

Plant Formations in the Central Anatolian BioProvince

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Central Anatolian *Artemisia fragrans* Steppe

These Inner-Anatolian steppes suffer from various degrees of grazing, and are only regarded as representative in the more moderately grazed areas. Here *Artemisia fragrans* is either dominant or co-dominant with *Thymus squarrosus*. Other characteristic species include grasses such as *Bromus tomentellus*, *Koeleria cristata*, *Stipa lagascae*, and a variety of forbs like *Aegilops triuncialis*, *Astragalus microcephalus*, *Atraphaxis billardieri*, *Consolida hellespontica*, *Convolvulus lineatus*, *Eryngium bithynicum*, *Globularia chrysantha*, *Helianthemum salicifolium*, *Hesperis angorensis*, *Nigella nigellastrum*, *Scabiosa argentia*, *Stachys cretica*, *Teucrium polium*, *Verbascum pycnocephalum* and *Xeranthemum annuum*. Some of the associated endemic or near endemic species are *Dianthus anatolica* (Caryophyllaceae), *Echinophora anatolica* (Apiaceae), *Linum anatolicum* (Linaceae), *Marrubium trachyticum* and *Salvia cryptantha* (of the Lamiaceae). In the extremely overgrazed anti-pastoral steppe the vegetation becomes characterized by unpalatable, spiny or toxic species and may be dominated by *Eryngium campestre* and *Euphorbia macroclada*.

Central Anatolian *Astragalus karamasicus*-*Gypsophila eriocalyx* Steppe

Steppe vegetation dominated by the endemic *Astragalus karamasicus* (Fabaceae) and *Gypsophila eriocalyx* (Caryophyllaceae) can be found on gypsaceous rocks in Cankiri Province northwest of Ankara at altitudes ranging from 600-850 m. Other characteristic taxa include *Allium flavum* subsp. *tauricum*, *Centaurea patula*, *Bupleurum boissieri*, *Linum mucronatum* ssp. *gypsicola* and the endemic *Gypsophila parva* (Caryophyllaceae) and *Thymus leucostomus* var. *gypsaceus* (Lamiaceae).

Central Anatolian *Convolvulus holoceriseus*-*Ajuga salicifolia* Steppe

Steppe vegetation dominated by *Convolvulus holoceriseus* and *Ajuga salicifolia* can be found on marly-gypsaceous rocks in the Ayas, Beypazari, Polatli and Tremelli areas west of Ankara at altitudes ranging from 650-1150 m. Other characteristic taxa include *Euphorbia macroclada*, *Galium verum* and *Linum flavum* subsp. *scabrinerve*.

Central Anatolian *Salvia tschihatcheffi*-*Hedysarum varium* Steppe

Steppe vegetation dominated by the endemic *Salvia tschihatcheffi* (Lamiaceae) and *Hedysarum varium* (Fabaceae) can be found on marly rock in the Haymana area southwest of Ankara at altitudes ranging from 800-1250 m. Other characteristic taxa include *Asyneuma limonifolium*, *Helianthemum nummularium* and the endemic *Linum hirsutum* subsp. *anatolicum* (Linaceae).

Central Anatolian *Phlomis armeniaca*-*Astragalus microcephalus* Steppe

Steppe vegetation dominated by *Phlomis armeniaca* and *Astragalus microcephalus* can be found on radiolarite, flysch, marly and serpentine rock in the Beynam-Bala area southwest of Ankara and in the Ayas Mountains west of Ankara at altitudes ranging from 750-1300 m. Other characteristic taxa include *Marrubium parviflorum* subsp. *oligodon* and *Teucrium chamaedrys*.

Central Anatolian *Arenaria ledebouriana*-*Astragalus plumosus* Steppe

Steppe vegetation dominated by *Astragalus plumosus* and the endemic *Arenaria ledebouriana* subsp. *ledebouriana* (Caryophyllaceae) can be found on cilicaceous (desite-andesite) rock in the Aydos, Cubuk and Karagol mountains at altitudes ranging from 1300-

1800 m. Other characteristic taxa include *Galium verum* subsp. *glabrescens*, *Sideritis germanicopolitana* and *Stachys iberica* ssp. *stenostachys*.

Central Anatolian *Thymus longicaulis*-*Alyssum virgatum* Steppe

Steppe vegetation dominated by *Thymus longicaulis* and *Alyssum virgatum* can be found on calcareous, phyllite and serpentine rock in the Yaprakli Mountains northeast of Cankiri at altitudes ranging from 1400-1800 m. Other characteristic taxa include *Astragalus plumosus* subsp. *nitens*, *Erysimum thyroideum*, *Helichrysum arenarium*, *Silene olympica* and the endemic *Astragalus leucothrix* (Fabaceae) and *Paronychia beauverdii* (Caryophyllaceae).

