

DISTRIBUTION OF BUTTERFLY SPECIES (LEPIDOPTERA: PAPILIONOIDEA) IN THE PROTECTED AREA "MIRUSHA WATERFALLS" IN KOSOVO

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In this paper we present the results of a study on the distribution of butterfly species in the protected area Mirusha Waterfalls in Kosovo, conducted in the period from April to the end of September 2016. No studies on butterfly fauna in this area had been conducted previously.

The survey was organized in 13 sites with different types of habitats, mostly dominated by grassland, natural forest and shrubs. During our study 83 species of butterflies were recorded. The highest diversity (Shannon-Wiener diversity index H) was registered at the site Dush i Sverkes which hosted 68 out of 83 recorded species. The highest number of species was Euro-Siberian (ES) followed by Euro-Oriental (EO), Euro-Meridional (EM) and Holarctic species (Hol). Our results confirm a rich diversity of butterfly fauna influenced by the climate characteristics, geology and plant composition of the studied area. Out of 83 recorded species in our survey, 7 have Near Threatened status in Europe: *Carcharodus floccifera* (Zeller, 1847); *Parnassius mnemosyne* (Linnaeus, 1758); *Cupido decolorata* (Staudinger, 1886); *Hipparchia fagi* (Scopoli, 1763); *Hipparchia statilinus* (Hufnagel, 1758); *Melitea aurelia* (Nickeri, 1850) and *Chazara briseis* (Linnaeus, 1764).

Key words: Mirusha waterfalls, Kosovo, biodiversity, Lepidoptera, habitat

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U radu prikazujemo rezultate istraživanja rasprostranjenosti vrsta leptira u zaštićenom području slapova Mirusha na Kosovu, provedenog u razdoblju od travnja do kraja rujna 2016. Fauna leptira tog područja nije prethodno istraživana. Istraživano je 13 lokaliteta s različitim tipovima staništa, dominirali su travnjaci, šuma i grmlje. Tijekom istraživanja zabilježene su 83 vrste leptira. Najveća raznolikost (Shannon-Wienerov indeks raznolikosti H) bila je na lokalitetu Dush i Sverkes, 68 od 83 zabilježene vrste. Najviše je bilo eurosibirskih vrsta (ES), slijedile su eurorijentalne (EO), euromeridionalne (EM) i holarktičke vrste (Hol). Naši rezultati potvrđuju bogatu bioraznolikost, na koju utječu klimatske značajke, geologija i biljni svijet istraživanog područja. Od 83 zabilježene vrste, 7 ih ima status gotovo ugroženih u Europi: *Carcharodus floccifera* (Zeller, 1847); *Parnassius mnemosyne* (Linnaeus, 1758); *Cupido decolorata* (Staudinger, 1886); *Hipparchia fagi* (Scopoli, 1763); *Hipparchia statilinus* (Hufnagel, 1758); *Melitea aurelia* (Nickeri, 1850) i *Chazara briseis* (Linnaeus, 1764).

Ključne riječi: slapovi Mirusha, Kosovo, bioraznolikost, Lepidoptera, stanište

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INTRODUCTION

The first records of butterfly fauna from Kosovo were published by REBEL (1913, 1917a), 1917b; REBEL & ZERNY (1931) and GRADOJEVIĆ (1930-31). Later on, after almost 50 years without any research into this topic, several publications about the butterfly fauna of Kosovo were published (JAKŠIĆ, 1987, 1988, 1998, 1999, 2003, 2006, 2007). According to JAKŠIĆ & ŽIVIĆ (1994-98) the butterfly fauna of Kosovo consists of 171 species. However, the butterfly list is probably not final, as there are still uninvestigated areas in Kosovo, where surveys might result in new species records. Due to many circumstances, in this part of the Balkans, butterfly research in Kosovo had another break, and it continued only after the year 2010 (ZHUSHI-ETEMI *et al.*, 2016, 2017)

The aim of this paper is to present the results of the first investigation of butterfly fauna in the protected area Mirusha waterfalls in Kosovo.

STUDY AREA

A Natural Monument of High Importance, Mirusha Waterfalls is one of the most beautiful and most interesting areas of nature in Kosovo. Flowing through Mirusha Park is the Mirusha River, from which the park got its name. With a surface of 598.4 ha, this area represents a rare natural phenomenon of special natural, scientific, cultural and touristic importance. It is positioned in the central part of the country, in the territory of three municipalities: Klina, Malisheva and Rahoveci. The Nature Park is located in the south of the Gremnik mountains, on both sides of the Mirusha River, from the beginning of the canyon, up to the discharge into the White Drini River, around 2 km from villages of Dush, Grapc and Llapqeva and the Hill of Dushi. The elevation ranges from 340 meters to 600 meters above sea level.

