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The alteration of proportion of different lizard species compared to each other at The Great Pasture of Hajdúbagos

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Abstract. Three different lizard species can be found at the great pasture of Hajúbagos. These are the balkan or crimean wall lizard *(Podarcis taurica)*, the sand lizard *(Lacerta agilis)* and the green lizard *(Lacerta viridis)*. All of them are protected by law in Hungary but while sand lizard and green lizard is common all over the country, the amount of the balkan wall lizard is decreasing. The main cause of this regrettable possession is the habitat degradation and thus habitat loss. Namely balkan wall lizard not only prefers but suffers open sand grasslands and these kinds of habitats are disappearing in Hungary. Due to the fact that the extensive animal grazing lost its importance, open sand pastures started to change, succession can be realized. Thus grass closing constantly what is favourable for sand lizard and green lizard. Furthermore sand lizard and balkan wall lizard share roughly the same food source and moreover green lizard could possibly pass into a predator of balkan wall lizard juveniles also. Therefore sand lizard and green lizard became competitors (or predators) of balkan wall lizard and the proportion of the three species compared to each other is changing. My aim is to examine the vegetation change and simultaneously monitor the amount of the mentioned three lizard species. After all I would like to make a well established proposal on the management of protected grasslands.

Introduction

My examination area is the great pasture of Hajdúbagos that stands for a unique nature conservation value. However this area is one of the last extensive pastures reminded on sandy areas in Hungary (HNPI 2003). The non adequate land-use causes quick succession changes at the area and this negative procession, besides the alteration of the natural vegetation, the closing and standing out of the grass, has numerous deteriorative effects among others it affects the natural fauna also.

From my landscape historical examinations I know that this area is under human impact since ages, according to the archaeological findings it was inhabited in the Neolithicum (B.C. 5500-3400) already (Kozma 1998). In the course of history it was under agrarian utilization almost from the beginnings, in conformity with the different documentations the façade of the land was formed mainly by the extensive, grazing animal husbandry. According to Molnár (2001) and Dorka (2004) it is understandable, as the agricultural potential of the area is rather low thus mainly the grazing land-use is characteristic. Although, the last one century resulted crucial changes. This land-use method ceased virtually or at least it had been pushed to the background, what has a visibly deteriorative effect on the examined area. The present animal stock could consume only a negligible part of the arising biomass that leads to an undesirable cumulation of the organic material at the pasture and causes the appearance of weeds. To be able to suppress weeds, as a part of the area management, mechanical mowing is going on at some area divisions. Mechanical mowing is thus only an obligate solution and it would be necessary to replace it, what could be reached with the increase of the grazing animal stock (Mazsu 2001).

To be able to prove the negative effects of the land-use changes I choose different lizard species as an indicator animal group because according to my assumptions the alteration of the proportion of these lizard species compared to each other could be monitored in consideration of their different ecological demands. Besides, I am measuring the amount of the biomass realized in the examined pasture to be able to decide the sustainable volume of stock. In possession of enough data I will be able to make a proposal on the management of protected grasslands.

Materials and Methods

As my aim is to examine the vegetation change and simultaneously monitor the amount of the mentioned three lizard species I will explain the different examination methods in separate paragraphs.

Examination of the vegetation changes

The examination of the vegetation change consists of two different methods. On one hand I measure the volume and analyze the main internal parameters of the realized biomass by test reaping and chemical analysis, and on the other hand I make botanical uptakes on the plant species of the examination area. 34 research quadrates give the basis of the examination on the area. All of the quadrates are one square metre sized and were developed according to the characteristics of the examination area. Namely, the total area of the great pasture of Hajdúbagos is some 265 hectares, and rather diverse in its relief as the relative micro relief of the area is 5-9 metres (Molnár 2001). It means that several dunes can be found at the pasture. According to the different altitudinal levels the vegetation differs that effects the fauna distribution also.

I have divided the examination area into four different altitudinal levels, these are the dune top (BT), dune side (BO), lower location areas (M) and lowest location areas (LM). I have counted the proportion of the different altitudinal levels according to each other and found that the latitude of the dune tops is the smallest, approximately 12,2 % of the total area. The latitude of the dune sides is approximately 15, 7 % and of the lowest location areas is at about 22,5 % of the total area. The latitude of the lower location areas is the biggest, this level occupies around 28,3 % of the total examination area (all the remaining areas are under water, covered by forest or under cultivation). After consulting with some acclaimed researchers I have stated that 5 quadrates on different dune tops will be enough to be able to do the examination. Thus this altitudinal level was given a unit

multiplier. Dune side level was given proportionally a 1.3, lower location area level a 2.3 and the lowest location area level a 1.9 multiplier. So after the multiplication I get 5 quadrates on dune tops, 7 (6.5) quadrates on dune sides, 12 (11.5) quadrates on lower location areas and 10 (9.5) quadrates on lowest location areas. It was necessary to create more examination quadrates on each level, because of the due repetitions and also to be able to estimate the examination in case of the loss or damage of some quadrates. The setout of the 34 quadrates happened in March in two times. The method of the setout was the so called guided random method, as the different altitudinal levels give the estimated place of the quadrates but within these territories the correct place of each quadrate was the result of random choice.

