

Jelašnica gorge – still a hot-spot of butterfly diversity

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Abstract. Some ten years back we pointed out a wealth of butterfly diversity in a very small gorge situated near the city of Niš, in southern Serbia. The paper also emphasized that growth of *Ailanthus* trees in the area was a serious threat, because some specific plants grow on exposed rocks in the gorge which are larval foodplants or nectar sources for various butterflies. It was said that if nothing was done to prevent spreading of woodland, sooner or later the open spaces available for those plants would be overshadowed, to the detriment of the butterflies. However, at present, butterfly diversity in the gorge remains impressive.

Samenvatting. Zo'n tien jaar geleden wezen we op een grote vlinderdiverseiteit in een zeer kleine kloof nabij de stad Niš, in het zuiden van Servië. Het artikel benadrukte ook dat de groei van *Ailanthus*-bomen in het gebied een ernstige bedreiging vormde, omdat sommige specifieke planten op blootgestelde rotsen in de kloof groeien, die voedselplanten voor larven of nectarbronnen voor verschillende vlinders zijn. Er werd gezegd dat als er niets werd gedaan om de verspreiding van die bomen te voorkomen, vroeg of laat de voor de lagere planten beschikbare open ruimtes zouden worden overschaduwd, ten nadele van de vlinders. Op dit moment blijft de vlinderdiverseiteit in de kloof echter indrukwekkend.

Résumé. Il y a une dizaine d'années, nous avons souligné une grande diversité de papillons dans une très petite gorge située près de la ville de Niš, dans le sud de la Serbie. Le document a également souligné que la croissance des arbres *Ailanthus* dans la région était une menace sérieuse, car certaines plantes spécifiques poussent sur des rochers exposés dans la gorge, qui sont des plantes alimentaires larvaires ou des sources de nectar pour divers papillons. Il a été dit que si rien n'était fait pour empêcher la propagation de ces arbres, tôt ou tard les espaces ouverts disponibles pour ces plantes seraient éclipsés, au détriment des papillons. Cependant, à l'heure actuelle, la diversité des papillons dans la gorge reste impressionnante.

Key words: Conservation – Checklist – Nature – Serbia.

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Introduction

Jelašnica Gorge is situated in southeast Serbia, (Fig. 1) some 15 km east of the city centre of Niš, even closer to the spa, Niška Banja (Fig. 2). In 1995, it was proclaimed a special nature reserve, but a tiny one, covering just over 1 km². In our research, we included adjacent areas along Jelašnica river with the similar features, and which are actually part of the gorge (Fig. 3). Even so, the total length of the researched area is no more than 2 km.

For a long time, the study of butterflies in Serbia was very erratic and unsystematic. Individuals were studying butterflies and making collections, but very little was published and collections were lost or destroyed. Consequently, our knowledge of Serbian butterflies was very limited. Important changes occurred in 2008 when NGO HabiProt started its database "Alciphron" and in 2014 when the database became available online. Since then, the number of insect observations is steadily increasing and now exceeds 140.000 records for butterflies alone (HabiProt 2020). Hence, our opinion on species distribution and time of appearance is no longer a matter of subjective judgement, but a product of data analyses.

In the previous paper on the Jelašnica Gorge (Đurić *et al.* 2010), 109 species of butterfly were listed (the sum was presented as 110 by mistake), but we continued to visit the gorge at different times of the year. In 2014, a booklet

titled "The overview of butterfly fauna in wider area of Jelašnica Gorge (Lepidoptera: Hesperioidae and Papilionoidea)" (Jakšić 2014) was published (in Serbian). Unfortunately, it was not particularly helpful in increasing the knowledge of the butterflies of Jelašnica Gorge itself, because it included a mix of data from ten different locations, in most cases far away and on different altitudes. The booklet mentioned five species for Jelašnica Gorge which were not included in Đurić *et al.*: *Heteropterus morpheus* (Pallas, 1771), *Plebejus sephirus* (Frivaldzky, 1835), *Kirinia roxelana* (Cramer, 1777), *Phengaris alcon* (Denis & Schiffermüller, 1775) and *Iolana iolas* (Ochsenheimer, 1816). Our recommendation is these records should be treated as doubtful since, for instance, the last species is known never to venture far from its larval foodplant (*Colutea arborescens* L.), and that plant has never recorded in Jelašnica Gorge. Nothing was added in the paper on students' collections (Stojanović-Radić 2007), while a 2014 master thesis (Petrović 2014) contained the same records as mentioned in the 'monograph' of Jakšić (2014).

