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Preliminary Data on the Plant and Vertebrate Animal Diversity in the Area of Dedovo Village (West Rhodopes Mts.)

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Abstract. Dedovo Village (Rodopi Municipality, Plovdiv District) is located at 25 km from Plovdiv City in the Western Rhodopes Mts., at an altitude of 1000 to 1060 meters. Its proximity to the city and relatively preserved natural environment make it a more attractive place during the last years for relaxation, especially in the summer. However, the increased tourist presence in the area leads to an increase of anthropogenic pressure on the natural ecosystems. Aim of this study is to assess the plant and vertebrate animal diversity in the area of Dedovo Village and to identify the potential threats and risks to its conservation. More than 70 plant species were described, including one rare species and 5 Balkan endemics and 30 species, listed in the Bulgarian Medicinal plants Act. From the vertebrate animals 39 species were described, including 15 mammals (3 species with conservation status), 15 birds (4 species with conservation status), 6 reptiles and 2 amphibians.

Key words: biodiversity, Dedovo Village, medicinal plants, conservation status, threats.

Introduction

Dedovo Village (Rodopi Municipality, Plovdiv District) is located at 25 km from Plovdiv city in the Western Rhodopes Mts., at an altitude of 1000 to 1060 meters. Nearest villages are Ravnishta Village – at 2.0 km and Boykovo Village - at 3.2 kilometers. Area of Dedovo Village covers 15.326 km^2 (RODOPI MUNICIPALITY, 2015). Resident population continuously decreased over the years – from 134 citizens in 01.01.2007 to 54 in 01.02.2011 (NSI, 2011).

Climate is typical for Western Rhodopes Mts., because of the high altitude the mountain climate prevails. It is mitigated by the warm Mediterranean air masses penetrating along the rivers. Average annual temperatures are between 5 and 10°C, and the average amount of precipitation varies from 750 to 1100 mm. In nearly 80% of the mountain, with the exception of southwestern and southern parts, the runoff is directed to the Maritsa River by its right tributaries – Chepinska Reka River, Stara Reka River, Pepelashka Reka River, Cherkezitsa River and other smaller rivers. In the high zone of the Western Rhodopes Mts., the large amount of rainfall, the prolonged detention of snow, the negligible evaporation, the big slope of the terrain and the prevailing watertight geological base are a prerequisite for the high value of the drain module (over 25 l/s km^2). Runoff mode within the average

altitude belt areas has reduced to 10-15 l/s km² due to increased precipitation and strong evaporation (RODOPI MUNICIPALITY, 2015).

Soils are largely influenced by the nature of the climate, geological base and the peculiarities of the relief. Foot and main belt of the mountain slopes are occupied by Cambisols, the mountain ridges are covered with Gleyic chromic luvisols, and Mollic Fluvisols are distributed along the rivers (RODOPI MUNICIPALITY, 2015).

Proximity of Dedovo Village to Plovdiv City, the fresh mountain air and relatively preserved natural environment make the village an even more attractive place during the last years for relaxation, especially in the summer. Increased tourist presence in the area leads to an increase of anthropogenic pressure on the natural ecosystems. The aim of this study is to assess the plant and vertebrate animal diversity in the area of Dedovo Village and to identify the potential threats and risks to its conservation.

Materials and Methods

Plant and vertebrate animal diversity in the region were examined through numerous field studies in the period 2014-2015. Field work was made using the method of line transect, as 8 transects were built using GPS Garmin E-Trex Vista - to N, NE, E, SE, S, SW, W and NW directions, starting from the village periphery. Each one was at least 1 km long depending on the peculiarities of the relief. Observations were made up to 3 m to the left and right side of each transect. Plants species were determined according to DELIPAVLOV & CHESHMEDZHIEV (2003). For determination of the vertebrate fauna, the Identification guide of vertebrate animals in Bulgaria (PESHEV, 2001) was used. Conservation status of the identified species was presented according to the contemporary Bulgarian and European legislation – Red Data Book of the Republic of Bulgaria vol.1. (PEEV *et al.*, 2015), Red Data Book of the Republic of Bulgaria vol.2. (GOLEMANSKI *et al.*, 2015), BULGARIAN BIOLOGICAL DIVERSITY ACT (2002), BULGARIAN MEDICINAL PLANTS ACT (2000), and IUCN Red List of Threatened Species (IUCN, 2015). Potential problems and threats to biodiversity in the region (fire, waste disposal, plant picking, poaching, etc.) were examined through direct observations and interviews with tourists and local population.

