Evaluation Of Rehabilitation / Construction Of Irrigation Projects In West Of Sulaimani City

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Abstract:

This study was conducted to assess agricultural and irrigation projects in some locations of Sulaimani governorate were abandoned and the expulsion of its inhabitants because of political circumstances and brought them together in other areas. After the collapse of the Baath regime in Iraq and formation of parliamentary system of rule, led to the return of these families to their fields and that the humanitarian organizations and international collaborators in the re-rehabilitation of irrigation projects and construction, In this study, 13 irrigation projects were selected and questionnaires have been distributed to the peasants, and also visited the departments of agricultural to obtain information about the reality of agricultural production.

The results showed, that the channels repaired by concrete led to minimization of evaporation and leakage of them have increased the quantity of irrigation water and for this reason the level of living of farmers was raised in terms of increased agricultural production. With regard to the size of the channels, the results showed that the size of channels was not enough to fulfill the amount of rainfall. Also most of the farmers were dependent on the cultivation of crops with a high value in the market. The results also showed that the lack of irrigation water in some projects was due to the lack of distribution channels and structures in some areas.

Key words: irrigation projects, Evaluation, Rehabilitation.

Introduction:

Water is the lifeblood for the people of Kurdistan, not just for living but also for the economy. The economy has traditionally been dominated by agriculture, which now accounts for over half the Gross Domestic Product and employs 66% of Kurdistan's working power. Decades of war have destroyed much of Kurdistan's irrigation project and other water supply systems, which are vital for the agricultural economy. The study covers an evaluation of irrigation projects renewed from years 2000 – 2004 in some locations of Sulaimani Governorate. FAO Mission visited Kurdistan regional government-Iraq from 2000 to 2005. The objective of the mission was to assess the current food supply and nutrition situation in the country, particularly after some consecutive years of drought, and to contribute to the rehabilitation and construction of irrigation projects As a result of the people return to their original areas which were the source of their income and livelihood. Water availability is generally the most important natural factor limiting the spread and development of agriculture in arid and semi-arid regions. Sulaimani is located in a semi-arid region and there are large areas which are not irrigated due to lack of irrigation water and loss of irrigation water by the channels to

convey irrigation water from the sources to the field for this reason channels must be checked and evaluate water convey efficiency to decrease water loss in the channels. Irrigated agriculture will face significant challenges in the future. Water use efficiency (WUE) of the crop, which is defined as a productivity term-output of crop per unit of water [1]. Most of the increased food production in the world will depend on irrigation and (WUE) [2]. In all agricultural systems, Low (WUE) can occur when soil evaporation is high in relation to crop evapotranspiration, early growth rate is slow, and water application does not correspond to crop demand and when shallow roots are unable to utilize deep water in the profile [3].The purpose is to know how much the farmers have got benefit from those schemes and their effect on the agricultural production and livelihood status of the beneficiaries. The comparison was made for these projects before and after rehabilitation, and their effects on agricultural yield and socio-economic.

Materials and methods:

The choices of schemes were done by assessing some irrigation projects in Dukan district, Sulaimani Governorate which included all mini, medium and maxi projects in the Governorate. For this purpose, many lists were prepared and questionnaires were answered about 13 sample were covered of schemes rehabilitated and constructed in the regions. The whole data and information was collected in this study which related to this assessment from reports on these projects, beneficial villages. This assessment comprises the following subjects:

1- Irrigated area against stated irrigation area.
2- Water availability quantity and quality.
3- Water use efficiency.
4- Reduction of water waste.
5- Methods of irrigation

Table 1: Selected irrigation schemes for assessment.

