

Insects and plants of a marsh at Küçükgeçit, Aşkale, Erzurum, Turkey: A preview on preservation

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Summary

During June of 1996 a marsh at Küçükgeçit, Aşkale, Erzurum, Turkey, was found to be rich in plant and insect species. Several vegetational units can be discerned, each with its own insect fauna. This area has great natural values. In some of the European countries including Netherlands, areas like this have almost disappeared; this may happen in Turkey as well. It is suggested that the Küçükgeçit marsh be preserved as a nature reserve, because destruction of valuable habitats such as this is going on at an alarming rate.

Key words: Preservation, insects, plants, Erzurum

Anahtar sözcükler: Koruma, böcekler, bitkiler, Erzurum

Introduction

In the course of excursions from Atatürk University, Erzurum, Turkey in search of different groups of insects for collection purposes and behaviour study of *Merodon* (Diptera: Syrphidae) in June of 1996, the present authors discovered an excellently preserved marshland on both sides of the Erzurum - Erzincan main road at Küçükgeçit, 45 km west of Erzurum, at an altitude of 1650 m above sea level.

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Only the smaller, southern part of the marsh is discussed in this paper, but this does not subtract from the values of the, much larger, part north of the road. The marshland is situated in the valley of the Serçeme Çayı river, and maintained by irrigation; water from the Serçeme Çayı is deviated along the slightly higher western side of the valley and runs back toward the river in a series of parallel, oblique channels to ensure the entire area is well watered. These channels are opened on alternate days, so if water supply runs low the irrigation is restricted in area, but not in quality. The marshland is used for hay cutting, as it is probably too wet for cattle grazing. As can be very well seen from the elevated road embankment, the marshland can be divided into a series of vegetational units. These, and the adjacent strips of land, will be described below, together with the insects they contain.

There are indications that the Serçeme Çayı does shift the course of its bed from time to time, e.g. the rather abrupt little escarpment rich in *Ornithogalum* (zone 6, described below) that can hardly be interpreted in another way than a fossil erosion loop caused by the Serçeme Çayı when the river bed ran along this escarpment long ago. The soil throughout the valley bottom exists of silt and silty clay and is reasonably fertile. The soil retains water well, but in view of the ample irrigation there is considerable surface runoff, checked only by the lush vegetation. Many plant species regarded by Tatlı (1988) to be characteristic of wet grassland or marsh are present.

Material and Methods

The insect material has been collected on flight and by trailing with hand nets. The material collected, mainly Diptera, is stored in the collections of the Zoölogisch Museum, Amsterdam and at Atatürk University, Faculty of Agriculture, Department of Plant Protection, Erzurum. Plants and insects were identified by the authors and workers of Department of Plant Protection. The insects have been pinned and dried.

Results

Division Into Vegetational Units (see map)

As noted, the vegetation of the Küçükgeçit marsh is not uniform. This is caused by several factors such as the evaluation above the summer river bed, the constitution of the soil and the water supply by

irrigation. The wettest areas alongside the river are occupied by three vegetation types, viz. **Salix** bushes (1); a vegetation dominated by **Phragmites** (2); a more open vegetat on with dominance of Orchidaceae (3). Farther away from the river bed a zone of grassland rich in **Gladiolus** (4) is found, followed by a zone of **Pimpinella** and **Lepidium** on higher ground (5). This zone is partially very well watered, where it borders on the main irrigation channel, which causes the vegetation to be slightly different. Where there is a slope between zones (4) and (5), this slope is occupied by a zone very rich in **Ornithogalum** (6).

The land adjacent to the valley bottom proper is mostly stony on the eastern side, rising to a rock escarpment some 60 m in height above the valley bottom (11). On the western side there is an embankment with a slope of approx. 30 degrees (7). The irrigation channel runs at the bottom of this slope; therefore the lower part of this embankment (8) is less dry and has a more lush vegetation than its upper part. The main Erzurum-Erzincan road also has an embankment; its vegetation resembles that of (7), the lower part of the road embankment (9) gradually merges into the **Phragmites** zone (2); it resembles (8), but with a less ruderal aspect. A ruderal area is found between the path running down the valley from the road embankment, and the embankment proper. The most eastward part of the valley bottom is very stony, with a few scattered plants (10).