After inclusion of our new findings, Jelašnica Gorge must be considered one of the best studied areas in Serbia, along with Stara Planina (Popović & Đurić 2014) and Vlasina (Tot *et al.* 2017), which are, however, much larger protected areas.

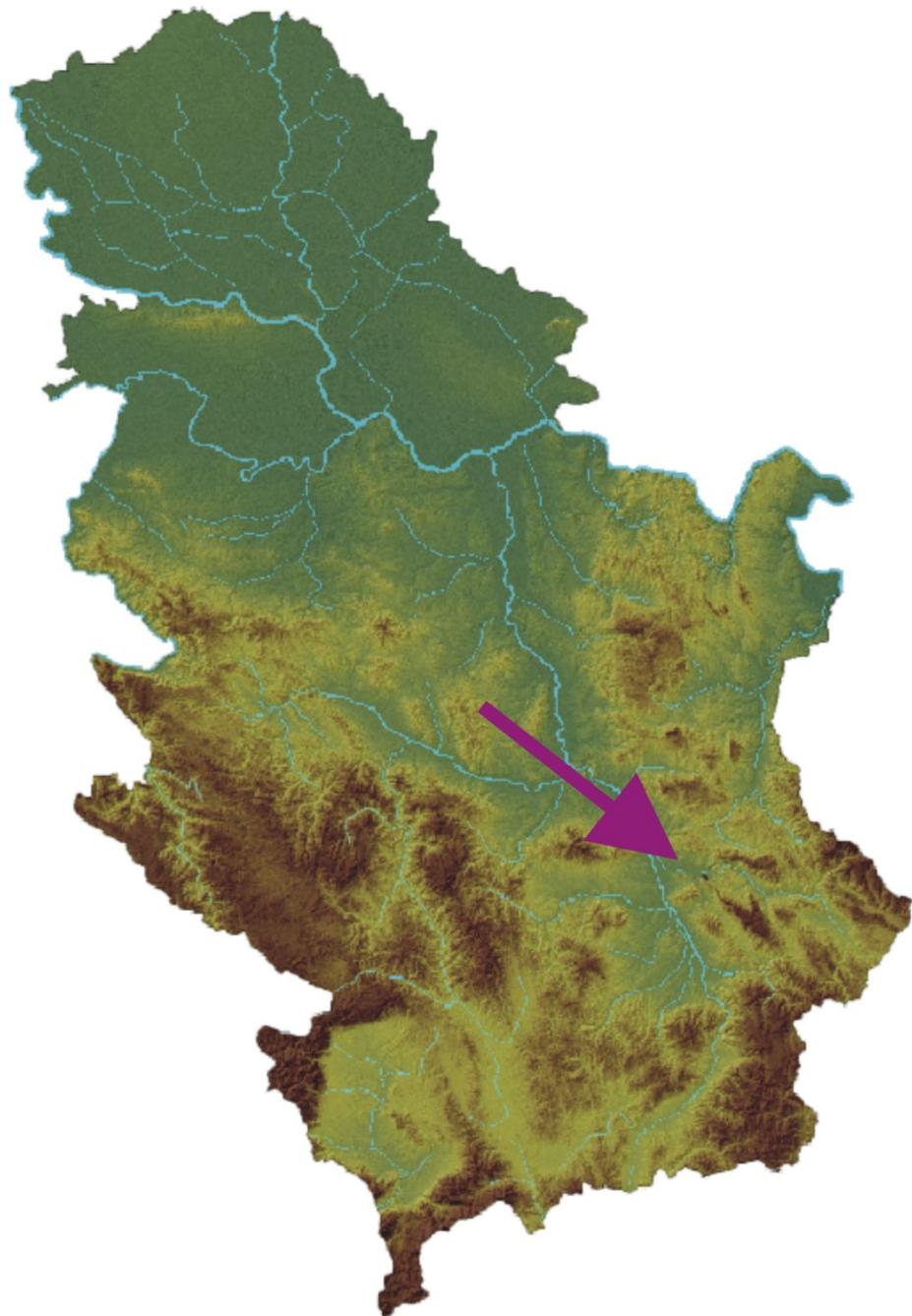


Fig. 1. Jelašnica gorge is situated in southeast Serbia.

