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ASSESSMENT OF THE ENDANGERED LEPIDOPTERAFAUNA OF THE SHKODRA LAKE AREA AS A FACTOR IN PRESERVING THE BIODIVERSITY VALUES OF THIS ECOSYSTEM

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ABSTRACT

This study, analyses 30 endangered species of butterflies and their endangered status, according to the IUCN, are identified in the area of special ecological importance such as that of Lake Shkodra. The analyzed species are respectively represented as: The Risk category LR is represented by 3 types; The risk category DD is represented by 2 types; The risk category VU is represented by 25 types. The study is based on field collection, identification and comparison with the literature of these endangered species, aiming to preserve the values of this natural ecosystem. The recommendations for increased care towards species threatened with extinction, will contribute to the health of this ecosystem and will promote strategies that will lead to the preservation of biodiversity, not only of lepidoptera, but also of other living things of this the ecosystem through its continuous monitoring.

Keywords: Shkodra lake area, region, threatened Lepidoptero fauna, monitoring biodiversity, IUCN, category.

INTRODUCTION

The Shkodra Lake area is an area with a very rich biodiversity of all kinds, especially of butterflies. Butterflies are insects with a diverse biology. Imagoes feed on the nectar of flowers and help a lot in their pollination. Caterpillars in general are phytophagous. Their life cycle is also quite diverse. Their presence in the ecosystem is an indicator of the pollution of the area. However, some factors such as: the destruction and fragmentation of habitats, climate changes, collection before spawning are threatening factors for the existence of some of their species. Taking into account their ecological importance, the assessment of the endangered status, also based on the IUCN definitions, takes on a special importance, as it gives an overview of the current state of butterflies in this region and aims to increase awareness for the preservation of the values of the biodiversity of flowers and all other species of this region.

Aims and Background

The provision of this information aims to help anyone working in the conservation and preservation of endangered lepidoptera species, so that they are able to make the right decision based on academic / scientific standards in the process of observation and classification of the respective category.

Determining the causes of endangerment and protective measures plays a key role in monitoring and preserving the biodiversity values of the Lake of Shkodra.

Figure 1. Lake of Shkodra, Albania.

Figure 2. Map of Shkodra Lake, Albania.

MATERIAL AND METHODS

The material was collected during the period March-September 2023, in the area of Shkodra Lake, in several stations Kamica and Shiroka and their places around them.
Shiroka is 6 km away from the city of Shkodra. Kamica is located on the other side of Lake Shkodra, 12 km from the city of Shkodra. The frequency of sample collection was episodic.
For butterflies mainly of entomological interest. It is treated in Misja (1990-2005), Paparisto (2001), Striniqi (2005).
Then the material is stored and then processed. After determining, consultation with Misja et al. is performed and finally their status (according to the IUCN Red List) is determined.
The assessment of the current state and the threatened level of some entomofauna of Lake Shkodra were made on the basis of the IUCN categories described by Sutherland (2006) in the Conservation Manual (research, management) and the existing data for the country in this field (Efetov & BUFASHKIN, 1990; MISJA, 1981; PAPARISTO, 2001).
For each of them, the status, habitat, chorology, the place where they are found and, in general, the threat and preventive measures are noted.
After the determination, the material was consulted with the endangered categories according to the IUCN was done.

RESULTS

Information is provided for 30 species of endangered butterflies in the Shkodra Lake area.
The collection, processing, and identification of 30 species of endangered butterflies in this area has been done, and for each species, data on the status of endangerment, identification, biogeography, habitat, and chorology are given.

Then the processing of this data was done.

1. *Erynnis tages – (Insecta, Lepidoptera- Hesperidae) Status: VU (Alb)*
2. *Carcharodus alceae – (Insecta, Lepidoptera- Hesperidae) Status VU (Alb)*
3. *Carcharodus flocciferus- (Insecta,Lepidoptera– Hesperidae) Status VU (Alb)*
4. *Hesperia comma –(Insecta, Lepidoptera– Hesperidae) Status : VU*
5. *Spialia phlomidis –(Insecta, Lepidoptera – Hesperidae) Status : DD*
6. *Gegenes pumilio –(Insecta, Lepidoptera – Hesperidae) Status: LR (nt)*
7. *Parnassius mnemasyne – (Insecta, Lepidoptera- Papilionidae) Status : VU*
8. *Zerynthia cerisyi- (Insecta, Lepidoptera- Papilionidae) Status: VU (Alb)*

