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THE CHANGES IN SOIL ACIDITY OF 10 LAKE BASINS IN THE ŁĘCZYŃSKO-WŁODAWSKIE LAKELAND

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A b s t r a c t. The changes in soil acidity of ten lake basins in the Łęczyńsko-Włodawskie Lakeland in the period of thirty years has been evaluated. It has been found that the studied soils are naturally acid due to parent rock properties. The data analysis showed increasing in the area of acid soils in the studied period. In some basins such soils occupy already 100 % of the area. The low level of agriculture, especially improper mineral fertilization as well as decreasing in the area of limed soils, has been considered as the main cause of soil acidification. The influence of acid rain as a result of the atmosphere pollution in the neighboring industrial areas should be taken into account also.

K e y w o r d s: soil acidity, Łęczyńsko-Włodawskie Lakeland

INTRODUCTION

Lake basins are the area units applied in hydrography. They are strongly connected with current geographical area of the region and its geology. Due to this fact, it is quite easy to trace there any changes occurring in the natural environment, including those caused by man. On the whole there is lack of such investigations owing to difficulties to determine basin boundaries in the region.

METHODOLOGY

The present paper was based on the basin boundaries of 10 lakes (the Łęczyńsko-Włodawskie Lakeland) that were determined in the region, together with pH values of soil there. The measurements were performed by the District Chemical-Agricultural Station in Lublin. The analysis included the results obtained for fields found within a basin or in close neighbourhood (Table 1). This method application resulted in equal value of findings for particular basins that depended on farms number in its region. A number of results proved to be various in a respective period of research time. It was related with the state policy. Initially when the investigations were paid by the public purse measurements number was quite high whereas it has decreased definitely nowadays, when pH measurements are made on charges against payment.

Despite the methodological failings, it was established that the mean values determined for particular basins and the terms afford possibilities for answering the question given in the title of the work.

RESULTS AND DISCUSSION

Analysing the range of soil pH changes, their qualities can not be neglected being a problem of the first importance. Soil quality is a determinant of model and intensity farming in this region. There are not only soils developed from sand and peat in the Lakeland. The sand soils, if used in cultivation, can be put under potatoes and rye that do not require any special soil conditions. Peat soil are most frequently

Table 1. The results of soil acidity determination in some basins of the Łęczyńsko-Włodawskie Lakeland in the years 1955-1990

Lake	Country	Years	pH					WR*
			<4.5	4.5-5.5	5.6-6.5	6.6-7.2	>7.2	
Moszne	Lipniak	1955-71	24	39	14	22	1	70
	wieś	1972-85	43	39	12	5	1	88
		1986-90	63	23	7	7	-	89
	Jamniki	1955-71	8	25	23	44	-	44
	kolonia	1972-85	43	39	12	5	1	88
		1986-90			lack of data			
	Jamniki	1955-71	8	25	23	44	-	44
	wieś	1972-85	43	39	12	5	1	48
		1986-90			lack of data			
Długie	Kol.							
	Wola	1955-71	6	20	10	64	-	31
	Wereszczyńska	1972-85	11	18	19	50	2	38
		1986-90	18	22	14	40	6	47
	Wólka	1955-71	67	28	1	4	-	95
	Wytycka	1972-85	58	20	9	12	1	82
		1986-90	64	13	6	16	1	80
Łukie	Załucze	1955-71	11	32	17	29	11	51
	wieś	1972-85	36	22	23	15	4	69
		1986-90			lack of data			
Piaseczno	Rozpłucie	1955-71	49	34	15	2	-	89
	Grabów	1972-85	85	10	4	1	-	97
		1986-90	69	21	6	2	2	93
Rogóźno	Rogóźno	1955-71	80	17	2	1	-	98
	wieś	1972-85	57	31	10	2	-	93
		1986-90			lack of data			
Uściwierz	Wólka	1955-71	-	20	40	40	-	40
	Nadrybska	1972-85	32	12	12	44	-	50
		1986-90	33	17	11	17	22	55
	Ostrówek	1955-71	-	6	20	46	28	16
		1972-85	3	5	15	57	20	15
		1986-90			lack of data			
Sumin	Sumin	1955-71	23	51	13	13	28	80
		1972-85	27	31	25	17	-	70
		1986-90	29	24	9	26	12	57

*WR - Rhiem index

used as inferior quality pastures or meadows. These soils are mostly classified among IVth class or lower and simply land.

