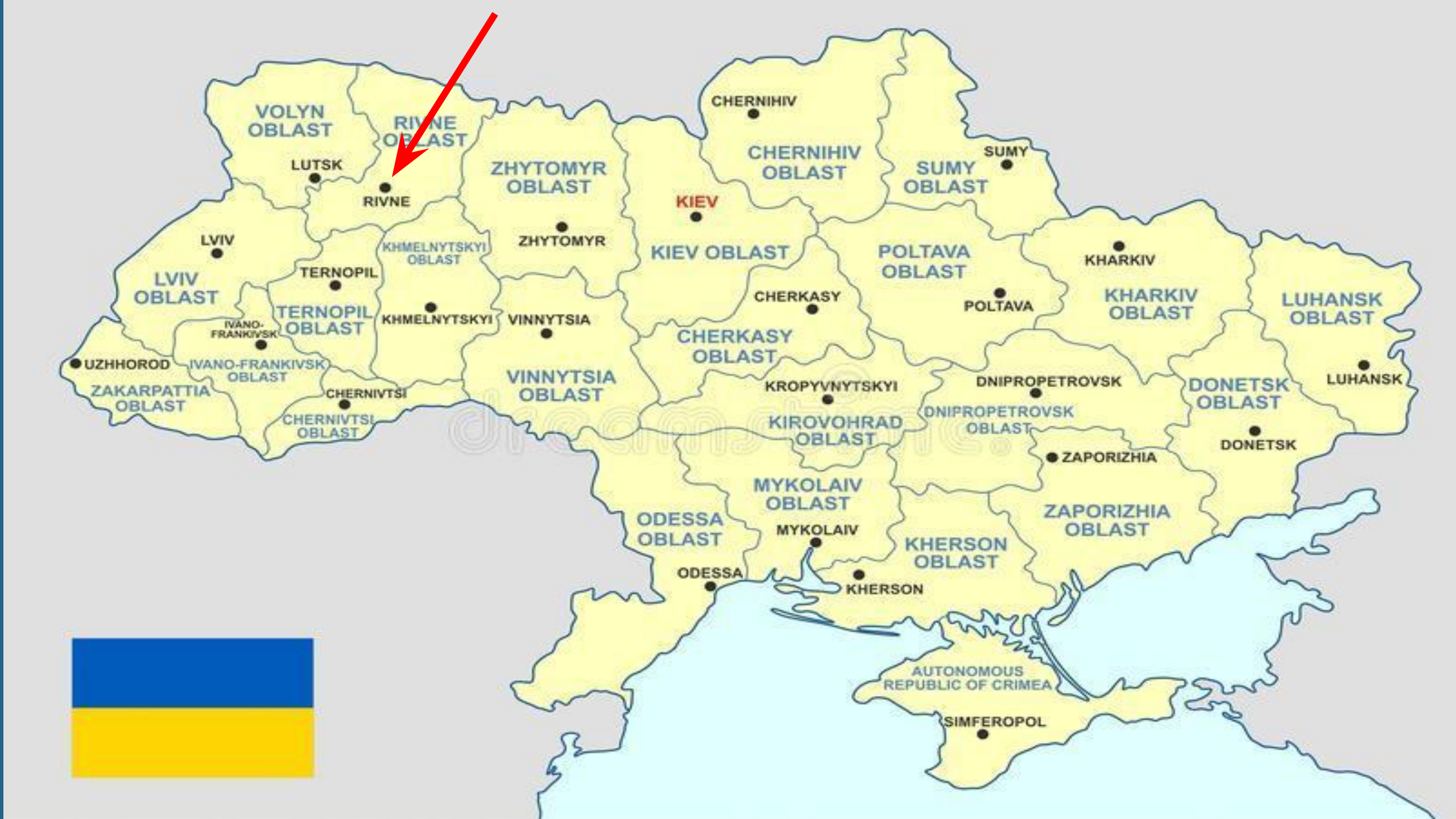
National University of Water and Environmental Engineering

