

REGISTER OF RESEARCH ON IRRIGATION AND DRAINAGE

QUESTIONNAIRE

A	Project title: Investigation of reclamation processes and crops yield for long period on large irrigation scheme of Syrdarya province.
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B	Topic n° : 2	Sub-topic n°: 0.2
1)	1	Technical field n° 2
2)	Category n°: 02	

C	Project location		
	Country: Republic of Uzbekistan	Area:403.52 th. ha	
	Syrdarya province		

D	Duration of the project:		
	Year in which the project was started: 1986	Project completed: 1996	
		Dates of Expertise: 1989	

E	Organizations and technical staff involved			
1	Supervisor/project coordinator: N. Gaipnazarov			%
	Organization: SANIIRI			Staff resources 60
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	Other counterparts:	Organizations	Surname	First name
1	Ikramov Rakhimjan, SANIIRI			40 %
2				%
3				%
4				%
	Other collaborators:		man-years	

F	Funding agencies	
	Full name or acronym	Percentage of project finance provided
1	Ministry for Land Reclamation and Water Management	100%
2		%
3		%

G	<p>Summary of research project</p> <p><i>1 Objective and technical fields:</i> Analysis of reclamation process dynamics and tendency. Assessment of water reclamation and agrotechnical factors influence on crops yield.</p> <p><i>2 Scientific and technical approaches:</i> Search for reasons of irrigated land and water productivity decrease by means of crops' yield changes analysis. Investigation's meaning: definition of main reasons for irrigated land and water productivity decrease by means of systems analysis. Development of recommendations on land and water productivity increase.</p> <p><i>3 Environment characteristics:</i> Climate is continental. Average annual temperature is 12.9 -14.9 ° C. Duration of positive temperatures period is 4300 -4400 ° C. Annual precipitation is 300 -340 mm. Evaporativity is 1090 -1150 mm. Relative air humidity is 50 -65 %, in summer - 30 35 %. Geomorphology: two zones are singled out: alluvial plain in north -east and proluvial -alluvial on the rest of area. Surface altitude is 250 -300 m. Relief is slightly corrugated. Slope is 0.0001 -0.0003. Groundwater level is 1.5 -4 m. Loam permeability coefficient is 0.1 - 0.6 m/day, sandy loam - 0.4 -1.0 m/day, sand - 2.5 -20 m/day. Groundwater salinity varies widely from 1 -3 g/l (Syrdarya 1-st -2-nd bottoms), 3 -5 g/l (Shuruzyak, Bayaut schemes) to 5 -20 g/l (Djetisay, Sardoba sinks). Salinity type is sulphate -chloride and chloride -sulphate. Groundwater inflow within 3-rd SyrDarya bottom is 0.013 l/sec/ha. Within 1-st -2-nd bottoms artesian water inflow is 0.011 l/sec/ha, drainage by the river 0.0139 l/sec/ha, difference is 0.003 l/sec/ha. Within 1-st -2-nd bottoms outside of artesian water spreading underground inflow is 0.0008 l/sec/ha, drainage by the river 0.05 l/sec/ha, difference is 0.049 l/sec/ha. Soils: grey-medow, slightly and middle salinized. Lithology within proluvial plains: loam with clay stratum (35 m), permeability coefficient is 0.1 -0.3 m. Groundwater inflow and outflow difference is +0.0025 l/sec/ha, salinity is 5 -25 g/l. Soils are grey, slightly, middle and strongly salinized.</p> <p><i>4. Parameters of Pilot Projects and Technical Solutions:</i> Within old irrigated zone (Shuruzyak, Sardoba, Bayaut and Poimenny) irrigated lands reclamation was performed by vertical drainage system (VDS). It was expected to construct: on Shuruzyak scheme -212 wells with total discharge 13 cu.m/sec; on Sardoba scheme - 151 wells with discharge 6.7 cu.m/sec; on Bayaut scheme -89 wells with discharge 5.1 cu.m/sec. Actually 306,184,109 wells respectively were constructed. Discharge is accordingly: 12.1; 4.2; 3.0 cu.m/sec. Collector -drainage network density on Shuruzyak scheme is 26.1 m/ha; on Sardoba scheme - 42.3 m/ha; on Bayaut scheme -21.4 m/ha; on Poimenny scheme -27.4 m/ha. Irrigation network mainly is earthen (78 82 %). Inter -farm network efficiency is 0.94 -0.96; on -farm network -0/70 -0.73. Within lands of new development drainage is open horizontal. Network density is 57.5 -94.4 m/ha. Irrigation network is lined on 80 -100 %. Inter -farm network efficiency is 0.90 -0.98, on -farm network -0.83 -0.86.</p> <p><i>5 Methodology:</i> Analysis of reclamation processes dynamics within long -term period with regard to drainability, water supply, leaching, drainage and irrigation network operation regime; use of water -salt balance for Shurusyak, Sardoba, Bayaut, Poimenny, Central South East -1, South East -2, Farhad, Djizak schemes.</p>
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6. Results:

