THE HASHEMITE KINGDOM OF JORDAN
MINISTRY OF MUNICIPAL AND RURAL AFFAIRS
AND THE ENVIRONMENT

THE STUDY ON INTEGRATED REGIONAL DEVELOPMENT MASTER PLAN FOR THE KARAK-TAFILA DEVELOPMEHT REGION

VOLUME 1 EXECUTIVE SUMMARY

March 1988

JAPAN INTERNATIONAL COOPERATION AGENCY

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FOR THE KARAK - TAFILA DEVELOPMENT REGION

FINAL REPORT

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PREFACE

In response to the request of the Government of the Hashemite Kingdom of Jordan, the Government of Japan agreed to conduct a study of Integrated Regional Development Master Plan for the Karak-Tafila Development Region and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Jordan a study team headed by Mr. Keiichi Terada, Nippon Koei Co., Ltd., during the period from July 1986 to November 1987.

The team had discussions on the study with the officials concerned of the Government of Jordan and of Karak and Tafila Governorates, and conducted a field survey in the Karak-Tafila Development Region. After the team returned to Japan, further studies were made and the present report has been prepared.

I hope that this report will serve for the development of the area and contribute to the promotion of friendly relationships between our two countries.

I wish to express my deep appreciation to the officials concerned of the Government of the Hashemite Kingdom of Jordan for their close cooperation extended to the team.

March 1988

Kensuke Yanagiya

Kensuke Yanagiya
President
Japan International Cooperation Agency

Mr. Kensuke Yanagiya
President
Japan International Cooperation Agency (JICA)
1-1, Nishi Shinjuku 2-chome
Shinjuku-ku, Tokyo, JAPAN

March 1988

Dear Sir,

Letter of Transmittal

We are pleased to submit to you the Final Report of the Study of Integrated Regional Development Master Plan for the Karak-Tafila Development Region for consideration by the Government of the Hashemite Kingdom of Jordan in contriving the development of the region.

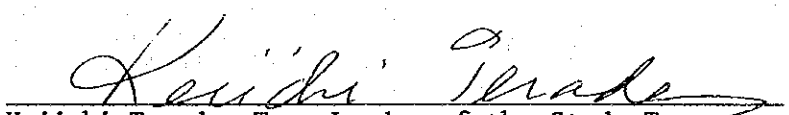
The Karak-Tafila Development Region needs strategic development in Highlands agriculture, tourism and small to medium scale industries in particular to accelerate economic development of the region, in compliance with the decentralization policy of the Government of Jordan. The water required for the proposed development will be secured within the natural recharge capacity of the aquifer and surface flow potential.

The Final Report consists of four volumes: Executive Summary; Main Report - Part 1 = Master Plan Study; Main Report - Part 2 = Preparatory Studies of Priority Projects; and Supporting Reports.

The Executive Summary presents in outline the recommended Master Plan and six priority projects which were selected from among the 40 Master Plan Projects. The Main Report - Part 1 describes the present conditions of the region, alternative scenarios of development and targets, and presents the Master Plan, including requirements and recommendations for implementation of the Master Plan. The Main Report - Part 2 contains the study results of the six priority projects. The Supporting Reports contain the results of ten sector studies associated with the Master Plan Study and the Preparatory Studies of Priority Projects, and cover present conditions, development potential and targets, and the development plan of each sector.

All the members of the Study Team would like to acknowledge gratefully the assistance extended by the officials and other individuals of Jordan, the personnel of your Agency, the seven Sector Committees, the Regional Development Councils of Karak and Tafila Governorates and all the Ministries and Authorities concerned. We sincerely hope that the study results will contribute to the future development of the region in particular and to the socioeconomic development of Jordan and well-being of its people.

Sincerely yours,



Keiichi Terada, Team Leader of the Study ~~Team~~
of the Integrated Regional Development Master Plan
for the Karak-Tafila Development Region