Study and research issues of water resources in Ukraine

PhD in water engeeniring, Assoc. Prof.
Lyudmyla Kuzmych


VOLYN OBLAST
RIVNE OBLAST
LUTSK
RIVNE
ZHYTOMYR OBLAST
ZHYTOMYR
CHERNIHIV
CHERNIHIV OBLAST
SUMY
SUMY OBLAST
KIEV
KIEV OBLAST
LVIV
LVIV OBLAST
KHMELNYTSKYI OBLAST
TERNOPIL
TERNOPIL OBLAST
KHMELNYTSKYI
VINNYTSIA
VINNYTSIA OBLAST
CHERKASY
CHERKASY OBLAST
POLTAVA
POLTAVA OBLAST
KHARKIV
KHARKIV OBLAST
LUHANSK OBLAST
LUHANSK
IVANO-FRANKIVSK
UZHHOROD
IVANO-FRANKIVSK OBLAST
ZAKARPATTIA OBLAST
CHERNIVTSI
CHERNIVTSI OBLAST
KROPYVNYTSKYI
KIROVOHRAD OBLAST
DNIPROPETROVSK
DNIPROPETROVSK OBLAST
DONETSK OBLAST
DONETSK
ZAPORIZHIA
ZAPORIZHIA OBLAST
MYKOLAIV OBLAST
MYKOLAIV
ODESSA OBLAST
ODESSA
KHERSON OBLAST
KHERSON
AUTONOMOUS REPUBLIC OF CRIMEA
SIMFEROPOL

National University of Water and Environmental Engineering

Founded in 1915, NUWEE is one of leading research universities of Ukraine

National University of Water and Environmental Engineering

University Campus

Today our University is one of the prominent modern educational establishments of Ukraine that became Alma mater for more than 65,000 domestic and international alumni.

National University of Water and Environmental Engineering

The University is the largest higher educational establishment in Rivne region, it consists of 8 Institutes, 5 training and consulting centres and 5 colleges. The eight Institutes of the University are guided by 378 Philosophy Doctors, 128 Habilitated Doctors - Professors, 45 Academics of the Academy of Sciences of Ukraine.

NUWEE IS:

- 37 specialties
- 12 research schools
- 52 departments
- 4 colleges, technical schools
- 4 educational bases
- 15 research laboratories
- 5 local centers of distant education
- institute of postgraduate education
- 8 educational-scientific institutes:
  - water and environmental engineering;
  - building and architecture;
  - mechanics;
  - automatics, cybernetics and computer engineering;
  - agroecology and land management;
  - economics and management;
  - law;
  - extramural and distance education.

National University of Water and Environmental Engineering

INSTITUTE OF WATER MANAGEMENT AND ENVIRONMENTAL ENGINEERING

Departments:

- Department of Hydraulic Engineering
- Department of Hydropower, Thermal Power and Hydraulic Machines
- Department of Water Engineering and Water Technology
- Department of Hydroinformatics
- Department of Geology and Hydrology

Specialities:

- Building (Hydraulic Engineering Construction)
- Hydropower Engineering
- Water Engineering (Water Resources)
- Heat Power Engineering

HYDRAULIC ENGINEERING LABORATORY (area - 915m²) is unique in its kind not only in Ukraine but also abroad. The squares of experimental platforms and installations and available tools allow modeling of hydraulic processes and waterworks on order of water economic construction companies, design firms and institutions.

National University of Water and Environmental Engineering

Areas of research activities Institute of Water Management and Environmental Engineering (IWMEE):

- **development of scientific foundations and water management in Ukraine;**
- **water management and use;**
- **develop criteria and modeling of permissible anthropogenic pressures on ecosystems of water bodies and their basins;**
- **improving the construction and operation of water systems and nature protection objects;**
- **developing of improved structures drainage systems and water regulation technologies of drained soils;**
- **riverbed processes and flood protection on mountain and lowland rivers;**
- **studying conditions of formation of surface and underground runoff, its qualitative and quantitative assessment in conditions of intensive and comprehensive anthropogenic load;**
- strategy for environmentally sound water use on river basins and ecologically allowable water withdrawal from rivers;
- a complex environmental assessment of water resources and around water ecosystems;
- water management and Ecological regionalization of river basins to identify priority investments in environmental protection measures;
- streamlining water protection zones of rivers;
- improving of the constructions, methods of calculation and design of hydropower facilities and hydraulic machines;
- improving thermal and hydraulic calculations of energy installations and apparatus;
- control optimization of water regime drained land with using modern computer and information technology;
- development of measures to improve operational reliability and efficiency of water use in the Danube rice irrigation systems;
- functioning problems of irrigation systems Ukraine and ways of their use;
- hydraulic study of open and closed watercourses;
- investigation of filtration processes in earthen dams and protecting dams;
- full-scale survey and research of hydraulic structures and channel processes;
- participation in the expertise, counseling, planning, in construction and in the hydraulic research of hydraulic structures;
- assessment of engineer geological conditions built-up areas.

Управління водними ресурсами за басейновим принципом

В межах території України виділено 9 районів річкових басейнів: 1 – райони річкових басейнів Вісли (Західного Бугу та Сану), 2 - Дунаю, 3 – Дністра, 4 – Південного Бугу, 5 – Дніпра, 6 – Дону, 7 – басейнів річок Причорномор'я, 8 – басейнів річок Приазов'я, 9 – басейнів річок Криму.