Type Project	S.N	Project name	District	Sub- District
Small	1	Kani Maran	Rania	Chwar Qurna
	2	Qishlagh 1st stage	Sharbazer	Chwarta
Medium	3	Hayasee	Sulaimani center	Bazian
	4	Seedan	Dukan	Surdash
	5	Whomizar	Sul-center	Bazian
	6	Chalakh	Dukan	Surdash
	7	Tynal	Sul-center	Bazian
	8	Kewra Kani	Rania	Center
	9	Qulay Rania	Rania	Center
Large	10	Alawa-Ist stage	pishder	Center
	11	Alawa-Ist seconed	pishder	Center
	12	Kani shok	Dukan	Surdash
	13	Sangasar	pishder	Sangasar

Results and Discussion:

In Pishder reservoir, in the most year's water was sufficient to irrigate a large area of agricultural lands by rainfall and snow in the area where rainfall ranges between 450 and 750 mm /year. Both animal and plant production were sufficient for local consumption and apart of the production was exported to the other regions.

However, in year 2012 the lands suffered from the lack of water because of the decrease in rainfall and hence low water resource, the most irrigation areas decreased because of the quantity of water was not sufficient to irrigate all agricultural lands.

One of the limiting factors for crop production is water discharge which is not enough for farm irrigation hence lining of irrigation channel is needed to ensure the water sufficiency for irrigating the whole irrigated areas in these agricultural projects.

Area Effectively Irrigated Against Stated Area:

Table (2) shows 13 schemes for assessing the irrigation status of different agricultural projects in Sulaimaniya governorate, the actually irrigated versus the total agricultural lands (irrigated and non- irrigated areas).

The percentage of actually irrigated area to total agricultural area, the table mentioned some of the farmer migrate their irrigated lands in some projects such as Seedan, Whormiziar, Chalakh, Hayasee and Qishlagh in which water was not sufficient to irrigate a large area of agricultural lands. Some of irrigated area is suffering from limited water for irrigation during some periods through the irrigation season (summer) so some farmers attend to give the crop an additional irrigation even if the crop didn't need it at that time and that's for maximizing the stored water in the soil [4]. Also Table (2) indicates some villages were not benefit from the implement of the project as the result of the lack of water because of the remain of their lands under the non lining cannels.

Table 2. Shows irrigation area against stated area.

S.N	Project Name	Location		stated irrigation Areas(Ha)	Actual irrigation Areas(Ha)	%Actual irrigation Areas(Ha)	Area Non Irrigation (Ha)
		District	Sub-District				
		Small Schemes					
1	Kani maran	Rania	Chwar Qurna	750	612.5	81.7	137.5
2	Qislagh	sharbazher	Chwarta	250	186	74.4	64.0
		Medium Schemes					
3	Seedan	Dukan	Surdash	62.5	17.5	28.0	45.0
4	Chalakh	Dukan	Surdash	475	320	67.4	155
5	Hayasee	Sulaimani center	Bazian	175	115	65.7	60.0
6	Whomizar	Sul-center	Bazian	200	150	75.0	50.0
7	Tynal	Sul-center	Bazian	300	230	76.7	70.0
8	Kewra Kani	Rania	Center	50.0	45.0	90.0	5.0
9	Qulay Rania	Rania	Center	1000	780	78.0	220
		Large Schemes					
10	Alawa-Ist stage	pishder	Center	387.5	387.5	100	Nil
11	Alawa-2nd stage	pishder	Center	412.5	295	17.5	117.5
12	Sangasar	pishsar	Sangasar	2000	300	15.0	1700
13	Kani shok	Dukan	Surdash	100.0	100	100	Nil

Availability of water Resource (quantity):

In these locations, irrigation system was used in form of earth channels. The most villagers and farmers failed to depend on irrigation only, because of high losses of water according to runoff and infiltration. Intensive canal of irrigation is becoming a major cornerstone for agricultural activities [5].After construction some of the channels and the renewal of the old ones like Sangasar (Pishdar district) through cement lining of all channels it caused increasing of water stream from minimum rates to a maximum rates. The importance of the irrigation projects rehabilitation can be shown through the following benefits:

A-Irrigation areas increased due to greater availability of water through the lining channels (increase in water use efficiency).

B- Decreasing water seepage from the side and bed channels results an increase in water quantity for planting.

C- Reduction water losses in earth channels by an average of 30%.

D- Decreasing of channel erosion and maintenance cost.

Increasing irrigation water by project rehabilitation enhanced farmers to irrigate the whole agricultural lands which in turns the following benefits:

A-Assisted farmers to plant more of agricultural lands resulting increase in production and total income for farmers.