1. **Salix** zone

Characters: The river bed directly borders on this zone and is eroding it on its outer loop sides. Some silt is deposited along the inner loop sides, but the high dynamics of these points has prevented **Salix** shrubs from growing there. The soil is composed of silty clay and sand, and completely waterlogged. The vegetation consists of **Salix** species and grasses.

2. **Phragmites** zone

Characters: This zone also is in direct contact with the river over a considerable length. The soil consists of recent or subrecent sediments and is waterlogged. Its vegetation is made up of a.o. **Phragmites australis** (Cav.). Irin. ex Steudel, **Orchis palustris** Jacq., **Ornithogalum platyphyllum** Boiss., **Pedicularis comosa** L., **Koeleria cristata** (L.), **Equisetum ramosissimum** Desf. The vegetation is rather open, soil cover being up to 75 % .

3. *Orchis* zone

Characters: Being for its main part in direct contact with the Serçeme Çayı, this disjunct zone is partly being eroded away. The soil is silty and waterlogged. It is a zone of low grasses with a dominant aspect of Orchidaceae such as *Orchis anatolica* Boiss., *O. palustris*, *Dactylorhiza iberica* (Bieb. ex Willd.) Soo and *D. osmanica* (Kl.) Soo. Some *Pedicularis comosa* and *Rhinanthus angustifolius* Gmelin and *Equisetum* spp. are present; the grasses are represented by *Poa pratensis* L., *P. trivialis* L., *Dactylis glomerata* L., *Koeleria cristata* and *Hordeum violaceum* Boiss. & Huet. Soil cover by the vegetation is low, down to 50 % but generally 80 %.

4. *Gladiolus* zone

Characters: This zone is not usually in direct contact with the Serçeme Çayı, but it occupies the lowest parts in the terrain away from the river bed. It is not unlikely that the area now seen as the *Gladiolus* zone corresponds with a former course of the Serçeme Çayı. This is the more probable in view of the shape of these depressions in the terrain. The soil, although not waterlogged, is well watered and is made up of clayey silt.

The vegetation of this zone consists of, a.o., the following taxa: *Gladiolus atraviolaceus* Boiss., *Orchis anatolica*, *Ornithogalum platyphyllum*, *Cynosurus cristatus* (L.), *Poa pratensis*, *P. trivialis*, *Rumex crispus* L., *Pimpinella saxifraga* L., *Rhinanthus angustifolius*, *Hordeum violaceum*. The vegetation is rather open, soil cover being up to 75 %.

5. *Pimpinella* zone

Characters: The *Pimpinella* zone corresponds with the older, higher river bed into which the Serçeme Çayı has cut its recent bed. The soil is moderately well watered, but in absence of irrigation it would be rather dry. It is made up of silt.

Some plant species found here were: *Pimpinella saxifraga*, *Ornithogalum platyphyllum*, *Cynosurus cristatus*, *Poa trivialis*, *P. pratensis*, *Hordeum violaceum*, *Lepidium campestre* (L.) R. Br. (growing in clumps), *Potentilla erecta* L., *P. sterilis* L., *P. reptans* L., *Rumex crispus*, *Trifolium repens* L., *Ranunculus brachylobus* Boiss. & Hoh., *Ranunculus grandiflorus* L.. Soil cover is high, up to 150 % or more (partial double cover).

6. *Ornithogalum* zone

Characters: This zone marks the more or less sharp escarpment (only some 60-80 cm high) in the river valley bottom: a borderline between the fossil and recent valley bottoms. It is not rich in species, probably in view of a) its small area and b) relatively high dynamics due to its slope. The soil consists of silt. The vegetation is dominated by *Ornithogalum platyphyllum*, some clumps of *Anthemis cotula* L., *Stipa hohenackeriana* Trin. et Rupr., *Alopecurus arundinaceus* Poiret and *Hordeum violaceum*. The vegetation is rather open, soil cover about 60 %.