The sampling by test reaping started in April (26.04.06). One test reaping of all the quadrates lasts for two or three days and repeats in 35 days. I timed the test reaping according to the usually 210 day sheep grazing season during which the pasture is used 6 times per 35 days (Vinczeffy 1993). I considered sheep grazing instead of cow grazing as presently the great pasture of Hajdúbagos is -and according to my landscape historical examinations I know that it earlier also was (HBML IV.A. 4/b.60.k., HBML IV.A. 4/b.76.k., HBML IV.A. 4/b.81.k., HBML IV.A. 4/b.83.k., HBML IV.B. 420/c. No. 2047., HBML XXII. 626/b. 21. k.)- rather a sheep pasture than a cow pasture. Before removing the grass I note the average height of the grass than cut it with a 3 centimetres stubble, again taking into account the grazing habits of sheep. The quadrates, where the average grass height is about 3 centimetres, or below this value I do not reap the grass. After reaping of the quadrates I measure the wet volume of the grass on a laboratory scale, than dry the samples and measure the anhydrous volume of the samples also. After that I mill a small portion of the samples for later analysis of the main internal parameters. So far I am ready with three test reaping and measurement without the chemical analysis.

The botanical uptakes should happen twice a year, first at the spring aspect and second at the late summer aspect. Unfortunately I do not have a complete uptake of the different plant species exist at the examined pasture from the spring aspect but the late summer uptake has already started, and now I have full and correct data from five quadrates of the 34, and the uptake is going on constantly now.

Lizard monitoring

According to the Hungarian National Biodiversity Monitoring System Amphibians and Reptiles Protocol (KvVM 2003) there are two methods for the observation of lizards. One is the sampling along lane method when the lizards should be observed along 2-5 metres wide and 500-1000 metres long lanes. If the field facilities do not enable the previous method, there is the sampling in quadrates when the observation should be carried out in habitat fragments with near similar vegetation. According to the protocol 50x50 (or 100x100) metre quadrates should be set out and the quadrates should be walked around like 10-25 parallel lanes.

As at the great pasture of Hajdúbagos the field facilities do not enable this method either, I have changed the directions of the protocol a bit. I have created 30x30 quadrates, considering the already mentioned altitudinal levels. Thus, I set out altogether 12 quadrates for the monitoring of the different lizard species exist at the examined area in April in two times. There are three quadrates on sand dunes (SzB; top and side together), three on sandy meadows (HL; lower location areas), three on fresh meadows (ÜR; lowest location areas) and according to the ecological demands of green lizard three quadrates on fringes of forest fragments (ESz). I used the guided random method for the setout of the quadrates like in the case of test reaping mentioned before.

In accordance with the Hungarian National Biodiversity Monitoring System Amphibians and Reptiles Protocol (KvVM 2003) the best season for reptile observation is the late summer-early autumn period however I have already started the monitoring in May to be able to increase the security of my examinations. So far there were two observations, one in May and one in July. For the first time I did the survey with some volunteers but than I had to change the conception of the monitoring system as it is rather difficult to work together with several people. For the second occasion there was only one volunteer with me and it proved to be a better method so in the future I will do the observations in this manner.

Results

Test reaping

I started the test reaping series this year on the 26th of April. I could finish the first reaping in three days and was able to reap 31 quadrates. Namely three quadrates can be found at a very precious area where the strictly protected small pasque flower *(Pulsatilla pratensis ssp. hungarica)* blooms and yields. During this period –until the end of July- I had to leave out this area from the experiment. However without the data of these three quadrates (BT4, BO2, BO6) the first graph (Fig. 1.) shows that in most cases the average grass height was the highest for the first test reaping than it decreased constantly. In some cases (M3, M4, M5, M11, LM7, LM6) the average grass height was higher for the third reaping than in the second one, according to my opinion this is because of the different botanical structure of these quadrates. This graph also shows that the average grass height is the highest at the lower location areas and also rather high at the lowest location areas but at the dune tops and dune sides it is lower. This fact could be interesting with considering the different ecological demands of the examined lizard species.