B- Helps farmers to get benefit from their lands of the project.

Through the visits of villages and agricultural land around projects, it was noticed that apart of agricultural lands were not cultivated in spite of increasing water project.

Tables (3) shows the actual quantity of available irrigation water and project discharge for all schemes covered by the assessment; it is mentioned that the actual water availability is less than the design discharge for some schemes like Kani-maran, Gislagh, Alawa 1st and 2nd stage, Sangasar, Whomizar and Kewra Kani. The area of these schemes was subjected to drought effect leading to decrease the irrigated agricultural lands.

Table 3: water Availability

Type of Schemes	S.N	Project Name	Actual water Availability for the project(L/s)	Project Design Discharge (L/s)
Small Schemes	1	Kani maran	180	360
	2	Qislagh	120	135
Medium Schemes	3	Seedan	240	480
	4	Chalakh	315	280
	5	Hayasee	63	37
	6	Whomizar	50	480
	7	Tynal	33.2	43
	8	Kewra Kani	24.0	60
	9	Qulay Rania	480	150
Large Schemes	10	Alawa-Ist stage	180	480
	11	Alawa-2nd stage	265	424
	12	Sangasar	693	6280
	13	Kani shok	210	430

Changing in Crop systems:

To evaluate an agricultural or irrigation project one has to know the cropping patterns used in this project. In places where farmers or production have to pay for irrigation water, it is important for them to consider that vegetables consume more water than other crops [6].

In the years, before the farmers did not used the agricultural cycle because climatic were not suitable for planting in the winter.

From the study of the field, it is observed that most of farmers were depending on cultivating high market value crops and cultivated permanent crops because most of the people immigrated to cities.

Before the implementation 1986 law, the cropping systems used was Tobacco, Rice and Sunflower because the high prices were (20, 16, and 10 ID /kg) respectively, Rice and Sunflower were planted in the most areas such as Taynal and Qully- Rania project.

Table (4) shows the changes in cropping system after 1986 in all study areas.

As well as the areas of these crops for all projects, the farmers are depending on the permanent agricultural crops more than the other crops and the table it's mentioned that the cultivated area for some project after the implementation is less than it was previously, such as kani maran, Taynal, Alawa-Ist stage and Sangasar because the cultivation suffered lack of water that observed through the study

Table 4: Type of crops and the change in cropping patterns

S.N	Project	Cultivated crops before project implementation Area (ha)					Cultivated crops after project implementation Area (ha)				
		Rice	Fruit trees	Summer Crops	Populs Alba	Total	Rice	Fruit trees	Summer Crops	Populs Alba	Total
1	Kanimaran	405	-	150	-	154.5	-	-	147.62	-	147.62
2	Qislagh	-	65	43.5	-	78.5	-	39.5	27.5	-	67
3	Seedan	4.5	22.5	18	8	73	37.5	-	20	14	71.5
4	Chalakh	94.5	5	130	24	237.5	74.87	-	153.75	2.5	230.62
5	Hayasee	8.55	6.5	17.5	28	55.5	-	6.5	16	10	32.5
6	Whomizar	10	-	8.5	10	47.5	7.5	4.5	10.5	2.5	25
7	Tynal	25	12	82	1.5	109.5	-	-	21	1.25	22.75
8	Kewra Kani	-	2.5	20	3.5	26	-	-	18	-	18
9	Qulay Rania	70	-	487	-	600	30	8.5	352.5	20	411
10	Alawa-Ist stage	-	28	21	15	188					
11	Alawa-2nd stage	-	35	-	132		-	32.5	76	25	133.5
12	Sangasar	23	12	404	55		7.5	21.5	312	50.5	391
13	Kani shok	-	31	20.24	118	169	-	24.5	55.5	50	130

Field water efficiency:

Figure (1) shows the percentage of field water efficiency and available water for project (L/s).

For the determination of amount of water requirement for crops in a certain irrigation project crop consumptive use or evapotranspiration (ET) must be known. Water requirement includes not only ET but also all possible water losses.