Materials and methods

In this research, butterflies were photographed and occasionally netted, but in most cases they were released after identification. For identification we used standard field guides/keys (Đurić & Popović 2011), (Tolman & Lewington 1997), and (Lafranchis 2004). Some specimens were collected for further examination. The nomenclature used is according to the European Red list of Butterflies (van Swaay *et al.* 2010).

At present, our database contains 1310 records from the defined area of Jelašnica Gorge. The records are presented in Table 1, in which the columns represent the following: A – species ordinal, B – species name, C – number of records for the species in our database, D – number of records in our previous paper (Đurić *et al.* 2010), E – black dot for species reported from Jelašnica Gorge or Jelašnica village (Jakšić 2014), F – conservation status per IUCN in Serbia (Maes *et al.* 2019), G – conservation status per Red Data Book of European Butterflies (van Swaay & Warren 1999).

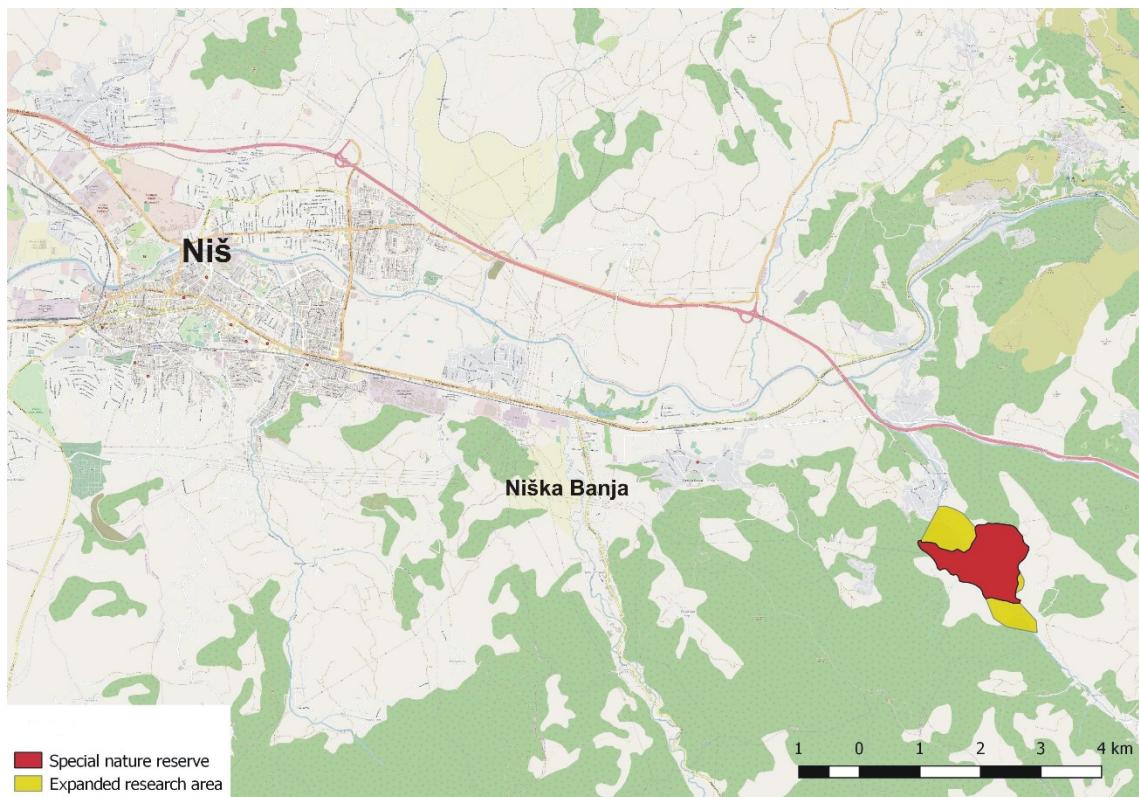


Fig. 2. Jelašnica gorge is situated some 15 km eastward from center of city of Niš, even closer to its spa, Niška Banja.