Description of the conservation status categories according to the UICN criteria (IUCN, 2015):

EN - Endangered (a taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild).

VU - Vulnerable (a taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild).

NT - Near Threatened (a taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future).

LC - Least Concern (a taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category).

Fig. 1. Indicative map of study area.

Results and Discussion

Plant diversity

Dedovo Village falls into Rhodopes Mts. (middle) floristic region. We described about 70 plant species common for the region – 7 with conservation status [including one rare species – *Erodium hoefftianum*, and 5 Balkan endemics – *Silene fabarioides*, *Genista rumelica*, *Digitalis viridiflora*, *Fritillaria pontica*, *Rorippa lippizensis,* and two with conservation status LC in IUCN Red List - *Dactylorhiza cordigera* and *Rorippa lippizensis*] (Table 1) and 30 species, included in the Bulgarian Medicinal plants Act (Table 2).We found that in the region of Dedovo Village meet coniferous, deciduous and mixed forests of *Abies alba*, *Picea abies*, *Pinus sylvestris*, *Pinus nigra*, *Fagus sylvatica*, *Betula pendula*, *Populus tremula*, *Tilia* spp., and others (Table 3). Subforest and herb layer consist mainly of *Dryopteris filix-mas*, *Juniperus communis*, *Rubus caesius*, *Rubus idaeus*, *Rosa canina*, *Vaccinium vitis-idaea*, *Vaccinium myrtillus*, *Fragaria vesca* and others (Table 4). Some other species were also observed: *Dactylis glomerata*, *Campanula sparsa*, *Luzula sylvatica*, *Myosotis sylvatica*, *Lamium garganicum*, *Chaerophyllum aureum*, *Trifolium aureum*, *Holcus lanatus*, *Campanula rapunculus*, *Chamaenerion angustifolium*, *Poa annua*, *Quercus petraea*, *Sedum pallidum*, *Acer hyrcanum*, *Nepeta nuda*, *Lysimachia punctata*, *Lychnis coronaria*, *Trifolium purpureum*, *Galium tenuissimum*, *Lapsana communis*, *Carduus candicans*, *Prenanthes purpurea*, *Doronicum austriacum*, *Trifolium hybridum*.

Table 1. List of identified plant species with conservation status.

№	Scientific name	Common name	Family	Bulgarian Red Data Book, Vol. 1	Bulgarian Biological Diversity Act	IUCN Red List
1	*Erodium hoefftianum* C. A. Meyer	Hoefftianianst Storksbill	Geraniaceae	Rare species	-	-
2	*Silene fabarioides* Hausskn.	Campion	Caryophyllaceae	Balkan endemic	-	-
3	*Genista rumelica* Velen.	Rumelian Greenweed	Fabaceae	Balkan endemic	-	-
4	*Digitalis viridiflora* Lindley	Green Foxglove	Scrophulariaceae	Balkan endemic	-	-
5	*Fritillaria pontica* Wahlenb.	Pontic Fritillary	Liliaceae	Balkan endemic	+	-
6	*Rorippa lippizensis (Wulfen)* Reichenb.	-	Brassicaceae	Balkan endemic	-	LC
7	*Dactylorhiza cordigera (Fries)* Soó	Heart Shaped Lip Dactylorhiza	Orchidaceae	-	-	LC

Table 2. List of identified plant species included in the BULGARIAN MEDICINAL PLANTS ACT (2000).

№	Scientific name	Common name	Family
1	*Fagus sylvatica* L.	European Beech	Fagaceae
2	*Cardamine bulbifera* (L.) Crantz. (*Dentaria bulbifera* L.)	Coralwort	Brassicaceae
3	*Euphorbia amygdaloides* L.	Wood Spurge	Euphorbiaceae
4	*Fragaria vesca* L.	Strawberry	Rosaceae
5	*Tussilago farfara* L.	Coltsfoot	Asteraceae
6	*Dryopteris filix-mas* (L.) Schott	Wood Fern	Aspidiaceae
7	*Vaccinium myrtillus* L.	Bilberry	Ericaceae
8	*Geranium sanguineum* L.	Bloody Cranesbill	Geraniaceae
9	*Prunella vulgaris* L.	Self-heal	Lamiaceae
10	*Pinus sylvestris* L.	Scots Pine	Pinaceae
11	*Carpinus betulus* L.	European Hornbeam	Betulaceae
12	*Abies alba* Miller	Silver Fir	Pinaceae
13	*Rubus caesius* L.	European dewberry	Rosaceae