9. Zerynthia polixena (Insecta, Lepidoptera- Papilionidae) Status: VU (Alb)
10. Pieris krueperi – (Insecta, Lepidoptera – Pieridae) Status : VU (Alb)
11. Gonopteryx farinose – (Insecta, Lepidoptera – Pieridae) – Pieridae) Statusi :LR
12. Thecla betulae – (Insecta, Lepidoptera – Lycaenidae) Status : VU (Alb)
13.Heodes ottomanus - (Insecta, Lepidoptera – Lycaenidae) Status : VU (Alb, at the European level)
14. Palaeochrysophanus hippothoe – (Insecta, Lepidoptera–Lycaenidae) Status :VU (Alb)
15. Glaucopsyche alexis - (Insecta, Lepidoptera – Lycaenidae) Status :VU (Alb, at the European level)
16.Maculinea alcon – (Insecta, Lepidoptera – Lycaenidae) Status :VU (Alb, at the European level)
17. Maculinea arion – (Insecta, Lepidoptera – Lycaenidae) Status :VU (Alb, at the European level)
18.Iolana iolas – (Insecta, Lepidoptera – Lycaenidae) Status :VU (Alb, at the European level)
19.Pseudophilotes vicrama – (Insecta, Lepidoptera – Lycaenidae) Status :VU (Alb, at the European level)
20.Solitantides orion - (Insecta, Lepidoptera – Lycaenidae) Status :VU (Alb, at the European level)
21.Neohipparchia statilinus – (Insecta, Lepidoptera – Nymphalidae) Status :VU (Alb)
22.Nymphalis antiopa - (Insecta, Lepidoptera – Nymphalidae) Status :VU (Alb)
23.Cinclidia phoebe - (Insecta, Lepidoptera – Nymphalidae) Status :VU (Alb)
24. Mellicta athalia - (Insecta, Lepidoptera – Nymphalidae) Status :VU (Alb)
25. Zygaena loti - (Insecta, Lepidoptera – Zygaenidae) Status :VU (Alb)
26. Saturnia pyri - (Insecta, Lepidoptera – Saturniidae) Status :VU (Alb)
27. Saturnia pavonia - (Insecta, Lepidoptera – Saturniidae) Status :LR (nt)
28. Daphis nerii - (Insecta, Lepidoptera – Sphingidae) Status DD
29. Hemaris croatica - (Insecta, Lepidoptera – Sphingidae) Status :VU (Alb)
30. Euplagia quadripunctari - (Insecta, Lepidoptera – Arctiidae) Status :VU

1.Erynis tages - (Insecta, Lepidoptera, Hesperidae) Status VU
Identification: Size 28-32 mm, from the top of the face brown, the front with three white spots near the top of the lateral fin, the back with white dots. Biogeography: It flies in the period April-September, gives one generation. Habitat: Found in grassy environments. Chorology: Euro-Siberian type.
2. Carcharodus alceae – (Insecta.Lepidoptera.Hesperidae),Status VU
Identification: Size 26-32mm. The upper side of the plates is marbled, dark brown, the lower side of the plates is light brown with white spots. Biogeography. It flies in the period March-September, gives one generation. The caterpillar is found in plants of the genus Malva L, Hibiscus L. Habitat Area without moisture, rich in plants Chorology Palearctic type.
3. Carcharodus flocciferus- (Insecta,Lepidoptera– Hesperidae) Status : VU
Identification: e upper side of the wings is dark brown-gray with white spots. Sexual variability is low. Biogeography Flies in May-September. One to two generations. Habitat Found in areas with moist vegetation. Chorology Eurosiberian type.
4. Hesperia comma (Insecta, Lepidoptera, Hesperidae),Status VU
Identification: Size 29-33mm. The upper side of the leaves is red, the back leaves with small light spots. Biogeography: It flies in the period June-September. Gives one generation Habitat: Habitat: Grassy environment. Chorology: Eurasian type
5. Spialia phlomidis- (Insecta, Lepidoptera, Hesperidae), Status DD
Identification: Size 30-34mm. The upper side of the leaves is black-dark brown with large spots.
Biogeography: It flies in the period June-July. Gives one generation. Habitat: Environment with rich vegetation. Chorology: Balkan type.
6. Gegenes pumilio- (Insecta, Lepidoptera, Hesperidae), Status LR
Identification: Size 19-35mm. The upper side of the leaves is one-colored, light brown in the male), paler in the female and with small white spots. Biogeography: It flies in the period April-October. Gives several generations. Habitat: Found in low, warm areas without moisture. Chorology: Mediterranean type
7. Parnassius mnemasyne- (Insecta, Lepidoptera, Papillionidae), Status VU
Identification: Size 50-60mm. The upper side of the leaves is white with 2 black spots.
Biogeography: It flies in the period May-August. Gives one generation. Habitat: Plains, meadows with plants. Chorology: Eurosiberian type.
8. Zerynthia cerisyi (Insecta, Lepidoptera, Papillionidae), Status VU

Identification: Size 40-55mm. The upper side of the flats is pale yellow with black figures and red spots on the back flats. Bioecology: It flies in the period April-July. Gives one generation. Habitat: Found in areas well warmed by the sun. Chorology: Balkan type.