9 ГОЛОВНИХ РАЙОНІВ РІЧКОВИХ БАСЕЙНІВ
8 серед них транскордонні

Development of scientific foundations and water management in Ukraine

Water resources of Ukraine are formed at the expense of inflow of transit river waters from foreign countries, local flow and underground waters. The potential resources of river waters are 209.8 km3, of which only a quarter is formed within Ukraine, the rest comes from Russian Federation, Belarus, Romania, Moldova.

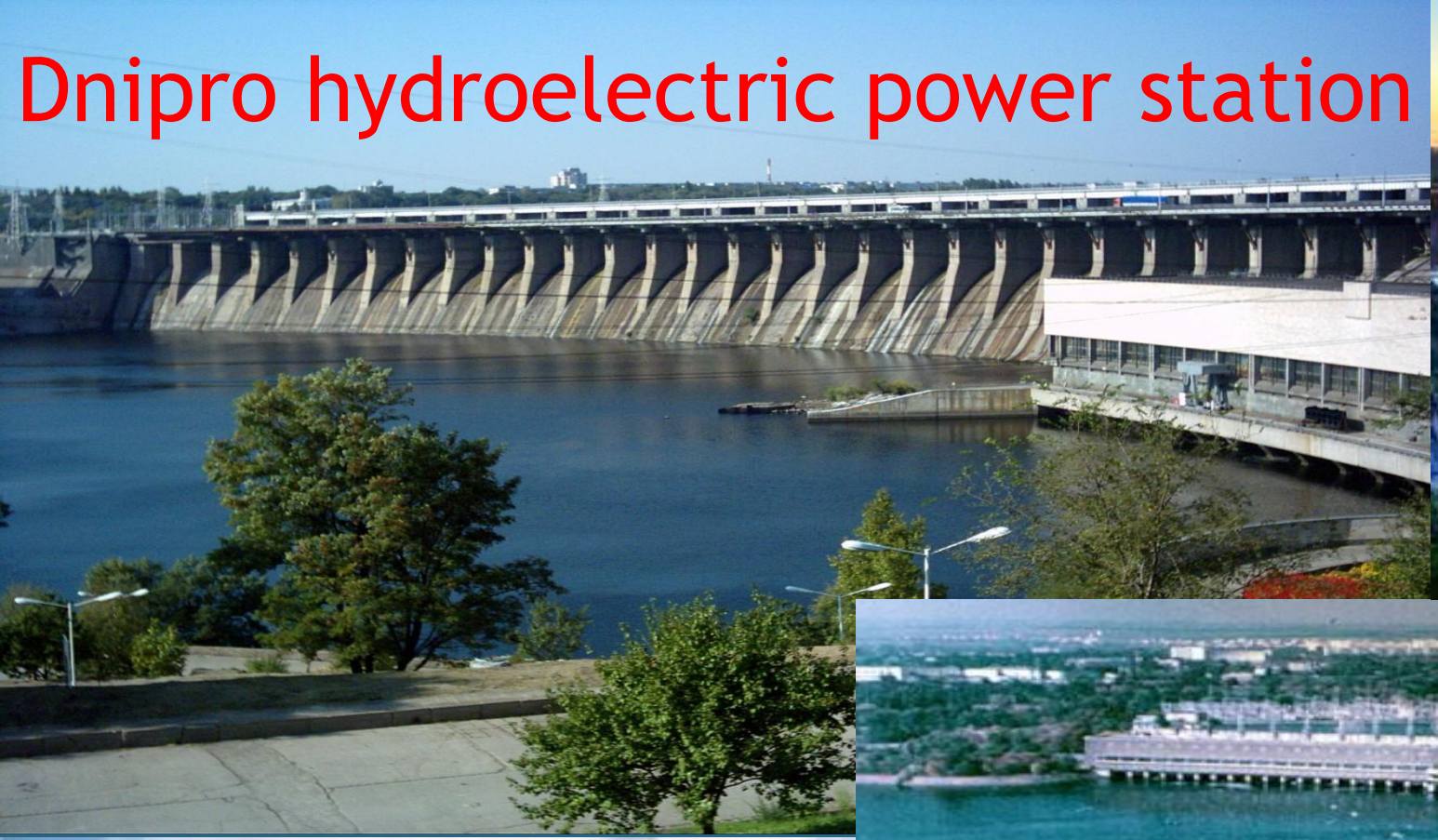
Characteristics of transboundary waterbodies of Ukraine

