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Engineering and Geological Properties of Soils in Hungry Steppe as Assessment of Melioratic State

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ABSTRACT: The article considers the deterioration of the land reclamation condition, which is the degree of degradation, which is determined by the deviation of any soil indicators from the initial or reference value. For example, if the deviation of the indicators does not exceed 10%, it is considered that there is no degradation. Every next 10% increases the degree of degradation, and when the deviation exceeds 40%, degradation is considered catastrophic. The studied 2.0-2.5m thickness of the study area sandy sand is considered as a zone of hypergenic changes associated with aridity of the climate. Physical degradation is part of hypergenic processes, destruction of organo-mineral bonds, deterioration of aggregating ability, decrease of water resistance, mechanical strength and deterioration of pore space of aggregates, formation of crust and overcompaction of deeper layers, deterioration of water regime.

KEYWORDS: degree of degradation, groundwater, ground conditions, reclamation state, hypergenesis, irrigation periods, porosity, filtration coefficient.

I. INTRODUCTION

Currently, a serious problem of irrigated territories of the Syrdarya region is a significant rise in groundwater of 2.5-5.0m or more, compared with natural conditions since 1960 5.0-10m. The flooding of 1.5-3 m of significant areas in the last decade creates additional difficulties in the construction of engineering structures, underground communications and in violation of the rules for the operation of irrigation systems. In addition, level rise causes secondary salinization, hypergenesis and physical degradation of soils in irrigated and newly irrigated areas. At the moment, studies of the reclamation state of water facilities were carried out using methods that do not fully meet today's requirements. In this regard, in order to improve the quality of engineering and geological studies to assess the reclamation state of the soils of irrigated and newly irrigated areas, we recommend using granulometric composition, physical and mechanical properties, analysis of water drawing and depth of groundwater as additional indicators.

II.RELETED WORK

One of the indicators of soil reclamation deterioration is the degree of degradation, which is determined by deviation of any of the listed indicators from the initial or reference value. For example, if the deviation of the indicators does not exceed 10%, it is considered that there is no degradation. Every next 10% increases the degree of degradation, and when the deviation exceeds 40%, degradation is considered catastrophic. The standard means soils with indicators in the initial period of use, and degraded - grunts that have acquired new deteriorated indicators after a certain period of irrigation. It is important to note that the new indicators should be sustainable. In other words, soils that can restore natural physical performance cannot be called degraded and subject to hypergenic changes.

Approximately the same approach has already been adopted in Russia [2]. True, the set of indicators of physical degradation here was somewhat wider. In addition to the above, porosity, filtration coefficient, reduction of soil power and others were used here.

Some Russian departments (for example, the Ministry of Ecology) recommend using with their own methods for assessing the physical degradation of soils [3], the essence of which is approximately the same - assessing the deterioration of soils in relation to some initial state.

In fact, the only sources of information for judging the presence of physical degradation and susceptible to hypergenic changes are the results of comparative observations in non-irrigated and irrigated areas of long-term field geotechnical studies accompanied by experimental experiments. Based on these sources of information, it is important for us to

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systematize the processes in soils related to hypergenesis and physical degradation, establish its causes, more clearly diagnose, possible distribution ranges and find ways to prevent it.

III. OBJECTS AND METHODS OF RESEARCH

The article uses the results of mining and experimental filtration studies of irrigated and newly irrigated territories of the Hungry steppe, related to the Syrdarya region. Based on these comparative studies, conclusions will be drawn about the change in physical properties, interpreted by us as degradation and hypergenic changes in soils. Results of study of macro- and micro-morphological and textural structure of soils and separate soil aggregates, structural-textural structure, water resistance of aggregates, porosity, about ratio of vertical and horizontal pores - anisotropy are used as indicators of these processes.

According to the methodological manuals for hydrogeological and engineering-geological studies [1,4,5,6,7] lithological composition of rocks lying in the outcrop and their stratigraphic position is recommended to be described with little detail. The procedure for describing soils was carried out in the following sequence: a) petrographic name; b) mineralogical composition of rock; c) rock color; d) impurities and cement of rocks; e) density; f) structure and texture; g) layering and various features associated with rock formation conditions; h) inclusions; and) rock fracture; k) fauna and flora; l) estimated age.

