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ARAB ORGANIZATION FOR AGRICULTURAL DEVELOPMENT
KHARTOUM

INTEGRATED RURAL DEVELOPMENT
AND THE DEVELOPMENT OF THE ROADS NETWORK
IN THE BASIN OF RIVER ZARGHAA

SUMMARY

KHARTOUM, 1981

CONTENTS

<u>Subject</u>	<u>Page</u>
Introduction	1
1-1 Site	2
1-2 Climate	4
1-3 Physical Analysis of the Region	4
1-4 Population	6
1-5 Social Conditions	8
1-6 Economic Situation	10
1-7 Social Development and Services Distribution	11
1-8 Land Uses	20
2-1 Agricultural Development	22
2-1-1 Introduction	22
2-1-2 The Present Situation	22
2-1-3 Proposed Improvements	28
2-1-4 Organizational Measures	31
2-1-5 Development Projects	32
2-1-6 Economics of the Development Programmes	34
2-2-1 Industrial Development	39
3 - Roads Network	43
3-1 Planning and Costs	43
3-2 Traffic Movement and Criteria	47
3-3 The Soil	49
3-4 Economic Feasibility	52
4 - The Strategy of Planning and Development	54
4-1 Social Development	54

<u>Subject</u>	<u>Page</u>
4-1-1 Population and the Labour Force	54
4-1-2 Training and Education	55
4-1-4 Distribution of Services	57
4-1-5 Roads	59
4-1-6 Identification of Village Sites	59
4-2 Economic Development	60
4-2-1 Economic Feasibility	60
4-2-2 Programme Capital Costs	64

INTRODUCTION

The objective of the study is the integrated socio-economic development of the Region of King TALAL'S BARRAGE. The network of rural and agricultural roads - the main focus of the study is considered the civilized vehicles that brings about socio-economic development matching in importance and extent with the level of services provided in this respect.

The strategy of the study aimed at decreasing the disparities and contradictions between rural and urban areas by :-

First - providing a better income through integrated agro-industrial rural development that diversifies the sources of income and absorbs the leisure time of the manpower in the studied area and transform it into an economic return - this should contribute to the settlement and stability of the rural family and hence to the overall national economic development.

Second - Raising the social standard in the rural areas by way of social development, aiming at realizing the best and most extensive services at the least costs and in the shortest period of time.

The study, therefore, propose an integrated socio-economic rural development focussing on an improved network of roads - the aim was to make the rural population participate in the development process through a multi-purpose rural cooperative society that organizes the relationship between the rural area and the town, facilitates the provision of services, supports the economic pillars in the rural area and augments employment opportunities to the population.

The creation of a Higher Authority for Rural Development in the Kingdom, encompassing all those concerned with rural development, shall facilitate the work of the central planner in setting plans with clear objectives and also help the concerned agencies in following up execution. Moreover, this shall remove the existing duplication in providing services and economic development in the rural areas.

An economic analysis of the integrated project, based on the costs and revenue of each project, separately, and then of the whole project has resulted in an Internal Rate of Return of 21.9%, which indicates that the project is economically feasible.

1.1 SITE :

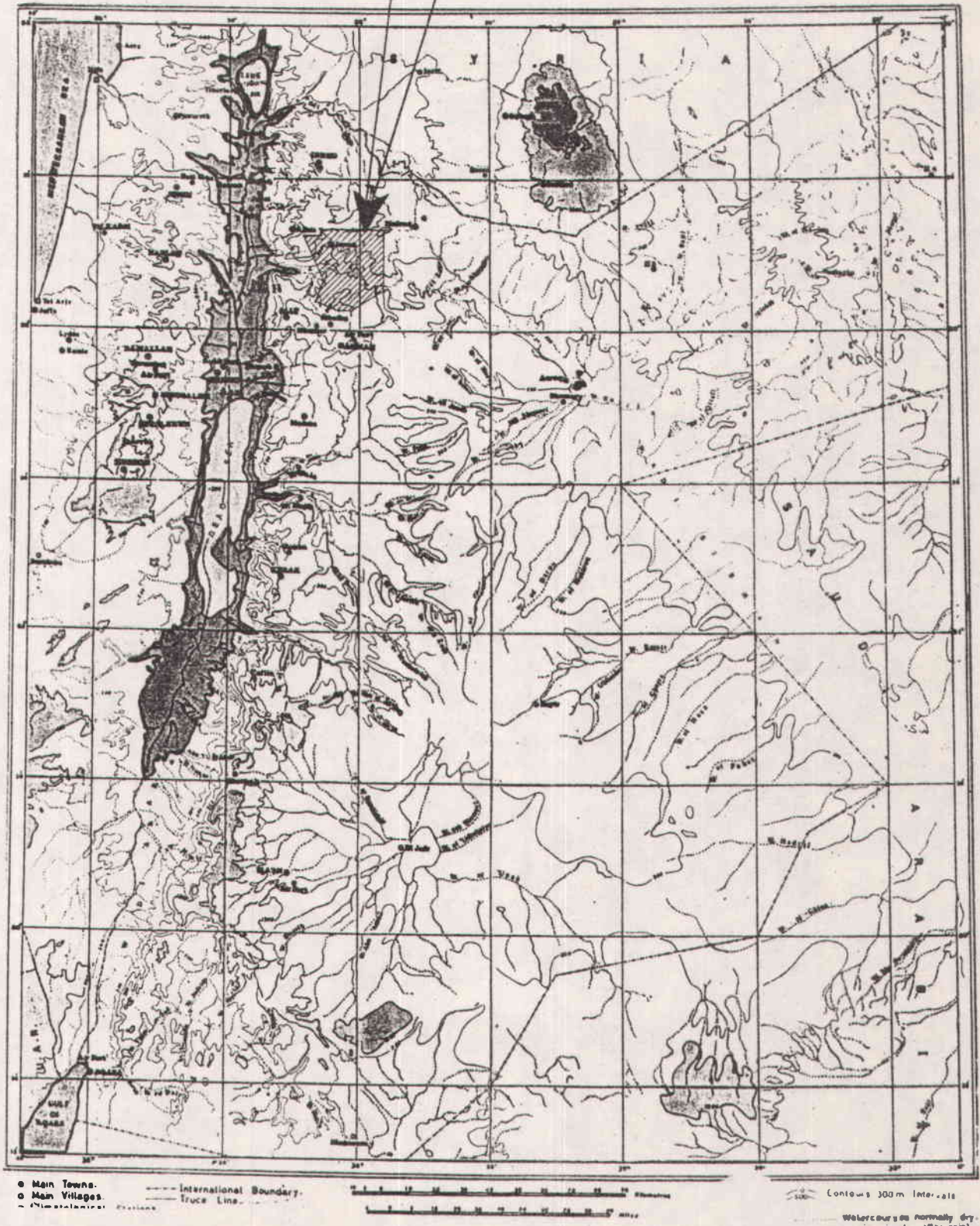
The studied area, covering the basin of King Talal's Barrage, is estimated to be 820 thousand Donums. It lies between longitudes 35 and 37 and latitudes 31 and 33 and constitutes the lower part of river Zargha basin which is part of the river basin with an area of 3,2 million donums (Map No. 1).

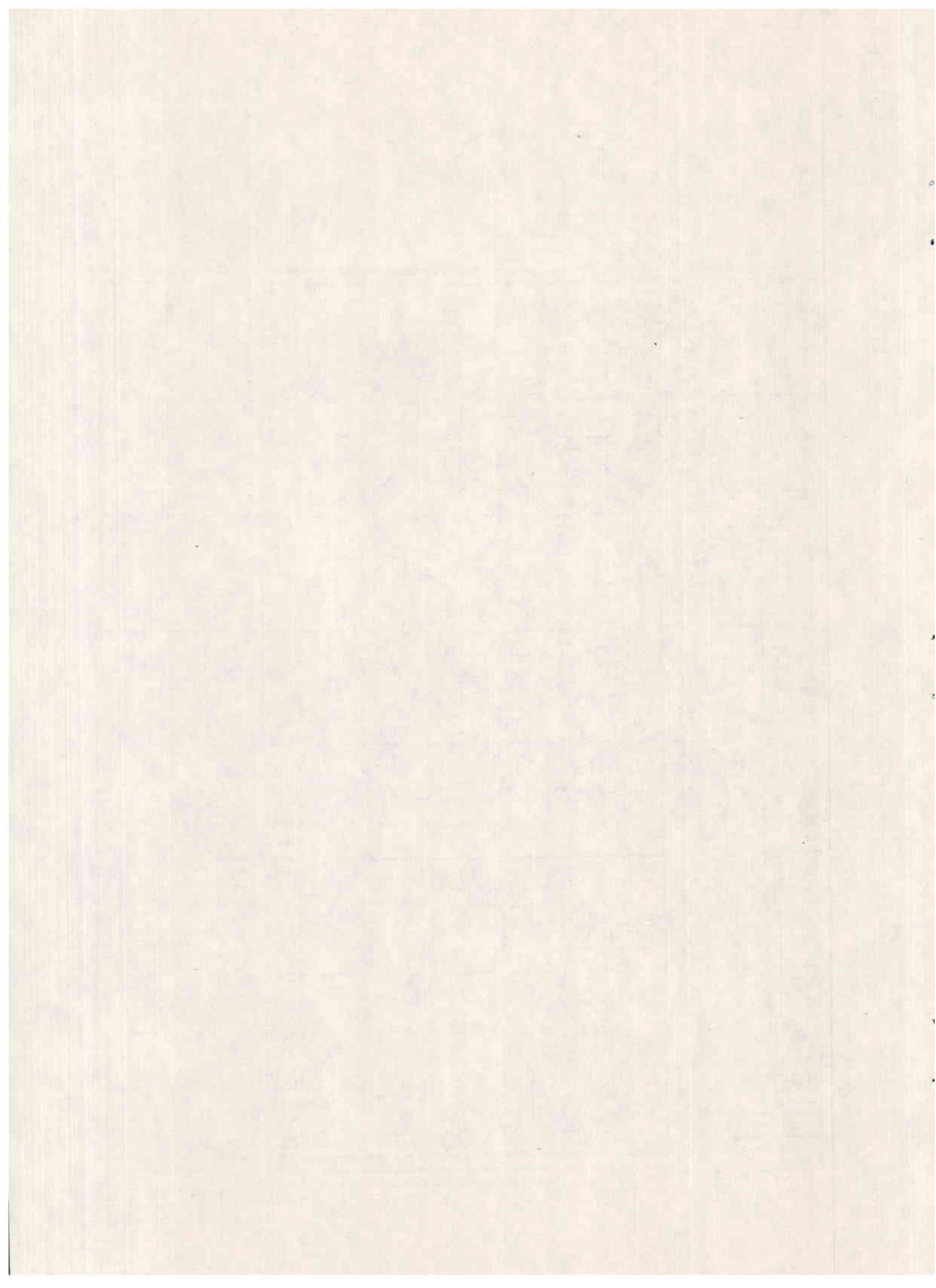
Province		Villages		Population		Area Donum		Density persons/100 Donum
		No.	%	No.	%	Area	%	
The Capital	1979	18	22	6722	12,4	140752	17,6	5
	2011	-		20842	12,7			15
El Balgha'a	1979	23	27	19636	36,2	165754	20,7	12
	2011	-		40045	24,3			24
Irbid	1979	43	51	27936	51,6	493034	61,7	6
	2011	-		103589	63			21
Total	1979	84	100	54294	100	799541	100	7
	2011	-		164476				21

PHYSICAL MAP

Study Area

MAP NO. (3)





These areas constitutes the area of the villages, basins and settlements included in the study. However, there is another area (estimated at 20458 donums) forming small parts of a number of villages, basins and settlements adjacent to this region is also included table No. (1) Population density in ghe studied region, by provinces, for the years 1979 and 2011.

1.2 CLIMATE :

The climate of the region is generally considered to be mediterranean climate with the highest summer temperature averaging 32^oc and the lowest temperature 3^oc. Humidity varies between 70% in winter and 43% in summer.