Central Anatolian *Minuartia juniperina*-*Minuartia pestallozae* Steppe

Steppe vegetation dominated *Minuartia juniperina* and the endemic *Minuartia pestallozae* (Caryophyllaceae) by can be found on calcareous rock in the Hacibaba Mountains south of Konya at altitudes ranging from 2000-2350 m. Other characteristic taxa include *Astragalus angustifolius*, *Centaurea mucronifera*, *Marrubium globosum* subsp. *micranthum*, *Paronychia davisii*, *Poa alpina* subsp. *fallax*, *Silene pharnaceifolia*, *Veronica cuneifolia* and the endemic *Dianthus zederbaueri* (Caryophyllaceae).

Central Anatolian *Genista involucreta*-*Marrubium globosum* Steppe

Steppe vegetation dominated by the endemic *Genista involucreta* (Fabaceae) and *Marrubium globosum* subsp. *micranthum* (Lamiaceae) can be found on calcareous and marly-calcareous rock in the southern areas of Ermenek and Karaman at altitudes ranging from 1600-1700 m. Other characteristic taxa include *Causinia ermenekensis* and the endemic *Arenaria ledebouriana* subsp. *parviflora* (Caryophyllaceae), *Astragalus acicularis* (Fabaceae) and *Paronychia argyroloba* (Caryophyllaceae).

Central Anatolian *Alyssum lepidostellatum*-*Astragalus condensatus* Steppe

Steppe vegetation dominated by the endemic *Alyssum lepidostellatum* (Brassicaceae) and *Astragalus condensatus* (Fabaceae) can be found on calcareous rock in the Karagasekmez, Kervansaray and Naldoken (Kirsehir) mountains at altitudes ranging from 1300-1600 m. Other characteristic taxa include *Anchonium helichrysifolium* subsp. *canescens*, *Astragalus densifolius*, *A. micropterus*, *Centaurea paphlagonica*, *Euphorbia anacampseros*, *Sideritis galatica* and the endemic *Minuartia anatolica* subsp. *arachnoidae* (Caryophyllaceae), *Salvia blepharochlaena*, *S. modesta* (Lamiaceae) and *Verbascum vulcanicum* (Scrophulariaceae).

Central Anatolian *Phlomis nissolii*-*Onobrychis tournefortii* Steppe

Steppe vegetation dominated by *Phlomis nissolii* and the endemic *Onobrychis tournefortii* (Fabaceae) can be found on calcareous and marly rock in the areas of Bolvadin, Cay, Senirkent and Uluborlu southwest of the Afyon Emir Mountains at altitudes ranging from 900-1000 m. Other characteristic taxa include *Eryngium bithynicum* and *Hypericum avicularifolium* subsp. *depilatum*.

Central Anatolian *Sideritis phrygia*-*Centaurea cariensis* Steppe

Steppe vegetation dominated by the endemic *Sideritis phrygia* (Lamiaceae) and *Centaurea cariensis* subsp. *maculiceps* (Asteraceae) can be found on calcareous and phyllite rock in the Sultan Mountains (Aksehir) at altitudes ranging from 1200-2200 m. Other characteristic taxa include the endemic *Asperula nitida* subsp. *hirtella* (Rubiaceae), *Astragalus strictispinis*, *A. wiedemannianus* (Fabaceae), *Aubrieta anamasica* (Brassicaceae), *Bolanthus frankenioides* var. *fasciculata* (Caryophyllaceae), *Helictotrichum pubescens* subsp. *longipes* (Poaceae), *Minuartia leucocephala* (Caryophyllaceae) and

Verbascum cherianthifolium subsp. *heldreichii* (Scrophulariaceae). In fact, all of the characteristic species of this steppe type are endemic.

Central Anatolian *Verbascum phryginum*-*Astragalus flavescens* Steppe

Steppe vegetation dominated by *Verbascum phryginum* and *Astragalus flavescens* can be found on desite and andesite in the Kumalar Mountains (Afyon, Sandikli-Dinar) at altitudes ranging from 1200-2300 m. Other characteristic species include *Euphorbia anacamprecos*, *Sideritis condensata* and *Verbascum crausianum*.

Central Anatolian *Astragalus akscheriensis*-*Onobrychis pisidica* Steppe

Steppe vegetation dominated by *Astragalus akscheriensis* and the endemic *Onobrychis pisidica* (Fabaceae) can be found on volcanic rock in the Karadag (Isparta) area at altitudes ranging from 1300-2300 m. Other characteristic species include *Chamaecytisus drepanolobus*, *Hieracium patentissimum*, *Sideritis pisidica* and the endemic *Saponaria chlorifolia* (Caryophyllaceae). Remarkably this steppe type supports in the order of 805 endemic species.

