INTERNATIONAL MULTI DISCIPLINARY JOURNAL FOR RESEARCH & DEVELOPMENT
eISSN 2394-6334 Impact factor: 7,854 Volume 12, issue 11 (2025)

ENHANCING GIS-BASED TECHNIQUES FOR EVALUATING IRRIGATED LAND CONDITIONS

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Anotatsiya: So'ngi yillarda respublikamizda ekologik vaziyatning yildan yilga yomonlashishi tufayli tabiiy sug'oriladigan qishloq xo'jaligi yerlarida o'zgarishlar sezilarli darajada o'zgarishlar kuzatilmoqda. Sug'oriladiga yerlarga noto'g'ri agrotexnik ishlarini qo'llash oqibatida degredatsiyaga uchramoqda. Ushbu maqolada tuproq mexanik tarkibi, sizot suvlar sathi, tuproq sho'rlanishi, harorat tahlillar va prognozlash usullari ko'rib chiqiladi.
Kalit so'zlar: Tuproq sho'rlanishi, sizot suvlar sathi, tuproq mexanik tarkibi, harorat.
Abstract: In recent years, there are significant changes in natural irrigated agricultural land due to the deterioration of the environmental situation in our republic from year to year. It is being degraded by the use of improper agrotechnical work on irrigated land. This article will consider the mechanical composition of the soil, the level of sewage waters, soil salinity, temperature analyzes and forecasting methods.
Keywords: Soil salinity, sewage water levels, soil mechanical composition, temperature.

Introduction

At the video conference held on August 6, 2020, with the World Bank, the President of the Republic of Uzbekistan outlined tasks for the implementation of the "Agricultural Modernization" project, focusing on the effective use of investments allocated to the agricultural sector and the development of high-impact projects. The designated tasks prioritized advancing science, introducing advanced equipment, and implementing modern technologies in project development. Ensuring the timely and high-quality execution of these tasks aims to optimize the use of investments in agriculture and direct capital effectively. In this regard, the role of the agricultural geodatabase and a comprehensive digital map of agriculture is considered significant for project implementation. According to the Resolution of the Cabinet of Ministers of the Republic of Uzbekistan dated October 30, 2023, No. 578, "On Approving the Regulation on the Procedure for Maintaining the National Report on the State of Land Resources", the Ministry of Agriculture was tasked with ensuring the inclusion of data on the quantity, quality, and valuation of lands designated for agriculture in the "Land Report" AIS (an automated information system for generating and maintaining land-related data). This section of the research work serves to support the implementation of these tasks. The research primarily focused on assessing the quality of agricultural lands in the Bukhara region, taking into account soil fertility, salinity levels, groundwater, air temperature, infrastructure placement, and water availability for irrigation, with efforts directed toward creating maps to evaluate land quality.

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Methodology

The need to create an assessment map of agricultural lands in the geodatabase arises from identifying, monitoring, and implementing designated measures. Therefore, in developing an assessment map for irrigated agricultural croplands, digitizing the groundwater level, temperature indicators, soil mechanical composition, and soil salinity levels of the study area through a geographic information system is considered one of the priority tasks of the research work.

Analysis and results

The provided text discusses the creation of an assessment map for irrigated agricultural lands in the Bukhara region, emphasizing the importance of terrain, climate, groundwater levels, and soil mechanical composition. It mentions that geospatial analyses were conducted based on thematic layers in the Bukhara region's geodatabase, as outlined in Section 2.3 of the research. These analyses considered indicators such as soil, climate, terrain, groundwater, and soil salinity to develop a comprehensive quality assessment map for agricultural lands. The text also references a table (Table 1.1.1) regarding the mechanical composition of soils in the Bukhara region, measured in hectares

	District	light	medium	heavy
1	Bukhara city	975,6888	0	894,31
2	Bukhara district	10159,18	2681,116	9801,70
3	Gijdivon	9201,593	7038,756	4200,65
4	Jondor	15587,53	8316,875	4251,59
5	Kogon	11053,25	1644,322	4471,43
6	Olot	9662,866	4060,61	3495,52
7	Peshku	9881,455	7923,55	997,994
8	Qorako‘l	10212,12	8230,323	1150,56
9	Qorovulbozor	0	13227,6	2169,40
10	Ramiton	8764,911	3515,903	10721,19
11	Shofirkon	4306,415	17197,28	1652,30
12	Vobkent	6603,121	4059,56	10003,3
	Total:	**96408,12**	**77895,9**	**53809,98**

Information on temperature indicators of Bukhara region
(Table 1.1.2). (hectare, ha)

