



MATERIALS FOR THE RED BOOK OF MONTENEGRO

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SYNOPSIS

In this publication we are presenting 30 selected threatened taxa from Montenegrin vascular flora. For each taxon following data are given: IUCN category and criteria, regional adjustment of category, international IUCN category, assessment of population condition and trend, causes of threats, measures of protection, description of the taxon, habitat type, distribution in Montenegro and Europe.

Three selected taxa are national endemic, while eight are endemic of Balkan Peninsula. One species is assessed as regionally extinct (RE), 13 are critically endangered (CR), 10 are endangered (EN) and 6 are vulnerable (VU).

Data presented in this paper are not the results of systematic study of endangered flora, but they are gathered during ordinary floristic surveys over the territory of Montenegro.

Ključne riječi:

vaskularna flora Crne Gore, IUCN kategorije i kriterijumi, Crvena knjiga

SINOPSIS

U ovom radu smo prikazali 30 odabranih, ugroženih taksona u vaskularnoj flori Crne Gore. Za svaki takson su dati: IUCN kategorija i kriterijum, regionalna prilagođenost kategoriji, internacionalna IUCN kategorija, procjena stanja populacije, trend populacije, način zaštite, opis taksona, tip staništa, rasprostranjenost u Crnoj Gori i Evropi.

Tri taksona pripadaju nacionalnim endemima, dok je osam endema balkana. Jedna vrsta se smatra regionalno izumrlom (RE), 13 je ktirično ugroženo (CR), 10 je ugroženo (EN) i 6 taksona su ranjivi (VU).

Podaci predstavljeni u ovom radu nisu rezultat sistematke studije ugrožene flore Crne Gore, već različitih florističkih istraživanja ovog područja.

INTRODUCTION

During the last decade man's impact on natural ecosystems started rapidly to grow. Intensive urbanization, over exploitation of natural resources, development of tourism, biological invasions, different way of pollution etc. started seriously to threat natural equilibrium in ecosystems and permanently to destroy it parts. According to that, numerous plant and animal taxa become endangered.

Despite extraordinary floristic richness and diversity of the flora of Montenegro, as well as to often emphasizing of a need and significance of its protection, Red list and Red book of the flora of Montenegro is not yet done. Until now, two National lists of protected plant species were published (1982, 2006), but they do not include data about population condition and vulnerability level of species. Further, in 1995 Stevanović published the Review of vascular plant species with international importance. For each taxon, author is giving IUCN category, but not information about population, its trend and measures of protection.

MATERIAL AND METHODS

As it is mentioned in the abstract, data presented in this paper are not a result of systematic investigation with one purpose-The Red Book of Vascular plants of Montenegro, but they are gathered during series of floristic surveys undertaken in the frame of different scientists and applied projects (Important Plants Area, Natural potentials of medicinal plants in Montenegro, Evaluation of the Bojana river basin, Flora and vegetation of city area of Podgorica ...). The main criterion in selection of taxa for this publication was well documentation about population condition, trend, and causes of threats.

Nomenclature of taxa is accorded to Greuter & al. (1984-1989), Tutin & al (1964-1980, 1993), Tan (2000). Actual name of the taxon is followed by synonym(s). Other accompanying data are: IUCN category and criteria, regional adjustment of category, international IUCN category, assesion of population condition and its trend, causes of threats, description of taxon, habitat type, distribution in Montenegro and Europe. Level of threat is defined according to 3.1 version of IUCN Red List categories and criteria (IUCN, 2001), as well as Guidelines for using IUCN Red List categories and criteria (IUCN, 2005); while in regional adjustment of categories IUCN, Regional guidelines to Red List categories and criteria (IUCN, 2003.) were used. International IUCN category consist data about category of threat in Europe (Bern Convention, 1996; Habitat directive, 1992) and in the world (Walter & Gillet, 1998). Population is assessed by approximate number of individual or approximate area size. Causes of threats are given as descriptive, while types of threats are accorded to IUCN standard classification (Hilton-Taylor, 2000.). Conservation measures included information about conservation status of the taxon in Montenegro, and for some species also a recommendation of the author for need of conservation. Description of the taxon comprise of general morphological features, life form and flowering time. Literature

sources on which we based descriptions are: Tutin et al (1964/1980, 1993), Josifović ed. (1970-1976), Sarić ed. (1992), Pignati (1982), Jordanov (1982), Šilić (1990), Mayer & Blečić (1969). Due to the fact that Montenegro doesn't have developed habitat classification, descriptive method is used. Distribution range of the taxon on territory of Montenegro is based on literature data, as well as on observations in field. In citations considering area of distribution in Europe, abbreviations from Flora Europaea were used, with addition of one for ex Yugoslav Republics (BH– Bosnia & Herzegovina; Cro– Croatia; Mc– Macedonia; Mne– Montenegro; Sr– Serbia; SI – Slovenia). In the case when we reliably know that species is extinct from the locality on which it was in former time recorded, than locality is marked with (†).

RESULTS AND DISCUSSION

List of taxa is given in text below categorized according IUCN

1. Regional extinct (RE)

Marsilea quadrifolia L.

IUCN category: RE (CR?)

Regional adjustment of categories: Reintroduction is hardly possible or impossible.

International IUCN category: Species is listed at Bern Convention, Emerald Network Program and Habitat Directive (Anonymous 1992, Annex IIb,IVb).

Causes of extinction: Literature sources in which *Marsilea* is mentioned, are not giving any information about its population size or trend. Despite of numerous and long term botanical investigations of Skadar Lake, finding of the species has never been confirmed. Considering locality Plavnica, we are of the opinion that urbanization and rapid development of tourism contribute to its extinction.

According to the IUCN standard classification: Habitat loss (primarily human induced):1.3. Development (1.3.2. Human settlement, 1.3.3.Tourism)

Conservation measures: Species is protected by national law (Official Register of the Republic of Montenegro, no 26/06).

Taxon description: Usually far-creeping, with internodes more than 1 cm. Leaves glabrous; petiole 7-20 cm; leaflets obdeltate, with entire to slightly undulate, rounded apex. Sporocarps 1 or 2 (3) near the base of petiole, 3-5 mm, ellipsoidal, with basal teeth, pedicellate; stalks 1-2 cm, erect, 2 to 4 branched, rarely simple, usually partly connate, adnate to the petiole. Time of sporulation: VII – IX. Life form: Hyd

Habitat: Temporary flooded wetland area

Distribution in Montenegro: Skadarsko blato, Plavnica (†) (Rohlena, 1942, Černjavski et al 1949), Gostilje (†) (Černjavski et al. 1949), Skadarsko jezero (Lakušić, 1983)

Distribution in Europe: Al, Au, BH, Cro, Sr, Mc Bu, Cz, Ga, Ge, He, Hs, Hu, It, Lu, , Po, Rm, Rs(W,E) (Tutin et al 1993, Nikolić, T., Topić, J. eds. 2005)

2. Critically endangered (CR)

Androsace mathildae Levier

IUCN category: CR **Criteria:** D

Regional adjustment of categories: Possible introduction, EN.