The most interesting part of the park is the canyon where the Mirusha River flows and creates 16 karst lakes and 12 waterfalls arranged one after another in cascades.

Regarding the geological structure, it consists of ultra-basic rocks and volcanic-sedimentary formations of Jurassic age, and carbonates from the Lower and Upper Cretaceous. The geological structure of Mirusha canyon is mainly composed of Mesozoic limestone cliffs with a tendency to drop in the direction of the water flow (MESP, 2012)

Besides the waterfalls and lakes, characteristic forms are also caves with different shapes and sizes, cracks and other rock phenomena created as a result of the geological past, the effects of erosion, water and other factors.

The climate in the area of Mirusha Park is mild continental with influence of the Mediterranean climate. As a result of this climate, but also of the low industrial development and traditional farming, the area is quite rich in plant species and associations. The flora is composed of 14 plant associations, 5 of them of endemic character. The largest part of the area is covered by the association of oak (Ass. *Quercetum farnetto - Cerris scardicum* Krasniqi 1968), which is one of the most widespread associations in Kosovo. The characteristic of this region is the presence of habitats like: white willow (*Salicetum albae fragilis*), red willow (*Salicetum purpurea*), black alder (*Alnetum glutinosae*), oak (*Quercetum farnetto-Cerris scardicum* and *Quercetum pubescentis-cerris*), juniper (*Astero-Juniperetum oxycedri*), and other associations *Polygalo-Genistetum hassertianae*, *Hyperico-Euphorbietum glabriflorae*, *Potentilla-Fumaretum bonopartei*, *Salvio-Scorsoneretum villosae*, *Echinario-Convolvuletum althaeoides*, *Onosmo-Scabietosum fumaroides*, *Vitici-Tarmaricetum dalmaticae* (REXHEPI, 1974, 1994)

Tab. 1. Surveyed localities with habitat types, geographic coordinates, and altitude

Locality and habitat types	N	E	altitude
L1. Volljakë - close to the Restaurant at the entrance of Mirusha Park – wet mesotrophic grassland	42°31'31"	20°33'46"	366m
L2. Mrasor - near the electric power lines – unmanaged mesic grassland	42°30'45"	20°33'39"	439 m
L3. Mrasor – agriculturally improved, re-seeded and heavily fertilized grassland, arable land with unmixed crops	42°30'42"	20°33'44"	459 m
L4. Llapqevë – dry grassland with sparse vegetation and screes	42°30'15"	20°34'21"	509 m
L5. Llapqevë - hot, dry grassland, vegetation >30%	42°30'1"	20°34'57"	523 m
L6. Llapqevë – broadleaved deciduous shrubs and low trees combined with screes	42°31'10"	20°34'26"	471 m
L7. Llapqevë - on the way to the first waterfall – woodland clearings, grassland with shrubs	42°31'8"	20°34'22"	391 m
L8. Dush i Sverkes - open eutrophic flowery grassland with herbaceous plants	42°31'26"	20°34'35"	379 m
L9. Dush i Sverkes - near the first waterfall and lake - stony lake shore, sheltered wet grassland; basic and ultra-basic inland cliffs	42°31'26"	20°34'55"	383 m
L10. Dush i Sverkes - rough terrain over the first waterfall – calcareous grassland	42°31'36"	20°34'57"	424 m
L11. Volljakë – wet mesotrophic grassland	42°31'25"	20°33'46"	416m
L12. Volljakë - wet meadow, woodland clearings	42°31'14"	20°33'59"	364m
L13. Llapqevë – Broadleaved deciduous woodland	42°31'22"	20°34'36"	440m