9.Zerynthia polixena - (Insecta, Lepidoptera, Papillionidae), Status VU

Identification : Dimensions 44-46mm. The upper side of the leaves is yellow with black figures.

Biogeography: It flies in the period April-July. Gives one generation. Habitat: Found in warm areas. Chorology : Mediterranean type.

10. Pieris krueperi - (Insecta, Lepidoptera, Pieridae), Status VU

Identification : Dimensions 32-44mm. The upper side of the leaves is white, the front ones except for the black spot on the top. Biogeography: It flies in the period March-September. Gives one or more generations. Habitat: The area and another spot on the front lip. warm. Chorology: Eurasian type.

11. Gonopteryx farinose – (Insecta, Lepidoptera – Pieridae), Status LR

Identification: Size 56-66mm. In the back flats, the third nerve forms a longer 'tail'. Biogeography: Flies in May-August. Gives one generation. Habitat: Found in hilly meadows. Chorology: Mediterranean type.

12. Thecla betulae - (Insecta, Lepidoptera – Lycaenidae), Status VU

Identification: Size 30-38mm. The upper side of the wings brown, the front wings with wide orange spots. Biogeography: It flies in the period June-October. Gives one generation. Habitat: found in bushy areas. Chorology: Palearctic type.

13.Heodes ottomanus – (Insecta, Lepidoptera – Lycaenidae), Status VU

Identification: Size 28-30mm. The back plates with 'tooth', the upper side of the plates red-gold with black borders. Biogeography: It flies in the period April-August. It gives two generations. Habitat: Found in meadows - pastures starting from 50m. Chorology: Mediterranean type.

14. Palaeochrysophanus hippothoe– (Insecta, Lepidoptera–Lycaenidae), Status VU

Identification: Sizes 24-37mm. The upper side of the plates is red-gold with a black border. Biogeography: It flies in the period June-August. Gives one generation. Habitat: Found in meadows.Chorology: Balkan type.

15. Glaucopsyche alexis – (Insecta, Lepidoptera – Lycaenidae).Status VU

Identification: Size 24-32mm. The upper side of the flats is blue with a dark border. Biogeography: It flies in the period April-August. Gives one or two generations. Habitat: Found in forest areas. Chorology Euroasian type.

16. Maculinea alcon – (Insecta, Lepidoptera – Lycaenidae), Status VU

Identification: Size 30-38mm. The upper side of the plates is purple-blue or gray-brown with an enlarged border. Bioecology: Flies in June-September. Gives one generation. Habitat:Moist meadows up to 100m..Chorology: Eurosiberian type.

17. Maculinea arion – (Insecta, Lepidoptera – Lycaenidae), Status VU

Identification: Dimensions 38-41mm. The upper side of the flats is blue and celet-brown. Biogeography: It flies in the period May-August. Gives one generation. Habitat: Found in dry environments with dense vegetation. Chorology: Eurosiberian type.

18.Iolana iolas – (Insecta, Lepidoptera – Lycaenidae), Status VU

Identification: Size 38-44mm. The upper side of the leaves is purple-blue with glitter. Biogeography: It flies in the period May-July. Gives one generation. Habitat: It is found in areas with interspersed bushes.

Chorology: Mediterranean type.

19. Pseudophilotes vicrama - (Insecta, Lepidoptera – Lycaenidae), Status VU

Identification : Size 22-24mm. The upper side of the leaves is light gray-blue with a darkened lateral furrow. Biogeography: It flies between April and September. It gives two generations. Habitat: Found in areas with rich vegetation. Chorology: Eurasian type.

20. Scolitantides orion - (Insecta, Lepidoptera – Lycaenidae), Status VU

Identification: Size 24-35mm. The upper side of the flats is brown with blue. Bioecology: It flies in the period April-August. Gives one to two generations. Habitat: Found in areas with dense vegetation, but without moisture. Chorology: Eurosiberian type.

21. Neohipparchia statilinus - (Insecta, Lepidoptera – Nymphalidae), Status VU

Identification: Size 46-56mm. The upper side of the leaves is brown-beige-gray with two black and two small white spots. Biogeography: It flies between July and September. Gives one generation. Habitat: Found in areas without wetlands and deciduous forests. Chorology: Mediterranean type.