The winter season extends from late July, when the rains begin to fall, to the end of April. During this period the Western and south-western winds flow in the region bringing rains, but occassionally, and for short periods , the hot dry easterly winds flow. Many times during the winter the snow falls on the high areas in the region, but it does not continue for more than a few days, each time - during the summer, moderate northerly winds flow most of the time. The climate of the region suits deciduous trees, olive trees, crops and vegetables.

1.3 PHYSICAL ANALYSIS OF THE REGION :

The area under study comprises 84 colonies including villages, basins , settlements. However, for the sake of simplicity and to avoid linguistic confusion they are all called villages. The inhabitants in these villages differ between 19 and 6905 persons, distributed in three provinces (Map No. 1) where 22% of these villages lie in the capital Amman and 27% and 51% lie **respectively**, in the provinces of ELBALGHA'A and IRBID.

The area of the villages in the province of Irbid constitutes about 61.7% of the total area, while 20.7% and 17.6% of the total area lie respectively in the provinces of ELBALGHA'A and the capital. The distribution of the population follows closely the distribution of these areas.

The population density in these villages, by provinces, constitutes 12, 6, 5 persons per 1000 donum in the provinces of ELBALGHA'A , IRBID and the capital , respectively, while the population density in the studied area constitutes on average 7 persons/ 1000 donum.

The area shown in the above table constitutes the area of the villages which are wholly included in the studied area ; the area of those villages which fall partly in the studied area has been deleted.

Distances between one village and another differ, for 11% of the villages the distance is less than one kilometre, for 35% of the villages it is between 1 - 2.5 kms, for 44% between 2.5 - 5 kms and for 10% between 5 and 8 kilometres.

75% of the villages fall west of the isohyete 250 m/m. The main roads, numbers 15, 20, 33, 24 are considered to be the main arteries that provide the region with economic and social services. Apart from this the other roads, are generally considered to be below the certified engineering standards according to the road design standards in the Jordanian - Hashimite Kingdom. 256 kilometres of the established rural roads are in need of improvement.

The western part of the isohyete 250 m/m in the studied region, lacks services and agro-industrials resources, in comparison with the western part of the region.

1.4 POPULATION :

In this region there are 4 Palestinian refugees camps with a total population of 67098 persons, according to 1979 census ; El Balgha camp which is inhabited by 45691 persons constitutes 37% of total population in the area including the refugees camps.

The population in the region, till school age, shall reach, in 2011 376359 persons, including the refugees, and 168355 persons without the refugees. (The number of population in the region was 54294 persons in 1979).

The population in the studied area numbers 121392 persons, constituting 5.64% of the total population of the Kingdom. The population in the villages constitutes 45% of the total population in the Region, of which the population in the refugee camps constitutes about 55%.

Females constitute 48% of the total population in the Region and 4.9% of the total population in the refugee camps.

The average number of persons in a family in the project area is estimated at 6.72 ; the average in the refugee camps is bigger 6.76 persons, as compared to 6.66 persons in the villages of the region. There are 18075 families in the region, 45% of which are in the village of the region.

The percentage of the population at working age (15 - 64) is 46% of the total population, while the percentage of the population less than 15 years of age is 5.8%. The same group constitutes 51% of the total population in the Kingdom. The percentage of the population above 64 years of age is 3.2% as against 2.4% for the Kingdom.

The percentage of the people employed is 18.9% of the total population i.e. there are 5.29 dependants to every productive worker.

21% of the population in the region are engaged in agriculture, while these engaged in the services sector and with the armed forces

constitute about 75% of the whole population.

This percentage indicates that agriculture is the dominant economic activity ; it is double the percentage of the people engaged in agriculture in the Kingdom, which is 10.3%.

The results of the sample survey show a big shortage in the participation of women in the labour force of the region. The percentage of female participation is 3.2% of the total labour force and they are mostly engaged in public administration. It was found that 97% of the females in the sample do not have any employment, apparently they are wholly engaged in house keeping and up-bringing of the children.

The average rate of increase of the population in the region differs between 31.1% and 17% , according to the censuses of 1975 and 1979. This high lights a very unusual movement among the population of these villages.

The rate of increase of the population in Elbalgha'a region is 9.9% while it is 8.3% and 6% in Irbid and the capital, respectively. The average rate of increase of the population in the villages of the region is 8.4%, in the camps -0.9% i.e. the rate of increase of the population in the region is 3.6% - less than the average rate of increase of the population in the region, which is 3.8%.

The population in the region is distributed among 5 municipal councils, 26 village councils and 47 voluntary organizations. However, there are other 6 population settlements which do not have any form of local government representation.

1.5 SOCIAL CONDITIONS :

82.6% of the total population are illetrate above school age, with a higher percentage among the females rather than among the males. The percentage of the graduates (universities and institutes) is 2.4% , and that of the students and pupils (elementary, intermediate and secondary) is 48% of the total population.

The schools in the villages of the region number 121, comprising 620 classes in the school year 1979 - 1980. There are 13 villages which lack all sents of schools. The number of schools and classes have increased from 13% to 77% between the years 1974 and 1980, respectively. At the same time the number of teachers from both sexes has increased by 110%.

The students (both sexes) in the region constitute about 27.8% of the total population and this is below the general average for the Kingdom, which is 33%. The study has shown that there are 17 students to everage teacher in the region, while the average for the Kingdom is 20 students to a teacher. This clearly indicates the availability of the necessary number of teachers in the region, provided that there are enough schools and that their distribution is equitable.

There are no hospitals or equipped health centres in the villages of the region and the people depend greatly on the improved on medical services in the surrounding towns like the capital, El Zargha'a in addition to Garash town which lies within the studied area. Only 36% of all villages in the region do have modest medical services. In all, there are 9 main health centres, 28 village clinics and 3 mother and child care centres. The number of medical doctors in the studied area is only 6 i.e. 1 doctor to every 9049 persons ; there are 37 attendants of both sexes i.e. 1 for every 1467 persons.

From time to time visiting doctors and rural medical teams offer their services to the population.

The field survey indicated that hospital treatment is widely accepted. The percentage of children both in hospitals is 98% ; about 45% of the mothers frequent the doctor and about 92% of the total population make use of modern medicine.

The people in the region prefer to own their houses with 91% of the families having their own house, and only 9% hire houses. 82% of the population live in houses from stone and cement, and only 4% have mud houses. 40% of the families live in houses with an area less than 50 square metres, and 75% of the families live in houses with less than 100 m² of area . On the average, each person has 10 m² . However, this figure is subject to further scrutiny .

Most of the houses lack health and necessary services ; 41% of the houses have internal bathroom, while 20% of all the houses have internal lavatrine.

The sources of drinking water for the population differ from pipe network, to wells to spring to water tanks. It is found that about 47% of the families in the sample draw their water from the pipe network, while 44% depend on wells and springs.

44% of the population in the region enjoy electricity (31.9% depend on the national grid, while 11,8% have their own generators). Therefore, more than 55% of the population in the region do not enjoy this facility.

1.6 ECONOMIC SITUATION :

About 60% of the population in the region own agricultural land with plots averaging about 53 donum, of which only 40% is utilized. More than 51% of the families in the region own livestock, namely cows, sheep, goats and poultry.

Family income varies, with 50% of the families have annual income less than 1000 dinars and 87% of the families with less than 2000 dinars.

If one takes into consideration that the average personal Jordanian , in 1980, is 380 dinars and that there are 6-7 persons in a family, the average family income shall be about 2550 dinars. However, the study has shown that 93% of the families in the region have less than the above average .

Concerning the general expenditure, it was found out that 55% of the families spend less than 1000 dinars annually while 93% spend less than 2000 dinars.

The demands put forward by the population in the region include the provision of all services. About 40% of them request medical facilities, while about 60% - electricity ; 42%, drinking water, 13.7% secondary education and 18.2% municipal councils. The families have expressed leadiness to participate in the provision of these services. It was found out that 35% of them are ready to participate financially and 63% to participate physically and 7% by providing materials and equipments.

This last phenomenon is encouraging to the rural planner. It enhances development through wholesale participation of the rural population in the integrated rural development. The perception of

the population in the region of their needs for services, to which they, attach priorities, facilitates the process of services distribution.

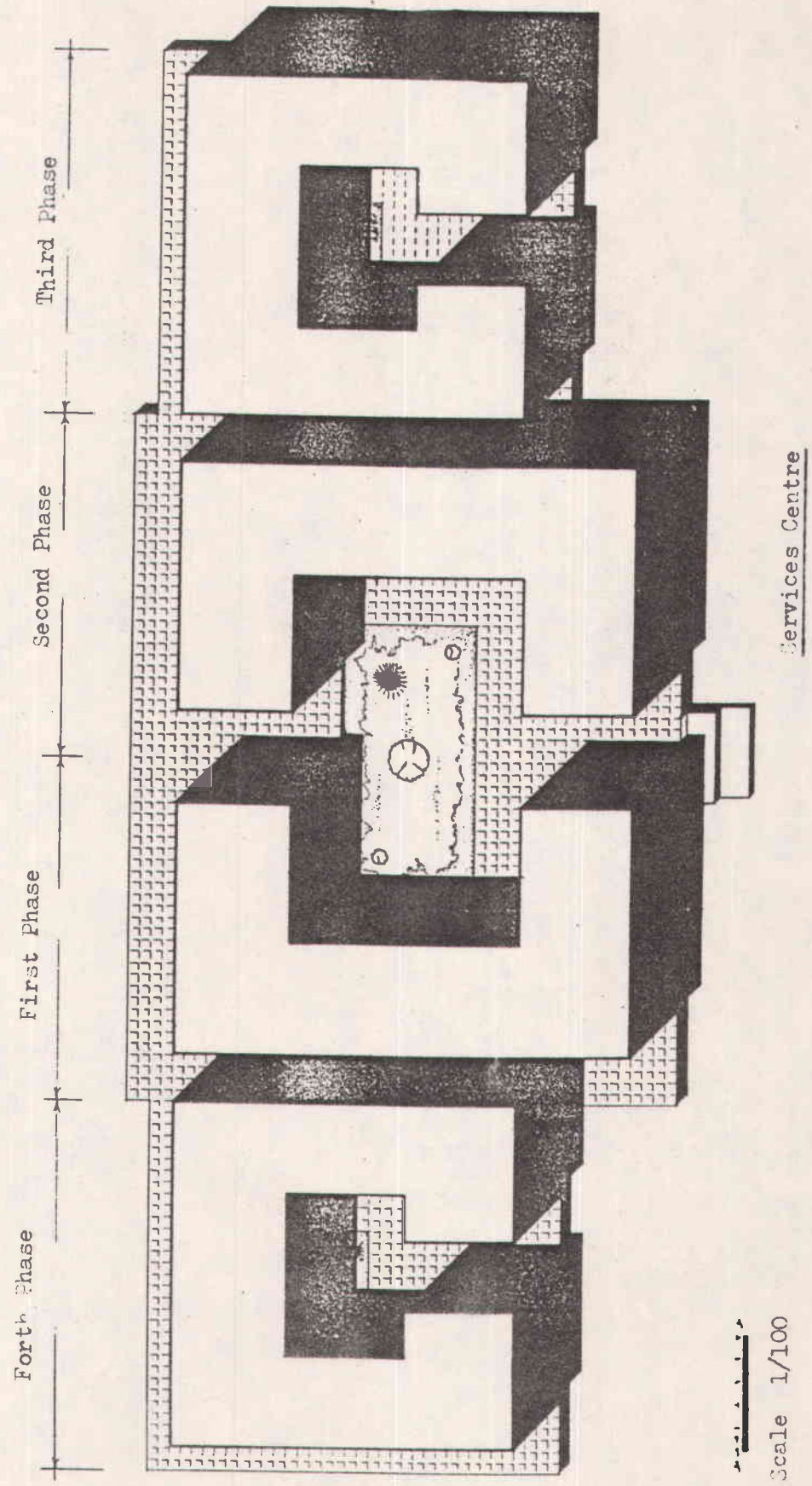
1-7 SOCIAL DEVELOPMENT AND SERVICES DISTRIBUTION :

The above analysis of the society and the family necessitates bridging the existing gap in services in both directions horizontally and vertically, in order to provide the best services which are suitable to the requirements of a life comparable to that in town. It is necessary that consideration be given to low costs, simple design and modest structures, if the services are to be provided in a short period of time.