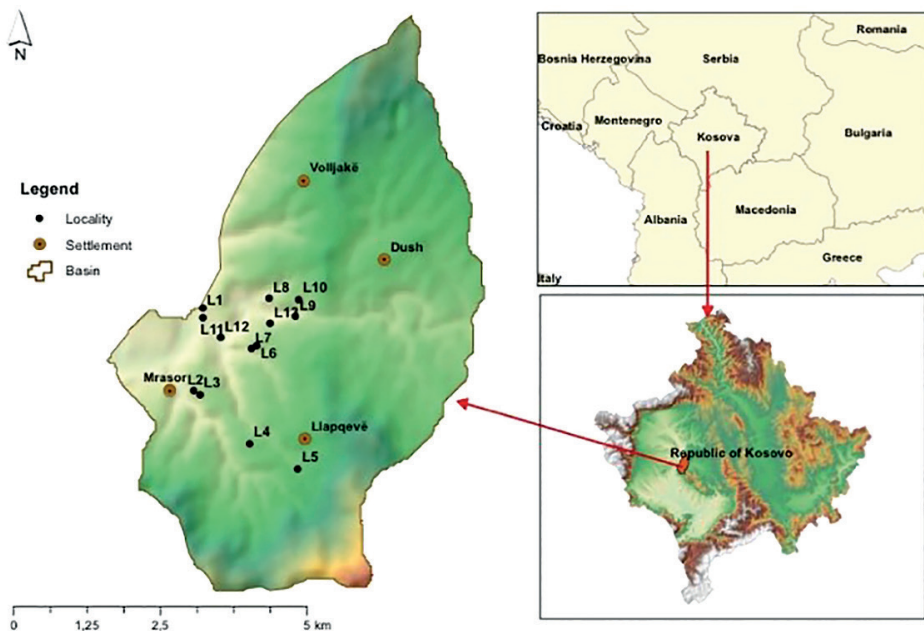


Fig. 1. Map of the surveyed area.

METHODS

Butterflies were collected two times per month with an entomological net in the period from April to the end of September, 2016, at 13 localities with butterfly-rich habitats (Fig. 1). A permit for the research was issued by the Ministry of Environment and Spatial Planning of Kosovo. During this survey 1704 butterfly specimens were examined. Most of the butterflies were identified in the field (TOLMAN & LEWINGTON, 2008) and released, except few species that were identified in the laboratory with the help of stereomicroscope, based on morphometric characteristics of the wings. The genitalia for some problematic species were not checked.

The taxonomy follows NIEUKERKEN *et al.* (2011), nomenclature follows Fauna Europaea (DE JONG *et al.*, 2014). The IUCN categories are taken from European Red List of Butterflies (VAN SWAAY *et al.*, 2010). All the preserved material is deposited at the Department of Biology, FMNS, University of Prishtina.

The zoogeographical categorization is based on KUDRNA (2015). The ecological metrics (species richness-S; abundance-N; and Shannon-Wiener diversity index H) were calculated using ComEcoPaC (DROZD, 2010).

RESULTS AND DISCUSSION

During our survey in the Mirusha waterfalls area we recorded 83 species (Tab. 2), representing 40% of the butterfly fauna of Kosovo (JAKŠIĆ & ŽIVIĆ, 1994/1998).

As shown in Tab. 3, each of the surveyed localities is quite rich in butterfly diversity, hosting more than 50% of all recorded species. However, the species richness (S) is the highest in L11 where 71 out of 83 species were recorded. This locality was dominated by grassland habitat with screes and was also the richest in terms of abundance of butterflies. The Shannon Wiener diversity index H was the highest (H=5.935) in L8. The poorest in butterfly numbers/abundance was locality 10, with basic and ultra basic inland cliffs.

Tab. 2. List of recorded butterfly species in the surveyed area, zoogeographical characteristic-faunistic groups and the locality where the species was recorded

	LEPIDOPTERA PAPILIONOIDEA	Faunal Elements (KUDRNA <i>et al.</i> , 2015)	Locality where the species is recorded	IUCN Status
	HESPERIIDAE			
1	<i>Carcharodus alceae</i> (Esper, 1780)	Med	5,6,9,10	NT
2	<i>Carcharodus floccifera</i> (Zeller, 1847)	EO	5,6,8	NT
3	<i>Hesperia comma</i> (Linnaeus, 1758)	Hol	2,3,4,5,6,7,8,12	LC
4	<i>Ochlodes sylvanus</i> (Esper, 1761)	ES	3,4,11,13	LC
5	<i>Pyrgus armoricanus</i> (Oberthür, 1910)	EO	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
6	<i>Pyrgus malvae</i> (Linnaeus, 1758)	ES	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
7	<i>Pyrgus sidae</i> (Esper, 1784)	EO	2,4,5,6,7	LC
8	<i>Spialia orbifer</i> (Hübner, 1823)	EO	3,4,11,13	LC
	PAPILIONIDAE			
9	<i>Iphiclides podalirius</i> (Linnaeus, 1758)	ES	1,2,3,4,5,6,7,8,12,13	LC
10	<i>Papilio machaon</i> Linnaeus, 1758	ES	1,2,3,4,6,11,12	LC
11	<i>Parnassius mnemosyne</i> (Linnaeus, 1758)	EO	8,11,12	NT
12	<i>Zerynthia polyxena</i> (Denis & Schiffermüller, 1775)	EO	1,3,4,8,11	LC

