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PRESERVATION OF KURGANS IN BÉKÉS COUNTY, HUNGARY

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Abstract: Ancient burial mounds, so-called 'kurgans' have a great importance in the history of the Carpathian Basin. They are considered as significant elements of the cultural and natural heritage, and moreover they represent unique landscape, archaeological, botanical and zoological values. We can meet them in many areas of Eastern Europe. Unfortunately, the different agricultural activities resulted in their continuous degradation and their number also decreased over the past centuries. There were remarkable changes in agricultural regulation concerning the mounds in the EU – and in Hungary, too – in 2010. They were declared protected landscape elements and therefore they became part of cross-compliance. In our research we checked the results of the new regulation in relation to the changes in the state of the mounds in Békés County (SE Hungary).
Keywords: agricultural regulation, Békés County, protected landscape, heritage

1. INTRODUCTION AND OBJECTIVES

Kurgans are part of the cultural history of the Carpathian Basin. By examining them, not only archaeological science can benefit, but we can gain better knowledge on botany, palaeoecology, landscape ecology and soil science as well. In Hungary, the different types and ages of prehistoric mounds are called 'Cumanian mounds'. This name (which is inexact) suggests that it is only about the man-made mounds that were built by the Cumanian ethnic group in the 13th century. On the contrary, archeological excavations and dating have proved that most of them are older than the tumuli that the Cumanians built. These human-made formations-play a significant role in nature conservation, landscape architecture, and they are part of archaeological, botanical, zoological, cultural history heritage of the Great Hungarian Plain in the Carpathian Basin. [1].

The archaeological excavations revealed that most of mounds were built due to burial purposes either in the Late Copper Age or Early Bronze Age. Moreover they formed basis for settlements throughout the prehistory and history of the Carpathian Basin. Today Sarmatian, German and Hungarian Conquest period cemeteries, churches and tombs from the Árpád Age can be found on some of these mounds.

The outstanding botanical value of the mounds is that it is the last shelter for the non-cultivated, natural habitat and for the rarefying plants of the steppe. The mounds that detach as islands are the places that keep the biological diverseness [2; 3]. As plough-land cultivation has become more intensive, the country (chernozem) lands – that are of excellent quality – have been cultivated, hence only a small amount of the indigenous flora has remained. Today, we can hardly find a habitat where the loess flora has not been touched through the past millennium. The kurgans are the last island-like, ancient habitats and shelter, which is why they are botanically and zoologically valuable. The areas that have dry and hot climate – sometimes with rare associations – also create proper conditions for animal habitats.

Beside their botanical and archeological values these also have landscape, soil science and palaeoecological values [4]. As landscape values, they belong to the picture of our Great Hungarian Plain. The imposing mounds that stand out of the flat land serve as a locality point and also give amazing scenery for those who travel around the area [1]. The mounds are also valuable considering soil science. The detailed examination of the once buried and the soils that have been formed in the past millennia can broaden – moreover it can augment new results – the body of knowledge of the Holocene environmental changes, like climate changes [5; 6; 7; 8; 9], it also helps evaluate the human-made, anthropogenic soil formations [10].

Although the human-made mounds had raised people's attention, researches on mounds have only started to boom in the past few decades. In Hungary, the examination of these constructions and their environment started in the beginning of the 20th century, but a complex archeological and environmental research has only been in progress in the past few years. The examinations were professionally divided and the archaeological aspects were dominant. Archaeological researches mainly dealt with the

ethnical and chronological classification of the mounds and also with the people's lifestyle in the Copper and Bronze Ages [11; 12; 13; 14]. Among the researches related to kurgans, there are some new ones that are based on natural science approaches. The analyses carried out on soil science, palaeobotany and geology cannot only give an answer to the circumstances of how these mounds were built or the ancient environment of the mounds, but they also provide us with valuable data on how the land has changed since the mounds were built.

