

Contribution to the distribution of rare or largely overlooked vascular plants in southern Albania

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In the course of vegetation studies in the Vjosa catchment in southern Albania in the years 2017 to 2023, a number of taxa previously unknown or insufficiently known from the area were found. In this paper, the following taxa are presented in alphabetical order: *Acanthus hungaricus*, *Balkana spargulifolia*, *Biarum tenuifolium*, *Carex flacca* subsp. *serrulata*, *Cyperus flavescens*, *Fimbristylis bisumbellata*, *Periploca graeca*, *Salsola tragus* subsp. *tragus* und *Typha minima*. Their distribution in southern Albania, habitat requirements and protection status are discussed.

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Im Zuge von vegetationskundlichen Untersuchungen im Einzugsgebiet der Vjosa in Südalbanien in den Jahren 2017 bis 2023 wurde eine Reihe von bisher aus dem Gebiet nicht oder nur unzureichend bekannter Taxa gefunden. Im Rahmen dieser Arbeit werden folgende Taxa in alphabetischer Reihenfolge vorgestellt: *Acanthus balcanicus*, *Balkana spargulifolia*, *Biarum tenuifolium*, *Carex flacca* subsp. *serrulata*, *Cyperus flavescens*, *Fimbristylis bisumbellata*, *Periploca graeca*, *Salsola tragus* subsp. *tragus* und *Typha minima*. Ihre Verbreitung in Süd-Albanien, Standortsansprüche und der Schutzstatus werden behandelt.

Keywords: Southern Albania, Vjosa catchment, IUCN Red List, distribution pattern, flora.

Introduction

The basis of floristic geobotany in Albania are the works of Baldacci (1917), Hayek (1924–1933), and Markgraf (1931, 1932). In the meantime a large number of papers dealing at least partly with the flora of southern Albania have been published. For more detailed information on the floristic exploration of Albania especially in the 20th century see Barina (2017).

Several field trips since 2017 as part of Science weeks and the VjoSusDev project (“Environmental assessment of the Vjosa riverscape as the basis for an integrated water management and sustainable catchment development”) have provided new data from previously little-explored parts of southern Albania.

The aim of this work is to bridge the existing gaps compared to Barina (2017) in the distribution patterns of several taxa of southern Albania.

Material and Methods

The Vjosa catchment with a total area of 6704 km² is situated in southern Albania and adjacent northern Greece. The Greek part (2339 km²) comprises the greatest part of Sarantaporos, the uppermost stretch of Vjosa (Greek: Aoos) and a smaller part of the Drinos catchment (Fig. 1). Several excursions were carried out between April and September in the years 2017 to 2023 and more than 180 vegetation surveys (relevés) were performed using the Braun-Blanquet approach (Mueller-Dombois & Ellenberg 2002). This should provide the opportunity to observe species in their habitat at all times of the year.