	LEPIDOPTERA PAPILIONOIDEA	Faunal Elements (KUDRNA <i>et al.</i> , 2015)	Locality where the species is recorded	IUCN Status
	PIERIDAE			
13	<i>Anthocharis cardamines</i> (Linnaeus, 1758)	ES	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
14	<i>Aporia crataegi</i> (Linnaeus, 1758)	ES	1,2,3,4,5,8,11,12	LC
15	<i>Colias alfariensis</i> (Ribbe, 1905)	EO	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
16	<i>Colias crocea</i> (Fourcroy, 1758)	EO	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
17	<i>Gonepteryx rhamni</i> (Linnaeus, 1758)	ES	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
18	<i>Leptidea sinapis/juvernica</i> (Linnaeus, 1758)	ES	1,2,3,4,5,8,11,12	LC
19	<i>Leptidea duponcheli</i> (Staudinger, 1871)	EO	1,2,3,4,5,8,11,12	LC
20	<i>Euchloe ausonia</i> (Hübner, 1803)	Med	1,2,3,4,8,12	LC
21	<i>Pieris brassicae</i> (Linnaeus, 1758)	ES	1,2,3,4,8,12	LC
22	<i>Pieris ergane</i> (Geyer, 1828)	EO	1,2,3,4,5,8,11,12	LC
23	<i>Pieris napi</i> (Linnaeus, 1758)	ES	1,2,3,4,5,8,11,12	LC
24	<i>Pieris mannii</i> (Mayer, 1851)	EO	1,2,3,4,5,8,11,12	LC
25	<i>Pieris rapae</i> (Linnaeus, 1758)	Hol	1,2,3,4,5,8,11,12	LC
26	<i>Pontia edusa</i> (Fabricius, 1777)	ES	1,3,4,8,11	LC
	LYCAENIDAE			
27	<i>Aricia agestis</i> (Denis & Schiffermüller, 1775)	ES	1,2,4,5,8,11	LC
28	<i>Callophrys rubi</i> (Linnaeus, 1758)	ES	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
29	<i>Celastrina argiolus</i> (Linnaeus, 1758)	ES	11	LC
30	<i>Cupido argiades</i> (Pallas, 1771)	Hol	1,2,4,5,8,11	LC
31	<i>Cupido decolorata</i> (Staudinger, 1886)	EM	8,12	NT
32	<i>Cupido minimus</i> (Fuessly, 1775)	ES	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
33	<i>Glaucopsyche alexis</i> (Poda, 1761)	ES	1,2,3,4,5,6,7,8,9,10,11,12,1	LC
34	<i>Lampides boeticus</i> (Linnaeus, 1767)	Tro	11	LC
35	<i>Lycaena alciphron</i> (Rottemburg, 1775)	EO	1,3,4,8,11,12	LC
36	<i>Lycaena dispar</i> (Haworth, 1802)	ES	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
37	<i>Lycaena phlaeas</i> (Linnaeus, 1761)	Hol	1,2,3,4,5,6,7,8,10,11,12,13	LC
38	<i>Lycaena tityrus</i> (Poda, 1761)	ES	1,3,4,8,11,12	LC
39	<i>Lycaena thersamon</i> (Esper, 1784)	EO	1,3,4,8,11,12	LC
40	<i>Plebejus argus</i> (Linnaeus, 1758)	ES	1,8,9,10,11,12	LC
41	<i>Plebejus argyrognomon</i> (Bergsträsser, 1779)	ES	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
42	<i>Polyommatus amandus</i> (Schneider, 1792)	ES	1,2,3,4,5,6,7,8,10,11,12,13	LC
43	<i>Polyommatus bellargus</i> (Rottemburg, 1775)	EO	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
44	<i>Polyommatus coridon</i> (Poda, 1761)	EO	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
45	<i>Polyommatus daphnis</i> (Denis & Schiffermüller, 1775)	EO	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
46	<i>Polyommatus icarus</i> (Rottemburg, 1775)	ES	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
47	<i>Scolitantides orion</i> (Pallas, 1771)	ES	9	LC
	NYMPHALIDAE			
48	<i>Aglais io</i> (Linnaeus, 1758)	ES	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
49	<i>Aglais urticae</i> (Linnaeus, 1758)	ES	3,4,11	LC
50	<i>Apatura ilia</i> (Denis & Schiffermüller, 1775)	ES	8,11	LC
51	<i>Araschnia levana</i> (Linnaeus, 1758)	ES	8, 11	LC
52	<i>Arethusana arethusa</i> (Denis & Schiffermüller, 1775)	EO	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
53	<i>Argynnis aglaja</i> (Linnaeus, 1758)	ES	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
54	<i>Argynnis niobe</i> (Linnaeus, 1758)	ES	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
55	<i>Argynnis pandora</i> (Denis & Schiffermüller, 1775)	EO	1,2,3,4,5,6,7,8,9,10,11,12,13	LC