THE MASTER PLAN AND PRIORITY PROJECTS

AT A GLANCE

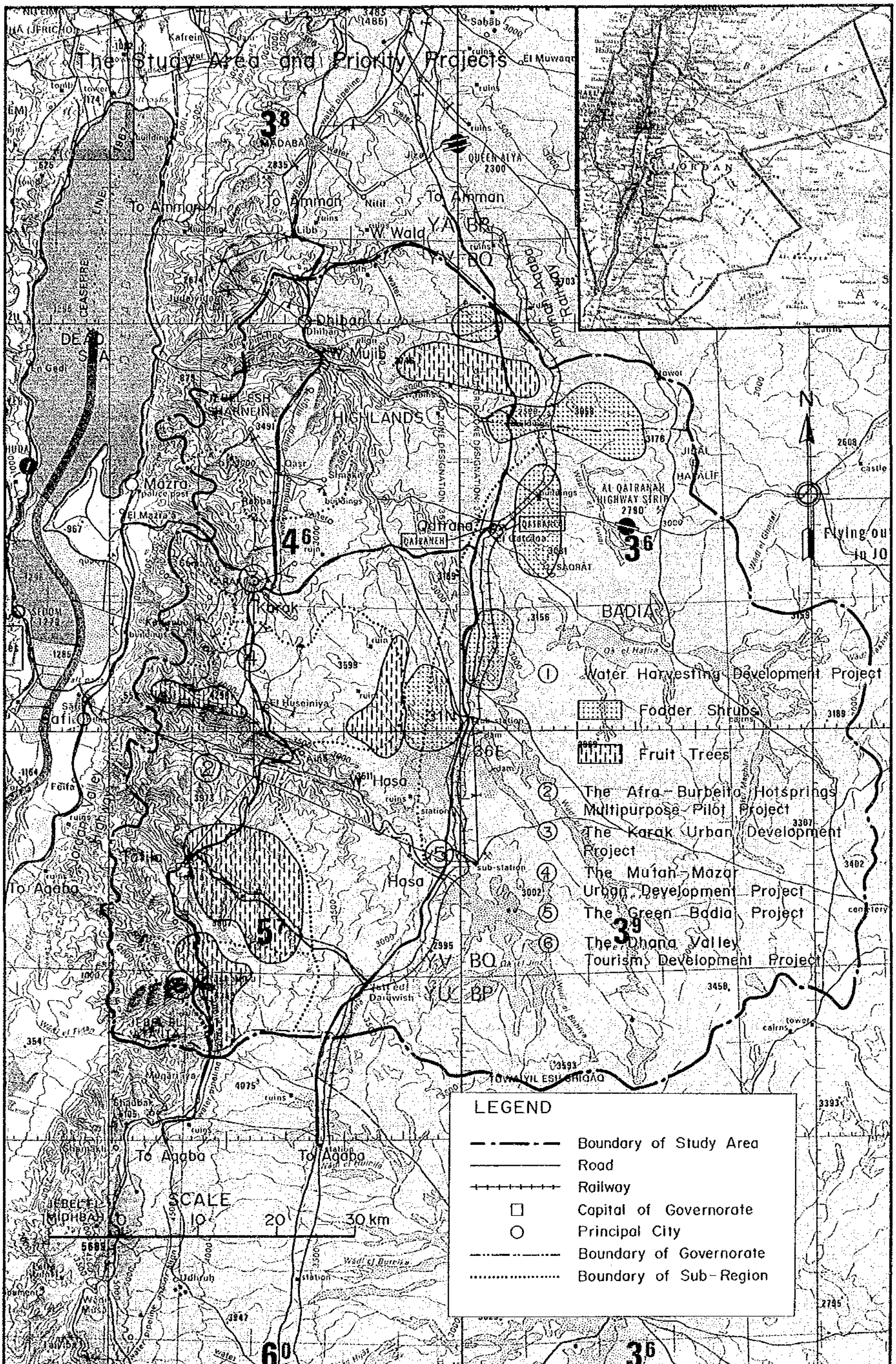

The Study Area and Priority Projects
① Water Harvesting Development Project
Fodder Shrubs
Fruit Trees
② The Afra-Burbeita Hotsprings Multipurpose Pilot Project
③ The Karak Urban Development Project
④ The Mutah-Mazar Urban Development Project
⑤ The Green Badia Project
⑥ The Dhana Valley Tourism Development Project
LEGEND
Boundary of Study Area
Road
Railway
Capital of Governorate
Principal City
Boundary of Governorate
Boundary of Sub-Region
SCALE
0 10 20 30 km
DEAD SEA
HIGHLANDS
BADIA
Karak
Tafila
Madaba
Dhiban
Mazra
Qatrana
Hasa
To Amman
To Aqaba
N

Fig. S-1 Work Flow of the Study

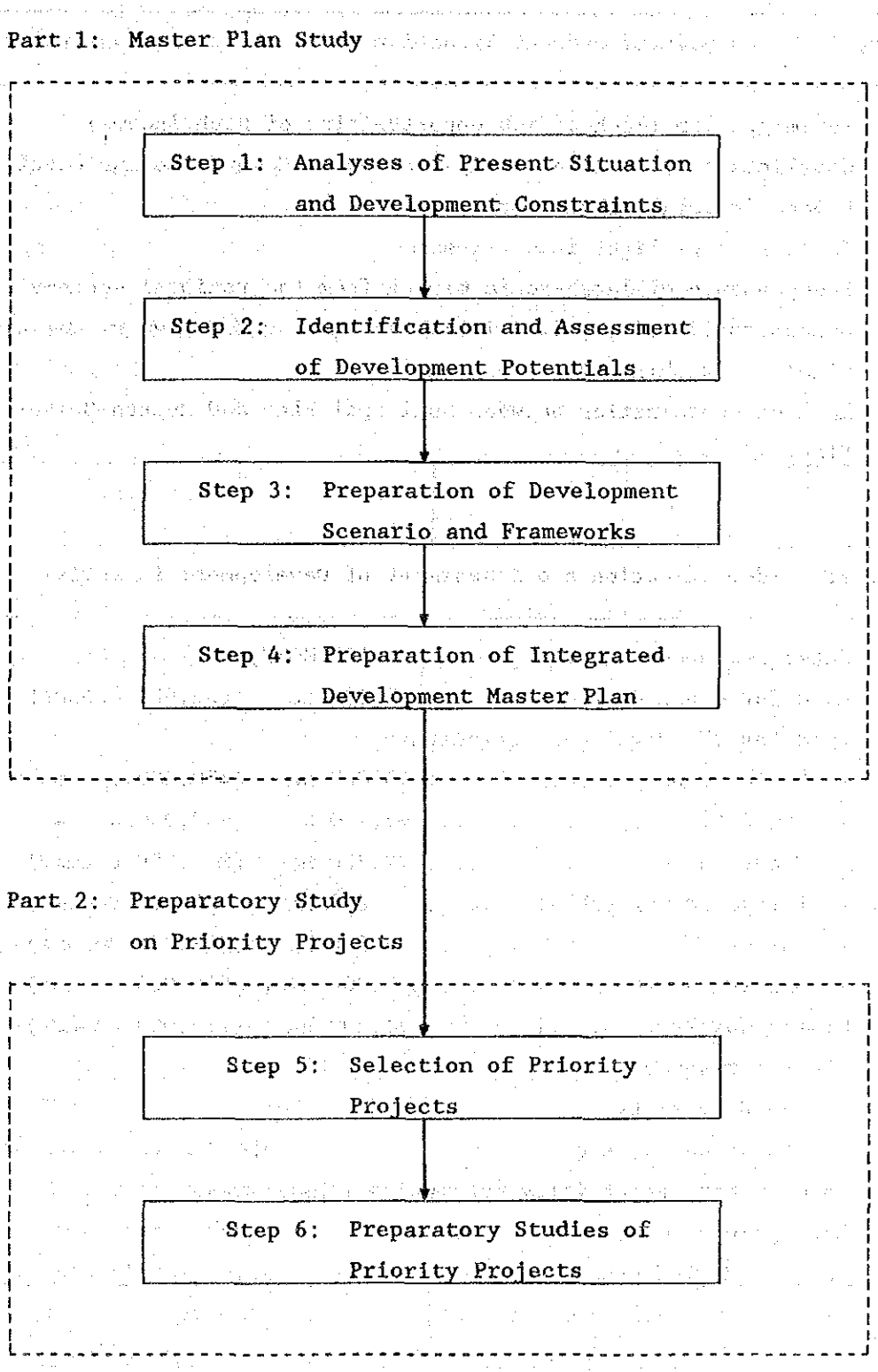


Fig. S-2 Principal Findings at Each Work Step (1/3)

Step 1: Analysis of Present Situation and Development Constraints

(1) Out-migration (lack of job opportunities of high income)
(2) Conflicts between local irrigation water demand and municipal demand in large urban centres
(3) Immaturity of light industries
(4) Independence of large-scale mining from the regional economy
(5) Concentration of population and economic activities in the western Highlands within the Study Area
(6) Lack of coordination between Municipal Plan and Mu'tah University Plan