After each reaping I measure the wet and the dry volume of the samples, so far I am totally finished with the samples of the first two reaping but do not have the data about the dry volume of the samples from the third reaping. According to the second graph, in close connection with the average grass height, the heaviest samples are from the lower and lowest location areas and the least grass was cut from dune tops and dune sides (Fig.2.). These data are not fully cover the main aim of my experiment but after all test reaping I will be able to state the total productivity of the pasture and thus to decide the sustainable volume of stock for this area. The results of the botanical updates will also be discussed later.

Lizard observations

From the consultation with the ranger of the great pasture of Hajdúbagos I know that earlier the proportion of sand and balkan wall lizard was about 50-50 %, and the number of green lizards was negligible. By now this relation shifted and presently the above mentioned proportion is 80-20 % for sand lizard. Besides, the number of green lizards is increasing spectacularly. Unfortunately my data so far are not show clearly this statement but proof that sand lizards are the most common at the examination area.

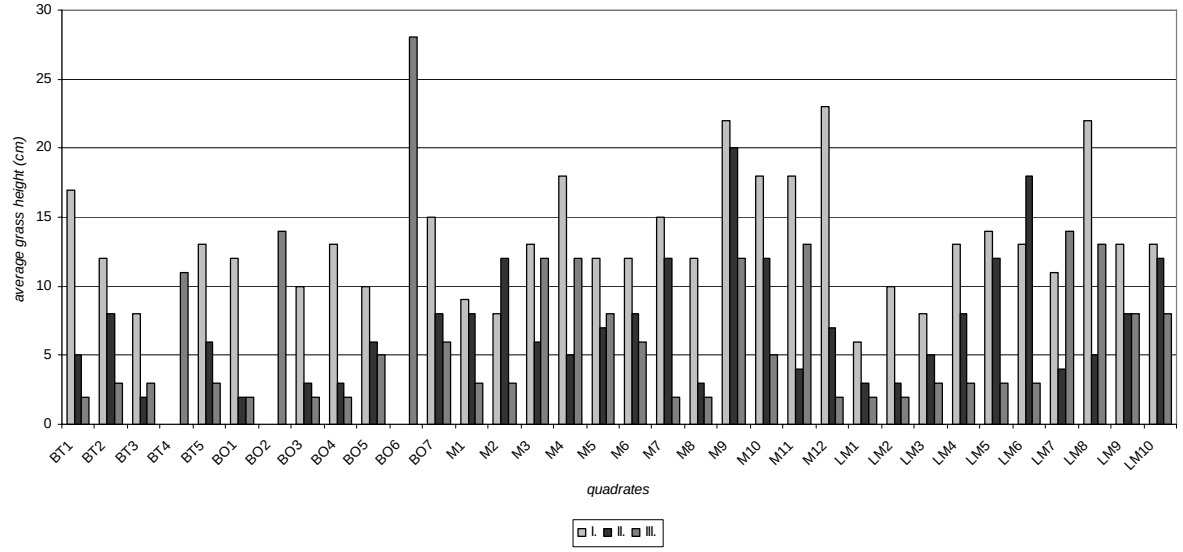

Figure 1.: *Average grass height in the examination quadrates for the first three test reaping*