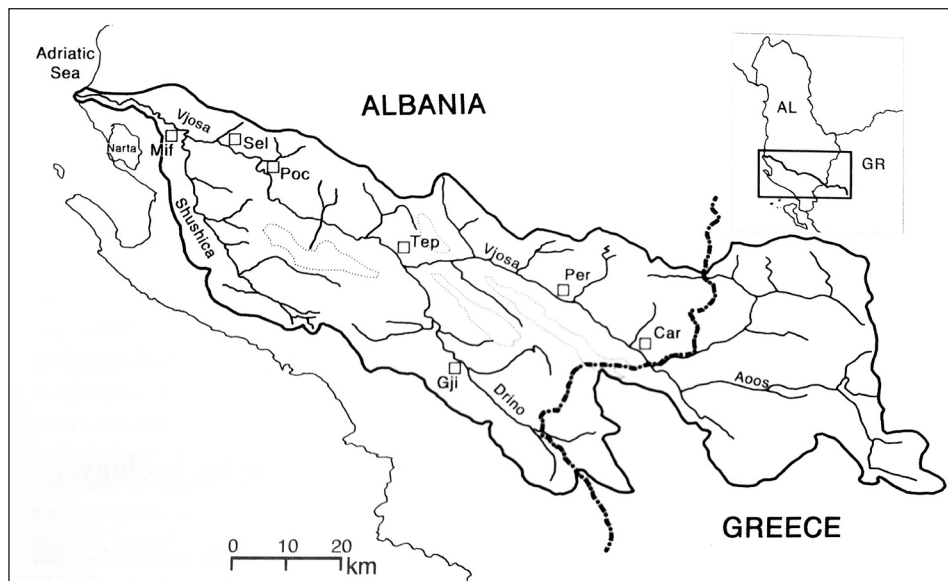


Fig. 1: Catchment of the Vjosa-Aoos river. Dotted lines in the Albanian part indicate the major mountain ranges. Abbreviations of settlements: Car (Çarshova), Gji (Gjirokastra), Mif (Mifoli), Per (Permet), Poc (Poçëm), Sel (Selenica), Tep (Tepelena). (From Schiemer et al. 2018). – Abb. 1: Einzugsgebiet der Vjosa (Aoos). Punktierte Linien markieren die wichtigsten Gebirgsmassive. Abkürzungen für die Siedlungen: Car (Çarshova), Gji (Gjirokastra), Mif (Mifoli), Per (Permet), Poc (Poçëm), Sel (Selenica), Tep (Tepelena). (Aus Schiemer et al. 2018).

In the present work, only our own observations and collections are considered, which are summarised in a list at the beginning of the discussion of each species. This list contains not only the data of the findings but also the collectors or photo authors and identifiers. The only exception is *Typha minima*. Here, the findings in Fontes et al. (2019) are also used for the representation in the distribution map in order to obtain a well-rounded visualisation.

For the identification of species, we consulted Flora Europaea (Tutin et al. 1968–1980; Tutin et al. 1993), the Illustrated Flora of Albania (Pils 2016, Pils 2024), for particular families we used special literature such as Delforge (2001) (*Orchidaceae*), Krendl (2014) (*Rubiaceae*), Tomasello (2028) (*Xanthium*), Kadereit et al. (2005) (*Salsola*). As a taxonomic-nomenclatural reference we used the Euro+Med Plant Base (Euro+Med 2006+). Unless otherwise stated, collected material is deposited in the private herbaria of A. Drescher and M. Meço. Acronyms of herbaria follow Index Herbariorum (2024).

Results

Acanthus hungaricus (Acanthaceae, Fig. 2, 5)

Përmet district: Rock crevices of the Langarica canyon (40°14'43.6"N, 20°26'16.9"E; 320 m a.s.l.) (phot. 16 August 2023, M. Meço). The rock crevices are very smooth with very little vegetation dominated by some rare plant species found in these crevices such as, *Asperula chlorantha*, *Lilium martagon* and *Stachys annua*.

Acanthus greuterianus, *A. hungaricus* and *A. spinosus* are the only three representatives of the family in Albania (Pils 2016, 2024).

The distribution area of the species is the Balkan Peninsula, extending to SW Romania and Croatia. It is introduced in Belgium, Germany and the Czech Republic (Tan et al., 2023). In Albania it is more present in the north-northeast of the country. It is found on limestone, in the mountain rocks, in rocky grasslands, scrub, rarely in xerophytic forests. In the Vjosa catchment it is reported by Barina (2017) as *A. balcanicus* in mountain areas of Gjirokastër and Përmet districts, close to the border with Greece.



Fig. 2: *Acanthus hungaricus*, on the rock crevices of Langarica canyon, Përmet district (phot. Marjol Meço, 16 August 2023). – Abb. 2: *Acanthus hungaricus*, in der Felswand der Langarica Schlucht, Përmet District (phot. Marjol Meço, 16. August 2023).

Balkana spergulifolia (Caryophyllaceae, Fig. 5)

Sarantaporos: Partly sand-covered gravel ridge in the flood plain of the Sarantaporos river, 40°04'57.8"N, 20°36'54.3"E; 355 m a.s.l. Scattered pioneer vegetation with low shrubs of *Populus nigra*, *Ononis spinosa* and temporarily drought-tolerant annual herbaceous species or perennials such as *Medicago coronata*, *Heliotropium europaeum*, *Tragus racemosus*, *Xanthium orientale*, *Asperula aristata*, *Cynodon dactylon*, *Gelasia doriae* and *Sanguisorba minor*. Leg. A. Drescher, 16 September 2017, Hb. Drescher.

The endemic species of the Balkan is found in Albania, Serbia, Kosovo, Bosnia-Herzegovina and North-Macedonia (Vangjeli 2015; Pils 2016 as *Gypsophila* s.; https://www.gbif.org/occurrence/search?taxon_key=9921141; as *G. s* as well on serpentine soils or on limestone, see www.gbif.org and JACQ: <https://mjb.jacq.org/MJG012040>; <https://w.jacq.org/W20120005455>; <https://gzj.jacq.org/GZU000293851> and <https://w.jacq.org/W0244580>). In Barina (2017: 196), the species is reported from the mountains of Albania as *Gypsophila spergulifolia*, "...more frequent from the northern parts". In the Vjosa catchment only one record from the southeast is indicated in the distribution map.