↓

Step 2: Identification and Assessment of Development Potentials

(1) Water resources ..... 185 MCM/yr
(2) Land for urban development ... 3,600 ha (36,000 dunums)
(3) Land for the Highlands agriculture
- Field crops ..... 43,000 ha (430,000 dunums)
- Fruit trees ..... 45,200 ha (452,000 dunums)
- Fodder shrubs ..... 22,200 ha (222,000 dunums)
- Irrigated vegetables ..... 800 ha (8,000 dunums)
- Forest ..... 74,900 ha (749,000 dunums)
- Grazing & others .....551,000 ha (5,510,000 dunums)

(4) Mining quarry ..... 71,500 ha (715,000 dunums)
(5) Mineral resources
(6) Mu'tah University
(7) Castle of Karak, etc.
(8) Road, water, electricity, communications systems
(9) Hot springs
(10) Solar and wind energy

↓

Fig. S-2 Principal Findings at Each Work Step (2/3)

Step 3: Preparation of Development Scenario and Frameworks

		Policy	Population	Share (%)
(1)	Scenario 1:	Out-migration continues	220,000	4.4
(2)	Scenario 2:	Stop out-migration by year 2005	248,000	4.9
(3)	Scenario 3:	Increase the population share from 5.3 % in 1985 to 5.4 % in 2005	270,000	5.4

Frameworks for Selected Scenario 3 in 2005

(1) Population 270,000
(2) Job opportunities 62,000
(3) GRDP ..... JD 250 million
- Agriculture sector ..... JD 21
- Mining sector ..... JD 60
- Industry sector ..... JD 85
- Services sector ..... JD 84

(4) Per capita GRDP excluding mining sector .. JD 720 (national level)

Step 4: Preparation of Integrated Development Master Plan

(1) 3 Development Sub-areas

	Area in km^2	Population	
	(2005)	(1985)	(2005)
- Rural	3,874	86,000	140,000
- Urban	21	50,000	100,000
- Badia	4,205	7,000	30,000
Total	8,100	143,000	270,000

(2) 40 Master Plan Projects
- 27 projects for the Rural Development Sub-area
- 4 projects for the Urban Development Sub-area
- 9 projects for the Badia Development Sub-area

(3) Required Investment ..... JD 1,210 - 1,520 million for the period 1986-2005 (JD 60.5 - 76.0 million per annum)

Fig. S-2 Principal Findings at Each Work Step (3/3)

Step 5: Selection of Priority Projects

(1) Selection Criteria

- Urgent need
- Small to medium scale projects
- At least one project from each Development Sub-area
- Productive projects (contribution to improvement of income levels and to creation of job opportunities)
- Contribution to balanced socio-economy, especially to development of the least developed areas
- Pioneer and innovative projects
- Contribution to environmental conservation

(2) Selected Six Projects

- WATER HARVESTING DEVELOPMENT PROJECT
- AFRA-BURBEITA HOT SPRINGS MULTIPURPOSE PILOT PROJECT
- KARAK URBAN DEVELOPMENT PROJECT
- MU'TAH-MAZAR URBAN DEVELOPMENT PROJECT
- GREEN BADIA PROJECT
- DHANA VALLEY TOURISM DEVELOPMENT PROJECT

Step 6: Preparatory Studies of Priority Projects

See Figs. S-3 and S-4 for outlines of six priority projects

Fig. S-3 Outlines of Six Priority Projects

Water Harvesting Development Project

- Pilot Scheme
  - 56 ha for Winter Irrigation
  - 82 ha for Micro-catchments
- Water Harvesting Scheme
  - Fruit: 45,200 ha
  - Fodder: 22,200 ha (gross area)
  - Microcatchment
  - Contour furrow
  - Runoff farming
- Winter Irrigation Scheme (300 ha)
  - 6 dam schemes
  - 5 weir schemes

Afra-Burbeita Hot Springs Multipurpose Pilot Project

- Aquaculture Scheme
  - Tilapia: 150 t/yr
  - Prawn: 8 t/yr
- Greenhouse Horticulture Scheme (0.45 ha in floor area, fruit, flower, mushroom)
- Irrigated Agriculture Scheme
  - Existing 78 ha
  - Reclamation 25 ha
- Tourism Scheme
  - Rest House (50 bedrooms)
  - Medical Rehabilitation Station

Karak Urban Development Project

- Population 36,000
- Land 586 ha
- Relocation of Administrative function to New Karak
- Handicraft Centre
  - 40 employees
  - 700 m^2 in floor
- Karak Museum City
  - Restoration of Castle, Wall, Towers, Historic Quarter
  - Event programme
- New Karak
  - *Combined Governmental Complex*
  - Shopping Centre
  - Central Plaza
  - Traffic Terminal
  - Green open space
  - Quality housing

Mu'tah-Mazar Urban Development Project

- Population 30,000
- Land 441 ha
- Mu'tah Industrial Estate Programme
  - 2,500 employees
  - 33 ha in land area
- Urban Development Programme
  - Parco Mu'tah (Shopping Centre)
  - Hotel (40 rooms)
  - Regional Medical Centre with *Advanced Nursing* School
  - People's hall
  - Quality housing
  - Sports ground
  - Neighbourhood parks (10 ha in total)

Green Badia Project

- Population 25,000
- Land 1,173 ha
- *Water Programme*
  - Tailings dam
  - Hasa dam
  - Darawish well field & pipelines
- Environment & Tourism Programmes
  - Oasis Water Park
  - Productive Green Park
  - Badia Wonderland
  - Badia Country Club (Polo and golf)
- *Hasa New Town Prog.*
  - Housing
  - Shopping Centre
  - Community Centre
  - Badia Development Institute
- New Energy Programme
  - Solar Village
  - Watering Station
  - Pilot Plant

