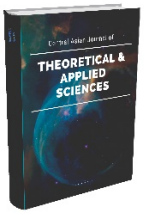

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Factors of Influencing Changes on the Groundwater Level in the Upper Pliocene Sediments in the Western Part of the Bukhara Field

Nodirjon Najmiddinovich Rakhimov
Junior Researcher (Basic Doctoral Student) Republic of Uzbekistan State Committee of Geology and Mineral Resources University of Geological Sciences, Institute of Hydrogeology and Engineering Geology

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Annotation: *This article presents the results of experimental filtration work from the well, the water flow rate was obtained on average 5-6 l/s. To obtain the required amount of water (98.05 l/s), 20 wells with a flow rate of 5.0 l/s will be required. When setting a regime with such a flow rate, the risk of salt water suction both from the top and from the sides sharply increases.*

Therefore, in order to satisfy rural settlements, it is necessary to strictly follow the recommendations for the operation of wells, i.e. do not exceed the selection of underground within 2.0 l/s.

Keywords: *Zarafshan River, experimental filtration works, wells, water consumption, fresh and slightly saline groundwater.*

Introduction

By administrative division, it belongs to the Vabkent, Peshkun and Romitan districts of the Bukhara region.

Large settlements are: the regional centers of Vabkent, Yangibazar, Romitan, as well as the rural settlements of Yangikent, Zandani, Peshku, Afshona, Bogimuso, Kalaycharbag, Khazortut, Sarbiston and Novfach, they are connected by asphalt roads.

The population is mainly represented by Uzbeks. The leading sectors of the economy are agriculture, cattle breeding, gardening, etc.

The vegetation cover is represented mainly by herbaceous species - wormwood, yantak. The industry is concentrated in large settlements and is represented by enterprises for the processing of agricultural products.

Most of the territory of the study area is a gentle undulating plain of the ancient and modern delta of the Zarafshan River with a general gentle slope to the west and southwest with absolute elevations of 200-250m.

The study of the natural historical conditions of Central Asia, including the Bukhara region, began in the first half of the 19th century. These studies were mainly of a route nature and over the course of a century

- episodic in nature. Special hydrogeological studies for the reconstruction of the irrigation network and hydrogeological-reclamation zoning of the irrigated zone of the Bukhara oasis were carried out by MM Reshetkin, SV Luchitsky, AN Vitt,1952-53, and AA Khudoyberdiev, 1957. The last two authors provide data on the lithology of the oasis alluvium, they have compiled a map of the mineralization of the first aquifer from the surface and carried out hydrogeological-reclamation zoning.

In 1958-60. V.P. Semenov carried out prospecting hydrogeological works in the valley of the Zarafshan River in order to find sources of water supply for the city of Bukhara. As a result, the Shakhrud area was proposed, the author's groundwater reserves were estimated in the amount of 742.7 l/s (8.59 thousand m^3/day) and recommendations were given for further research.

In 1960, V.P. Volkov, Yu.V. Kultik, M.M. Malikov performed exploration and experimental work in the northeastern part of the Bukhara oasis and calculated the groundwater reserves in the alluvium of the Zarafshan River for the design assignment of potable water supply to the Gazli gas field.

In 1961, V.P. Volkov and L.P. Podlyavskaya carried out detailed hydrogeological studies with the calculation of the operational reserves of the Shakhrud deposit of fresh groundwater for the purposes of drinking water supply in Bukhara with their approval in the State Reserves Committee under category B - 0.3 m^3/s.

In 1965, G.M. Mzhelskaya and S.Sh. Mirzaev carried out a regional assessment of the predicted operational reserves of groundwater with mineralization up to 1.5 g/l within the Kenimeh-Karmaninsky, Bukhara, Karakul and Kokchinsky deposits. Fig. 1 shows an overview map of the study area.