14	*Veronica officinalis* L.	Heath Speedwell	Scrophulariaceae
15	*Urtica dioica* L.	Stinging Nettle	Urticaceae
16	*Geum urbanum* L.	Common Avens	Rosaceae
17	*Hypericum cerastoides* (Spach) N. K. B. Robson	St. John's wort	Hypericaceae
18	*Hypericum perforatum* L.	Perforate St John's wort	Hypericaceae
19	*Geranium macrorrhizum* L.	Cranesbill	Geraniaceae
20	*Polypodium vulgare* L.	Polypody	Polypodiaceae
21	*Chamaecytisus albus* (Jacq.) Rothm.	White Broom	Fabaceae
22	*Digitalis lanata* Ehrh.	Woolly Foxglove	Scrophulariaceae
23	*Achillea millefolium* L.	Common Yarrow	Asteraceae
24	*Clinopodium vulgare* L.	Wild Basil	Lamiaceae
25	*Viola tricolor* L.	Wild Pansy	Violaceae
26	*Betula pendula* Roth	Silver Birch	Betulaceae
27	*Crataegus monogyna* Jacq.	Common Hawthorn	Rosaceae
28	*Matricaria trichophylla* (Boiss.) Boiss.	-	Asteraceae
29	*Lathyrus pratensis* L.	Tom Thumb	Fabaceae
30	*Trifolium pratense* L.	Red Clover	Fabaceae

Table 3. Identified plant species in deciduous, coniferous and mixed forests.

№	Scientific name	Common name	Family
1	*Abies alba* Mill.	Silver Fir	Pinaceae
2	*Picea abies (L.)* H. Karsten	Norway Spruce	Pinaceae
3	*Pinus sylvestris* L.	ScotsPine	Pinaceae
4	*Pinus nigra* L.	Austrian Pine	Pinaceae
5	*Fagus sylvatica* L.	CommonBeech	Fagaceae
6	*Quercus petraea* (Mattuschka) Liebl.	Sessile oak	Fagaceae
7	*Betula pendula* Roth.	Silver Birch	Betulaceae
8	*Carpinus betulus* L.	European Hornbeam	Betulaceae
9	*Populus tremula* L.	Aspen	Salicaceae
10	*Tilia tomentosa* Moench	Silver Linden	Tiliaceae
11	*Tilia cordata* Miller	Small-leaved Linden	Tiliaceae
12	*Tilia platyphyllos* Scop.	Large-leaved Linden	Tiliaceae
13	*Acer hyrcanum* Fisher & C. A. Meyer	Balkan Maple	Aceraceae

Table 4. Identified plant species in subforest and herb layer.

№	Scientific name	Common name	Family
1	*Juniperus communis* L.	Common Juniper	Cupressaceae
2	*Rubus caesius*L.	European Dewberry	Rosaceae
3	*Rubus idaeus* L.	Raspberry	Rosaceae
4	*Fragaria vesca* L.	Wild strawberry	Rosaceae
5	*Rosa canina* L.	Dog-rose	Rosaceae
6	*Crataegus monogyna* Jacq.	Common hawthorn	Rosaceae
7	*Vaccinium vitis-idaea* L.	Mountain Cranberry	Ericaceae
8	*Vaccinium myrtillus* L.	Bilberry	Ericaceae
9	*Dryopteris filix-mas* (L.) Schott	Wood Fern	Aspidiaceae
10	*Polypodium vulgare* L.	Polypody	Polypodiaceae

Vertebrate animal diversity

More than 50 vertebrate species were found, including 15 mammals (3 species with conservation status) (Table 5) and 15 bird species (4 species with conservation status) (Table 6). Only two amphibians were registered - *Salamandra salamandra* and *Pelophylax ridibundus*; reptiles were presented by *Elaphe longissima*, *Vipera berus*, *Lacerta viridis*, *Lacerta trilineata*, *Testudo hermanni* and *Emys orbicularis*.

Table 5. List of identified mammals in the region of Dedovo Village.