The farming of this region was and still has been of a quite low level, that is manifested by low application of mineral fertilizers as well as calcium ones. In the times of command and distribution character of economy, mineral fertilization was extorted and hence mostly irrational. Subsoil water contamination

with the fertilizers is an evident proof of the above statement. However, current prices of fertilizers also prelude their appropriate usage. The decline in mineral fertilizers and calcium employment in the country is particularly apparent in the mentioned here region.

Here the climatic conditions are propitious to undergo washing and leaching of cations inside a profile - alkaline cations first. That is why, a process of steady pH decrease has been a dominant process in the light soils. Some acid pollution of atmosphere has influence on the processes, too. Therefore, it can not be neglected although the Lakeland Region is far removed from the intensive emission sources. Mineral fertilization application is considered a potential source of soil acidification and can be prevented when soil liming is introduced. Unfortunately, this sort of operation is often negligent in this region.

The enclosed Table 1 shows some changes in soil pH in the year 1955-1990. This period of time has been divided into 3 sub-periods, regarding the possibilities of proper data arrangement. It seems that presented findings manifest explicitly the course of pH coefficient changes in the studied soils. Some gaps among data appear because of lack of reliable and suitable documents.

Soil reaction has been presented according to the division standing in the soil science. Moreover, every object and term was stated with so-called negative valuation indicator (after Rhiem). It determines the percentage of acid soils. This type of soil prevails in almost every studied basin according to even rough analysis of the table. The Uściwierz Lake basin is the only exception where in Ostrówek country acid soil percentage was equal only 15 %. In another country of basin (Wólka Nadrybska) this percentage was considerably higher and reached 55 %. In the other basins this percentage was even higher and did not decrease below 10 % but approached 100 %.

The analysis of acid soils in the course of time shows that their area increases in general in all the basins together with time pass. The soil of Sumin country is exceptional (Sumin basin) because of calcium fertilizers applied at adequate time and quantity. Similar tendencies but not so evident were observed in The Długie Lake Basin (Wólka Wytycka country).

CONCLUSIONS

On the ground of analysis on soil pH changes in some basins of The Łęczyńsko-Włodawskie Lakeland, the following conclusions can be drawn:

1. The predominant part of soils found within the studied land or in close neighbourhood are the acid soil low value and agricultural suitability.

2. These soils are acid in the majority, in vast region there were only acid soils.

3. In the studied objects there was recorded a progressive acidification of soils. No direct causes have been found out but as well as natural factors there are some operating at present like mineral fertilization applied without necessary liming. Moreover, the influence of polluted atmosphere should also be considered.

REFERENCES

1. **Borowiec J., Gajda J.:** Wstępna ocena chemizmu wód i gleb w rejonie LZW w aspekcie planowanej intensywnej działalności gospodarczej i przemysłowej. Annales UMCS, 38/39, 1983/1984.
2. **Dobrzański B., Turski R.:** Pokrywa glebowa. W: Rejonizacja produkcji rolniczej województwa lubelskiego, UW Lublin, 1972.
3. **Pasternak K.:** Skład chemiczny wody rzek i potoków w zlewniach zbudowanych z różnych skał i gleb. Acta Hydrobiol., 15(2), 1973.

ZMIANY KWASOWOŚCI GLEB ZLEWNI 10 JEZIOR NA POJEZIERZU ŁĘCZYŃSKO-WŁODAWSKIM

Oceniano zmiany zakwaszenia gleb 10 zlewni jezior Pojezierza Łęczyńsko-Włodawskiego w okresie 30 lat. Gleby wykazują zakwaszenie naturalne, jako efekt właściwości skały macierzystej. Stwierdzono, że obszar gleb kwaśnych zwiększa się. W niektórych zlewniach zajmują one 100 % obszaru. Niski poziom gospodarki rolnej, zwłaszcza niewłaściwe nawożenie mineralne oraz niższe wapnowanie są głównymi czynnikami zakwaszenia gleb. Należy także uwzględnić wpływ kwaśnych deszczy, jako efekt zanieczyszczenia powietrza przez sąsiednie tereny przemysłowe.

S ł o w a k l u c z o w e: kwasowość gleb, Pojezierze Łęczyńsko-Włodawskie.