

The Eurasia Proceedings of Health, Environment and Life Sciences (EPHELs), 2022

Volume 5, Pages 35-39

**ICMeHeLS 2022: International Conference on Medical, Health and Life Sciences**

## **Flora and Fauna Conservation in Machakhela National Park Georgia**

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**Abstract:** Biodiversity conservation is the protection and management of biodiversity to obtain resources for sustainable development. The diverse topography and climate has provided conditions to develop a remarkably wide array of landscapes and plant formations. They include two features of plants and plant associations that date back millions of years: the Colchic refugium in the eastern Black Sea basin and the Hyrcanic region on the southern Caspian Sea coast. These “refugia”/refugial forests harbour many locally endemic plants - species that are found nowhere else. They include relict and endemic oaks (such as *Quercus imeretina*, *Q. hartwissiana*), Medvedev’s birch (*Betula medwedewii*), Ungern’s and Smirow’s rhododendrons (*Rhododendron ungerii*, *R. smirnowii*) in the Colchic. Machakhela National Park is located 30 km away from Batumi in the foothills of the Lesser Caucasus. Close to the Turkish border, Machakhela expands the protection of the unique ecosystems of the Colchic forests – rich tropical and sub-tropical habitats (temperate rain forests with peat bogs) which contain unrivaled biodiversity, and are rich in relics of the tertiary period: Colchic bot box, chestnut, nut, hazel-nut, and bot trees abound. Trails are being developed and since this park has only been recently established, you can still be one of the first to witness its wet beauty. At the same time these unique forests can mostly be classified as temperate rainforests, due to the same principal reasons as for other temperate rainforest regions: relevant slopes of barrier mountains located along coastlines that trap a large portion of the humidity from sea air masses. Montane barriers also contribute to a warm and humid climate that has been present since the late Tertiary and is the primary reason that the Caucasus has acted as a shelter for humid- and warm-requiring (hygrothermophilous) relicts during the ice age.

**Keywords:** Machakhela. National Park. Biodiversity. Flora. Fauna

### **Introduction**

Georgia, like the whole Caucasus, is one of the 36 "hot spots" of world biodiversity. As a reserve of many endemic, rare and extinct species, it is the richest in its biodiversity not only in the Caucasus, but also in Europe. Adjara, in this respect, is considered to be one of the outstanding regions in the whole Caucasus. Protected areas, including national parks, are a guarantee of sustainable development in Georgia. The main parts of the country's wealth, forest groves, the representatives of terrestrial and aquatic flora and fauna, monuments of historical and cultural heritage and others are protected in these areas. (Gegechkori, 2020).

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- Selection and peer-review under responsibility of the Organizing Committee of the Conference

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Machakhela National Park is located on the territory of the Khelvachauri Municipality of the Autonomous Republic of Adjara and is part of the Protected Areas Agency of the Ministry of Environment and Natural Resources of Georgia. In the north the territory of Machakhela National Park is bordered by the territory of Keda Municipality and Kirnati Forestry of Khelvachauri Forestry Administration. Kirnati Forestry of Khelvachauri Forestry Administration in the west, Turkish state in the east and south. The forest massifs of Machakhela National Park stretch 11 kilometers from the north to the south, and 20 kilometers from the east to the west. The total area of the forest fund of Machakhela National Park is 7327 ha with the afforestation of 2016.

