vjosa River area (Fig. 1), Southern Albania. Up to 30 people participated, most of them students from MSc. Environmental Biology and from Bachelor Natural and Environmental Sciences, Department of Biology, FNS, UT. 5 working groups, experts and students worked together in the field: 1) Riverscape geo- and hydro-morphology; 2) Algae, water quality and nature conservation; 3) Riparian and submersed vegetation and related habitats; 4) Invertebrates and related water quality; & eADN sampling; 5) Vertebrates (amphibians, reptiles, birds & mammals).

The main objective was to integrate interdisciplinary research activities conducted by national and international experts with hands-on training and practical field experience for students and young researchers. The program addressed key topics such as biological and environmental monitoring, aquatic and riparian biodiversity, in Vjosa River, tributaries & Narta Lagoon, vegetation assessment, geology and geomorphology, and river ecosystem dynamics, with particular attention to natural processes in free-flowing river systems.

Why Vjosa region?

The Vjosa River / Aoos River, flowing between Greece and Albania, is distinguished by its exceptional hydro-morphology and biodiversity (Fig. 1). It is considered one of the last free-flowing river systems in Europe (Acta ZooBot Austria, 155/1, 2018; Kovarovics & Michael, 2024; Miho, 2026; etc.), together with many of its tributaries. The river corridor contains extensive and well-preserved Natura 2000 and EUNIS habitats, which support remarkable biological diversity, with up to 1,890 species recorded to date, including more than 820 plants and 1,070 animal species (approximate estimation). Ca. 40 species are classified as threatened according to the IUCN Red List, while about 120 species are included in the Albanian Red List (2013). Furthermore, ca. 150 species are listed in Appendices I–III of the Bern Convention on migratory species, more than 80 species are included in Annex I of the Birds Directive (Bino *et al.*, 2023), and about 80 species are protected under the Habitats Directive.

Due to these exceptional values, and due to efforts and contributions by experts, environmentalists, and numerous international environmental organizations in one decade, the Albanian government declared the Albanian section of the Vjosa River and its tributaries—the Drino, Bença, and Shushica Rivers—a National Park in March 2023, encompassing approximately 400 km of free-flowing river network.

For these reasons, we, as experts, have regularly visited the Vjosa basin over the years together with students, contributing both to biodiversity assessment and to the practical training of a new generation of experts, while also raising awareness about the area and promoting its sustainable development. Such educational and scientific activities are followed with great interest and provide mutual benefits for all parties involved, including those involving our bachelor's and master's students,

The experts leading each working group, coauthors here, presented and discussed the most important findings in the final Rapport (Miho *et al.*, 2026), prepared for the supporters of this event. Some of the research is still ongoing and will be presented in separate publications. Nevertheless, we believe that our findings and observations, although preliminary, can contribute to the ongoing assessment of riverine, estuarine, and coastal biodiversity. Considerations related to water quality assessment and the ecological status of the surveyed stations may support the relevant protected area administrations and other local stakeholders in identifying biological values, promoting their conservation and restoration, and ensuring their sustainable use across different development sectors.

Material and methods

In total up to 20 stations were visited (Fig. 1, *with the following station codes*): Mifoli (Mi-Vj), Poçemi (Po-Vj), Dragoti (Dr-Vj), Petrani (Pe-Vj), & Tre Urat (TU-Sa) on the Vjosa River; Lekli (Le-Dr) & Kordhoca (Ko-Dr) on the Drino River; Tre Urat (TU-Sa) & Vromonero (Vn-Ts) on the Sarandoporos River; Aqueduct (Ad-Be) on the Bença River; Lepusha (Le-Sh) & Gjormi (Gj-Sh) on the Shushica River; springs of Poçemi (Po-Sp) & Cold Vater (CW-Sp), Tepelena; Viroi spring, lake, and river (Vi-Sp), Gjirokastra; Kelcyra Waterfall (Wf-Ke); Spring brooklet (Br-Sp) near VRC, Tepelena; Benja thermal springs & Langarica River (Be-Ts); Vromonero thermal springs (Vn-Ts) & Sarandoporo River; Treporti seacoast, Zverneci, & Narta Lagoon (Tp-Zv); Narta Lagoon & Skrofotina Saltpan (Na-Ak); Dead River (Dr-De), Delisufi.

The geo- and hydro-morphological structures of the selected sites of river landscape were described and evaluated, including analysis of riverbed changes and erosion processes.

Periphyton sampling was conducted from submerged stones or other substrates using a toothbrush (based on the standard EN 13946:2003) or a small field knife. Selected fresh samples were examined using stereomicroscopes and microscopes available at the VRC, and then after in Tirana, using a Leica DM4B microscope, and a Leica M205C stereomicroscope, both equipped with digital cameras. For the taxonomic and ecologic aid were mostly used: Bellinger & Sigeo (2010), Streble *et al.* (2018), etc., a collection of microscopic photos from Vjosa and the web data.

The analyses were on algal diversity, primary productivity, and key bioindicator taxa used to assess the ecological status of selected habitats in accordance with the Water Framework Directive (2000/60/EC). Streble *et al.* (2018) combines several ways of assessing water quality: 4 nutrient classes (oligotrophic, mesotrophic, eutrophic and polytrophic); 4 water quality classes (I, oligosaprobe - os; II, β -mesosaprobe - bms; III, α -mesosaprobe - ams; IV, polysaprobe - ps); the ecological value, saprobity and other quality classes are given for some species in table 1.

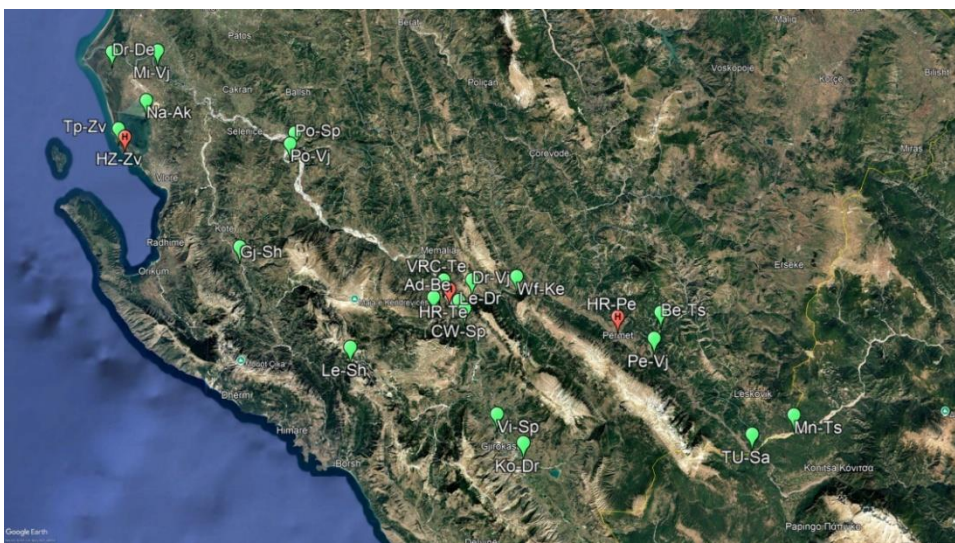


Figure 1. Satellite map of the visited stations (in green) in the Vjosa area, April-May 2026; in red are the accommodation places; VRC-Te, the Vjosa Research Center "Fritz Schiemer", Tepelena.

