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«Assessment of Potential Impact of Climatic
Changes in Belarus on Water Recourses of the
basic Transboundary Rivers»



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The Republic of Belarus has a large number of aquatic ecosystems including rivers (around 21 000), lakes (11 000), water storage reservoirs (153) and ponds (1 500).

- They are located within the major catchment areas of the Black and Baltic Seas. The main river are Dnieper, West Dvina, Berezina, Neman, Sozh and Pripyat.

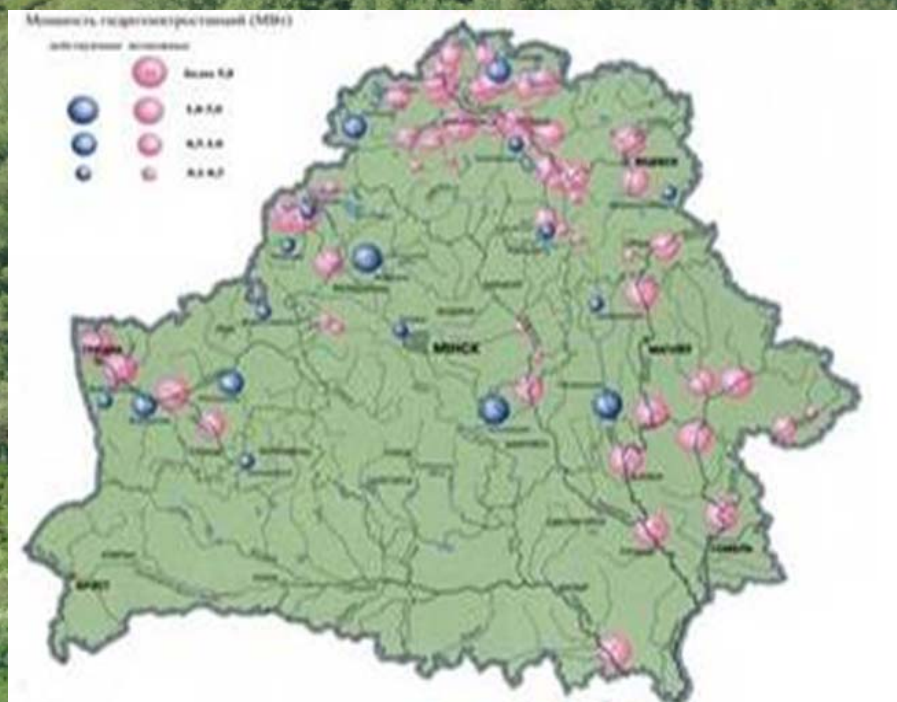
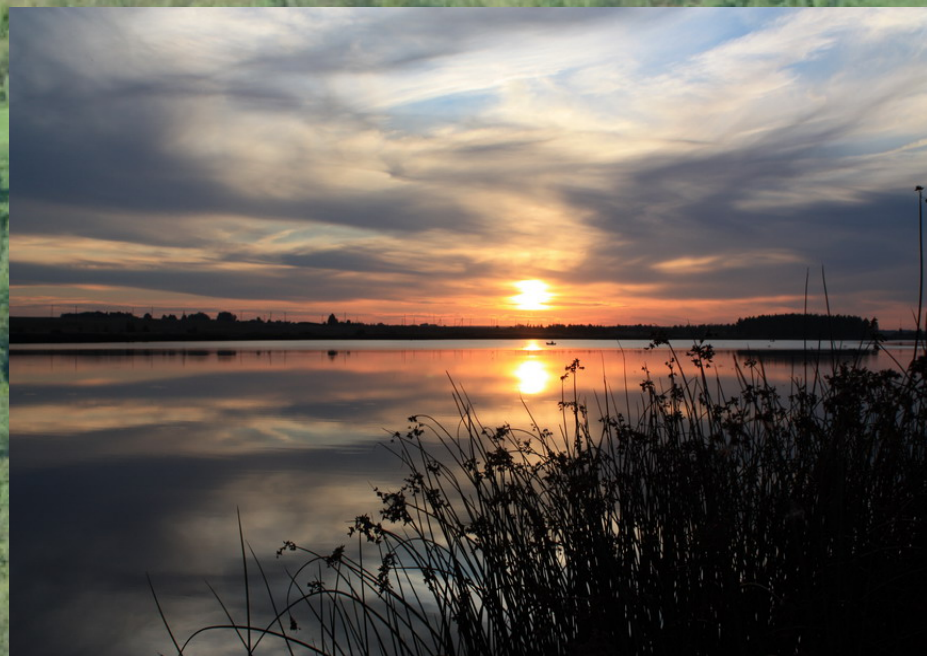


25 % of the annual precipitation amount is transformed into the local river runoff.

The total resources of the local river runoff are 56.2 km³/year.

The most important problems for Belarus as for the most of the countries, are the unevenness of distribution and the quality of water resources.