Results

Table 1. Observation records of butterflies in Jelašnica gorge, Serbia.

| A | B | C | D | E | F | G |
|----|---------------------------------|----|----|---|----|----|
| 1 | <i>Iphiclides podalirius</i> | 41 | 10 | • | LC | |
| 2 | <i>Papilio machaon</i> | 16 | 4 | • | LC | |
| 3 | <i>Zerynthia polyxena</i> | 3 | 1 | | LC | |
| 4 | <i>Zerynthia cerisy</i> | 10 | 4 | • | LC | NT |
| 5 | <i>Ochlodes sylvanus</i> | 13 | 4 | • | LC | |
| 6 | <i>Hesperia comma</i> | 2 | 1 | | LC | |
| 7 | <i>Thymelicus lineola</i> | 9 | 2 | • | LC | |
| 8 | <i>Thymelicus sylvestris</i> | 8 | 2 | | LC | |
| 9 | <i>Thymelicus acteon</i> | 5 | 2 | | LC | NT |
| 10 | <i>Carterocephalus palaemon</i> | 1 | 1 | | LC | |
| | <i>Heteropterus morpheus</i> | | | • | LC | |
| 11 | <i>Pyrgus carthami</i> | 8 | 2 | • | LC | |
| 12 | <i>Pyrgus sidae</i> | 4 | 2 | | LC | |
| 13 | <i>Pyrgus malvae</i> | 24 | 7 | • | LC | |
| 14 | <i>Pyrgus armoricanus</i> | 1 | 1 | | LC | |
| 15 | <i>Pyrgus alveus</i> | 1 | | | LC | |
| 16 | <i>Spialia orbifer</i> | 8 | 2 | | LC | |
| 17 | <i>Carcharodus alceae</i> | 16 | 4 | | LC | |
| 18 | <i>Carcharodus lavatherae</i> | 2 | 1 | • | NT | NT |
| 19 | <i>Carcharodus flocciferus</i> | 1 | | | LC | NT |
| 20 | <i>Erynnis tages</i> | 29 | 5 | • | LC | |
| 21 | <i>Colias crocea</i> | 21 | 8 | • | LC | |
| 22 | <i>Colias hyale</i> | 1 | | • | LC | |
| 23 | <i>Colias alfaciensis</i> | 32 | 11 | • | LC | |
| 24 | <i>Gonepteryx rhamni</i> | 25 | 10 | • | LC | |
| 25 | <i>Euchloe ausonia</i> | 1 | | | NT | |
| 26 | <i>Anthocharis cardamines</i> | 20 | 6 | • | LC | |
| 27 | <i>Pontia edusa</i> | 2 | 2 | | LC | |