Central Anatolian *Micromeria cristata*-*Olymposciadium caespitosa* Steppe

Steppe vegetation dominated by *Micromeria cristata* subsp. *phrygia* and the endemic *Olymposciadium caespitosa* (Apiaceae) can be found on calcareous rock in the Barla and Kapi mountains at altitudes ranging from 1950-2250 m. It also spreads on to siliceous rock above the tree line in the Ilgaz Mountains. Other characteristic taxa include *Cyclotrichium organifolium*, *Festuca jeanpertia* and *Silene caryophylloides* subsp. *eglandulosa*.

Central Anatolian *Silene olympica*-*Astragalus densifolius* Steppe

Steppe vegetation dominated by *Silene olympica* and *Astragalus densifolia* can be found on eroded soils in the Ilgaz Mountains at altitudes ranging from 1850-2200 m. Other characteristic taxa include *Anthemis tinctoria* subsp. *pallida*, *Erysimum pulchellum*, *Minuartia hirsuta* subsp. *falcata*, *Muscari aucheri*, *Nepeta nuda* subsp. *cadmea* and *Ranunculus dissectus* subsp. *sibthorpii*.

Central Anatolian *Pedicularis comosa*-*Astragalus alpinus* Steppe

Steppe vegetation dominated by *Pedicularis comosa* and *Astragalus alpinus* can be found on eroded soils in the Ilgaz Mountains at altitudes ranging from 2200-2500 m. Other characteristic taxa include *Aster alpinus*, *Galium album* subsp. *prunense*, *Jasione supina*, *Gentiana septemfida* and *Myosotis alpestris*.

Central Anatolian *Achillea wilhelmsii*-*Artemisia santonicum* Salt Steppe

Salt steppe vegetation dominated by *Acillea wilhelmsii* and *Artemisia santonicum* can be found on salty soils around Tuz and Seyfe lakes at altitudes ranging from 960-1000 m. Other characteristic species include *Allium pseudoflavum*, *A. scabriflorum*, *Anthemis fumariifolia*, *Krascheninnikovia ceratoides*, *Reaumuria alternifolia* and the endemic *Acantholimon halophilum* (Plumbaginaceae), *Alyssum blepharocarpum* (Brassicaceae) and *Verbascum helianthemoides* (Scrophulariaceae).

Central Anatolian Saltmarsh

Central Anatolia has many lakes and several of these are surrounded by saltmarsh including Tuz Lake (Konya-Ankara-Aksaray), Seyfe Lake (Kirsehir) and Yay Lake (Sultansazligi, Kayseri). These halophytic communities support some of the highest levels of endemism of any habitat in the BioProvince especially Tuz Lake. Studies at Yay Lake and other sites show that these saltmarshes can usually be divided into three zones – an

inner zone usually dominated by *Salicornia europaea* where salt levels are at a maximum, a middle zone often dominated by *Salsol macera* where there are intermediate levels of salinity and an outer zone sometimes dominated by the endemic *Petrosimonia nigdeensis* (Chenopodiaceae). Apart from the common saltmarsh plant *Halocnemum strobilaceum* the inner zone supports few other species but there are no endemic taxa. Vegetation cover varies from 10-80% depending on salinity, and its width can vary from narrow zones where there are relatively steep slopes to zones extending for kilometers with very gradual slopes. Further studies at Tuz Lake and Seyfe Lake, for example, shows that the middle zone can be divided into two physiognomic types. In areas where surface water is not available Chenopodiaceae and Plumbaginaceae dominate with many succulent dwarf shrubs and small herbaceous species. The most common of these are *Frankenia hirsuta*, *Halimione verrucifera*, *Puccinellia convoluta* and the endemic *Lepidium caespitosa* (Brassicaceae), *Limonium iconicum* (Plumbaginaceae) and *Salsola stenoptera* (Chenopodiaceae). In fact, up to 21% of this flora is endemic. Where standing water occasionally occurs Poaceae and Juncaceae mainly dominate with tall herbaceous species, such as *Inula aucherana*, *Juncus heldreichianus*, *J. maritima* and the endemic *Elymus elongata* subsp. *salsus* (Poaceae) and *Puccinellia convoluta* subsp. *anatolica* (Poaceae) being prominent. Endemism here can be as high as 32%. The outer zone, which can be described as salty steppe (see above), is transitional between halophytic and glycophytic (non-halophytic) communities. One of the main species is *Artemisia santonicum*, while other common species include *Achillea wilhelmsii*, *Alhagi pseudalhagi*, *Apera intermedia*, *Noaea mucronata* and *Peganum harmala*. Endemism in this zone ranges from 17-23%.

Further information required.

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