Adjara fauna diversity is represented by 4627 species. 4028 of them belong to invertebrates (15 species are included in the Red List of Georgia), and 599 belong to chordates (66 species are included in the Red List of Georgia). 548 species of plants are distributed on the territory of Machakhela National Park, 55 species of which are endemic, among them 21 from the Caucasus, 3 from Georgia, 25 from Colchis, 4 from Adjara-Lazeti and 2 from Adjara. On the territory of the park, there are 35 coniferous plants (5.5%), 31 shrubs (5.7%), 18 semi-shrubs (3.3%), 19 filices (3.5%) and 445 species of herbaceous plants (81.2%), 278 (50.7%) of which are perennial herbaceous plants, 53- (9.7%) biennial herbs, 90- (16.4%) annual herbs, 19-(3.5%) seasonal herbs, 5-(0.3%) biennials and perennials. Many relict and endemic plants are gathered here: rare and endangered species, 12 species of the "Red List" of Georgia, 52 species of the "Red List" of the Caucasus and 7 species of the IUCN-International Red List. Among the species in the national park, there are Pontic oak (*Quercus pontica*), Medvedev birch (*Betula medwedewii*), Laz iris (*Iris lazica*), Ungern sugar (*Rhododendron ungeri*), Hartwiss oak (*Quercus hartwissiana*) and many other plants. (Nakhutsishvili, 2014)

## Method

The purpose of the research is to study the flora and fauna of Machakhela National Park and to assess their current state. The collection of the field data was held on the territory of the park using a weekly route method. We processed the selected sample areas using the releve method. The plant nomenclature is given in the abstract of Flora of Georgia (Gagnidze, 2003), Florist of Georgia Vol. IXIV, (1971-2003), We assigned systematic status to the plant according to the Plant List ([www.theplant.list.org](http://www.theplant.list.org)).

Observation and description of animals in the research area is carried out using various methods: monitoring and recording methods, camera processing, orthophotos, traps. For example, the population monitoring of the hornbill, Caucasian salamander, brown bear, lynx is carried out with photo traps.

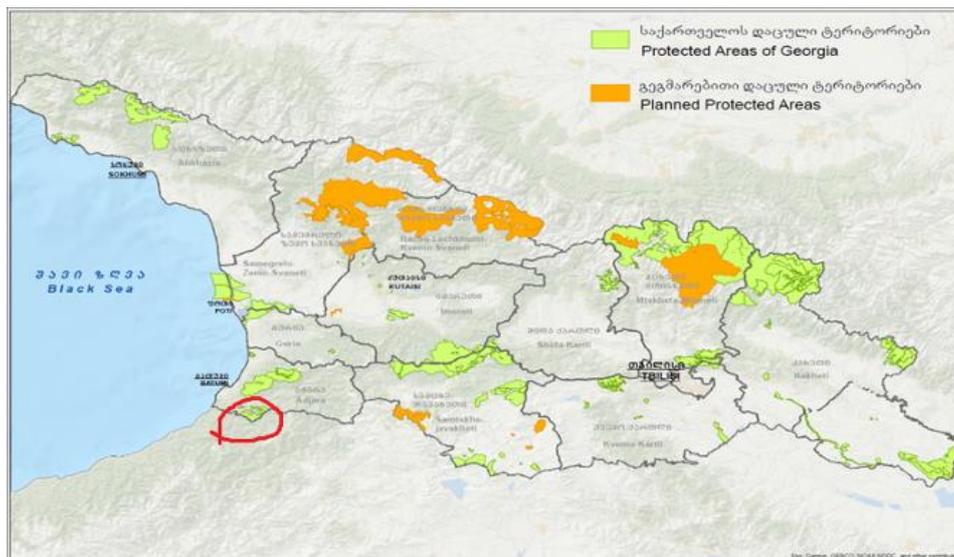


Figure 1. Map of study area

Photo traps are placed in different rangers, the areas of which are determined by the staff of the protection department, in strategic places, mainly where the probability of detecting priority key species is high, as a result of which monitoring is carried out. Also, the monitoring is carried out in a special form developed by the administration, which is filled in daily in the field while recording traces, excrement, den and other specific signs.

While recording traces, excrement, den and other specific signs in the field, monitoring proceeds actively with both photo traps and a camera and direct observation. The number of birds' nests, overgrown hollowed out trees, ant nests and the location of wild animals were recorded using the abovementioned methods.