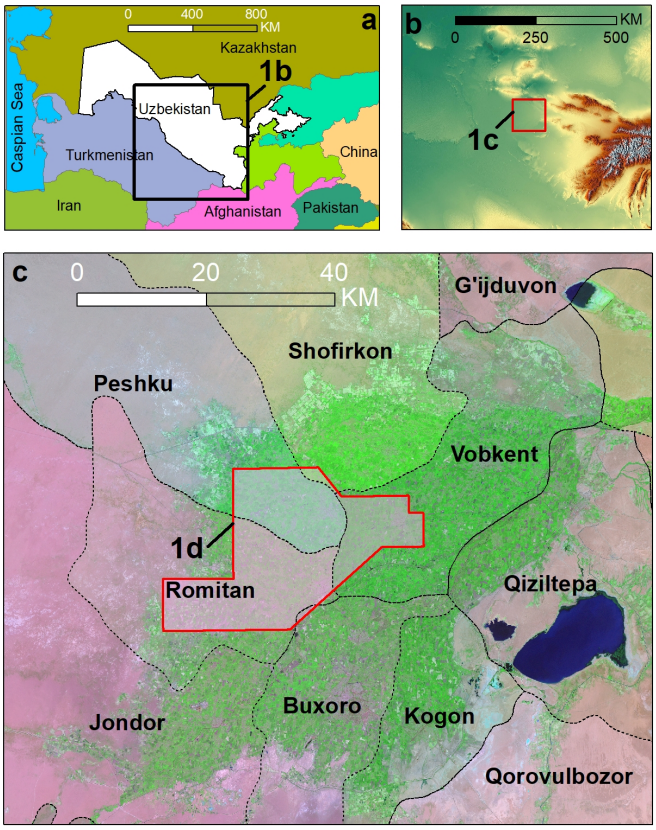

Fig. 1. Survey map of the research area. a) on a continental scale, b) on a regional scale based on a digital elevation model; c)-location of the study area at the local level based on the Landsat satellite image; d) the contour of research.

Since 1966, SARNIGMI has been conducting constant monitoring of the water quality of surface watercourses, in particular, the Zarafshan River in the area of the location of large hydroelectric facilities and in places where collector-drainage waters are discharged, as well as reservoirs. Based on observations, an increase in the mineralization of water in surface streams and reservoirs, as well as pollution of the latter with pesticides and mineral fertilizers, was established.

1968-1971 GM Mzhelskaya completed work on solving the issue of water supply to cities and towns of Bukhara region in "Special conditions".

In the period from 1968 to 1973, I.E. Shtamm carried out prospecting and hydrophysical research in the Bukhara region in order to prepare areas promising for the opening of fresh groundwater, suitable for water supply to settlements.

As a result of the work carried out, maps of iso-thicknesses, hydroisohypsum, mineralization at sections of 20m, 30m were compiled and the full thickness of the Neogene sediments was estimated, promising areas were identified for drilling on water.

The following complex hydrogeological and engineering-geological surveys at a scale of 1: 50,000 were carried out on the territory of the following area of SE "West Uzbekistan GGE" to substantiate reclamation measures:

In 1969-1971. M.B. Utiev (Yakkatut ISP) in the northwestern part of the Bukhara oasis.

In 1970-72. I.V. Vasiev (Romitan ISP) in the central part of the Bukhara oasis, in 1971-75. D.U. Ashirmatov (Shafrikan ISP) in the northwestern part of the Bukhara oasis.

In 1977-80. D.U.Ashirmatov and others (Gishtyn ISP) in the northeastern part of the Bukhara oasis.

As a result of the work carried out, the corresponding maps were drawn up at a scale of 1: 50,000, areas of fresh groundwater were identified, with a depth of study up to 100 m.

In 1978-80. Shutko V. (Dzhilvan State Geological Enterprise) general searches for fresh groundwater for water supply of rural settlements of the Bukhara oasis were carried out. As a result, the areas of Kanimekh, Narpai, Gijduvan, Shafrikan, Dzhilvan, Vabkentdarya and others were identified with a mineralization of groundwater up to 1.5 g/l for water supply to rural settlements. The work was carried out along the large canals of the Bukhara region.

The entire research area is covered by the state hydrogeological survey at a scale of 1: 200,000 - 1973-78. B.R.Ruziev and N.Akhmadkulov (Gizhduvan State State Enterprise).

As a result, conditional hydrogeological maps were compiled at a scale of 1:200000. Recommendations are given on the organization of special hydrogeological works in the identified promising areas.

On the entire area of work, the Bukhara hydrogeological station is carrying out work to study the regime and balance of groundwater, control over their protection from depletion and pollution.