The species is found more frequently on serpentine rocks than on calcareous substrates. The ephemeral occurrence in the partly sand-covered coarse gravel of the Sarantaporos seems to be the exception rather than the rule. The small seeds of the boleochorous clade may have been blown directly into the flood zone by the gusts of wind – but may also have been transported some distance by the water.

Due to their verticillate phyllotaxi, their distinctly swollen connate leaf bases and seed features, Madhani et Zarre placed *Gypsophila spergulifolia* in the new genus *Balkana* (Madhani et al. 2018).

Biarum tenuifolium (Araceae, Fig. 3, 5)

Vasjar: Along a path through dry grassland, next to the road of Vas-

Fig. 3: *Biarum tenuifolium* found in the dry grasslands of the Vasjar hill (phot. M. Meço, 26 September 2023). – Abb. 3: *Biarum tenuifolium* am Fundort in den Trockenrasen der Vasjar Hügel (phot. M. Meço, 26. September 2023).

jar village, Tepelena (40°21'25.1"N, 19°56'15.9"E; 145 m a.s.l.) (phot. 26 September 2023, M. Meço). Disturbed area with little vegetation. Dominant species are: *Achnatherum bromoides*, *Phlomis fruticosa*, *Euphorbia chamaesyce*, *Dactylis glomerata*, *Medicago minima*, etc.

According to Boyce & Athanasiou (1991) *B. tenuifolium* is one of the 20 species of the genus *Biarum*. This genus is occurring from Portugal to Iran and from ex-Yugoslavia to Jordan. The discrete centres of diversity of the *B. tenuifolium* complex are the Afro-Iberian Mediterranean region and the East Mediterranean, mainly in the Balkans. The authors reported three subspecies and two varieties of *Biarum tenuifolium* known from the Balkans: subsp. *abbreviatum*, subsp. *idomenaeum* and subsp. *tenuifolium* with two varieties: var. *tenuifolium* and var. *zeleborii*. Pils (2016) reported *Biarum tenuifolium* subsp. *tenuifolium* from Albania. According to the Euro+Med Plant Base (Euro+Med 2006+) the species is found in Bosnia-Herzegovina, Croatia, Greece, Italy, North Macedonia and Turkey (Asiatic part). In Albania it occurs very sporadically, with only a few records. It is found in dry grasslands, at altitudes between 50 and 1400 m above sea level. The Konispol district is the only Albanian region where this species is known. From the Vjosa catchment an unconfirmed record in the Përmet area, close to the border with Greece, was reported (Barina 2017).

Carex flacca* subsp. *serrulata (Cyperaceae, Fig. 4, 5)

Selenice: NE-exposed lower slope on the orographic left river bank of the Vjosa river (40°32'54.9"N, 19°35'46.2"E; 57 m a.s.l.; relevé no. 168, 17 April 2023, A. Drescher, unpublished). Scrub dominated by *Quercus coccifera* and scattered *Acer campestre*. The species rich field layer is characterized by a mixture of evergreen and deciduous woody species like *Cistus creticus*, *Spartium junceum*, *Rosa sempervirens*, *Crataegus monogyna*, *Phillyrea latifolia*, *Hippocrepis emerus* subsp. *emeroides* and others.

Kutë: Lower terrace of the Vjosa floodplain southwest of Kutë, orographic left river bank (40°26'10.2"N, 19°45'01"E; 55 m a.s.l.; 24 April 2017, leg et det. A. Drescher GZU000337147). Lowest terrace at a distance of approx. 500 metres from the main channel with dry conditions and *Teucrium polium*, *Bellis annua*, *Micromeria juliana*, *Achillea coarctata*, *Aira caryophylla*, *Plantago lagopus*, *Bombycilaena erecta* and others.

Tepelenë: Gravel ridge in the floodplain of the Vjosa river (40°17'05.9"N, 20°02'03.1"E; 126 m a.s.l.; relevé no. 117, 26 June 2022, A. Drescher, unpublished). Open gravel site with species-rich (more than 50 species per 100 square meters) herbaceous vegetation and individual shrubs such as *Paliurus spina-christi* and *Populus x canadensis*.

Gjorm: Lowest terrace of the river Shushica on the orographic left bank, south of the new road bridge approx. 1.8 km N Gjorm (40°20'01.3"N, 19°38'38.8"E; 119 m a.s.l.; phot. A. Drescher, 30 May 2021); shrubland with dominating *Rubus sanctus*, furthermore *Phlomis fruticosa*, *Crataegus monogyna*, *Dasyphyrum villosum*, *Vicia villosa*, *Lathyrus aphaca*, *Anchusella cretica* and others.