The riverscape, submerged vegetation, and associated habitats were assessed with regard on plant diversity, primary productivity, ecological condition and potential threats. Key bioindicator taxa were evidenced to assess the ecological status in accordance with the WFD 2000/60/EC. For the taxonomic identification of plant species in the field, as well as for some ecological considerations, the Pl@ntNet platform and the Illustrated Flora of Albania (Pils, 2016) were used, together with other Albanian floristic literature available in Tirana.

Sampling of benthic invertebrates and nematodes was in representative habitats. Selected samples were preliminary observed in the VRC and are now in process of further analysis, and will be published elsewhere.

Additionally eADN sampling was conducted in 10 stations on the Vjosa River, tributaries (Drino, Shushica, Bença, Sarandoporos) and on the Narta Lagoon. It represented an innovative opportunity for the Vjosa area. The use of genetic barcoding can facilitate the identification of a large number of taxa and overcome limitations associated with species identification at early life stages in selected sites. The study will be in cooperation with a Swiss eDNA laboratory specialized in molecular analyses; the data will be hopefully published elsewhere.

Field assessment of vertebrates (amphibians, reptiles, birds & mammals) was conducted in mentioned habitats of Vjosa River and its tributaries, as well as in the Narta Lagoon, and the seashore.

Results and discussion

Based on a rapid assessment of the samples and materials collected or observed in the visited areas, a total of 184 plant and animal species were recorded, representing either the most abundant taxa, taxonomically noteworthy species, or species encountered for the first time: 43 algae, 4 mosses, 11 ferns, 86 flowering plants (19 monocots, 67 eudicots and others), 4 amphibians, 4 reptiles, 28 birds and 4 mammals. The checklist is presented in Table 1 at the end, and arranged according to the main systematic groups. The most frequently observed or representative species are also illustrated in PLATES I–VIII; these include 75 field and microscopic photographs representing 64 species (53 plants and 22 vertebrates).

Considerations on algae: A total of 43 algal species were recorded (PLATES I - III). Filamentous algae of the genus *Spirogyra* (PLATES II,

Figs. 3-5) were abundant in several habitats, particularly in the thermal springs of Benja and Vromonero, as well as in the Viroi Lake and the Poçemi springs. These communities were often associated with species of the genus *Vaucheria*, together with filamentous cyanobacteria, especially from the genera *Oscillatoria*, *Planktothrix* and *Phormidium* (PLATES II, Figs. 10-11). *Cladophora glomerata* was present in the Bença River (PLATE I, Fig. 2).

Among the diatoms, it is worth highlighting the abundant presence of the centric species *Ellerbeckia arenaria* and *Melosira varians* at the Poçemi springs, Viroi, and Bença stations. These species are considered indicators of good water quality.

It is worth noting that, despite the rather preliminary and opportunistic nature of these observations, the species *Batrachospermum gelatinosum* (Linnaeus) De Candolle (PLATES I, Figs. 3&4), *Nostoc commune* Vaucher ex Bornet & Flahault (PLATES I, Figs. 5&6), *Spirogyra varians* (Hassall) Kützing (PLATES II, Figs. 3&4), and *Vaucheria geminata* (Vaucher) De Candolle (PLATES II, Figs. 1&2) were recorded for the first time in the Vjosa River basin (Tab. 1).

Riparian flora and vegetation: Among the plant kingdom recorded in the area, flowering plants were the most diverse, with a total of 86 species, including 67 eudicots and 19 monocots. In addition, 11 fern species and four aquatic moss species were documented, representing an important contribution to the biodiversity of the Vjosa NP. Six fern species and 24 flowering plant species are included in the IUCN Red List, although all are currently classified as Least Concern (LC). Two species, *Orchis italica* and *Sternbergia lutea*, are protected under the Convention on International Trade in Endangered Species (CITES). Several other species have a restricted distribution within the study area, including *Arbutus andrachne*, *Anthyllis hermanniae*, *Hypericum olympicum*, *Scorzonera lafranchisiana*, *Symphytum ottomanum* (PLATES V & VI), etc.

Some plant species are characteristic of aquatic habitats (PLATES III & IV), including almost all moss species, as well as *Angelica archangelica*, *Berula erecta*, *Nasturtium officinale*, *Eleocharis palustris*, *Carex* cf. *riparia*, *Lythrum virgatum*, *Alisma plantago-aquatica*, *Helosciadium nodiflorum*, *Rumex hydrolapathum*, and *Scirpoides holoschoenus*. *Ranunculus penicillatus* extensively covered the surface of Viroi Lake, its spring, and the out flowing river, with other submerged aquatic plants and filamentous algae, particularly species of *Spirogyra* and *Vaucheria* (PLATE II).

Vertebrates: Forty vertebrate species were recorded, including 28 birds and 4 species each of amphibians, reptiles, and mammals (Tab. 1) (PLATES VII & VIII). Nearly all are part of the IUCN Red List, although most are currently classified as Least Concern (LC); however, the European pond turtle, *Emys orbicularis*, recorded in Viroi and Kordhoca, has a higher conservation status of Near Threatened (NT); similarly, the Curlew sandpiper, *Calidris ferruginea*, classified as Vulnerable (VU), was noted in high abundance in the Narta Lagoon.

Regarding vertebrate occurrence, all riverine stations were of considerable interest; however, the **Viroi area was particularly notable during spring**, especially for amphibians, reptiles, and waterfowl (9 noted vertebrates of 29 species in total). The Narta Lagoon and the salt works are also of exceptional importance for waterbirds, as are other wetland habitats that are abundant within the LP Pische Poro–Narta Landscape (Miho *et al.*, 2024).