International river basins of the main river or its largest tributaries	The number of countries within the basin	Adjacent to Ukraine
Danube	15	Romania
Pruth, Siret	3	Romania, Moldova
Tisza	6	Romania, Hungary
Dnister	3	Moldova
Rivers between Danube-Dnister basins area (Kagul, Kopylnyk and other)	2	Moldova
Wisla (San, Vyshnya, other)	2	Poland
Western Bug	3	Poland, Belarus
Dnieper	3	Belarus, Russia
Pripyat	2	Belarus
Desna	2	Russia
Siversky Donets	2	Russia
The Azov Sea Rivers	2	Russia
Azov Sea	2	Russia
Black Sea	10	Russia, Romania

For Ukraine, the special economic and ecological importance such cross-border rivers as the Dnipro (shared by 3 countries) and the Danube (shared by 18 countries), which impact largely on the state of the Black Sea.

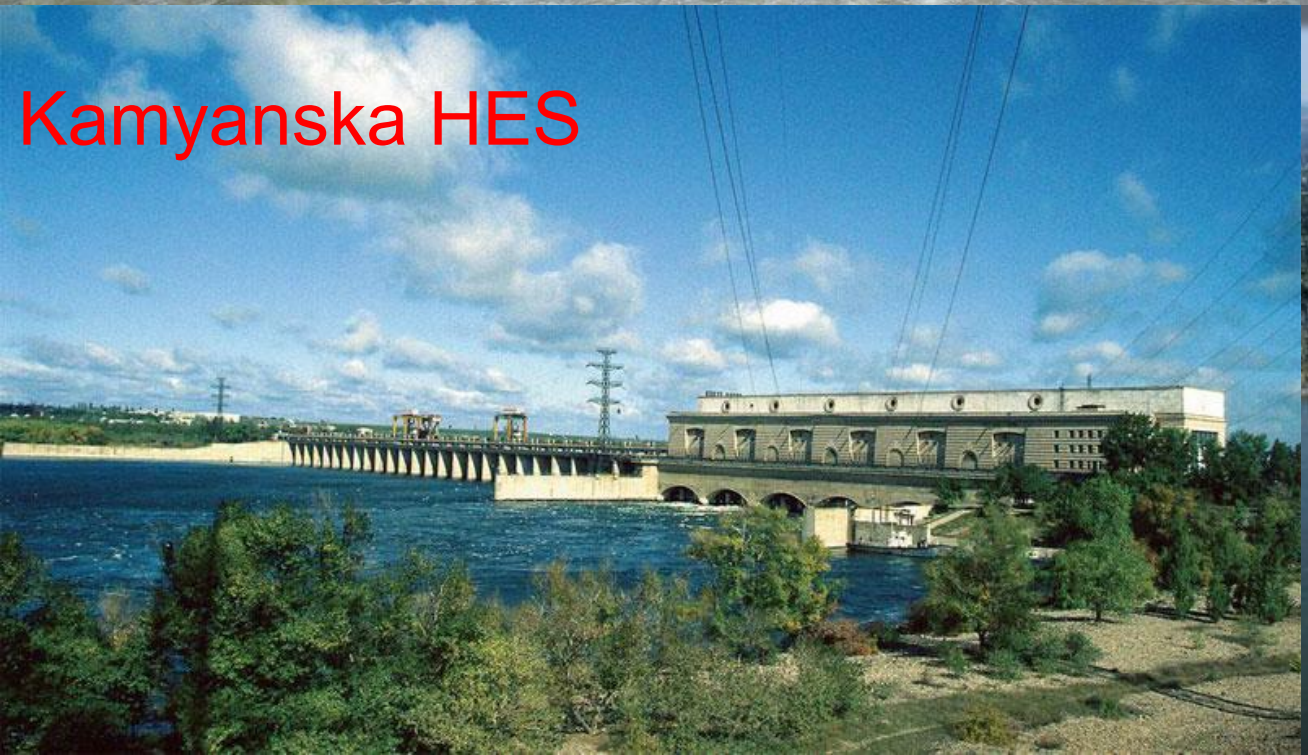
The Dnipro River became a transboundary water body after the collapse of the USSR. There is no an agreement between Ukraine, Russia and Belarus on the use of this river and its protection. Some aspects of this issue are regulated on the basis of common bilateral agreements.