7. Embankment of the valley - western side

Characters: This stony slope with a 30 degree incline has a high level of dynamics. Therefore the vegetation is possibly ephemeral, and certainly liable to change considerably over time due to succession if soil disturbance will be low, or due to soil disruption after which the vegetation must again assert itself. The lower part of this embankment seems to be more stable, and supports a richer flora than the upper part. This is due to its vicinity to the irrigation channel which ensures a slightly better water supply which in its turn enables more plant species to survive. The embankment with its vegetation probably acts as a buffer for the valley bottom in several ways, viz. the absorption or checking of rock slides, in providing a gradual transition of the groundwater table and by shelter from the wind. The loose, well aerated soil is composed of a mixture of silt, clay, rounded pebbles and rough gravel, and appears to have low water retaining qualities.

The vegetation of the embankment is disjunct, soil cover being much variable; overall soil cover is only 20 % in the upper part, increasing to 60 % or more at the bottom of the slope. The plant species growing on the embankment are mainly xerotolerant annuals or biannuals. Given the high dynamics, the flora is diverse and consists of a.o. *Astragalus pinetorum* Boiss., *A. christianus* L., *Anchusa azurea* Miller, *A. leptophylla* Roemer & Schultes, *Trifolium repens*, *T. trichocephalum* Bieb., *T. pratense* L., *Onobrychis viciifolia* Scopoli, *Lotus uliginosus* (L.), *L. corniculatus* L., *Coronilla varia* L., *Isatis candolleana* Boiss., *Eryngium billardieri* Delar., *Capsella bursa-pastoris* Medik. (L.), *Vicia canescens* Lab., *V. cracca* L., *Crataegus monogyna* L., *Verbascum oreodoxum* Hub-Mor., *Lamium macrodon* Boiss. & Huet, *Cerinthe minor* L., *Onopordon* sp.,

Artemisia absinthium L., **A. austriaca** Jacq., **Consolida orientalis** Schröd. (Gay) and **Veronica orientalis** Miller.

8. Lower part of the embankment

Characters: This area has a gradual transition from (7) which appears to be caused by better water supply, which has led to higher soil cover (up to 100 %) and abundance of grasses such as **Dactylis glomerata**, **Bromus inermis** Leysser, **B. tectorum** L., **Alopecurus arundinaceus** and **Poa trivialis**. Also, **Trifolium pratense**, **T. repens** and **Coronilla varia** occupy relatively much of the area. The soil consists of fine gravel and silt, grading into the valley bottom soil; water supply is ample. The ground is uneven, as there are several parallel water channels which may be in alternate use. Along these channels **Mentha longifolia** (L.) Huds. is common.

9. Embankment of the Erzurum-Erzincan road

Characters: This embankment is steep and stony. Water supply is extremely low in the upper part, but the bottom of the slope is well watered. Also, it appears to be richer in nutrients which are probably leached from the slope above. The vegetation is rich in species, but has a somewhat ruderal character, possibly due to the high dynamics of this zone. The upper part resembles (7) while the lower part has the same species as (8), with the addition of **Orchis palustris**, **O. anatolica**, **Pedicularis comosa**, a few specimens of **Gladiolus atroviolaceus**, **Anthemis cotula**, **Ornithogalum platyphyllum** and **Lepidium campestre**. Soil cover is high, up to 150 %.

Insect Life

The Küçükgeçit marshland area is rich in insects. A short survey has yielded the following results:

Lepidoptera

Lycaenidae: **Heodes virgaureae** L., **Meleageria daphnis palandoekis** Schriani-Hauser, **Sublysandra myrrha** Herrich-Schaffer.

Nymphalidae: **Argynnis paphia** L., **Mesoacidalia aglaja** L., **Cynthia cardui** (L.), **Vanessa atalanta** L., **Pandroiana pandora** Schiff., **Brenthis daphne** Berg., **Polygonia c-album** L.

Papilionidae: **Papilio machaon** L., **Parnassius apollo** L.