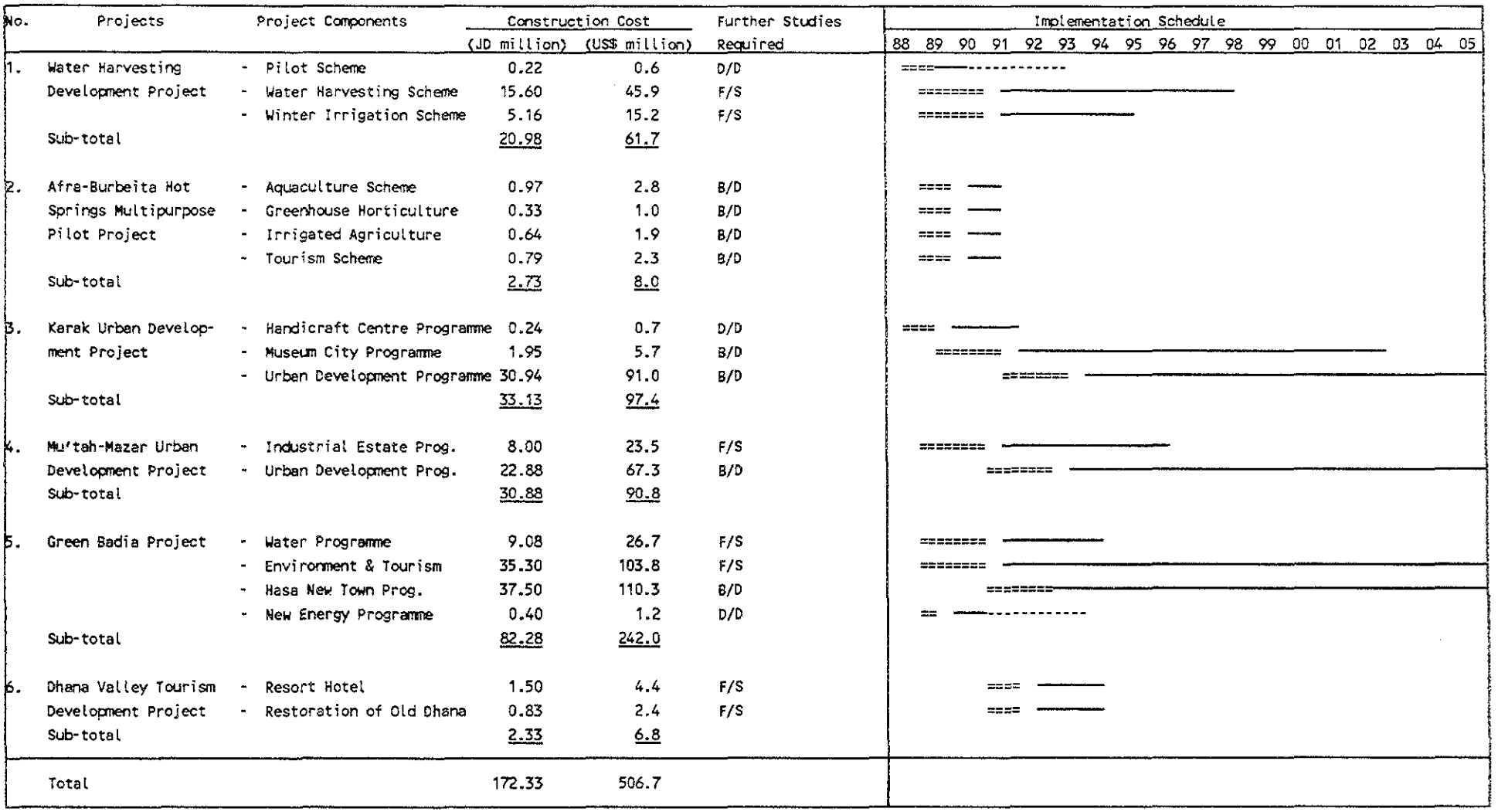
Dhana Valley Tourism Development Project

- Resort Hotel (100 rooms)
- Restoration of Old Dhana Village
- Hiking course
- Heliport

Fig. S-4 Construction Costs and Implementation Schedule of Six Priority Projects

No.	Projects	Project Components	Construction Cost (JD million)	Construction Cost (US$ million)	Further Studies Required
1.	Water Harvesting Development Project	- Pilot Scheme	0.22	0.6	D/D
		- Water Harvesting Scheme	15.60	45.9	F/S
		- Winter Irrigation Scheme	5.16	15.2	F/S
	Sub-total		20.98	61.7	
2.	Afra-Burbeita Hot Springs Multipurpose Pilot Project	- Aquaculture Scheme	0.97	2.8	B/D
		- Greenhouse Horticulture	0.33	1.0	B/D
		- Irrigated Agriculture	0.64	1.9	B/D
		- Tourism Scheme	0.79	2.3	B/D
	Sub-total		2.73	8.0	
3.	Karak Urban Development Project	- Handicraft Centre Programme	0.24	0.7	D/D
		- Museum City Programme	1.95	5.7	B/D
		- Urban Development Programme	30.94	91.0	B/D
	Sub-total		33.13	97.4	
4.	Mu'tah-Mazar Urban Development Project	- Industrial Estate Prog.	8.00	23.5	F/S
		- Urban Development Prog.	22.88	67.3	B/D
	Sub-total		30.88	90.8	
5.	Green Badia Project	- Water Programme	9.08	26.7	F/S
		- Environment & Tourism	35.30	103.8	F/S
		- Hasa New Town Prog.	37.50	110.3	B/D
		- New Energy Programme	0.40	1.2	D/D
	Sub-total		82.28	242.0	
6.	Dhana Valley Tourism Development Project	- Resort Hotel	1.50	4.4	F/S
		- Restoration of Old Dhana	0.83	2.4	F/S
	Sub-total		2.33	6.8	
	Total		172.33	506.7	

Implementation Schedule: 88 89 90 91 92 93 94 95 96 97 98 99 00 01 02 03 04 05



====: study ——: construction ----: experimental operation F/S: feasibility study B/D: basic design D/D: detailed design

EXECUTIVE SUMMARY

THE STUDY ON
INTEGRATED DEVELOPMENT MASTER PLAN
FOR THE KARAK - TAFILA DEVELOPMENT REGION

FINAL REPORT

VOLUME 1: EXECUTIVE SUMMARY

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ABBREVIATIONS

(1) Organizations

JICA	Japan International Cooperation Agency
JVA	Jordan Valley Authority
MCTA	Ministry of Culture, Tourism and Antiquities
MOP	Ministry of Planning
MMRAE	Ministry of Municipal and Rural Affairs and the Environment
NRA	Natural Resources Authority
RSS	Royal Scientific Society
WAJ	Water Authority of Jordan