1989-95 T.M.Zinovyeva et al. (Shirinkuduk GGP) carried out detailed searches for fresh and slightly saline waters in the Neogene-Quaternary sediments of the Bukhara and Karakul oases. As a result of the work carried out, a promising site with an area of 540 km^2 was identified with groundwater salinity up to 1.0 g/l and hardness up to 10 mg-eq/l. Balance-operational reserves were calculated for categories C_1 = 8.872 thousand m^3/day, C_2 = 15.047 thousand m^3/day. $C_1 + C_2$ = 23.919 thousand m^3/day. Recommendations for further work are given.

In 1998-2000 II-Shirinkuduk GGP (Zinovyeva T.M.), groundwater exploration of the Upper Pliocene and Quaternary deposits of the northeastern part of the Bukhara field was carried out for water supply to rural

settlements of the Bukhara region. Based on the results of these works on the research area, 3 promising areas were identified and operational reserves were approved in the following categories: A - 648 m³/day, B - 11815.1 m³/day, C_1 - 6344.7 m³/day. Total A + B + C_1 = 18808 m³/day (18.8 thousand m³/day).

In 2004-2008. PB Navruzov et al. (Zhondorskaya GGP) carried out appraisal work and approved the balance operational reserves of fresh and slightly saline groundwater in the Zhondor and Sayat sections, according to the GKZ protocol 367 dated 23.01. 2009 as of 01.01.2009 for household, drinking and technical needs for a period of 15 years in quantity by category (thousand m^3/day): drinking - B - 0.977; C1 - 2.621; B + C1 - 3.598, technical - C2 - 2.341.B 2007-2010yy.

Z.Kh. Kholikov et al. (Shurabad State Geological Enterprise) carried out regional hydrogeological studies to reassess the predicted fresh groundwater resources of the Upper Pliocene deposits of the northern part of the Bukhara and southern parts of the Kokchinsky groundwater deposits in connection with changes in water management conditions and the development of new lands for irrigated agriculture. As a result of the work, promising areas of fresh groundwater were identified and the predicted groundwater resources were calculated in the amount of 500 l/s (43.2 thousand m^3/day).

In 2011-2014. P.B. Navruzov et al. (Vabkent GGP) assessed the reserves of fresh and slightly saline groundwater of the Upper Pliocene sediments for drinking water supply to rural settlements of the Gijduvan and Vabkent districts of the Bukhara region and the border areas of the Kyzyltepa district of the Navoi region. As a result of the work, promising areas of fresh groundwater were identified and the operational reserves of groundwater were calculated in the amount of 154 l/s (13.32 thousand m^3/day).

In 2011-2015. O.Ya. Tolibov et al. (Peshkunskaya GGP) carried out regional hydrogeological studies to reevaluate the predicted fresh groundwater resources in the Upper Pliocene sediments of the western part of the Bukhara field within the Peshkun and Romitan districts due to changes in water conditions and the development of new lands for irrigated agriculture.

Methodology of work.

Within the territory under consideration, two types of relief are distinguished: a structural elevated plain and an alluvial plain.

The first type of relief is located in the southwestern and western parts of the study area and is a slightly undulating plain with a slope towards the alluvial plain. The absolute marks vary within 217-230m and they rise above the surface of the alluvial plain by 3-5m [1].

The second type of relief occupies almost the entire area of the study area.

In the cross section of the alluvial-delta valley, three terraces of the r. Zarafshan, including understand.

The first floodplain terrace is traced in the form of separate outliers along the modern river bed. The surface of the terrace rises 0.5-1.0 m above the water horizon in the river. the width of the terrace reaches 0.3-0.5 km.

The second terrace is traced in separate parts along the floodplain and rises 0.4-1.5 m above the floodplain.

The third terrace borders on the second terrace, a floodplain and rises 2-5 m above the water level in the river. The third terrace has a significant distribution and represents the entire alluvial plain of the study area, with the exception of the areas of the first and second terraces.

The general slope of the plain is observed from northeast to southwest with local slopes towards the river. The absolute marks of the surface range from 220-242m. The surface is flat and mostly occupied by cotton and wheat crops. The area of the terrace is crossed by a dense network of irrigation and drainage

systems, there are various mounds and hills with a height of 3-15m, sometimes up to 20m. General slope (0.0003-0.0004) to the southwest.