Researches carried out on the ancient environment of the mounds started with the geoarchaeological examination of the Test-halom kurgan [15]. Tóth [1; 15] carried out geomorphological and stratigraphic researches on Büte-halom kurgan.. It has become possible to clarify the building circumstances of the mounds and to reconstruct the ancient environment of three kurgans: the Csípő-, the Lyukas – and the Bán-halom by soil morphological, soil chemical, malacological and phytolith analyses of the buried soil [7; 8; 9; 16; 17]. Island biographical researches carried out on loess fields that remained on some of the mounds and are rich in different species of animals and plants concentrated on the description of some valuable animal and plant species and beside the examination of their isolation dynamics they also focused on the threatening environmental impact on symbiotic unions [18].

Based on map sources there were approximately ten thousand mounds in Hungary but by the mid-20th century they significantly decreased in number and their condition drastically deteriorated. During the 19th and 20th century hundreds of mounds were eroded and ploughed mainly by the river control and then by the developing agriculture. The names of those remained have been forgotten by today. Although the I. Josephian military map-sheets show a large number of mounds in the Carpathian Basin and by gleaning the old maps we can see almost forty thousand mounds, today we can hardly ever see an untouched, undamaged mound in the Great Hungarian Plain that we could be proud of.

Because of these the map and terrain record and the census of the mounds have started in the last decades of the 20th century. In the area of Tiszántúl 3724 pieces of mounds – most of them are burial mounds – have been counted by using different sources of maps [19]. The mound cadastre in Hajdú-Bihar County was compiled in the beginning of the 1980's. In the same decade the mounds in Jász-Nagykun-Szolnok County were assessed and categorized by their condition. According to the database assembled in 2002, after the countrywide cadastre, the mounds have been in very bad condition. Almost half of the mounds are under intensive plough cultivation, 40 % of them are damaged and a fifth of them have no landscape value, they are forested and weedy mounds [20; 21]. Although making the cadastre – which is maintained by the assessment and data supply of National Parks – was successful, the assessment itself did not protect the mounds efficiently.

Although the memorandum of the 22nd February 1847 Hungarian Academy of Sciences general assembly and then the Budapest Prehistoric Congress of 1876 dealt with the archaeological values and the necessity of their record, and took the protection of the mounds as a high priority case, the first significant result was due to the Act LIII of 1996 about nature conservation. Under this regulation the mounds became *ex lege* protected. However, the biggest problem of the regulating aim was that there was no enforcement order, and it only said that the mounds must not be abused. In other words, the regulation did not forbid agricultural cultivation, only eroding the mounds was forbidden.

There was a remarkable step in the common agricultural policy (CAP) reform of 2009. The basis of today's work is the communal order that came into force by the reform, the relating local laws and their impact on the growers and the country land. The new regulation has two basic elements: Statutory Management Requirements (SMR), which are governed by the law, and the required standards in the agricultural and environmental conditions (GAEC). Cross-compliance was introduced by Council Regulation (EC) No. 73/2009 owing to the reform in Common Agricultural Policy in 2003. The cross-compliance is related to the following issues: nature conservation, environment protection, animal marking, animal- and plant health, and animal welfare. These regulations are due to be introduced in between 2009 to 2013. The later one, which is related to the right agricultural and environmental condition, was introduced by Council Regulation (EC) No. 1782/2003, and came into force by 4/2004. (I.13.) FVM in Hungary, in 2004. At present, Hungary complies with the corresponding EU regulations by 50/2008. (IV.24.) FVM about the Good Agricultural and Environmental Condition enforcements. It contains nine elements as the other basic pillar of cross-compliance. These elements determine the regulations which are related to the healthy and sustainable agricultural environment, agricultural environment protection, rural development, landscape ecology, mosaicism, landscape, and the required criteria to observe them. There were continuous changes in the regulation owing to the amendments. It contained six regulations until 2010 such as terrace cultivation rules, crop rotation rules, criteria of weed-free zones, soil protection against erosion, burn bans, protection of soil structure, and observation of grazing rules. The regulation was modified by the Regulation No. 32/2010 (III.30.) FVM in 2010 in accordance with the Council Regulation (EC) No. 73/2009 – establishing common rules for direct support schemes for farmers under the common agricultural policy – and two new criteria were involved into the regulatory system. One of them is the irrigation rules, owing to which the number of conditions in regard with the agricultural environment increased. During the modification another criterion was passed into law, which – besides the environmental factor – designated the notion of landscape as sites to be protected. As a