International IUCN category: Species is listed at Bern convention, Emerald Network Program and Habitat directive (Anonymous 1992, Annex IIb, IVb).

Assessment of population and population trend: In Montenegro species is present with only one small population, that covers few sqm. For now, population is stable.

Causes of threats: Considering the fact that species inhabits high alpine rocks (at altitude cca 2500m), it is not exposed to anthropogenic or zoogenic negative impacts.

Conservation measures: Species is protected by national law (Official Register of the Republic of Montenegro, no. 26/06).

Taxon description: Caespitose perennial. Leaves linear, glabrous, or sometimes shortly ciliate when young. Flowers solitary. Calyx 3-4mm, more or less pubescent. Corolla white or pink. Flowering time: VII-VIII. Life form: Ch

Habitat: Mountain rocks, altitude cca 2500 m.

Distribution in Montenegro: Mountains Komovi, summit of Kučki Kom (Wraber, 1986)

Distribution in Europe: It, Mne (Tutin et al. 1972, Wraber 1986)

Arnica montana L.

IUCN category: CR **Criteria:** D

Regional adjustment of categories: Due to habitat loss it is very difficult to introduce this species. In addition it is also considered as threatened in neighboring countries (Cro, BH)

International IUCN category: Species is on the list of threatened taxa of Bern Convention (Recommendation No 49, Anonymous 1996) and in the List of Species of the Habitat Directive (Anonymous 1992, Annex IIb, IVb).

Assessment of population and population trend: In Montenegro only two subpopulations with few individuals were recorded.

Causes of threats: Natural succession of meadows rushed with cessation of mowing, as well as over exploitation of the plants in medicinal purposes.

According to the IUCN standard classification: 1. Habitat loss (primarily human induced): 1.1. Agriculture (1.1.3 Shifting agriculture); 2. Direct loss/ Exploitation: 2.1 Hunting and collecting (2.1.4. Traditional medicine)

Conservation measures: Species is protected by national law (Official Register of the Republic of Montenegro, no. 36/82, Official Register of the Republic of Montenegro, no 26/06)

Taxon description: Herbaceous, rhizomatous perennial. Lower leaves obovate to elliptical, subsessile. Flowers yellow. Involucral bracts 18-24, lanceolate; capitula 5-

8 cm in diameter. Ligules with 2-3 teeth. Achenes 6,5-9 mm; pappus about as long as the corolla. Flowering time: VI – VIII. Life form: H

Habitat: Meadows, pastures in mountains

Distribution in Montenegro: Ljubišnja mountain: Konjsko polje (Blečić & al. 1968) Planina Maglić: granica CG i BH (Bjelčić, 1956)

Distribution in Europe: Au, Be, BH, Cro, Cz, Da, Ga, Ge, He, Ho, Hs, Hu, It, Lu, No, Po, Rm, Rs, Sl, Su (Tutin et al. 1976, Domac, R. 1967, Blečić & al. 1968, Bjelčić, 1956)

***Asperula baldaccii* (Halácsy) Ehrend
syn. *Galium baldaccii* Halácsy**

IUCN category: CR; **Criteria:** D

Regional adjustment of categories: Due to the fact that *A. baldaccii* is local endemic species, introduction from neighboring areas is excluded.

International IUCN category: As a rare (R) it is included in IUCN Red List of Threatened Plants (Walter, Gillet 1998).

Assessment of population and population trend: Whole population of species is located at only one rock. It has cca 50 mature individuals, but it is considered as stabile.

Causes of threats: In regard to restricted approachability of its habitat, species is protected from negative impact of humans and animals. The most serious threat are fires. Radical urbanization of the area is also considered as possible threat.

According to the IUCN standard classification: 4. Atmospheric pollution: 4.3. Wildfire.

Conservation measures: Species is protected by national law. (Official Register of the Republic of Montenegro, no 26/06). Due to very restricted area of distribution we are of the opinion that seed of this local endemic species should be collected and stored for the future in gene bank.

Taxon description: Perennial with long, patent hairs. Stem is branched, up to 17 (-20) cm. Leaves are narrowly lanceolate, acute, with softly revolute margin. Flowers are dirty yellow, in ovoid, lax inflorescence. Fruits are oblong, longer than bracts, densely hairs. Flowering time: V-VI. Life form: H

Habitat: Crevices of calcareous rocks.

Distribution in Montenegro: Rumija, above Old settlement of Bar (Rohlana, 1942)

Distribution in Europe: Mne (Tutin et al. 1976).

***Caldesia parnasifolia* (L.) Parl.
syn. *Alisma parnassifolium* L.**

IUCN category: CR **Criteria:** B2ab, D

Regional adjustment of categories: Reintroduction of species is hardly possible or impossible, because in surrounding area taxon is considered as extinct (Cro, Sr) or endangered (It – CR). Additional number of favorable habits in Montenegro is declining.

International IUCN category: The taxon has been included in the List of the Convention of European Wildlife and Natural Habitats (Bern Convention) and in the List of Species of the Habitat Directive (Anonymous 1992, Anex IIb, IVb).

Assessment of population and population trend: Population has only few individuals at only one locality.

Causes of threats: The main threat is eutrophication of Lake.

According to the IUCN standard classification: 6. Land/ Water pollution (6.4 Other)

Conservation measures: Species is recently found in the flora of Montenegro, so it's not included to the list of plants protected by our national law. As a very rare and threatened species we consider that it should find place at new and supplemented list of protected plants.

Taxon description: Aquatic perennial, only with basal leaves, floating or aerial, ovate to elliptical, cordate to subcordate, up to 6x4 cm obtuse. Flowers hermaphrodite, in racems or panicles. Petals 5-7mm, white. Fruitlets 3-4mm, obliquely obovoid, smooth with 3-5 longitudinal ribs on the dorsal side. Flowering time: VII-VIII Life form: Hyd

Habitat: Reed vegetation belt

Distribution in Montenegro: Skadarsko lake: Pančeva oka (Biberdžić, 2007).

Distribution in Europe: Ct, Ga, Ge, Hu, It, Mne, Po, Rm, Rs(B,C,W), (Tutin et al. 1980), Cro (Nikolić & Topić 2005), Sr- † (Vukojičić & Janković 1999)

***Dianthus nitidus* Waldst. & Kit.spp. *lakusici* Wraber**

IUCN category: CR **Criteria:** D

Regional adjustment of categories: Taxon is endemic, with rather restrict distribution area. Beside in Montenegro, it is recently found at territory of Serbia, so introduction is considered as possible

International IUCN category: /

Assessment of population and population trend: Up to now, only two small, but stabile subpopulations are noted.

Causes of threats: Grazing and trampling.

According to the IUCN standard classification: 1.Habitat loss (primarily human induced): 1.1. Agriculture (1.1.5 Grazing, 1.1.9. Other)

Conservation measures: Species is protected by national law (Official Register of the Republic of Montenegro, no 26/06)

Taxon description: Subcaespitose, glabrous perennial. Stems often branched. Leaves oblonge to oblanceolate. Flowers borne above the leaves. Epicalyx scales are broadly obovate, abruptly contracted into a cuspidate apex. Calyx widening upwards; teeth acute, broadly scarios. Petal limb bearded. Flowering time: VII-VIII. Life form: Ch

Habitat: alpine pastures

Distribution in Montenegro: Bjelasica: Lalovića dolovi, (Wraber, 1988), Bjelasica: Pitoma smetina (leg. Vuksanović, 2007.)

