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The problem of construction on salted soils due to insufficient use of Underground Water of the Bukhara Region

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Abstract The article investigates and conducts complex geographic studies, gives a classification of soils, describes their physical properties and the problems of construction on saline soils in connection with the unsustainable use of groundwater. The high level of formation of groundwater leads to salinization and waterlogging of soils on the surface layer. In this regard, it is necessary to carefully monitor soils prone to salinization and waterlogging, careful monitoring of soils is recommended, a high level of groundwater occurrence, by reducing unproductive water losses by streamlining its distribution at all levels of systems, repairing canals and cleaning the collector.

Key words: soil strength, deformation, filtration, groundwater, soil classification, physical properties, mechanical composition, groundwater level, salinization, waterlogging.

Introduction

The problem of construction on saline soils has become especially urgent in recent years in connection with the irrational use of groundwater in the Bukhara region. Low-moisture and dry soils, when moistened, sharply change their strength, deformation and filtration properties due to the removal of salts. Salinization processes are also developing, the salinity of the surface layers of the soil increases. The complexity of construction on saline soils is also due to the fact that deformations of buildings and structures occur both in the process of their construction and operation, often manifesting themselves in the form of a sharp subsidence.

One of the most important properties of soils, determined during engineering and geological surveys, is their strength. It is the strength that determines the stability of the soil under the influence of various factors and loads and, accordingly, the stability of any building and structure, in most cases, based on the exact design decisions taken during construction.

The bases of saline soils should be designed taking into account their features, which determine:

- the formation of ssf suffosion sediment during prolonged filtration of water and leaching of salts;
- a change in the physical and mechanical properties of the soil during the washing of salts, as a rule, accompanied by a decrease in its strength properties;
- increased aggressiveness of groundwater in relation to materials of underground structures due to the dissolution of salts contained in the soil.
- take into account that in saline soils, when they are moistened, subsidence or swelling may appear.

The soils of the Bukhara region have been deeply studied by Uzbek scientists, the quality and composition of the soil have been determined,

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extensive geographic studies have been carried out, their physical properties have been classified and described [1,2,3]. In the Bukhara region, there are morphic, transitional hydromorphic soils of the desert zone, formed from different genesis and age [4]. Soils of various types from sandy-sandy to medium-loamy. They contain minerals: humus 0.6-1.8%, nitrogen concentration 0.05-0.16%, total phosphorus 0.09-0.11%. In terms of physical and mechanical composition, they differ from heavy loamy to sandy. The humus content in the heavy loamy layer is 0.3-1.8%, nitrogen is 0.03-0.16%. The sandy ones contain about 0.5% humus and 0.04-0.05% nitrogen.

The purpose of this article is to study the problem of the rational use of groundwater in the Bukhara region, which leads to salinization, affecting the physical and mechanical properties of the soil, which is accompanied by a decrease in its strength properties, which determines the stability of the soil under the influence of loads, and, accordingly, the stability of engineering structures in the Bukhara region.

In Bukhara region, surface waters are fully provided by the Amu Darya and Zeravshan rivers. The main source of water is the Amubukhara and Amukarakul canals, the additional source is the Kuyimazar, Tudakul and Shurkul reservoirs. The hydrographic network of the region is characterized by numerous irrigation structures and drainage networks. The main drainage faults are Tsentralnaya, Severnaya, Paralnaya, Tashkuduk, Parsankul and Ogitma. Bukhara region is located in the lower reaches of the Zeravshan River [7,8].

The groundwater level depends mainly on the relief, depth and distance of drainage [9]. The main source of power and the reason for the close occurrence of groundwater is water coming from hydraulic systems.