## **Results and Discussion**

41 species of mammals (3 species are included in the Red List of Georgia), 108 species of birds (8 species are included in the Red List of Georgia), 31 species of fish (1 is included in the Red List of Georgia), 21 species of amphibians and reptiles belong to the list of animal species widespread on the territory of the Forest Foundation of the Machakhela National Park.

During the research process in the research area, 8 harmful insects were identified, which are a necessary component of the biological processes in the forest ecosystems. According to the route-detailed recording method of pathological observations, a list of harmful insects has been determined, which, from the economic and pathological point of view, are of special importance for the present and the nearest future:

1. *Mikiola fagi* Hartig
2. *Cameraria ohridella* Deschka & Dimic
3. *Tischeria complanella* Hb.,
4. *Cerambix cerdo acuminatus* Motsch.,
5. *Lymantria (Ocneria) dispr* L.,
6. *Erannis defoliaria* Clerck.
7. *Agelastica alni* L.
8. *Cydalima perspeqtalis* Walker.

31 species registered in the class of fishes in Machakhela National Park are united in 10 families; 5 species registered in the class of amphibians are united in 3 families; 41 species registered in the class of mammals are united in 13 families;

### Species of the red list in Machakhela National Park

- I. Class: Actinopterygii Klein, 1885  
Family: Salmonidae Cuvier, 1816  
1. Species - *Salmo trutta* Linnaeus, 1758 VU (A1d)
- II. Class: Birds - Aves Linnaeus, 1758  
Family: Podicipetidae Latham, 1787  
2. Species - *Podiceps grisegena* (Boddaert, 1783) VU(D1)  
Family: Ardeidae Leach, 1820  
3. Species - *Ciconia nigra* (Linnaeus, 1758) VU(D1)  
Family: - Accipitridae Vieillot, 1816  
4. Species - *Accipiter brevipes* (Severtzov, 1850) VU(D1)  
5. Species - *Aquila clanga* Pallas, 1811 VU(IUCN)  
6. Species - *Aquila heliaca* Savigny, 1809 VU(IUCN)  
7. Species - *Buteo rufinus* (Cretzschmar, 1826) VU(D1)  
8. Species - *Neophron percnopterus* (Linnaeus, 1758) VU(D1)  
Family: Falconidae Vigors, 1824  
9. Species - *Falco vespertinus* Linnaeus, 1766 EN(D1)
- III. Class: Mammals - Mammalia Linnaeus, 1758  
Family: Sciuridae Fischer, 1817  
10. Species - *Sciurus anomalus* Gmelin, 1778 VU(A1e)  
Family: Mustelidae Fischer, 1817  
11. Species - *Lutra lutra* (Linnaeus, 1758) VU(B1(bI))  
Family: Ursidae Fischer von Waldheim, 1817  
12. Species - *Ursus arctos* Linnaeus, 1758 EN

95% of the territory of Machakhela National Park is covered with forest and impenetrable bushes. Hypsometrically, the forests are distributed as follows:

500-600 m above the sea level: it is represented by mixed broad-leaved Colchian type forests, where the largest part of the park's territory is occupied by forest phytocenoses dominated by alder (*alnus barbata*), also in this zone we find chestnut copse - (*astanea sativa*) and beech forest (*fagus orientalis*) as well as hornbeam (*lat. Carpinus caucasica*) ash-tree (*Fraxinus excelsior*), sumach (*Rhus coriaria*), maple (*Acer campestre*) - chequer (*Sorbus torminalis*) and others.

500-800-1000 (1200 m): chestnut belt. This belt also includes hornbeam, alder, linden - (*tilia caucasicum*), elder - (*Sambucus nigra*), ash-tree - (*lat. Fraxinus*), elm - (*lat. Ulmus*) spruce - (*lat. picea orientalis*) yew - (*lat. Taxus baccata*), persimmon - (*lat. Diospyros lotus*), locust - (*lat. Robinia pseudoacacia*), pear (*lat. Pyrus caucasica*), goat-willow - (*lat. Salix caprea*), from aspen species - poplar (*lat. Populus euphratica*) (*Populus*) and others.