	District	15^0 S	16^0 S	17^0 S
1	Bukhara city	0	1870	0
2	Bukhara district	2351,446	20290,55	0
3	Gijdivon	20441	0	0
4	Jondor	0	28156	0
5	Kogon	1863,655	15305,35	0
6	Olot	0	8535,417	8683,583
7	Peshku	18803	0	0
8	Qorako‘l	0	19412,27	180,7269
9	Qorovulbozor	829,1688	14567,83	0
10	Ramiton	13839,96	9162,036	0
11	Shofirkon	23156	0	0
12	Vobkent	20616,79	49,20598	0
	Total:	**101901**	**117348,7**	**8864,31**

Information on the level of groundwater in Bukhara region
(Table 1.1.3). (hectares, ha)

	District	0-1.5	1.5-2.5	2.5<
1	Bukhara city	0,786197	1269,4	599,8143
2	Bukhara district	56,06372	15008,34	7577,601
3	Gijdivon	483,4773	10714,89	9242,63
4	Jondor	1716,693	24728,51	1710,795
5	Kogon	122,6968	16205,72	840,5826
6	Olot	3585,167	13431,7	202,1355
7	Peshku	17,19103	4390,721	14395,09
8	Qorako‘l	1409,852	10765,11	7418,039
9	Qorovulbozor	443,3239	762,9282	14190,75
10	Ramiton	189,1218	16981,88	5830,998
11	Shofirkon	406,9195	14351,42	8397,658
12	Vobkent	573,9382	8146,292	11945,77
	Total:	**9005,231**	**136756,9**	**82351,86**

Information on soil salinity in Bukhara region

(Table 1.1.4). (hectares, ha)

	District	Salted	Low salted	Medium salted	High salted
1	Bukhara city	6,481014	1841,589	21,93048	0
2	Bukhara district	79,79827	18583,46	3978,743	0
3	Gijdivon	691,4753	17357,27	2270,953	121,2969
4	Jondor	2,614707	17135,5	10812,49	205,391
5	Kogon	225,7286	12467,34	4475,926	0
6	Olot	468,6216	14720,24	2030,139	0
7	Peshku	393,7543	16067	2170,343	171,8986
8	Qorako‘l	872,9019	16596,9	2123,199	0
9	Qorovulbozor	3244,314	9000,721	3151,965	0
10	Ramiton	257,2765	18215,9	4432,234	96,5926
11	Shofirkon	0	17983,21	5027,441	145,3499
12	Vobkent	1535,189	15362,48	3768,332	0
	Total:	**7778,155**	**175331,6**	**44263,69**	**740,529**

Based on these criteria, irrigated lands in the Bukhara region were divided into classes by qualitative classification.

	Criteria	Classes				Note
		A-1	A-2	A-3	A-4	

1	Salinity	I	II	III	IV	I- not saline II- low saline III- medium saline IV- highly saline
2	Sewage water level	III	II	IV	I	I- up to 0-1.5 meters II- up to 1.5-2.5 meters III- up to 2.5-3.5 meters IV- above 3.5 meters
3	Distance from irrigation networks	I	II	III	IV	I- 0-1000 II- 1000-5000 III- 5000-10000 IV- 10000-30000
4	Distance from district centers	I-II	III-IV	V	VI-VII	I- 0-500 II- 500-1500 III- 1500-3000 IV- 3000-5000 V- 5000-10000 VI- 10000-20000 VII- 20000-30000
5	Temperature indicators	II	III	IV	I	I – temperature 13-14 C II – temperature 15-16C III – temperature 16-17 IV – temperature 17<

A-1 is the status given to lands with the highest quality indicators.
A-2 is the status given to lands with high potential and quality indicators.
A-3 is the status given to lands with medium potential and quality indicators.
A-4 is the status given to lands with low potential and quality indicators.

Conclusion

The analysis showed that in the process of spatial analysis, the mechanical composition of soils in relation to irrigated agricultural lands in the Bukhara region was classified according to light, medium and heavy mechanical composition. It was determined that, out of the total irrigated agricultural lands of 228,113 thousand ha of Bukhara region, soils with light mechanical composition account for 42.26% (96,408.12 ha), soils with medium mechanical composition account for 34.15% (77,895.9 ha), and soils with heavy mechanical composition account for 23.59% (53,810.0 ha). As for climatic indicators, it was determined that in the Bukhara region, the areas with an average annual temperature of 150 ° C account for 44.67% (101,901 ha), the areas with an average annual temperature of 160 ° C account for 51.44% (117,349 ha), and the areas with an average annual temperature of 170 ° C account for 3.88% (8,864.31 ha). The areas with a groundwater level of 0-1.5 meters account for 3.95% (9,005.23 ha), 1.5-2.5 meters account for 59.95% (136,757 ha), and the areas with a level of more than 2.5 meters account for 36.1% (82,351.9 ha). According to the degree of soil salinity, the research revealed that non-saline lands account for 3.40% (7,778.16 ha), slightly saline lands account for 76.86% (175,332

ha), moderately saline lands account for 19.40% (44,263.7 ha), and highly saline lands account for 0.32% (740.5 ha).

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