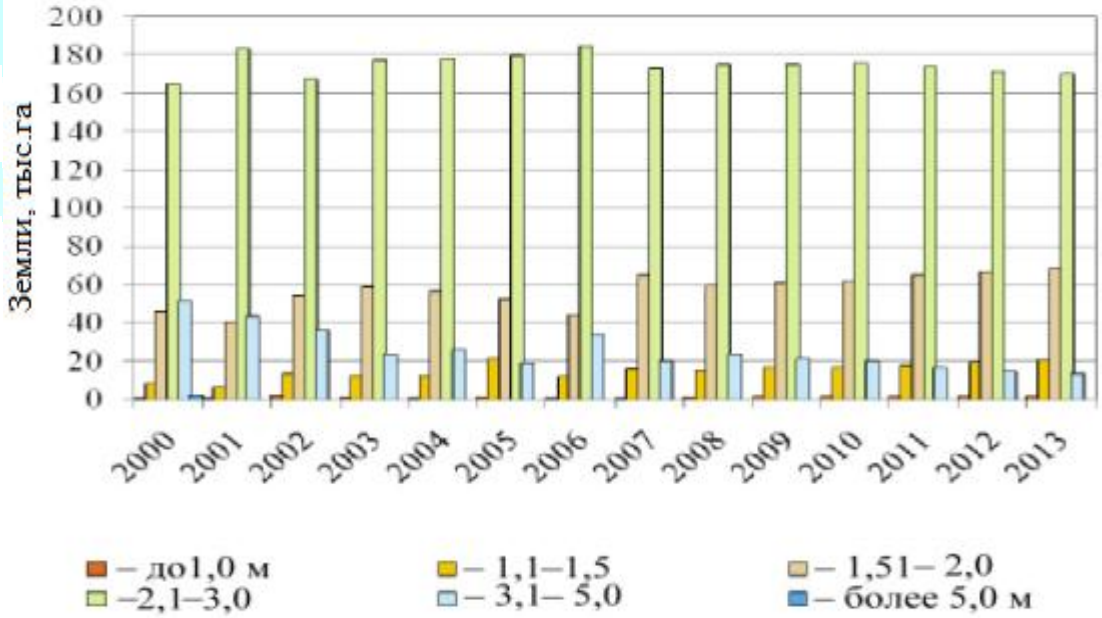

Fig. 1. Dynamics of changes in the level of groundwater

Precipitation also plays a role in groundwater recharge. The high level of saline groundwater leads to salinization and waterlogging of soils. To reduce salinization and waterlogging of soils, it is necessary to analyze the causes of temporary changes in the level of groundwater, the location and length of territories in the salinization and

waterlogging zone, and also to develop measures to prevent salinization and waterlogging of soils.

In fig. 1.The dynamics of the UPW from 2000 to 2013 has been analyzed. The largest area of the groundwater formation zone at a depth of 1.1-1.5 m was recorded in 2005, 2012 and 2013. 20 thousand hectares, the smallest in 2000-2001. 6.6-8.5 thousand hectares. With a groundwater depth of 1.51-2 m, the largest area was 68.4 thousand hectares in 2009-2013, while the smallest area was 40.3-44.2 thousand hectares in 2000 and 2012. At a depth of 2.1-3 m, the largest area was recorded in 2001, 2004, 2005 and 2006. - 180 thousand hectares, with the least in 2000 and 2013. 164.7 - 170 thousand hectares, respectively. In 2000, the largest area was 14.4 thousand hectares, in 2000 the smallest with a groundwater depth of 3.1-5 m was 57.9 thousand hectares, in 2013 the largest - 13.9 thousand hectares. ha, this is almost 3.7 times less, groundwater at depths of more than 5 m was recorded in 2000 and 2002, and the least 0.3-2.6 thousand ha.

Based on the analysis of the dynamics of changes in the groundwater level, it can be assumed that the level of occurrence of groundwater during the year can vary significantly, and the area of the formation zone of groundwater will change accordingly. One of the main reasons for the high level of formation of groundwater in saline soils is a constant increase in the pressure and inflow of deep groundwater [9]. The volume of filtration water depends on the volume, intensity and frequency of precipitation, water-physical properties (permeability) of the soil and rocks of the aeration zone [10]. The migration of absorbed water to the surface occurs until they reach the groundwater horizon, after which their vertical movement stops.

They flow in the form of a ground stream to the nearest natural drains (river valleys, ravines). When the filtration water reaches the groundwater basin, its level rises.

As a result of a number of reasons - reservoir backwater, poor natural water flow from the territory and unsatisfactory condition of collectors, underground waters can be close to the earth's surface almost all year round. Clogged drainage and pressure in the collectors lead to a situation of rising groundwater levels and their outflow is impossible.

If the groundwater salinity is relatively low, then the secondary soil salinization will be minimal or absent at all, provided that the groundwater level is low. Salt accumulation source - salt water 1.0-1.5 g / l. The salinity of the Amu Darya water at the time of the study was 0.2-0.3 g / l at the outlet from the mountains and 1.0 and higher in the lower regions.