Old and fresh spraints of the otter, *Lutra lutra* (NT; also protected under CITES), were observed at several riverine stations: Poçemi, Dragoti, Petrani, Tre Urat, Vjosa River; Lekli, Drino River; Gjormi, Shushica River (Tab. 1); it is considered as ecological indicator, evidencing the overall health, pollution levels, and biodiversity of riverine ecosystem; otters require clean, well-oxygenated water, abundant fish populations, and complex bank vegetation (Narváez *et al.*, 2020).

The Drino River valley has long served as an important refuge for the white stork, *Ciconia ciconia*; four nests were observed along the valley during our survey (PLATE VIII, Figs. 1-3). The white stork serves as a premier bio-indicator and "umbrella species" for environmental health, indicating an intact, functioning wetland ecosystem; stork territories frequently host a higher richness of other farmland birds; are excellent sentinels for chemical exposure; additionally, large stork nests provide micro-habitats and shelter for other species, such as house sparrows and bats (Kronenberg *et al.*, 2017; Wojciech & Krzysztof, 2019).

Ecological considerations and nature conservation: The high abundance of filamentous algae belonging to the genera *Cladophora*, *Spirogyra*, and *Vaucheria*, mixed with *Ulothrix*, and of cyanobacteria (*Oscillatoria* spp., *Phormidium* spp.), and other submerged plants, is frequently associated with water quality conditions. According to the ecological indicator values reported by Streble *et al.* (2018), 27 species were classified as *bms* (β -mesosaprobic), corresponding to moderately polluted waters or the 2nd

quality class. Seven species were classified as *ams* (α -mesosaprobic), indicating tolerance to higher levels of organic pollution, corresponding to the 3rd quality class. In contrast, only four species were classified as *os* (oligosaprobic), characteristic of clean, high-quality waters (1st class) and intolerant to organic pollution (Tab. 1).

It is worth noting that no strongly pollution-tolerant species, such as α -mesosaprobic (*ams*) or polysaprobic (*ps*) taxa, were recorded at any of the assessed stations. A similar pattern was also observed during the previous autumn survey (Toska *et al.*, 2025). However, the **moderate to relatively high levels of pollution observed** are likely associated with increased organic matter and nutrient loads (particularly nitrogen and phosphorus), especially in the Vjosa and Drino rivers. Species of *Cladophora*, *Spirogyra*, *Vaucheria*, *Ulva*, *Oscillatoria*, *Planktothrix*, *Phormidium*, etc. are often considered **nitrophilous/eutrophic** for they thrive in habitats with high levels of nitrogen (Granéli *et al.*, 2008). They act as key biological indicators of nutrient pollution and ecosystem changes, probably driven by the **discharge of untreated urban wastewater**, agricultural runoff, livestock, intensified erosion, and the effects of climate warming.

Periphyton on submerged rocks in the Vjosa River was very scarce at Poçemi (Fig. 2), Dragoti, Petrani, and other stations. Water turbidity at these sites was also high, largely due to rainfall during our visit. A relatively different situation was observed in the Drino River stations at Lekli and Kordhoca, in the Bença River near the Aqueduct, and in the Shushica River at Lepusha and Gjormi. At these sites, periphyton was more abundant and water transparency was higher, consistent with observations from many of our previous visits.

We suggest that the scarcity of periphyton is largely due to the substantial accumulation of mud on submerged stones, a condition frequently observed in these waters. This sediment layer reduces light availability, thereby limiting algal development. The presence of mud is clear evidence of **intense erosion** along the riverbanks and slopes of the Vjosa basin. Part of this sediment load is related to the highly erosive geological substrate of the basin, as also indicated by the findings of geological experts; especially in its headwaters and middle sections the riverbanks and hilly slopes are bare erodible limestone and conglomerates (Anonymous, 2017) and the poor vegetation cover (Hasenauer *et al.*, 2022).



Figure 2. Periphyton attached to submerged stones in the Vjosa River is very sparse (*right photo*). Stones are frequently covered by mud (*left photo*), limiting light availability required for algal growth. This is clear evidence of high erosion rates along the Vjosa River and its tributaries, including the Sarandoporo and Langarica rivers. Photos: I. Metani.

However, this process is undoubtedly exacerbated by **inadequate land-use practices and the degradation of riparian vegetation**, shrublands, and forests on the basin slopes, resulting from agriculture, construction, logging, burning, excessive grazing, and related activities. Similar patterns have been documented in previous visit on the Vjosa River, ether in wet and dry seasons (Toska *et al.*, 2025), as well as in our previous investigations of rivers in the Western Lowlands (Miho *et al.*, 2005), the Bovilla basin (Miho *et al.*, 2009), and other areas in Albania. Although some afforestation efforts have been undertaken, they remain insufficient and require stronger institutional and financial support. Ecoalbania has established a small tree nursery in Tepelena to support the restoration of approximately 230 ha of riparian habitats along the Vjosa River, using native tree species such as plane, poplar, alder, and willow.

Worth to note **the healthy and rich marine communities at the Treporti, Zverneci, Vlora, with 26 species noted** (Fig. 1; PLATE III, Figs. 1&2). The presence of submerged *Posidonia oceanica* meadows—an endemic Mediterranean species highly threatened in our Adriatic coast by pollution, riverine sediment inputs, and uncontrolled coastal development—and the high algal diversity, makes this station noteworthy. It is an additional natural

feature, complementing the rocky molasses' bed that contributes to its significance as a natural monument (geomonument). The recent tourist-based interventions in this area, highly opposed by local and international community, cannot in any way be friendly to this virgin part of the LP Pishe-Poro - Narta, but also to the entire Mediterranean (Schwarz, 2024).

The thermal springs of Vromonero and Benja show marked differences in species diversity, with 25 species recorded in Vromonero and only 7 species in Benja (Tab. 1). The Benja springs and the Langarica River—an exceptional Natural Hydromonument and part of the Hotova Fir–Dangellia NP—appear today to have lost much of their natural character, particularly special for such sensitive habitats. In recent years, the ecological quality of the Benja waters has deteriorated from 'good' during 2008–2014 (Miho *et al.*, 2018) to 'poor' in 2022 (Vata, 2024). Recent interventions, including the construction of accommodation facilities with low ecological values, cannot be considered friendly with this fragile ecosystem; tourists frequently bathe in the pools with little care for environmental conservation and, potentially, for their own health.

