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Dependence of Fractional Structure of River Sediments on Chemical Composition

Aybek Arifjanov, Luqmon Samiev, Shamshodbek Akmalov

Abstract: ***The article investigates the mechanical and chemical composition of river sediments and analyzes studies on changes in the chemical composition of sediments by changing their mechanical composition. Given scientific investigations about efficient use of chemical compounds in sediments. The connections between mechanical and chemical composition of the sediments are based on correlation coefficients. The results are based on the fact that small fractional sediments less than 0.05 mm can be used effectively in agriculture.***

Keywords: ***River sediments, mechanical and chemical composition, irrigated fields, mineral fertilizers, water consumption, canals, turbidity.***

I. INTRODUCTION

Estimation of river sediment management in the world is of particular importance in carrying out targeted research activities, such as finding scientifically sound, cost-effective and environmentally friendly solutions, estimating the quantity and quality of direct river sediments and developing new technologies for their use. One of the main tasks in this area is to conduct effective scientific research, including the assessment of river sediment quality, the development of methods and technologies for river sediment management, and the development of mechanical and chemical composition of river sediments.

The main water sources available in the country (Amudarya, Syrdarya, Zarafshan, etc.), along with water, carry considerable amounts of sediments containing mineral fertilizers. The literature on the mechanical and chemical composition of river sediments of the Amudarya and Syrdarya rivers is limited. The general question of the role of sediments in soil fertility has been investigated by various researchers at different times, such as IA Dzhorikov, NV Borodina, LY Mamaeva, MA Orlov, AN Rozanov, IA Klyukanova and others.

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***** Correspondence Author
Arifjanov Aybek*, Prof. of Hydraulic and hydroinformatics Department, Tashkent Institute of Irrigation and Agricultural Mechanization Engineers, Tashkent, Uzbekistan. Email: obi-life@mail.ru
Luqmon Samiev, PhD of Hydraulic and hydroinformatics Department, Tashkent Institute of Irrigation and Agricultural Mechanization Engineers, Tashkent, Uzbekistan. Email: luqmonsamiev@mail.ru
Shamshodbek Akmalov, PhD of Hydromelioration Department, Tashkent Institute of Irrigation and Agricultural Mechanization Engineers, Tashkent, Uzbekistan. Email: luqmonsamiev@mail.ru

In the studies of KM Stepanova, NI Gridnev, NI Gorbunov, VA Kovda, GV Zakharina, OA Shelyakina certain estimation of mechanical and chemical composition of the deposited sediments was given. [1,2,3].

Acquisition of available sedimentary material from the rivers leads to the conclusion that, although there is a great deal of information on the occurrence of strong floods, we know little about the sediment composition. This information is limited to the mechanical composition of river sediments. The unilateral characterization of river sediments requires extensive research on the detailed study of river hydrology and chemical composition of sediments. The study of the mechanical and chemical composition of river sediments has long attracted the attention of scholars [4,5].

II. METHOD AND MATERIALS

In the course of the research, we used commonly used methods in hydraulics and hydrology, as well as analytical and tested numerical methods to use mathematical and statistical data.

The problem of ensuring that small-diameter (≤0.05 mm) sediment particles with large amounts of minerals that increase soil fertility reach the irrigated fields is related to the distribution patterns. Scientific studies show that about 60% of the suspended sediment particles in the Amu Darya are sediments with a diameter less than 0.05 mm [6,7].

Fig 1. Processes in natural field conditions in the main trunk channel

One example shows that over 70% of the suspended sediment in the Mirishkor canal flowing from the Amu Darya is composed of particles less than or equal to 0.05 mm (Fig 2). Chemical analysis of sediment particles revealed that the bulk of the chemical compounds required for soil fertility increase.

Studies have been carried out taking into account the fractional (grain), chemical and mineralogical composition of river sediments.

The sediment distribution, fractional and chemical composition of the sediments were analyzed on the basis of several common methods.

The study of river turbidity and the order of enclosed sediments plays an important role in solving a number of water-related problems in the national economy. In particular, the study of river water turbidity and sewage behavior is the key to the construction of various hydraulic structures (reservoirs, irrigation ditches, hydroelectric stations, canals, etc.).

Mechanical composition of river sediments is characteristic. Small sediments of river sediments are of great importance for irrigation.

The link between river sediment size and its chemical composition has long attracted the attention of scientists. Changes in the chemical composition of sedimentary particles in rivers like the Amudarya and Syrdarya have been studied by many scientists [8,9].