| A | B | C | D | E | F | G |
|----|-------------------------------|----|----|---|----|----|
| 28 | <i>Pieris brassicae</i> | 4 | 1 | • | LC | |
| 29 | <i>Pieris mannii</i> | 4 | | | LC | |
| 30 | <i>Pieris rapae</i> | 25 | 10 | • | LC | |
| 31 | <i>Pieris ergane</i> | 9 | 4 | • | LC | |
| 32 | <i>Pieris napi</i> | 23 | 8 | • | LC | |
| 33 | <i>Pieris balcana</i> | 3 | | | LC | |
| 34 | <i>Aporia crataegi</i> | 17 | 7 | • | LC | |
| 35 | <i>Leptidea sinapis</i> | 38 | 12 | • | LC | |
| 36 | <i>Leptidea duponcheli</i> | 2 | 1 | | NT | |
| 37 | <i>Hamearis lucina</i> | 9 | 3 | • | LC | |
| 38 | <i>Polyommatus dorylas</i> | 6 | 2 | | LC | NT |
| 39 | <i>Polyommatus amandus</i> | 10 | 4 | | LC | |
| 40 | <i>Polyommatus thersites</i> | 9 | 2 | • | LC | |
| 41 | <i>Polyommatus icarus</i> | 22 | | • | LC | |
| 42 | <i>Polyommatus daphnis</i> | 11 | 3 | • | LC | |
| 43 | <i>Polyommatus bellargus</i> | 19 | 8 | • | LC | |
| 44 | <i>Polyommatus coridon</i> | 6 | 2 | • | LC | |
| 45 | <i>Polyommatus admetus</i> | 5 | 2 | | NT | |
| 46 | <i>Polyommatus ripartii</i> | 2 | 1 | | NT | |
| 47 | <i>Cyaniris semiargus</i> | 12 | 5 | • | LC | |
| 48 | <i>Aricia agestis</i> | 15 | 6 | • | LC | |
| 49 | <i>Aricia artaxerxes</i> | 1 | | | LC | |
| | <i>Plebejus sephirus</i> | | | • | NT | |
| 50 | <i>Plebejus argus</i> | 20 | 8 | • | LC | |
| 51 | <i>Plebejus idas</i> | 16 | 7 | • | LC | |
| 52 | <i>Plebejus argyrogynomon</i> | 15 | | • | LC | |
| 53 | <i>Phengaris arion</i> | 6 | 2 | • | LC | EN |
| | <i>Phengaris alcon</i> | | | • | LC | |
| | <i>Iolana iolas</i> | | | • | EN | NT |
| 54 | <i>Glaucoopsyche alexis</i> | 10 | 5 | • | LC | |
| 55 | <i>Scolitantides orion</i> | 39 | 10 | • | LC | |
| 56 | <i>Pseudophilotes vicrama</i> | 10 | 4 | • | LC | NT |
| 57 | <i>Celastrina argiolus</i> | 15 | | • | LC | |
| 58 | <i>Cupido minimus</i> | 16 | 5 | | LC | |
| 59 | <i>Cupido osiris</i> | 10 | 4 | • | LC | |
| 60 | <i>Cupido argiades</i> | 21 | 7 | • | LC | |
| 61 | <i>Cupido decoloratus</i> | 3 | 1 | | LC | NT |
| 62 | <i>Cupido alcetas</i> | 2 | | • | LC | |
| 63 | <i>Favonius quercus</i> | 1 | 1 | | LC | |
| 64 | <i>Satyrium w-album</i> | 5 | 2 | | LC | |
| 65 | <i>Satyrium pruni</i> | 1 | 1 | | NT | |
| 66 | <i>Satyrium spini</i> | 9 | 1 | • | LC | |
| 67 | <i>Satyrium ilicis</i> | 3 | 2 | • | LC | |
| 68 | <i>Satyrium acaciae</i> | 6 | 1 | • | LC | |
| 69 | <i>Callophrys rubi</i> | 20 | 6 | • | LC | |
| 70 | <i>Lycaena phlaeas</i> | 2 | 2 | | LC | |
| 71 | <i>Lycaena dispar</i> | 14 | 3 | • | LC | |
| 72 | <i>Lycaena virgaureae</i> | 1 | 1 | | LC | |
| 73 | <i>Lycaena tityrus</i> | 4 | 1 | | LC | |
| 74 | <i>Lycaena alciphron</i> | 8 | 2 | • | LC | |
| 75 | <i>Lycaena thersamon</i> | 1 | | | LC | |
| 76 | <i>Lasiommata megera</i> | 19 | 3 | • | LC | |
| 77 | <i>Lasiommata maera</i> | 4 | | • | LC | |
| 78 | <i>Pararge aegeria</i> | 18 | 9 | | LC | |
| | <i>Kirinia roxelana</i> | | | • | LC | |
| 79 | <i>Coenonympha arcania</i> | 12 | | • | LC | |
| 80 | <i>Coenonympha glycerion</i> | 1 | 1 | | LC | |
| 81 | <i>Coenonympha leander</i> | 17 | 7 | • | LC | |