Dnipro hydroelectric power station




Kakhovka HES


Kyiv HES


Kamyanska HES

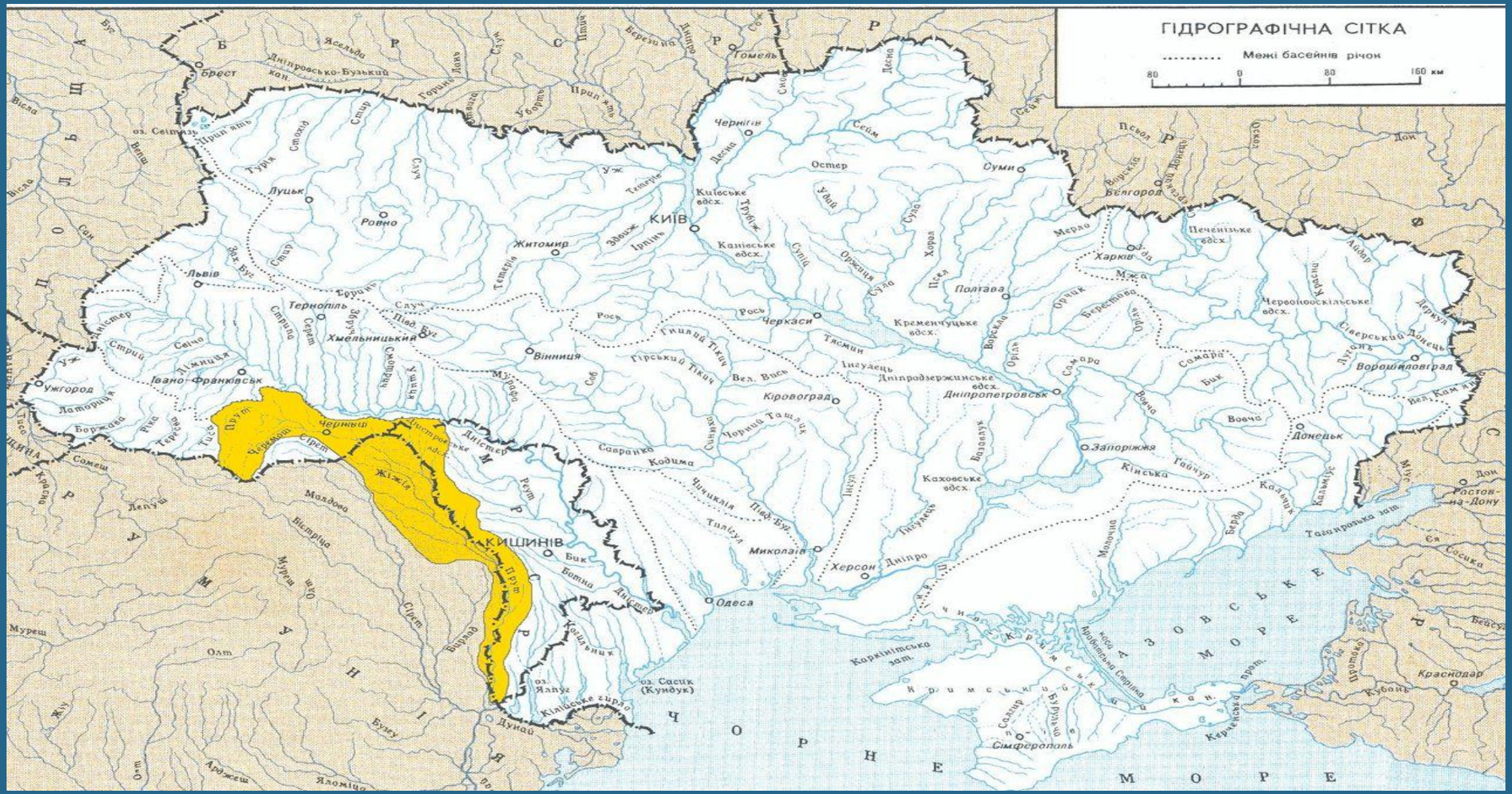

Kremenchuk HES

Tisza, Pruth and Siret are the tributaries of the Danube, which is located within Ukraine

