

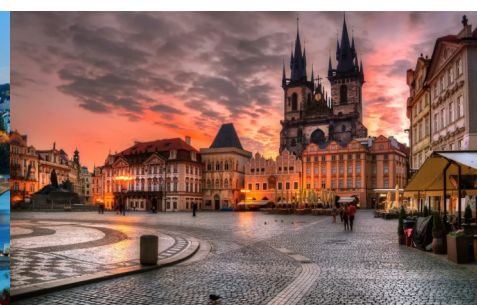
# 11<sup>th</sup> Eastern European Young Water Professionals Conference



## Book of Abstracts

Water for All - Water for Nature,  
Reliable Water Supply, Wastewater Treatment  
and Reuse

1-5 October 2019, Prague, Czech Republic  
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**11<sup>th</sup> Eastern European Young  
Water Professionals  
Conference**



**Water for All – Water for Nature, Reliable Water Supply, Wastewater  
Treatment and Reuse**

1-5 October 2019, Prague, Czech Republic

**BOOK of ABSTRACTS**



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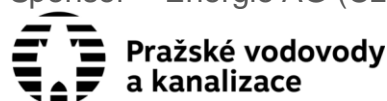
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## The Ecological Risk of Deterioration in the Water Flow of the Udy River Basin

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### INTRODUCTION

The current state of surface waters requires the development of new scientific tools to prioritize the implementation of environmental protection measures. One of the most effective and efficient methods for determining the level of environmental hazard are environmental risk assessments. The method for assessing the environmental risk of disturbing the well-being of an aquatic ecosystem, presented in this paper, is based on the determination of environmental standards. The Udi River basin has a transboundary significance and flows through the territory of a large industrial center of Ukraine, characterized by high anthropogenic pressures. Therefore, prioritizing the implementation of environmental measures based on the assessment of the environmental risk of disturbing the well-being of the aquatic ecosystem of the watercourses of the Udi River Basin in the Kharkiv region is a very urgent task.

### RESEARCH METHODS

There is proposed a methodology for assessing the environmental risk of deterioration of the aquatic ecosystem based on the determination of environmental standards, taking into account the landscape and geographical features of river basins (Rybalova and Artemiev, 2017). In the absence of environmental standards, it is proposed to use the upper limit of the 3rd category of surface water quality classification as a threshold value, corresponds to Class II with good condition according to the method. It is considered that if the ecological standard is exceeded, there is a probability of disturbing the well-being of the aquatic ecosystem (Vasenko et al., 2016). We propose to use the methodology of environmental assessment of the quality of surface waters in the relevant categories (Romanenko et al., 1998). In article (Rybalova and Artemiev, 2017) it was proposed to limit the number of indicators to five. We consider this restriction as incorrect, since the analysis of the ecological state of the Siversky Donets River in the Kharkiv region showed an excess of the environmental standard by 8-10 indicators. According to the presented methodology, an environmental risk assessment of the disturbance of the well-being of the aquatic ecosystem for the watercourses of the Udi River basin in the Kharkiv region is given. At the first stage, (Romanenko et al., 1998) determines the degree of pollution of the Udi river watercourses. The value of the ecological index of water quality is determined by the formula:

$$I_e = \frac{(I_1 + I_2 + I_3)}{3}, \quad (1)$$

where  $I_1$  - the index of pollution components of the salt composition;  $I_2$  - the index of trophic-saprobiological (ecological and sanitary) indicators;  $I_3$  - index of specific indicators of toxic and

radiation exposure. The assessment of the ecological status of the Udi River according to the values of the environmental index showed a deterioration in the long-term period. The qualitative state of the Udi River in the Kharkiv region is worsening from the border with Russia (v.Okop) to the mouth (v.Eschar). At the second stage, environmental standards are determined according to the method that is presented in (Vasenko et al., 2016). Then the risk of disturbing the well-being of the aquatic ecosystem (ER) is determined by definition (Rybalova et al., 2018):

$$Prob = -2,3 + 2,21 \lg \sum \left( \frac{C_i}{C_{EHi}} \right), \quad (2)$$

where  $C_i$  - concentration of  $i$ -th substance in the water object,  $\text{mg} / \text{dm}^3$ ;  $C_{EHi}$  - ecological norm for  $i$ -th substance in a water object,  $\text{mg} / \text{dm}^3$ . An environmental risk assessment of the deterioration of the aquatic ecosystems of the Udi River Basin in the Kharkiv region showed that the risk value of watercourses located in the city of Kharkiv corresponds to 4 classes (high risk), and the Lopan and Kharkiv rivers are the most polluted.

**Table 1.** Characteristics of the Udi River Basin in the Kharkiv region in terms of the environmental risk of deterioration of aquatic ecosystems

The name of the river, the post of observation	ER	Class	Qualitative assessment of ecological risk
Lopan River, the mouth, Kharkiv city	0,66	4	High risk
Kharkiv River, mouth, Kharkiv city	0,66	4	High risk
Udi River, village Horoshevo	0,64	4	High risk
Udi River, village Peresichna	0,63	4	High risk
Udi River, smt.Eskhar	0,60	4	High risk
Lopan River, village Kazacha Lopan	0,53	3	Significant risk
Udi River, village Okop	0,39	2	Increased risk

## FINDINGS

For the first time, an assessment of the environmental risk of disturbing the well-being of the aquatic ecosystem for the watercourses of the Udi River Basin in the Kharkiv region was made on the basis of the determination of environmental standards. An environmental risk assessment of the deterioration of the aquatic ecosystems of the Udi River Basin in the Kharkiv region showed that the risk value of watercourses located in the city of Kharkiv corresponds to 4 class (high risk), and the Lopan and Kharkiv rivers are the most polluted.

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