	LEPIDOPTERA PAPILIONOIDEA	Faunal Elements (KUDRNA et al., 2015)	Locality where the species is recorded	IUCN Status
56	<i>Argynnis paphia</i> (Linnaeus, 1758)	ES	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
57	<i>Boloria dia</i> (Linnaeus, 1767)	ES	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
58	<i>Boloria euphrosyne</i> (Linnaeus, 1758)	ES	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
59	<i>Brenthis daphne</i> (Bergsträsser, 1780)	ES	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
60	<i>Brenthis hecate</i> (Denis & Schiffermüller, 1775)	ES	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
61	<i>Brintesia circe</i> (Fabricius, 1775)	EO	6,7,8,11,12	LC
62	<i>Chazara briseis</i> (Linnaeus, 1764)	ES	2,5,6,11,12,13	NT
63	<i>Coenonympha pamphilus</i> (Linnaeus, 1758)	EO	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
64	<i>Hipparchia fagilsyriaca</i> (Scopoli, 1763)	EM	1,2,6,7,12,13	NT
65	<i>Hipparchia stalinus</i> (Hufnagel, 1758)	EM	1,2,6,7,12,13	NT
66	<i>Hipparchia volgensis</i> (Mazochin - Porshnjakov, 1952)	EM	1,2,6,7,12,13	LC
67	<i>Hyponephele lupina</i> (Costa, 1836)	ES	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
68	<i>Issoria lathonia</i> (Linnaeus, 1758)	ES	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
69	<i>Kirinia roxelana</i> (Cramer, 1777)	EO	1,2,6,7,9,12,13	LC
70	<i>Lasiommata megera</i> (Linnaeus, 1767)	EO	9,11,	LC
71	<i>Limnitis reducta</i> Staudinger, 1901	EO	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
72	<i>Maniola jurtina</i> (Linnaeus, 1758)	ES	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
73	<i>Melanargia galathea</i> (Linnaeus, 1758)	EO	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
74	<i>Melitaea athalia</i> (Rottemburg, 1775)	ES	2,6,7,9,12,13	LC
75	<i>Melitaea aurelia</i> Nickerl, 1850	EO	8	NT
76	<i>Melitaea cinxia</i> (Linnaeus, 1758)	ES	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
77	<i>Melitaea didyma</i> (Esper, 1778)	ES	2,3,4, 6,7,8,9,10,11,12,13	LC
78	<i>Melitaea phoebe</i> (Denis & Schiffermüller, 1775)	ES	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
79	<i>Melitaea trivia</i> (Denis & Schiffermüller, 1775)	EO	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
80	<i>Polygonia c - album</i> (Linnaeus, 1758)	ES	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
81	<i>Pyronia tithonus</i> (Linnaeus, 1767)	EM	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
82	<i>Vanessa atalanta</i> (Linnaeus, 1758)	Hol	1,2,3,4,5,6,7,8,9,10,11,12,13	LC
83	<i>Vanessa cardui</i> (Linnaeus, 1758)	Cos	1,2,3,4,5,6,7,8,9,10,11,12,13	LC

Tab. 3. Species richness, abundance and Shannon-Wiener diversity index (H) in surveyed localities

Indices	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10	L11	L12	L13
S-total number of species (species richness)	65	63	63	66	55	54	50	68	48	45	71	68	51
N - total number of individuals / abundance	159	150	134	147	110	118	127	169	123	81	172	122	92
H-Shannon-Wiener diversity index	5.85	5.84	5.78	5.90	5.61	5.53	5.45	5.93	5.31	5.25	5.84	5.92	5.50

In a zoogeographic aspect –faunistic composition (Tab. 2) 52.43% or 43 of the recorded species are Euro-Siberian (ES); 31.7% or 26 species are Euro-Oriental (EO); 6.09% (5 species) are Euro-Meridional (EM); 6.09% (5 species) are Holarctic (Hol) and the rest 3.63 % are Cosmopolitan, Mediterranean and Tropical.