Therefore, the population in the school age and in the working age have been calculated for the years 1979 and 2011, and on these bases the volume and costs of the necessary services to each village separately have been calculated, using the International, Arab and Jordanian standards for utilizing the soil.

The identification of the available services in every village, as a result of the field survey which was made for the purposes of this study, as well as the data collected from the concerned Ministries and government agencies (Table No. 2) and the volume of the necessary services according to the above standards, necessitate the construction of 277401 square metres of services at a cost of 20 million dinars (Table No. 3).

The study has adopted the (Services Centre) shown in fig.(1) which suits the philosophy of the multi-purpose utilities in the rural areas and this fits the objective of the study, namely providing the best services at the least costs. The adoption of these services centres necessitates the construction of 25400 square metres at a cost



Scale 1/100

Services Centre

Figure No. (1)

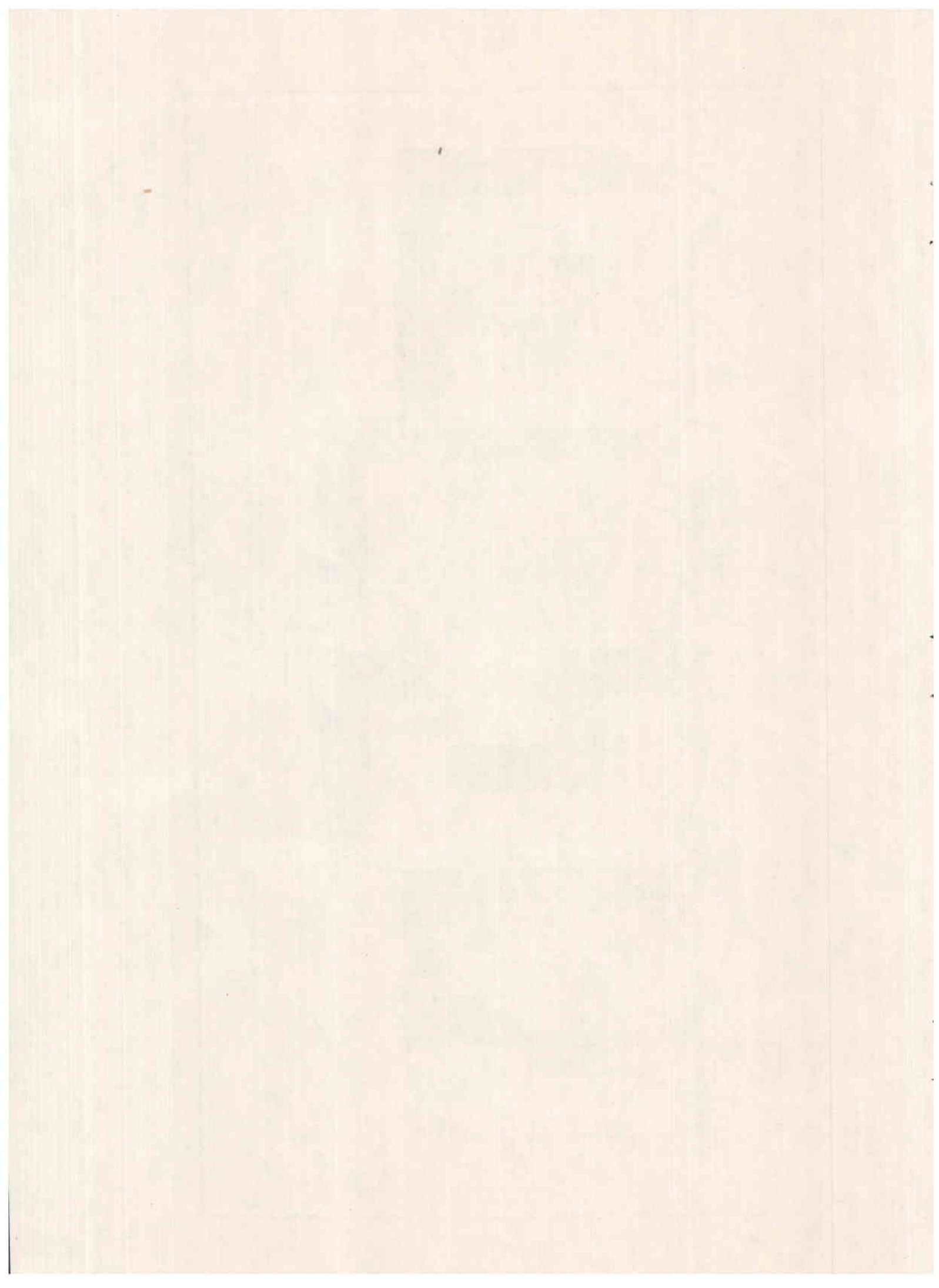


TABLE NO. 2 : DISTRIBUTION OF PUBLIC SERVICES AMONG THE VILLAGES IN THE REGION, BY PROVINCE.

No. Villages	PROVINCE	SCHOOLS						HEALTH				DRINKING WATER				ELECTRICITY		POSTES		Tarmac Roads	AGRIC. SERV.			SOC. SERVICE	RELEGIION		COMMERCE			LOCAL GOVT.						
		ELEMENTARY			INTERMED.			SECOND.		Motor & Child Care	Village clinic	Health Centre	Piped	Springs wells	Wells	Grid Net.	Other	Telephone	Agency		Office	Coop. Soc.	Extention		Vet. Serv.	Nutrition Centre	Social Centre	Illletracy	Mosque	Church	Shops	Wholesale	Municipal Council	Village Council	Appointed	None
		Kindor Sorter	Males	Females	Mixed	Males	Females	Mixed	Males	Females	Males	Females	Mixed	Females	Males	Mixed	Males	Females	Mixed																	
1 Um Zewaitina	AL ASIMMA																																			
2 Shfa Badran																																				
3 El Raheel																																				
4 Doughra																																				
5 Birein																																				
6 Um Rummana																																				
7 Kagm El Shouk																																				
8 Srount																																				
9 El Massara																																				
10 El Kumaha																																				
11 El Alouk																																				
12 Taweheen El Udwan																																				
13 Mekkan Elisa																																				
14 El Sahhara																																				
15 El Beera																																				
16 El Ghaniya																																				
17 Ein Sabir																																				
18 Um El Bayar																																				
19 Ghaf Ghafa	ERBID																																			
20 Gaba																																				
21 Kharbat El Shawahid																																				
22 Mukbilla																																				
23 Dir El Leyat																																				
24 Souf																																				
25 El Katta																																				
26 Rimon																																				
27 Sakib																																				
28 Nahla																																				

Proposed Services *
Existing Services •

TABLE NO. 3

Province	Year	Needed services according to Western Standards		Alternate Services according to the proposed services Centre		Savings in costs
		Area m2	Costs 1000 D.	Area m2.	Costs 1000 D	
The Capital	1979	10615,6	743,1	3,600	324,000	419,1
	2011	13331,4	1563,-	800	72,-	1491,2
Total		<u>23947</u>	<u>2306,1</u>	<u>4,400</u>	<u>396,-</u>	<u>1910,-</u>
El Balgha'a	1979	22552,1	1680,-	5,400	480,-	1200,-
	2011	<u>43482,2</u>	<u>3932,8</u>	<u>1,600</u>	<u>150,-</u>	<u>2782,8</u>
Total		<u>66034,3</u>	<u>4612,8</u>	<u>7,000</u>	<u>630,-</u>	<u>3982,8</u>
Irbid	1979	65029,7	4524,8	11,400	1026,-	3498,8
	2011	<u>122390,7</u>	<u>8621,5</u>	<u>2,600</u>	<u>234,-</u>	<u>8387,5</u>
Total		<u>187420,7</u>	<u>13146,3</u>	<u>14,000</u>	<u>1260,-</u>	<u>11886,3</u>
	1979	98197,0	6947,9	20,400	1830,-	5117,9
	2011	<u>179,204,0</u>	<u>13117,3</u>	<u>5,000</u>	<u>456</u>	<u>12661,3</u>
Grand Total		<u>277401</u>	<u>20065,2</u>	<u>25,400</u>	<u>2286,-</u>	<u>17779,2</u>

of 2,28 million dinars . Thus it is possible to make savings in costs of 17,77 million dinars and to gain time as a result of the differences in area to be constructed, estimated at 252001 M², or nearly ¼ of a million square metre of structures.

The services centres comprises (health centre, library, shop, market place, police station, administrative centre, youth centre, coffee house and post office) on the basis that the size of the population in a village necessitates a specific area of services (Table No. 4), below, the services centre can be executed in four phases, each extending to 200 M² at an estimated cost of 18,000 dinars for construction and simple furniture.

TABLE NO. 4

A- From 100 - 1000 persons	needs one phase of the services centre
B- From 1000- 5000 "	needs 2 phases " " " "
C- From 5000 - 10000 "	needs 3 phases " " " "
D- From 10000 - 20000 "	needs 4 phases " " " "

Thus, intensively utilizing 9% of the land allotted, according to the Arab Standards, to achieve many purposes realizes the dreams of the rural population by providing all the services required. This also eases the pressure on the treasury by reducing the public expenditure needed to achieve the national objectives and shall also ease the pressure on the other national development plans.

The provision of education and training services may follow the same pattern, i.e. optimizing the utilization of the land and the facilities. For example each school may be utilized twice or thrice a day and the number of students in any one class may be extended to the upper limit (52 students).

TABLE 5 : PLANNING AND COST OF EDUCATIONAL SERVICES

Province	Units required	Units required	No Units required	Total Deficit		Costs (1000)
	36 students/ Class one term School	52 student/ Class one term School	52 students/ Class 3 term School	School	Class	
The Capital	226	158	58	3	4	121,800
El Balgha'a	449	300	106	10	25	430,500
Irbid	1161	804	276	-	11	2,310
Total	1836	1273	440	13	40	554,1
Total according Standards	1836					3301,5
Savings after planning						2,74

Table No. 5 indicates that the number of classes required, according to the Arab standards, comes to 1836 classes, costing about 3,3 million dinars. The cost was reduced to 554 thousand dinars as a result of maximizing utilization. The number of schools to be built was limited to 13 mixed schools, each with 6 classes, in the 13 villages which previously did not have any schools, in addition to the establishment of 40 classes in the various villages. The sports fields of the schools should be extended to the whole village and the school buildings should serve as centres for youth where educational and training courses may be arranged. This policy saves 2.7 million dinars, which money could be utilized either in providing needed services in the villages and rural areas or in

enhancing the pace of development in the urban areas, or in the national economic and services sectors in the Kingdom.

The provision of the main supporting infrastructure (drinking water, electricity, roads) is a basic necessity to the life requirements and therefore all villages in the region should be provided with all those services which are lacking, or only partially available.

The roads network, including the rural , agricultural and forestry roads, have been studied and certain improvements were suggested which shall facilitate the provision of social and economic services. This is referred to later.

The provision of the basic requirements in the rural areas is considered to be the main plan in developing the rural society, with the ultimate objective of diminishing the disparities between the rural areas and the towns. This is one of the strategies of this study.

The housing policy in the rural areas should stem from the main principle that all citizens should own their houses. This should be part of the legislation which guarantees the establishments of houses in planned areas by the state. These houses are to be financed by (ISKAN) Estate Banks, through the extension of encouraging facilities. The contribution of the state may be in the form of granting housing plots at nominal prices. Such a policy shall relieve the state from shouldering the responsibility of financing the housing projects in the rural areas. Moreover, it shall further strengthen the association of the inhabitants with the land and environment.