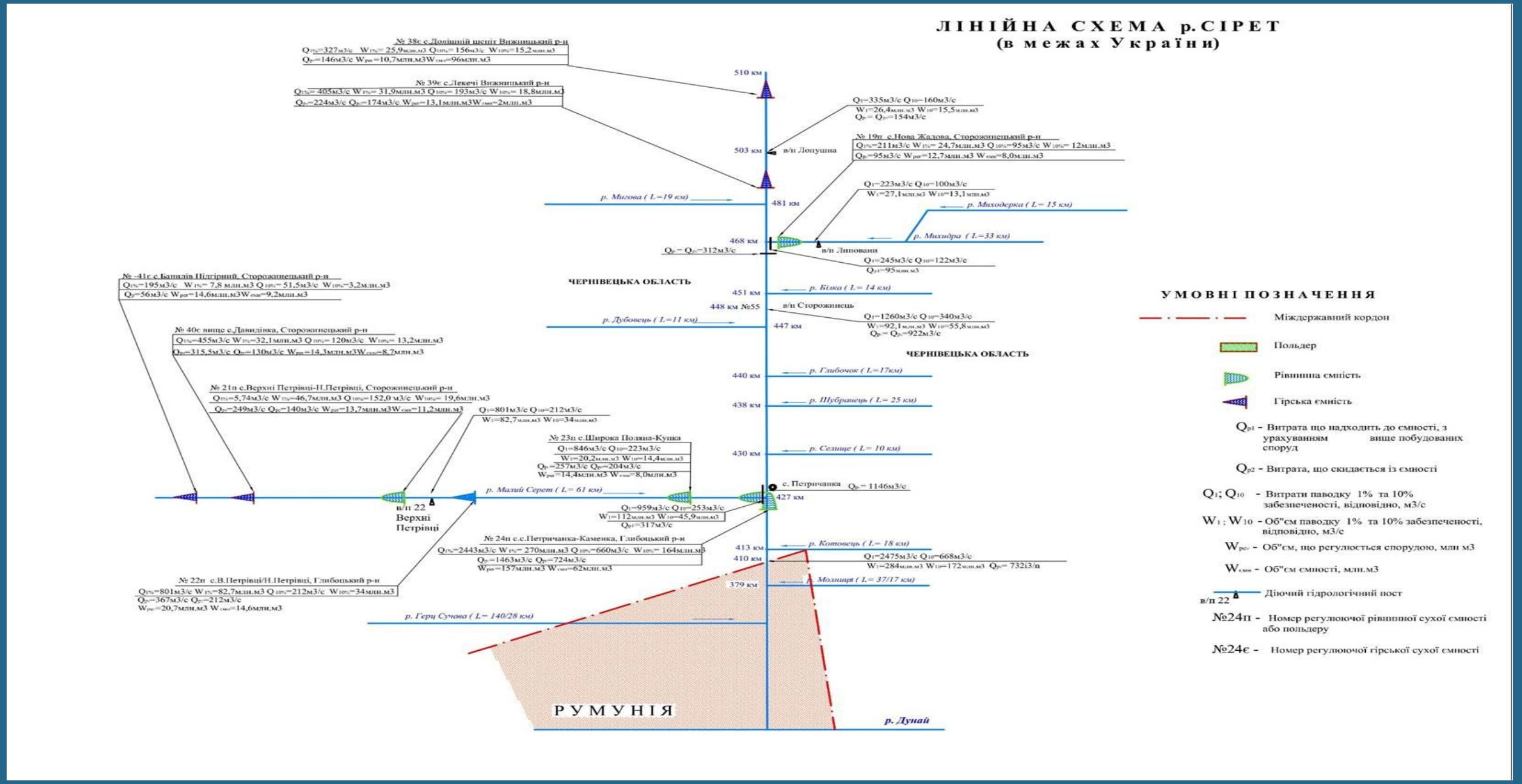
The automated information and measuring system “Tisza” for flood forecasting and water management in the Tisza river basin gives an opportunity to solve the following issues:

- Prediction of rain, thaw-rain and mudflow flood;
- Monitoring parameters and predicting the quality of natural and sewage waters;
- Forecasting of flood zones and possible damages from flooding by rain;
- Development of operational plans for flood control measures;
- Operation of the water sector during a special period.

The Prut and Siret rivers basins cover the territory of Chernivtsi region in Ukraine and Romania



The line scheme of the Siret river basin



Consequences of destructive action of water

A main cause of frequent flooding in the region of the Siret and Prut rivers basins is the hydrometeorological situation and structure of the river, and economic activity in the basins. These include :

- global climate change;
- cyclic occurrence of periods of raising the level of undergroundwater;
- uncontrolled economic activity in the catchment area and violation of the rules of construction on this area, including floodplains of mountain district of the Siret and Prut rivers basins;
- large sloping of the rivers and significant slopes and a lack of the water transport capacity;
- significant reduction of the area of forests and forest plantations, especially unsystematic deforestation on the slopes, which accelerating the runoff water in the rivers and floods abrupt formation of high levels;
- consumerism practice in the valleys of the rivers and the mountains, especially in the areas of forests;
- lack of water regulating structures financing.