Distribution in Europe: Mne, Sr (kosovske Prokletije, Hajla) (Niketić, 2000).

***Edraianthus dalmaticus* A.DC.**

IUCN category: CR **Criteria:** B2ab(iii)

Regional adjustment of categories: Due to restricted area of distribution and very specific and sensitive habitat type (flooded karstic meadows), introduction is hardly possible.

International IUCN category: Categorized as rare (R) species is included in IUCN Red List of Threatened Plants (Walter, Gillet 1998).

Assessment of population and population trend: Population is stabile and it consists of few groups with around ten individuals.

Causes of threats: Species inhabits temporary flooded area, which is not suitable neither for urbanization nor agriculture. In connection to geological substrate, it is almost impossible to consider the circumstance, that water level of reservoir Vratac will rise so high and endanger the habitat of dalmatian bell. So, we conclude that there is no realistic threat to this species.

Conservation measures: At the territory of Montenegro presence of this species is recently confirmed (Bubanja & al., 2007), so from that reason it is not included at the list of protected plants. As well as in the case of *Caldesia parnasifolia*, due to the restricted area of distribution and specific habitat type, we are of the opinion that this taxon should be added to the list of protected plant species.

Taxon description: Small, low growing perennial. Stems ascending to erect, glabrous, simple. Leaves narrow, light-green. Flowers in clusters, sessile. Ovary glabrous, very rarely sparsely hairy; calyx teeth broadly triangular, ciliate, much shorter than ovary, not appendiculate. Corolla blue-violet, glabrous. Flowering time: V-VI. Life form: Ch

Habitat: Flooded submediterranean meadows

Distribution in Montenegro: In Hayek and Rohlena this species is put under the question mark! (Hayek 1913., Rohlena, 1942.), Near Rijeka (Lakušić. 1974); Budoške bare, in vicinity of Nikšić (Bubanja & al., 2007)

Distribution in Europe: Cro, BH, Mne (Bjelčić & Mayer 1983, Janchen. 1910, Lakušić 1974, <http://hirc.botanic.hr/> , Bubanja & al., 2007)

***Edraianthus wettsetini* Halácsy & Bald. *subsp. lovcenicus* Mayer & Blečić**

IUCN category: CR; **Criteria:** D

Regional adjustment of categories: Due to the fact that taxon is characterized as local endemic, introduction from neighboring areas is excluded.

International IUCN category: /

Assessment of population and population trend: Up to now, taxon is recorded at only one locality, where population is distributed over area of approximate 0,02 km². Population were stabile until this summer, when huge fire spread over the area.

Causes of threats: Huge fire that spread over the area of NP Lovćen, didn't miss the locality inhabited by Bell of Lovćen. Consequences that fire left on population

of this taxon will be assessed in next vegetation season. In addition to fires, collecting the samples of this rare plant presents a potential threat.

According to the IUCN standard classification: 2. Direct loss/ Exploitation: 2.1. Hunting and collecting; 4. Atmospheric pollution: 4.3. Wildfire.

Conservation measures: Species is protected by national law (Official Register of the Republic of Montenegro, no 26/06). Due to the fact that locality of this taxon belongs to NP Lovćen it is also indirectly conserved.

Taxon description: Comparing to typical subspecies, stem is longer (up to 14 cm), and it carries more leaves (8 to 25), and inflorescence consists of 1-3 (-5) flowers (Mayer & Blečić, 1969) Flowering time: VI-VII. Life form: Ch.

Habitat: Crevices of calcareous rocks.

Distribution in Montenegro: Lovćen: Štirovnik, in direction to Mirac (Mayer & Blečić, 1969)

Distribution in Europe: Mne (Mayer & Blečić, 1969)

***Gagea amblyopetala* Boiss. & Heldr.**

IUCN category: CR, **Criteria:** D

Regional adjustment of categories: Possible introduction from neighboring areas; EN

International IUCN category: /

Assessment of population and population trend: Population has up to 50 individuals and for now is stabile. But, it can be expected that further urbanization of the area will cause reduction of population size or even its complete extinction.

Causes of threats: Urbanization of the area is considered to be the most serious threat to this species. According to the IUCN standard classification: 1. Habitat loss (primarily human induced): 1.3. Development (1.3.2. Human settlement)

Conservation measures: Species is not protected by national law, but due to the fact that it is presented with only one small subpopulation, we propose its protection.

Taxon description: Bulbosus perennial, with two bulbs in common tunic. Stem is erect, solitary, with two basal and two upper, alternate leaves. Perianth leaves are elliptic and obtuse, yellow, up to 1cm long. Maximal number of flowers in inflorescence is 7. Flowering time: IV. Life form: G

Habitat: shrubs of mountain belt and open habitats

Distribution in Montenegro: Podgorica: Sadine (Stešević, 2006)

Distribution in Europe: Cr, Gr, It, Mne, Rs (W, K), Tu (Tutin et al. 1980)

***Genista hassertiana* (Bald.) Bald.**

IUCN category: CR **Criteria:** D

Regional adjustment of categories: Possibility for introduction from surrounding area exists; EN

International IUCN category: /

Assessment of population and population trend: Population has cca 50 individuals and for now it is stabile.

Causes of threats: For now, there is no intensive threat to this taxon, but potential ones are: exploitation of serpentine and urbanization of the area.

According to the IUCN standard classification: 1. Habitat loss (primarily human induced): 1.2.Extraction 1.3. Development (1.3.2. Human settlement)

Conservation measures: Species is not protected by law, but considering the fact it is Balkans endemic, with only one population in Montenegro, we think that species as well as locality should be put under protection.

Taxon description: Short, densely branched shrub, with linear leaves glabrous on the upper surface and silkily haired on lower side. Leaves are for a half shorter than internodes. Flowers (2-4) are gathered in heads. Corolla is pale yellow, up to 8mm long. Flowering time: VI, Life form: Ch

Habitat: serpentine rocks in mountain and alpine zone

Distribution in Montenegro: Selo Kalica, between Berana and Rožaja (Lakušić 1985:75)

Distribution in Europe: Al , Gr, Mc, Sr, Mne (Tutin et al. 1968, Strid 1986, Diklić 1972, Tomović 2007)

***Kickxia cirrhosa* (L.) Fritsch**

syn. *Linaria cirrhosa* (L.) Cav.

IUCN category: CR; **Criteria:** C2a(i,ii), D

Regional adjustment of categories: Reintroduction from surrounding area is not possible because of habitat loss..

International IUCN category: /

Assessment of population and population trend: Population size is rather small and presented with few mature individuals. Declining trend of population is noted.