1.8 LAND USES :

The area in the studied region has various agricultural and topographic characteristics. The absence of detailed information concerning the fertility of the soil, which is the basis for identifying land utilization, made us depend on the topographic characteristics, as an indicator to the type of production and agricultural pattern.

The arial photographs have shown that 44.3% of the total area is natural pasture land, 32.6% occupied with field crops, 10.4% covered with fruit bearing trees and 10.6% with forests.

The different parts of the area have varying altitudes, with the peak reaching 1250 metres, above sea level. The area is traversed with numerous vallies which flow towards the basin of River Zargha'a . The area is also characterized by the fact that 50% of the area is having more than 25% slope and 43.6% of the area is having slopes between 25% and 50%.

34.4% of the total area is a mixture of hills with more than 5% slope and mountains with varying heights. The area east of the isohyte 250 millimetre is a group of hilly and mountainous land. Although it constitutes 25% of the total area, it lacks all aspects of supporting infrastructure , especially roads. Therefore, the study has given this area priority in distributing services for social development. Apart from this, the intention was to make equitable distribution of the other services on the basis of population density and on the economic and social value of those parts to be developed.

2) Economic Development :

Introduction :

In this study, the objective of the economic development is the optional utilization of the natural resources, the provision of employment opportunities to the inhabitants in the region with a view to increase the income of the rural family and make it compatible with that of the urban family, and thereby decreasing the economic differences between the rural and urban areas.

The strategy of this part of the study intends to diversify the sources of income within the agricultural and industrial sectors. It also intends to distribute development according to priorities set out by the most backward areas - the most important and then the important- so that the result is an equitable distribution of wealth and sources of income in the region.

The absence of the necessary data for the development of tourism in the region has forced its exclusion from this part, with the hope that it shall be reappraised by those concerned to complete the rural economic development.

The committment of this section to limited industrial development should not imply the lack of better and more extensive potentialities.

However, the time limit for the study did not allow any detailed analysis but certain proposals for some industries which may be considered for the region, were put forward. The extent of development of the agricultural sector is limited by the availability of water. If the water resources are increased there shall, definately, be more development opportunities.

2.1 AGRICULTURAL DEVELOPMENT :

2.1.1. Introduction :

The strategy of the Jordanian Government has given priority, in the 5 year Development Plan (1981 - 1985), to conservation of natural resources, to their better utilization and to the enhancement of the productive efficiency through integrated improvements. This being the starting point, the study has to cover the existing potentialities of the available resources and to study their environmental and economic characteristics. It was possible to identify the problems behind the low productivity, the unhealthy utilization of resources and the deterioration of potentialities. As a result development programmes were set which could lead to conservation and better utilization of resources and to the increase of the agricultural production. Following is a brief survey of the agricultural situation and the proposed development programmes.

2.1.2 The Present Situation :

The area of the studied region is 820 thousand donum, of which 85 thousand donum are covered with fruit trees, mainly olive. About 87 thousand donum are covered with forests, around 267 thousand donum with seasonal field crops and about 362 thousand donum are natural pastureland. The balance is partially used for public uses and the remainder is unsuitable for agricultural purposes.

The studied area differs according to the slopes, with 187.5 thousand donum having less than 60% slope, about 236 thousand donum having between 10% and 25% slopes and the rest (396 thousand donum) with more than 20% slope . This topographical nature affects the soil, making it susceptible to rainwater erosion. The eroded soil is driven to the valleys and from there to the river Zarghaa and ultimately to the lake of King Talal Barrage. The volume of annual

sediments in the lake is estimated at a million cubic metres. This, gradually diminishes the capacity of the barrage and shortens its economic age. Therefore, urgent measures are needed to cut down the volume of these sediments and to conserve the soil which is the national wealth.

Agriculture depends on three sources of irrigation. The first is that part of underground water which is devoted to irrigation. About 5 million cubic metres are pumped annually from some 111 tube wells. The second is the water from the natural springs. There are 34 springs in the area with a total capacity of about 11 million cubic metres. These are mainly used for drinking purposes and what remains is used for irrigation. The third is rainwater. The average annual rainfall in the region is estimated at 4.5 million cubic metres. The volume of precipitation differs from one place to another in the region, the average decreasing eastward. The rainfall is considered to be one of the main factors that limits the type of agricultural activity. This bears more significance here due to the big differences in rainfall from season to season and from a certain period to another within the same season. The area with rainfall less than 250 millimetres is estimated to be about 69 thousand donums ; with rainfall between 250 - 500 mm. is about 632 thousand donums, and the area with more than 500 mm is about 119 thousand donums. Although river Zargha'a traverses the studied area only an insignificant portion of its waters is used for irrigating an area on its banks and the flows into the lake of King Talal Barrage. This water is then used to irrigate agricultural fields in the valley of Jordan, outside the range of the studied area.

The man-power engaged in agriculture constitutes about 4.35% of the total population, or about 3 thousand labourers. The man-power requirement of the Region is estimated at 13 thousand labourers. The deficit in man-power is made for by uncruting hands from the refugee camps and by foreigners. It is calculated that the requirements of animal production are about 1255 labourers and for plant production about 11745 labourers (based on 200 days a year and 8 hours day .

Agricultural machinery is used on a limited scale relatively and this is confined to the lowlands and then, only the plough, the harvesters and the thresher are used. The farmers in the region depend partially on their own implements and partly on hiring machinery from outside the region. The number of tractors owned by the inhabitants is estimated at 39 tractors. They also own about 14 threshers. The agricultural census of 1975 shows that about 207 plots depend completely on mechanical power and about 1560 plots depend jointly on mechanical and animal power and about 1629 plots on animal power only. The number of plots which are operated only with man power are not more than 289 plots.

The utilization of machinery in agriculture has started recently and this is being expanded in Jordan as a whole, and in the studied area. The number of tractors in Jordan, in 1960 was estimated at 2000 tractors and by 1979 the number has doubled (to 4000 tractors). The number of harvesters has rizen from zero in 1960 to 200 in 1979.

The agricultural supporting services provided by the Ministry of agriculture include technical support, extension and improved seeds , in addition to this, the Ministry provides support in kind in collaboration with the World Food Programme, for soil conservation planting of fruit trees and forest on the hilly areas. (The

Ministry has also its own afforestation programme). The supporting services also include the facilities provided by the Agricultural credit organization and by the cooperative agency. These agencies provide short and medium term loans with a simple rate of interest not exceeding 8.5%. In the region there are 19 multi-purpose cooperative societies in which about 1422 farmers participate. The loans provided also do not cover all the requirements of the farmers for financing ; the balance is covered from own resources (agricultural and non-agricultural) or from other sources (individuals or companies active in the agricultural field).

Not all the land suitable for agriculture is cultivated annually. Part of it is left intentionally as fallow or is abandoned carelessly during the dry seasons. The anable land is estimated at 353 thousand donum or about 43% of the total area of the region. The area which was cultivated in 1980 (a year of a higher than average rainfall) is about 276.4 thousand donums distributed as follows :-

Winter crops	144.8	thousand donums
Summer crops	16.9	" "
Rainfed vegetables	5.6	" "
Irrigated vegetables	16.7	" "
Fruit trees	92.4	" "

The area suitable for forests is estimated at 222 thousand donum, of which about 87 thousand donum are covered with forest trees and the rest is tree-less and open to erosion. The forest land being staping constitutes the basic source of sediments which occupy the barrage of King Talal. Nor all forest land is owned by the treasury, part of it (about 12300 donu) are owned by the inhabitants and they do not seem to be enthusiastic about reafforestation. There is need for certain legislations to enforce

activities to combat erosion, and to reafforest that part of the region.

Oak trees are considered to be the most distributed forest trees in the region as they occupy about 43 thousand donum. They are followed by the pine trees which cover about 13 thousand donum. The remaining area, about 31 thousand donums is covered by various types of forest trees. Presently the Ministry of Agriculture is undertaking a reafforestation programme, through which about 70 thousand donums have been reafforested since 1963. However, the annual average achieved is considered to be less than the required minimum to protect the barrage from the sediments and to check erosion and conserve the soil.

The area with rainfall less than 250 m/m is estimated at 362 thousand donums, of which about 140 thousand donums are utilized as natural pasture. Here, grazing shrubs grow during the spring and they are being grazed by sheep and goats. The area is subjected to overgrazing and to mechanical ploughing which damages the top soil and diminishes its grazing capabilities. Unauthorized ploughing should be curtailed, grazing should be organized and the necessary measures should be taken to restore the planting cover.

It is difficult to refer all the livestock herds to the region as the herds moved to and from the region in search of pasture and water. The available statistical data indicate that in the region there are about 76 thousand heads of Awassy sheep, and about 73 thousand heads of domestic goats. The cattle, which are mostly indigenous, number about 3 thousand heads and they are dependant on the natural grazing area. The offsprings of both sheep and goats are generally slaughtered at an early age, before reaching the optimum weight and this becomes more critical during the dry years. The

cows have low milking productivity, the cow gives, an average , about 200 kilogrammes p.a. some foreign breeds husbanded in the region give more than 600 kilogrammes and they are doing well.

Jordan has started in the last few years to witness a significant expansion of the poultry industry, to the extent that self-sufficiency was achieved. It is noted that the studied area is one of the regions that experienced this expansion, with 86 poultry farms for the production of broilers producing 636 thousand broilers, and 41 poultry farms for the production of laying hens with a capacity of 396 thousand birds and 4 mother farms with a capacity of 75 thousand mothers. Part of these farms are equipped with the most modern facilities another part uses greatly improved techniques and small part uses the traditional means. In addition to this the tenants keep their own stock at home for the production of eggs and broilers.

The cost of agricultural production (including plant and animal) is estimated at 13.2 million dinars annually, distributed as follows among the main agricultural activities according to the estimates for the years 1979 and 1980 :-

Field crop production	1.2 million dinars
Vegetable "	0.7 " "
Fruit "	2.2 " "
Livestocks "	9.1 " "

The value of agricultural production for the same period is estimated at 20-2 million dinars distributed as follows :-

The value of the crops	0.9 million dinars
" " " " vegetables	2.8 " "

The value of the Fruits	4.9 million dinars
" " " " livestock	11.6 " "

It is noted that crop production is not remuneration to the farmer who depends on hired labour. Revenue from other crops nets a profit which helps the farmer to continue and to expand his agricultural activities.

It is worthy noting that the production estimates made by the Ministry of Agriculture are less than the figures taken in calculating the above revenue. If the economics of production were calculated on the basis of the Ministry's estimates the farmer shall be found to incur losses due to the production of both field crops and vegetables. As both are being continuously cultivated, the team, undertaking the study, has found it difficult to believe that the farmer continues to cultivate if these losses persist. Therefore, the team was only guided by these estimates as well as by other similar country studies and was able to deduce the volume of production which is considered to be more or less very close to the actual volume.

The studied area is characterized by producing certain agricultural commodities in quantities that exceed the consumption needs of the inhabitants, while producing other commodities quantities less than the consumption needs. This is shown by the following Table No. 6.