The color of the rock can often indicate the genesis of the rock and its properties. So, in our studies, bright red shades due to the presence of anhydrous iron (Fe_2O_3) oxide or hydroxides ($2Fe_2O_3*H_2O$), gypsum ($CaSO_4*2H_2O$) indicate continental formation conditions, a fairly dry and hot climate. It should be borne in mind that rocks often in fresh fracture have a color or shade different from the color of the rock from the surface. This latter circumstance is due to weathering processes: oxidation, reduction and decomposition of the main rock-forming minerals.

Many signs of the breed were determined by eye and touch; for example: the sandstone and clay of the rock were determined to the touch by rubbing or rolling the rock; ironicity was recognized due to the rusty color of the rock; mica is determined due to the sparkles of mica plates; the presence of water-soluble salts by the content of crystals in soils - hydrates K and Na, which contribute to the formation of so-called "plump" individuals of bright white color in the section, which are a loose, dusty medium.

IV. RESULTS OF THE RESEARCH

The density of soils was described as follows: sands and loams are divided into loose, compacted (caked), clays, clay loams in viscosity, plasticity.

When describing the structure and texture of the rock, the shape, location and size of the minerals that make up the rock are noted.

In the presence of different grains in the rock of secondary formations, it is described as diffuse. Grain sizes are determined using a pie chart, and with a known skill can be determined by eye.

To determine the filtration coefficient of non-water-saturated soils, that is, soils lying in the aeration zone, the method of pouring water into the sump is used. Essence of method consists in creation of vertical filtration flow leaking through dry soil down from sump bottom, measurement of flow section area, flow rate. Water is absorbed into the dry ground and moves in it not only under the influence of gravity directed downward, but also capillary forces that can act in all directions. As the wetting depth increases, the rate of change in the wetting pattern slows down, and the water flow for infiltration from the sump stabilizes. Thus, using this method, the value of the filtration coefficient was set only approximately, but with an accuracy quite acceptable for practical purposes.

This method of determining the filtration coefficient usually does not take into account the action of capillary forces and lateral flow. Therefore, by the Boldyrev method, they are poured into sumpfs, it is advisable to use the method when testing permeable rocks, such as sandy sandy, granular sands, gravel-pebble deposits, tre squash rocks, etc.

The experimental filtration work conducted to study the filtration coefficient of various genetic types (in our case $aQ_{IV}sd$ and $apQ_{III}gl$ of quaternary age) of saline sandy soils and sandy sandy soils showed that the filtration coefficient is determined by a natural combination of the characteristics of their composition, state and nature of structural bonds.

V.CONCLUSION

A thorough study of saline soils in the territory of the Syrdarya region made it possible to identify their different sensitivity to water. In the studied territory, it is universally established depending on the texture, structure, content and composition of secondary salts (amorphous silica -SiO_2, gypsum - $CaSO_4*2H_2O$ etc.) dense saline zone at depth from

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0.75-1.0 to 1.5 m. The formation of the zone is possibly associated with capillary lifting of saline groundwater and due to the influence of the arid climate, a dense zone of re-formed salts appears. This zone negatively affects the land reclamation condition of irrigated areas. In our case, according to the schedule of changes in water consumption from the time, the sandstones, being quite strong in the saline state, are additionally hydrated, decompressed and sharply softened during the leaching process to varying degrees, their reclamation state improves.

And in the areas of villages and central estates of the region, the ratio of soils to water leads to leaching of salts, coagulation-crystallization structural bonds are weakened and broken in sandy soils, which leads to a sharp decrease in strength and a change in the deformation behavior of soils.

Thus, the studied 2.0-2.5m thickness of the study area sandy sand can be considered as a zone of hypergenic changes in the climate associated with aridity. Physical degradation is part of hypergenic processes, destruction of organo-mineral bonds, deterioration of aggregating ability, decrease of water resistance, mechanical strength and deterioration of pore space of aggregates, formation of crust and overcompaction of deeper layers, deterioration of water regime.

After interpreting the results of laboratory definitions, it will be possible to judge the degree of susceptibility to hypergenic changes and physical degradation of soils and determine the reclamation state of irrigated areas.

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