Hundëkuq: Lower slope approx. 2 km northwest of Hundëkuq (40°12'06.2"N, 20°05'21.5"E; 195 m a.s.l.; relevé no. 152, 13 April 2023, A. Drescher & Ella Brugger-Schiefermüller, unpublished). Grazed, open and species rich macchia with single trees of *Quercus trojana* and *Pyrus eleagrifolia*, in the shrub layer *Paliurus spina-christi*, *Phlomis fruticosa* and a species rich heavily browsed herb layer.

Sarantaporos: Orographic right bank of the Sarantaporos river (40°05'01"N, 20°36'59"E; 356 m a.s.l.; relevé no. 56, 16 September 2017, A. Drescher, unpublished). Mixed forest with *Quercus cerris* in the upper tree layer and *Platanus orientalis*, *Carpinus orientalis*, *Fraxinus ornus* and *Populus nigra* in the understorey. The stand is situated on a river terrace about 1.5 to 3 meters above the summer water level. At least during highwater periods the root system of the trees is in contact with ground water.



Fig. 4: *Carex flacca* subsp. *serrulata*. Shushica floodplain approx. 1.8 km north of Gjorm (phot. A. Drescher, 30 May 2021). – Abb. 4: *Carex flacca* subsp. *serrulata*. Shushica Aue ca 1,8 km nördlich von Gjorm (phot. A. Drescher, 30. Mai 2021).

The distribution of *Carex flacca* is given in Barina (2017) as “common throughout the country” up to 2100 metres a.s.l. in various types of grasslands, scrubland and olive groves, oak woodlands. Unfortunately, the authors do not differentiate between subspecies, which is why this information is of limited value. In addition to subsp. *flacca*, which is widespread in Europe, subsp. *serrulata* is listed in the Euro+Med Plant Base but as subsp. *erythrostachys* in POWO (2023). Pils (2016) distinguishes three subspecies: subsp. *flacca*, subsp. *erythrostachys* and subsp. *serrulata*. The distinguishing features between the two latter subspecies, such as bracts about as long or longer than the erect or erecto-patent utricles, the latter with a denticulate arista, are consistent with subsp. *serrulata* (Pils 2016). The altitudinal distribution “Mediterranean to sub-Mediterranean” as opposed to “montane to sub-alpine” of *erythrostachys* (Pils 2016) is also consistent with our determination. The native range of the subspecies *serrulata* is around the Mediterranean (except the central Balkan states of Serbia, Kosovo and North Macedonia, Egypt and the Arab peninsula) to Pakistan. The rhizomatous geophyte (POWO 2023) is growing outside the floodplain on lower slopes or on river terraces in mixed deciduous forests.



Fig. 5: Dot map of new findings of *Acanthus hungaricus*, *Balkana spargulifolia*, *Biarum tenuifolium* and *Carex flacca* subsp. *serrulata*. – Abb. 5: Punktverbreitungskarte der neuen Funde von *Acanthus hungaricus*, *Balkana spargulifolia*, *Biarum tenuifolium* und *Carex flacca* subsp. *serrulata*.

Cyperus flavescent (Cyperaceae, Fig. 6)

Tepelenë: orographic left bank of the Vjosa river. Slowly intermittently flowing shallow water channel at the outer edge of the flood plain, together with *Fimbristylis bisumbellata*, *Cyperus fuscus*, *Eleocharis palustris*, *Crypsis alopecuroides*, *Veronica anagallis-aquatica*, *Helosciadium nodiflorum* and seedlings of *Salix amplexicaulis*. Leg. et det. A. Drescher, 16 September 2017. (Hb. Drescher).

The genus *Cyperus* comprises approx. 600 perennial or annual species of pantemperate and tropical distribution (Tucker et al. 2002).

The therophyte *C. flavescent*, with a basal rosette of keeled leaves, colonises very moist sites where the water level is subjected to strong fluctuations (see fig. 5). The species is a weak competitor and tolerant of disturbance. While *C. flavescent* is classified as “LC” (least concern) for the territory of the European Union as a whole, it is considered “VU” (vulnerable) in some regions, e.g. in Croatia (IUCN 2023: <https://www.iucnredlist.org/species/157979/5179639>). Barina (2017) considers it “not rare in the whole country”, but the distribution map (Barina 2017) shows only two localities: one in the Vjosa Delta, a second in the lower reaches downstream of the Shushica confluence. The site near Tepelenë from September 2017 no longer exists after a flood event.