(2) Economic Terms

JD	Jordanian Dinars
GNP	Gross National Product
GDP	Gross Domestic Product
GRDP	Gross Regional Domestic Product
ICOR	Incremental Capital Output Ratio

(3) Measurement

mm	millimetre	cm^2	square centimetre
cm	centimetre	m^2	square metre
m	metre	ha	hectare
km	kilometer	km^2	square kilometer
cm^3	cubic centimetre	mg	milligramme
l, lit	liter	g	gramme
m^3	cubic metre	kg	kilogramme
MCM	million cubic metre	ton	metric ton
bbl	barrel	t.o.e.	tons of oil equivalent
s, sec	second	o	degree
min	minute	'	minute
h, hr	hour	"	second
y, yr	year	^oC	degree Celsius
V	Volt	m^3/s	cubic metre per second
A	Ampere	lcd	liter per capita per day
W	Watt		
kW	kiloWatt	kWh	kiloWatt-hour
MW	megaWatt	MWh	megaWatt-hour
GW	gigaWatt	GWh	gigaWatt-hour
10^3	thousand	10^6	million
ppm	parts per million	ppt	parts per thousand
ø	diameter in mm		

(4) Exchange rate

US$ 1.00 = JD 0.34 (the prevailing rate in mid 1987)

1. INTRODUCTION

The Government of the Hashemite Kingdom of Jordan (the Government of Jordan) recognizes integrated regional development as an important tool in development strategy. Accordingly integrated development master plans have now been prepared for each region on the East Bank of the Jordan. In August 1982, the Government of Jordan requested the Government of Japan to undertake an integrated regional master plan study for the Karak-Tafila Development Region (the Study). In response to this request, the Japan International Cooperation Agency (JICA), the official agency for technical cooperation of the Government of Japan, dispatched a study team in July 1986 to commence the Study.

The Study was undertaken in six steps, as shown in "The Master Plan and Priority Projects at a Glance" at the beginning of this report together with principal findings of each step, and outlines, costs and implementation schedule of six priority projects.

The Study Area, 8,100 km^2 in total area, is located in the Highlands to the south of Greater Amman, and mainly covers Karak and Tafila Governorates. Safi Sub-region of Karak Governorate was excluded from the Study Area because it has been designated as part of the development area of Jordan Valley Authority (JVA). While part of Amman Governorate to the south of the main river course of Wadi Wala was included in the Study Area as it was not covered in the master plan prepared for Amman-Balqa Region in 1979.

The Study was undertaken by the JICA Study Team with cooperation from the Ministry of Municipal and Rural Affairs and the Environment (MMRAE), the Ministry of Planning (MOP), and other ministries and agencies concerned of the Government of Jordan, including the Regional Development Councils of Karak and Tafila Governorates. Furthermore, seven Sector Committees were formed to review the Study and provide appropriate guidelines to the Study Team. Each Sector Committee was comprised of representatives of the ministries and agencies concerned.

The Sector Committees covered (A) water, (B) agriculture, (C) labour force, (D) education and higher education, (E) industry, mining and tourism, (F) transportation, communications and energy, and (G) housing and urban planning.

The Study Team maintained close collaboration throughout with counterparts from MMRAE and MOP, and members of Sector Committees, through daily work and workshops held almost every two weeks for transfer of planning technology and coordination.

2. MASTER PLAN

Master Plan of Techno-Highland Karak-Tafila

for harmonious life styles between:

- Rural peace and urban dynamics,
- Traditional culture and modern technology,
- Academy and business

The Study Area has become left behind in the socioeconomic development of the Kingdom as may be seen from Table 1: the per capita GRDP in 1985 was JD 381 excluding the contribution of the mining sector (equivalent to US$ 1,120 at an exchange rate of US$ 1 = JD 0.34), which was only 75 per cent of the national average at JD 509 (US$ 1,497); and the population growth rate was 2.8 per cent per annum during the period 1979-1985 which was much lower than the national average of 3.7 per cent per annum, and probably signifying out-migration during this period (see Figs. 1 to 4 for the present conditions).

Past development of large scale mines in the region has had no substantial impact on the regional economy except for some increase in employment. The young but well-educated labour force in the region appears to have out-migrated towards Greater Amman seeking job opportunities and higher incomes. An intensive development plan for the region is therefore desired by the local governments and the people.

This Master Plan has been prepared by identifying the regional resources and assessing their development potentials. The principal target of the development is set at raising the per capita GRDP to JD 720 (US$ 2,100) by the year 2005, which is the projected national average. It is also targeted to raise the share of population from the present 5.3 per cent to 5.4 per cent of the national population by the year 2005. The total labour force would be 62,000 being 22.9 per cent of the projected population of 270,000 in the year 2005 (see Tables 2 to

4 for the socioeconomic frameworks).

The GRDP should reach JD 250 million (US$ 735 million) by 2005, of which 8.4 per cent should be produced by the agricultural sector, 58.0 per cent by the mining and industrial sector, and the remaining 33.6 per cent by the services sector.

In this Master Plan, the population growth rate is targeted at 3.2 per cent per annum on an average during the plan period of 20 years (1986-2005) in conjunction with the overall economic growth rate targeted at 4.8 per cent per annum.

This Master Plan has been prepared for three development sub-areas (see Fig. 8): the Rural Development Sub-area, the Urban Development Sub-area; and the Badia Development Sub-area. Furthermore, an urban hierarchy system is proposed for efficient provision of urban services not only to urban residents but also to the people in the surrounding rural areas and the Badia as well. It consists of four Strategic Urban Centres (Karak, Tafila, Mu'tah-Mazar and Hasa), nine Secondary Urban Centres (Ayy, Tayybeh, Faqqoo, Rabba, Moab, Bseira, Ain Al Baida, Dhiban and Qatrana), and about 80 New Villages which will be reformed by consolidating existing small villages of 157 as of 1987. The Master Plan includes 40 Master Plan Projects in total as listed in Table 7 (see Figs. 3 and 5 to 7 for the planned spatial structure, future landuse plan, proposed industries and tourism network).

The Rural Development Sub-area: the population would be 140,000 by the year 2005, or 52 per cent of the whole region. The Sub-area includes eight Secondary Urban Centres and most of the New Villages. It is proposed that rainfed agriculture and animal husbandry be promoted as the principal economic activity in the Sub-area by implementing the Water Harvesting Project for fruit trees and fodder shrubs, which would be planted on 67,400 ha of land in total gross area (see Table 6 for the present landuse and future plan). This will be complemented by the other agricultural projects proposed. Afforestation would be accelerated to conserve soils and rainwater as well as for improving the living

environment. At the same time, the New Village Project will be implemented to improve living standards in the rural areas with an improved quality supply of basic human needs such as education and public health.