However the drought in some project areas were renewed and showed that water was sufficient to irrigate the most available land using old method of irrigation in some project Qishlagh and Sangasar project has caused water deficiency in those areas so that not all agricultural lands could be irrigated.

In all agricultural systems, low water use efficiency can occur when soil evaporation is high in relation to crop evapotranspiration, this is related to the fact that water application does not correspond to crops demand in those areas [7],[8].

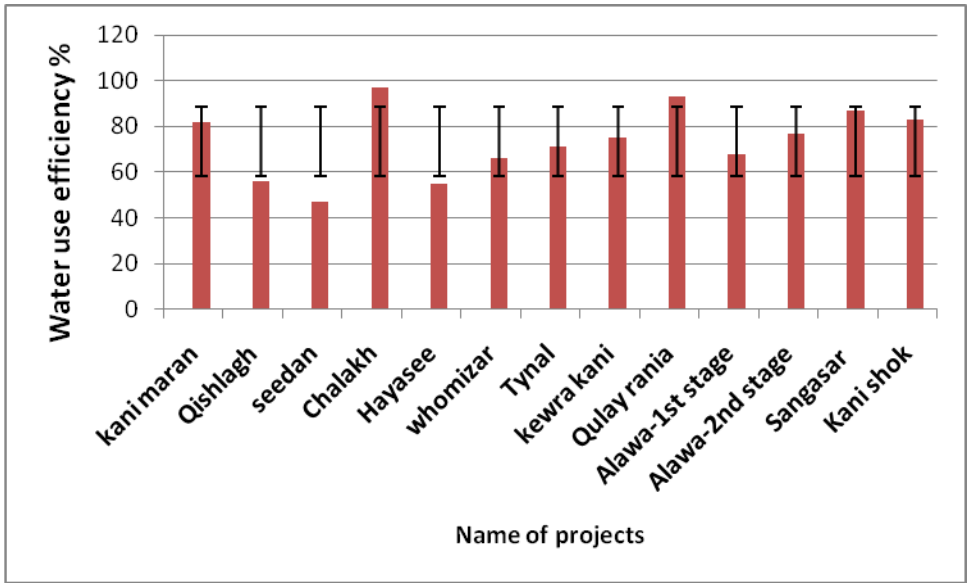

Fig. 1 Field water efficiency

Reducing Water Losses:

Water control and diversion structures are necessary to give and effective control of irrigation water on the farm. Good control will reduce the labor required to irrigate and reduce erosion and water loss.

In addition to the lining channel in all projects, there is some water lost due to the unawareness of farmers towards the use of available water and water crop requirement. This case causes a loss of water in the project.

Removing and breaking of irrigation structures like Gates, Orifice and Weirs by some farmers caused to an increase in water losses by leakage throughout the gates. Also some Gates were not properly installed, this also increase water loss.

Irrigation Method:

Surface flood irrigation method is the only way used to irrigate crops in all projects of this study. Some water springs are located in some of these projects and their water is directed to go through irrigation channels for irrigation

crops. Some other ways to obtain water are from the near rivers through irrigation canals using some irrigation structures such as weirs so that raising the water level from the sources to the level of the channels and causing diversion to the agricultural lands.

The farmers used furrow irrigation method to irrigate their crops with no efficient rate of water for their crops need to increase production and to remove the losses of water in the farm, and they needed to increase their knowledge about irrigation process.

Beneficiaries

Through the field study, it was noted that a large number of Beneficiaries are not remained in the villages or in the project lands and the reasons can be related to the land abandonment due to farmers leaving their lands and obtained a limit income during harvesting their crops or not having pasture to feed their animals caused to leave their lands to find another labor in the cities.

Table (5) shows the number of families benefited and settles in their village and the number of animals found in the project.

From the Table 6 also noted that the number of the settled families living in the village of project is very few compared with the number of beneficiary families.