Causes of threats: Urbanization (new road infrastructure, beach bars, playgrounds ...), which is last 5 years become very intensive at the area of Long Ulcinj Beach, presents the major cause of threat. **According to the IUCN standard classification:** 1. Habitat loss (primarily human induced): 1.3. Development (1.3.3.Tourizm); 3. Indirect Effects: 3.1. Human caused (3.1.1. Recreation/tourism)

Conservation measures: Species is not protected by national law, but due to the fact that Long Beach near Ulcinj is protected as Natural Monument, it is indirectly conserved. Nevertheless, according to new urban planning, hotel megacomplexes are planned to be build up, so we suggest collecting of seeds and its preservation in gene banks, because further destiny of the species is put under the question mark.

Taxon description: Annual, stem is procumbent or climbing, patent hairy or subglabrous, up to 90 cm. Leaves are lanceolate-lineare, basal sometimes with small teeth at the base; the middle and upper are sagittate at the base. Flowers are violet or whitish, pedicels up to 3,5 cm. Capsule is globose. Flowering time: V-VI. Life form: T.

Habitat: Damp, sandy places, usually near the sea.

Distribution in Montenegro: Long Beach near Ulcinj (Vuksanović & Petrović, 2004)

Distribution in Europe: Az, Bl, Co, Cro, Ga, Hs, It, Lu, Mne, Sa, Si (Tutin et al. 1972)

***Lysimachia artropurpurea* L.**

IUCN category: CR; **Criteria:** C2a; D

Regional adjustment of categories: Introduction from surrounding areas is possible, EN.

International IUCN category: /

Assessment of population and population trend: Species was for the first recorded at 3 near by localities on Long Beach near Ulcinj (Petrović & Vuksanović, 2005); and total number of individuals were cca 30. Last investigation, undertaken in 2008 species extinct from one locality. We expect that due to intensive anthropogenic impact, population will soon be in decline.

Causes of threats: Urbanization (constructing of access roads, beach bars, new parking areas, playgrounds, etc.), which in last 5 years become very intensive at the area of Long Beach near Ulcinj, presents a major threat to this species.

According to the IUCN standard classification: 1. Habitat loss (primarily human induced): 1.3. Development (1.3.3. Tourism); 3. Indirect Effects: 3.1. Human caused (3.1.1. Recreation/tourism)

Taxon description: Perennial with spindle shape root. Stem is erect, branched, sparsely hairy, from 20 to 65 cm tall. Leaves are lanceolate to spatulate, upper are sessile, while lower are on petioles. Flowers are sessile, or on short glandular pedicels, gathered in terminal spike. Corolla is dark purple. Flowering time: VI-VIII. Life form: H

Habitat: Damp, sandy places.

Distribution in Montenegro: Long Ulcinj Beach, backwards (Petrović & Vuksanović, 2004)

Distribution in Europe: Al, Bu, Cr, Gr, Mc, Mne, Sr, Tu. (Tutin et al. 1972)

***Ophrys tethredinifera* Willd.**

IUCN category: CR **Criteria:** D

Regional adjustment of categories: Introduction from surrounding area is possible, EN.

International IUCN category: /

Assessment of population and population trend: Subpopulation recorded in Podgorica has only few individuals, while subpopulation in vicinity of Petrovac is not assessed. Certainly, this is a very rare species with small population, and subpopulations very sensitive to intensive urbanization in these areas.

Causes of threats: Intensive urbanization of Petrovac and Podgorica area is the major threat to this taxon.

According to the IUCN standard classification: 1. Habitat loss (primarily human induced): 1.3. Development (1.3.2. Human settlement)

Conservation measures: Species is protected by national law (Official Register of the Republic of Montenegro, no 26/06)

Taxon description: Up to 20cm tall, but very gently plant. Stem carries 3-9 flowers. Outside perianth leaves are reddish, rarely whitish, broadly ovate and concave. Inner perianth leaves are similar to outside, but they are shorter, broadly triangular and obtuse at apex. Labelum is obovate, square or flabelliform, convex, entire, and rarely different shaped. Color is purplish brown, usually with wide, yellow, densely hairy marginal zone, with a glabrous appendage. Flowering time: IV-V. Life form: G

Habitat: light forests of shrubs in (sub)mediterranean

Distribution in Montenegro: Petrovac, 1,4 – 1,8 km eastern from Podgorica (Parolly, 1991(1992): 229); Podgorica (leg Stešević, 2006).

Distribution in Europe: Bl, Co, Cr, Ga, Gr, Hs, It, Lu, Sa, Si, Tu (Tutin et al. 1980) Cro (<http://hirc.botanic.hr/>), Mne (Rohlena 1942), BH (observation in filed).

***Sternbergia colchiciflora* Waldst. & Kit.**

IUCN category: CR **Criteria:** C2a, D

Regional adjustment of categories: Introduction from surrounding area is possible, EN.

International IUCN category: /

Assessment of population and population trend: Subpopulation on hill Gorica had cca 10 mature individuals, but it become extinct due to intensive disturbance. In Piperi, species is noticed at only one locality and its subpopulation has up to 40 individuals.

Causes of threats: Urbanization of hill Gorica is considered as the main cause of extinction of subpopulation of this taxon. For now, subpopulation in Piperi is not threatened by any cause, but fires and cutting of woods can be taken as potential threats. **According to the IUCN standard classification:** 1. Habitat loss (primarily human induced): 1.3. Development (1.3.2. Human settlement), 1.4. Unspecified causes (1.4.2 Deforestation); 4. Atmospheric pollution: 4.3. Wildfire

Conservation measures: Species is protected by national law (Official Register of the Republic of Montenegro, no 26/06).

Taxon description: Bulbosus perennial, bulb diameter up to 2cm. Stem has dwarf form and its major part is underground. Flower is solitary, pale yellow. Leaves (3-10) are linear, obtuse, appearing in spring. Flowering time: IX-X. Life form: G.

Habitat: Dry meadows, stony places.

Distribution in Montenegro: Piperi: Crnačko brdo (Pulević & Bulić, 1990); Podgorica: brdo Gorica (†) (Stešević, 2002.)

Distribution in Europe: Bu, Cro, Ga, Gr, Hs, Hu, It, Mc, Mne, Sr, Rm, Rs (W, K), Si (Tutin 1980)

3. Endangered (EN)

***Asplenium cuneifolium* Viv**

syn. *Asplenium adiantum nigrum* L. ssp. *serpentini* (Tsch.) Heufl.

IUCN category: EN **Criteria:** D

Regional adjustment of categories: Introduction from surrounding area is possible; VU

International IUCN category: /

Assessment of population and population trend: Population has cca 100 individuals and for now it is stabile. .

Causes of threats: For now there is no intensive threat to this taxon. Potential cause of threat are: exploitation of serpentine and urbanization of the area.

According to the IUCN standard classification: 1. Habitat loss (primarily human induced): 1.2.Extraction 1.3. Development (1.3.2. Human settlement)

Conservation measures: Species is not protected by national law.