The climatic conditions of the work area are typical arid ones, due to the proximity to the Kyzyl Kum desert zone. The climate is sharply continental with large fluctuations in temperature throughout the year and day.

Summers are long, hot, dry; winters are short and relatively cold. Precipitation falls in insignificant amounts. Low air humidity and high volatility are noted. Data on the main climatic factors characterizing the climate are taken from the meteorological station located in Bukhara. The main data of climatic characteristics are given in tables 1, 2.

Average monthly air temperature (^{0}C) according to the data of the meteorological station in Bukhara.

Table 1

Years	Months												Yearly average
	I	**II**	**III**	**IV**	**V**	**VI**	**VII**	**VIII**	**IX**	**X**	**XI**	**XII**	
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
1961	1,5	2,2	8,3	15,8	25,7	26,6	28,7	26,9	19,5	10,6	7,1	4,6	14,8
1962	0,3	6,5	11,5	15,3	21,8	23,6	29,5	24,6	18,9	12,0	2,9	1,4	14,0
1963	4,0	8,1	9,1	18,6	22,3	27,5	28,1	24,6	19,4	14,9	6,4	1,4	15,4
1964	-4,4	2,8	10,2	14,2	21,4	25,9	27,8	24,9	19,3	9,6	6,7	-1,9	13,4
1965	0,2	2,6	8,4	15,8	26,4	28,5	25,0	18,9	18,9	13,3	8,2	3,1	14,1
1966	4,6	7,4	9,5	15,7	28,6	28,6	26,7	20,6	20,6	12,5	4,4	2,3	15,2
1967	0,0	2,2	8,7	15,8	25,9	27,6	25,5	19,9	19,9	12,5	8,9	4,3	14,4
1968	3,4	3,2	10,0	14,6	26,6	27,3	25,7	19,6	19,6	12,8	7,7	1,1	14,8
1969	-8,0	-9,7	6,4	15,0	26,3	27,4	25,1	20,0	20,0	13,6	6,1	5,9	12,4
1970	-2,0	6,1	8,4	18,1	26,0	27,0	26,0	19,9	19,9	14,0	7,2	0,4	14,6
1971	-1,6	3,6	11,3	15,1	26,8	28,1	24,6	20,5	20,5	13,9	10,9	6,6	14,9
1972	-5,7	-6,7	5,3	16,6	26,7	26,6	23,8	20,5	20,5	13,8	8,8	-0,5	-
1973	-3,5	5,8	7,4	17,1	28,0	-	-	-	-	-	-	-	-
1974	-3,0	-1,7	8,1	15,2	23,2	26,7	28,8	24,7	19,6	13,4	8,3	0	13,6
1975	1,7	2,3	9,7	18,0	22,7	27,6	29,6	26,6	21,0	12,6	3,7	2,0	14,8
1976	-4,9	0	6,1	17,1	23,3	27,0	29,2	27,2	20,0	11,5	2,0	-1,3	13,2
1977	-5,4	2,6	12,2	19,6	23,8	29,0	28,4	25,5	21,0	12,0	9,3	2,8	15,1
1978	-5,3	4,0	7,5	18,4	21,6	26,7	28,6	24,3	22,2	14,0	5,3	6,4	14,8
1979	0,3	4,3	8,9	17,4	20,2	26,1	29,5	26,5	21,1	16,2	6,5	5,6	15,2
1980	0,2	0,2	7,6	19,2	23,7	27,8	29,6	25,9	20,8	12,8	10,5	4,5	15,2
1981	4,6	4,5	11,5	15,9	21,8	26,6	29,1	26,5	21,2	10,0	8,7	4,5	15,4
1982	0	2,6	7,8	18,9	23,5	26,5	27,7	25,7	19,7	13,6	3,9	0,5	14,2
1983	2,4	6,0	7,9	18,1	23,6	28,3	21,2	27,7	20,4	10,6	20,1	2,6	15,7
1984	0,2	-3,9	8,4	16,3	22,9	27,7	30,7	28,6	20,1	13,9	8,2	-7,4	13,7
1985	-0,9	6,4	7,0	18,7	22,9	29,0	29,7	25,5	21,0	12,7	6,1	2,6	15,0