The Urban Development Sub-area: the population would be doubled to 100,000 by the year 2005. As principal productive sectors in the urban centres, it is recommended that tourism and small to medium scale industries be promoted including transportation and communications services. The proposed tourism development in Old Karak and industrial development in Mu'tah would lead the economic development of the region. For promoting urban development, physical and social infrastructures and urban facilities should be expanded including the supply of quality housing.

The Badia Development Sub-area: this needs socioeconomic development including rehabilitation of the natural environment with greenery as development in the past has been limited to mining activities. With the water resources available around Hasa, the Green Badia Project is proposed to establish Hasa New Town as a growth point in the Badia. The principal economic activities proposed in the Badia will be animal husbandry, transportation and tourism in the short-term. In the long run small and medium scale industries will also be introduced. Irrigated agriculture is not recommended due to the limited water resources available except for small scale farming to supply fresh vegetables and flowers to be planted around urban centres. Instead, establishment of a productive green park and reafforestation are recommended in conjunction with tourism development and environmental rehabilitation for human settlement.

The water requirements for the proposed Master Plan Projects could be satisfied although utmost efforts will be required to expedite implementation of various water supply projects conceived for municipal water supply to Greater Amman and to re-examine the water requirement of the Dead Sea Chemical Complex planned in the Southern Ghor. The overall water demand of the Mujib-Hasa basin in the year 2005 was projected to be about 203.4 MCM/yr consisting of the regional demand of 59.3 MCM/yr,

the demands of existing irrigated agriculture in the north bank of Wadi Wala (21.0 MCM/yr), the irrigation and industrial demands of the Southern Ghor (87.1 MCM/yr), and the municipal demand of Greater Amman (36.0 MCM/yr), while the overall potential of the water supply was assessed to be about 184.9 MCM/yr, suggesting a water shortage of about 18.5 MCM/yr in future. With this imbalance of water supply and demand, four alternative water allocation plans have been prepared as shown in Table 5.

The proposed development of groundwater resources will be within the natural recharge capacity of the aquifer in general, but it has to be pointed that all water development in the Study Area will inevitably contribute to the further lowering of the level of the Dead Sea which is already having adverse effects on the Arab Potash Company's operations.

Realization of the proposed Master Plan would contribute not only to the region's development but also to national food security mainly in fruits and red meat, decentralization of population and socioeconomic activities in Greater Amman, social stability through absorbing unemployment, and the quality life in the Kingdom generally.

To achieve the development targets, a total investment of JD 1,210 to 1,520 million will be required over the plan period of 20 years. This means that about JD 60.5 to 76.0 million per annum (equivalent to US$ 178 to 224 million) should be invested in the region or the equivalent of 9.0 to 11.3 per cent of total national investment. This share is about double the region's population share. To stimulate private investment, a branch of the regional development fund should be established in the Study Area.

3. PREPARATORY STUDIES OF PRIORITY PROJECTS

3.1 Selection of Priority Projects

All the 40 Master Plan Projects should be implemented by the year 2005 to achieve the development targets set in the Master Plan. Of these, however, six priority projects were selected for preparatory studies in Step 6 of this study.

(1) First selection: Those projects that did not meet all of the following three conditions were excluded:

(A) New projects; not ongoing under the Third Five-Year Plan
(B) Projects directly beneficial to the region's development
(C) Short-term projects which should be implemented before 1995

(2) Second selection: The priority projects were finally selected from consideration of the following qualitative criteria:

(A) Small to medium scale projects, or projects which can be divided into small components for staged implementation
(B) At least one project from each of the three Development Sub-areas
(C) Productive projects which would contribute to improvement of income levels and to creation of new job opportunities
(D) Contribution to realization of a balanced spatial structure of the socio-economy in the Study Area, or to development of the least developed sub-regions
(E) Pioneer or innovative projects
(F) Contribution to environmental conservation or rehabilitation

(3) Selected Priority Projects: Five priority projects were originally selected in accordance with the above criteria. People in Tafila Governorate and Tafila Municipality, however, desired the early implementation of the Dhana Valley Tourism Development Project and urged that this project be taken up as one of the priority projects. Accordingly, the following six priority projects were eventually selected (see Fig. 9 for their locations):

(A) The Water Harvesting Development Project
(B) The Afra-Burbeita Hot Springs Multipurpose Pilot Project
(C) The Karak Urban Development Project
(D) The Mu'tah-Mazar Urban Development Project
(E) The Green Badia Project
(F) The Dhana Valley Tourism Development Project

3.2 The Water Harvesting Development Project

(1) Conclusions: Under the Water Harvesting Development Project, two schemes are proposed for promoting Highlands agriculture in the Study Area; the Water Harvesting Scheme covering about 67,400 ha gross, and the Winter Irrigation Scheme tentatively covering about 300 ha net.

As Water Harvesting measures for effective use of rainwater, micro-catchments are proposed to cover about 45,200 ha gross with slopes less than 12 per cent, while contour furrows would cover about 22,200 ha with slopes steeper than 12 per cent (see Fig. 10). As crops under the Water Harvesting Scheme, fruit trees and fodder shrubs are proposed for their long root systems and the domestic demand. Planting of about 900,000 fruit trees is proposed on about 44,400 ha to yield fruits of about 18,000 t/yr. Planting of fodder shrubs is proposed on about 17,500 ha to produce fresh fodder amounting to about 11,000 t/yr, which could support about 5,000 sheep or goats.

The Winter Irrigation Scheme is formulated to irrigate farmland with flood water in winter. This would be stored in small scale Highlands dams or be diverted from intake weirs (see Fig. 11). The flood water diverted to farmland would be stored in the soil. Six potential dam schemes and five potential weir schemes have been identified around Karak and to the east of Tafila (Karak-Tafila Highlands Dam Scheme), where the hydrometeorological conditions are most favourable in the Study Area (Fig. 12). The expected water yield is estimated at 2.3 MCM/yr in total. The unit water cost at the farm is estimated at about 250 fils/m^3 on a weighted average, ranging from 105 to 627 fils/m^3. The Winter Irrigation Scheme would be expanded to surrounding areas after completion of the proposed Karak and Tafila Highlands Dam Schemes.