Taxon description: Rhizome is short and branched, creeping or ascending. Leaves are numerous, 3-4 times pinnatifid, up to 50cm long, at upper side pale green. Petiole is black to reddish-brown, in upper part green. Season of sporulation: VII-VIII. Life form: Ch

Habitat: serpentine rocks in mountain and alpine zone

Distribution in Montenegro: Selo Kalica- between Berane and Rožaje (Lakušić 1985: 74)

Distribution in Europe: Al, Au, Bu, Co, Cz, Ga, Ge, Gr, He, Hs, Hu, It, Lu, Mc, Mne, Po, Rm, Rs (W), Sr. (Tutin et al. 1993)

***Calystegia soldanella* (L.) R. Br.**

syn. *Convolvulus soldanella* L.

IUCN category: EN; **Criteria:** A4ac; B2a + b(ii,iii,iv,v)

Regional adjustment of categories: Because of habitat loss reintroduction from surrounding area is hardly possible.

International IUCN category: /

Assessment of population and population trend: Due to intensive urbanization subpopulation recorded between Bar and Ulcinj is extinct. Species is retained only at Long Beach near Ulcinj, but because of urbanization subpopulation is in decline.

Causes of threats: Urbanization (construction of access roads, beach bars, parking areas, playgrounds, etc.), which in last 5 years become very intensive at the area of Long Beach near Ulcinj, presents a major threat to this species. **According to the IUCN standard classification:** 1. Habitat loss (primarily human induced): 1.3. Development (1.3.3.Tourizm); 3. Indirect Effects: 3.1. Human caused (3.1.1. Recreation/tourism)

Conservation measures: Species is protected by national law. (Official Register of the Republic of Montenegro, no 26/06), and due to the fact that Long Beach near Ulcinj is protected as Natural Monument, it is also indirectly conserved.

Taxon description: Perennial, with simple, and fleshy root. Stem is creeping branched, up to 50 (100) cm long. Leaves are petiolate, reniform, somewhat fleshy. Flowers are solitary, on long petioles, lilac or pink, with 5 white stripes. Flowering time: VI-VIII. Life form: G.

Habitat: Sandy and sunny places near the coast.

Distribution in Montenegro: Between Bar and Ulcinj (†) (Rohlana, 1942); Long Ulcinj Beech (Trinajstić 1989, Mijović 1994).

Distribution in Europe: Al, Az, Be, Bl, Br, Bu, Co, Cr, Cro, Ct, Da, Ga, Ge, Gr, Hb, Ho, Hs, It, Lu, Mne, Rs (K), Sa, Si, Sl, Tu (Tutin et al. 1972)

Cypripedium calceolus L.

IUCN category: EN; **Criteria:** D

Regional adjustment of categories: Introduction from surrounding areas is possible; VU.

International IUCN category: Species is listed in Bern convention and Habitat Directive (Appendix IIb I Appendix IVb)

Assessment of population and population trend: Subpopulation at locality Crne pode has cca 50 individuals, the one at Sinjavini only few mature individuals (Niketić & Stevanović, 1999), while subpopulation in Ljubaštica valley is assessed with approximate 50 individuals (Petrović et al, 2006).

Causes of threats: Considering the fact that *Cypripedium* is ornamental plant, it presents a kind of target for passionate collectors. Subpopulations in Montenegro are rather hardly approachable, and from that reason are partly protected. In the case of subpopulation in Ljubaštica valley is cutting of the woods presents a serious threat.

According to the IUCN standard classification: 1. Habitat loss (primarily human induced): 1.4. Unspecified causes (1.4.2 Deforestation); 2. Direct loss/ Exploitation: 2.1. Hunting and collecting.

Conservation measures: Species is protected by national law (Official Register of the Republic of Montenegro, no 26/06). Subpopulation at locality Crna poda is indirectly conserved due to the fact that it belongs to the territory of NP Durmitor. (Official Register of the Republic of Montenegro, no 26/06).

Taxon description: Perennial with robust, horizontal rhizome. Stem is shortly hairy, with brown basal sheaths. Leaves are elliptical to ovate, acute to acuminate, sparsely pubescent. Flowers subtended by a large leaf-like bract. Perianth segments are 6-9cm, reddish-brown. Labelum is shorter than perianth segments (cca 3cm), ovoid, rounded at apex, pale yellow, with reddish spots inside. Flowering time: V-VII. Life form: G.

Habitat: Conifer and mixed forests, screes, shady and half shady steep places.

Distribution in Montenegro: Gorge of river Tare: 1. near village Dobrilovine and 2. Crna poda, in *Pinus nigra* forest (Stevanović et al. 1991), Sinjavina: Provalija (leg. Vincek), Komovi: Ljubaštica valley (Petrović et al. 2006).

Distribution in Europe: Au, BH, Br, Bu, Cro, Ct, Cz, Da, Fe, Ga, Ge, Gr, He, Hs, Hu, It, Mc, Mne, No, Po, Rm, Rs (N, B, C, W, K, E), Sl, Sr, Su, Sv (Tutin et al 1980, Pignati 1982)

Daphne malyana Blečić

IUCN category: EN **Criteria:** A2ac

Regional adjustment of categories: Introduction from surrounding areas is possible, VU

International IUCN category: As vulnerable (V) species is included in IUCN Red List of Threatened Plants (Walter, Gillet 1998).

Assessment of population and population trend: Construction of hydropower Perućica, followed by sinking of Piva and Komarnica gorges, population size was significantly reduced. On this localities only one subpopulation left and it consists of only few individuals. Subpopulation at Sinjavina mountain and Tare gorge have up to 10 individuals, while the one in Donja Lukavica is more numerous. Data about size of subpopulation at Magliču doesn't exist..

Causes of threats: "Due to narration of Prof. Blečić, between all named localities in Pive and Komarnica gorge, only one is left- near the dam of hydropower, while others are sunk by waters of newly constructed reservoir "(Lakušić & Pulević 1980). Subpopulation in Tara gorge could be destroyed by constructing a dam. Others inhabits hardly approachable sites, so practically causes of threats are absent.

According to the IUCN standard classification: 1. Habitat loss (primarily human induced): 1.3. Development (1.3.4. Infrastructure)

Conservation measures: Species is protected by national law (Official Register of the Republic of Montenegro, no. 36/82, Official Register of the Republic of Montenegro, no. 26/06).

Taxon description: Evergreen shrub with grey or brown-reddish bark. Stem glabrous, up to 5 – 10 (30) cm, much branched. Leaves are obovate-spathulate, on short pedicel; upper face green, lower glaucous. Flowers are sessile, rarely on short pedicels; white, in terminal clusters. Flowering time: IV-V. Life form: Ch.

Habitat: Crevices of cretaceous rocks; usually southern expositions and shady places. Is also appears in subalpine zone, preferably on southern exposition (Lakušić & Pulević, 1980).

Distribution in Montenegro: Piva and Komarnica gorge: Seljani, Rudinice, Bezuje, Mratinje (Blečić, 1953: 24); Careva vrata, near the dam, Stara Ćuprija, Visjelac, Čelina, Borovi, Milićeva luka, Skakavica (leg Blečić); Donja Lukavica (Lakušić & Pulević, 1980); Tara gorge: upstream of Đurđevića Tare cca 10 km, above Gornja Dobrilovina (Lakušić & Pulević, 1980); Maglič, few localities in border zone between Montenegro and Bosnia and Herzegovina (Bjelčić et al. 1969); Sinjavina: Babji zub, below saddle Sto (Vuksanović, 2003).