Pieridae: **Colias aurorina** Herrich-Schaffer

Hymenoptera

Several species of Tenthredinidae, Braconidae, Ichneumonidae, Chrysididae and Sphecidae.

Scoliidae: *Calpa quinquecincta* (Fabricius) and *Scolia sexmaculata* Müller.

Pompilidae: *Cryptocheilus variabilis* (Rossius), *Anoplius samariensis* Pallas and *A. viaticus* (Linnaeus).

Vespidae: *Vespa germanica* Fabricius, *Polistes nimpha* (Christ), *P. biglumis alpium* Blüthgen, and *P. dominulus muchei* Gusenleitner.

Eumenidae: *Eustenancistrocerus amadanensis transitorius* (Morawitz), *Stenodynerus bluethgeni* Van der Vecch, *Odynerus melanocephalus armenicus* (Morawitz), *Gymnomerus laevipes* (Shuckard), *Hemipterochilus bembeciformis bembeciformis* (Morawitz), *H. aberrans* Morawitz, *Antepipona orbitalis ballioni* (Morawitz), *Pseudopipona herrichi* (Saussure), *Ancistrocerus oviventris oviventris* (Wesmael), *Eumenes dubius dubius* Saussure, *E. lunulatus lunulatus* Fabricius, *Katamenes flavigularis* (Blüthgen) and *Jucancistrocerus jucundus* (Mocsary).

Masaridae: *Ceramius caucasicus* Andre.

Apoidea: Several species of *Sphecodes*, *Halictus*, *Andrena*, *Melitta*, *Osmia*, *Megachile*, *Chalicodoma*, *Lithurga*, *Anthidium*, *Nomada*, *Eucera*, *Tetralonia*, *Anthophora*, *Xylocopa*, *Bombus* (*B. incertus* (Mor.), *B. cullumanus apollineus* (Skor.), *B. niveatus* (Kriech.), *B. argillaceus* (Scop.), *B. subterraneus latreillellus* (Kr.), *B. armeniacus* (Rad.) and *B. sylvarum daghestanicus* (Rad.)) and *Psithyrus maxillosus* (Klug).

Diptera

Syrphidae: *Merodon aberrans* Egger, *M. alagoezicus* Paramonov, *M. avidus* (Rossi), *M. biarcuatus* Curran, *M. femoratoides* (Paramonov), *M. kaloceros* Hurkmans, *M. loewi* Van der Goot, *M. longicornis* Sack, *M. nanus* Sack, *M. nigritarsis* Rondani, *M. velox* Loew; *Cheilisia albitarsis* Meigen, *C. canicularis* Panzer, *C. variabilis* Panzer; *Chrysogaster hirtella* Loew, *C. solstitialis* Fallén, *Lejogaster metallina* Fabr.; *Sphaerophoria scripta* (L.), *S.*

turkmenica Bankowska; *Eristalis arbustorum* L.; *E. tenax* L.; *Chrysotoxum cautum* Harris, *C. festivum* L., *C. octomaculatum* Curtis, *C. parmense* Rondani, *C. vernale* Loew; *Spazigaster ambulans* (Fabr.).

Tabanidae: *Hybomitra ciureai* Seg., *Haematopota bigoti* Gob., *Theriopectes tricolor* Zell, *Tabanus bromius* L.

Asilidae: *Dysmachus bilobus* Loew, *D. bimucronatus* Loew.

Stratiomyidae: *Odontomyia* sp., *Chloromya formosa* (Scopoli), *Sargus bipunctatus* (Scopoli).

Various Tachinidae, Conopidae, Calliphoridae, Platypezidae and Muscidae are present, but were not collected.

Odonata

Isoptera as well as Anisoptera are well represented.

Coleoptera

Meloidae: *Cerocoma dahli* Kraatz, *Mylabris cincta* Olivier, *M. fabricii* Sumakov, *M. quadripunctata* (Linnaeus), *M. scabiose* (Olivier), *M. zebraea* (Marseul), *Lydus turcicus* Kaszab and *Micromerus erivanicus* (Maran).