Studies have shown that the sediments present in river sediments vary in percentage from> 0.25 mm to <0.001 mm (Figure 2.3). We need to ensure that small particles in the formations of river sediments, that is, the physical amount of clay, are transported to the irrigated lands from the main canals and irrigation canals.

The river sediments can also be seen in the natural and field work on the enrichment of the fractional composition of the soils in the trunk channels that receive water from the Amudarya and Syrdarya rivers.

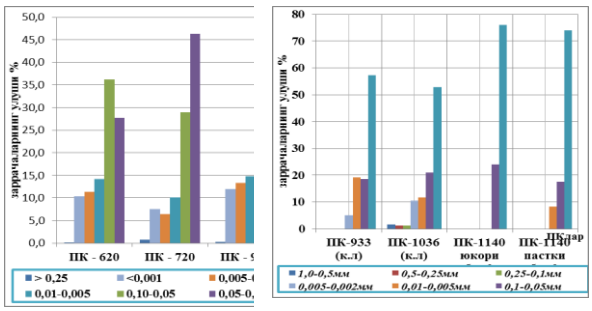

Fig 2. Fractional composition of sedimentary particles in the canal Fractional composition of sediments in the main trunk channel channel

The distribution of sediments in the river in the trunk canals is very diverse. Also, the fractional composition of these river sediments is dominated by fine-grained sand (0.1-0.05 mm) and large dust (0.05-0.001mm), (<0.001mm) particles (Fig 2).

In the development of soils, the formation and improvement of genetic strata of irrigated lands, the state of the small particles of the rocky rocks is of great importance. In turn, a group of small particles make up the fraction of the soil. The fractional structure of the soil is one of the most important determinants of the properties and fertility of the substrate, primarily because of its agrochemical composition.

In irrigated soils, il and colloidal particles are of great importance, and the soil fertility is closely linked to the smallest particles (<0.001 mm) in it. As the particle size decreases, the amount of humus and nitrogen increases. The erosion process, however, can also change the behavior of humus and other nutrients in it, not just altering the mechanical composition of the soil by washing such small particles. Thus, the mechanical composition of soils is inextricably linked to all the properties of soil cover (nutrient elements and humus content, water permeability, absorption, moisture content, etc.).

Sediment (<0.001 mm) is mainly composed of highly dispersed secondary minerals. This fraction is very important in soil fertility and plays a major role in a number of physical and chemical processes occurring in the soil. Sedimentary fractions are highly permeable, contain humus and a large amount of nitrogen and other substances necessary for plants. Colloidal particles in it play an important role in the formation of soil structure.

From the foregoing, it can be seen that as the size of mechanical elements grows, their properties also change. Such sharp changes are particularly well represented within the fractions of "physical sands> 0.01 mm" and "physical clay" d <0.01 mm.

In the studied sections of the main channels, PK-620 to PK-1140, the mechanical content of the physical sludge was found to be 10 to 15%. The bulk of the river sediment is composed of large dust particles (0.05 and 0.01 mm), with a content of 35 to 45% (Fig 2).

Large amounts of mineral fertilizers were found in small river sediments (Fig 3). For this purpose, it is required to supply particles of river sediments between 0.05 and 0.001 mm (il) to irrigated land. As a result of the neglected use of chemical fertilizers, the soil can be damaged. In agriculture, instead of using chemical fertilizers, it is important to use natural river sediments as fertilizers, thereby increasing soil fertility. It is desirable for agriculture to bring the required fractional composition of river sediments into the fertile soil layer. It is necessary to provide access to the irrigated lands by the management of the fractional composition of the adjacent sediments entering the irrigated lands through a combination of modern methods and engineering measures.

It is clear from the foregoing that the environmental condition and productivity of soil depends on the quality of irrigation water. However, their role in hydraulic and reclamation structures that are designed to manage and use water resources is not always properly taken into account. The problem of ensuring that small-diameter (≤0.05 mm) sediment particles with large amounts of minerals that increase soil fertility reach the irrigated fields is related to the distribution patterns.