Fimbristylis bisumbellata (Cyperaceae, Fig. 6)

Tepelenë: orographic left bank of Vjosa the river. Slowly intermittently flowing shallow water channel at the outer edge of the flood plain, together with *Cyperus flavescent*, *Cype-*

rus fuscus, *Eleocharis palustris*, *Crypsis alopecuroides*, *Veronica anagallis-aquatica*, *Helosciadium nodiflorum* and seedlings of *Salix amplexicaulis*. Leg. et det. A. Drescher, 16 September 2017 (Hb. Drescher).

The annual species is widespread in large parts of the Old-World tropics and subtropics along riverbanks, on sandy wet places (see map in POWO 2023). In Europe it occurs in the Mediterranean countries north to Romania, Switzerland and Ukraine (IUCN 2023, Euro+Med 2006+). Barina (2017) reports it from localities “mainly near the sea and in the lowlands”. The ephemeral site near Tepelenë disappeared in the meantime after a flood event. With its ruderal strategy, this low-competitive species can make optimum use of open sites with an unfavourable water regime. Seed dispersal by the wind fits in well with this strategy. According to the IUCN (2023), the species is protected in the Provence-Alpes-Cote d’Azur region, in Croatia and Serbia it is classified as critically endangered (CR) (Nikolić & Topić 2005; Stevanović 1999). Following IUCN (2023) the population development is stable, in some countries the species is in decline due to the loss of suitable habitats and/or the decrease in rice cultivation.

Periploca graeca (Apocynaceae, Fig. 6)

Dellenjë: Vjosa Delta, orographic left bank of the river (40°39'24"N, 19°22'44.5"E; 1 m a.s.l., 1 June 2021, relevé no. 108, A. Drescher, unpublished). *Ulmus minor* relic forest with climbing species such as *Periploca graeca*, *Clematis vitalba*, *Hedera helix*, *Dioscorea communis*, *Rubia perigrina*, *Calystegia sepium* and a species poor herb layer.

Novosele: Vjosa estuary, orographic right bank of the river (40°38'11.6"N, 19°28'01.9"E; 3 m a.s.l.; relevé no. 112, 4 June 2021, A. Drescher, unpublished). *Populus alba*-*Salix alba*-forest with understorey of dominant *Cornus sanguinea* and *Rubus sanctus*, in canopy gaps dense cover of *Agrostis* spec.

Poçëm: Foot of a slope (40°30'33"N, 19°44'11"E; 45 m a.s.l.; relevé no. 71, 22 September 2017, A. Drescher, unpublished). Freshwater spring with *Alnus glutinosa* coppice with lianas such as *Hedera helix*, *Solanum dulcamara* and moisture indicators like *Carex remota*, *Helosciadium nodiflorum*, *Equisetum telmateia* and *Iris pseudacorus*.

Humelice: orographic left bank of the river Drinos (40°10'15"N, 20°05'00"E; 172 m a.s.l.; rel. no. 160, 14 April 2023, A. Drescher, unpublished). *Salix alba*-*Alnus glutinosa*-*Platanus orientalis* wood with *Crataegus monogyna*, *Ligustrum vulgare*, *Prunus spinosa*, *Vitis* spec. and seedlings of other woody species like *Ulmus minor* and *Quercus robur*.

Sarantaporos: Orographic right bank of the Sarantaporos river (40°05'01"N, 20°36'59"E; 356 m a.s.l.; relevé no. 56, 16 September 2017, A. Drescher, unpublished). Mixed forest with *Quercus cerris* in the upper tree layer and *Platanus orientalis*, *Carpinus orientalis*, *Fraxinus ornus* and *Populus nigra* in the understorey. The stand is situated on a river terrace about 1.5 to 3 meters above the summer water level. At least during highwater periods the root system of the trees is in contact with ground water.

Periploca graeca is a deciduous woody climber with stems up to 12 meters. It grows in any fertile soils in woods, thickets and river-banks under rather sunny conditions. The distribution area covers the entire Balkan Peninsula up to the Danube Delta in the northeast with the exception of Bosnia-Herzegovina, Serbia, Kosovo and North Macedonia. The East Aegean islands form the bridge to the western Asian occurrences in Turkey, Armenia, Israel, Palestine, Jordan, Lebanon and Syria. It is cultivated in Crimea and introduced in



Fig. 6: Dot map of new findings of *Cyperus flavescent*, *Fimbristylis bisumbellata* and *Periploca graeca*. – Abb. 6: Punktverbreitungskarte der neuen Funde von *Cyperus flavescent*, *Fimbristylis bisumbellata* und *Periploca graeca*.

Algeria, Spain, France and other countries (Euro+Med Plant Base). In Albania the species is found frequently along the Adriatic coast and around Lake Shkodra. It is reported sporadically elsewhere in swamp woodlands, marshes, scrub, pine forests and along the riverine forest riverbeds (Barina 2017). Along the Vjosa River and its catchment this species has not been reported yet. We found *P. graeca* in the Vjosa catchment from the Delta up to the Greek border at approx. 350 m a.s.l. in different woodland communities and their edges (see collection data and Fig. 6).