result of this, sweep-pole wells and kurgans also became protected sites in Hungary. In accordance with the modified regulation the farmers who have kurgans on their lands are obliged to protect these sites and give up some cultivation methods such as ploughing and disking, both of which may cause soil disturbance in kurgan bodies (Ministry of Rural Development, 2011).
The introduction of the regulation started with a survey of their state. In order to carry out the survey we used the national mound cadastre as a background database. The survey was performed by the Ministry of Rural Developement (MRD) and the Agricultural and Rural Development Accredited Paying Agency (ARDA).
After the EU regulations, the modification of GAEC order and after this order had come into effect (1st November 2010) – except for reseeding works – any agricultural cultivation is forbidden on the mounds. All in all there have been such changes in the protection of the mounds that it is worth assessing, investigating and putting it into the centre of a research theme.

2. MATERIAL AND METHODS

The introduction of the regulation started in autumn 2011 with a countrywide site assessment of the registered mounds. For doing this, the database was given by the previously mentioned mound cadastre. The assessment was done by the controlling department of the Agricultural Rural Development Agency (the paying agency of the EU agricultural and rural development support). By joining this work we have controlled the most significant mounds in Békés County that can be part of the regulation.
As a result of the former cadastre work, the directory of the National Park of Körös-Maros has classified the mounds that are on its territory into 6 categories (in a scale of 1 to 6) according to their significance. Number 1 covers the untouched, non-cultivated mounds, while number 6 covers the cultivated, eroded ones. However, when categorizing them besides their condition they also paid attention to their unique values. So, considering these results and the result of our database, we suggested that the regulation include categories from 1 to 3. The survey carried out in 2010 concluded that only 185 mounds remained in a state with landscape importance from the once existing 1533. The data of these 185 mounds were uploaded in a chart. The chart contains the unique [1]FÖMI (IGCRS) identification number of the mounds, the [2]EOV (UNPS) centre coordinates (X and Y) the [3]MePaR (LPIS) physical block identifier including the mound and its registered radius.
During the site assessment, following the chart above, we generated a measurement package for the concerning blocks based on the physical block identifier of the mounds and we downloaded these measurement packages from the [4]IIER (IACS) system, which is the computer system of the paying agency. We did the measurements of the mounds with the help of the measurement packages, with THALES MOBILE MAPPER PDA-GPS machines. We navigated on the registered centre of the given mound in the given measurement package of the physical block and this was how we searched the highest point of the mound. Through the years the registered centers might have been changed, therefore, based on the experiences we had on the scenes, in many cases we realigned the coordinates belonging to the registered centre.
In the scene, standing on the actual centre, we recorded the coordinates of the given mound with the help of the PDA, and we checked the radius data given during the cadastre survey.
1. When the shape of the mound was a regular circle then we measured its radius and we recorded this data beside the centre measurement. At this time, after giving the radius data, the PDA showed us the layout of the mound.
2. When the shape of the mound was not regular, then we walked around the verges of the mound and we assigned them to the centre. In this case, the area that we walked around has become the circle line of the mound.
With these steps we updated and corrected the data of the former mound cadastre.
After this, we gave further data on the cultivation branch of the mounds (utilized as meadow or cultivated) by filling in a chart, we took photos of its sides and we assigned the farmer(s) to the mounds with the help of the cadastre vectors of the land registry. We electrically recorded the data as well on the PDA, because after finishing this work we had to backload the measurement packages with the data given at the scene into the IIER system. These data will serve as a reference database in the future, and this will be the basis of the contingent sanctions. Additionally, the polygons of the mounds have been marked in the database of the MePaR, among the map-covers. This is a help for the mound-owners, because by handing in their Area Payment Scheme the mounds will be visible on the maps as well.
The farmers who did not give up cultivating the mounds were penalized with a serious sanction in terms of their SAPS support in 2011. The degree of the sanction amounted to 1%–3% of the total support, the exact amount of which depended on the size of the total area applied for, and the number of the mounds cultivated by the farmer. Sanctioning occurs according to the process of controls falling under the cross compliance and the process of regulations concerning legal consequences, order 81/2009. (VII. 10.)

