

LAND RECLAMATION IN BREST REGION (BELARUS): STATE, PROBLEMS, PROSPECTS

A. Meshyk, M. Barushka

Brest State Technical University
267, Moskovskaya Str., Brest, Belarus, 224017

E-mail: omeshyk@gmail.com

Annotation. The article presents a historical background of land reclamation in Brest region, Belarus. It also describes a current state of land reclamation in the area and specifies some aspects of professional training of qualified experts in the sphere.

Key words: land reclamation, Belarus.

INTRODUCTION

Brest region enjoys an advantageous location in the Republic of Belarus. Better supplies with soil moisture and warmth create favorable conditions for agriculture in the region. Nevertheless, both excesses and shortages of moisture and warmth are often observed in cultivated soils due to instability of natural irrigation. Today, water and heat regimes of soil are regulated with ameliorative facilities predominantly. Agronomic soil properties, natural soil fertility, and natural irrigation only cannot guarantee high and steady crop yields. It is also essential to create a productive air-water and heat regimes on cultivated areas, although that might not be enough to solve the problem. Another requirement necessary for sustainable agriculture is considered a balance of gases, minerals, and organic fertilizers. That is why amelioration is regarded today as engineering activities (facilities and technologies) which provide optimal air, moisture, temperature, and nutrition regimes in soils.

HISTORY

Land reclamation in Brest region has a long history.

Considerable growth of population, social and industrial development in the 16th century resulted in the necessity to cultivate new and virgin lands and improve them. Land reclamation began to develop then. A few melioration canals were built in Kobrin district after Queen Bona Sforza ordered to start reclaiming her lands (1549 – 1557). The biggest one has survived until now. It is called the Bona Canal to honor the Queen. The canal is 29 km long. Its catchment area is 261 km².

After Queen Bona's contribution to land improvement the practice was continued by the Dutch who settled near Brest in the 17th century. They drained bogs for agricultural purposes of their own.

At the end of the 18th century Polish government of King Stanislaw August Poniatowski started to erect a navigable canal between the Dnieper River and the Bug River watersheds. The canal, which was called the Royal Canal, connected the Pina River with the Mukhavets River. Today it is called the Dnieper-Bug Canal although a part of the canal in Kobrin district still remains with its original name. After the war of 1941-1945 the canal was restored. Today it is used for navigation, fishing, recreation, and as a water intake reservoir of the local melioration system. The total length of the Dnieper-Bug water system is 196 km of which 105 km is the canal itself. It comprises 12 hydro-engineering structures with navigation locks, 28 flow-through dams, 14 water outlets, 5 earth-fill dams, 3 drop structures, 64-kilometer dams. In fact, the Dnieper-Bug Canal connects the basins of the Baltic and the Black Seas [1].

Alongside with the Dnieper-Bug Canal another canal called the Oginski was built at the end of the 18th century. Its length is 47 km. It connects the Shchara and the Yaselda Rivers and as a result the Baltic and the Black Seas. During World War I the canal was greatly destroyed so it lost its original importance. The canal bed, some hydro-engineering facilities, and the revetments built in the war years have remained until now. Today the canal silts up. It operates only as a water intake reservoir of the nearby polder melioration system.

The biggest land reclamation work was the so-called Western Expedition organized by Russian general I.I. Zhilinski at the end of the 19th century. Land amelioration was performed according to a governmental plan to reclaim Polesie marshlands that is why the project was well designed and financed. From 1874 to 1897 the Expedition managed to construct 4360 km drainage canals, 549 bridges, 30 canal locks. 127 km of river beds were cleared of weeds and grass. Many of them were built so profoundly that they have remained up to now.

Amelioration in Brest region almost stopped in the first half of the 20th century, which is explained by political changes (revolution and wars), and as a result, poor funds. But in the mid-1950s the work proceeded again and soon a hector of ameliorated area started to produce 18-19 hundredweight of rye, 20-27 hundredweight of oats, 200-300 hundredweight of potatoes, 250-400 hundredweight of root crops, 400-500 hundredweight of corn for silage.