Table 6: Beneficiaries and Livestock

S.N	Project	No. of Family	No. of Family Habitation	No. of Livestock
1	Kani maran	250	250	1500
2	Qislagh	40	35	25
3	Seedan	65	65	320
4	Chalakh	150	110	380
5	Hayasee	150	150	750
6	Whomizar	100	100	Nil
7	Tynal	200	205	Nil
8	Kewra Kani	35	25	Nil
9	Qulay Rania	400	400	Nil
10	Alawa-Ist stage	210	200	1000
11	Alawa-2nd stage	230	180	1200
12	Sangasar	1300	1220	Nil
13	Kani shok	120	120	380

Agricultural productivity:

Table (7) shows the production of most crops cultivated in the areas is relatively low production compared to the country average productivity of crops, only one or two crops from this production is higher than the other in many developed countries.

Table 7: Data of Agricultural productivity (Ton)

S.N	Project	Rice	Grapes	Apricot	pear	peach	Sunflower	Lentil	Tomato	Cucumber	Water melon	Onion	Okra	Eggplant	Tobacco	Squash	Radish
1	Kani maran	-	-				0.82	-	4		4.5				-		-
2	Qislagh	-	0.73	0.5	2.3	1.38		-	4.86	1.76	10	0.3	0.2	1.2	-	1.44	-
3	Seedan	6	-	-	-	-	8.4	-	7.2	-	-	-	-	-	-	-	-
4	Chalakh	16.6	-	-	-	-	12.7	-	26	-	-	--	-	-	-	-	-
5	Hayasee	8	-	-	-	-	0.3	-	0.4	-	-	-	-	-	-	-	-
6	Whomizar	2.88	-	-	-	-	4.2	-	11.8	-	-	-	-	-	-	-	-
7	Tynal	12.5	-	-	-	-		-	9.6	-	-	7	5.28	-	-	9	-
8	Kewra Kani	-	-	-	-	-	10	-	-	-	-	-	6.48	-		6.5	-
9	Qulay Rania	-	-	-	-	-	24	-	-	-	-	4.3	-	-	4.28	-	14
10	Alawa-Ist stage	-	-	-	-	-	5.6	2.16	-	-	-	-	-	-	-		-
11	Alawa-2nd stage	-	-	-	-	-	4.5	25.	-	-	-	-	-	-	-	-	-
12	Sangasar	-	-	-	-	-	92.4	25	34.5	-	40.8	29.8	-	-	-	-	69.7
13	Kani shok	33	-	-	-	-	62.6	-	44.4	-	-	-	-	-	-	-	-

Farmers income from the Projects:

Figure (2) shows the average income for families living in the studied areas.

The total annual income for farmer is higher than the average annual income obtained crop production because it includes crop and animal production.

Farmer's income will increase by cultivating permanents crops such as fruit trees which need a long time for growing. Figure (2) shows some cases that the family's income is low in some project area with the reasons of some factors affected agriculture production like.

1-More project areas were not under the control of the farmers because most of lands were contaminated with mines. These cased the low of income from the two parts of production.

2-In some project, the reason is that due to the water resource with the discharge of irrigation schemes ranging from (10 L/S – 30 L/S) according to the type of projects. The result was that most of the agricultural lands where left without cultivation