Moreover, worth to note the **heavily urbanization of the springs**: Cold Water, Tepelena, Poçemi, Kelcyra Waterfall, etc., all elite natural hydromonuments! Even unlimited rafting in the Vjosa, increased evidently in recent years, severely discussed by experts, requires appropriate measures (Miho, 2026). Not to mention the extreme use of drinking water, where the most recent case is that of the Lepusha springs, the Shushica headwater, important tributary of the Vjosa NP; we noted that the water uptake system for the Himara Water Supply System had been completed, although strongly opposed by environmentalists, local residents and the most prominent international institutions.

Worth noting **the presence of solid waste dumped here and there** along the riverbanks, or transported by the river floods, up to the delta area. Beside the ugliness, all these liquid or solid wastes are a source of pollution, with coliforms, heavy metals, microplastics, harmful either to the river life of the Park, but also to human health, as water users (agriculture, livestock, drinking water, etc.).

Recommendations

The Vjosa Basin, the Vjosa River and its tributaries, Drino, Bença and Shushica, and their headwaters and interconnected hydro monuments: Cold

Water, Tepelena; Viroi, Gjirokastra; Vromonero, Leskoviku; Benja, Permeti; the marine habitats of Triporti, Zverneci, the Narta Lagoon; and the wetlands of the LP Pisha Poro – Narta, are oases of biodiversity, and require careful consideration by the respective administrations of these protected areas, by local governments and investors. Balancing nature protection with development in all sectors always remains a challenge for them.

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Table 1. Checklist of noted species after main taxonomic groups, with places where were noted, and conservation state (CS) and/or ecological and corresponding water quality for some aquatic plants after Streble *et al.* (2018).

Scientific name	Place	CS and/or Ecology
Algae s.l.		43
Algae: Charophyta		
<i>Chara</i> sp.	Brook near VRC; Vromonero	os/bms 1-2
<i>Closterium ehrenbergii</i> Meneghini ex Ralfs	Viroi lake; VRC brook	bms 2
<i>Closterium leibleinii</i> Kützing ex Ralfs	Aqueduct, Beņa	bms/ams 2-3
<i>Cosmarium formosulum</i> Hoff	Aqueduct, Beņa	os/bms 1-2
<i>Spirogyra calospora</i> Cleve	Benja	bms 2
<i>Spirogyra inflata</i> (Vaucher) Dumortier	Vromonero	-
<i>Spirogyra</i> sp.	Poçemi springs; VRC brook	os/bms - bms
<i>Spirogyra varians</i> (Hassall) Kützing	Viroi	bms/ams 2-3
Algae: Chlorophyta		
<i>Caulerpa cylindracea</i> Sond.	Treporti, Zverneci (invasive; known as "Mediterranean tumor" and which is a descriptive of <i>Posidonia oceanica</i> sea meadows)	Invasive
<i>Cladophora glomerata</i> (Linnaeus) Kützing	Aqueducti, Beņa; VRC brook	(os/bms –ams) bms 2
<i>Halimeda tuna</i> (J. Ellis & Solander) J. V. Lamouroux	Treporti, Zverneci (indicator of high ecological water quality in the Mediterranean and subtropical regions) (sea coast)	-
<i>Ulothrix zonata</i> (F. Weber & Mohr) Kützing	Aqueducti, Beņa; Poçemi springs; Lelkli	os/bms 1-2
<i>Ulva lactuca</i> Linnaeus (= <i>Ulva fasciata</i> Delile)	Treporti, Zverneci (sea coast)	-
<i>Ulva prolifera</i> O.F. Müller	Treporti, Zverneci (sea coast)	-
Algae: Bacillariophyta		
<i>Cocconeis lineata</i> Ehrenberg	Poçemi springs	-
<i>Cocconeis pediculus</i> Ehrenberg	Poçemi springs	bms 2
<i>Cymbella</i> cf. <i>tumidula</i> Grunow	Vromonero	
<i>Ellerbeckia arenaria</i> (D. Moore ex Ralfs) Dorofeyuk & Kulikovskiy	Poçemi springs; Aqueduct, Beņa	os/bms 1-2
<i>Fragilaria crotonensis</i> Kitton	Poçemi springs	-
<i>Melosira varians</i> C. Agardh	Viroi; Poçemi springs; Aqueduct, Beņa	bms 2
<i>Nitzschia denticula</i> Grunow	Vromonero	-
<i>Stephanocyclus meneghinianus</i> (Kützing) Kulikovskiy, Genkal & Kociolek	Vromonero	bms/ams 2-3
<i>Ulnaria capitata</i> (Ehrenberg) Compère	Poçemi springs	bms 2
<i>Ulnaria ulna</i> (Nitzsch) Compère	Benja; Poçemi springs	bms/ams 2-3
Algae: Phaeophyceae		
<i>Cutleria</i> cf. <i>multifida</i> (Turner) Greville	Treporti, Zverneci (sea coast)	-
<i>Dictyota dichotoma</i> (Desfontaines) J. V. Lamouroux	Treporti, Zverneci (sea coast)	-

Scientific name	Place	CS and/or Ecology
Gongolaria barbata (Stackhouse) Kuntze (=Cystoseira barbata (Stackhouse) C.Agardh)	Treporti, Zverneci (sea coast)	-
Padina pavonica (L.) Thivy	Treporti, Zverneci (sea coast)	-
Algae: Rhodophyceae		
Batrachospermum gelatinosum (Linnaeus) De Candolle	Poçemi springs	os/bms 1-2
Ceramium rubrum C.Agardh	Treporti, Zverneci (sea coast)	-
Ellisolandia elongata (J.Ellis & Solander) K.R.Hind & G.W.Saunders	Treporti, Zverneci (sea coast)	-
Halymenia cf. floresii (Clemente) C.Agardh	Treporti, Zverneci (sea coast)	-
Plocamium sp.	Treporti, Zverneci (sea coast)	-
Rytiphlaea tinctoria (Clemente) C.Agardh	Treporti, Zverneci (sea coast)	-
Sphaerococcus coronopifolius Stackhouse	Treporti, Zverneci (sea coast)	-
Tricleocarpa sp.	Treporti, Zverneci (sea coast)	-
Algae: Xanthophyceae		
Vaucheria geminata (Vaucher) De Candolle	Viroi; Poçemi springs	bms 2
Vaucheria sp.	VRC brook	-
Algae: Cyanophyceae		
Anabaena sp.	Aqueduct, Beņa	-
Nostoc commune Vaucher ex Bornet & Flahault	Viroi river	-
Nostoc sp.	Kordhoce; Poçemi Spring	-
Oscillatoria spp.	Benja; Vromonero; Aqueduct, Beņa	-
Phormidium spp.	Benja	-
Planktothrix spp	Benja	-
Mosses		
4		
Cratoneuron filicinum (Hedw.) Spruce	Cold Water Spring	-
Fontinalis antipyretica Hedw.	Viroi Lake	bms 2
Platyhypnidium riparioides (Hedw.) Dixon (=Rhynchostegium riparioides)	Poçemi springs	G4(Nature Serve)
Ferns		
11		
Adiantum capillus-veneris L.	Cold Water Spring	LC
Anogramma leptophylla (L.) Link	Dragoti	-
Asplenium ceterach L.	Cold Water Spring; Dragoti	LC
Asplenium scolopendrium L.	Cold Water Spring	LC
Asplenium trichomanes L.	Cold Water Spring; Dragoti	-
Trichomanes cuspidatum Willd. (=Didymoglossum cuspidatum (Willd.) Ebihara & Dubuisson)	Cold Water Spring	-
Equisetum sp.	Gjormi, Shushica River	-
Hemionitis acrostica (Balb.) Mosyakin (=Allosorus acrosticus (Balb.) Christenh.)	Cold Water Spring	LC