In 1971 irrigation systems started to be built alongside large-scale drainage practices. There appeared water reservoirs and ponds, pump stations, network hydro-technical facilities, diversion dikes, roads, bridges, communication lines and power transmission lines. At the top of land reclamation activity the productivity of drained agricultural land was 33-38 hundredweight of fodder unit, and specifically, reclaimed soils produced 43-53 hundredweight of fodder unit. Gross output of crop production was 45%, including fodder up to 60%. Reclaimed areas of Polesie were put into cultivation by new farms (sovkhoz). They also tried to develop social services such as industrial and residential areas, public buildings and shops, recreational areas [1].

CURRENT STATE

According to the latest data (01.01.2017), 23% of the total area and 48% of the agricultural area in Brest region is drained. Today over 80 % of the land in need of amelioration is drained. The most ameliorated districts of Brest region are Ivanovo district (35%), Kobrin district (35%), Zhabinka district (34%), and Drogichin district (32%). The least ameliorated districts are Baranovichi (8%) and Kamenets (14%). 372,900 ha of Brest region land are drained with subsurface drainage systems, which is about 50% of all the drained area. Ceramic drainage is being replaced with the plastic one in the systems under reconstruction. It already accounts for about 5%.

37% of the ameliorated area (283,200 ha) is controlled by a two-way regulation (drainage and subirrigation) of water regime. But, in fact, it is hard to use as a lot of the retaining structures (19%) in the double-acting (drainage and subirrigation) systems are in poor condition.

Amelioration systems of water rotation type operate on the area of 40,400 ha. Drainage of 227,800 ha is performed with the use of pump stations. Polder systems occupy most of the area, which is a peculiarity of land reclamation in Brest region. Winter (non-flooded) polders occupy 208,000 ha.

The irrigated area has decreased significantly over the past decades. Today it accounts for 4,400 ha, which is less than 1% of all the ameliorated area. The reason for this decrease is current financial problems, and as a result, poor maintenance of the equipment.

The total length of meliorative drainage network in Brest region is 164,200 km, including 41,300 km of an open network. The network consists of diversion dikes (2,800 km), inspection roads (6,100 km), field-protecting forest belts (2,100 km), 291 pump stations, 364 locks, 7662 pipe-regulators, 794 bridges, 13304 conduit passes, 2411 pedestrian bridges, 7670 wells in a closed collector-drainage network, 83909 drain outlets, 728 wells for observing groundwater level.

PROSPECTS

Over the past decades land reclamation in Brest region has been conducted according to the State Program for preserving and using ameliorated lands. The Program is developed and adopted for every five years. Its main goal is to improve soil fertility by meliorative practices and drainage of highly fertile lands. In order to reach the goal, the Program requires providing optimal air-water regime on ameliorated lands through appropriate maintenance. Today, worn-out and outdated equipment of the melioration systems or their particular elements are being replaced, failed systems are being restored. A lot is being done to provide technically efficient maintenance of the system and its elements.

Although most of the ameliorated land in Brest region is mineral soils (70%), there is a problem of preserving drained peat bogs. Agricultural use of peat-bog soils inevitably results in their degradation. Brest region has peat-bog soils up to 1 m deep. Almost a third of them has mineralized and transformed into organic-mineral and human modified soils. Inefficient agricultural use of peat-bog soils causes soil erosion. About 30% of the peat-bog soil is used for tillage. Thermo-physical properties of the ameliorated peat-bog soil have changed significantly, which aggravated a problem of ground frost and fires [2]. The double-acting (drainage and subirrigation) systems that function on the peat-bog soils cannot solve the problem as their equipment is in poor technical condition and they are badly maintained.

Scientific support to implement the State Program for preserving and using ameliorated land is provided by scientific research establishments of the Department of Agrarian Sciences of the National Academy of Sciences of Belarus. In particular, RUE Institute for Land Reclamation is a leading scientific establishment which provides scientific support for over 4.3 million ha of farmland of which 2.9 million ha is drained. The Institute develops technologies and design decisions for reclamation of wetlands and bogs of Polesie.

In Belarus professional training for specialty “Land Reclamation and Water Management” is conducted at Belarusian State Agricultural Academy and Brest State Technical University.

CONCLUSION

Although the scale of land reclamation has reduced considerably lately, Belarus is developing and implementing the State Program for preserving and using ameliorated lands. Brest region is the country’s leader in this sphere. In order to provide professional staff for this branch of national economy, higher educational establishments coordinate their work with the industry.

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