The following families at least are represented: Carabidae, Silphidae, Scarabaeidae, Buprestidae, Elateridae, Coccinellidae, Alleculidae, Cerambycidae, Chrysomelidae and Curculionidae.

Discussion

The insects found at Küçükgeçit do not appear all in the same place. Their occurrence varies according to the vegetational units. The stony embankments seem to attract mainly Hymenoptera and Lepidoptera, while the wetter parts of the terrain are rich in Diptera and Odonata.

From a more detailed study it can be shown that the finer divisions of the vegetation are also reflected in the fauna. As an example, the *Pimpinella* zone (5) is rich in large species of *Merodon*, while the *Gladiolus* zone (4) harbours the smaller species of this genus;

the *Gladiolus* zone is rich in Stratiomyidae that are hardly found outside this zone (N.B. that this situation may change with the season).

The occurrence of 11 different species of *Merodon* at any one locality is unusual, but it confirms that at least many species of this genus are not xerophiles (Hurkmans, 1988; 1993). Also, the abundance of *Merodon* in the *Pimpinella* zone points at a preference for Umbelliferae, as noted before by Suster (1959) and Hurkmans (1985, 1988). The marshland at Küçükgeçit is also rich in *Ornithogalum platyphyllum*, a known food plant of *Merodon* (Treiber, 1987; Hurkmans, 1988). During a previous fieldtrip, a new species of *Merodon* was even discovered by monitoring a stand of *O. platyphyllum* (Hurkmans, 1987). The behaviour of *Merodon* was studied by the present authors; the results will be presented in a separate paper (Hurkmans & Hayat, in preparation). The abundance of *Merodon* species at this locality, in the coldest region of Turkey cannot be conciled with Bankowska's view (1980) that *Merodon* must be considered thermophilous. This may be true of some species, but certainly not for the whole genus. In Israel, for instance, there are nearly 40 known species of *Merodon*. The great majority of these species are either found very early in the season, or occur in high altitudes (Hurkmans & Freidberg, in preparation). In Turkey, where some 60 species occur, most species of this genus can be found in the eastern mountain regions above 1000 m. General data on Syrphidae occurring in the Erzurum region are given by Hayat & Alaoğlu (1990a, 1990b).

The Asilidae are represented by *Dysmachus bilobus* and *D. fuscipennis*; both species are uncommon in this area (Hayat, 1993). The research of the Turkish Asilidae is still far from complete (e.g. Hayat & Özbek, 1994).

For Tabanidae, wet grasslands and marsh localities are important habitats (Hayat & Özbek, 1992).

The Odonata mainly occur near the Serçeme Çayı itself, on the lee side of the *Salix* bushes, and along the embankment bottoms. The species of Asilidae occur mainly on low shrubs growing on the embankments, and in the higher vegetation of the *Pimpinella* zone where they can occupy a good lookout-post from where they attack their prey.

Because of these preferences the vegetational units constitute separate biotopes in the ecosystem of the marsh.

The loss of habitat due to destruction or external disturbance is recognized as a worldwide problem - in fact this is the major cause of animal and plant species becoming extinct. Since insects are by a great margin the largest animal group, the need for their conservation is urgent for several reasons. Firstly, insects are part of so many food chains and ecological networks that their extinction, even if only locally, greatly upsets the biological balance - leading to pests or diseases. Secondly, insects constitute a major potential for fighting pests, for human medicine and for agriculture, e.g. as pollinators. Thirdly, many insects are important indicator species of changes in the ecological balance and the structure of the landscape. Lastly, it is our responsibility that our children will not have to live in a world where natural beauty has been lost due to our inability or lack of responsibility. Apart from habitat destruction, insects are endangered on account of bad agricultural management and air and water pollution.

Since more than half of the animal kingdom consists of insects, they contribute to biodiversity in a major way. Insects, therefore, are the most important group of organisms when maintenance of biodiversity is concerned.