| A | B | C | D | E | F | G |
|-----|------------------------------|----|---|---|----|----|
| 82 | <i>Coenonympha pamphilus</i> | 31 | 9 | • | LC | |
| 83 | <i>Maniola jurtina</i> | 22 | 6 | • | LC | |
| 84 | <i>Aphantopus hyperantus</i> | 9 | 1 | • | LC | |
| 85 | <i>Erebia medusa</i> | 11 | 4 | • | LC | |
| 86 | <i>Melanargia galathea</i> | 16 | 3 | • | LC | |
| 87 | <i>Brintesia circe</i> | 11 | 3 | • | LC | |
| 88 | <i>Arethusana arethusa</i> | 3 | 1 | | LC | |
| 89 | <i>Hipparchia statilinus</i> | 1 | | | NT | NT |
| 90 | <i>Hipparchia volgensis</i> | 2 | 1 | | LC | |
| 91 | <i>Hipparchia fagi</i> | 2 | 1 | | LC | NT |
| 92 | <i>Minois dryas</i> | 1 | | • | LC | |
| 93 | <i>Satyrus ferula</i> | 6 | 2 | • | LC | |
| 94 | <i>Melitaea cinxia</i> | 14 | 4 | • | LC | |
| 95 | <i>Melitaea phoebe</i> | 5 | 2 | | LC | |
| 96 | <i>Melitaea arduinna</i> | 8 | 3 | • | LC | |
| 97 | <i>Melitaea trivia</i> | 4 | 3 | • | LC | |
| 98 | <i>Melitaea didyma</i> | 13 | 6 | | LC | |
| 99 | <i>Melitaea diamina</i> | 1 | | | LC | |
| 100 | <i>Melitaea aurelia</i> | 7 | 3 | • | LC | NT |
| 101 | <i>Melitaea athalia</i> | 13 | 4 | • | LC | |
| 102 | <i>Neptis sappho</i> | 24 | 6 | • | LC | |
| 103 | <i>Limenitis camilla</i> | 1 | | | LC | |
| 104 | <i>Limenitis reducta</i> | 2 | 1 | | LC | |
| 105 | <i>Apatura ilia</i> | 12 | | • | LC | |
| 106 | <i>Nymphalis antiopa</i> | 6 | 2 | | LC | |
| 107 | <i>Nymphalis polychloros</i> | 10 | 2 | • | LC | |
| 108 | <i>Nymphalis vaualbum</i> | 2 | 2 | | LC | |
| 109 | <i>Araschnia levana</i> | 23 | 3 | • | LC | |
| 110 | <i>Polygonia c-album</i> | 20 | 6 | • | LC | |
| 111 | <i>Polygonia egea</i> | 1 | 1 | | LC | |
| 112 | <i>Aglais io</i> | 14 | 4 | | LC | |
| 113 | <i>Aglais urticae</i> | 6 | | | LC | |
| 114 | <i>Vanessa atalanta</i> | 17 | | • | LC | |
| 115 | <i>Vanessa cardui</i> | 9 | 1 | • | LC | |
| 116 | <i>Boloria euphrosyne</i> | 2 | 1 | | LC | |
| 117 | <i>Boloria dia</i> | 15 | 3 | • | LC | |
| 118 | <i>Brenthis ino</i> | 3 | | | NT | |
| 119 | <i>Brenthis daphne</i> | 24 | 4 | • | LC | |
| 120 | <i>Issoria lathonia</i> | 26 | 5 | • | LC | |
| 121 | <i>Argynnis paphia</i> | 15 | 3 | • | LC | |
| 122 | <i>Argynnis pandora</i> | 3 | | | LC | |
| 123 | <i>Argynnis aglaja</i> | 2 | 2 | | LC | |
| 124 | <i>Argynnis adippe</i> | 4 | 3 | | LC | |
| 125 | <i>Argynnis niobe</i> | 4 | 1 | | LC | |

Discussion

The total of 109 species in a very small area reported in our previous paper was already impressive, but with our new findings the number reached 125 species, an astonishing result. In other words, more than 62% of butterfly species recorded in Serbia (Popović & Verovnik 2018) have been found in this 2 km long gorge. That proves again Jelašnica Gorge very well deserves the title of a hot-spot, as previously suggested. Table 1 contains 5 more species reported in a 'monograph' (Jakšić 2014), but these were excluded from the total for already explained

reason. In regard to the protection of European butterfly fauna it is evident that Jelašnica Gorge is a very important area. It includes 3 species from Annex II of the Habitats Directive (*E. aurinia*, *L. dispar*, *N. vaualbum*) and 4 from Annex IV (*L. dispar*, *N. vaualbum*, *P. arion*, *Z. polyxena*). It is very likely that yet more species are still undiscovered there.

We are of opinion that the spread of *Ailanthus* trees threatens the biodiversity of this precious spot, and their control is even more urgent than it was 10 years ago. Every year, bare rocks are increasingly obscured by trees, and that will inevitably endanger the existing flora and,

indirectly, the fauna of this fantastic location. So far, neither managers of the protected area nor competent ministry have heeded our warning. We hope they will react before it is too late.

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Fig. 3. In our research we included adjacent areas along the Jelašnica river.

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