Distribution in Europe: BH, Mne, Sr.

***Gentianella bulgarica* (Velen) Holub**

IUCN category:EN **Criteria:** D

Regional adjustment of categories: Introduction from surrounding areas is possible; VU

International IUCN category: /

Assessment of population and population trend: Number of individuals in both populations is not bigger than 100. Up to now populations are stabile.

Causes of threats: Considering the fact that species inhabits not so approachable terrain, it is protected from anthropogenic and zoogenic impacts. Possible threat can present abandoning of katuns at Prokletije district; which will be

followed by completely absence of grazing and natural succession of clearings.
According to the IUCN standard classification: 1. Habitat loss (primarily human induced): 1.1. Agriculture (1.1.9. Other)

Conservation measures: Species is not protected by law.

Taxon description: Gentle biennial, with densely branched stem from the base. Lower leaves are spatulate-lanceolate, while upper are very narrow. Flowers are at long pedicels, and in dense umbel like inflorescence. Corolla is pale lilac, up to 2cm long, fabricate at the base of lobes. Time of flowering VII-IX, Life form: H

Habitat: meadows and pastures in (sub)alpine zone

Distribution in Montenegro: Hajla mountain (Markišić 2002); Visitor (leg. Stešević et al.)

Distribution in Europe: Al, Bu, Ru, Sr, Mne (Tutin et al. 1972, Jovanović-Dunjić 1973, Markišić 2002)

***Ilex aquifolium* L.**

IUCN category: EN; **Criteria:** D

Regional adjustment of categories: Introduction from surrounding areas is possible, VU.

International IUCN category: /

Assessment of population and population trend: At all localities in Montenegro species is presents with one of only few individuals.

Causes of threats: Deforestation and fires are the main threats to this species.

According to the IUCN standard classification: 1. Habitat loss (primarily human induced): 1.4. Unspecified causes (1.4.2 Deforestation); 4. Atmospheric pollution: 4.3. Wildfire

Conservation measures: Species is protected by national law (Official Register of the Republic of Montenegro, no. 36/82, Official Register of the Republic of Montenegro, no. 26/06).

Taxon description: Shrub or small tree, up to 10 m (25 in cultivation), with pale grey bark. Leaves are evergreen, ovate, with undulate margin and 3 to 5 spines on each side, glossy above; sometimes, on higher branches of older trees, there are no spines. Flowers are white, dioecious. The fruit is red drupe. Flowering time: IV-V. Life form: P.

Habitat: Mixed forests (oak-hornbeam, beach-hornbeam).

Distribution in Montenegro: Rapša (Baldači, 1903/1904.), Šekular iznad Andrijevice, Lovćen: Velje osoje and Ivanov laz (Rohlena, 1942); Kanjon Cijevne: Cijevna (Pulević & Lakušić, 1983), Karaula, Šumice, Selište (Bulić, 1994); Rumija: Vrsuta (leg. Pulević & Petrović, 2004), Mikulići (leg. Pulević).

Distribution in Europe: Al, Au, Be, Bl, Br, Bu, Co, Cro, Ct, Da, Ga, Ge, Gr, Hb, He, Ho, Hs, It, Lu, Mc, Mne, No, Rm, Sa, Si, Sl, Sr, , Sv (Tutin et al. 1968)

***Lunaria telekiana* Jav.**

IUCN category: EN **Criteria:** D

Regional adjustment of categories: Introduction from Albania is possible.

International IUCN category: Under the category of rare (R) species is included in IUCN Red List of Threatened Plants (Walter, Gillet 1998).

Assessment of population and population trend: Population has few groups of ten individuals and it is stabile.

Causes of threats: Only two small subpopulations make this endemic taxa as a very vulnerable. In last two years, in the near of localities on which this taxon is recorded, urbanization is intensify, as well as mountain tourism. These two actions are recognized as potential causes of threat.

Conservation measures: Species is protected by national law (Official Register of the Republic of Montenegro, no 26/06)

Taxon description: Perennial plant. Leaves dentate-crenate. Petals lilac to violet, c.12 mm. Silicula 30-50 mm; valves densely ciliate on the margin. Carpophore c. 1 mm.

Flowering time: VII Life form: H

Habitat: Screens

Distribution in Montenegro: Prokletije: slopes of Volušnica and Ljubokuč (Wraber, 1989)

Distribution in Europe: Al, Mne (Tutin & al. 1993., Wraber, 1989.)

***Notholaena marantae* (L.) Desv.**

syn. *Cheilanthes marantae* (L.) Domin

IUCN category: EN **Criteria:** D

Regional adjustment of categories: Introduction from surrounding areas is possible; VU

International IUCN category: /

Assessment of population and population trend: Population has cca 100 individuals and up to now it is stabile.

Causes of threats: Realistic threats to this taxon are not recognized. Potential ones are: exploitation of serpentine and urbanization of the area. According to the IUCN standard classification: 1. Habitat loss (primarily human induced): 1.2.Extraction 1.3. Development (1.3.2. Human settlement)

Conservation measures: Species is not protected by national law, and due to the fact that in Montenegro it is present with only one small population we share the opinion that protection is needed.

Taxon description: Rhizome is strong, creeping, densely covered with light brown scales. Leaves are in tufts, up to 35cm long. Petioles are dark to reddish brown, almost as long as lamina. Lamina is 2 times pinnate, glabrous above and densely clothed with light brown scales beneath. Time of sporulation: VI-VII. Life form: Ch

Habitat: Serpentine rocks. It also inhabits forest communities with black pine, sessile oak and hop hornbeam.

Distribution in Montenegro: Selo Kalica – between Berane and Rožaje (Lakušić 1985)

Distribution in Europe: Al, Au, BH, Bu Co, Cro, Cz, Ga, Gr, He, Hs, Hu, It, Mc, Mne, Sr, Rm, Rs (K) (Tutin et al. 1993, Micevski 1895, <http://hirc.botanic.hr/>)

***Salvia brachyodon* Wandas**

IUCN category: EN **Criteria:** D

Regional adjustment of categories: Introduction is possible, VU

International IUCN category: As a rare (R) species is included in IUCN Red List of Threatened Plants (Walter, Gillet 1998).

Assessment of population and population trend: Population in border belt between Montenegro and Hercegovina has cca 100 jedinki.

Causes of threats: "Because of simmilarity of *S. brachyodon* and *S. officinalis* leaves, species is exposed to the possible threat from overxploataotion, because sage has wide usage in pharmaceutical industry " (Lakušić, 1980)

Conservation measures: Species is protected by national law (Official Register of the Republic of Montenegro, no. 36/82, Official Register of the Republic of Montenegro, no 26/06)

Taxon description: Herb up to 70cm, woody at base. Leaves pinnatisect or pinnate with 3-6 pairs of small lateral segments and an ovate or elliptical terminal segment, petiolate, rugose, appressed-hairy. Verticilasters with 2-4 flowers. Bracts shorter than calyx. Calyx glandular-viscid. Corolla 30-40 mm, violet blue. Flowering time: VII – VIII. Life form: Ch.