22. Nymphalis antiopa – (Insecta, Lepidoptera – Nymphalidae), Status VU

Identification: Dimensions 66-82mm. The upper side of the leaves is dark brown with a row of small blue-purple spots and two darker spots. Biogeography: It flies in the period May-July. Gives one generatio Habitat: Found in deciduous forests. Chorology: Holarctic.type..

23. Cinclidia phoebe - (Insecta, Lepidoptera - Nymphalidae), Status VU

Identification: Size 44-48mm. The upper side of the leaves is yellow-reddish, with black spots and stripes. Bioecology: It flies in the period April-September. Gives one to two generations. Habitat; It is found in meadows with rich vegetation. Chorology: Palaarctic type.

24. Mellicta athalia - (Insecta, Lepidoptera - Nymphalidae), Status VU

Identification: Size 44-48mm. The upper side of the leaves is yellow-red with black spots and stripes. Biogeography: It flies between April and September. Gives one to two generations. Habitat: Found in meadows with rich vegetation. Chorology: Palaarctic type.

25. Zygaena loti - (Insecta, Lepidoptera - Zygaenidae), Status VU

Identification : Size 28-35mm. Black-gray front wings with five red spots. Biogeography: It flies in the period June-August. Gives one generation Habitat: Found in flowery meadows. Chorology: Mediterranean type

26. Saturnia pyri - (Insecta, Lepidoptera - Saturniidae), Status VU

Identification: Size 100-135mm. Dark brown and beige flats with a 'spot' like a large eye with a border. Biogeography: It flies in the period June-August. Gives one generation Habitat: Meets in environments with dense vegetation. Chorology: Mediterranean type

27. Saturnia pavonia – (Insecta, Lepidoptera – Saturniidae), Status LR

Identification: Sizes 50-75mm. Flats with one big 'eye', with rows of dark brown. Biogeography: It flies in the period March-May. Gives one generation. Chorology: Eurosiberian type

28. Daphis nerii- (Insecta, Lepidoptera – Sphingidae), Status DD

Identification : Dimensions 86-112mm. In general, the body is green-olive. Biogeography: It flies in the period June-October. Gives one to two generations. Habitat: found in oleander bushes. Chorology: Palaarctic type.

29. Hemaris croatica – (Insecta, Lepidoptera – Sphingidae), Status VU

Identification: Size 40-44mm. Olive-green front wings, red-brown lower lips. Biogeography: Flies in the period May-August: Gives one to two generations. Habitat: Found in areas with little vegetation. Chorology: Mediterranean type

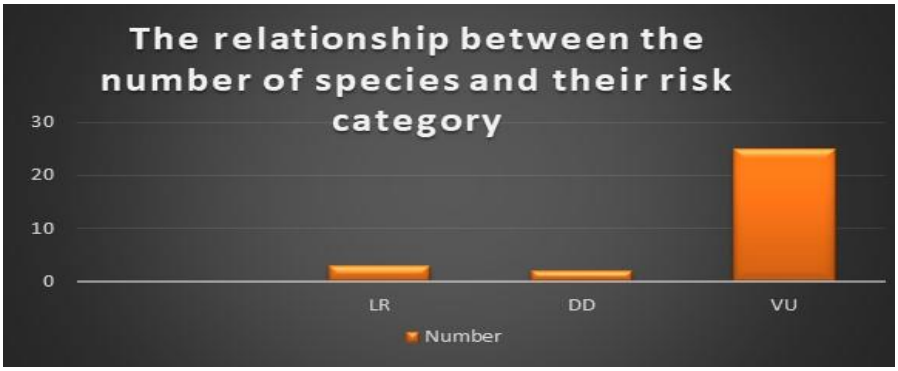
30. Euplagia quadripunctari – (Insecta, Lepidoptera – Arctiidae), Status VU

Identification: Sizes 50-70mm. Front plates brown and black with transverse white and yellow stripes. Biogeography: It flies in the period July-August. It is a generation. Habitat: found in areas with mayflower and blackberry bushes. Chorology: Eurasian type.

