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ECOLOGICAL SAFETY OF WATER RESOURCES IN UKRAINE: MODERN CHALLENGES AND THREATS TO HYDROPOWER POTENTIAL SAVING IN WARTIME CONDITIONS

Water resources are strategically important for every country, and their environmental condition is one of the indicators of global environmental security. According to the Ministry of Environmental Protection and Natural Resources of Ukraine, the country's population and economic sectors are provided with water by 7 large canals, 9 main river basins, 1,103 reservoirs, 49,000 ponds, and 18,500 people are employed in the field of water management [1]. The consequences of the pollution of water resources are all-encompassing, because in addition to the destruction of ecosystems, the disappearance of water bodies, the reduction of biodiversity, the threat of a humanitarian crisis, scarcity, and the use of poor-quality water, which can lead to a number of diseases of broad segments of the population, are growing. The key ecological problems that are characteristic of all water basins of Ukraine include: excessive anthropogenic load on water bodies; significant pollution of water bodies as a result of unregulated drainage of sewage from settlements, economic facilities and agricultural lands; radiation pollution of the basins of many rivers as a result of the accident at the Chernobyl nuclear power plant; deterioration of drinking water quality; and negative ecological condition of reservoirs and others [2]. According to the data of the interactive map "Clean water", which shows the level of pollution of rivers in Ukraine based on the data of the State Agency of Water Resources, the pollution of the rivers of the city of Chernihiv and the Chernihiv region exceeds the norm according to indicators such as chemical oxygen consumption, suspended solids, ammonium ions, and nitrite-ions [3].

Under wartime conditions, the scale of environmental pollution is growing, and new threats to the ecological safety of Ukraine's water resources, in particular river basins, are emerging. In addition to the influence of anthropogenic sources of water pollution such as sewage, solid waste, precipitation due to atmospheric air pollution and others, pollution of water bodies, soil, atmosphere due to shelling, fires, oil leaks, and destruction of sewage treatment facilities is added. Water supply is impossible due to shelling of water pipes. The threats of hydrodynamic danger in the regions of Ukraine, the main sources of which are reservoirs, are increasing. In the conditions of modern challenges and increasing threats of environmental disasters, it is necessary and important to constantly monitor environmental crimes as a result of Russian aggression. As of May 27, 2022, the operational headquarters of the State Environmental Inspection of Ukraine recorded 257 crimes against the environment committed during the 100 days of the large-scale Russian invasion, among them [4]:

- threats to nuclear and radiation safety;
- attacks on infrastructure and industrial facilities;
- pollution of the atmosphere, soil, groundwater, which is directly caused by hostilities;
- damage to nature reserves and protected ecosystems, destruction of forests due to fires;
- causing damage to water resources;
- pollution of the waters of the Black and Azov seas.

The issue of the destruction of the ecological systems of the Black and Azov Seas, where the destruction of existing biodiversity is irreversible, requires special attention.

During the assessment of the impact of military operations on water resources, models for assessing the impact on their condition, the water supply system, water supply management, and transboundary water resources management can be used [5]. When choosing a water risk assessment methodology, it is advisable to pay attention to Aqueduct 3.0 methodology. Created in 2011 by the World Resources Institute, the Aqueduct information platform informs a wide range of stakeholders about water-related risks and contains data on water risks that are open and accessible to decision-making users [6, p.2]. The methodology of Aqueduct 3.0 provides the use of 13 indicators to assess different types of water risk. In particular, the overall water risk is determined by the following indicators, combined into groups: 1) physical risk quantity (baseline water stress, baseline water depletion, interannual variability, seasonal variability, groundwater table decline, riverine flood

risk, coastal flood, drought risk); 2) physical risk quality (untreated connected wastewater, coastal eutrophication potential); 3) regulatory and reputational risk (unimproved/no drinking water, unimproved/no sanitation, Peak RepRisk country ESG risk index) [6, p.3]. Each indicator is assigned a risk element: 1) hazard: threatening event or condition (e.g., flood event, water stress condition); 2) exposure: elements present in the area affected by the hazard (e.g., population, asset, economic value); 3) vulnerability: the resilience or lack of resilience of the elements exposed to the hazard [6, p.9]. Given the lack of monitoring and the difficulty of measuring a number of indicators and the barriers to assessing the general water risk in Ukraine under martial law, this methodology should be considered promising from the point of view of identifying risk zones.

When assessing the impact of war on the state of water resources, it is advisable to take into account the results of existing scientific studies devoted to defining approaches to such an assessment. In particular, a model can be applied to assess the increased risk for the water system, which involves the assessment of indicators such as: population movement, management of the water supply system, water supply, and water quality [5]. To apply this model for the purpose of assessing the impact of the war on the state of water resources of Ukraine, it is necessary to ensure monitoring of the state of water quality and ecological assessment of water resources. Among the number of challenges that stand in the way of such an assessment is the lack of access to a large part of monitoring points in wartime conditions.

The number of environmental crimes is increasing every week, which creates threats of reducing the volume of available water resources, deterioration of their ecological condition and impossibility of using hydropower potential, creating obstacles to the development of hydropower in Ukraine. In the conditions of ecocide, it is important to assess the overall negative impact on the water resources of Ukraine and the amount of damage caused, and to determine the sources of funding for the implementation of measures to restore the ecological safety of water resources and preserve the water resource potential of Ukraine.

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