Continued table 1

1	2	3	4	5	6	7	8	9	10	11	12	13	14
1986	3,8	5,1	5,0	16,3	23,8	27,3	29,3	26,2	22,0	14,6	6,9	3,8	15,3
1987	4,6	5,3	10,0	14,1	23,2	26,9	28,1	27,6	20,0	10,1	6,4	4,8	15,1
1988	2,1	2,5	9,4	18,6	20,9	29,1	30,1	256,0	20,5	13,3	10,7	6,7	15,8
1989	1,0	1,7	10,3	-	21,1	27,3	29,9	-	19,8	15,30	7,2	5,7	13,93
1990	-0,8	5,0	10,5	15,9	23,7	29,6	28,5	27,3	22,1	13,4	4,9	1,0	15,22
1991	1,0	1,7	10,3	17,6	21,6	27,3	29,9	26,1	19,8	15,3	8,9	4,9	15,4
1992	2,1	2,5	9,4	18,6	20,9	29,1	30,1	25,0	20,5	13,3	10,7	6,7	15,7
1993	2,5	4,3	9,8	18,3	20,6	26,9	28,1	26,0	21,0	12,7	10,1	3,8	15,3
1994	2,4	4,8	9,3	18,4	21,1	27,1	30,1	27,6	20,5	10,1	8,9	4,9	15,4
1995	2,8	5,4	9,1	18,2	23,2	28,1	30,7	27,9	20,8	13,5	10,6	2,0	16,0
1996	0,2	1,6	7,5	15,7	28,8	28,0	29,6	26,4	21,8	13,4	5,9	5,3	15,3
1997	3,4	2,4	9,0	17,9	22,0	29,4	30,1	27,3	21,9	18,3	5,7	3,0	15,8
1998	0,4	2,1	7,8	17,8	22,0	28,1	30,2	28,2	21,9	13,8	9,0	4,3	15,4
1999	2,3	2,3	8,1	15,4	22,4	27,3	28,6	29,0	21,6	16,3	6,4	4,23	15,3
2000	2,7	4,3	9,2	20,8	24,1	27,3	29,4	28,4	21,9	12,4	5,9	4,1	15,8
2001	2,8	4,2	9,4	19,3	23,6	28,1	29,6	28,1	20,8	13,3	4,8	4,1	15,6
2002	2,6	4,6	9,6	18,5	22,5	27,5	29,1	28,6	20,6	14,2	5,7	4,5	15,6
2003	2,9	3,8	8,9	20,7	22,5	28,2	29,3	27,5	21,5	13,8	5,2	4,2	15,7
2004	2,1	3,5	9,4	19,6	23,2	28,8	30,1	28,2	20,8	13,6	6,1	4,4	15,7
2005	0,6	1,4	6,9	15,4	21,4	28,3	28,4	25,9	21,9	18,3	9,0	4,2	15,2
2006	0,2	1,6	7,8	15,3	22,8	27,3	30,7	27,1	18,8	21,0	1,4	2,2	16,9
2007	2,9	5,7	9,0	19,5	23,5	28,5	29,8	27,6	22,2	2,8	8,7	1,9	14,57
2008	-10,8	-0,7	15,2	18,6	24,9	29,2	30,2	28,6	21,0	14,3	7,9	3,7	15,17
2009	2,7	6,5	11,8	13,7	22,9	26,9	29,1	26,9	21,3	14,9	8,0	4,4	15,76
2010	4,3	4,2	11,7	17,7	23,2	28,8	29,7	28,2	21,5	17,1	9,1	3,5	16,58
2011	0,9	2,9	9,6	18,8	24,7	28,8	29,5	28,7	22,1	15,3	4,5	-1,1	15,57
2012	0,2	0,0	8,1	20,7	23,8	28,7	29,9	28,7	21,1	15,5	7,4	0,5	16,78
2013	3,2	5,4	11,1	15,6	23,0	28,6	30,0	27,0	23,5	14,7	9,0	2,1	16,1

Table 2.

The sums of monthly atmospheric precipitation (mm) according to the data of the meteorological station of Bukhara.

