



THE TOPIC OF THE LECTURE

Regional consequences of damaging effects of floods in Volyn

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Регіональні наслідки шкідливої дії паводків на Волині

consequences	наслідки	relevant	важлива
damaging	шкідливий	prevent	запобігти
harmful		reasoned	обґрунтований
ruinous	руйнівний	dam	дамба
effect	дія	straightening	спрямлення
impact, affect	вплив	deepening	поглиблення
flood	повінь, паводок	measures	заходи
flash flood	раптова повінь	implemented	застосовувати
forecasting	прогнозування	frequent	частий
forecast	прогноз	neighboring	сусідній
riverbed	русло річки	support	підтримка
valley	долина	combine	об'єднувати
cross-border	транскордонна	protection	захист
		establish	установлювати



Introduction

The problem of ruinous effects of seasonal flood waters in the river basins of Volyn is extremely relevant. Because it is practically impossible to prevent natural flooding and flash flooding processes, there arises a need for their forecasting and reasoned management. In particular, along with traditional methods (dam construction, straightening and deepening of riverbeds), modern measures to prevent these processes should also be implemented.



These include development of working models for forecasting floods in river valleys, digital maps of river valleys with objects that are at risk of flooding when water levels rise. The main part of the territory of the Volyn region (about 16 thousand km² or 80% of the area) is located in the basin of the Pripet River, which is a cross-border river, and frequent floods are a problem not only



for Ukraine, but also for neighboring countries.

Therefore, for effective forecasting of possible flooding, a joint international project "Monitoring and forecasting of floods in the Pripet River basin" has been implemented since 2009, with the support of the "Environment and Security" Initiative (ENVSEC), which combines the activities of six international organizations in the field of environmental protection. The main goal of the project is optimization of flood monitoring in the Pripet River basin and introduction of modern tools for their forecasting. Four automated hydrometeorological stations were established in 2011, of which two are in Ukraine (the city of Lutsk, Volyn region, and the village of Khrinnyky, Rivne region). Two more automated stations were set in September 2012 in the Pripet River basin on the Stokhid River in the town of Lyubeshiv and on the Pripet River in the village of Lubyaz. The stations in automated and operational mode (with a 5- minute interval) measure water and air temperature, water level, quantity of atmospheric precipitation, and transfer this information to the central database of the Volyn Regional Center for Hydrometeorology.



переклад англійських слів

precipitation	опад	conclusion	висновок
rainfall	опад	flow	течія, стік
receiving	отримання	inflow	приплив
rapid	швидкий	overflow	перелив, переток
wave	хвиля	runoff	стік
solving	вирішення	intra-annual	внутрішньорічний
scientist	науковець	runoff	стік
aimed	спрямований	distribution	розподіл
overcoming	подолати	redistribution	перерозподіл
crisis	криза	shower	злива
concern	стосуватися	watershed	вододіл, межень
significantly	значно	intermittently	переривчасто
manifestation	прояв	interrupt	переривати



Receiving data in real time with a high frequency has important value for rapid modeling of flood waves and the development of spring floods.

In solving the problem of the harmful effects of waters, scientists have established two types of flood protection, situational and preventive. Each has its own set of activities and measures, i.e. situational measures are to protect objects during the period of any particular flood, while preventive measures are aimed at preventing and quickly overcoming the crisis which concerns the protection of objects located in the zone of periodic flood risks for a long period of time. Depending on the scale of the problem of harmful effects of waters in the region, a specific concept of flood protection of territories is selected and developed.

Currently, the trend is already observed that climate changes significantly affect the hydrological regime of rivers and manifestations of the damaging effects of water. Numerous Ukrainian scientists came to these conclusions such as Hopchenko E.D., Grebin V.V., Loboda N.S., (*Loboda et al., 2014*) Lukyanets O.I., Obodovskyi O.H., Snizhko S.I. Serbova Z.F., (*Susidkoet et al., 2004*). Bozhok Yu.V., Petrochenko O.V. etc.

