MARKOSYAN A.K. 1951

Rasprostranenie i biomassa kharovykh vodoroslei i mkha v oz. Sevan.

Extent and biomass of the aquatic chariphytes and mosses in Lake Sevan.

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Translated By J.J. Holmes.

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[page 29].

The littoral zones of Lake Sevan have been studied by Arnol'di (1929), Fridman (1948, 1950) and Markosyan (1947, 1948). The washing effect is on the average not deeper than 15m and on this depends the extent and depth of the macrophytes.

The fundamental mass of this data is on the plants in the open parts of the lake - mostly aquatic charophytes and mosses, in what are called in Lake Sevan, the "zones of chara and moss". The extent of these zones is not the same in different parts of the lake. Along the eastern shore, where the bottom dips suddenly and the deep isobaths approach close to the shore, the aquatic charophytes occupy plots of from 6-17m deep, and the mosses to 18-19m. On the western and southern shores, where the bottom is more gently sloping and the deep isobaths lie a considerable way from the coastline, the chara and moss are found from 6-7m to 14m, and rarely up to 15m deep.

The soil on which the chara and moss is native, is a sandy silt. Its origin, as indicated by Arnol'di, is due to the dying and decomposition of the macrophytes, giving rise to a silt of organic origin.

Reduction of the water level of Lake Sevan, as shown in our own previous work, is not a disturbing effect, for the chara and moss of the littoral zones continue with the alteration of level and occupy the previous depths.

At the present time the level of water in the lake is, by comparison with 1938, lower by 4m. As before, the chara and moss occupy plots on the bottom of the littoral zone, of 6-7m to 14m on the western shores, and to 17m on the eastern shore. Such a pattern shows that the lowering of the level of the lake does not have a negative effect on the zones of chara and moss. Because of this situation, there naturally arises the question - what factors cause the spreading of the chara and moss in the littoral zone ?

We have observed in those of our open coastal regions of the lake which are almost constantly under the influence of breaking waves, that the zones of chara and moss commence at a depth of 6-7m. In parts of the lake which are sheltered from wave action (coves, bays) a different picture is revealed;

here the chara and moss start at a depth of 1-2m.

The fundamental factors limiting the upper-most boundary of extent in the chara and moss, of the open districts of the lake, to a depth of 6-7m [page 30] are the violent actions of the breaking waves. In the waters of less than 6-7m, thanks to the mechanical action of the surf, the underground of chara and moss is destroyed, and together with the silt on the bottom, is washed into the deep parts of the lake.

The lower boundary of extent of the chara and moss, as we have already pointed out, is not the same in different regions of the lake. Along the eastern shore, where there are not any rivers falling into the lake, and where the transparency of the water is high, the chara and moss extend to 19m, but by the western shore where the water is not so deep but is effected by rivers, they extend to only 14m deep. In spite of considerably lowering the level of the lake, the chara and moss are, as before, available at the same depths to which they previously grew. From this we see that the lower boundary of extent of water plants is determined by the depth to which the sunlight can penetrate the water.

The littoral zone of the lake has a rich animal population, particularly Gammarus, which forms a fundamental component of the benthos and is the major food object of the Sevan Trout.

The overwhelming mass of Gammarus is concentrated in the zones of chara and moss, where the undergrowth of these plants apparently create the most favourable conditions for existence. In this connection, the quantitative calculations of the chara and moss have a definite interest.

Below (Table 1) we have the data on the biomass (wet weight) of the aquatic charophytes, received from material gathered during the March 1947 - August 1948 series, taking two winter/spring and two summer periods.

At the time when the material was collected, we carried out a round-the-year observation on the chara vegetation and as shown by the data on the table, the largest amount of growth was concentrated into the winter. At the

beginning of the year there took place, in almost all the regions of the lake, a sharp decrease in the quantity of chara, while in the second half of the year it began to increase. Thus, during the year the chara had one winter maximum biomass (240·2 g/m^2) and one summer . . minimum (85·5g).

The development of the chara in different parts of the lake is not thr the same, and the variation of biomass attained on $1m^2$ ranges from 10g at Sarykaya to 470g at Babadshan.

On examination of the table it is obvious that the average annual biomass of lesser and greater Sevan is not the same, in the first there is an over-all average of 194·1 g/m^2 while in the latter this is 130·6g.

The area of the bottom of the lake limited by the 7-15m isobaths (Calculated for a lowering of the level by 4m) from the data by Kireeva (1933), total in Lesser Sevan 29Km^2 and in Greater Sevan 54Km^2. Accordingly, this is the area where there is always a rich population of aquatic charophytes, [page 31] the latest biomass of Lesser Sevan being 5050T and of Greater Sevan 6950T, giving a total of 12000T.

