State of butterflies

Habitat loss

Prime Butterfly Areas

Butterfly watching

Butterflies and youth

Butterflies are inhabiting our planet over 150 millions of years. During that period they not just survived in a tough competition, but have outlived several epochs of forming of the fauna of our planet. Moreover, they have occupied almost all the terrestrial areas: from tropics to tundra and from dry deserts to high-mountains. At current there are over 100 thousand species of butterflies inhabiting the Earth: these species have been able to adapt for the natural changes.

The changes that took place due to industrial revolution resulted in dramatic increase of human population of the Earth, which grew up more than twice during last 20 years. It inevitably causes more intensive use of natural resources. Consequences are current degradation of forests, grasslands, freshwater ecosystems, and biodiversity. Disappearance of natural habitats under human influence takes place with a speed that exceeds ability of most of plants and animals to become adapted. Butterflies are not an exception, distinctly demonstrating negative consequences of non-rational use of nature. Serious decline of their populations down to species extinction is observed in entire world. As a response to this tendency the scientists, conservationists, and nature-lovers in many countries have been united, in order to coordinate the works on protection of endangered butterfly species, and on conservation and restoration of their habitats.

Conservation

Approach **Species** **Areas** **Contributors**

Caucasus region and Armenian Highland in particular historically have been attracting entomologists for implementation of lepidopterological studies, since long-term isolation and complex relief have formed wide variety of habitats, but meanwhile became an obstacle for intensive studies. The greatest entomologists of the last century have dedicated significant amount of time studying the butterfly fauna of the region (see *History* for details), and have described over 100 species and subspecies. Having shared that passion and being inspired by opportunities of new discoveries, we from 1993 have started studies of butterfly fauna of Armenia, and have focused our activities in the territories of Central Armenia. Few years after we have started study of butterflies of more remote regions of Armenia: Shirak, Tavush, Vayots Dzor, and Syunik, identifying peculiarities of species composition, and forming more comprehensive understanding of the butterflies' fauna. Fairly small area of Armenia became an advantage, allowing us to visit the same areas of data collection several times per annum during the next eight years. The results of these activities were intensive growth of number of records and extensive growth of data collection sites.

In the same time the social-economic changes in the Republic have caused intensification of business activities and occupation of new lands, and that resulted in new conquest on natural habitats. In response to this tendency number of new protected areas was created. One of the most important component for creation of new protected area was existence of baseline data on biodiversity, and for further management of the area – installation of a system of regular monitoring.

In some extent that was an impetus for us to rethink some of the approaches in accordance to the new challenges. So a need emerged to study the best practices of colleagues from Europe to develop a system of regular monitoring of butterflies, and its subsequent introduction as a tool for biodiversity management (see *Butterfly monitoring*). Thus, since 2003, we have been intensively introducing new practices in data collection, which became the basis for the formation of Armenia's first database and allowed to apply the new methods to the study of distribution and abundance of butterflies (see *Distribution and population*).

In addition, we have evaluated the national conservation status for butterflies of Armenia (see *Approach: Conservation status*). This led to the following results, that today in Armenia there are 11 species (5%) which correspond to the category CR, 18 species (8%) – to the category EN, 22 species (9%) – to the category VU, 43 species (17%) – to the category NT, 9 species (9%) – to the category DD, and 123 species (58%) – to the category LC. Of these, 3 CR species are extremely endangered globally since they are represented by two or three populations throughout the world and, accordingly, are candidates for nomination to the IUCN Red List. Needs to note also that in the Red Book of Animals of the Republic of Armenia (2010) there are only 24 species represented.

As it was shown by the works conducted in a number of European countries, Butterflies are a effective tool for monitoring of terrestrial ecosystems since they are extremely sensitive indicators of changes. If existence of long -term data series allows they can be used not only for detection of patterns of changes occurring in habitats, but also for prediction of those (The Millennium Atlas, The State of Butterflies in Britain and Ireland). Taking this into account, we are assisting to lay the tradition of regular monitoring of butterflies, as an important tool for the rational use of the natural resources; the intermediate summarizing of our efforts will be an Atlas Book "The State of Butterflies in Armenia".

The state of **Butterflies** in Armenia

Eng   Arm

Conservation

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Armenia is a small-sized mountainous country, with wide diversity of various grasslands, forests, and wetlands.

Grasslands, which constitute 83.3% of the republic have been occupied rather intensively – by 60%. Among threats caused by intensive business activities, the cultivation of arable lands under different crops and ubiquitous and often poorly-controlled grazing of cattle and especially sheep and goats, are taking a special place, leading to large-scale change in vegetation and often result in erosion. The degradation of grassland habitat has contributed to a significant reduction of abundance in over30 species of butterflies from about 100 grassland specialists. However, mining, though occupies relatively small area leads to dramatic changes in the ecosystem (video link).

Forests in Armenia occupy about 12% of the country. Almost 40% of forests are subject to regular logging, which leads to thinning of forests, reducing shady areas, fragmentation of forest areas and aridization.