Results

By the nature of the flow distribution, the rivers of the Volyn region belong to the Eastern European type. Its characteristics are a high spring flood, a summer watershed that is intermittently interrupted by showers, a winter



watershed, and an increased autumn runoff. Some rivers of this type can have 2 maxima, the first (main one) in spring, the second in autumn.

Since most of the Volyn region is located within the Polissia lowland, which is characterized by excessive wetting of territories, and therefore periodic flood risks, over a long period of time. The Regional Office of Water Resources in the Volyn region constantly monitors the surface water levels of the region's rivers and provides short-term (up to 12-15 days) and long-term (up to 50-100 years) flood forecasts.



Результати

lowland	низовина	gloomy	похмурий
excessive	надмірний	thaw	відлига
wetting	зволожений	prolonge	тривалий
provide	надавати	melt	танути
expect	очікувати	modest	незначний
hydrometeorological service	гідрометеорологічна служба	reduction	зменшення
pattern	закономірності	annual	річний
movement	течія, переміщення	pronounced	очевидний
channel	канал	stretched	розтягнення
experience	спостерігати	contribute	сприяти
recent	останній	reserve	запаси
mild	м'який	virtually	по-суті
		observed	досліджувати

These forecasts of the expected maximum and minimum flows and water levels are based on the indicators provided by the hydrometeorological service, the patterns of water movement in the channels and the inflow of water to the studied sections of the river, the calculations of the movement and transformation of the water flow along individual sections of the river.

Due to global climate changes, Volyn has experienced in recent decades mild and gloomy winters



ВОЛИНСЬКІ НОВИНИ



RESULTS

with frequent thaws and little precipitation. As a result of prolonged thaws, the snow cover sometimes melts completely, the surface of the soil thaws (the temperature during thaws rises to 10-14°C), there is a tendency to a modest reduction in the amount of annual precipitation. This leads to some redistribution of the intra-annual runoff, when the spring flood becomes less pronounced (stretched in time), with no peak maximum flows. Rainfall in the summer does not contribute to the

accumulation of water reserves, but only to a short-term increase in the level of surface water in the rivers of the region. During the last decade, in the summer period, the minimum and maximum flows virtually do not differ. The mild winter of 2022-2023 with a significant amount of snow and rain precipitation in December and a thaw with a significant increase in temperature in January contributed to the formation of a winter flood and a prolonged spring flood in the northern part of Volyn.

flooded lands

A similar situation was observed in 2011, 2013, and 2018, but during these periods there was no intense winter flood, but only a long spring flood on the tributaries of the Pripet River – the Turiya, the Stokhid, and the Styr.



flooded lands





Результати

tributary	притока річки	eliminating	ліквідувати
gradual	поступовий	gully	канави
shift	зміщення	laying	укладання
timing	термін	expansion	розтягнення
inundation	повінь	exploitation	експлуатація
pumping station	насосна станція	district	район
emergency	аварійний	drainage	осушування
carried out	виконувати	community	громада
blocked	перегороджувати	amelioration	меліорація
packing	укладання	neglected	занедбаний
fixing	укріплення	leave	залишає
installing	влаштування	desired	бажаний
embankment	насип, дамба	weakened	просіли

RESULTS



There has been a gradual shift in the timing of spring floods and summer flash floods in recent years which is accompanied by the inundation of large areas. In 2023, starting from January, the emergency teams of the Regional Office of Water Resources of the Volyn region carried out work related to the protection against flooding or inundation of agricultural lands and territories of populated areas of the region, with 10 to 16 pumping stations out of 40 working daily. Emergency works were performed during January to May, but the largest number of them fell precisely in January 2023, when overflows were blocked by packing bags of soil to prevent the flow of water, fixing dams with bags of soil, installing protective embankments, eliminating gullies with laying bags of soil.