2.1.3. Proposed Improvements :-

In formulating the programmes of the proposed improvements, including the organizational measures and the development projects, the team was guided by the strategy of agricultural development and by the following guidelines :-

TABLE NO. 6

Item Produced	Consumption Rate		Present Volume of Production Ton/Year	Excess or Deficit Ton
	Person/ Kg/Year	Region Ton/Year		
Wheat	119.75	14204	7297	6229-
Other food crops	10.35	1228	3901	2673
Tomato	62	8540	7221	1319
Egg Plant	21	2491	1186	1305
Cucumber	6	712	1861	1149
Squash	4	474	1325	851
Cauliflower	6	712	1890	1178
Cabbage	5	593	1040	447
Green beans	4.6	546	735	189
Ladies fingers	1.5	178	657	479
Water mellow	25	2965	502	2463-
Sweet mellow	3	356	502	146+
Onion	6	712	79	633
Potato	14	1661	317	1344
Olive	8.5	1008	7259	6251
Other fruits	36	4720	16421	12161
Red meat	7.79	924	5801	4877
Poultry meat	14	1661	4838	3177
Egg (Number)	101	12 millions	100 millions	88 millions
Fresh milk	30.16	3577	985	2092-

1. The human being is one of the most important elements for whom Jordan is committed to achieve the best standard of living and to strengthen his association with the land.
2. Jordan is not self-sufficient in food production and there is need to enhance productivity through utilization of the available resources to achieve food security as far as possible, to decrease the gap between consumption and production and to maintain a minimum level of imports of food commodities.
3. There is limited availability of irrigation water and therefore, horizontal expansion, by subjecting additional areas to irrigation, is limited by this factor. Moreover, the rainfall in the studied area varies in volume and distribution from season to season and this puts a limit on the scope of expansion of rainfed agriculture and restricts the possibility of diversification.
4. The topography of the land, which is characterized with steep slopes subjects the soil to the erosion factors leading to huge deposits which are carried by the rain water to the vallies to river Zargha'a and are deposited in the Barrage of King Talal, there by reducing its capacity.
5. The present crop pattern is not the optimal pattern which produces the maximum yield/unit area.
6. The natural resources are badly utilized being subjected to passing, unauthorized ploughing overgrazing and all this has to be checked and optimal utilization should be encouraged.
7. There is need for supporting services and infrastructure to match the requirements of the integrated rural development.

8. The absence of some basic data at the village level, such as soil fertility and its suitability to the relevant crops. This data is very important for development planning.

2.1.4 Organizational Measures :

A. Land ownership should be organized and legislations should be enfered to realize the reafforestation of private lands. Small plots should be grouped into large economic plots. The size of the plots should be defined and the redistribution of grouped plots should be prohibited.

B. The movement of the sheep and goats herds should be organized within the grazing area. The necessary legislations should be passed which limits the carrying capacity of the grazing areas to avoid overgrazing and the incidence of overstocking.

C. Agricultural surfaces should be intersified, such as credit services, extention and marketing.

E. Adopt an optimal pattern of cropping leading to a better utilization of the agricultural land, as follows :-

TABLE NUMBER 7

Utilization	Present Area		Proposed Area	
	Donum	%	Donum	%
Seasonal crops	267630	32.6	140000	17.1
Fruit trees	92422	11.3	262422	32
Forests	87100	10.6	222000	27.1
Pasture	445688	54.4	168118	50.5
Other Uses	<u>17500</u>	<u>2.1</u>	<u>27500</u>	<u>3.3</u>
Total	<u>820040</u>	<u>100.0</u>	<u>820040</u>	<u>100.0</u>

2.1.5. Development Projects :

A. Improving Production of Field Crops :

The objective of this project is to expand irrigated agriculture, to curtail production on areas with less than 250 mm of rainfall, to restrict the area under fallow, to enhance productivity per unit area through improved agricultural techniques to establish cemented irrigation canals to replace the current soil-made canals and make land use operations subject to the natural and economic characteristics of the soil in each site as a result land utilization of the agricultural land should be as expressed by the following total number (8).

TABLE NO. 8

<u>Crop</u>	<u>Area</u> <u>(1000 donum)</u>	<u>Percentage</u>
Wheat .	24	17.1
Barley	40	28.6
Legumes	23	16.4
Tomato (rainfed)	10	7.1
Potato (irrigated)	1.5	1.1
Cucumber "	5	3.6
Phaseous "	3	2.1
Tomato "	5	3.6
Onion rainfed	1	0.7
Okra (Ladies fingers)rainfed	1	0.7
Water melons "	6	4.3
Snake cucumber "	5	3.6
Onion irrigated	1.5	1.1
Water melons "	5	3.6
Squash "	5	3.6
Calliflower "	4	2.4
Total	<u>140</u>	<u>100</u>

B. Soil Conservation and the Cultivation of Fruit Trees :

The objective of this project is to carry out the necessary soil conservation measures. Terraces and soil contour lines should be established to conserve the soil and preserve humidity in the soils with slope between 8% and 25%. Such soils are suitable for the production of fruit trees for 10 years. Establish wells to collect the rain water which may be used for partial irrigation of the seedlings during the summer of the first two years. Construct the necessary wind-breaks so that by the end of the improvement programme 170 thousand donums (in addition to the current area) may be cultivated with the following crops, table number (9) :-

<u>Crop</u>	<u>Present area</u>	<u>Added area</u>	<u>Total</u>	<u>%</u>
Olive	61136	80000	141132	53.8
Grapes	20439	30000	50439	19.2
Almonds	9482	40000	29482	18.9
Citruses	1369	-	1369	0.5
Fig	-	10000	10000	3.8
Apples	-	10000	10000	3.8
	<u>26422</u>	<u>170000</u>	<u>262422</u>	<u>100</u>
	=====	=====	=====	=====

C. Afforestation :

The objective is to plant forest trees in 135 thousand donums within 10 years. The soil should be subjected to the necessary soil conservation measures. Roads should be established to facilitate the process of afforestation and conservation of the soil-valuable forest trees should be introduced such as pine and almonds and citizens, in both the public and private sectors, should be urged to participate not only in the processes of afforestation and

conservation but also in making use of the recreational aspects of the new environment.

D. Expand of livestock and Poultry Production :

The objective of this project is to develop the grazing capacity of part of the pastureland, estimated at 140 thousand donum. In this area, grazing should be organized and 70 thousand heads of sheep and a similar number of goats should be bred during the coming 10 years, in addition to the present stocks. Another objective is to establish fattening centres for sheep with a total capacity of 15 thousand heads per annum. The centre is to be furnished with stores for fodder to be kept for emergencies as well as with veterinary and other technical services to be extended to the livestock men. A third objective is to replace the indigenous cows with foreign breeds within three years and to expand poultry production by 4% annually and egg production by 2% annually through establishing new poultry farms and expanding the existing ones.

2.1.6. Economics of the Development Programmes :

The capital costs requirements of the development programmes are estimated at 23656 thousand dinars distributed among the development years as indicated in the table below. The operational expenses are estimated at 2.9 million dinars annually to cover the cultivation of seasonal crops, and 5 million dinars in the first year to cover the expenses of afforestation. These should be increased gradually from year to year to a maximum of 12 million dinars in the 10th year in correspondance. With the programme of afforestation, This level of expenditure shall be maintained till the end of the project life. The operational expenses of the livestock and poultry production are estimated at 1.347 million dinars in the first year and this should be increased gradually to

about 7 million dinars in the 18th year, as indicated in the tables Numbers (10), (11) and (12).

The expected volume of agricultural production due to the development projects is estimated at 7 thousand tons of grains annually, 36 thousand tons of irrigated vegetables, and 11 thousand tons of rainfed vegetables. The expected volume of fruits, when the new trees reach maturity, is estimated at 14 thousand tons of olive, 20 thousand tons of grapes, 22 thousand tons of almonds, and 5.5 thousand tons of apples and an equal volume of Fig. The annual increase in red meat production is estimated at 5.7 thousand tons, fresh milk at 2.3 thousand tons. Egg production shall increase by 2% annually and the volume of increase during the last year of the project, after 30 years, shall be around to 60 million eggs. Poultry meat is to increase by 4% annually and the ultimate volume of increase at the end of the project life shall be 5.6 thousand tons annually.

The expected revenue from grains and vegetables is estimated at 8.8 million dinars annually at the end of the development operations, in the 6th year. The total annual revenue of the fruit trees at the end of the development operations, in year 26 is estimated at 15 million dinars. It is note-worthy that grapes shall be mixed-planted with olive trees and shall be pulled out when the olive trees reach maturity. As a result, the volume of revenue varies from year to year. The maximum annual revenue from livestock production of 5.4 M. dinars annually is expected after 10 years from the start of the project.

At the end of the development programme the expected total annual revenue from agricultural production is estimated at 33.7 million dinars as indicated in the table No. 12).

TABLE NO. (10)

CAPITAL COSTS OF THE PROPOSED DEVELOPMENT PROGRAMMES

Year	Structure, poultry farms and replacement cows	Terraces	Contour lines	Wells	Irrigation Canals	Fodder Stones fattening Centre	Forestry & Pasture Improvement	Total
1	407	1700	700	68	60	618	610	4236
2	407	1700	700	68	60	-	610	3545
3	407	1700	700	68	60	-	610	3540
4	407	1700	700	68	60	-	610	3245
5	107	1700	700	68	60	-	610	3245
6	107	-	-	68	60	-	610	785
7	107	-	-	68	-	-	610	785
8	107	-	-	68	-	-	610	785
9	107	-	-	68	-	-	610	785
10	107	-	-	68	-	-	610	785
11	107	-	-	-	60	618	-	785
12-15	428	-	-	-	240	-	-	668
16-20	535	-	-	-	-	-	-	535
Total	3040	8500	3500	680	600	1336	6100	23656

TABLE NO. (11)

TOTAL OPERATIONAL COSTS FOR PLANT AND LIVESTOCK PRODUCTION

Year	Plant Production	Livestock & Poultry	Total	Remarks
1	3574	1347	4921	These costs do not include operating costs of terraces, contour lines, cows replacement, poultry farms, fattening centres fodder stores, pasture improvement, afforestation, wells for collect- ing water.
2	4238	1800	6038	
3	4765	2333	7098	
4	5467	2798	8265	
5	6296	3263	9559	
6	7239	2728	10967	
7	8268	4193	12461	
8	9319	4662	13981	
9	10578	5123	15701	
10	12711	5588	18299	
11	12116	5703	17819	
12	12901	5818	19719	
13	13217	5933	19150	
14	14343	6088	20430	
15	14218	6163	20381	
16	13642	6278	19920	
17	13867	6393	20260	
18	13414	6508	19922	
19	12684	6623	19307	
20	12732	6738	19470	
21	12524	6853	19377	
22	12324	6968	19292	
23	12124	7083	19207	
24	11924	7198	19122	
25	11874	7313	19187	
26	11727	7428	19155	
27	12167	7543	19710	
28	12065	7658	19723	
29	12366	7773	20139	
30	12464	7888	20352	

TABLE NO. (12)

TOTAL REVENUE FROM AGRIC. PRODUCTION (1000 DINARS)

Year	Seasonal Crops	Fruits	Livestocks	Poultry	Total
1	7527	-	310	-	8237
2	7842	-	1852	158	9852
3	8164	440	2522	316	11342
4	8479	832	2956	474	12741
5	8811	1120	3353	632	13916
6	8811	1412	3750	790	14763
7	8811	2189	4147	948	16095
8	8811	3286	4544	1106	16848
9	8811	4434	4941	1264	19450
10	8811	5587	5338	1422	21185
11	8811	6917	5338	1580	22646
12	8811	8428	5338	1738	24315
13	8811	9792	5338	1896	25837
14	8811	11008	5338	2054	27211
15	8811	12048	5338	2212	28409
16	8811	12302	5338	2370	28821
17	8811	13091	5338	2528	29768
18	8811	13451	5338	2686	30286
19	8811	13811	5338	2844	30804
20	8811	14131	5338	3002	31322
21	8811	14531	5338	3160	31840
22	8811	14531	5338	3318	31998
23	8811	14531	5338	3476	32156
24	8811	14531	5338	3634	32314
25	8811	14531	5338	3792	32472
26	8811	14959	5338	3950	33058
27	8811	14959	5338	4108	33216
28	8811	14159	5338	4266	33374
29	8811	14159	5338	4424	33532
30	8811	14952	5338	4582	33690

2.2.1 Industrial Development :

The Industrial survey of the region of King Talal's Barrage shows that the region has about 175 industrial enterprises (small, medium and large) concentrated in some 20 towns and villages. Most of these enterprises (about 113) are small industrial land crafts, more than half of which is found in the 2 towns of GARASH and BUGHA'A only. The large and medium industries which contribute more than half the total revenue from industry in the Region are found in two main villages - EIN EL BASHA and ABU NUSEIR. From this survey are deducts the mal- distribution of industries in the villages and towns of the region. As a result of this infrastructure, such as roads, electricity and housing facilities, are concentrated in certain areas, while other areas are devoid all these services.