Scientific name	Place	CS and/or Ecology
<i>Polypodium cf. cambricum</i> L.	Dragoti	LC
<i>Polypodium vulgare</i> L.	Cold Water Spring	LC
<i>Pteridium aquilinum</i> (L.) Kuhn	Cold Water Spring; Lekli; Gjormi	-
Tracheophyta - Eudicots and others		67
<i>Ajuga orientalis</i> L.	Lepusha	-
<i>Angelica archangelica</i> L.	Cold Water	-
<i>Anthyllis hermanniae</i> L.	Treporti, Zverneci	LC
<i>Arabis verna</i> (L.) W.T.Aiton	Lepusha	-
<i>Arbutus andrachne</i> L.	Çarshova	-
<i>Aristolochia rotunda</i> L.	Kordhoca	-
<i>Astragalus monspessulanus</i> L.	Vromonero	LC
<i>Astragalus onobrychis</i> L.	Vromonero	LC
<i>Berula erecta</i> (Huds.) Coville	Cold Water Spring; Viroi	LC os/bms -ams
<i>Carduus nutans</i> L.	Shushica	-
<i>Campanula erinus</i> L.	Kordhoca	-
<i>Cerastium brachypetalum</i> Desp. ex Pers.	Lepusha	-
<i>Cirsium vulgare</i> (Savi) Ten.	Treporti, Zverneci	-
<i>Crepis rubra</i> L.	Viroi Lake	-
<i>Dittrichia viscosa</i> (L.) Greuter	Gjormi	-
<i>Galium murale</i> (L.) All.	Kordhoca	-
<i>Evax pygmaea</i> (L.) Brot. (=Filago pygmaea L.)	Treporti, Zverneci	-
<i>Eryngium creticum</i> Lam.	Kordhoca	-
<i>Euphorbia seguieriana</i> Neck.	Tre Urat	LC
<i>Geranium lucidum</i> L.	Viroi Lake	-
<i>Geranium</i> sp.	Viroi Lake	-
<i>Helichrysum italicum</i> (Roth) G. Don fil.	Dried specimens from street traders in Cold Water and Lekli, Tepelena	-
<i>Helosciadium nodiflorum</i> Lag.	Viroi Lake	LC
<i>Hippocrepis cf. emerus</i> (L.) Lassen	Tre Urat	-
<i>Hypericum olympicum</i> L.	Vromonero	-
<i>Iberis cf. carnosa</i> Willd.	Vromonero	-
<i>Lactuca muralis</i> (L.) Gaertn. (=Mycelis muralis (L.) Dumort.)	Cold Water Spring	-
<i>Legousia hybrida</i> (L.) Delarbre	Lepusha; rare or threatened annual arable weed in parts of its European range, such as Critically Endangered (CR) in Switzerland.	-
<i>Lysimachia atropurpurea</i> L.	Vromonero	-
<i>Lythrum virgatum</i> L.	Lekli	-
<i>Mentha</i> sp.	Viroi Lake; Lepusha	-
<i>Nasturtium officinale</i> W.T.Aiton	Cold Water Spring; Lepusha	LC os/bms 1-2
<i>Odontarrhena obtusifolia</i> (Steven ex DC.) C.A.Mey	Vromonero	-
<i>Onosma arenaria</i> Waldst. & Kit.	Vromonero	-
<i>Origanum vulgare</i> subsp. <i>viridulum</i> (Martrin-Donos) Nyman	Dried specimens from street traders in Cold Water and Lekli, Tepelena	-
<i>Origanum</i> sp.	Vromonero	-