The latter, is in significant scale influenced climate change. According to our observations, 25 species of butterflies out of over 60 forest specialists, demonstrate tendency of abundance decline (Report under the "Adaptation to Climate Change Impacts in Mountain Forest Ecosystems of Armenia" UNDP/GEF/00051202 project).

Wetlands make around 4.7% of the area of Armenia, being represented by swamps and wet meadows; the species composition of butterflies here are not rich and is represented by 5 species, however, in their native conditions, these habitats have been preserved only in protected areas.

At current, Armenia has two reserves, seven national parks and 24 reservations. It should be noted that the network of protected areas has evolved significantly over the last time, expanding the total area of from 4% to 12%. As an example, one can look at fairly recently organized National Park "Arevik" that is a home to unique flora and fauna of southern Armenia (video link).

Solving the issue of securing the protection of butterfly habitats in Armenia is possible with strengthening of protection measures in existing protected areas, expanding their networks and by developing of sustainable management of natural resources on the non-protected areas.

Conservation

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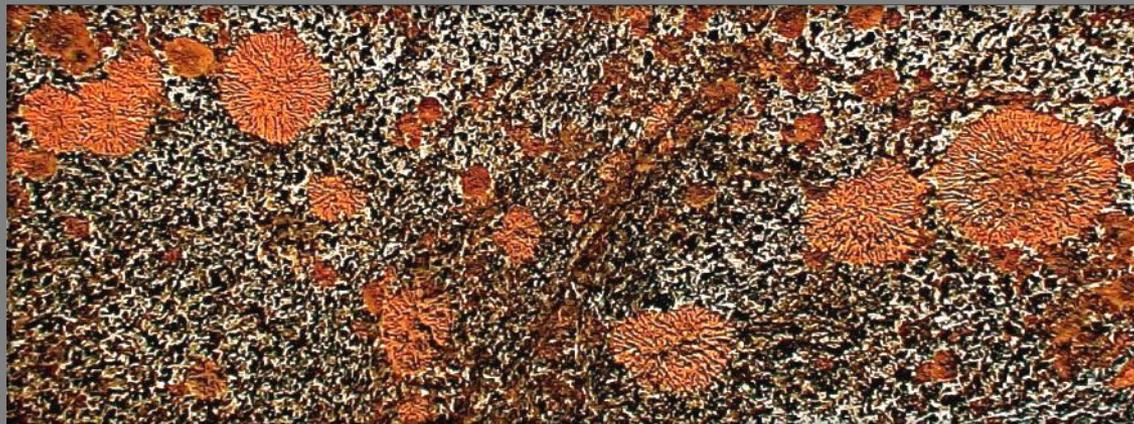
The growing anthropogenic factor leads to habitat degradation and loss of biodiversity with increasing speed. Thus in the Red Book of Butterflies of Europe (van Swaay & Warren 1999), it was clearly demonstrated that out of 576 species the 71 species are threatened. As a response to the emerging threats the development and introduction of the concept of Prime Butterfly Areas (PBA) was started. At the initial stage, identification of PBA was based on the idea of target species, which are considered to belong to two of the three categories: IUCN Red List, the Red Book of Butterflies of Europe, or the Bern Convention. Later, the scope has been expanded in order to include into PBA also areas with high species diversity. Currently, 37 countries in Europe allocated a total of 431 PBA, which makes about 21 million hectares, and about 1.8% of the territory.

Armenia has joined the initiative of Butterfly Conservation Europe in 2013 in frames of the project *Butterfly species and habitat conservation in Southern Armenia* (Rufford Small Grant Program 2013-2014); the implemented works included evaluation of the southern part of Syunik region using common methods (see *Area assessment and promotion*), where the first candidates to PBA have been identified.

Since anthropogenic influence is increasing, the development of a network of Prime Butterfly Areas in Armenia can become a deterrent – attracting an attention of governmental agencies, the scientific community and enthusiasts, thus solving the issue of changing of conservation status of the territory, and therefore contributing to the conservation of the fauna of butterflies and their unique habitats.

Eng   Arm

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Butterflies and youth

Butterfly watching is a relatively new branch of ecotourism, where the main object of observations are butterflies and moths. Currently, there is a steady increase in the number butterfly-watchers and enthusiasts in most developed countries. For example, in the UK, there are about 25,000 butterfly-watchers and more than 1.5 million enthusiasts, one way or another involved in the monitoring of butterflies and their monitoring. Such a great number of fans is not left unnoticed by the tour operators specializing in implementation of wildlife tours. The key to successful butterfly tour is a sufficient number of new species, diversity of habitats, compactness of local movements and the presence of accompanying infrastructure. It should be noted that Armenia, in our opinion, meets most of these requirements because of the presented 234 species, more than half are desirable for most butterfly-watchers (see _Species_). Fairly small area and an extensive branchy system of roads allows in a relatively short period of time (from seven to ten days) observation of wide range of habitats from arid semi-deserts to humid subalpine meadows (see _Areas_). However, the lack of summarizing information resources reflecting the species composition of butterflies, comfortable and at the same time saturated routes, knowledgeable and skilled guides - are deterrents to development of this branch of ecotourism. Formalizing the main provisions (see _Area assessment and promotion_) and developing the infrastructure for protected areas we contribute to the development of butterfly watching in Armenia.