Salsola tragus* subsp. *tragus (Chenopodiaceae, Fig. 7, 8)

Mifol bridge: On the sand deposits along the active channel of the Vjosa River, under the Mifol bridge (40° 38'4.8"N, 19°27'43.6"E; 4 m a.s.l.). *Xanthium orientale* is the dominant accompanying species. The shrub vegetation around is dominated by *Tamarix parviflora* mixed with *Imperata cylindrica* and *Tripidium ravennae*.

Luftinjë bridge: On the gravel river bed along the active channel of the Luftinjë river, close to the meeting point with the Vjosa river (40°20'56.2"N, 19°57'35.2"E; 100 m a.s.l.) (phot. 20 September 2022, M. Meço). The dominant accompanying species are *Xanthium orientale*, *Dittrichia viscosa*, *Tragus racemosus* and *Tamarix parviflora*.

Tepelenë: Gravel river bed of Vjosa the river, next to the waste deposit site of Tepelena town. (40°18'47.51"N, 20°1'23.05"E; 121 m a.s.l.; leg. 21 September 2022, M. Meço Hb. Meço). The accompanying species are: *Dittrichia graveolens*, *Dittrichia viscosa*, *Xanthium*

orientale, *Verbascum sinuatum*, *Verbena officinalis*, *Tamarix parviflora*, and seedlings of *Platanus orientalis*.

The taxon belongs to *Salsola kali* s.l. (Kadereit et al. 2005, Mosyakin 2017). It is annual and grows primarily in the temperate biome. In Albania it is reported from the Buna River Protected Landscape, NW of the country, as *Salsola kali* subsp. *tragus* by Fanelli et al. (2015). In the Checklist of vascular plants of Albania, it is reported as “occurrence not proven (unvouchered)” (Barina et al. 2018). Barina et al. (2017) reported *Salsola kali* as a species frequent along the Adriatic coast, and in the Prespa area, SE Albania. The records along the Vjosa River and probably the findings from the Prespa area are *Salsola tragus* subsp. *tragus*, a taxon also known from east-central Greece (Flora of Greece web: https://portal.cybertaxonomy.org/flora-greece/cdm_dataportal/taxon/751aeae5-34cb-4e1d-860e-9bdf8b79dba3/synonymy?highlight=87bcab12-1609-440b-9faa-c9257040ed77&acceptedFor=87bcab12-1609-440b-9faa-c9257040ed77#87bcab12-1609-440b-9faa-c9257040ed77). It also is occupying a different ecological niche than the coastal halophyte *Salsola kali* subsp. *kali* (Kadereit et al. 2005; Mosyakin 2017).



Fig. 7: *Salsola tragus* subsp. *tragus* found in the Vjosa riverbed, Luftinjë bridge (phot. M. Meço, 20 September 2022). – Abb. 7: *Salsola tragus* subsp. *tragus* im Flussbett der Vjosa, Brücke bei Luftinjë (phot. M. Meço, 20. September 2022).

Typha minima Funck ex Hoppe (Typhaceae, Fig. 8)

Poçem: orographic right bank of the Pevla rivulet (40°30'52.8"N, 19°44'24.6"E; 41 m a.s.l.; relevé no. 95, 14 May 2019, A. Drescher, unpublished). Sandy shallow bank with a thin layer of coarse sand. Dominant stand of *Typha minima* with *Agrostis stolonifera*, *Mentha*

longifolia, *Galega officinalis*, *Erigeron canadensis*, *Lythrum salicaria* and others. Population size: 100–500 individuals.

Poçem: orographic right bank of the Pevla rivulet (40°30'52"N, 19°44'3"E; 41 m a.s.l.; relevé no. 96, 14 May 2019, Drescher, unpublished). Sandy shallow bank with a thin layer of coarse sand. Dominant stand of *Typha minima* with *Lythrum salicaria*, *Vicia sativa*, *Juncus acutus* and seedlings of *Salix alba* and *Platanus orientalis*. Population size: 100–500 individuals.

Kutë: orographic right bank of the Vjosa river, outer edge of the active channel at the confluence of a slowly flowing side arm (40°28'40.7"N, 19°45'12.6"E; 49 m a.s.l.; relevé no. 12, 26 April 2017, A. Drescher, unpublished). Sandy shallow bank with patchy scrub of *Salix triandra*, *Salix alba*, *Tamarix parviflora*, *Populus alba*, *Platanus orientalis*, together with *Imperata cylindrica*, *Xanthium orientale*, *Equisetum ramosissimum*, *Dittrichia viscosa* and others. Population size: 50–100 individuals.