Years	Months												Yearly average
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1961	10	7,0	20,0	30,0	3,0	0	0	0	0	0	18,0	28,0	116,0
1962	1,7	15,2	23,4	22,1	11,5	7	0	0	0,2	9,2	8,6	4,9	103,8
1963	2,4	2,3	7,2	2,4	11,3	1,2	0	0	0	8,4	7,3	23,0	65,5
1964	14,3	18,7	32,0	99,2	4,5	48,7	0,1	0	0	0	0,4	8,4	226,3
1965	20,6	10,09	8,3	10,1	5,2	0,0	0,0	0,0	0,0	10,4	18,2	9,4	92,3
1966	6,4	3,8	28,4	21,5	8,1	0,0	0,0	0,0	0,2	3,4	0,6	6,8	73,2
1967	12,0	19,8	39,4	48,2	4,8	0,4	0,0	0,0	0,0	6,4	13,11	14,7	159,3
1968	25,4	11,1	27,6	14,3	3,2	0,0	2,2	0,2	0,0	1,0	21,1	34,7	148,8
1969	21,5	24,4	69,0	41,8	0,0	0,0	0,0	0,0	0,8	14,4	19,8	4,8	196,7
1970	62,9	4,4	13,3	19,3	0,0	0,1	5,9	0,0	0,0	12,8	19,5	13,9	151,9

1971	27,7	12,6	31,7	28,3	3,7	0,0	0,0	0,0	0,0	6,1	5,0	11,2	121,3
1972	31,9	6,0	28,7	9,8	40,7	0,0	3,2	0,0	0,0	4,8	4,8	16,4	147,3
1973	9,0	49,8	52,4	19,5	9,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0	136,3
1974	18,3	16,2	16,5	46,7	9,8	0,5	0	0	0	0	6,4	11,5	125,9
1975	13,1	15,0	28,9	0	0	0	0	0	0	0	12,8	8,4	78,2
1976	13,7	21,1	14,4	23,7	18,7	0	0	0	0	12,6	29,0	14,1	14,73
1977	18,2	22,8	15,9	4,9	1,5	0	0	0	0,3	16,8	24,8	32,8	138,0
1978	8,5	24,9	15,6	16,8	16,3	0	0	0	0	0	28,7	24,7	135,5
1979	31,9	19,6	32,0	8,8	2,7	0	0	0	0	0	0	15,9	110,9
1980	29,1	50,0	37,9	9,9	2,5	0	0	0	0	7,6	2,0	20,5	159,5
1981	26,9	11,8	51,2	33,1	19,7	0,2	0,6	-	0	0,9	8,0	12,4	164,8
1982	53,5	40,3	2,4	-	9,0	5,1	7,5	0	2,1	12,5	24,2	1,1	157,7
1983	13,9	2,3	42,8	32,3	9,3	1,0	0	0	0	0	8,3	14,9	124,8
1984	6,1	15,4	55,2	14,8	13,9	0	0	0	-	4,7	6,0	28,0	143,9
1985	57,1	17,5	13,2	8,2	14,3	0	0	0,7	0	0,9	0	29,7	141,6