Conservation

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Butterflies and youth

To secure sustainability in the use of natural resources and in species and habitat conservation it is very important to educate the young generation. For developing of children interest in nature the visible bright objects are commonly used, and the butterflies are a good example of that. Studies have shown that a person's attitude to the subject changes with the advent of the object's name. The youth, who learns to recognize species of butterflies is gradually changing the attitude towards them: it becomes personal and therefore more careful. Thus, the development of tools to teach identify types of butterflies was for as both responsible and interesting task.

The developed trainings, has been repeatedly tested on different age groups, have proved their effectiveness in the development of species identification skills , while excursions to the nature have been enhancing the effect, allowing our trainees to test their knowledge in the real conditions.
Feedback of trainees passed the trainings showed that the impulse that they had, contributed to the formation of a personal relationship between youths and nature.

Butterfly monitoring

Distribution and population

Species conservation status

Area assessment and promotion

As a baseline approach the new for Armenia methodological standard developed by Butterfly Conservation Europe (Monitoring Guide BCE) has been adopted. The standard European Monitoring Grid (1996) was applied for the territory of the republic that was divided the area into 374 squares 10x10 km each. Further, the squares were grouped into two categories: those the monitoring was conducted and those where the monitoring was not possible or was inappropriate. The first category includes squares covering the territories of existing reserves, National Parks, Reserves, and in the areas where assessment of the sites as potential protected areas was planned. Furthermore, in selecting priority squares we have been based on assumption that the species diversity of plants is crucial in determining the diversity of butterfly species, therefore have been based on floristic ranging of A.L. Takhtajan (1949). Doing that we have been restricting our choice with one or two squares at the relatively large and biotopically homogeneous areas. Usually, the squares themselves were not uniform: in a single square one could find one to three natural habitats, so for full coverage of the square, we laid on one route for each habitat. Thus, the number of routes in one box was varied from one to three. The frequency of counts on each route was determined by duration of the spring and summer seasons, and depending on the height was ranged from one to four times a year.

The second category consisted of squares in which the urbanized and heavily transformed territories make over 50% of the area. So, for example (see the figure above) from several neighboring squares, partially covering the territory of Khosrov nature Reserve the square #255 was selected for monitoring. Another example is the on that illustrates selection of squares at Leninakan steppe floristic province. Here two neighboring squares are located: one includes 37% of the foothills where cattle grazes and 63% of arable land, and the other – 72% of the foothills and 28% of arable land, and we choose the second, as containing a large proportion of less transformed habitat.

Also need to mention that the squares located at the state border have not been included into the monitoring scheme due to a number of specific limitations.
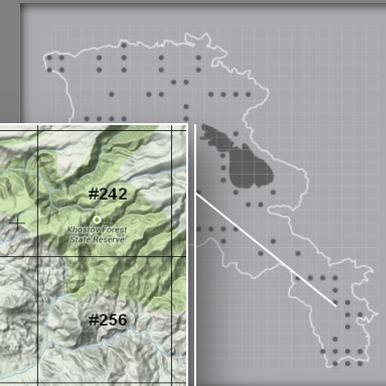
For the surveys, we have selected a standardized transect method of accounting better known as Pollad Walk (Pollard 1984, Pollard & Yates 1993). To this end, we have selected squares were have laid the routes for regular data collection. Each route itself forms the strip with length from 300 to 500 m (depending on the degree of homogeneity of the habitat), width of 5 m on each side, and I was located as far from the periphery of the biotope as possible to avoid edge effect. Routes were laid parallel to the slope and possible away from the roads. Surveys have been carried out by us in the clear days in the interval from 11:00 to 15:00, when the air temperature above 17°C and wind speeds less than 3 m/sec.

To record the count data, we have used standard protocols. At the beginning of the route we recorded the geographic coordinates of the starting point, weather conditions, type of habitat, the names of counters and the start time of count. During the walking through the route, we have been recording observed butterfly species and their number, ignoring the specimens which have been observed outside the five meters width of the route. At the end of the route we have been recording the geographical coordinates of the end point, the end time and traces of human activity in the area.

Until 2008, the taxonomy and systematics of the butterflies have been based on Tuzov et al. (1997, 2003) and Hasselbarth et al. (1995) and later was corrected according to Encyclopedia of Life (eol.species.list). In index on habitats and threats of the database we have been using the classification of IUCN (iucn.redlist.org_habitats_ver.3.1, iucn.redlist.org_threats_ver.3.1).

Database interface contains a list of all of the above mentioned parameters, and the assembly was implemented on the platform of Access.

Butterfly monitoring

Distribution and population

Species conservation status

Area assessment and promotion

For the study of distribution and abundance of butterflies the data collected from 2003 to 2013 with the same methodology have been used. Taking into account the fact that the number of butterflies was counted on routes of different lengths, for their unification their number per 1km of route was computed according to the formula $N_{1km} = 1000*(n/L_{route})$, where N_{1km} is a number of butterflies per 1 km of the route, n is a number per route, and L_{route} is a length of the route.