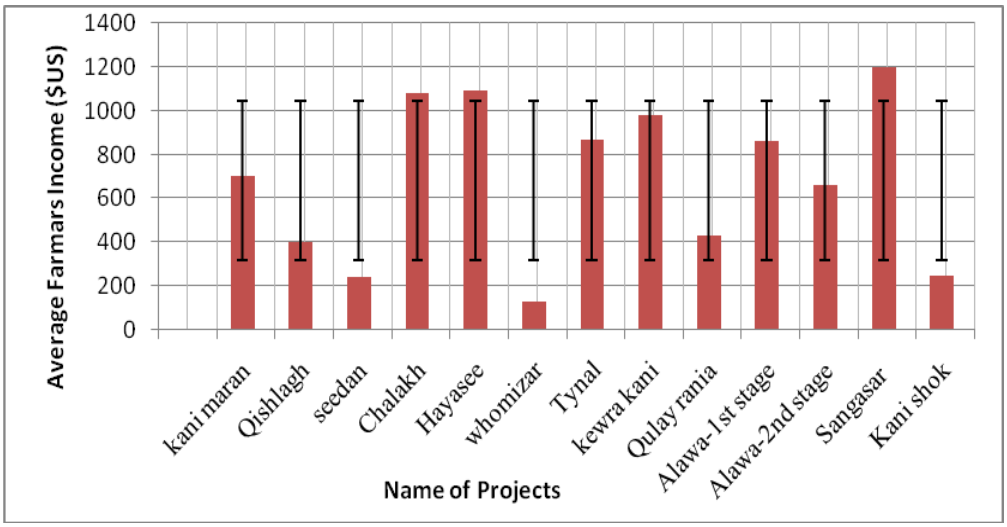

Fig. 2 Farmers Income the Project

Training of Farmers

Table (8) presents the participation of farmers in training received on improved crops yield technologies such as management of water project, crop water requirement, method of application fertilizers, and education of farmers.

Training farmers were very useful to improve their production technologies, Table (8) also show that there is a few training course for the following projects:

Qishlagh, Whormiziar and Kewra-kani

Villagers in the projects like Sangasar have received relatively few courses in training as mentioned below that do not covering their needs.

In the following projects, Kani- maran, Kani-shok and Chalakh intensive course training were provided to farmers as mentioned below:

Table 8: Training farme

No	Training subject	Training duration (days)	Farmers attendance number
1	Method of application fertilizer	10	24
2	Pruning of fruit trees	11	28
3	Operation pumps	1	8
4	Education of farmers	25	44
5	Crop water requirement	7	22
6	Management of water project	10	15
7	Blights insecticides	5	8
8	Water resource	21	10

Conclusions:

From the results, the following conclusion can be drawn:

1-The low prices of agricultural crops and products makes farmers to leave their lands without plantation.

2-Reducing irrigation efficiency in some projects such as Alawa 2nd stage, Seedan, Hayasen and Qishlagh projects as a result of decreased availability of water at the sites.

3-Decrease in distribution of agricultural materials by FAO like seeding, fertilizers and field tools to the villagers for the purpose of increasing agricultural production and farmer's income.

Recommendations:

The following recommendations can be drawn from this study.

a-The number of training and their duration in irrigation, crop water requirements and field water efficiency should be increased.

b- These projects required annual maintenance to conserve water capacity.

c- In order to operate the project correctly the gates or other structures should be improved and renewed to easily distribute water on the field.

d- Maintenance irrigation Schemes from misuse by farmers.

References

[1] H. Jones, 2004. Water Use Efficiency in Plant Biology, In: Water Use Efficiency in Plant Biology, Bacon, M. (Ed). Blackwell, Oxford, UK

[2] P, Najafi. SH. Tabatabaei, 2007.Effect of using subsurface drip irrigation and ET-HS model to increase WUE in irrigation of some crops. Irrig. And Drain. J. 56: 477-486.

[3] M. Gallardo, L. E. Jackson. K. Schulbach, R.L.Snyder R. B. Thompson L. J. yland (1996) Production and water use in lettuces under variable water supply. Irrig. Sci. 16: 125–137

[4] V. E. Hansen, O. W. Israelson; and G. E. Stringham. 1979. Irrigation Principles and Practices. John Wiley and Sons. Inc.

[5] W. Jobin, (1999). Dams and Disease: Ecological design and health impacts of large dams, canals and irrigation systems. London, E&FN Spon.

[6]A. Feigin, Letey J, Jarrell WM (1982) Nitrogen utilization efficiency by drip irrigated celery receiving preplans or water applied N fertilizer. Agronomy J. 74:978–983

[7] JC, Stark, Jarrell WM, Letey J (1983) Evaluation of irrigation-nitrogen management practices for celery using continuous-variable irrigation. Soil Sci. Soc. Am. J. 47:95–98

[8] T.A, Doerge, Roth RL, and Gardner B.R (1991) Nitrogen fertilizer management in Arizona. College of Agriculture, Univ. of Arizona, Tucson, Arizona, p 87

[9] General Directorate of Agriculture in the city of Sulaimaniya, 2000 Department of Livestock