Continued table 2

1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
1986	11,9	17,9	12,7	16,2	8,4	-	-	-	6,0	2,9	4,0	55,7	129,7
1987	5,8	5,1	100,6	24,3	0,0	0,0	1,4	-	2,2	3,7	3,2	33,0	149,6
1988	42,9	24,8	65,2	26,4	33,5	-	-	-	0,5	0,2	13,0	38,9	245,4
1989	6,5	2,8	13,3	-	0,4	0,0	0,0	-	0,0	0,9	8,6	37,8	70,3
1990	14,0	16,3	2,8	37,8	1,6	-	-	0,0	-	6,0	16,0	17,7	112,2
1991	8,3	21,6	13,4	16,8	16,1	1,0	-	-	-	-	1,6	4,2	83,0
1992	11,9	18,3	28,1	24,2	22,0	-	-	-	-	0,0	12,1	3,8	116,88
1993	16,3	19,4	19,4	16,0	19,8	-	-	-	-	1,0	2,0	4,3	98,2
1994	14,1	28,6	12,8	18,1	18,1	-	-	-	1,8	1,3	1,8	0,6	97,2
1995	12,2	32,3	8,3	14,4	17,9	0,9	-	-	2,0	1,4	1,2	0,7	91,3
1996	2,7	17,1	17,4	4,5	1,0	-	-	-	2,3	14,3	14,3	0,0	59,9
1997	6,1	14,6	40,2	42,3	60,7	4,5	-	-	-	13,5	13,5	8,1	193,7
1998	34,6	26,1	32,7	35,7	0,9	7,3	0,6	0,3	0,0	0,3	0,3	11,7	150,5
1999	20,2	33,6	8,3	27,7	0,7	-	4,8	2,3	6,7	32,9	32,9	1,9	141,8
2000	22,0	16,2	8,5	2,6	0,0	4,2	-	-	2,0	6,0	6,0	26,4	88,7
2001	19,1	17,4	8,3	2,3	0,6	-	-	-	2,0	6,3	6,3	28,2	87,6
2002	18,5	16,5	13,8	14,5	8,2	3,6	-	-	-	3,9	3,9	5,10	86,5
2003	20,4	22,6	15,7	8,3	5,9	3,10	-	3,2	2,5	14,7	14,7	10,9	106,9
2004	13,8	19,7	17,5	18,4	2,7	1,98	2,0	-	1,8	16,8	16,8	15,4	113,5
2005	11,4	21,8	12,8	14,8	3,6	0,0	0,0	2,0	1,5	0,0	28,2	17,3	113,4
2006	17,1	28,4	18,5	31,1	5,6	0,0	0,0	0,0	1,2	0,0	0,0	21,4	123,3
2007	8,7	21	47,8	12,4	0,7	0,0	0,0	0,0	0,0	0	34	17,7	142,3
2008	7,9	6,8	8,7	20	0,8	0,0	0,0	0,0	0,0	4,6	6,3	2,5	57,6
2009	10,4	45,7	38,4	30,8	24,8	0,0	0,0	0,8	0,3	0,7	7,7	4,7	164,3
2010	3,3	30,4	36,6	20,9	5,8	0,3	0,3	0,0	0,5	1,8	4,5	1,6	97,13
2011	6,8	10,5	6,5	5,7	1,6	2,2	0,0	0,0	0,0	10,7	29,1	14,3	87,39
2012	17,3	35,5	37,7	5,3	0,0	0,0	0,0	0,0	0,0	1,7	9,3	23,1	129,85
2013	28,3	21,9	47,9	9,7	2,1	0,0	0,0	0,7	0,0	10,2	1,2	22,1	144,09

According to the weather station for the period 1961-2014. the average annual air temperature varies from $+12.4^0$ to 16.9^0C. The maximum average monthly air temperatures reach +28.6 $+30.7^0$ C and are observed

in June, July, August. The minimum average monthly air temperatures are in December - January and reach values of + 1.5-3^{0}C and 0.5-10.78^{0}C.

The amount of atmospheric precipitation varies from 57.6 to 245.4 mm / year. Between January and April, precipitation is about 80% of the annual amount. There is usually no precipitation in the summer. It should be noted that during 1961-2014. increased precipitation was observed in 1988. (226.3mm), 1988 (245.4mm) and in the last 3 years - 2013. (144.09 mm) [1].

The hydrogeological conditions of the territory are determined by its geological, geomorphological structure and climatic features of the area.

The described area is confined to the Amudarya artesian basin, where the main distribution is groundwater, confined to the complexes of Cretaceous, Paleogene, Upper Pliocene and Quaternary deposits.

Cretaceous and Paleogene aquifers are not of interest for solving national economic problems. Below is a description of the main studied aquifers and complexes that are common in the study area.

The dynamics of the relative air humidity is directly dependent on the dynamics of precipitation and air temperature. The maximum relative humidity up to 86% is observed in December - January, the minimum in June - July 25-35%.

Insufficient air humidity during dry hot summers causes strong evaporation, which exceeds the amount of precipitation by 10 times. The maximum value of evaporation is observed in June - August and is up to 200 mm.

An important climatic factor is also the winds, which in summer have mainly northern and northeastern points. In winter, their direction is predominantly east. Sometimes the winds reach a significant speed of 15-18 m/s [1-4].