To visualize the species distribution we have computed waited mean of N_{1km} for 2003-2013 (N_{wmean}), after that using ArcGIS 10.1 we have created a linear shape file for each species, where by coordinates of the start and end points of the route the lines have been outlined; the lines have had a value of N_{wmean} in the atribute table for each route. With the next step we have created a point shape file, where the point was constructed in the 10x10 km square, and was uniting 1-3 routes. Coordinates of the point have been taken as the central coordinates of the square and the average of values of N_{wmean} was calculated. Since abundance of a species can vary within a range a necessity of better demonstration of the uneven population pattern emerged. For the purpose the values of N_{wmean} have been conditionally grouped into the following categories: 1-5; 6-12; 13-19, and over 20. Those categories received different colors and that allows visualizing the uneven number of the species on the map.

Information on the species distribution was supplemented by historical records, which have not been uniformly collected though. Thus the material (including collections) until 1995 was tied to the geographic locations, while later registrations – since 1996 have had GPS coordinates. These registrations were not a subject to quantitative analysis, but were transferred to GIS format and reflected on the distribution maps.

To compute and visualize the population trend we have used Collated Index taken in a logarithmic scale, which was calculated using N_{1km} with use of the TRIM 3.0 software. For statistical analysis the log-linear poison regression was used: at first the mean Collated Index was calculated for the period of 2003-2013, and then, each year was receiving an index, depending on level of difference from the mean Collated Index.

The obtained graph was used to calculate the trend and percentage of decrease or increase of the population, significant probability was taken at $p<0.05$ level.
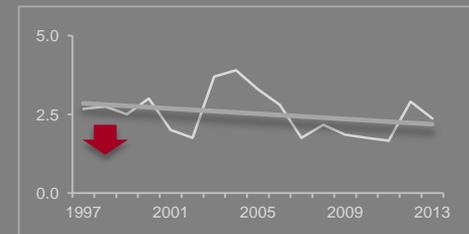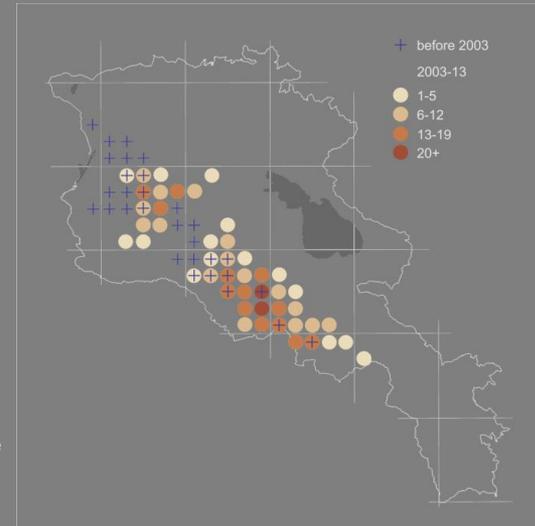
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Butterfly monitoring

Distribution and population

Species conservation status

Area assessment and promotion

To assess the conservation status of species the last manual of IUCN (2012) Guidelines for Application of IUCN Red List Criteria at Regional and National Levels: Version 4.0 was taken as a basis, which was used together with more general guidance: IUCN Red List Categories and Criteria: Version 3.1. According to the Guidelines, to determine the status of the species we estimated population of the species and its habitat in the territory of Armenia, a significant reduction in the population over 10 years, the risk of disappearance of habitat, the degree of specialization of the form, the degree of endemicity and its representation in national and international documents and regulations.

Initial information needed to assess the conservation status is set out in species accounts, particularly in the section *Distribution and biological peculiarities in Armenia*, we present its distribution in the world, as well as occupied habitat, flight period, the stage of hibernation and host plant in Armenia; section *Population dynamics* refers to the number of species, its dynamics and existing or potential threats (section is illustrated with map showing the change in the population throughout the range, and the graph that shows the change in the number for the period 2003-2013); section *Conservation measures* states the measures that are necessary for the protection of a species and its habitat or requires further study. Species accounts are complemented by the presence and status of the species at the national, regional and international levels as symbols below demonstrate:

■ IUCN – the status of the species in IUCN Red List (ver.3.0)

■ ERLB – the status of the species in the European Red List of Butterflies (van Swaay et al. 2010)

■ RBA RA – the status of the species in the Red Book of animals of Armenia (Aghasyan & Kalashyan eds. 2010)

■ CITES – recording of the species in Appendixes of Convention on International Trade of Endangered Species

■ Bern Convention – recording of the species in Appendixes of Bern Convention

■ Endemic – level of endemism of the species

The conducted assessments of the status of threatened species in Armenia, but not yet included in the Red Book of Animals of Armenia are planned for submission to the Ministry of Nature Protection, and assessments of the species that are at risk of global extinction, but have not been evaluated internationally are planned for submission to the IUCN Species Survival Committee