Habitat: Sheltered cretaceous rocklands, dry meadows, edges of termophilic forests and shrubs of ordo *Quercetalia pubescentis* Br. – Bl. (Šilić, 1984)

Distribution in Montenegro: Orjen: between fortress Ulica and Vrbanj (Vandas, 1889);

Between Ulica and Melovine near Vrbanj, (Berger, 1913); Vrbanje sub monte Orjen, (Rohlena, 1922); Orjen, near the border between Hercegonina and Montenegro (Lakušić, 1980); Planina Orjen, in vicinity of village Prčanj in border area of Montenegro and Hercegovina (Abadžić & Šilić, 1982- in Pulević, 2005).

Distribution in Europe: Cro, BH, Mne (Šilić 1990)

***Silene vallesia* L. ssp. *graminea* (Vis. & Reichenb.) Nyman**

syn. *Silene graminea* Vis.

IUCN category: EN **Criteria:** D

Regional adjustment of categories: Introduction from surrounding areas is possible, VU.

International IUCN category: /

Assessment of population and population trend: Only 3 subpopulation with small number of individuals are recorded.

Causes of threats: Plant grows at hardly approachable places, and due to the fact it is protected from anthropogenic impacts. Grazing and trampling are considered as possible future threats to this taxon. **According to the IUCN standard classification:** 1. Habitat loss (primarily human induced): 1.1. Agriculture (1.1.5 Grazing, 1.1.9. Other).

Conservation measures: Species is protected by national law (Official Register of the Republic of Montenegro, no. 26/06).

Taxon description: Mat-forming perennial with ascending, glandular-pubescent stems. Leaves linear, pubescent. Petals usually white, sometimes pink. Capsule scabrid, equalling the glabrous carpophore. Flowering time: VI-VIII Life form: H.

Habitat: High-mountain meadows

Distribution in Montenegro: Durmitor: Šljeme (Rohlena, 1942), Sinjajevina: above Timarsko polje (leg: Vuksanović & al.).

Distribution in Europe: Al, Cro BH, Mne, Mc, It (Tutin et al. 1993, <http://hirc.botanic.hr/>, Domac 1967)

4. Vulnerable (VU)

Clypeola jonthlaspi L.

IUCN category: VU **Criteria:** A4ac

Regional adjustment of categories: Reintroduction is hardly possible or impossible.

International IUCN category: /

Assessment of population and population trend: No data about size of subpopulation in Kotor vicinity is available. Considering subpopulation at Long Beach near Uclinj, due to rapid urbanization that culminate in last 5 years, its size declined. This trend is continued.

Causes of threats: Major threat to this taxon is rapid urbanization of coastal region of the country, that culminates in last 5 years. **According to the IUCN standard classification:** 1. Habitat loss (primarily human induced): 1.3. Development (1.3.3. Tourism); 3. Indirect Effects: 3.1. Human caused (3.1.1. Recreation/tourism)

Conservation measures: Species is not protected by national law.

Taxon description: Annual. Plant small, erect, grayish pubescent. Leaves linear-oblongate to obovate. Raceme elongate in fruit. Petals 1-2 mm, glabrous. Siliqua 2-5 mm obovate or elliptic-orbicular, with a distinct wing, entire or notched, pubescent or glabrous. Flowering time: II-III Life form: T.

Habitat: Sunny and dry habitats, sandy soils

Distribution in Montenegro: Hill San Đovani above Kotor (Biasoletto 1842); Vicinity of Kotor (Hirc 1912); Kameno (Šmarda, 1968), Ulcinj (Petrović & Vuksanović, 2005)

Distribution in Europe: Al, Bu, Co, Cr, Ga, Gr, He, Hs, It, Cro, BH, Mne, Rm, Rs(K) Sa, Si, Tu (Tutin et al. 1993, Domac 1973).

Edraianthus wettsetini subsp. *wettsetini* Halácsy & Bald.

IUCN category: VU; **Criteria:** D

Regional adjustment of categories: Introduction from Albania is possible.

International IUCN category: Within category of rare (R) species is included in IUCN Red List of Threatened Plants (Walter, Gillet 1998).

Assessment of population and population trend: Subpopulation at Sutorman and Lonac mountain are small and presented with few tufts. At the summit of Rumija mountain subpopulation is more numerous; area of occupancy on this locality is about 0,5 km².

Causes of threats: Hardly approachable habitat protects this taxon from anthropogenic impacts. Potential causes of threats are fires and collectors of rare plants. **According to the IUCN standard classification:** 2. Direct loss/ Exploitation: 2.1. Hunting and collecting; 4. Atmospheric pollution: 4.3.Wildfire.

Conservation measures: Species is protected by national law. (Official Register of the Republic of Montenegro, no. 36/82, Official Register of the Republic of Montenegro, no. 26/06).

Taxon description: Dwarf, caespitose perennial, up to 2-5 (-10) cm. Leaves 4-10 (-15); linear, sessile, densely appressed hirsute and grey above. Flowers solitary, rare 2 (-3), blue-violet, corolla more or less densely hirsute. Flowering time: VI-VII. Life form: Ch.

Habitat: Crevices of calcareous rocks

Distribution in Montenegro: Rumija mountain, Medjurečka mountain, Kosa, Lonac (Rohlana, 1942); Sutorman (Petrović, 2004)

Distribution in Europe: Al, Mne (Tutin et al. 1976)

***Euphorbia dendroides* L.**

IUCN category: VU; **Criteria:** A4ac; B1a + b(ii,iii,v)

Regional adjustment of categories: Introduction from surrounding areas is hardly possible, because of habitat loss.

International IUCN category: /

Assessment of population and population trend: In last 4 years size of the area with this species rapidly decline. Similar trend is expected in future.

Causes of threats: Intensive urbanization in costal part of the country, is the major threat to this taxon. Hill Spas, which is familiar as the locality with biggest size subpopulation of *E. dendroides*, is planned to be urbanized (complexes of hotels and golf field). Approximate 30 % of area covers by this species was burned in big fires in 2007. and 2008. **According to the IUCN standard classification:** 1. Habitat loss (primarily human induced): 1.3. Development (1.3.3.Tourizm); 3. Indirect Effects: 3.1. Human caused (3.1.1. Recreation/tourism); 4. Atmospheric pollution: 4.3.Wildfire.

Conservation measures: Species is protected by national law .(Official Register of the Republic of Montenegro, no. 36/82, Official Register of the Republic of Montenegro, no. 26/06). Habitat at hill Spas is located inside the borders of area protected as Area of Exceptional Natural Values.

Taxon description: Shrub up to 2 (3) m, with brown to red-brown bark. The leaves are oblong-lanceolate, obtuse; ray leaves are shorter and wider than cauline. Leaves fall off in late spring. Glands are suborbicular. The capsule is up to 6 mm, usually smooth. Flowering time: XI-IV. Life form: P.