[1] Földmérési és Távérzékelési Intézet (Institute of Geodesy, Cartography and Remote Sensing)
[2] Egységes Országos Vetületi Rendszer (Uniform National Projection System)
[3] Mezőgazdasági Parcella Azonosító Rendszer (Land Parcel Identification System)
[4] Integrált Igazgatási és Ellenőrzési Rendszer (Integrated Administration and Control System)

FVM. The formula also includes what happens in case of breaking the order of the rest GAEC and cross-compliance and their extent in proportion to the economical area. In this way the sanction can be 100 % of the given support. Apart from this the sanction can be yearly. Sanctions can be used due to breaking the rules of cross-compliance and it can be deducted from the amount of support once or yearly.

A comprehensive examination of the basic number, which changes year after year, and the cultivated mounds are surveyed each year. The figures show that their number was 185 in 2010, 98 in 2011, 78 in 2012, and 40 in 2013. During the field survey year after year we follow the mounds still cultivated, and note the date when a mound becomes un-cultivated. During our work we filled spreadsheet with our experience of the actual examined mounds (state, land use and crops on the mounds). Every examined year we photo-documented the cultivated mounds too.

We started our monitoring system in 2013, through which we checked the untouched mounds that had been examined in the previous years. With the help of this system we can see the stability of the changes caused by the regulations. This activity is done by a representative sampling procedure and random number generator every year. The sampling rate is 10 %, in which the basic multitude in 2013 is the number of the cultivated mounds in 2011, in 2014 is the number of the cultivated mounds in 2012, in 2015 is the number of the cultivated mounds in 2013.

We keep the above mentioned paper and photo documents at this level of examination, too.

3. THE RESULTS OF SITE ASSESSMENT OF 2011

We can see that the examined mound population in Békés County reaches up to 185 (Figure 1). 87 of the 185 mounds were non arable in the time of the survey in 2010. During the year 2010, when there was a change in the law, at the time of the site assessment we found 87 nearly non-cultivated original mounds.

The area of these mounds has not been cultivated through history. These mounds are situated in natural areas, on meadow areas, a few of them are on balks and on borderlands. Loess flora inhabits their surface, which were mainly used for herding or sometimes mowing.

We found 20 mounds that were used as plough-lands in the previous years and only because of legal changes they are now non-cultivated. Most of these mounds took place on extended plough-lands. These mounds eroded due to cultivation that lasted for decades and centuries. Some of them were significant mounds of the landscape.

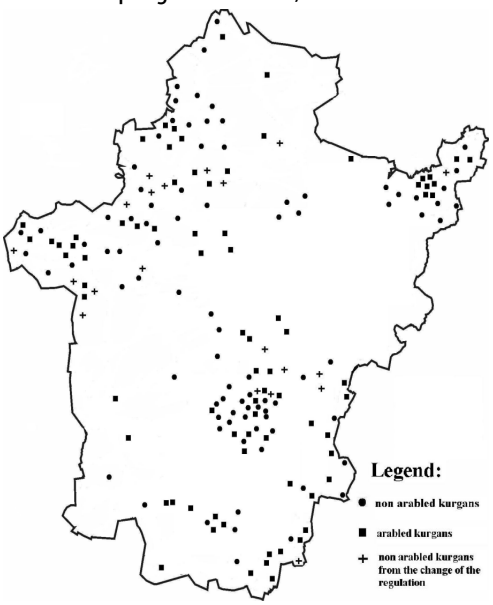

Figure 1. The results of site assessment of 2011

During our work we found 78 mounds that were under cultivation despite the existing and legal regulations. These mounds are also situated on current plough-lands. They are also low in height and are dilapidated. Intensive cultivation can still be seen on their sides. On these plough-lands where these mounds are situated conventional cultivated plants such as wheat, corn or sunflower are grown.