Kutë: orographic right bank of the Vjosa river (observation data see Fontes et al. 2019). Population size: 500–1000.

Kutë: orographic right bank of the Vjosa river (observation data see Fontes et al. 2019). Population size: 50–100.

Qesarat: orographic right bank of the Vjosa river (observation data see Fontes et al. 2019). Population size: 500–1000.

Vasjar area: orographic right bank of the Vjosa river (observation data see Fontes et al. 2019). Population size: > 1000.

Tepelenë: orographic right bank of the Vjosa southeast of Tepelena town (40°17'25.3"N, 20°02'23.1"E; 126 m a.s.l.; relevé no. 123, 29 June 2022, A. Drescher, unpublished). Sandy-silty sediment, flooded only at high waters. Scattered shrub vegetation with *Salix amplexicaulis*, *Salix triandra*, *Tamarix parviflora*, herb layer with *Schoenoplectus triqueter*, *Tripidium ravennae*, *Panicum repens*, *Xanthium orientale*, *Euphorbia prostrata*, *Tragus racemosus* and others.

Sarantaporos: Orographic right bank of the Sarantaporos river (40°04'58"N, 20°36'54"E; 355 m a.s.l.; relevé no. 53, 16 September 2017, A. Drescher, unpublished). Shallow depression at the outer edge of the floodplain with sandy sediment. Pioneer vegetation with dominant *Typha minima*, also *Populus nigra* and other herbaceous species such as *Equisetum ramosissimum*, *Elytrigia* spec., *Xanthium orientale*, *Typha angustifolia*.

The smallest of the five Albanian *Typha* species (Pils 2016) is listed under Appendix I of the Bern Convention as well as in the most recent IUCN Red List of endangered species. Globally it is assessed as least concern (LC), for Europe as data deficient (DD) with the need for reassessment. According the Albanian Red List (VKM 2013) *Typha minima* is assessed with conservation status CR C1. In the last version of Albanian Red List which was updated in 2020 (and is expected to be approved by the Decision of the Ministers' Council), the conservation status VU A3C is proposed for this species as several more locations have become known since 2013 and it is no longer considered so rare (unpublished data).

The species' range extends from NE China and Russia via Mongolia, Kazakhstan, Kyrgyzstan, Tajikistan, Uzbekistan, Turkmenistan, Afghanistan, Pakistan, the Caucasus region, Ukraine to the Western Alps and the Mediterranean region (Jaunautre et al., 2016).

According to Meusel et al. (1965), the pre-Alpine (sub)meridional-continental-Eurasian flora element is strongly disjunct in Europe. Here it is considered extinct in several countries, such as Hungary, Liechtenstein and the Czech Republic. In Austria, Croatia and Germany it is reported as critically endangered, in Switzerland (Galeuchet & Holderegger 2005), Serbia and Greece as endangered, although it is known only from one locality (Yannitsaros & Vassiliades 2003, IUCN 2023).

A series of studies from Switzerland and Germany report on the sharp decline in occurrence after the regulation measures on many rivers, beginning at the end of the 19th century. Herbarium and literature studies in the course of several projects along the Danube show that the species was also widespread in Austria before the regulations and power plant constructions on all larger rivers in the Alps and the foreland (Drescher unpubl.). For this reason, reintroduction campaigns were launched in several countries in the wider Central European region as early as the 1990s (e.g. Baur et al. 2015; Egger et al. 2023; Jaunautre et al. 2016; Werner 1998).

Typha minima was reported as new for Albania from the Devolli river in 2010 (Mullaj & Tan 2010). In Barina (2017) several additional findings are given from central Albania, along the Erzen and Shkumbin rivers catchments. During several excursions between 2017 and 2022 several new localities have been found (see distribution map, figure 8).

This light-demanding species is restricted to the banks of fast-flowing rivers and shallow water zones of (temporary) water bodies with sandy to coarse-sandy substrate. It requires moist conditions for germination, such as those found shortly after floods retreat. If the