The species that were recorded only in one of the sites are *Lampides boeticus* (Linnaeus, 1767) at L9, *Scolitantides orion* (Pallas, 1771), and *Celastrina argiolus* (Linnaeus, 1758) at L11.

The two species that were most often dominant in this survey were *Coenonympha pamphilus* and *Hyponephele lupina*, followed by *Melitea phoebe* and *M. trivialis*. Among Lycaenidae the most abundant were *Polyommatus icarus* and *Polyommatus bellargus*.

According to the Red Data List of European Butterflies (VAN SWAAY *et al.*, 2010) among the 83 recorded species, 7 are near threatened (NT): *Carcharodus flocciferus*, *Parnassius mnemosyne*, *Cupido decolorata*, *Hipparchia fagi*, *Hipparchia statilinus*, *Chazara briseis* and *Melitea aurelia*.

Lycaena dispar, *Parnassius mnemosyne* and *Zerynthia polyxena* are three species listed in Annex IV of the Habitats Directive and Annex II of the Bern Convention and will require more attention from the competent authorities of the country responsible for the conservation measures to protect listed species and their habitats. The habitats of *Lycaena dispar* (Haworth, 1802) are boggy margins of lakes and rivers, ditches and canals (TOLMAN & LEWINGTON, 1997). The main threats for this species are the changes in land use and the drainage of wetlands. In Kosovo *L. dispar* is recorded in several localities: in Sharri Mountain National Park (JAKŠIĆ, 1998); in Bjeshket e Nemuna National Park (JAKŠIĆ, 2006), and in Shkoza Massif (ZHUSHI-ETEMI *et al.*, 2016)

Another interesting species is *Cupido decolorata* (Staudinger, 1886), which in our research was recorded in two localities with a small number of specimens. In our survey this species was recorded in a wet flowery grassland and in woodland clearings. The existing data for the presence of this species in our country are from Sharri Mountain National Park (JAKŠIĆ, 1998) and from the Shkoza Massif in the central part of the country (ZHUSHI-ETEMI *et al.*, 2016)

Compared to other protected areas in Kosovo, Mirusha has a relatively modest butterfly fauna. According to existing data, 147 butterfly species are reported from Sharri National Park on both sides of the Kosovo-Macedonia border (JAKŠIĆ, 1998); 98 species in Mt. Pashtrik (JAKŠIĆ, 2007); 110 species from Germia Regional Park in Prishtina and 139 in Mt. Bjeshket e Nemuna/Prokletije (JAKŠIĆ, 2006), which nowadays has national park status.

CONCLUSION

In taxonomic terms, the 1704 specimens examined during our survey belong to 5 families, 49 genera and 83 species. The richest in diversity is the family Nymphalidae with 36 recorded species (43.37%), followed by Lycaenidae with 21 species (26.30%), Pieridae 14 (16.86%), Hesperidae with 8 recorded species (9.63%) and Papilionidae with 4 species (4.81%).

In comparison with the fauna of other studied regions, the number of butterfly species recorded in the Mirusha waterfall area looks modest, but it should be noted that it is based on a single study, whereas in the other regions the survey period was much longer, resulting in a higher number of recorded species. In our opinion, the species list from this survey should prompt the national authorities to start immediately with conservation measures for the protection of the seven recorded species that are Near Threatened (NT) in Europe as well as two other species, *Lycaena dispar* and *Zerynthia polyxena*, which are not threatened but are listed in Habitat directives and are protected in Europe.

We can conclude that the number of recorded butterfly species in this survey indicates a potentially rich butterfly fauna in the protected area Mirusha waterfalls. However, further research in this area should give more information about the butterfly diversity as well as about the ecological, geological, climate and floristic factors that influence the species composition. We would suggest that the authorities restrict changes in land use, especially the building of hotels and restaurants inside the protected area that can have an impact on butterfly habitats.

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