

PRIMARY PRODUCTION OF THE WATERBODIES OF THE SOUTHERN UKRAINE AS A FUNCTION OF THEIR HYDROLOGICAL AND MORPHOMETRIC PARAMETERS

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ПЕРВИЧНАЯ ПРОДУКЦИЯ ВОДОЕМОВ ЮГА УКРАИНЫ КАК ФУНКЦИЯ ИХ ГИДРОЛОГИЧЕСКИХ И МОРФОМЕТРИЧЕСКИХ ПАРАМЕТРОВ

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The aim of this work was to determine the relationship between the primary production parameters and hydrological and morphometric parameters (catchment basins including) in a set of eutrophic waterbodies located in the south of Ukraine. Our own data on the waterbodies of the north-western part of the Black Sea Region (Goncharov, 2006) were analyzed. In addition, literature data (Oksyuk at al., 1998) on the floodplain lakes of the lower Dnieper with different water cycles were included. All data cover the vegetation period.

The investigated waterbodies significantly differ by size. The surface areas and the volumes of the lakes differ by five and six orders of magnitude, respectively.

Characteristics of the investigated parameters

Type of parameter	Name of parameter	Range of values	Dimension of parameter	
Gross primary production	in surface layer (P_{surf})	0,38-11,47	$mgC \cdot dm^{-3} \cdot day^{-1}$	
	in column of water (P_{column})	0,68-8,39	$gC \cdot m^{-2} \cdot day^{-1}$	
Morpho-metric	mean depth of water body	0,6-23,1	m	
	specific catchment area	catchment area / water body area	5-632	dimensionless
		catchment area / water body volume	2500-170000	km^{-1}
Hydrological	changes over time (external water cycle)	0,2-228,1	$year^{-1}$	
	water discharge per unit area of drainage basin (modulus of flow)	0,17-7,40	$dm^3 \cdot km^{-2} \cdot s^{-1}$	
	water load on the water body (hydraulic load)	0,6-110,0	$m^3 \cdot m^{-2} \cdot year^{-1}$	

Our study revealed the following regularities:

- P_{surf} is negatively correlated with the mean depth, a pattern that can be approximated by a power equation. P_{column} , however, has no dependence on depth.

- P_{column} varies along with specific catchment area by a hyperbolic law. P_{surf} values are independent on this factor.

- P_{column} / external water cycle relationship is described by a unimodal curve, with a maximum in the domain of 40-50 times per year. Also, P_{surf} demonstrates an increase up to these values of water cycle, followed by a slight decrease and stabilization at a certain level (about $1,8 mgC \cdot dm^{-3} \cdot day^{-1}$).

- P_{surf} and P_{column} change with the mode flow differently. P_{surf} has a positive linear dependence on the mode of flow. However, P_{column} reaches a plateau at the mode of flow of more than $2 dm^3 \cdot km^{-2} \cdot s^{-1}$.

The hydraulic load determines the primary production parameters in different ways. P_{surf} increases up to the water load of $5 m^3 \cdot m^{-2} \cdot year^{-1}$, and decreases at higher values. However, the primary production in the water column (P_{column}) increases hyperbolically.

Thus the morphometric and hydrological parameters of the examined waterbodies are significantly associated with the primary production.