4. THE RESULTS OF FIELD CONTROL OF 2012

The Figure 2 gives an overview of the results of the field survey conducted in 2012. The map shows mounds that have not been cultivated since the beginning of 2012 – including – the ones that became non-cultivated in 2011–, and those which became non-cultivated during the year 2012 are marked. During our fieldwalking on the area, we found 107 mounds that were non-cultivated during the previous year and during the year 2012 another 38 mounds became non-cultivated, nevertheless there were 40 mounds that were still under cultivation. Similarly to the previous year, mainly wheat, corn and sunflower were found on these cultivated mounds.

Figure 2. The results of field control of 2012

Reseeding process has only started in a few cases on the mounds that became non-cultivated in the previous years. Through the assessment process we also made photo documentation. Figures 3-4 show photos taken of mounds that became non-cultivated in 2012.

Figure 3. Mound No. 1048 in 2011 in cultivated state

Figure 4. Mound No. 1048 in 2012 in non-cultivated state

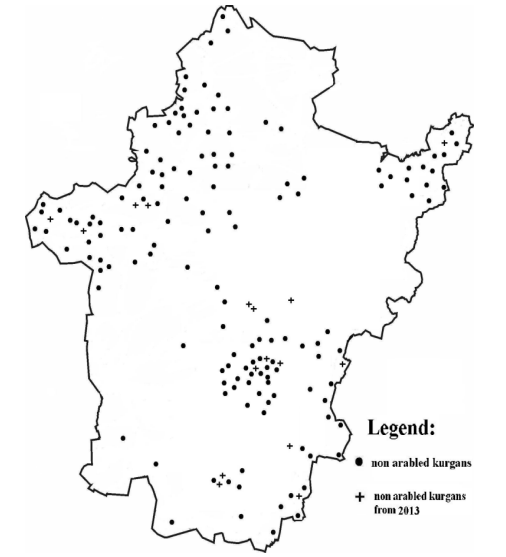

Figure 5. The results of field survey conducted in 2013

During the fieldwalking in the area we found 145 mounds that were non-cultivated in the previous year and during the year 2013 another 16 mounds became non-cultivated. By the end of the year 2013, 161 mounds became non-cultivated, nevertheless 24 mounds were still cultivated. Similarly to the previous year mainly wheat, corn and sunflower were found on these cultivated mounds (Table 1). Reseeding process has only started in a few cases on the mounds that became non-cultivated in the previous years.

5. THE RESULTS OF FIELD CONTROL OF 2013

The next figure (Figure 5) gives a summary on the results of the field survey conducted in 2013. This map shows both those mounds that have not been affected by cultivation since the beginning of 2013 – including the ones that became non-cultivated in 2012–, and those that became non-cultivated during the year 2013.