Before implementing the Project, construction of a Pilot Scheme is proposed to examine the technical soundness and economic viability of Water Harvesting as well as to obtain basic data for design and operation of the two schemes proposed. The Pilot Scheme will extend over 56 ha and 82 ha for experimentation on the Winter Irrigation and the Micro-catchments Schemes respectively.

The construction cost of the Pilot Scheme is estimated at about JD 0.22 million (equivalent to US$ 0.6 million). The construction cost of the main Water Harvesting Development Project is estimated at JD 20.76 million (US$ 61.1 million), consisting of JD 15.60 million (US$ 45.9 million) for the Water Harvesting Scheme, and JD 5.16 million (US$ 15.2 million) for the Winter Irrigation Scheme.

(2) Recommendations: A Pilot Scheme is recommended for immediate implementation together with a feasibility study on the main Project components: the Water Harvesting Scheme, and Karak and Tafila Highlands Dam Schemes, including an inventory study to identify other potential sites for the Winter Irrigation Scheme.

In order to partly fund the Project in its initial investment, establishment of a Watershed Development Fund is proposed so that urban residents, who are benefiting from the groundwater supply from less developed rural areas, will bear some of the costs of flood flow development. In addition, provision of soft loans to farmers, who wish to grow crops by Water Harvesting, should also be considered for construction of the necessary structures.

3.3 The Afra-Burbeita Hot Springs Multipurpose Pilot Project

(1) Conclusions: It is proposed that a multipurpose pilot project be developed for aquaculture, greenhouse horticulture, irrigated agriculture and tourism, using the thermal energy of Afra-Burbeita hot springs and the base flow of Wadi Hasa, to form the basis for a model New Village to be located during the design stage in the Hasa Valley (see Figs. 13 and 14 for the project location and general layout). This Project would accelerate development of other hot springs such as Wadi

Ben Hammad.

Aquaculture: The high demand for fresh fish supply in Jordan was confirmed. The project site in Burbeita was identified to be the best in the Study Area. Under proper management of the recommended production system, 150 tons of Red Tilapia and 8 tons of Giant Freshwater Prawn could be harvested annually with a water supply of 3,000 litre/min. Preliminary analysis suggests that, if a soft loan is provided, the Aquaculture Scheme will be financially viable.

Greenhouse horticulture: Greenhouses with a floor area of 4,500 m^2 could be constructed with a hot water supply of 1,200 litre/min. In the greenhouses, high value-added products would be produced such as fruit trees, flowers and mushrooms.

Irrigated agriculture: It is proposed to develop irrigated agriculture on 25 ha of the flood plain of Wadi Hasa by constructing a dike, as well as improvement of the existing irrigated agriculture of 78 ha. A new drip irrigation system would cover 103 ha in total. Since the unit cost of the irrigation water is estimated at about 85 fils/m^3, intensive irrigated agriculture could be promoted in the Valley.

Tourism: Construction of a Rest House with 50 bedrooms and a Medical Rehabilitation Station is proposed as a social welfare programme mainly for the local people.

The construction cost of this Project is estimated at JD 2.73 million (equivalent to US$ 8.0 million), consisting of JD 0.97 million for the aquaculture, JD 0.33 million for the greenhouse, JD 0.64 million for the irrigated agriculture, and JD 0.79 million for the tourism development.

(2) Recommendations: Before implementation of the Project, hygiene conditions at Afra hot springs must be improved by building more toilets and establishing a garbage collection system for visitors.

It is recommended that basic and detailed designs of the Project be carried out as a first step, with cooperation from Mu'tah University. Socioeconomic studies, especially the market study for the Greenhouse Horticulture Scheme and for the Tourism Scheme are also recommended for commencement as soon as possible.

3.4 The Karak Urban Development Project

(1) Conclusions: Karak City is proposed for development as a regional centre of tourism, commercial, administrative and handicraft manufacturing activities. It is proposed that the Karak Urban Development Project be implemented under three programmes as shown below (see Figs. 15 and 16 for the project location and present landuse).

Karak Museum City Programme: this is planned to remodel the whole town of Old Karak as a *Museum City* by restoring the Castle of Karak, Historic Quarter, City Walls and Watch Towers. The evacuated land of administrative buildings would be called the Castle Square and be used as a plaza where various event programmes will be provided for tourists (Fig. 18). These will attract tourists and will have a significant impact on starting tourism development in the region.

Karak Handicraft Centre Programme: this is to incubate the craft industry as an integral part of the *Museum City*. A floor plan of the Centre is shown in Fig. 19. This would contribute to development of the female work force in the region. The Centre can be self-financed except for the initial investment and the training cost, which should be borne by separate budgets.

Karak Urban Development Programme: proposed relocation of administrative facilities to New Karak and the development of a quality housing estate and commercial facilities in New Karak can give a new horizon to Karak City (see Fig. 17 for a future landuse plan). Expansion of infrastructures such as roads, water supply and sewerage, and so forth will be required to enhance urban services for this regional centre (see Fig. 20 for proposed Lajjun-Karak water pipeline).

The total construction cost of the Project is estimated at about JD 33.13 million (equivalent to US$ 97.4 million), consisting of JD 1.95 million for the Karak Museum City Programme, JD 0.24 million for the Karak Handicraft Centre Programme, and JD 30.94 million for the Karak Urban Development Programme.

(2) Recommendations: The Study Team recommends that a start be made on a more detailed study on the Karak Museum City and Urban Development Programmes, and on detailed design and implementation of the Karak Handicraft Centre.

3.5 The Mu'tah-Mazar Urban Development Project

(1) Conclusions: It is proposed that Mu'tah and Mazar be developed as an education and industry oriented urban centre of the King's Highway Corridor which will extend from Karak to Tafila (see Figs. 21 and 22 for the project location and present landuse). Mu'tah University should lead the development with its research functions in industrial technology and in the supply of qualified manpower for incubating and promoting small and medium scale industries.

Mu'tah Industrial Estate Programme: this will have a land area of 33 ha and new job opportunities of 2,500, and will be an essential component of the Project. A layout plan is given in Fig. 24. The Estate should put special emphasis on incubation and development of small and medium scale industries which will take root in the local industrial linkage and local communities.