Scientific name	Place	CS and/or Ecology
<i>Orobanche ramosa</i> L.	Aqueduct, Beņa; Permeti Rock	-
<i>Parietaria lusitanica</i> L.	Kordhoca	-
<i>Parietaria officinalis</i> L.	Cold Water Spring; Lepusha	-
<i>Petteria ramentacea</i> (Sieber) C.Presl	Lepusha, Shushica River (Balkan with distribution in northwestern and southwestern parts of Albania, Croatia, Serbia and Kosovo)	LC
<i>Petasites paradoxus</i> (Retz.) Baumg	AD, Beņa	LC
<i>Platanus orientalis</i> L.	Mifoli, Poçemi, Dragoti, Tre Urat, Vjosa River; Lekli, Kordhoca, Drino River; Lepusha & Gjormi, Shushica River	LC
<i>Quercus ilex</i> L.	Zareli, Lepusha	LC
<i>Ranunculus penicillatus</i> (Dumort.) Bab.	Viroi Lake	LC bms/ams 2-3
<i>Ranunculus</i> sp.	Viroi Lake	-
<i>Rubus ulmifolius</i> Schott	Gjormi	-
<i>Rumex hydrolapathum</i> Huds.	Viroi	-
<i>Salix</i> spp.	Mifoli, Poçemi, Dragoti, Tre Urat, Vjosa River; Lekli, Kordhoca, Drino River; Lepusha	-
<i>Saponaria calabrica</i> Guss.	Vromonero	-
<i>Scorzonera lafranchisiana</i> Kit Tan & Vold	Vromonero (rare perennial herb native to Greece and Albania)	-
<i>Scutellaria orientalis</i> L.	Petrani	-
<i>Senecio</i> cf. <i>gallicus</i> Chaix	Lepusha	-
<i>Sideritis raiseri</i> Boiss & Heldr	Dried specimens from street traders in Cold Water and Lekli, Tepelena	En(Al)
<i>Silene graeca</i> Boiss. & Spruner	Gjormi	-
<i>Silybum marianum</i> (L.) Gaertn.	Kordhoca	LC
<i>Symphytum ottomanum</i> Friv.	Cold Water Spring; Lepusha	-
<i>Tamarix</i> sp.	Mifoli, Poçemi, Dragoti, Tre Urat, Vjosa River; Lekli, Kordhoca, Drino River; Lepusha & Gjormi, Shushica River	-
<i>Thalictrum flavum</i> L.	Cold Water	-
<i>Theligonum cynocrambe</i> L.	Kordhoca	-
<i>Thymus longicaulis</i> C. Presl	Lepusha	-
<i>Trigonella corniculata</i> (L.) L.	Fresh specimens from street traders in Cold Water and Lekli, Tepelena	NE
<i>Tussilago farfara</i> L.	Lepusha, Shushica River	-
<i>Umbilicus chloranthus</i> Heldr. & Sart. ex Boiss	Kordhoca	-
<i>Umbilicus rupestris</i> (Salisb.) Dandy	Viroi Lake	-
<i>Verbascum pulverulentum</i> Vill.	Vromonero	-
<i>Veronica anagallis-aquatica</i> L.	Viroi Lake	os/bms 1-2
<i>Veronica arvensis</i> L.	Kordhoca	-
<i>Veronica cymbalaria</i> Bodard	Lepusha	-
Tracheophyta - Monocots		19
<i>Alisma plantago-aquatica</i> L.	Viroi Lake; Cold Water	LC os/bms -ams
<i>Anacamptis laxiflora</i> (Lam.) R.M.	Tre Urat	-

Scientific name	Place	CS and/or Ecology
Bateman, Pridgeon & M.W. Chase		
<i>Arum italicum</i> Mill.	Kordhoca	-
<i>Briza maxima</i> L.	Gjormi	-
<i>Carex cf. riparia</i> Curtis	Lekli	LC
<i>Carex</i> sp.	Kordhoca	-
<i>Cymodocea nodosa</i> (Ucria) Asch.	Treporti, Zverneci	LC
<i>Eleocharis palustris</i> (L.) Roem. & Schult.	Lekli	-
<i>Muscari neglectum</i> Guss. ex Ten. & Sangiov.	Gjormi	-
<i>Ophrys scolopax</i> Cav.	Vromonero	LC
<i>Orchis italica</i> Poir.	Vromonero	CITES
<i>Orchis quadripunctata</i> Cirillo ex Ten.	Lepusha (protected by CITES)	LC
<i>Orchis simia</i> Lam.	Vromonero	LC
<i>Ornithogalum montanum</i> Cirillo	Kordhoca	-
<i>Posidonia oceanica</i> (L.) Delile	Treporti, Zverneci	LC
<i>Scirpoides holoschoenus</i> (L.) Soják	Viroi Lake; Gjormi	-
<i>Serapias vomeracea</i> (Burm.f.) Briq.	Tre Urat	LC
<i>Sternbergia lutea</i> (L.) Ker-Gawl. ex Spreng.	Permeti Rock	CITES
<i>Typha</i> spp.	Viroi Lake; Lekli, Kordhoca, Drino River	bms/ams 2-3
Amphibians		4
<i>Bufo bufo</i> L.	Talpodes: Poçemi & Dragoti; Vjosa River; Lekli, Drino River; Vromonero; Benja	LC
<i>Bufotes viridis</i> Laurenti	Talpodes: Poçemi & Dragoti, Vjosa River; Lekli, Drino River; Vromonero; Benja	LC
<i>Pelophylax kurtmuelleri</i> Gayada	Poçemi & Dragoti & Petrani, Vjosa River; Lekli, Drino River; Viroi lake, Gjirokastra (abundant); Kordhoca, Drino River (plenty, some in amplexus); Vromonero (adults and juveniles); Benja (adults, juveniles and tadpoles); Lepusha, Shushica River	LC bms
<i>Rana graeca</i> Boulenger	Aqueduct, Bença River; Lepusha, Shushica River	LC
Reptiles		4
<i>Emys orbicularis</i> L.	Viroi lake, Gjirokastra; Kordhoca, Drino River (several inds. under the bridge)	NT
<i>Lacerta trilineata</i> Bedriaga	Vromonero springs	LC
<i>Natrix natrix</i> L.	Viroi lake, Gjirokastra; Kordhoca, Drino River	LC
<i>Natrix tessellata</i> Laurenti	Viroi lake, Gjirokastra; Kordhoca, Drino River	LC
Birds		28
<i>Ardea cinerea</i> L.	Treporti, Zverneci	LC
<i>Calidris ferruginea</i> (Pontoppidan, 1763)	Narta Lagoon (dozens)	VU
<i>Cecropis daurica</i> (Laxmann, 1769)	Dragoti, Vjosa River; Kordhoca, Drino River (on fly feeding over the river)	LC
<i>Ciconia ciconia</i> L.	Viroi, Gjirokastra (nest on a high-voltage	LC