Table 1. The collected data of the cultivated kurgans in 2013

No.	mound identifier	EOV X	EOV Y	radius	area (ha)	height (m)	utilization of the mound
1.	1060	804305.00	107056.00	31	0.17	4.50	barley
2.	1064	800805.00	108575.00	43	0.58	2.00	maize
3.	1074	808711.00	158464.00	33	0.34	1.50	maize
4.	1268	780744.00	172971.00	58	1.05	3.50	maize
5.	1342	787661.00	175626.00	72	1.86	5.00	wheat
6.	1373	807378.00	201977.00	23	0.15	2.50	maize
7.	1558	825079.75	182458.76	31	0.30	4.40	wheat
8.	5003	806431.00	109952.00	28	0.20	2.50	maize
9.	5029	819594.00	127424.00	23	0.16	2.00	maize
10.	5100	794425.00	116471.00	15	0.04	3.00	barley
11.	5106	811628.00	129002.00	18	0.05	1.50	maize
12.	5107	811661.00	128046.00	18	0.09	2.00	maize
13.	5108	811006.00	123845.00	29	0.26	4.00	maize
14.	5109	814131.00	127539.00	18	0.04	1.50	wheat
15.	5259	774072.00	146304.00	25	0.23	1.00	wheat
16.	5264	778159.00	138705.00	33	0.02	1.50	wheat
17.	6164	812756.00	122121.00	21	0.14	2.00	wheat
18.	8569	839008.00	181707.00	43	0.57	1.20	wheat
19.	8570	839441.00	181322.00	30	0.28	1.80	maize
20.	8571	839598.00	182105.00	38	0.43	2.10	maize
21.	8572	838892.00	181764.00	35	0.38	3.00	maize
22.	8573	838942.00	181471.00	31	0.29	1.20	wheat
23.	1111	788738.00	120699.00	54	0.90	0.50	sunflower
24.	2222	788686.00	120690.00	50	0.50	0.50	sunflower

Table 2. The results of monitoring audit of 2013

No.	mound identifier	utilization of 2011	utilization of 2012	utilization of 2013	year of the change of the status
1.	1071	maize	made lawn	made lawn	2012
2.	1152	maize	fallow	fallow	2012
3.	1153	maize	made lawn	made lawn	2012
4.	1277	barley	fallow	fallow	2012
5.	1449	maize	fallow	fallow	2012
6.	5030	sunflower	made lawn	made lawn	2012
7.	5099	grass	fallow	fallow	2012
8.	5225	alfalfa	made lawn	made lawn	2012
9.	1240	pasture	pasture	pasture	before 2010
10.	8408	pasture	pasture	pasture	before 2010

6. THE RESULTS OF MONITORING AUDIT OF 2013

Table 2 shows the fieldwalking results of our monitoring process in 2013. At this level of the monitoring process we can claim that we have not found a mound that has been cultivated since the regulations. The table also shows that four of the mounds have been re-inhabited with grass vegetation.

7. CONCLUSIONS AND SUGGESTIONS

There used to be over 40000 mounds in Hungary. The records kept by the Körös-Maros National Park reveal that 1533 of them were situated on the land which is now part of Békés County (SE Hungary). The survey carried out in 2010 concluded that there are only 185 mounds remained with any landscape significance. 87 were non arable and 98 arable lands out of the 185 mounds. In 2011, the number of non-arable mounds increased to 107. In 2012 this numbers went up by 38 pieces and culminated at 145. In 2013 the number of non arable mounds increased, too. Today there are 161 pieces of these mounds. There has been a significant change and the number of the well-preserved mounds has increased, their erosion stopped. Having seen the results, we can say that there is a significant chance for the condition of the mounds to get better, as the former loess flora populations can be restored due to the lack of cultivation, which includes the rare and unique plant and animal species that tightly relate to each other. The diagram also shows that it is more than just stopping erosion, as a result of the regulations there has been improvement and regeneration as well, which we have confirmed with photos.

It is necessary to continue the monitoring process in the following years, as due to the nature of the regulation it is essential to conduct follow-up studies related to the condition of the mounds. Still, there can be conflicts between the mound-owners within the triangle of mound-cultivation-sanction. Therefore, it is necessary to examine the owners' attitude to the law. Their negative/positive attitudes and aspects towards the mounds are interesting issues. In our opinion, men cannot be taken out of nature, as they are integrant and formative part of it, hence their opinion and actions are highly important when talking about nature conservation. Relating to this, we are planning to do a sociological, depth interview within a predetermined target group.

The mounds that are often more than thousand-year-old anthropogenic elements of the landscape have been developing with the society. Their present and future depend on the work and protection or destructive activity of those living and farming in the area. The main task of nature conservation related to the mounds should be to stop their destruction with the help of reasonable compromises. We have to find out whether the regulations have reached their goals in people's attitude or it will lead to conflicts.

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