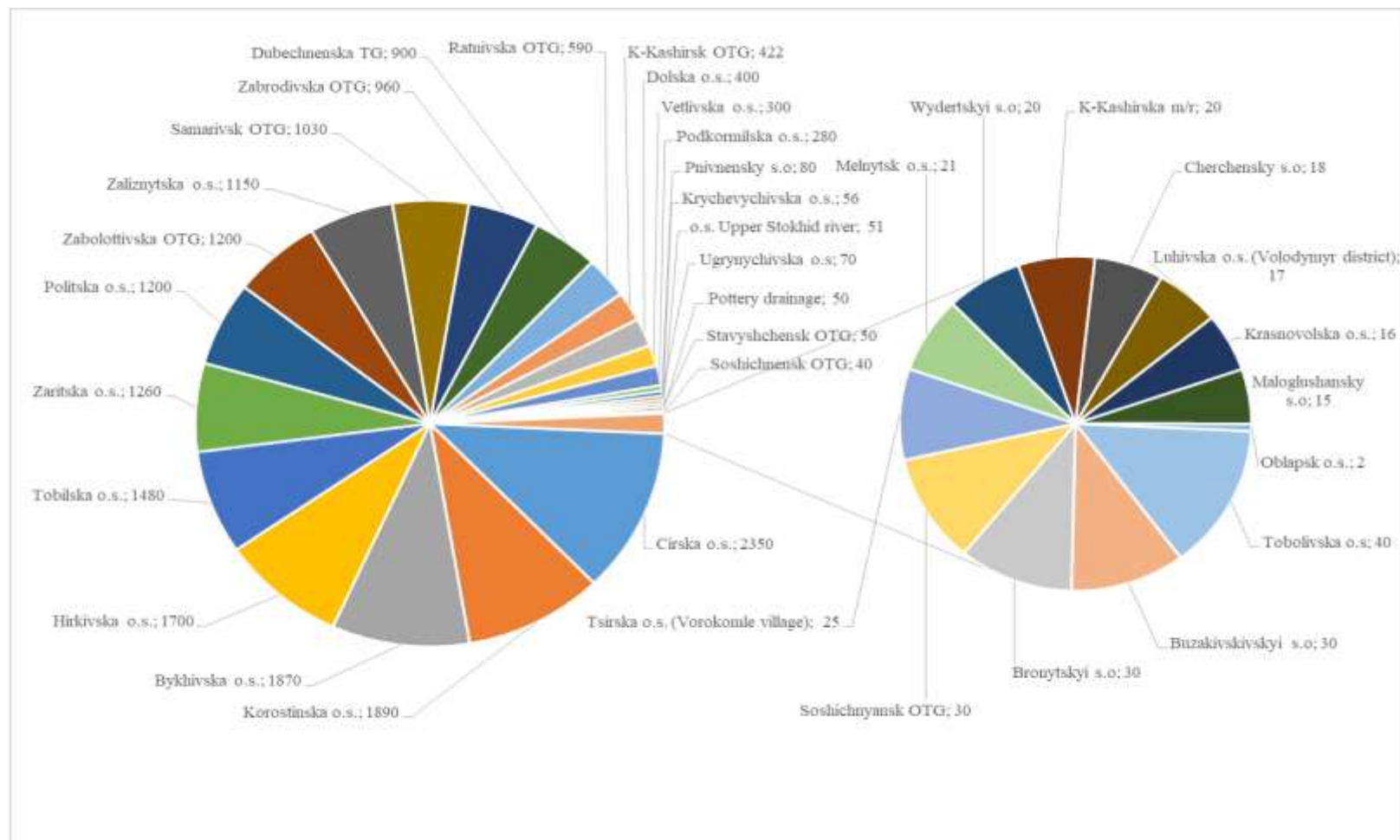
Results



Damaging effects of flood waters and their expansion in time results in flooding of significant areas of land, about 8,000 hectares located mainly in the northern districts of the region – Ratne, Kovel, Lyubeshiv, Kamin-Kashirskyi. This problem is most acutely manifested in the Lyubeshiv and Pripet exploitation districts. The largest area of flooded land (Fig. 1) is located in the Tsyry, Bykhiv, Korostyn drainage systems (2350–1200 ha), as well as the Samariv and Zabolottia territorial communities (1200–1030 ha).