It is also noted that the existing industries are mostly of those limited hand crafts which do not serve other than the village community and can not help to develop the region significantly. Therefore, attention should be concentrated on the large industries which may serve the region as a whole and help towards the integration of the region by to self and towards its integration with the rest of the Kingdom. As a result the region shall be developed and all its areas shall be furnished with services.

On the other hand, the total volume of capital invested in the existing industires is estimated at 17 million dinars, about half of it is concentrated in the construction sector, while only 9% is devoted to the engineering and mineral industries.

At present, about 1500 employees are engaged in the industrial sector, earning about 1.7 million dinars annually. However, the number shall be increased with the establishment of the new industries. The resultant added value from this lively economic

sector is about 4.7 million dinars annually i.e. equal to about 480 dinars, annually, to every person in the families of the employees in these industries. This equals about 3% of the total added value of the Jordanian industrial sector and it is hoped that this percentage be increased.

To rectify the above situation of maldistribution of industry in the region, to make for the deficit in medium and large scale modern industries and to meet the requirements of giving employment to the biggest number of unemployed and also the need to introduce development and services to the region the study has proposed the establishment of 39 industries (including light, medium and large). These are to be distributed in the various parts of the region equitably, according to the population density, the presence of raw materials and industrial expertise as well as according to the basic needs.

The capital requirements of these industries are estimated at 13 million dinars and they shall provide employment to about 1500 persons in the region. Out of the proposed projects 17 were studied to ascertain their economic feasibility and other economic parameters such as employment, productive capacity, investment costs, added value as well as the Internal Rate of Return of the joint investments in the 17 industries. The study has shown that the group of 14 projects shall give employment to 500 persons who shall earn 700 thousand dinars annually. The capital investments of these industries are estimated at 3.17 million dinars and the resultant added value is estimated at 1.7 million dinars. The internal rate of return is calculated to be 31.2% . The project was also found to be feasible when subjected to the sensitivity analysis (increasing costs by 10% and decreasing revenue by 10%) giving IRR of 12.6% and 10.5%, respectively.

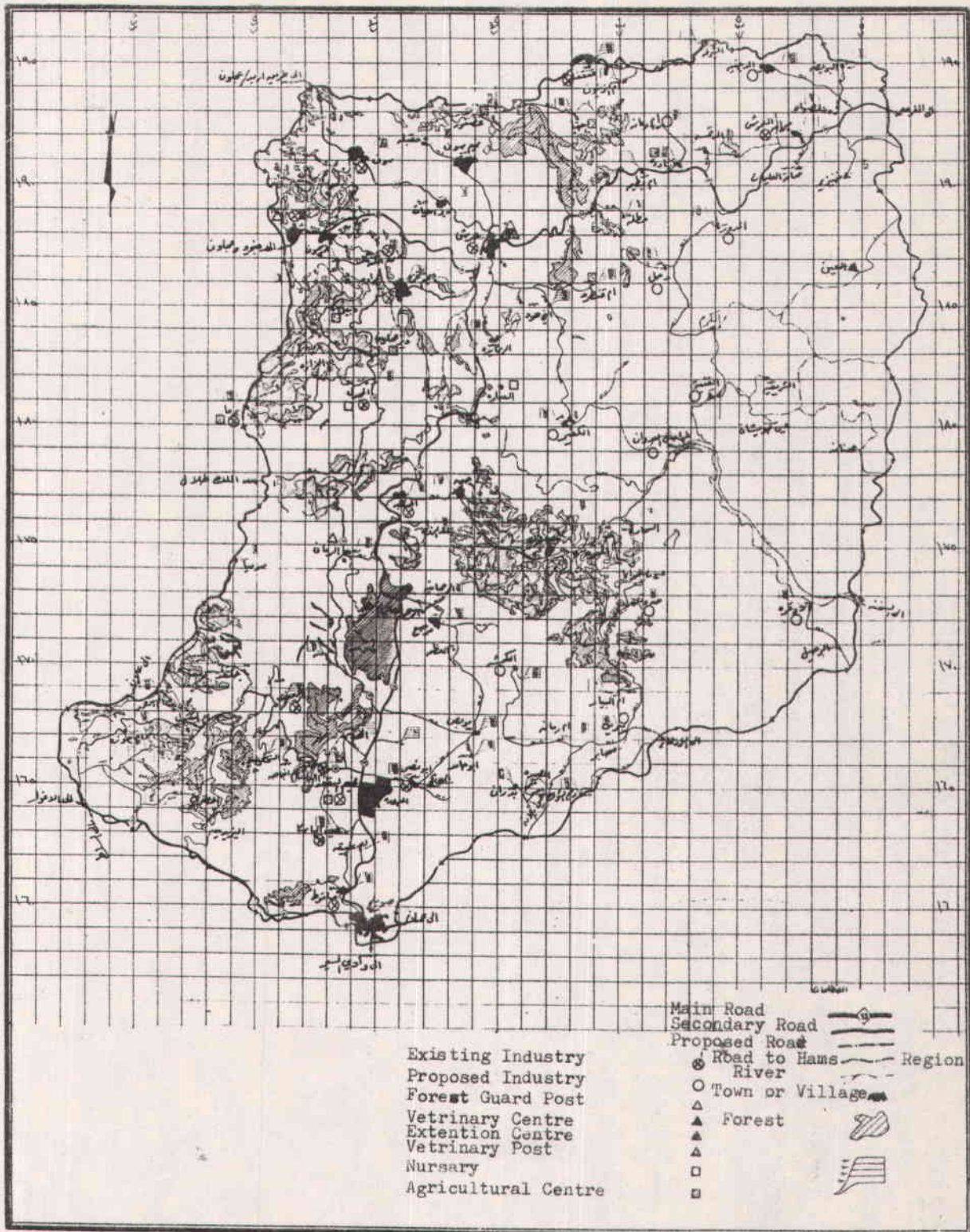
In order to encourage and promote the establishment of these industries, to attract the necessary capital, to support its execution, financially and technically, to help prospective entrepreneurs, to train the necessary cadre in the fields of operation and administration as well as to expand the existing industries and to solve their problems - the study proposes the establishment of specialized local agencies to provide industrial extension. It also proposes to establish training centres equipped with specialists and experienced people offering technical training and support to the new industry.

It is advised that a system should be worked out to grant entrepreneurs facilities and incentives which are not to be offered to the other inhabitants, such as grants, easy-term credits, exemption from duties, subsidized wages and salaries etc. The Government should also help with the establishment of towns and industrial centres, research stations .. etc.

The study also proposes the establishment of cooperative industrial societies which may provide the raw materials, industrial inputs at reasonable prices, guaranteed markets for the products with reasonable prices. The study highlights the complimentary role of the rural family in industry, similar to the family's role in agriculture. Attention should be given to training and the provision of infrastructure, especially roads, to facilitate the transport of goods and industrial products to the consumption markets in the region and to the export markets, outside the region. Moreover, roads shall facilitate the transport of raw materials from the sources for the region.

Map No. 2 shows the Industrial distribution in the region as well as the distribution of the agricultural services centres.

MAP NO. 2 : DISTRIBUTION OF AGRICULTURE AND INDUSTRY
IN THE REGION



3. Roads Network :

3.1. Planning and Costs :

Rehabilitation and planning of 256 kms tarmac roads in the region have already been completed following the design standards of the Jordanian - Hashimite Kingdom. This process included the study of each road separately according to a special form following an inventory of the roads. 57.8 kms of new roads were established (Table No. 13), as well as 23 kms of agricultural roads ; 43.4 kms of forests roads were improved in addition to the establishment of 227.7 kms of new forests roads. From the above mentioned table it becomes clear that the improvement process of the roads network has covered 314 kms of tarmac roads and 294 kms of the insurfaced roads at a total cost of 7.9 million dinars.

The classification of these roads according to the present situation and the future, after the improvement process, is shown in table number 2. From the Table it is clear that the lengths and costs of the roads differ in the three provinces. The province of IRBID enjoy's 40.7% of all the roads in the region, while the other two provinces of ELBALGHA'A and the capital have respectively 33.6% and 25.7%.

However, the distribution of the costs of the roads does not follow the same pattern. For example, 36% of the costs of the roads are in the province of the capital. This is due to the fact that 2 dams have been established on River Zargha'a, at the villages of Doughrah and Tawaheen El Udwan, on the new proposed road connecting JARASH Town with Zargha'a town, parallel to Zargha'a River. The road passes through the village Sukhnah and is considered to be very crucial for the development of the western and central parts of the Region. The costs of the roads in the

provinces of the capital and El Balghaa are estimated at 33% and 31% , respectively.

The importance of the new forest roads stems from the strategy to guarantee the best services and to conserve this national wealth from wild-fires. The fire that has exterminated 16000 forest trees from the forest of Late Wasfi El Tell, in 1975, has been very devasbating. In addition, other fires in other regions of the Kingdom occuring between the years 1962, 1974 have similarly been harmful, Fig. No. (2).

FIG. NO. (2)

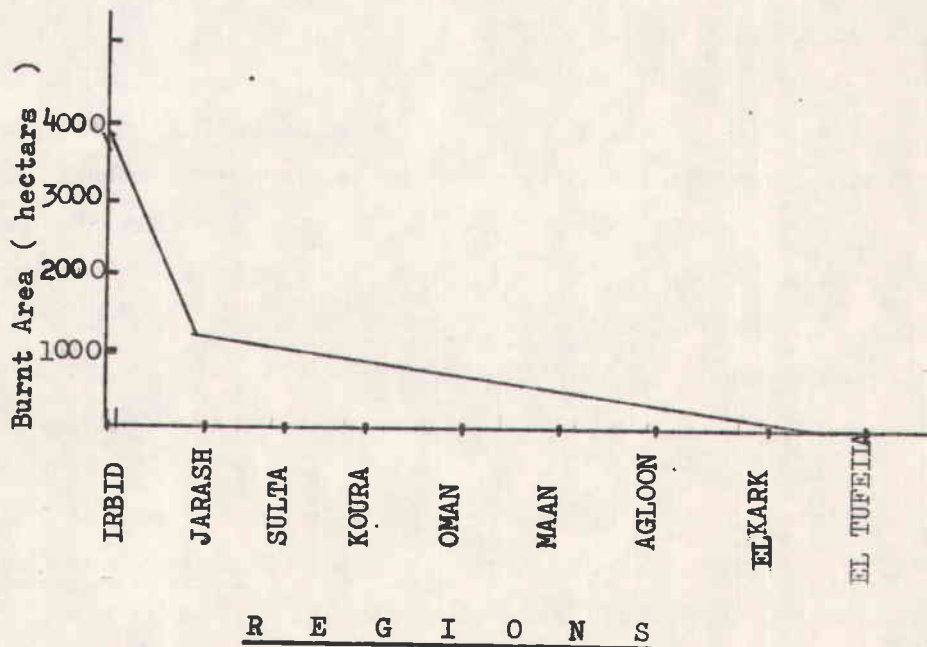


TABLE NO. (13)

SUMMARY OF OPERATIONS TO IMPROVE AND ESTABLISH ROADS
IN THE REGION

Description	Length km.	Costs (1000 dinars)	Remarks
<u>First : Improve the present</u> rural roads	256.41	3,932,230	Tarmac surface
<u>Second : Establish New :</u>			
- rural roads	57,800	2,624,770	Tarmac surface
- agric. roads	23,000	183,600	Unsurfaced to be tarmac later
<u>Third : Improve</u>			
Existing forest roads	43,450	116,400	Levelled, heaped, compacted
Establish new forest roads	227,700	1,059,530	Levelled, and heaped compactd

TABLE NO. (14)

SUMMARY : LENGTH & COSTS OF PROPOSED ROADS BY PROVINCES
SHOWING ROADS BEFORE & AFTER IMPROVEMENT .