Deformations of the channel which arise when extracting gravel

Gravel deposits, a mass of trees, roots, twigs that have accumulated during the annual flooding

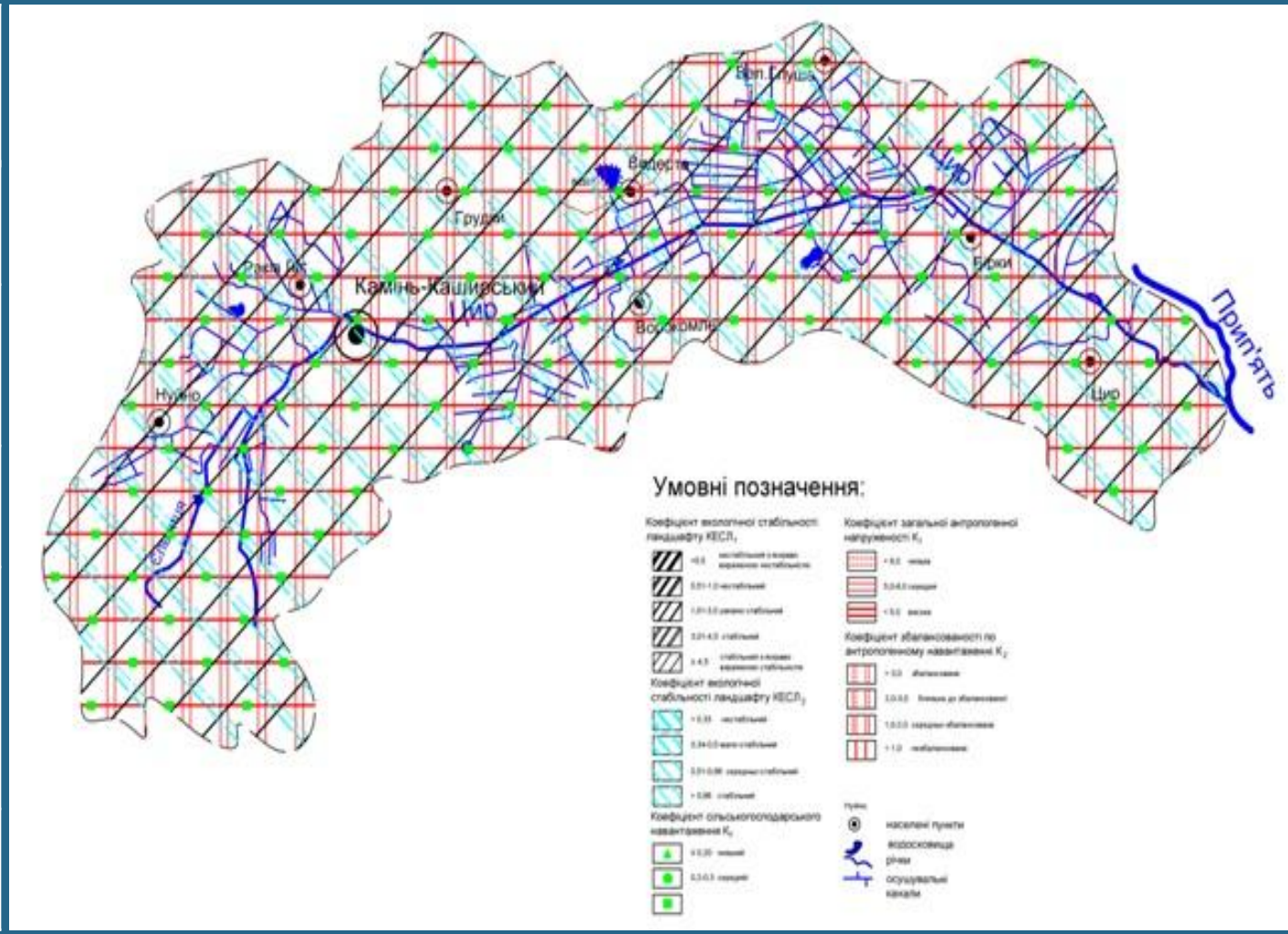
At present, about 20 km among 139 km flood objects which have been on the balance of Chernivtsi water management agency require major repairs and complete reconstruction. As a result, under the threat of flooding and destruction along the Prut and Siret rivers are 73 settlements with an area of a possible flooding more than 200 km^2, where about 40 thousand people live. And the similar situation on small rivers during floods might have negative impact on an area of 370 km^2 and 156 settlements.