21 small hydroelectric power plants (HEPP) with a total installed capacity of about 10 MW operate in Belarus. At the same time the hydro potential is used by 3 % only.



- Rivers are used by the inland water transport providing mineral/construction and wood freight as well as passenger services along the rivers of Pripyat, Dnieper, Berezina, Sozh and Dnieper-Bug canal.



Water resources are highly vulnerable to the climate change. Therefore to develop adaptation measures under changing climate, a unified information exchange system is needed to assess the water regime of both – the whole region and specific states.



The most important phase of the Belarusian rivers' water regime is the spring flood

- The height of the spring flood above the normal (low-water) level reaches over 12 meters on large rivers.
- The flood height is approximately 2 times lower on medium and small rivers.



The shortest flood occurs in the rivers of the Niemen watershed area, and the longest – in the Pripyat watershed area. The number of floods which caused great damage reached 12 times over the last 70 years.

The spring flood on the rivers is followed by the summer-fall low-water periods, when water levels reach minimum values. The average duration is around 160 days. In dry years, drying of rivers and canals was observed in watershed areas exceeding 1.000 km².



- When designing the climate change influence to the water resources, the 4 scenarios were examined.
- All of them take into account the average annual increase in temperature by 2 °C in comparison with current state of the water level under the condition that the volume of the precipitation is stable or there is an increase or decrease in precipitation by 10 %.



The consequences relevant to the water sector could be the following:

- decrease in actual design supply of economy units using surface water;
- drop in minimum water levels in rivers;
- ground water recession;
- lower river water quality;
- transformation of the rivers' hydrobiological regime.



- Decreasing water levels in Dnieper and Prypiat rivers is likely to increase ^{137}Cs and ^{90}Sr radio nuclide concentrations in the surface water.
- The growth of the temperature in future would affect the ground water.
- If temperature in Belarus increases by about $1.5\text{ }^{\circ}\text{C}$, this may result in the ground water level recession of $0.03\text{-}0.04$ meters relative to the normal.



- Control structures of small-sized hydroelectric power plants comprise small reservoirs for day storage which are affected by climate to a great extent.

- The increase in temperatures would lead to additional evaporation and respective power generation loss.



In the years with low water, the local flow may reduce down to 2-3 % of the annual one, thereby affecting the water level and operation of the water domestic transport.



- An increase in frequency and duration of dry spells would lead to the decline of water levels in rivers, lakes and water reservoirs and, hence, would deteriorate the quality of water.
- This would necessitate an upgrading treatment of waste water discharge into these sources and the reallocation of polluters beyond the boundaries of water protection areas.





Impact of Hydraulic Reclamation on River Hydrological Regime, groundwater levels and climate. Up to date, nearly 1 million 400 thousand hectares have been reclaimed in the south of the country which is called Belarusian Polesye.

- **At present in the Belarusian Polesye region instead of the drainage marches one can see reclaimed sandy lands.**
- **And we would not like to have deserts in this region in future due to the global climate warming.**