Prov- ince	Length	Costs	Present Width			New Width			Type of Pav- ing				
			2	4	5	With- out	With	5.4	6	6.6	Earth	S.C.	H.M.
THE CAPITAL	22,00	304,850	*			*		*				*	
	22,00	728,200	*			*			*			*	
	10,50	130,170		*		*		*				*	
	7,30	124,100		*			*	*				*	
	6,05	112,675			*	*			*			*	
Total	65,85	141,995											
EL BALGA 'A	44,86	716,192	*			*		*				*	
	5,900	180,650	*			*			*			*	
	2,300	27,252	*				*		*			*	
	17,200	130,500	*				*	*				*	
	2,600	24,700		*			*	*				*	
	7,550	62,130			*	*		*				*	
	2,100	23,000			*		*	*				*	
	3,600	32,370			*	*		*				*	
Total	86,110	1217,895											
IRBID	50,05	699,20	*			*		*				*	
	23,85	477,25	*				*	*				*	
	15,10	120,80		*		*		*				*	
	0,70	4,90		*			*	*				*	
	4,75	1,20			*		*	*				*	
Total	104,45	1302,25											
72	256,41	3932,237	GRAND TOTAL										

The above roads net-work has been shown on areal contours (1/25000) and have been numbered to complete the data and costs tables covering all the roads mentioned above (

3.2 Traffic Movement and Criteria :

The study of the traffic movement along the net-work of rural roads is lengthy and diversified. However, it cannot be the main criterion for planning and extending those roads. The relative socio-economic importance gets mixed with the strategic and human criteria in planning and establishing rural roads. For the future development road planning should depend on the traffic volume and density till the year 2011. On this basis the roads were divided into 3 groups of different cross-sections, depending on the Jordanian criteria. This is based on the Jordanian design standard as well as on the criteria of designing roads by the Ministry of Public Works, with slight changes to reduce costs while preserving the safety of traffic. The criteria adopted by the Authority for rural roads have been compared with those followed in the Syrian Arab Republic, in the Arab Republic of Egypt, in the Democratic Republic of Sudan and in the Iraqi Republic with a view to find out how the criteria adopted in the study can compare with those of the Arab networks of rural roads.

The increase in traffic incidents in the Jordanian - Hashimite Kingdom, as seen in Table (15) below, shows that 20.3% of the incidents are caused by speed, 9% due to overturning, 6% due to out passing. Unfortunately 329 victims had to pay the price in 1979 and this number was increased to 447 in 1980. 62 sites have been identified as dangerous spots for traffic in the external roads by the Public Security Administration Traffic Dept. Three of these sites lie in the network within the Region (Table No. 15).

TABLE NO. (15)

Details	Y e a r s					
	1974	1975	1976	1977	1978	1979
Total	4911	5368	6873	8139	9020	11113
<u>Type of Incidents</u>						
	442	528	695	782	925	1047
Cohesion with people	1921	1891	2211	2382	2781	2866
Cohesion with cars	2648	2049	3867	4985	5314	7200
<u>Victims</u>						
Dead	284	253	329	355	515	344
Wounded	3249	3602	4029	4649	5247	6334

Source : Traffic Department Public Security Administration.

Table (16) shows the number of cars available in the region as well as their relative distribution, according to type. From the average annual travelled kilometers per car for the year 1981, it is shown that about 70.8% of the cars are either private saloons, service cars or taxi, while the different trucks constitute 25% of all cars. As there are 2351 cars in the region the ratio of these cars to the average daily travelled kilometers of about 784 kms is not found to be significant.

TABLE NO. 16

Type of Car	No.	%	Average travelled Kilometer for each car		Total travelled kms to all cars/year (1000 km)	%	
			Annual	Daily			
Private Saloon	1 370	58.27	21,000	57,5	28770	34.4	
Service Saloon & Taxi	283	12.04	65,000	178,1	18395	22.0	
Auto	99	4,21	65,000	178,1	6435	7.7	
Saloon Public & Bus +	382	16,25	65,000	178,1	24830	29.7	
Trucks	110	4,68	72,000	197,3	7920	9.5	
Lorries + Pickup	489	20,80	45,000	123,3	22005	26.4	
Total for all Cars	2733	100	**	53,600	146.9	83525	100

** Average travelled kilometers for the different 5 types of cars.

Travelled kilometers estimated annually for each car separately to calculate the costs of journeys by cars along the different roads in the Kingdom. These might be compatible with the travelled kilometers for cars in the studied region. This line gives the total of buses, public saloon . Service cars and taxi. This line is not included in the total.

3.3. The Soil :

The topography of the area shows that the region of King Talal Barrage, extending from EL BUGHAA Basin, Suweilih, Salt highlands,

Sail El Ramumain and River Zargha'a basin to Zarghaa town, Jarash highlands and Dubein forests, is of various altitudes and is covered with forest trees in various parts. The part with the red soil, which resembles the soil of the mediterranean, is of high fertility and is being utilized for the cultivation of fruit trees and crops, either irrigated from springs and streams or rainfed.

Variations in the side line slopes make these hills susceptible to erosion and therefore the removal of the fertile red soil leading to the appearance of stoney, sandy or mixed layers. This reduces the fertility of some of these parts.

Geologically, the area is composed of sedimentary lime stone, chert, Marl, Dolomite and mesozoic rocks. The dolomite rocks containing lime stone, chert and marl are buried beneath the agricultural soil which constitute the upper layer of the fertile soil on the high lands. Soil erosion has led to the loss of significant quantities of soil from the steeping parts to the bottom of the vallies. The steep slopes of the highlands in the lower region, i.e. the western side, have come as a result of a depression in the region which constitutes the valley of Jordan.

The red soil (Mediterranean soil), referred to above, covers most of the hilly region extending from Suwailih southward to Agloun and Euy Gina northwards. The yellow mediterranean soil covers the western slopes overlooking River Jordan and also the eastern hills lying between the desert and the mountainous regions.

The corrosion and erosion taking place due to the slopes has greatly affected the water courses and the valleys in the region. The most affected areas are found in the western part of

River Zargha'a, as well as in Bugha'a region directly to the north of Suwailih. In this area which has 15% slope running water has dug deep between 1 - 1.5 metres when flowing. In the other areas with more than 25% slope corrosion and erosion are greater depending on the state of the top soil. It is noted here that the forest areas constitute a barrier against soil creep and erosion. This is one of the best solutions to combat that problem.

The surface rocks that cover the soil constitute between 10% to 75% of the soil. About 53% of the area in the region contain between 10 - 50% of rocks while the percentage of the area with more rocks is not more than 7% of the whole area. About 40% of the available areas are partially covered with rocks, less than 10%.

The barrage of King Talal is situated on river Zarghaa at 79 metres above sea level and about 25 Kilometres from where it conjugates with river Jordan at Dir Ala. The height of the Barrage is 92 metres above the stream and 169 metres above sea level. The height of the barrage at the apex is equal to 330 metres. At full storage the normal level of the water surface reaches 164 metres, the lowest level is equal to 123 metres ; the total storage capacity is equal to 56 million cubic metres. The live storage capacity equals 48 million cubic metres, studies were made to add 15 metres to the present height and, thereby, increase the storage capacity of the barrage . The average annual flow of running water is estimated at 97 million cubic metres, at the lowest level, and 172 million cubic metres at the highest level. Therefore, the barrage can be filled twice in a normal year. Sedimentation is estimated at 1.25 million cubic metres annually and, therefore, the storage space devoted to sedimentation shall be filled within 6 years, diminishing the storage capacity at the rate of 2.5% per annum. This means that the barrage shall lose all its storage capacity within 10 years, as it shall be filled

with sediments. Accordingly there is need to carry out the necessary measures to overcome this problem. In effect certain preliminary measures have already been taken to assess the situation and to find out the best solutions.

3.4 Economic Feasibility :

The increase in the number of cars and the establishment and development of the roads network in the region should be reflected economically, by increasing the pace of economic and social activities, by the decreasing the costs of transport by way of increasing the speed and decreasing the time span of the journey.

Detailed analysis was made for the number of cars, their relative distribution, average annual travelled kilometers, the number of daily journey, the number of kilometres made annually on the rural roads in the region as compared with the relative distribution of the cars on the secondary roads in the Kingdom. It was found out that the highest ratio of annual travelled kilometers is made by the private saloon cars - 57/8% and this is compatible with the number of cars in the region. This shows that the relative importance of the public saloons, the bus and the private saloon are nearly equal.

For passenger cars, the travelled kilometers constitute 75% of the total on the rural roads in the region and 80% on the secondary roads. The trucks make 25% of the total travelled kilometers on the rural roads. This is due to the fact that the pickup cars are more suited to transport commodities and passengers along the rural roads, than the big trucks. These last constitute no more than 5% of the total travelled kilometers on the rural roads, 9.4% on the secondary roads and 35% on the main roads.

In spite of the expected increased relative importance of the

big trucks as a result of development in the area and also as a result of the increased industrial production, the relative importance of the various cars, in making journeys during the project life, is assumed to be constant, at the 1981 level. As the saving in the cost of journeys, made by the pickups on the roads, in the region, are a great deal less than that of the big trucks, (Similarly, in case of the private saloons as against the public saloons and the bus) the assumption of not changing the relationship of the relative distribution of the journeys, and therefore the annual travelled kilometers among the various types of cars means a reduction in the calculated savings in the cost of journeys, and therefore reduction in the internal rate of return. This means that the economic appraisal of the project has been lowered to some extent.

From the analysis of the journeys, costs it is found that the main differences of the tarmac roads with 6 and 6.5 metres width are the differences resulting due to development and the establishment of new roads - i.e. changing the rate of coarseness on the road.

The development and the establishment of new roads has decreased maintainance costs, fuel consumption, tyres wear and, therefore, extended the age of the car and increased its price.

All the above aspects have been appraised and analysed economically. They have been compared with the total costs of the projects, including the costs of establishment and maintainance. The internal rate of return was found to be 21.98%, which indicates that the project is feasible economically.

4. The Strategy of Planning and Development :

4.1 Social Development :

4.1.1. Population and the Labour Force :

The volume of the labour force shall increase at the rate of 300% by 2011, in comparison with 1979. The number shall be 77401 persons (15 - 64 yrs). If we deduct the unemployed who are not qualified physically, the students (at school age) and a certain ratio of unemployed women, the volume of the available labour force (excluding these in the camps) shall be 58050 persons by 2011, and 129810 persons if the inhabitants of the camps are included.

The required volume of employment according to the strategy of integrated socio-economic development is indicated by sectors below :-

A.	27000	labourers	Agricultural Sectors
B.	1944	"	Industrial sector
C.	17366	"	Services, army and police
	<hr/>		
	46310		Total

The average number of persons in a rural family is 6.76 persons and the effective members in a family constitute, on average, 1.9 persons. The number of population in the region shall reach 164766 persons according to the above strategy and this is less by 12035 persons when compared with the expected total population by the year 2011, i.e. with a rate of increase nearing 2.1% of the total population. This rate is lower than the accepted averages in this respect.

There is need to study, apprais. and organize the income of

the rural family. This should be raised to a level approaching that of the urban family through diversifying the sources of income, through proper agricultural and economic planning and through making the best use of the time of the rural family, use should be made of the Programme planning to increase the revenue and to organize a (mathematical model) which takes care of all the variables, limiting factors probabilities to come out with the best model.

The size of the population in the region should be kept either through decreasing the differences (socially and economically) between the rural areas and the town, or through population barriers which are productive and effective (socially and economically). These should surround the area as effective barriers against the the population movement and emigration outside the region. This shall help the planner to realize the objective and shall guarantee the execution of the development plans within the scope, conceptions and assumptions planned for.