Analysis of study results

30 endangered species identified during the expeditions conducted in this area were analyzed (the expeditions were conducted in the periods April-August 2023). Referring to the endangered categories according to the IUCN, the 30 species belong respectively to:

- DD category – 2 types
- LR category – 3 types
- Category VU – 25 types

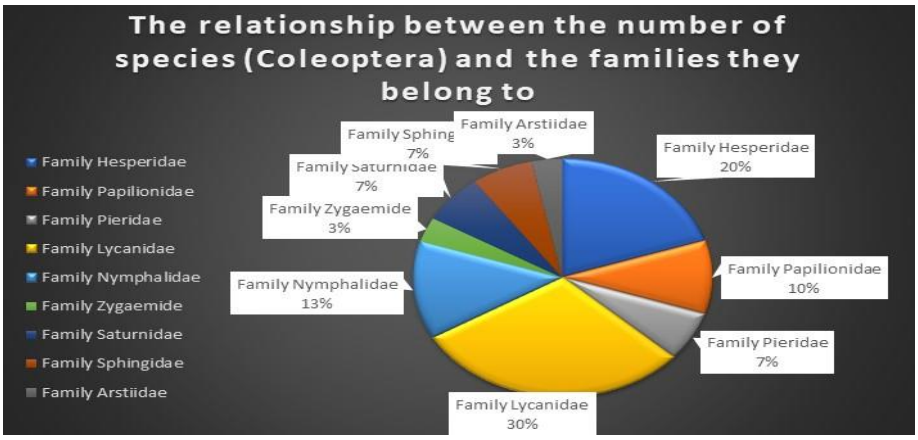


Graph 1. The relationship between the number of species and their risk category.

Relation analysis between the number of species and the family to which they belong

The Lepidopteras analyzed belong to 9 different families, respectively:

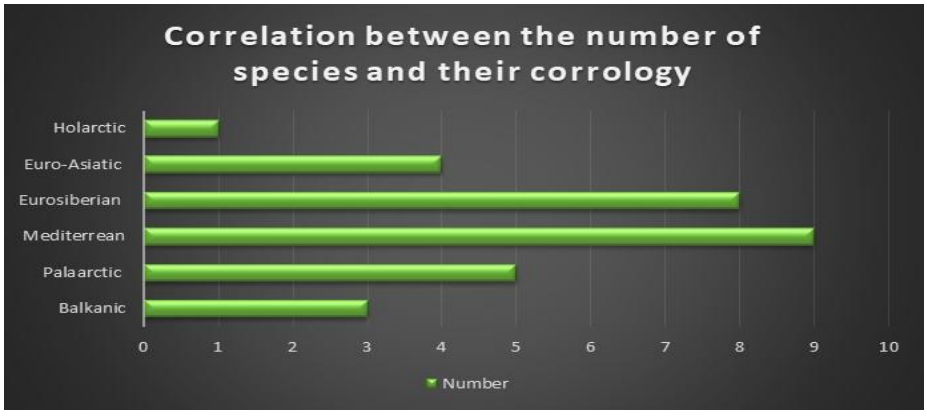
- Family Hesperidae – 6 species
- Family Papilionidae – 3 species
- Family Pieridae – 2 species
- Family Lycanidae – 9 species
- Family Nympalidae – 4 species
- Family Zyganidae -1 species
- Family Saturiidae -2 species
- Family Sphingidae -2 species
- Family Arctiidae -1species



Graph 2. The relationship between the number of species and their families.

Analysis of the correlation between the number of species and the chorology to which they belong.
The analyzed lepidopteras belong to 6 different groups, respectively:

- Eurosiberian- 8 species
- Holarctic-1 specie
- Balcan type-3 species
- Palaarctic-5 species
- Euroasian-4 species
- Eurosiberian-1 type
- Mediterranean-9 species



Graph 3. The relationship between the number of species and their risk corology.

CONCLUSIONS

- The results show that the families with the largest number of endangered species are: the Lycanidae family with 9 species and Hesperidae with 6 species of the 30 types taken into analysis, 25 of them belong to the VU category, 2 types to the DD category and 3 other types to the LR category.
- The analyzed species belong mostly to the Mediterranean type represented by 9 species and the Eurosiberian type by 8 species.
- This study analyzes 30 species of endangered butterflies in the Shkodra Lake area, which are in different categories of risk according to the IUCN definition.
- I think the real reasons are many, but the risk can be summed up in a few main reasons: habitat damage and destruction, pre-spawning, collections, habitat restriction by human activity, commercial collections, forest area fires, collecting (by killing or collecting).
- Biological research on the nature and type of biotopes is underway to avoid pollution of water channels and ponds. In particular, special measures and actions must be taken against the risk of extinction
- To preserve and protect the habitats of the species, regular monitoring of the situation, prohibition of collection, regeneration of natural habitat, to undertake bioecological studies for the complete study of the species, prohibition of collection
- Taking these protective measures will help preserve the biodiversity of butterflies in this area.,

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