Concluding the abovementioned facts, the main issues of water resources management of the Siret and Prut rivers include:

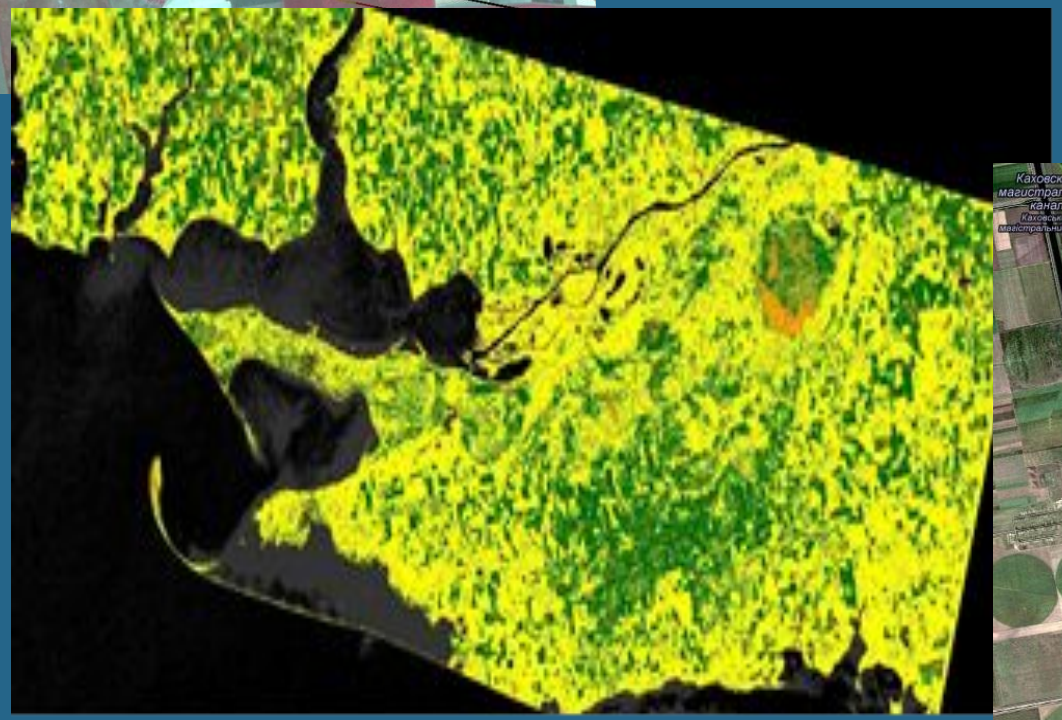
- Adequate and stable funding existing flood control programs;
- Allocation of funds to fully recover the destroyed water structures, which were damaged during the floods of previous years;
- Repairing of the existing water structures and building new structures in the border area of Chernivtsi region;
- Lack of funding for the creation of bench protection strips along rivers, around reservoirs, ponds and other water bodies and drainage channel strips, as required by the Water Code of Ukraine;
- Cutting down forests, plowing, building of floodplain of the rivers, etc. lead to increased stress on water intake, resulting in disturbed natural regime of the river, changing conditions of the flow, frequent floods and rising losses on them.

INDICATORS OF A COMPREHENSIVE ASSESSMENT OF THE ECOLOGICAL CONDITION OF THE TSIR RIVER

Indicator		Characte-ristic of the coefficient	Estimated value	Characte-ristic of quantitative significance
ecological and economic condition of the territory	K_1	general anthropogenic tension	2.07	high anthropogenic tension
	K_2	balance anthropogenic tension	1.23	medium-balanced anthropogenic tension
ecological stability of the landscape	$ESFL_1$	ecological stability of the landscape	1.19	conditionally stable
	$ESFL_2$	ecological stabilization of biotechnical elements and the entire landscape	0.48	little stable
agricultural use	K_c	the degree of agricultural use of the territory	0.56	high



"Irrigation" GIS for Kakhovka irrigation system site



NDVI map for Krasnoznamianska irrigation system site after classification using ISODATA

the Top-10 things to visit in

Visit to Rivne would be surprisingly interesting, because several architectural masterpieces still managed to survive. Among the places in Rivne, which should be visited in the first place, top priority has Holy Resurrection Cathedral, which was built in 1895. Worth visiting this main Rivne Orthodox church, which survived the II World War and the years of Soviet militant atheism, because it is a majestic building, done in Byzantine style. During a visit to Rivne you will find out that in Soviet times a museum of atheism housed here, but the cathedral again takes parishioners now.

The most ancient monument, which is worth visiting in Rivne is Assumption Church 1756, which has the bell tower and the "chain of moral principles" to which the wicked parishioners were chained for the public remission of sins.

Another great attraction in the city of Rivne, which all guests seek to travel to, is the St. Anthony Cathedral, opened in 1868. Previously, it had two steeples which, unfortunately, did not survive. However, beautiful antique clocks are still on the facade of the building. The house of organ music is now located in the church.

Attractions of Rivne city
Source:

Tunnel of Love

Shevchenko Park of Leisure and Culture

Rivne Drama Theatre

Zoo

Amber Museum

Thank you for your attention!