Butterfly monitoring

Distribution and population

Species conservation status

Area assessment and promotion

The area assessment is based on monitoring data (collected in the period 2003-2013), supplemented by data for the period 1993-2002, the latter have been used to generate species lists for the areas. Further the target species have been separated (*van Swaay & Warren 2006*), and the species diversity characteristics, including number of species – endemics of the region have been identified. Based of these two components, the decision about fitting the territory with the criteria of PBA was made. Then each area was presented in the following sequence: description of the territory, which included the geographical coordinates of the central point, elevations, area, main habitats *(IUCN: Habitats Classification Scheme version 3.0*), the dominating plant species and general information about the climate; description of the fauna of butterflies, which included information on the species diversity and lists of target species and endemics; description of the threats, which included types of the land use in these areas, existing and potential threats arising from human activities (*IUCN: Unified Classification of Direct Threats version 3.2*); national or international protection status, which was denoted with the following symbols:

🟥 Protection status of the area in Armenia

🟦 Natura 2000 –designation of the area under Natura 2000 network

The current information was presented to Butterfly Conservation Europe for approval and inclusion of the PBA into the general database.

The information that was collected to assess the status of the territory as a PBA was also used to popularization and promotion of the site for butterfly-watching, becoming in fact the basis for designing of tourist trails. Based on that, the information materials were developed, such as trail-guides and information boards, which have been complementing the existing infrastructure of protected areas (*see Lake Arpi National Park blog post*). The next step is a training of rangers of protected areas in species identification and guiding of tourists on a given trail. Along with this, we conduct lectures and excursions with local students, during which the specificity of the local fauna was emphasized giving it a character of exclusivity, and motivating the younger generation to be responsible for the species and their habitats. Promotion of the territories is finalized with the actions aimed at disseminating information about the opportunities of butterfly watching (*see trails in National Park Arevik*) among local tour operators which have wildlife tour packages.

Hesperiidae

Papilionidae

Pieridae

Satyridae

Libytheidae

Nymphalidae

Lycaenidae

The territory of Armenia is located at the intersection of the two zoogeographical provinces dominating in the region – European and Iranian, which have had a major impact on the formation of the species composition of the fauna of butterflies that is presented by seven families: *Hesperiidae* - 28 species; *Papilionidae* - 5 species; *Pieridae* - 27 species; *Satyridae* - 42 species; *Libytheidae* - 1 species; *Nymphalidae* - 41vid; *Lycaenidae* - 89 species.

 Long-term geographic isolation of the region, climatic peculiarities and a variety of landforms actively contribute to the process of speciation and has led to the emerging of a significant number of species, often represented by local forms, with a total of 234 recorded species, which make more than a third of European fauna of butterflies.

Hesperiidae

Papilionidae

Pieridae

Satyridae
  Esperarge
  Pararge
  Lasiommata
  Melanargia
  Coenonympha
  Erebia
  Proterebia
  Hyponephele
  Maniola
  Hipparchia
  Brintesia
  Arethusana
  Satyrus
  Pseudochazara
    P. pelopea
    P. schahrudensis
    P. beroe
    P. geyeri
    P. daghestana
    P. thelephassa
  Chazara

Libytheidae

Nymphalidae

Lycaenidae

Pseudochazara schahrudensis (Staudinger, 1881)

- 🟥 IUCN – not evaluated
- 🟥 RBB EU – not evaluated
- 🟧 RBA RA – Least Concern
- 🟦 CITES – not included in Appendix II
- 🟦 Bern Convention – not included in Appendix II
- 🟩 Endemic of South Caucasus and North Iran

Distribution and biological peculiarities in Armenia: The species is distributed from the Caucasus to E. Elburs. N. Africa, S. and SE. Europe, the Caucasus and Transcaucasia, Asia Minor, Middle Asia, Kazakhstan, S. Siberia. Armenia is inhabited by nominate subspecies. The species inhabits dry clayey and stony habitats at 1000-2500 m a.s.l. Host plant is *Poa annua.* Flight period in Armenia lasts from late June to early September in single generation. In some years some early specimens begin flight in mid June, and some late individuals end the flight in mid September. In Armenia the species is distributed in central regions of Armenia, where it inhabits mainly dry areas such as various types of semidesert.

Population dynamics: The species shows low abundance within a typical habitat and the population declined on 12% during last 10 years. Taking into account that the species can be considered as a habitat specialist since it occupies very specific niche within a habitat, and that the host plant belongs to grasses, we can say that it is initially vulnerable and the overgrazing is probably one of the main threats for the species.