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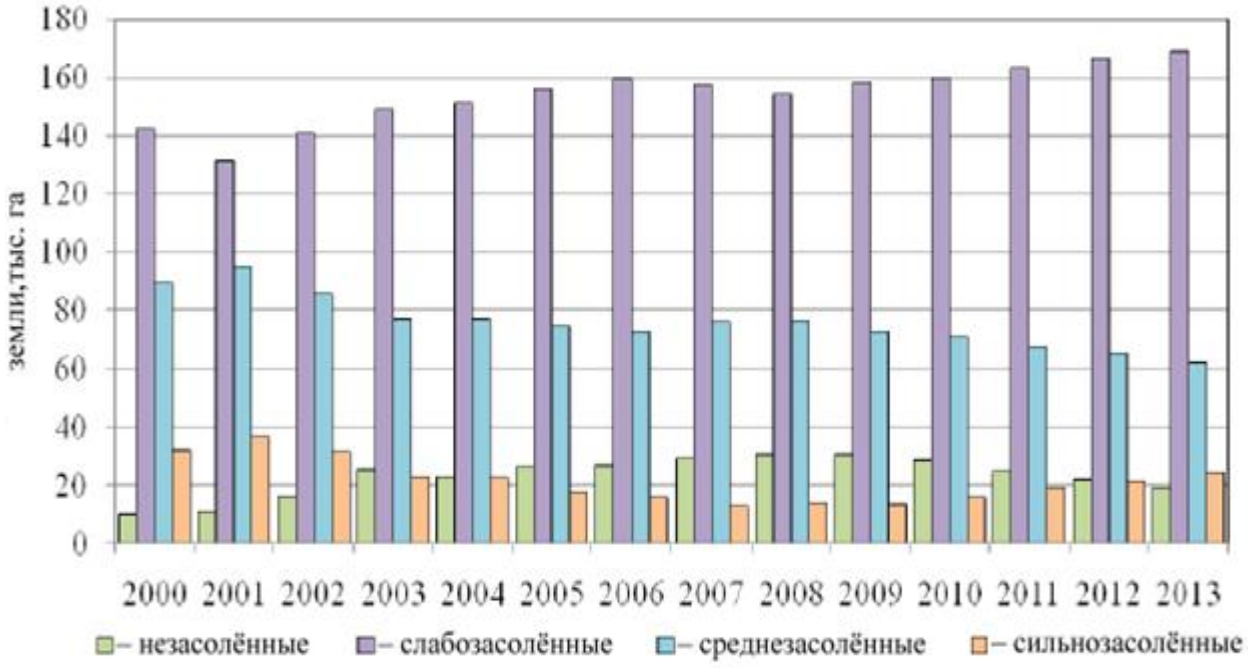

Fig. 2. Dynamics of land salinization

The area of non-saline lands in 2000 was 10.2 thousand hectares, in 2013 - 19.3 thousand hectares, an increase of almost 2 times. If the total area was 274.9 thousand hectares, then in 2013 non-saline lands accounted for 7%. An increase in this indicator was recorded in 2003 and 2005-2008 (Fig. 2).

In 2000, the area of slightly saline lands was 142.5 thousand hectares, in 2013 - 169.2 thousand hectares. Its growth was observed in 2006, 2010 and 2013. The decrease in moderately saline soils began in 2001. So, in 2000 this figure was 89.2 thousand hectares, in 2013 - 69.1 thousand hectares. The largest land plot was registered in 2001, 94.8 thousand hectares of this category.

In 2000, the area of highly saline lands was 31.9 thousand hectares, and in 2013 it decreased to 24.5 thousand hectares. Thus, 61.5% of the total land area is classified as slightly saline 22.5%, and 8.9% is moderately and highly saline. It should be noted that the salinity of the lands of the Bukhara region is stable.

Large evaporation leads to strong soil salinization. In such conditions, it is very difficult to regulate the water-salt regime. It should be noted that soil salinity in the Bukhara region is frequent. Salinization is the result of irrational use of water resources [12]. And as already mentioned above, the clogged drainage and the pressure in the collectors lead to a situation of an increase in the level of groundwater, in this case the collectors collapse, the slopes float and the bottom is poured. Hot conditions increase the transpiration of water and the accumulation of salts in the surface layer of the soil. From the analysis of the dynamics of the behavior of the groundwater level in the Bukhara region, it shows that the closer they are to the surface of the soil layer, the greater their participation in the intensive accumulation of salts on the surface layers of the soil [13, 14]. The dominant landscapes of the Bukhara region are characterized by weak natural drainage and slight land slopes (0.0001-0.0002). Without good drainage, difficulties will arise in lowering and removing groundwater and regulating the salt regime of the ground. Most of the existing drainage systems are malfunctioning or

inoperative, and about 50% of the vertical drainage is not used at all. Existing collectors fill up quickly and therefore work in a pressure mode, which in turn increases the level of groundwater, which leads to an increase in salinization and waterlogging of the soil.

In this regard, careful monitoring of soils subject to secondary salinization and waterlogging is recommended.

In addition, it is necessary to apply improved methods of simplified ground operational control in order to prevent salinization and waterlogging of certain areas during the growing season, as well as rational use of water resources, reduce unproductive water losses by streamlining its distribution at all levels of systems, repairing canals and cleaning the collector [15].

All account of the above recommendations, we can also prevent the following measures to protect against soil salinization during the construction of a building and structure:

- waterproof;
- constructive;
- partial or complete cutting of saline soils with a cushion made of clay soils;
- cutting through the strata of saline soils with foundations, including pile foundations;
- consolidation, consolidation or neutralization (saturation of soils with solutions that exclude the dissolution of salts) of soils;
- preliminary desalinization of soils;
- waterproof and constructive measures, as well as the device of a ground cushion;
- anticorrosive to protect the body of the foundation from the aggressive effects of water and soil;
- for highly saline soils, stopping or slowing down the movement of the filtration flow (installation of waterproof curtains: clay, silicate, bituminous, cement);
- a decrease in the dissolving capacity of groundwater (artificial saturation of the filtration flow with salts) [16].

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