Figure 1. The largest area of flooded lands of the Volyn region in 2023 (ha)





Результати

require	потребують	forest strip	лісосмуга
repair	ремонт	creation	створення
yearly	щорічний	storage	нагромаджувач
maintainance	обслуговування	related	пов'язаний
threat	загроза	fell	припала
through	через	precisely	точно
settlements	населений пункт	pond	ставок
reclamation	меліорація	catchment area	басейн річки
waterlogged	затоплений	anti-flood	протипаводковий
household	господарський	previous	попередній
condition	умови	compliance	дотримання
landscape	ландшафт	restoration	відновний
planting	посадка	passage	проходження



Results

The water amelioration system in Volyn which has been neglected for almost 40 years leaves much to be desired, as water overflows dams which have weakened over time and require major repairs. Yearly maintenance of the dams are performed, but during extreme periods of spring and flash floods there is a threat of water overflows through the dams, leading to inundation or flooding of settlements. During the 1970s and 1980s, reclamation of waterlogged lands was carried out in the region, with protective measures for the long-term prevention of the harmful effects of waters, such as adaptive

(adaptation of households and agricultural structures and economic activities to the conditions of periodic flooding, etc.), water and landscape (planting forest strips, creation of storage ponds, changing the conditions for the formation of flood runoff in catchment areas, etc.), and hydrotechnical (construction of systems of complex anti-flood protection, accumulation of part of the flood flow, etc.). However, previous protective measures for the long-term prevention of harmful flood effects require compliance with the operational conditions and periodic restoration measures.



Результати

necessary	необхідний	aquatic	аквальний
reduce	зменшувати	woody	деревний
clearing	розчищення	culvert	дренажна труба
silt	мул	dismantling	демонтаж
fallen tree	повалені дерева	crossing	переправа
beaver dam	боброві загати	mowing	косіння
improve	поліпшувати	reed	очерет
rollover	перекочування	uprooting	викорінювати
low	низький	shrub	чагарник
restore	відновлювати	combating	боротися
pool	плесо	infestation	інвазія
cross-section	поперечний	cleaning	очищення
перетин		garbage	сміття
habitat	середовище існування	sediment	наноси
		lengthening	подовження



Results

Since it is the long-term passage of spring floods that leads to significant flooding of agricultural lands and buildings, a number of economic measures are necessary to reduce the damaging effects of flood waters on the territory of the Volyn region:

- clearing riverbeds of excess vegetation and silt, solid household waste (especially plastic), fallen trees and beaver dams, which will contribute to improving the hydrological regime of riverbeds;
- establishment of rollovers to regulate the water level of the riverbed during low and flood periods. Clearing of the riverbed with the formation of rollovers helps restore pools and accumulate water in them during the watershed period, increase the cross-section of the river for better passage of floods, improve the habitat of aquatic and subaquatic flora and fauna;
- clearing drainage channels, especially from woody vegetation;
- major repair/construction of culverts, pumping stations, etc.;
- major repair or dismantling of fallen bridges and crossings.

Results

The important events on the prevention of the damaging effects of floods also include the following:



- constant annual mowing of reeds, especially in the narrowest sections of the channel, as well as near hydrotechnical structures;
- uprooting of shrubs on drainage canals, as well as combating beaver dams and infestations;
- cleaning of rivers and drainage canals from garbage (especially plastic and fallen trees) near hydraulic structures, bridges and crossings;
- cleaning of melioration canals from silt and sediments to improve the drainage of water from waterlogged areas.



Conclusions

Performed analysis of the dynamics of long-term indicators of hydroclimatic features and trends in Volyn showed that the recent decades observed a change in the characteristics of the passage of spring floods and flash floods, their lengthening in time and a significant negative impact on the state of the economic complex of the region. As a result of harmful effects of spring floods and flash floods, of significant areas of land in the region are flooded which amounts to about 8,000 hectares located mainly in the northern districts.

THANK YOU FOR THE ATTENTION!