In Turkey, the loss or degrade of habitats of great natural value is currently proceeding at an alarming rate. Over the last 25 years a very great area has already been lost due to excessive use of pesticides, use of fertilizers and increased pressure from grazing and more intense use of land due to the rapid increase of the population of Turkey (Özbek and vd Zanden, 1996).

Hesselbarth et al. (1995) list 425 taxa of Lepidoptera, Rhopalocera. Van Oorschot estimates that in the coming 10 years, 80 % of the current Turkish Rhopalocera may not be able to survive (Pers. comm.). These authors, in their standard work "Die Tagfalter der Türkei" also comment on the great pressure by treading of cattle (Hesselbarth et al., 1995).

The continuing degradation of the natural environment makes it necessary to collect information both on the degree of pollution and on the effect of contamination and environmental changes of the state of biological components of the natural environment (Banaszak, 1995).

The decline of wild bee population in Turkey is due to, a.o., the use of pesticides, overgrazing and agriculture mechanization; the number of both species and individuals is rapidly declining (Özbek, 1995).

Changes in the landscape lead to destruction of possible nesting sites for bees (Ortiz-Sanchez, 1995).

If rational decisions on the maintenance of biodiversity are not soon made, there will be no way out of the biodiversity crisis that has already become a threat. Measures must be taken to educate the people, since sadly the Turkish people are not aware of the destruction that goes on. Preservation of at least some areas is necessary to maintain faunal and floral refugia in addition to preserving the cultural and utility values of these environments.

Our study has shown that the marshland at Küçükgeçit has a rich flora and fauna. The other part of the marsh, viz. north of the Erzurum - Erzincan road, appears to have similarly high natural values. The only factors that are now acting to change the present environment are internal factors, viz. rock slides, alterations in the course of the Serçeme Çayı and the weather. Therefore, we preliminarily regard this marshland area to be relatively undisturbed, and to be of considerable natural value. Possibly, areas of comparable natural beauty are to be found in this area. Ideally, all these areas should be surveyed and their plant and animal life recorded. Practically this may be an impossibility, but this must not prevent us from doing this work.

In the Netherlands, protection and preservation of areas of outstanding natural values started very late - too late in fact, because there is almost no place in that country where one can see meadows or marshland full of flowers and insects. Moreover, the few areas that have been preserved are small and far apart. This makes it very difficult for the flowers to cross-pollinate with other populations of their species, and animals have great difficulty in travelling from one suitable place to another. In Turkey, on the other hand, it is not yet too late: many areas of high natural value are still present and the distance between them is often small. Let us take this chance, and preserve areas such as the marsh at Küçükgeçit. The human influence on this marsh, such as it is now, is beneficial: the terrain is irrigated and the grass is cut once a year for haymaking - just the right management for this marsh. As long as this tradition is preserved, the marsh will remain beautiful and of