The extent of the moss in Lake Sevan is similar to that of the aquatic charophytes. The quantitative data on their distribution in the lake (Table 2) was taken during the period January to August 1948. The material was gathered from 3 regions of the lake - Noradus, Areguni and Sarukaya. The first and second regions are in Lesser Sevan, the third in Greater Sevan. We compared the distribution of chara with moss in the separate regions of the lake, and discovered that it considerably exceeded the quantity of chara. For example, in the Noradus region the biomass on $1m^2$ exceeds that of the chara by about 2·5 times and in all the rest of the lake by about two times.

[page 32] At the time of collection we came across a considerable amount of dead material in the Noradus region, but less in the Areguni region. Apparently, here, owing to the steep dip in the bottom of the lake, the dead moss rapidly washes off into the lake depths, while in the Noradus region the

dead moss remains and decomposes and is not swept away.

The quantity of moss in Lesser Sevan is almost two times greater (401·9 g/m^2) than in Greater Sevan (214·7 g). The average biomass for Lesser Sevan, taken over 8 months was 10,450 tons, while for Greater Sevan it was around 11,600 tons, giving a total for the whole lake of 22,050 tons.

The average biomass of the chara dnt the moss therefore comes to 34,000 tons.

Examination of the chara and moss in the lake showed that there was considerably more plants in Lesser Sevan than in Greater Sevan. At the same time, two regions in Greater Sevan - Babadzhan and Sarykaya, the first on the eastern coast, the other on the western, are sharply distinguished between t on the quantitative distribution of chara. The chara is 4 times greater in the Babadzhan region than in Sarykaya.

One reason for this is that in the Sarykaya region fishing is done with seine - nets, and every time are dragged from the lake onto the bank they bring up a great quantity of chara and moss together with Gammarus and other living creatures.

Constant repetition of this results in the "ploughing" of the plots on the bottom and breaks the normal conditions of growth and development of the macrophytes.

The best places for working with seine nets are on the western and southern shores of Greater Sevan. On the eastern shores of Greater Sevan and Lesser Sevan, it is not so good and the amount of netting done here is negligible.

The use of seine nets to catch fish changes the conditions and way of life of the most productive zone of chara and moss.

In order to avoid this the fishing organisations would have to use drift nets and shutter (O)(?) nets.

TABLE 1.

Quantity of chara in the littoral zone of lake Sevan (g/m^2).

Month	Lesser Sevan			Greater Sevan			Average for all Lake
	Noradus	Areguni	Average	Sarykaya	Baba - dzhan	Average	
1947							
III	358·0	285·0	321·5	55·0	263·0	159·0	240·3
IV	213·0	81·0	147·0	75·0	334·0	204·5	175·7
V	146·0	180·0	163·0	15·0	112·0	63·5	113·3
VI	56·0	216·0	136·0	24·0	50·0	37·0	86·5
VII	294·0	242·0	268·0	?	120·0	120·0	194·0
VIII	?	?	?	?	?	?	?
IX	185·0	127·0	156·0	26·0	332·0	179·0	167·5
X	97·0	235·0	166·0	47·0	340·0	193·5	179·7
XI	80·0	210·0	145·0	50·0	470·0	260·0	202·5
XII	?	?	?	?	?		
1948							
I	251·0	101·0	176·0	?	70·0	70·0	123·0
II	322·0	181·0	251·5	53·0	?	53·0	152·3
III	256·0	194·0	225·0	10·0	199·0	104·5	164·7
IV	290·0	287·0	288·5	47·0	36·0	41·5	165·0
V	142·0	146·0	144·0	142·0	200·0	171·0	157·5
VI	50·0	90·0	70·0	36·0	355·0	195·5	132·7
VII	126·0	198·0	162·0	16·0	220·0	118·0	140·0
VIII	130·0	443·0	286·5	138·0	32·0	85·0	185·6
Average	187·2	201·1	194·1	52·4	208·8	130·6	162·3

TABLE 2.

Quantitative development of moss in the littoral zones of L. Sevan. (g/m^2).

Month / Region	I	II	III	IV	V	VI	VII	VIII	Average of the region
Noradus	354·0	56·0	587·0	521·0	280·0	668·0	646·0	663·0	471·9
Areguni	264·0	232·0	300·0	488·0	335·0	93·0	120·0	823·0	331·9
Sarykaya	-	106·0	102·0	175·0	561·0	33·0	63·0	463·0	214·7
Average	309·0	131·3	329·6	394·6	392·0	264·6	276·3	649·6	339·4

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Notice

Please note that these translations were produced to assist the scientific staff of the FBA (Freshwater Biological Association) in their research. These translations were done by scientific staff with relevant language skills and not by professional translators.