Conservation measures: We propose to review the conservation status of the species, as well as to detail its distribution and abundance. It might be necessary to designate some areas of species distribution as sites of special concern.
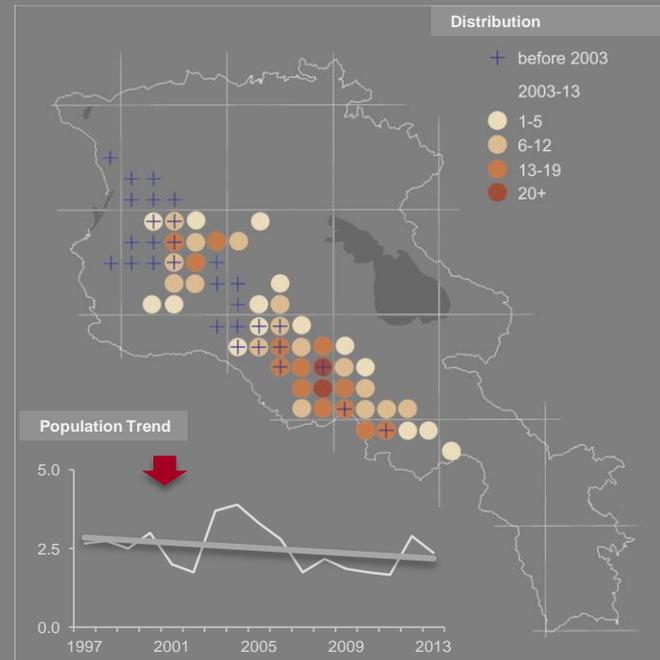
Distribution

- ✚ before 2003
- 2003-13
  - 🟡 1-5
  - 🟠 6-12
  - 🟠 13-19
  - 🔴 20+

Population Trend

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Aragatsotn
Ararat
Armavir
Gegharkunik
Kotayk
Lori
Shirak
Syunik
Tavush
Vayots Dzor

The relief of the Armenian Highlands with an elevation range of 375 to 4090 m above sea level, creates favorable conditions for the formation of a wide range of habitats. They include such types as wormwood, variegated, and halophytic semidesert, impassable brushwoods, tragacanth, esparcet and grass-forb steppes, sub-alpine meadows, alpine carpets, coniferous woodlands, deciduous forests, complemented by cliffs, talus, swamps and floodplains. This originality of the habitats led to the formation of a large number of species, often specialized to specific conditions. The area of the republic is divided into 11 administrative-territorial units – called Marz.

Aragatsotn Marz is located in the central part of Armenia and includes the highest mountain in Armenia - Aragats. Here the mountain-steppe and semi-desert plant formations are dominating, although the high mountain zone is represented by alpine carpets. Also some residual plots of oak forest can be found in the region.

Ararat Marz is located in the south of the country and covers the eastern part of the Ararat Plain. Here the dominating ecosystems are wetlands and wormwood and halophytic semidesert, but in the mid elevation of mountain ranges, which are encircling the Plain from the east, the tragacanth and

Aragatsotn

Ararat

Armavir

Gegharkunik

Kotayk

Lori

Shirak

Syunik

Tavush

Vayots Dzor

esparcet mountain steppes, juniper woodlands and deciduous forest can be observed. The highlands are presented by alpine carpets. Most of the valley is occupied by agriculture: gardening, horticulture and viticulture.

Armavir Marz covers the northern part of the Ararat Plain and is represented mainly by wetlands and wormwood and saltwort semideserts. Here, as in the previous case, a significant part of the valley is occupied by gardening, vegetable growing and viticulture.

Gegharkunik Marz is located in the east of the country and covers the valley of the region's largest alpine lake Sevan, formed by three mountain ranges. Located mainly above 2000 m above sea level, the region is generally represented by mountain-steppe habitats. On the banks of the lake the numerous swamps can be found. North-eastern coast of the lake is the warmest and it hosts the highest-situated plot of juniper woodland in Armenia.

Kotayk Marz is located in the central part of Armenia and is one of the contrasting regions of Armenia. While the slopes Tsakhkunyats mountain ridge (western part) are covered by oak-hornbeam forests, slopes of Gegham Ridge (east) entirely represented by grass-forb mountain steppe, gradually turning into alpine carpets. The southern part of the Marz isdisposed on 1000 m above sea level and presented by arid formations: wormwood and variegated semi-deserts and tragacanth mountain steppes.

Lori Marz is located in the north of Armenia. In the west, where the Lori plateau is, the area is represented mainly by mountain-meadow and mountain-steppe formations interspersed with large swamps, but as we move to the east, relief becomes more rigorous and the forest habitats become dominated ones and are presented by oak-hornbeam and oak-beech associations.

Shirak Marz is located in the west of Armenia and it is mostly a hilly area that stands out as the Shirak plateau. In the relief of Marz a gradual increase of its the elevation is observed from 1000 m above sea level in the south to over 3000 m in the north; thus the change in habitats from wormwood semidesert, through the grassland steppes and subalpine meadows, and further to alpine carpets is noted, and this is interspersed with variety of wetlands,. Particular noteworthy the relict aspen grove in the north-western part of the Marz and insulated portion of esparcet mountain steppe situated on the border with Lori Marz.