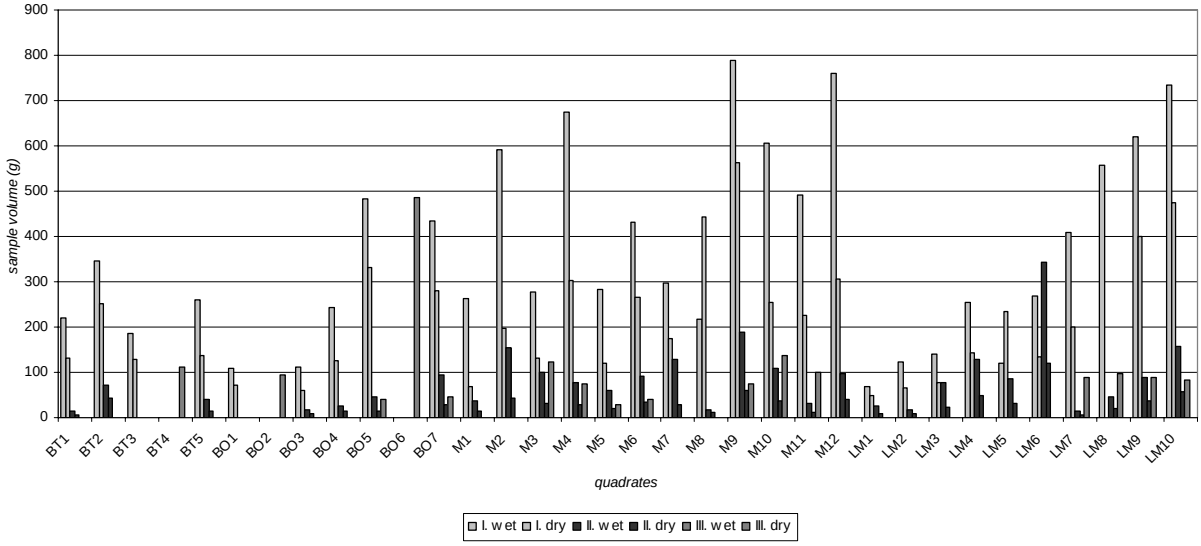

Figure 2.*: Wet and dry volume of the samples from the examination quadrates in case of the first three test reaping*

The first occasion of lizard observation on the great pasture of Hajdúbagos was on the 19th of May 2006. Unfortunately the weather did not subserve the monitoring examination as it was cool, hazy and rainy a bit, with about 19 °C. Notwithstanding the rather bad weather circumstances altogether 20 lizards were observed in the 12 quadrates and all of them were sand lizards (*Lacerta agilis*). The proportion of the observed lizards among the different kind of quadrates is shown on the third graph (Fig.3.). According to this graph most of the lizards were observed on fresh meadows (40 %) and on fringes of forest fragments (40%). On sand dunes 15 % and on sandy meadows only 5 % of the lizards were observed.

For the second time (17.07.2006) the weather was more favourable as it was sunny and dry with about 23 °C but not the best as the wind speed was rather high, at about 18-19 m/s during the observation (OMSZ 2006). Because of the wind only 15 lizards were observed, 14 were sand and one was green lizard. According to the fourth graph (Fig.4.) no lizards were observed on fresh meadows. On sandy meadows 20 % of the lizards were observed and this time the most lizards were seen on sandy dunes (40 %) and similarly to the first examination, on fringes of forest fragments (40%). The

only one green lizard was found on a fringe of forest fragment.

Discussion

Considering the lizard species of the great pasture of Hajdúbagos it is understandable that it stands for a unique nature conservation value. Three protected lizard species, the balkan or crimean wall lizard *(Podarcis taurica)*, the sand lizard *(Lacerta agilis)* and the green lizard *(Lacerta viridis)* can be found at the area. The presence of the balkan wall lizard is a very important fact as this species not only prefers but suffers open sand grasslands and unfortunately these kinds of habitats are disappearing because of the land use changes according to the receding of extensive animal grazing. However the proportion of the lizard species exist at the great pasture of Hajdúbagos compared to each other is altering constantly and due to the negative habitat changes the number of balkan wall lizards is on the decrease.

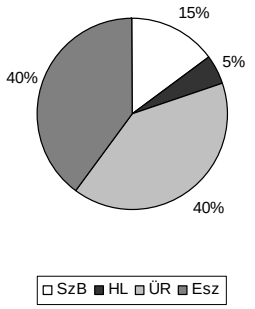

Figure 3.: *The distribution of the observed lizards between the different habitat types at the first monitoring examination*

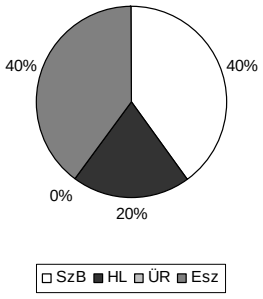

Figure 4.*: The distribution of the observed lizards between the different habitat types at thesecondt monitoring examination*

With this recognition I started to monitor the amount of the mentioned three lizard species and simultaneously to examine the vegetation changes. So far I do not possess enough data but what could be seen is that that the previously huge substance of balkan wall lizard decreased significantly while the earlier non common green lizard occurs rather frequently at the studied area. In the aggregate, according to my examination data the sand lizard should be considered the most common lizard species at the great pasture of Hajdúbagos.

The examination results of the test reaping show that the management of the area should be reconsidered as the productivity of the grass differs greatly according to the calendar period, the different altitudinal levels and to the botanical structure of the several pasture segments. To strengthen this statement I also make botanical uptakes for the sake of the exact plant list of the area but as I only have data about approximately 15 % of the examination quadrates and only from the late summer aspect so far the results of the botanical uptakes will be discussed later.

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