Habitat: Slopes of valley, sand cliffs near the sea.

Distribution in Montenegro: Ravine Pećin near to Čanj, between Petrovac and Lučice, Near to Drobni pjesak, Mogren, Jaz, hill Spas near to Budva (Pulević, 1970).

Distribution in Europe: Al, Bl, BH, Co, Cr, Cro, Ga, Gr, Hs, Mne, It, Sa, Si (Tutin et al. 1968)

***Gymnospermium altaicum* ssp. *scipetarum* (E. Mayer & Pulević) Kit Tan & Mullaj**

syn. *Gymnospermium scipetarum* E. Mayer & Pulević

IUCN category: VU; **Criteria:** D

Regional adjustment of categories: Reintroduction is hardly possible because of habitat loss.

International IUCN category: /

Assessment of population and population trend: Species densely covers the area of 0,001 km², but outside it, only few individuals is noticed. Population is stabile, but in last few years intensive degradation of surrounding forests, appeared to be a serious threat.

Causes of threats: Construction of the road at Vrsuta mountain (started in 1999), caused rapid degradation of beech-hornbeam forest inhabited by population of this taxon. New road enable further exploitation of the the wood, and in last few years expansion in illegal wood cut is noticed. If this trend will be continued, habitat of the taxon will soon be fragmented and totally extinct. As addition threat to the taxon we recognize summer fires, that become very frequent in past period. **According to the IUCN standard classification:** 1. Habitat loss (primarily human induced): 1.3. Development (1.3.4. Infrastructure), 1.4. Unspecified causes (1.4.2 Deforestation); 4. Atmospheric pollution: 4.3. Wildfire

Conservation measures: Species is protected by national law (Official Register of the Republic of Montenegro, no 26/06). It would be necessary to protect also the locality (Vrsuta), as the unique habitat of this species in Montenegro...

Taxon description: Perennial with tuber up to 8 (-12) cm. Stem is glabrous, slender, up to 20 cm with long-petiolate basal leaf; cauline leaves are subsessile. All leaves are divided palmately into (3) 4-5 (7) segments. Flowers are golden yellow, in a terminal, bracteate raceme. Frut is subglobose, pendent. Flowering time: IV-V. Life form: G

Habitat: Slopes of valleys and cliffs near the sea.

Distribution in Montenegro: Rumija: Vrsuta (Mayer & Pulević, 1983; Petrović, 2004)

Distribution in Europe: Al, Mn (Mayer & Pulević, 1983)

***Gentiana lutea* L. subsp. *symphiandra* (Murb.) Hayek**

IUCN category: VU; **Criteria:** A4acd

Regional adjustment of categories: Introduction from surrounding areas is possible; NT

International IUCN category: Listed in Bern Convention (Recommendation 49, Anonymous 1996), and Habitat Directive (Anonymous 1993, Annex V).

Assessment of population and population trend: Considering this taxa we were faced with lack of well documented observations of population size and its changes during the time. It is obvious that in last two decades, subpopulations at easy accessible localities rapidly decline or even extinct. In spite of the fact that taxon is protected by law, its over exploitation affected constant decline of population.

Causes of threats according to the IUCN standard classification: Over exploitation of yellow gentian in medicinal purposes, is recognized as the major threat to its natural populations. **According to the IUCN standard classification:** 2.Direct loss/ Exploitation: 2.1 Hunting and collecting (2.1.4. Traditional medicine)

Conservation measures: Taxon is protected by national law (Official Register of the Republic of Montenegro, no. 36/82, Official Register of the Republic of Montenegro, no. 26/06). Subpopulations located inside borders of NP Durmitor are indirectly protected.

Description of taxon: Perennial, with short and thick rhizome with long roots. Stem is erect, simple, stout, up to 45 – 120 (140) cm. Leaves are broadly elliptical or ovate, glaucous. Basal leaves are in rosette, on long petiols. Lower leaves of the stem are on short pedicels, while upper are sessile. Flowers pedicellate, crowded in terminal and axillary cymes. Anthers connate in a tube. Flowering time;VI-VIII. Life form: H.

Habitat: Alpine pastures and meadows, rarely shrubs and rocky slopes, altitude: 800 – 1500 (2000) m.

Distribution in Montenegro: Crna planina, Kom, Sinjavina, Durmitor, Javorje planina, Korita rovačka, Žijovo planina, Rogam and Varda, Maglić Pivski, Lukavica planina, Štirni do, Bukovica ispod Komova. (Rohlina, 1942); Kanjon Cijevne: Žijovo (Bulić, 1994); northern slopes of Babji zub: Jelje, Popov krš, southern slopes of Babji zub (Vuksanović, 2003); Orjen, Nedajno –Sušica gorge, Mali Durmitor, Veliki Maglić, Volujak, Tara gorge, Durmitor: Žugića bare, Žabljak: Šibalićeva livada, Bjelasica, Kolašin, Kom, Kom Kučki, Krnjača, Otaševo lice, Troglav (in Benić, 1996).

Distribution in Europe: Balkan peninsula, SE Alps.

***Thymus bracteosus* Vis. Ex Bentham**

IUCN category: VU **Criteria:** D

Regional adjustment of categories: Introduction from surrounding areas is possible; NT

International IUCN category: /

Assessment of population and population trend: Population has cca 250 individuals and it is stabile.

Causes of threats: Summer fires, which in last few years become very frequent at costal Dinaric Alps in Montenegro, presents the only real threat to this species. Considering the fact that it grows at not so approachable area, it is protected of anthropogenic and zoogenic impacts. **According to the IUCN standard classification:** 4. Atmospheric pollution: 4.3. Wildfire

Conservation measures: Species is protected by national law (Official Register of the Republic of Montenegro, no 26/06)

Taxon description: Plant with long procumbent wood stem. Flowering stems up to 10cm, pubescent to villous. Leaves are opposite, spatulate, glabrous, but ciliate in basal half Bracts are very wide similar to the leaves, and also ciliate. Inflorescence is capitulate. Corolla is purplish, long up to 8mm. Flowering time: VI-VII. Life form: Ch

Habitat: Open meadows and rocks in (sub)Mediterranean region

Distribution in Montenegro: Orjen: village Prčanj near Vrbanj, (Lakušić B. et al. 1999: 270); village Vilusi (leg. V. Pulević)

Distribution in Europe: Endemic species of Dinaric Alps- Cro, BH, Mne (Tutin et al. 1972, Šilić 1990).

CONCLUSION

During the last decade man's impact on natural ecosystems started rapidly to grow. Intensive urbanization, over exploitation of natural resources, development of tourism, biological invasions, different way of pollution etc., started seriously to threat natural equilibrium in ecosystems and permanently to destroy it parts. According to that, special attention should be pay on investigation of threatened taxa.

In this "pioneer work" in the field of assessing the conservation status of vascular flora of Montenegro, 30 taxa were presented. Three taxa are considered as national endemic, while eight are endemic of Balkan Peninsula. One species is assessed as regionally extinct (RE), 13 are critically endangered (CR), 10 are endangered (EN) and 6 are vulnerable (VU).

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