Scientific name	Place	CS and/or Ecology
	pole); Kordhoca bridge, feeding along the Drino river,	
<i>Cinclus cinclus</i> L.	Lepusha, Shushica River	LC
<i>Columba livia</i> Gmelin, JF	Dragoti, Vjosa River (3 inds under the bridge); Gjormi, Shushica River (7 inds under the bridge)	LC
<i>Chroicocephalus ridibundus</i> L.	Treporti, Zverneci	LC
<i>Delichon urbicum</i> L.	Mifoli & Poçemi (dozens of nests under the bridge), Vjosa River; Gjormi bridge; Treporti, Zverneci (hundreds on nests)	LC
<i>Egretta garzetta</i> L.	Treporti, Zverneci	LC
<i>Gallinula chloropus</i> L.	Viroi lake, Gjirokastra (5 individualsts)	LC
<i>Himantopus himantopus</i> L.	Narta Lagoon (19 inds)	LC
<i>Hirundo rustica</i> L.	Viroi lake, Gjirokastra (several nests); Kordhoca bridge, Drino River	LC
<i>Circaetus gallicus</i> (Gmelin, JF)	Çarshova	LC
<i>Chroicocephalus genei</i> (Breme, 1839) (Breme, 1839) (=Larus genei)	Narta Lagoon (21 nests)	LC
<i>Larus michahellis</i> Naumann	Poçemi (2 inds on fly) & Dragoti (1 ind on fly), Vjosa River; Clod Water Spring (<i>Larus michahellis</i> (one individual flying along the Drino river); Lekli, Drino River (2 inds on fly); Gjormi, Shushica River	LC
<i>Merops apiaster</i> L.	Mifoli (several on fly) & Poçemi, Vjosa River; Vromonero; Treporti, Zverneci	LC
<i>Motacilla cinerea</i> Tunstall	Lepusha	LC
<i>Passer hispaniolensis</i> Temminck	Mifoli & Poçemi, Vjosa River & Treporti, Zverneci (several stolen nests of <i>D. urbicum</i>)	LC
<i>Pelecanus crispus</i> Bruch	Narta Lagoon (3 inds)	NT(CITES)
<i>Phalacrocorax carbo</i> L.	Narta Lagoon (2 inds)	LC
<i>Phoenicopterus roseus</i> Pallas	Narta Lagoon (about 1200 inds)	LC
<i>Podiceps cristatus</i> L.	Viroi lake, Gjirokastra (6 individuals and 3 nests)	LC
<i>Ptyonoprogne rupestris</i> Scopoli	Aqueduct, Bença River	LC
<i>Recurvirostra avosetta</i> L.	Narta Lagoon (48 inds)	LC
<i>Sterna hirundo</i> L.	Narta Lagoon (3 inds); Dead River, Delisuf (2 inds)	LC
<i>Sternula albifrons</i> Pallas	Narta Lagoon (dozens)	LC
<i>Tachybaptus ruficollis</i> Pallas	Viroi lake, Gjirokastra (11 individualsts)	LC
<i>Thinornis dubius</i> Scopoli (=Charadrius dubius)	Lekli Drino River (2 inds.)	LC
Mammals		4
<i>Lutra lutra</i> L.	Old and fresh spraints: Poçemi (old and fresh), Dragoti, Petrani (old), Tre Urat, Vjosa River; Lekli, Drino River; Gjormi, Shushica River	NT (CITES)
<i>Martes foina</i> Erxleben	Scats and tracks: Dragoti, Vjosa River; Lekli, Drino River; Gjormi, Shushica River	LC

Scientific name	Place	CS and/or Ecology
<i>Vulpes vulpes</i> L.	Scats and tracks: Dragoti, Vjosa River; Lekli, Drino River; Gjormi, Shushica River	LC
Bats	Gjormi, Shushica River (droppings of bats under the old bridge)	-
Total noted species:		184

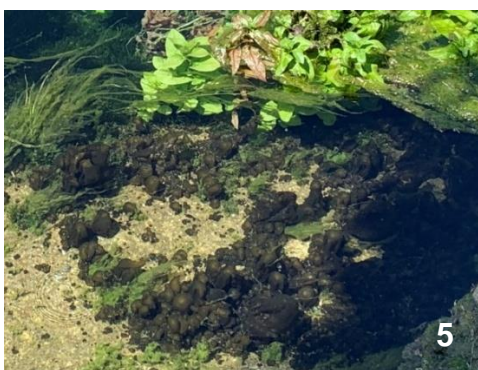
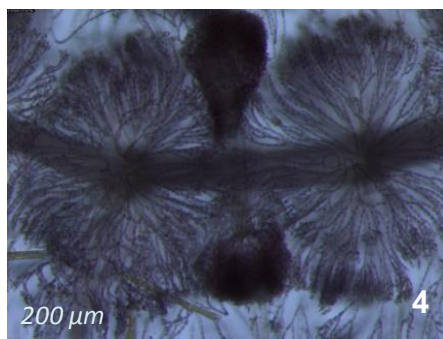
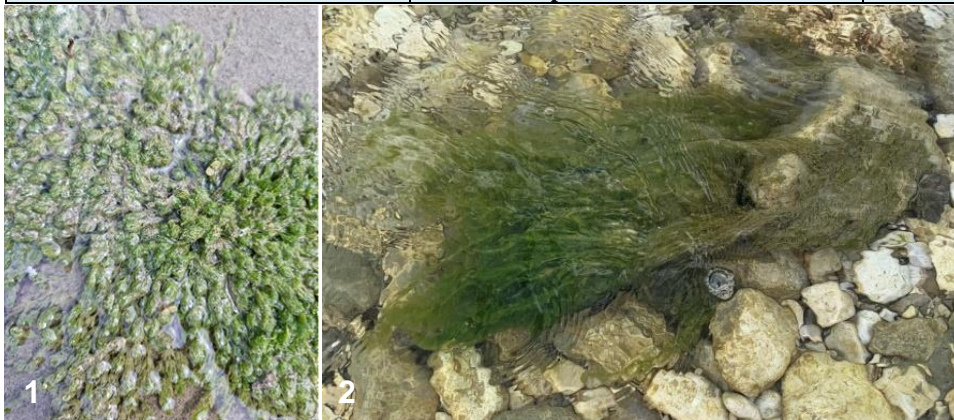


PLATE I. Macroalgae from Vjosa NP: 1, *Chara* sp., Vromonero; 2, *Cladophora glomerata* in Shushica; 3 – 4, *Batrachospermum gelatinosum*; 5 - 6, *Nostoc commune*, Viroi River. Photos: 1, S. Saçaj; 2-6, A. Miho.