Syunik region disposes of the south-east of the country and covers Sisian plateau and three mountain ridges, one of which – Zangezur Ridge – has the greatest extent and is the second highest mountain range in Armenia. At the same time in the region the lowest point in Armenia can be found, thus in the region the only area of Armenia with dry subtropics can be found. With increase of the altitude, the habitats become consistently replaced with semidesert, juniper woodlands, deciduous forest, tragacanth and esparcet mountain steppes, subalpine meadows and alpine carpets. The Sisian plateau is mainly presented by grass-forb steppes and subalpine meadows.
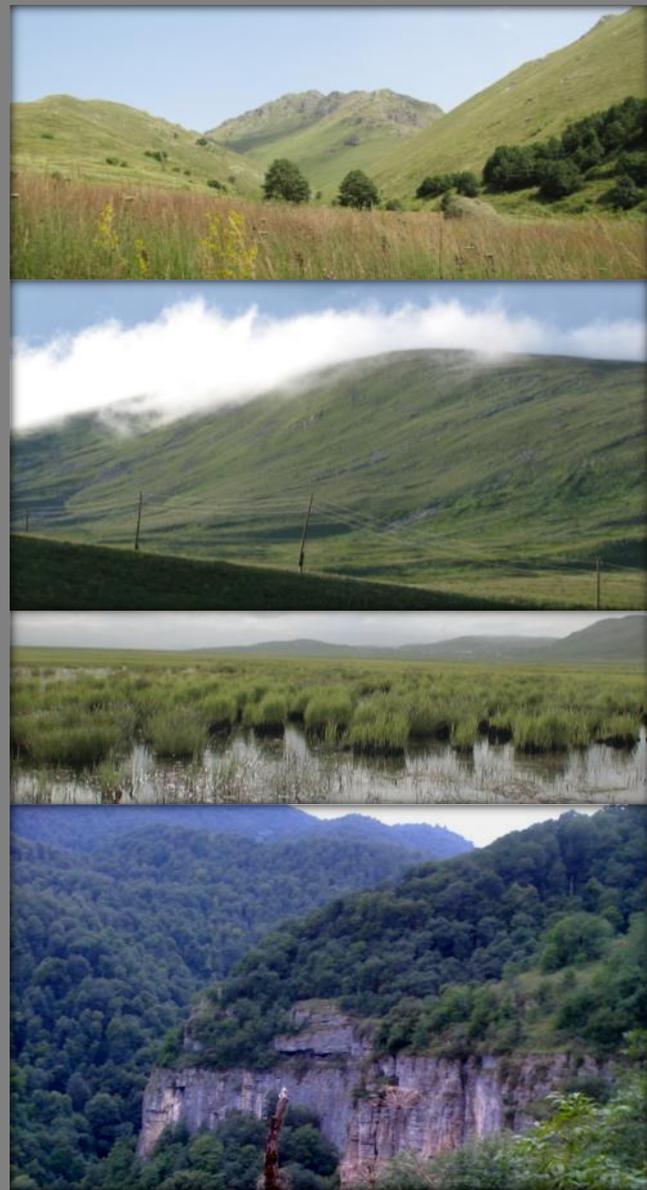
Tavush Marz is located in the north-east of the country. Vast forests of this area are an extension of the forests of Lori Marz. As we move to the northeast, the height of marz decreases and the forests gradually become impassable brushwood, however, despite the low altitude and high temperature, semidesert does not enter the region due to its high humidity.

Vayots Dzor Marz is located on the south of the country and contains a very rugged terrain. The main rock type here is orogenic sedimentary, which imposes a significant imprint on the vegetation composition of the region. It is dominated with tragacanth and esparcet mountain steppes, while the low mountains richly presented with variegated semi-desert. On mountain ridges some residual forests left, and at high altitudes the grasslands become alpine carpets.

Aragatsotn
Ararat
Armavir
Gegharkunik
Kotayk
Lori
Shirak
Syunik
  Agarak
  Goodemnis
  Gyumorats
  Kaladash
  Lichk
  Meghri
  Shvanidzor
Tavush
Vayots Dzor

Name of the territory: Gyumorats

🟥 PA Am – Entire area is within the borders of National Park "Arevik".

🟦 Natura 2000 – the area is not designated

General description: The area (about 627 ha) is located at the southern slopes of Meghri mountain ridge at elevations from 1305 to 2328 m above sea level. The average steepness of slopes is from 15˚ to 30˚. The area includes tragacanth and esparcet mountain steppe, meadows, and broad-leafed forest. Dominant vegetation among herbs are various grasses (*Poa sp. Festuca sp.* etc), and legumes (*Astragallus sp., Onobrychis sp. Trifolium sp.,* etc.); among bushes are tragacanths, and *Onobrychis cornuta*, rosehip (*Rosa sp.*), hawthorn (*Crataegus sp.*), honeysuckle (*Lonicera sp.*), and others; among trees are oak (*Quercus sp.*) and hornbeam (*Carpinus sp.*). The area is characterized by moderate dry climate, with worm and relatively dry summers.