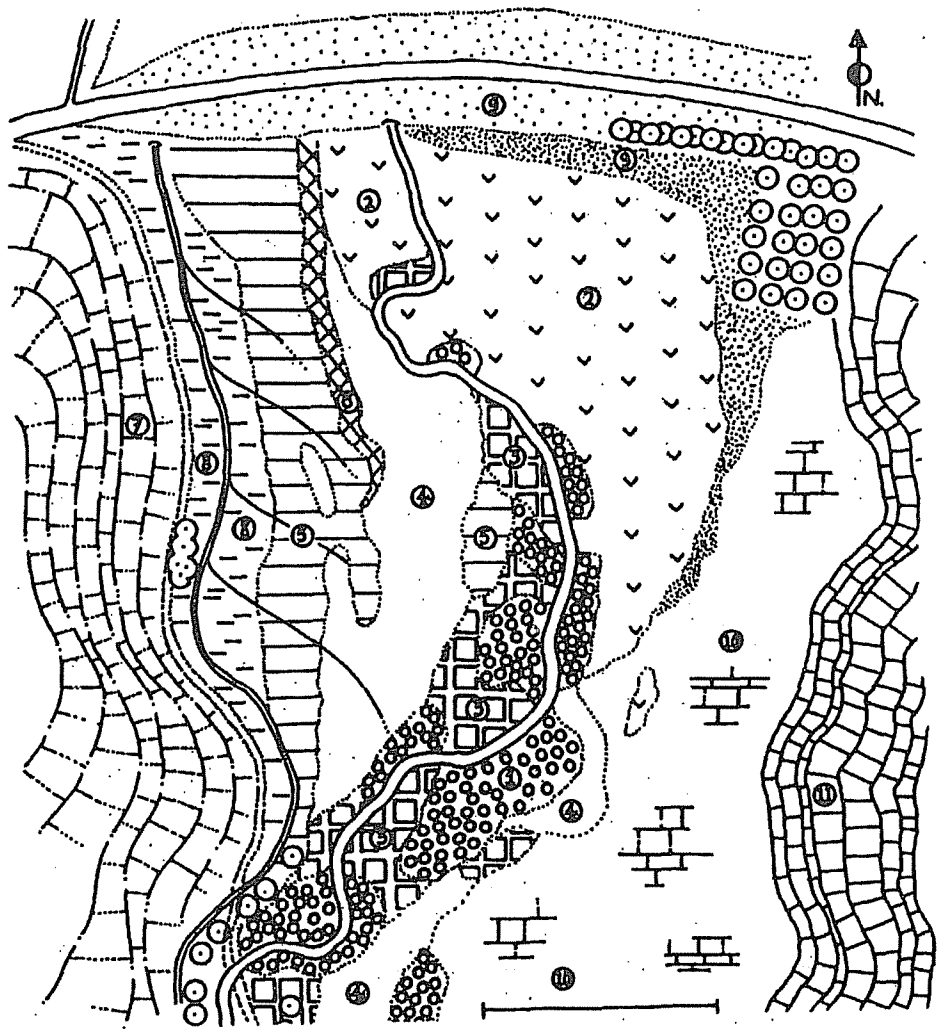


Fig 1. Vegetation map of the K kge it Marsh. 1. *Salix* bushes; 2. *Phragmites* zone; 3. *Orchis* zone; 4. *Gladiolus* zone; 5. *Pimpinella* zone; 6. *Ornithogalum* zone; 7. West side embankment; 8. Lower, moist part of w. embankment; 9. Road embankment; 10. Stony part of valley bottom; 11. Eastern rock escarpment. Scale line 50 m.

great value. Use of fertilizer, waste dumping or other disturbing uses should be forbidden. If we protect this area by making a nature reserve of it, the farmers can still go on cutting hay, but then we have a guarantee for the stability of this area. One of the advantages of the marsh at Küçükgeçit is its large surface, which is estimated to be 5 Ha (south part) and over 20 Ha (north part). Large size is not always a guarantee for good preservation, but it is a factor to even out external influences.

A second importance of areas such as the Küçükgeçit marsh is that they constitute a pool of genetic material a reserve from which species that are elsewhere depleted or extinct, can be replenished. For this purpose it is vital that the area be preserved in an excellent state. Therefore, the present authors suggest that the Küçükgeçit marsh be designated as a nature reserve.

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Özet

Küçükgeçit (Aşkale-Erzurum)'deki bir sulak alanın bitki ve böcek türleri ve bu alanın korunması

Bu çalışma, Haziran 1996'da zengin böcek ve bitki türlerinin bulunduğu Küçükgeçit Köyü'ndeki bir sulak alanda yapılmıştır. Bu alan, birçok vejetasyon bölgesine ayrılarak, her bölgenin böcek faunası tespit edilmiştir. Doğal dengenin büyük ölçüde hüküm sürdüğü böyle yerler, Hollanda da dahil olmak üzere, birçok Avrupa ülkesinde hemen hemen yok olmaktayken, Küçükgeçit'de bulunan ve doğal özelliğini henüz muhafaza eden bu tip alanları, Türkiye'de daha fazla geç kalınmadan korumak için acil tedbirlerin alınması ve halkın bu konuda bilinçlendirilmesi gerektiği kanaatine varılmıştır.

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