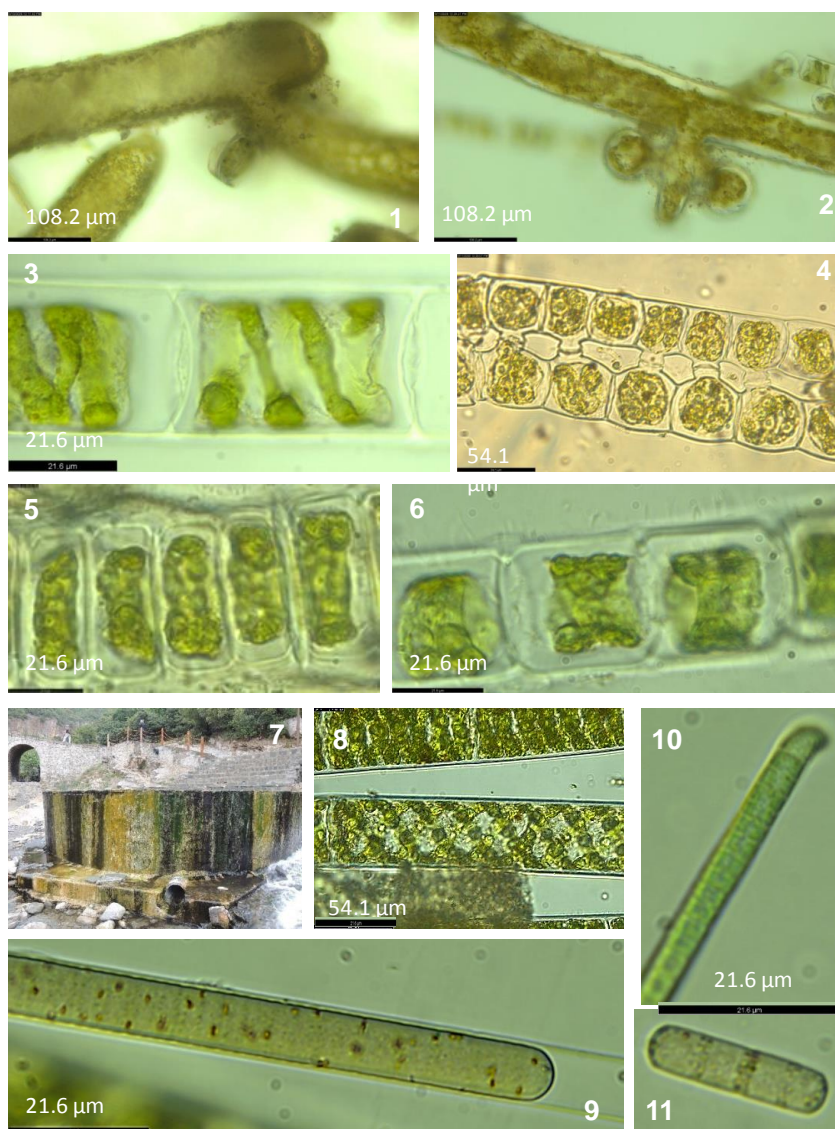


PLATE II. Filamentous algae from Vjosa: 1-2, *Vaucheria geminata*, with sexual reproductive organs, Viroi lake; 3-4, *Spirogyra varians*, during conjugation and zygote formation (4); 5-6, *Ulothrix zonata*, Aqueducti, Bença; 7, Filamentous algae from Big Pond, Benja; 8, *Spirogyra calospora*; 9, *Phormidium* sp.; 10-11, *Oscillatoria* spp., all from Benja. Photos: 7, F. Bego; others A. Miho.



PLATE III. View of the marine habitat with *Posidonia* (1) and algae (2) (*Padina* & *Ulva*), and the rocky molasses' bed, at Triporti, Zverneci, Vlora; 1, *Ceramium rubrum*; 2, *Caulerpa cylindracea*; 3, *Halymenia* cf. *floresii*; 4, *Rytiphlaea tinctoria*. Photos: 2, I. Metani; others from A. Miho &



PLATE IV. Aquatic plants from Vjosa NP: 1, *Adiantum capillus-veneris*, CW; 2, *Asplenium trichomanes*, CW; 3, *Anogramma leptophylla*, Dragoti; 4, *Polypodium cambricum*, Dragoti; 5, *Trichomanes cuspidatum*, CW; 6, *Petasites paradoxus*, Aqueduct, Bença; 7, *Eleocharis palustris*, Lekli; 8, *Carex* cf. *riparia*, Lekli; 9, *Lythrum virgatum*, Lekli; 10, *Nasturtium officinale*; 11, *Angelica archangelica*; 12, *Alisma plantago-aquatica*. Photos: A. Miho.



PLATE V. Aquatic plants from Vjosa NP: 1, *Helosciadium nodiflorum*; 2, *Rumex hydrolapathum*; both from Cold Water springs, Tepelena; 3, *Scirpoides holoschoenus*; 4 & 5, *Ranunculus penicillatus*; all from Viroi Lake, Gjirokastra; 6, *Berula erecta*, Poçemi; 7, *Arbutus andrachne*, Çarshova; 8, *Sternbergia lutea*, Permeti Rock; 9, *Scorzonera lafranchisiana*, Vromonero; 10, *Orobanche ramosa*, AD, Bença; 11, *Onosma arenaria*, Vromonero; 12, *Scutellaria orientalis*, Petrani; 13, *Lysimachia atropurpurea*, Vromonero. Photos: 1-3, 6-7, A. Miho; 8, J. Ele; 9, S. Gasc; 10, F. Bego; 11-13, E. Gjeta.



PLATE VI. Riverscape plants from Vjosa NP: 1, *Orchis simia*; Vromonero; 2, *Orchis italica*, Vromonero; 3, *Anacamptis laxiflora*, Tre Urat; 4, *Ophrys scolopax*, Vromonero; 5, *Serapias vomeracea*, Tre Urat. Photos: 1, A. Miho; 2, E. Xhaferaj; 4, E. Gjeta; 3 & 5, F. Bego.



PLATE VII. Amphibians, reptiles and birds from Vjosa: 1, juvenile of *Bufo viridis*, Langarica; 2, *Rana graeca*, AD, Bença; 3, *Pelophylax kurtmuelleri*, Lepusha; 4, *Emys orbicularis*, Kordhoca; 5, *Lacerta trilineata*, Vromonero; 6, Talpodes of *Bufo bufo*, Lekli; 7, *Himantopus himantopus*, & 8, *H. himantopus* & *Recurvirostra avosetta*; 9, *Egretta garzetta*, from Skrofotina Saline; 10, colony of *Chroicocephalus genei*, Narta Lagoon. Photos: 5, Ecoalbania; others F. Bego.



PLATES VIII. Birds and mammals from Vjosa: 1 - 3, *Ciconia ciconia*, Viroi (1), Kordhoca (2), Gjirokastra (3), Drino River; 4, *Podiceps cristatus*, Viroi lake; 5, *Motacilla cinera*, Lepusha, Shushica River; 6, *Charadrius dubius*, Lekli; 7, *Columba livia*, Gjormi, Shushica River; 8, *Delichon urbicum*, & 9, *Passer hispaniolensis*, Zverneci Hydrometric Station; 9, *Hirundo rustica*, Viroi lake; 10, *Delichon urbicum*, Mifoli bridge; 11, Otter spraints, Gjormi, Shushica River. Photos: 1, G. Gjiniija; others F. Bego.