Description of butterfly diversity:
Number of butterfly species in the area – 105 (45% of total number of species in Armenia)
Number of species included in IUCN Red List – None
Number of species included in European Red List – 5
Number of species included in National Red Data Book – 4
Species of national and international concern:

Parnassius mnemosyne, Leptidea duponcheli, Colias aurorina, Proterebia afra, Coenonympha leander, Coenonympha arcania, Hipparchia syriaca, Chazara briseis, Chazara bischoffi, Clossiana euphrosina, Argynnis adippe, Argynnis aglaja, Melithaea caucasogenita, Satyrium abdominalis, Lycaena hippotoe, Callophrys paulae, Pseudophilotes vicrama, Iolana iolas, Agrodiaetus firdussii, Agrodiaetus vanesis, Agrodiaetus zarathustra,

Mountain steppe фото Иванов И

Threats:
Major threats are related to habitat change due to road construction. The road construction in this rigorous terrain and very steep slopes is often implemented as serpentines and it destroys habitat at 100-200m each side and fragments the habitat. The area serves as summer pasture, and thus is threatened by free grazing of livestock (mainly cattle, goats, and sheep) from June to August. The latest removes host-plants of key species, destroys productive top-soil at the slopes by feet of livestock, and in the forest it prevents regeneration of trees due to elimination of young growth.

Onobrychis cornuta dominated steppe above the timeberline. The habitat of *L.duponchelli, C. paulae, A. firdussi, A. vanensis.*(autor foto) .

The listed threats affect all the species of the area but are especially dangerous for the *Parnassius mnemosyne*, *Proterebia afra*, which grow on the herbs, for *Chazara bischoffi,* *Leptidea duponcheli, Callophrys paulae,* *Agrodiaetus firdussii,* and *Agrodiaetus vanensis,* which are represented in the region by the only population, and also for *Agrodiaetus zarathustra,* which has only one known population in the world located in the Gyumorats area. Local children have a habit of burning tragacanths and esparcet *Onobrychis cornuta* that is extremely destroying for populations of *Leptidea duponcheli, Colias aurorina, Callophrys paulae, Agrodiaetus firdussii,* and *Agrodiaetus vanensis,* since it eliminates their host-plants.

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History of research

Acknowledgements

Study of the fauna of butterflies in Armenia began in the late twenties of the nineteenth century, when from Kinderman and Gabergauer the first verified material enters into scientific exchange (unpublished archival materials Moscow Society of Naturalists). Somewhat later, as a result of expeditions to Armenia the 40 species of butterflies have been listed (Lederer, 1852; 1860; 1864; Nordmann, 1851; Eversmann, 1851; Ershov, 1870; Staudinger, 1871). Following this, N.M. Romanov (Romanoff, 1884) in «Les Lèpidoptéres de la Transcaucasie» provides at least 142 species of butterflies, registered in the territory of Armenia.

A work that summarizes the studies on the butterfly fauna of the nineteenth century in Armenia, can be considered the catalog of O. Staudinger and H. Rebel (Staudinger, Rebel, 1901) «Katalog der Lepidopteren der Palaearktischen Faunesgebietes». From the works of the early twentieth century, it is necessary to mention the work of K. Lampert (Lampert, 1911-1913) «Atlas of Butterflies in Europe and part of the Russian-Asian holdings", which contains some information on butterflies Caucasus.

The period following the political changes in Russia and the Caucasus was marked by works, in which the main emphasis was on the study of agricultural pests and the development of methods of their control, whereas during this period (from 1917 to the thirties of the twentieth century) any significant works have not been dedicated to study of butterflies of Armenia.

However, during this period, and later the accumulation of material on the Rhopalocera of Armenia was continued. Thus, intensive collection of butterflies were carried out by a number of researchers, such as: S.K. Korb, G.A. Gamburtsev, G.S. Kochubei, V.V. Sovinsky, B.P. Tkachukov, M.A. Ryabov, L.A. Shelyuzhko, A.V. Tsvetayev, Y.P. Nekrutenko.

Their materials have formed a solid foundation for the establishment of regional lists, atlases and a series of papers on the systematic. Some useful information on the taxonomy of butterflies on the fauna of Armenia were published in major catalogues and reports on the butterflies of the world (Smart, 1976), butterflies of Europe (Higgins, Riley, 1970), on the butterflies of Turkey (Hesselbarth et al., 1995). An iconic work was the atlas of Y.P. Nekrutenko "Butterflies of the Caucasus", that was including 34 species of Armenia (Nekrutenko, 1990).

In 1995-1996, a book by Y.P. Korshunova and P.Y. Gorbunov "Butterflies of Asian part of Russia", was released that brings together information on 432 species, including 182 from Armenia (Korshunov & Gorbunov 1995). V.K. Tuzov in his catalog (Tuzov 1993) greatly expanded the list of species of butterflies mentioning 879 species for USSR, including 199 species of Armenia.

Actually on the fauna of butterflies of Armenia there are not numerous works. S.A. Vardikyan (1959) in her book "Butterflies of Armenia" (in Armenian) results in 64 species. In 1982 a book "Rare insects" (Mirzoyan 1982) was published and contains information on 15 species occurring in the territory of Armenia.

Finally, sufficient details on vulnerable species of butterflies of Armenia are given in the recent publication

History of research

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The project Butterfly Conservation Armenia will stay an open initiative, that will dynamically become fulfilled with new information, and we with full acknowledgement will receive your contribution and to include the new data into the database and take it into account for further analysis. We with pleasure will answer any questions regarding fauna and distribution of the butterflies of Armenia.

(*info@butterfly-conservation.am*)

Name of observer

Date of observation

Name of location

Species

Number of individuals

E-mail (for contact)

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