Undergrowth: Colchian bladder-nut is frequent here - (*Lat. Staphylea colchica*), Colchian box tree - (*Lat. buxus cholchica*), Pontic Rhododendron - (*Lat. Rhododendron ponticum*), azalea - (*Rhododendron luteum*), cherry-laurel - (*laurocerasus officinalis*), spodozol fern - (*Dryopteris oreopteris*), male-fern - (*dryopterix filix-mas*), ivy - (*Hedera pastuchowii*), hart's tongue - (*Phyllitis scolopendrium*), elder - (*Sambucus ebulus*), phytolacca - (*Phytolacca Americana*), field chamomile - (*Leucanthemum-vulgare*), ilex - (*Ilex colchica*), bladder-nut - (*Staphylea*), fig (*Ficus carica*), alder buckthorn - (*Frangula alnus*), apple - (*Malus orientalis*), locust - (*Robinia pseudoacacia*) and others.

The beech belt is represented at 1000-1500 (1800m) above the sea level. This belt consists mainly of eastern beech, hornbeam, and the mixture of other species.

The species of flora included in the red list of Machakhela National Park

№	Species	Verbal basis for the inclusion in the "red list"	The status of safety and condition
1	<i>Castanea sativa</i>	Reduction of the area and the tendency of fragmentation	VU
2	Georgian walnut <i>Juglans regia</i>	Reduction of the area and the tendency of fragmentation	VU
3	<i>Corylus colchica</i>	Small fragmented area	VU
4	<i>Taxus baccata</i>	Small, fragmented area	VU
5	<i>Buxus colchica</i>	Reduction of the area and the tendency of fragmentation	VU
6	<i>Rhododendron ungerii</i>	Small, fragmented area	VU
7	<i>Cerasus silvestris</i>	Small, fragmented area	VU
8	<i>Ulmus glabra</i> Huds	Small, fragmented area	VU
9	Georgian maple ( <i>Acer ibericum</i> M. Bieb. ex Willd)	Small, fragmented area	VU
10	<i>Quercus pontica</i>	Small, fragmented area	VU
11	<i>Quercus hartwissiana</i> , <i>Quercus armeniaca</i>	Small, fragmented area	VU
12	<i>Betula medwedewii</i>	Small, fragmented area	VU
13	<i>Staphylea colchica</i>	Small, fragmented area	VU

## Conclusion

Thus, the flora and fauna of Machakhela National Park have been studied. According to the data of 2018-2022, 8 species of harmful insects and 201 species of vertebrate animals have been registered, 41 species of which are mammals, 108 species are birds, 31 species are fish, 16 species are reptiles, 5 species are amphibians. 12 species of vertebrate animals are included in the red list of Georgia.

548 species of plants, united in 108 genera of 30 families, 55 species of which are endemic, including 21 from the Caucasus, 3 from Georgia, 25 from Colchis, 4 from Adjara-Lazeti and 2 from Adjara.

## Scientific Ethics Declaration

The authors declare that the scientific ethical and legal responsibility of this article published in EPHELS journal belongs to the authors.

## Acknowledgements or Notes

\* This article was presented as an oral presentation at the International Conference on Medical, Health and Life Sciences ([www.icmehels.net](http://www.icmehels.net)) conference held in Baku/Azerbaijan on July 01-04, 2022.

\* The authors are thankfully acknowledge the sponsorship of Machakhela National Park Administration.

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## To cite this article:

Jgenti, L., Bolkvadze, G., Iakobadze, M. & Diasamidze, I. (2022). Flora and fauna conservation in Machakhela National Park Georgia. *The Eurasia Proceedings of Health, Environment and Life Sciences (EPHELS)*, 5, 35-39.