4.1.2. Training and Education :

The philosophy of integrated rural development, based on the participation of the rural population in the integrated development process, necessitates the training and education of the inhabitants in the region. They should be able to participate effectively in the different social and economic activities to fill the vacuum created due to the fact that the qualified cadre avoid employment in the rural areas, on one hand, and to realise self-sufficiency (as far as possible) in these expertises. Multipurpose services and activities should be undertaken by the inhabitants of the Region, who should constitute the medium cadre that helps the advanced cadre and the specialists in realizing the integrated socio-economic development.

More attention should be paid to educating the rural woman and to qualifying her socially and economically in order to increase the effectiveness of the rural activities. This should strengthen the cohesion of the society, increase cooperation and increase the family income.

4.1.3. A. The existing vacuum due to the absence of any department or institution that takes care of integrated rural development created duplication, due to the overlap of activities of the official agencies working in the rural areas. Moreover, coordination is weak and there is no national integrated plan for rural development.

Therefore, the study proposes the establishment of a Higher Authority for rural development. Membership in the Authority should include high level representatives of other Ministries and Government agencies, specially National Planning Council, Ministries of Agriculture, Municipalities, Social Development, Public Works, etc which are concerned with rural development. A special legislation should be passed spelling the terms of reference, including planning and follow up of the execution of programmes and adopted plans. The following offices should be attached to the authority :-

- (1) Secretariat
- (2) Technical consultants and experts
- (3) Documentation, statistics and rural research centre.

The Organizational structure of the agencies working in the rural areas helps the central planner to know the reality, to define the objectives more precisely and to follow easily the execution of the plans which are meant to develop the rural areas within the context of a comprehensive national plan, encompassing the rural and urban areas, so that there is an equitable distribution of

investment.

B. The organization of the rural population in multipurpose rural cooperative societies (agricultural, industrial, consumer - oriented, housing etc) helps to facilitate the internal management of the small settlements scattered in the region. Moreover, this helps the official dealings between the Government units and the inhabitants through following up and reviewing the activities of those societies. There is need for a special legislation to be passed to coordinate the proposed societies with the present cooperative structure, and also with the credit agencies, financing corporations, banks and other related .

Should there be any reason for not carrying out this proposal either for the sake of reducing local points and power centres in the rural areas, where there are voluntary organizations and national municipal councils, or for any other reason, the responsibility of these rural cooperative societies should be entrusted to the rural and municipal councils. This also needs a special legislation.

4.1.4. Distribution of Services :

The philosophy of distributing services rests on priorities, which put foremost the region east of the isohyete 250 mm. This should be furnished with a developed networks of roads to connect the inhabitant communities in the region with the nearby large towns of Jarash, Zarghaa and Mufrigh . The two banks of river Zarghaa should be connected by 2 dams at the villages of Doughrah and Tawaheen- El Udwan. The main services should be concentrated in the axis GHUNNIYA - Tawaheen el - Udwan which constitutes the centre of the region that is badly in need of services and economic,

industrial, and agricultural activities. The volume of the required services has been analysed and studied, for each village separately. This was reviewed in conjunction with the existing services so that the deficit could be made for by the multi-purpose services centres, within the context of the objective of the study, to offer the best services at the least costs and in the shortest possible time. A policy for education and training was set, based on the maximum utilization of the existing educational institutions in the rural areas in addition to filling the gaps in every village, separately.

The philosophy of rural housing is based on a strategy of mutual cooperation between the rural inhabitants and the state. The trend should be that the rural families own the houses on certain conditions and rules. A legislation should be passed to guarantee the execution of rural planning, housing policy and ensure the participation of the rural people in this developmental process.

The adoption of the specific standards of the rural areas in execution, and in the provision of services shall save 3.3 million dinars in the field of education and training, and 17.77 million dinars in the field of public services, making total savings of about 21 m. dinars.

The existence of permanent Jordanian criteria for rural planning is becoming a necessity in the Kingdom. Consultancies and International organizations mix between the reality in the rural areas and development in the third world and that of the Modern World. As a result most of the proposed plans are not being executed, either due to unsuitability, or due to high costs. The new Jordanian criteria should be based on the philosophy of rural development, ensuring the participation of the rural people in the construction and maintenance operations with a view to reduce, to the extent possible, the need

for the advanced technical expertise.

4.1.5. Roads :

In planning and establishing roads, care was taken to connect the productive, marketing and services centres with one another in order to create a better socio-economic life. It was important, in setting priorities, to connect the large inhabited areas with the socio-economic centres, and to connect the rural roads with the main and secondary roads which traverse or surround the region.

In selecting forest roads care was taken that they do not cross trees sites so that these are not uprooted. Forest roads should be unsurfaced, suitable to the environment and should help to provide the necessary services and to transport vehicles and equipments to put out fires when needed.

The analysis of costs and revenue of roads shows that the project is economically feasible, in spite of the fact that the revenue from forest roads and the advantages of reducing incidents on all roads were not taken into consideration.

4.1.6. Identification of Village Sites :

Absence of data and detailed information concerning soil fertility and its suitability to agriculture diminishing the ability of the rural planner to identify the village sites on the basis of rural productive units, the required employment and, therefore, the number of population and the size of the community. Moreover, the absence of a detailed survey of the water sources in the different parts of the region adds another obstacle in identifying the village sites.

The haphazard division of the inhabitant communities resulting in unwarranted population increases puts strains on national investment and confuses the central planner . Therefore, a legislation should be passed to set criteria based on sound socio-economic bases.

4.2 Economic Development :

4.2.1. Economic Feasibility :

To come to the economic feasibility of the development programme of all the region of the lower basin River Zarghaa, economic analysis was carried out on the agricultural, industrial and road sectors, separately, following the traditional technique of project appraisal. Accordingly, the costs and revenue of each sector were calculated first " without development " and then " with development", then the additional costs and revenues, for each year of the 30 years of the economic life of the project. The total additional costs were deducted from the total additional revenues to get the net cash flow for each sector and then the internal rate of return.

The following sensitivity analysis tests were carried out to find out the influence of increasing costs and or reducing revenue on the internal rate of return :-

- 1) Increasing costs by 10%
- 2) Decreasing revenue by 10%
- 3) Increasing costs by 10% and reducing revenue by 18%.

The following table shows the internal rate of return of the sectors and the results of the sensitivity analysis.

TABLE NO. 17
INTERNAL RATE OF RETURN OF THE DEVELOPMENT PROGRAMME

Sector	IRR %	IRR with sensitivity analysis		
		Increase costs by 10%	Decrease Rev. by 10%	Increase Costs 10%, Dec. Rev. by 10%
Agriculture	19.8			7.9
Industry	31.3	12.6	10.6	
Roads	21.98			18.9

From the above table it is clear that the IRR of the development programmes of the agricultural, industrial and roads sectors is greater than the opportunity cost of capital in Jordan which is estimated at 10 - 12%, under the normal conditions of costs and revenue.

Increasing the costs by 10% and decreasing the revenue by the same rate for the agricultural sector reduces the IRR of this sector to about 8%. This rate is lower than that of other sectors and also lower than the opportunity cost of capital, in Jordan. It should be noted here that the revenue estimates were conservative and that some ensured revenues of agricultural development were not entered in the calculation of the IRR. For example, the expected revenue due to soil conservation and the reduction of sediments in the Barrage of King Talal. The reduction of sediments at the rate of 700 thousand cubic metres annually saves irrigation water for about 700 donum in the region of EL AGHWAR. The revenue is equal to 700 X the net revenue from a single donum in EL AGHAWAR region.

This revenue was not included in the calculations of the IRR of the development of the agricultural sector.

Increasing costs by 10% leads to the reduction of the IRR of the Industrial sector to 12.6%. On the other hand reducing revenue by 10% reduces the IRR to 10.3% . However, this rate is still within the range of the opportunity cost of capital.

It should be emphasized that industrial development in the region of the lower basin of River Zarghaa leads to the diversification of the economic activities and creates some balance among the different economic activities, thereby reducing the almost absolute dependence of the region on agriculture.

The internal rate of return of roads development under the normal conditions of costs and benefits is equal to 22%. This rate is reduced slightly to 18.9% if costs are increased and revenue decreased, both by 10%.

Reference should be made that the estimated revenue from developing roads considered for calculating the IRR did not include all expected revenues. For example, revenue due to opening forest roads and advantages of reducing road incidents as a result of developing existing roads. In addition to this, some other revenues are difficult to quantify. For example the advantages of joining the isolated rural pockets with other areas and connecting, organically, the rural areas with the urban centres.

In addition to the economic analysis of each project, separately the economic feasibility of all the development programmes, taken jointly, was all carried out. The net cash flows of the agricultural and industrial sectors were considered with the costs of rural

TABLE NO. 18

INTERNAL RATE OF RETURN OF COSTS & REVENUE OF ALL ECONOMIC AND
SERVICES SECTORS

Net Cash Flow :

Industry	Agriculture	Roads	Services	Total net cash flow	Total net cash flow discounted by 20%	Net cash flow discoun- ted by 25%
-2600	-2621	-1979	-435	-76350	-6360	-6108
166	-1605	-2069	-481	- 3889	-2703	-2489
916	-1075	-1690	-481	- 2330	-1351	-1193
1037	- 543	- 106	481	- 93	-10459	-9828
1037	- 662	1386	-481	1280	515	420
1037	1147	1375	-481	3078	1093	806
1037	1075	1458		3570	996	750
1037	308	570		2915	679	490
1037	1191	1756		3984	773	534
1037	327	1951		537	355	-933
-933	2298	1978		3343	451	287
1037	3655	2103		6795	761	469
1037	4746	2261		8044	748	442
1037	4840	2496		8373	653	368
783	6087	2742		9612	625	336
1037	6950	2825		10812	584	303
1037	7627	3009		11673	525	268
1037	8483	3231		2751	485	230
1037	9616	3533		14186	440	199
1037	9971	3852		14860	386	178
1037	10789	4013		15739	346	142
1037	10774	4280		16091	290	113
1037	11175	4590		16802	252	101
1037	11418	4988		17443	227	87
1037	11513	5408		17958	180	72
1037	12129	5678		18844	170	57
1037	11732	6063		18832	132	38
1037	11877	6497		19411	116	39
1037	11619	7028		19684	98	20
1037	11564	7592		20193	-10459	-9828
					+12142	+7141
					+ 1683	-2687

$$\text{Internal Rate of Return} = 20 + 5 \times \frac{1823}{4340} = 21.93\%$$

development (without taking into consideration any revenue due to this development). The internal rate of return of the whole development programme in the region was calculated to be 21.93% i.e. the programme is feasible economically. Moreover, when the programme is executed the state would have realized part of the objectives of the past and current development plans. Namely, the distribution of the advantages of development equitably among the different regions of the Kingdom, and diminishing the differences between the rural and urban societies.

4.2.2. Programme Capital Costs :

Total capital costs are estimated at about 37.5 million dinars distributed among the sectors as follows :-

TABLE NO. 19

<u>Sector</u>	<u>Capital Costs(1000 dinars)</u>	<u>% of total costs</u>
Agriculture	23656	63.8
Industry	3170	8.4
Roads	7916	21.1
Rural Development	2840	7.6
	<u>39582</u>	<u>100.9</u>
	=====	=====

The required capital costs for the agricultural sector constitute more than 60% of the total capital costs ; for roads 20%.

The execution of this programme requires the participation of the Government and the private sector, in financing the projects. Naturally, the Government shall take care of the activities concerning forests, the establishment of fodder and fattening centre

within the agricultural sector as well as developing all roads in addition to the rural development. Other agricultural and industrial projects are meant for the private sector. There is need to provide the necessary financing for these projects from the industrial development bank, Financing institutions, cooperative societies so that the private sector is able to finance these projects whether at the establishment phase, the operational phase or during maintenance.

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