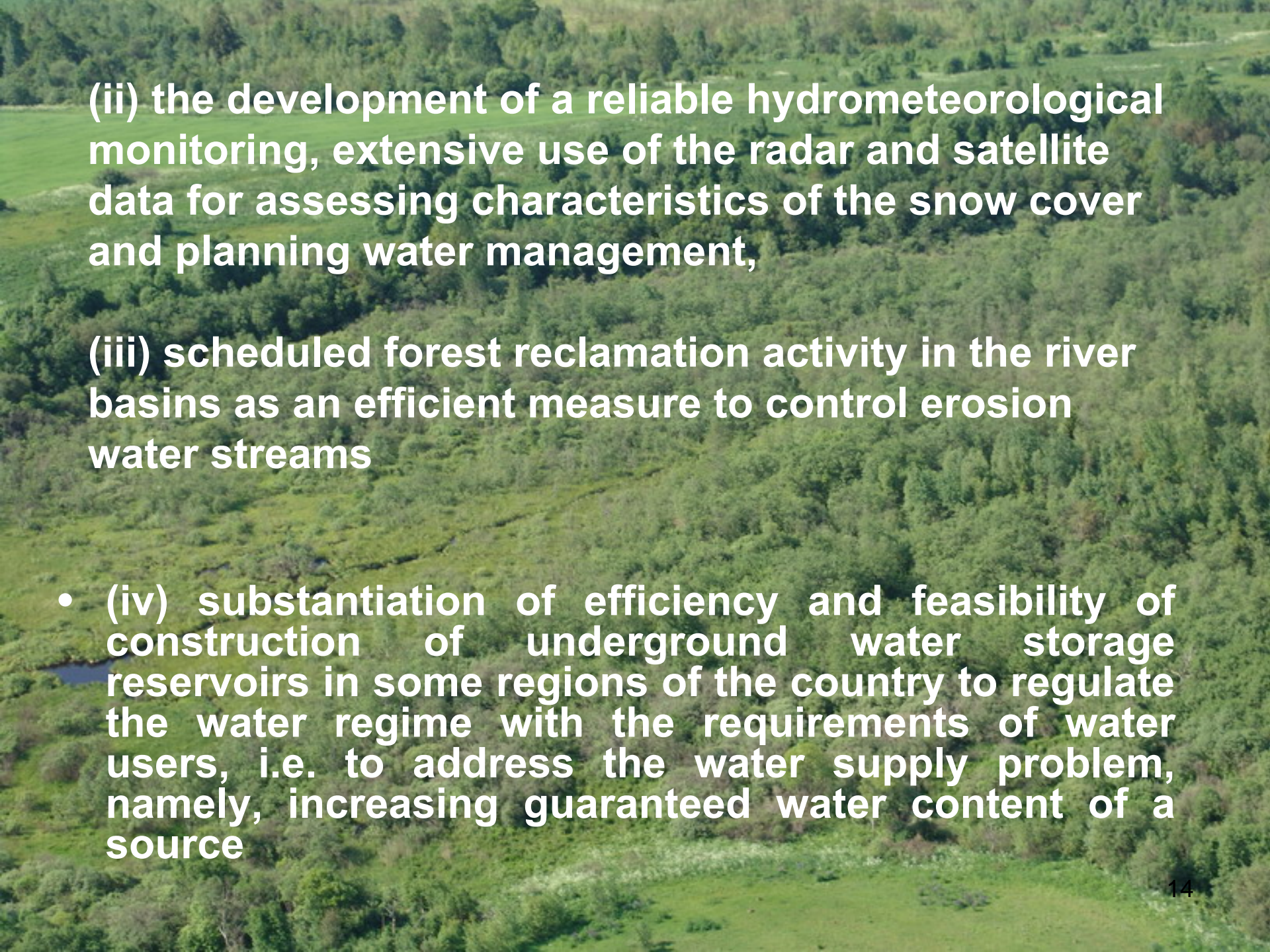




Proposals on Most Critical Adaptation Measures:

Major efforts in the water resources sphere are proposed to be focused on the following adaptation measures:

- (i) The Development of flood control actions primarily for the Polessie region, with specifics of the river runoff formation in Ukraine being accounted for; agricultural and forest protection measures;



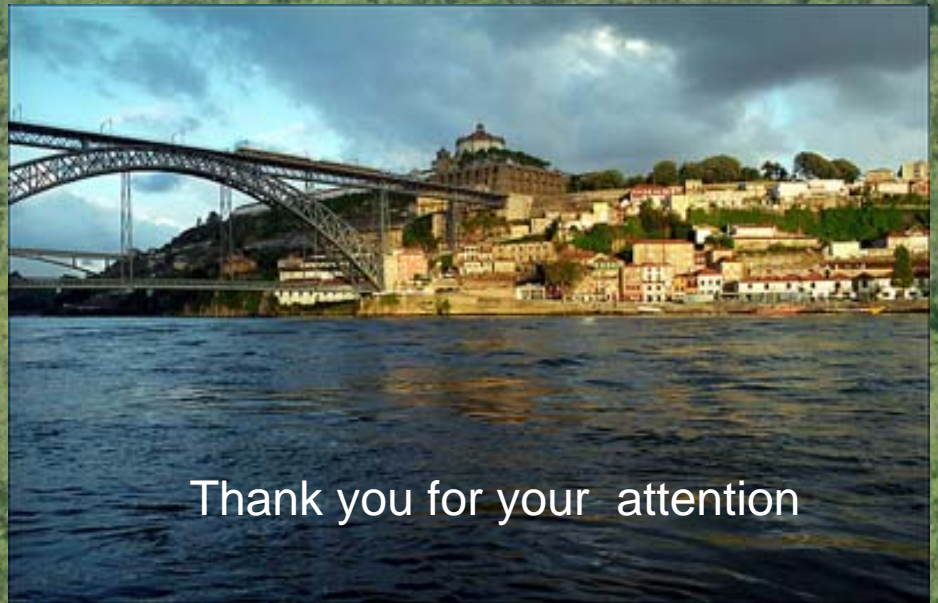
(ii) the development of a reliable hydrometeorological monitoring, extensive use of the radar and satellite data for assessing characteristics of the snow cover and planning water management,

(iii) scheduled forest reclamation activity in the river basins as an efficient measure to control erosion water streams

- (iv) substantiation of efficiency and feasibility of construction of underground water storage reservoirs in some regions of the country to regulate the water regime with the requirements of water users, i.e. to address the water supply problem, namely, increasing guaranteed water content of a source**



- **The adaptation of the economic activity should first of all include water conservation, extensive use of water-conservation.**
- **Implementing water supply actions is time consuming, therefore large water management facilities need to be planned 25 years in advance and commissioned 10-15 years ahead of the water demand.**



Thank you for your attention