№	Scientific name	Common name	Family	Bulgarian Red Data Book, Vol.2	IUCN Red List
1	*Lepus europaeus* Pallas	European hare	Leporidae	-	LC
2	*Sus scrofa* L.	Wild boar	Suidae	-	LC
3	*Capreolus capreolus* L.	European roe deer	Cervidae	-	LC
4	*Cervus elaphus* L.	Red deer	Cervidae	-	LC
5	*Dama dama* L.	Fallow deer	Cervidae	-	LC
6	*Rupicapra rupicapra* L.	Wild goat	Bovidae	EN	LC
7	*Ursus arctos*L.	Brown bear	Ursidae	EN	LC
8	*Vulpes vulpes* L.	Red fox	Canidae	-	LC
9	*Canis lupus* L.	Gray wolf	Canidae	VU	LC
10	*Canis aureus* L.	Golden jackal	Canidae	-	LC
11	*Sciurus vulgaris* L.	Red squirrel	Sciuridae	-	LC
12	*Martes foina* (Erxl., 1777)	Beech marten	Mustelidae	-	LC
13	*Mustela putorius* L.	European polecat	Mustelidae	-	LC
14	*Meles meles*L.	European badger	Mustelidae	-	LC
15	*Erinaceus roumanicus* Barrett-Hamilton, *1900*	Southern white-breasted hedgehog	Erinaceidae	-	LC

Table 6. List of identified birds in the region of Dedovo Village.

№	Scientific name	Common name	Family	Bulgarian Red Data Book, Vol.2	IUCN Red List
1	*Tetrao urogallus* L.	Western capercaillie	Phasianidae	EN	LC
2	*Phasianus colchicus mongolicus* von Brandt	Common Pheasant	Phasianidae	-	LC
3	*Perdix perdix* L.	Grey partridge	Phasianidae	-	LC
4	*Coturnix coturnix*L.	Common quail	Phasianidae	-	LC
5	*Columba palumbus* L.	Common wood pigeon	Columbidae	-	LC
6	*Streptopelia turtur* L.	European turtle dove	Columbidae	-	VU
7	*Streptopeliadecaocto* Friv., 1838	Eurasian collared dove	Columbidae	-	LC
8	*Scolopax rusticola* L.	Eurasian woodcock	Scolopacidae	EN	LC
9	*Aquila pomarina* Brehm	Lesser spotted eagle	Accipitrida	VU	LC
10	*Cuculus canorus* L.	Common cuckoo	Cuculidae	-	LC
11	*Dendrocopos major*L.	Great spotted woodpecker	Picidae	-	LC
12	*Dryocopus martius* L.	Black woodpecker	Picidae	VU	LC
13	*Falco sp.*	Falcons	Falconidae	-	-
14	*Strix aluco*(Linnaeus, 1758)	Tawny owl	Strigidae	-	LC
15	*Asio otus* L.	Long-eared owl	Strigidae	-	LC

Threats to plant and vertebrate animal diversity in the region of Dedovo Village

There are signs that tourist are picking up many of the identified wild berries (*Rubus caesius, Rubus idaeus*, *Rosa canina*, *Vaccinium vitis-idaea*, *Vaccinium myrtillus*, *Fragaria vesca*) and herbs with medicinal use (*Tussilago farfara, Dryopteris filix-mas, Geranium sanguineum, Veronica officinalis, Urtica dioica, Hypericum cerastoides, Hypericum perforatum, Geranium macrorrhizum*, etc.). In some cases they were taken out with the roots which is especially damaging to the populations.

Poaching and illegal fishing also were registered, they are the threats which directly affect the biodiversity but the perpetrators in most cases remained unpunished. Poachers mostly kill the following species: *Cervus elaphus, Capreolus capreolus, Sus scrofa, Rupicapra rupicapra* and *Ursus arctos*. According to the data, provided by tourists, there are isolated cases of illegal fishing in Pepelashka River. Object of this fishing is mainly *Salmo trutta fario*.

Another big problem is the wastes disposal from tourists, mainly of packaging and food scraps.

Conclusion

Data obtained assumed that the studied area is characterized by preserved natural environment with high biodiversity and therefore offers many opportunities for tourism and recreation. To deal with the problems, arising from the threats of anthropogenic origin, it is recommended some assistance to municipalities of Dedovo Village and of the neighboring settlements, in order to solve these problems.

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