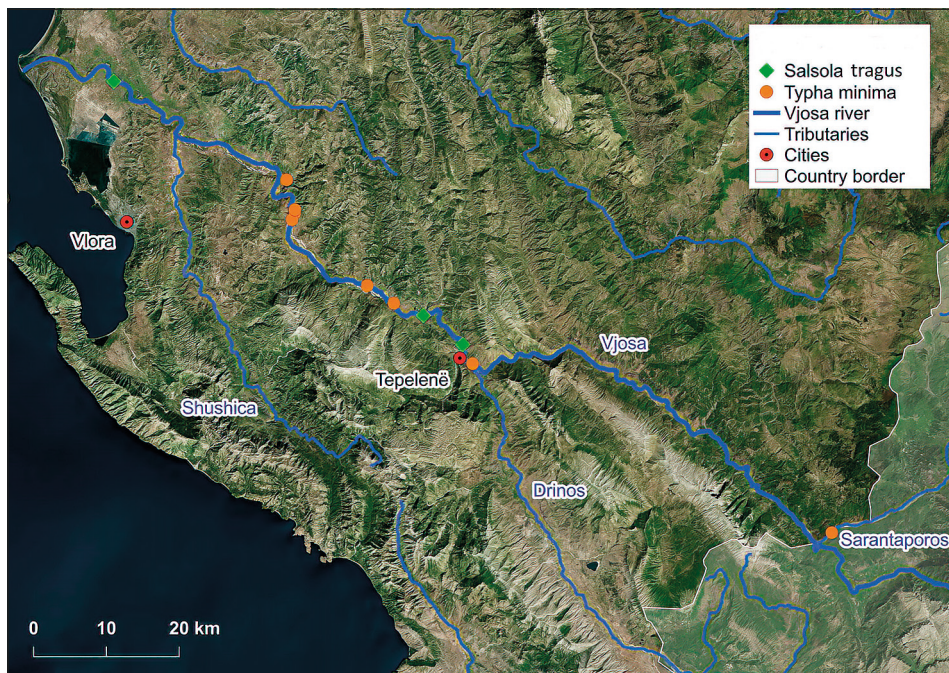


Fig. 8: Dot map of *Salsola tragus* subsp. *tragus* and *Typha minima*. – Abb. 8: Punktverbreitungskarte von *Salsola tragus* subsp. *tragus* und *Typha minima*.

high hydromorphological dynamics are lost due to canalisation and power plant construction, existing stands are also darkened by the shading of woody species. This explains the difficulties in reintroduction (Baur et al. 2015; Egger et al. 2023; Jaunautre et al. 2016; Werner 1998) and, above all, conservation.

Discussion and Conclusions

In the years 2017 to 2023, characteristic valley sections in the Vjosa catchment, which covers over 6700 km², were investigated as part of the VJoSusDev research project. While documenting the biodiversity of these delimited landscape sections, an attempt was made to interpret the distribution patterns in a larger context. However, the most recent and so far, most accurate publication on the distribution of vascular plants in Albania (Barina 2017) showed large gaps in southern Albania for some species with special habitat requirements. The undermapped taxa such as *Typha minima*, *Fimbristylis bisumbellata*, *Cyperus flavescens* or *Balkana spargulifolia* are often colonisers of special ecological niches.

In the Vjosa catchment area, which has so far been almost completely spared from technical intervention and has watercourse sections of varying characteristics, intermittently flowing side arms, stagnant oxbow sections and dry sites on high gravel areas in the floodplain are formerly widespread habitats. They are colonised by taxa that are weak in competition but tolerant of repeated disturbances that occur at irregular intervals. These species do not find suitable habitats in regulated river systems or those disturbed by the construction of power plants, as is well known from comparable rivers in the Eastern Alps such as the Isar (Zingraff-Hamed & Egger 2019; Karl et al. 1998; Schauer 1998 et al.) or the Enns (Hochegger et al. 2019).

As the planned water diversion on the Shushica (<https://www.euronatur.org/ueber-euronatur/presse/pressemitteilungen/protestaktion-an-der-albanischen-shushica>) or the construction of the airport in the Vjosa Delta (<https://www.euronatur.org/ueber-euronatur/presse/pressemitteilungen/besorgnis-bei-berner-konvention-wegen-flughafenbau-in-albanien>) show, the threats posed by the excessive development of tourism, for example, with the declaration as a national park ('Vjosa Wild River National Park', March 2023; <https://www.euronatur.org/unsere-themen/flussschutz-in-europa/fluesse-aktuell/riesiger-erfolg-die-vjosa-ist-nationalpark>; <https://www.parkukombetarvjosa.al/>) are by no means averted. In individual cases, overgrazing is also a serious problem that can be tackled by local control measures.

In view of the fact that some of the taxa discussed here, such as *Typha minima* or *Fimbristylis bisumbellata*, colonisers of special niches, are endangered in large parts of Europe or extinct in individual countries (Prunier et al. 2010), strict protection is therefore required for the catchment area or at least for the area of the Wild River National Park with its network of watercourses and diverse habitats. Over the next few years, attempts will therefore be made to close some of these distribution gaps before these sensitive habitats are destroyed.

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