

PROCEEDINGS OF SPIE

[SPIDigitalLibrary.org/conference-proceedings-of-spie](https://spiedigitallibrary.org/conference-proceedings-of-spie)

Flood risk assessment of Chervonograd mining-industrial district

Y. Starodub, V. Karabyn, A. Havrys, I. Shainogal, A.
Samberg

Y. Starodub, V. Karabyn, A. Havrys, I. Shainogal, A. Samberg, "Flood risk assessment of Chervonograd mining-industrial district," Proc. SPIE 10783, Remote Sensing for Agriculture, Ecosystems, and Hydrology XX, 107830P (10 October 2018); doi: 10.1117/12.2501928

SPIE.

Event: SPIE Remote Sensing, 2018, Berlin, Germany

FLOOD RISK ASSESSMENT OF CHERVONOGRAD MINING-INDUSTRIAL DISTRICT

Starodub, Y.*^a, Karabyn, V.^a, Havrys, A.^a, Shainogal, I.^a, Samberg, A.^b

^aThe State Emergency Service of Ukraine, The Lviv State University of Life Safety, Lviv, Ukraine;

^bi4-Flame OU (LLC), Tallinn, Estonia

ABSTRACT

In the beginning of the century, few desktop review projects were carried out in Ukraine under the Global Water Partnership. In particular, interested in transboundary water research, there are some examples: Environmental Project Water Management of Kakhovka Reservoir and Lower Dnieper River (2000-2001) and Flood Management in Ukraine and Slovakia (2000-2003), and the 16th OSCE Economic and Environmental Forum “Maritime and inland waterways” (2007). The afore-mentioned studies were mostly dedicated to the establishment of a dialog between the governments and stakeholders. So far, basically, there are no applied research in order to perform the risk assessment in particular transboundary areas. For instance, during the past decade, both the Chervonograd coal mining industrial district in the Western Bug river region (the border between Eastern Poland and Western Ukraine) and the mitigating environmental risks for water security have been paid a little attention. The Lviv-Volyn carboniferous basin (Western Ukraine) is one of three major coal mining regions in Ukraine). This paper describes the recent preliminary results of applying GIS technology for simulation of flood risks and associated hazards in the Lviv-Volyn coal basin. The contamination of drinking water (Be, Yb, Co and Pb) was considered as one of main hazards in territory of investigation. Using satellite optical imagery, flood modeling and the prediction of contamination were conducted in the areas of West Bug River and Vistula River. The input parameters were the following: the average water flow velocity 0.45-0.65 m/s, the width of the channel in the meadows 25-70 m, and the depth 1.1-1.7 m. The river runoff is adjusted by the dams of the Dobrotrivska thermal power station and the Sokalsky chemical factory. The water field is 6250 sq. km. The issue of increasing risk of wasting drinking water resources in the region with the estimated population of about 15 million inhabitants is essential.

Keywords: Flooding, modelling, abounded mines, environmental disaster, disaster management, water resources

1. INTRODUCTION

The latest desktop study of literature has identified a need for further investigation of problems and risk assessment which are associated with the Western Bug River and increasing of the technogenic risks^{8,9,10,11,12,13,14,15,16,17,18,19,20,21,22}. One of the major concerns is unpredictable underground water discharge from the abounded coal mines. Earlier researches were founded by various international institutions during the period of 2009-2012 before the Revolution of Dignity in the end of 2013. Later this work was almost terminated. The group of experts from the Lviv State University of Life Safety made an attempt to review the state-of-the-art and conduct modeling.

The extraction of coal has a negative impact on the environment, which leads to a violation of the stability of geosystems, and thus to increase the environmental hazard. In Ukraine, coal mining is concentrated in three basins: Donetsk, Lviv-Volyn carboniferous basins and Dniprovsky coal basin. Lviv-Volyn carboniferous basin is located in the western part of Ukraine near the border with Poland. The territory of the coal basin in the Northern direction flows on the Western Bug River (Figure 1) with numerous tributaries, of which the main are Rata and Solokiya. In Ukraine and Poland water from the Bug is used for food and drinking needs. The Western Bug River flows into the Vistula River. The research area has the prospect of being involved in the pan-European waterway, the Baltic Sea - the Black Sea. The research aimed at predicting possible contamination of the territory if flooding occurs of the Western Bug River will occur.

*george_starodub@yahoo.com