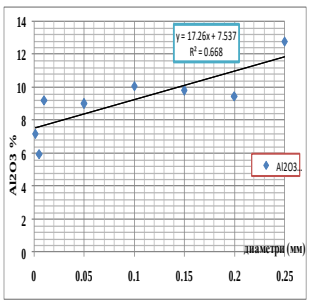

Fig 3. Depending on the chemical composition of river sediments (Al2O3)

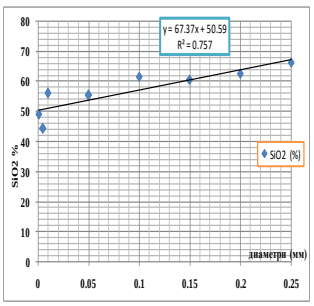

Fig 4 Depending on the chemical composition of river sediments (SiO2)

The analysis of the results shows that the mechanical composition of the sediments and the chemical composition of the sediments can be seen to be regular (Fig. 3,4,5). We can see, for example, the change in the chemical composition of the particle, given the average fraction of the sediment fraction. We can observe a decrease in the amount of alkaline oxide (Al2O3) and silicon oxide (sand SiO2), which is less than 0.005-0.001 mm and less than 0.001 mm (Figure 3,4).

These compounds have an inverse relation to particles with a diameter greater than 0.01 mm. As the particle is less than 0.01 mm, we can see in the studies that the amount of chemical compounds R2O5 and K2O increased (Fig. 5,6).

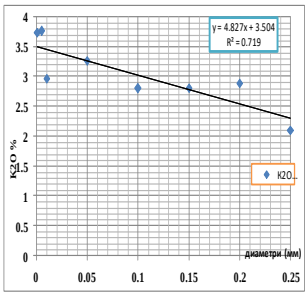

Fig 5. Depending on the chemical composition of river sediments (K2O)

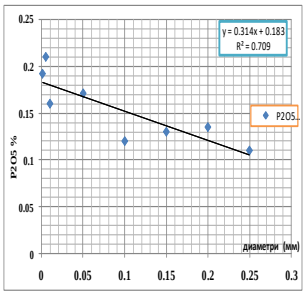

Fig 6. Depending on the chemical composition of river sediments (P2O5)

III. CONCLUSIONS

By controlling the mechanical composition of the sediments, it is possible to regulate the chemical composition and determine and predict the amount of minerals, biogenic elements and humus released into the field. To the laboratory analyzes conducted during the irrigation season We can observe a decrease in the amount of chemicals in the water, regardless of the level of water turbidity. Increasing the mineralization level downstream of the channel indicates that various substances are added to the water during the flow.

Delivery of river sediments to fractions by fractions (Mirishkor canal) is related to the channel's sludge capacity. The variability of the channel water consumption during the year may result in a change in the flow rate of the channel and, consequently, the change in the channel's turbidity. The problem of the small-diameter (0.05 mm) diameter sedimentary particles with high soil fertility to reach the irrigated fields is related to the distribution of sediments in the channel flow.

The analysis of data collected in the main channel channels (Mirishkor channel) and hydraulic structures in natural field conditions revealed that each object has its own river sediments, and the correlation coefficient (r = 0.70) between their fractional and chemical composition in their management and use. This allows the chemical composition to be controlled by the administration of small sedimentary fractions.

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AUTHORS PROFILE

Arifjanov Aybek Muxamedjanovich
Doctor of Technical Sciences, Professor
Head of the Department of Hydraulics and Hydroinformatics
Work address:
100000, Uzbekiston, Tashkent City, Qori Niyazi Street, Building 39
Building / Office: Building G, G-402
Tel.: +998712371971
Email: obi-life@mail.ru

Interests in the field of research: Methods of calculating the distribution of river sediments and process in channels

The main scientific and methodical work:

А.М.Арифжанов, Қ.Т.Рахимов, ва А.К.Ходжиев; “Гидравлика”, Ўқув қўлланма, Тошкент 2016 й.

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Samiev Luqmon Nayimovich
PhD, dotsent
Tel.: +99871-237-19-71
Email:
Docent of the Department of Hydraulics and Hydroinformatics
Work address:
100000, Uzbekiston, Tashkent City, Qori Niyazi Street, Building 39
Building / Office: Building G, G-402
Tel.: +998712371971
Email: luqmonsamiev@mail.ru

The main scientific and methodical work:

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Akmalov Shamshodbek Baxtiyarovich
Candidate of Technical Sciences, Associate Professor
Tel: +99890-315-18-94
Email: sh.akmalov@tiiame.uz
Associate Professor of the Department "Hydrology and Hydrogeology"
Address of work: 100000, Uzbekistan, Tashkent city, Kori Niyazi street, 39
Building / office: building G, G-108
Tel.: +99871-237-09-71
Email: sh.akmalov@tiiame.uz

Research Interests:

Hydrology, hydrometrics and flow regulation, climatology, GIS technology

The main scientific and methodical work:

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