After drainage system development two stage can be singled out in reclamation process dynamics:

I. After drainage development and its operation with efficiency 0.55-0.65 and leaching regime possibility was achieved;

- to regulate groundwater level within 2.5 -3.0 m;
- to regulate drainability within 3000 -5000 cu.m/ha;
- to carry out winter -spring leaching by rate of 2500 -4000 cu.m/ha'
- to change irrigation norms from 5000 to 8200 cu.m/ha

Under these conditions unsaturated zone desalinization with annual salt stock decrease on 4 -18 t/ha; occurred groundwater overflow from cover loam to lower aquifer changed from 1.0 to 4.5 th.cu.m/ha (Shuruzyak and Bayaut), from 1.5 - 2.4 th.cu.m/ha (Sardoba). Groundwater salinity decreased from 6.7 to 2.76 g/l (Shuruzyak), from 11.66 to 4.81 g/l (Sardoba). Non -salinized and slightly salinized land constituted by 1988 83 % (Shuruzyak), 53.8 % (Sardoba), 81.1 % (Bayaut), 89 % (Poimenny).

II. 1988 -1996: stage is characterized by:

- VDS efficiency decrease;
- specific yields decrease on 33 -79 %;
- average well discharge decrease to 22 -37 l/sec;
- drainability decrease to 2000 -2500 cu.m/ha;
- water supply decrease (K =0.89 -0.90), annual water duty 4400 -7500 cu.m/ha was against 7500 - 12800 cu.m/ha in 1970 -1983;
- winter -spring leaching rate decrease to 1200 -1900 cu/m/ha against 2500 -4600 cu/m/ha;
- groundwater salinity growth from 2.76 to 3.27 g/l on Shuruzyak sceme; from 4.81 to 5.22 g/l on Sardoba scheme.

Under these conditions soil salinization restoration is observed. Since 1992 salinization has been strengthened due to groundwater level rise and salt influx.

Water-salt balance was positive -salt accumulated within root zone to 33 -36 t/ha (Shuruzyak), 24 -59 t/ha (Sardoba), 38 - 61 t/ha (Bayaut), 25 -29 t/ha (Poimenny). Within the new developed zone to 1980 - 1985 under groundwater level rise from 10 -15 to 2.5 - 3.0 m soil salinization restored. Then soil desalinization started and by 1990 areas of non-salinized and slightly salinized lands increased to 36.5 -72 %.

1991 -1996 period is characterized by:

- land drainability decrease to 1000 -1500 cu.m/ha against 2000 -2500 cu/m/ha;
- drainage system degradation: 33 -50 % open and 17 -37 % close drainage network requires repair. Drainage system efficiency was: 0.13 -0.22 (Central scheme), 0.38 - 0.47 (Farhad scheme), 0.26 -0.27 (Djizak scheme);
- water duty decrease, K = 0.54 -0.89, specific water duty in field is 3800 -6600 cu.m/ha against 7100 -9000 cu.m/ha;
- winter -spring leaching rate decrease (750 -1600 against 2800 -3300 cu.m/ha).

Water -salt balance became positive. Salts accumulated in root zone in amount of 29 -33 t/ha (Central), 19 t/ha (SEM-1), 23 -30 (SEM-2), 25 (Farhad), 22 t/ha per year (Djizak). On the base of systems analysis of cotton yield relations with water duty (X_1), soil salinization (X_2), fertilizers insertion dose (X_3) an equation was obtained:

$$Y = 1.1 X_1 - 1.1 X_2 + 6.8 X_3$$

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H Suggested key-words			
1	Reclamation process	4	Water -salt balance
2	Water supply	5	Yield
3	Land drainability	6	

I Most recent publications (maximum 3)			
1	Author(s): N. Gaipnazarov		
	Title: Reclamation processes dynamics within Shuruzyak scheme of Golodhaya Steppe		
	Publication details: Analysis of reclamation processes dynamics. Water supply -drainability -ground water level interrelations are studied. Cause of land secondary salinization is determined. Relation between reclamation processes dynamics and cotton yield is established.		
	Year of publication: 1997	free access <input checked="" type="checkbox"/>	restricted <input type="checkbox"/>
2	Author(s):		
	Title:		
	Publication details:		
	Year of publication:	free access <input type="checkbox"/>	restricted <input type="checkbox"/>
3	Author(s):		
	Title:		