The Zarafshan River is a natural surface watercourse in the studied area. Zarafshan is a river of mixed glacier-snow supply. In the spring, melted snow water and atmospheric precipitation take part in its feeding, later - melting snow in the mountains and wedging out of the drainage runoff within the river valley. Zarafshan. Currently, the Zarafshan River in this area plays the role of a collector. Water from other collectors and drains is discharged into it. Its flow rate varies from 2.5 to 5.5 m3 / s, and its mineralization - from 2.5 to 3.0 g / l [2-3].

Water is supplied to the study area from the Amu-Bukhara canal from the eastern part of the work area through Vabkentdarya and the north-western part by the North-Western branch canal. Water is supplied to the Koza hydroelectric complex and 3 branches are distributed from this hydroelectric complex:

1. Zandani canal, canal length 13.3 km, maximum water discharge 33 m3/s. The waters of this canal completely irrigate 25,500 hectares of land in the Peshkun region. Mineralization of water is 0.9 g/l, total hardness is 9.75 mEq/l.
2. Canal Romitan, canal length 6 km, maximum water discharge 34 m3/s. Irrigation is provided for 25,500 hectares of lands in Romitan region. The salinity of the canal water is 0.9 g/l, and the total hardness is 9.50 meq/l.
3. Hayrabad Canal, total length of the canal is 28.2 km. Provides mainly irrigated lands of Zhondor and part of Romitan districts.

Results and discussion.

On the territory of the Peshkun district, the largest canals are Bogimuso canals with a flow rate of 1.3 m^3/s, Deidaroz - 1.2 m^3/s and Safarabad - 1.0 m^3/s. The highest water discharge through the canals is observed in the winter (leaching time) and summer (irrigation time) months and reaches 24.58 m^3/s along the Zandani canal, 26.62 m^3/s along the Romitan canal and 22.46 along the Hayrabad canal. m^3/s.

The value of the total salinity of water in the canals varies from 0.7 to 1.6 g/l. At the same time, during the growing season with high water flow rates in the canals, water salinity was minimal 0.6-0.8 g/l. At low flow rates, the mineralization of water increases and reaches a value of 1.1-1.6 g/l.

In the study area, the total length of irrigation systems (main and inter-farm canals) is 220.3 km, of which concreted canals are 201 km, and non-concreted ones - 19.3 km. After the 80s of the last century, 9 inter-farm concrete canals with a length of 129 km were built. Within the boundaries of the Bukhara region from the Kharkhur and Koza hydroelectric complex, the salinity of the surface waters of the main canals varies from 0.7 to 1.4 g/l, the hardness from 6.5 to 12.4 meq/l.

In addition, the hydrographic network of the work area is represented by drains and collectors. The largest of them are Abdullakhan, Pirmast, Severny, Saraideicha, Nakib, Chilongu and Central Bukhara (Zarafshan). Water is discharged outside the district. The total discharge of the discharged water is 8.0-9.6 m^3/s, and the average salinity is 3.0-3.2 g/l [2-4].

Conclusion.

As a result of the work carried out, the predicted resources of fresh and slightly saline groundwater of the Upper Pliocene aquifer were calculated in the amount of 8.98 thousand m3 / day. According to the results of the work on an area of 232 km2, fresh and slightly saline groundwater were identified, including fresh and 142 km2 - slightly saline groundwater on an area of 90 km^2.

The thickness of the aquifer in areas with mineralization up to 1.5 g/l is 35m on average. Natural reserves in this area are estimated at 350 million m3.

With a withdrawal of 8.98 thousand m^3/day after 104 days, the regional natural lowering of the groundwater level within the Bukhara field will be 8.0 m, and directly in the wells - 13.0 m, only 21.0 m. At the same time, the level water will be within 5-8 m above the top of the aquifer. The time for pulling up salt water at the maximum design water withdrawal (8.98 thousand m^3/day) will be 13 years. The calculation was carried out under harsh conditions.

On the entire research area, work is being carried out to study the regime and balance of groundwater, control over their protection from depletion and pollution as part of the Bukhara GGS.

In recent years, intensive work on agricultural land development has begun in the study area. In this regard, there is a significant change in the hydrogeological-reclamation state and hydrochemical conditions of the area of the projected research.

Despite the rather large volume of geological, hydrogeological and geophysical works performed, there were clearly not enough materials to select sites and organize potable water supply to rural settlements from groundwater.

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