Mu'tah-Mazar Urban Development Programme: the planned area is 710 ha, and projected population and job opportunities in 2005 30,000 and 9,000 respectively. With implementation of the proposed infrastructures, urban facilities and the Pilgrim Park surrounding the Muslim martyrs' tomb, the Mu'tah-Mazar Urban Centre would become a unique growth point in harmony with agriculture, technology research and manufacturing industry, and pilgrimage (Fig. 23).

The construction cost of the Project is estimated at JD 30.88 million (equivalent to US$ 90.8 million), consisting of JD 8.00 million for the Mu'tah Industrial Estate and JD 22.88 million for the Mu'tah-Mazar Urban Development.

(2) Recommendations: The Study Team recommends that Jordan Industrial Estate Corporation should make a feasibility study of the proposed Mu'tah Industrial Estate. In parallel with this, a detailed study should be made of the proposed Urban Development Programme for early implementation.

Also, the Study Team recommends the establishment of a joint committee between both councils for urban development because the co-ordination between Mu'tah-Mazar and Karak Urban Development is important in terms of their combined effects.

3.6 The Green Badia Project

(1) Conclusions: The Study Team proposes that Hasa be developed as a strategic growth point in the Badia on account of its proximity to water resources, its geographic location in the centre of the South Badia, extensive unutilized governmental land, good access to transportation, and Hasa Castle as a tourism resource (see Figs. 25 and 26 for the project location and present landuse).

Water Programme: in the proposed Project area around Hasa, wastewater from the phosphate mines can be recovered at about 2.1 MCM/yr by constructing tailings dams. Flood water of 1.8 MCM/yr can also be developed by constructing the proposed Hasa Dam, and groundwater of 5.5 MCM/yr can be developed in the proposed Darawish well field. In addition, a further flood flow of more than 1.0 MCM/yr can be developed by drainage improvement works in Qa El Hasa (see Figs. 28 to 31).

Environment and Tourism Programmes: as an income generating sector, tourism development is proposed by constructing an *Artificial Oasis Park* with the *Badia Country Club* surrounded by a *Productive Green Park*, exploiting the water resources mentioned above (see Fig. 27 for a future

landuse plan). In the long term, establishment of an Amusement Centre and a Badia Country Club is also proposed to attract tourists not only from the Kingdom but also from elsewhere in the Middle East.

Hasa New Town Programme: with implementation of the proposed infrastructures and urban facilities, Hasa New Town having a planned population of 25,000 by the year 2005 would become a unique growth point in the South Badia to accommodate people who will engage in development of the Badia.

New Energy Programme: both of the proposed new energy applications, the *Solar Village* and the *Watering Station*, are feasible under certain conditions of application even at present levels of equipment cost. These do not need any fuel transportation and would be essentially maintenance free. It is proposed that the proposed pilot plants be established to investigate economic viability, technical suitability, and social acceptability of the actual applications.

The total construction cost of the Project is provisionally estimated at about JD 82.28 million (equivalent to US$ 242 million), consisting of JD 9.08 million for the Water Programme, JD 35.30 million for the Environment and Tourism Programmes, JD 37.50 million for the Hasa New Town Programme, and JD 0.40 million for the New Energy Pilot Plants.

(2) Recommendations: The Study Team recommends the establishment of a New Hasa Development Board under the proposed Badia Development Council, which is presently under consideration by the Government. The Board would be constituted by related agencies, municipality and the private sector to manage and supervise the development activities of the Project.

Upon approval of the basic development plan by the Council, it is recommended that the detailed study of the Water Programme and the basic design of the New Energy Pilot Plants be started first, followed by a feasibility study of the Environment and Tourism Programmes. It is recommended that a certain part of the water resources available around

the project area be allocated to the Project as a basic input. Some environmental works such as for the greenbelt and afforestation could be started in parallel with the feasibility study. A detailed study for the Hasa New Town Programme should be started immediately after completion of the feasibility study so that the infrastructures can be constructed in a pre-arranged manner without duplication or replacement.

3.7 The Dhana Valley Tourism Development Project

(1) Conclusions: A resort development project is proposed in the Dhana Valley targeting long-stay tourists (see Fig. 32 for the project location). It would include a resort hotel with 100 bedrooms and recreational facilities, restoration of stone houses in Old Dhana, and sports and culture programmes.

To attain a bed occupancy rate of 60 per cent in the proposed resort hotel, a total of about 3,000 visitors staying one week or more will be required in a year. The most important factor to ensure success of this Project will be marketing since the site is rather far from large population centres and the number of tourists would become almost nil in winter except business visitors to Tafila Municipalities etc.

The construction cost of the Project is estimated at JD 2.33 million (equivalent to US$ 6.8 million).

(2) Recommendations: The Rashadiya Cement Factory owns a wide concession in Jabal Sarab on the north bank of the Dhana Valley. After extraction of limestone from quarry, the site should be rehabilitated with greenery to recover the original environment. With this rehabilitation work, the mining, which contributes to the national economy, can be in favourable harmony with the excellent natural environment and with the proposed tourism activities as well.

Social education should be given to local inhabitants to avoid the friction with visitors who may have different religious and cultural backgrounds.

4. CONCLUSIONS AND RECOMMENDATIONS

In accordance with the Government policy of decentralization, the Master Plan has been prepared with the targets towards the year 2005 of increasing the region's population share in the Kingdom slightly and of attaining the national average level of per capita GRDP. To achieve these targets, 40 Master Plan Projects were formulated or identified and would require intensive investment of JD 61 to 76 million per annum. The water requirements for the Master Plan Projects can be satisfied with the region's water resources.

Preparatory studies were made on six priority projects, which were proved to deserve further detailed studies before they are implemented. It is recommended that these studies be initiated as soon as possible.

Until the socio-economy of the region gains sufficient momentum for self-sustainable development, the public sector should lead development. Cooperation between the related ministries, authorities and the local governments is also required. For monitoring implementation of the Master Plan Projects as well as for updating the Master Plan continuously, it is recommended that a monitoring team be established with the necessary rights, funds and staff.

T A B L E S

Table 1 REGION'S PRESENT POSITION IN JORDAN (1/2)

Aspects	Unit	Figure		Share of Study Area (%)
		Jordan	Study Area	
1. Land area	km^2	89,206 1/	8,100	9.1
2. Population				
(1) Population	1000	2,700	143	5.3
(2) Pop. density	p/km^2	30	18	-
(3) Pop. growth rate (1979-1985)	%/yr	3.7	2.8	-
(4) Urban pop. ratio 2/	%	70	24	-
3. Employment	1000			
(1) Agriculture sector		39.2	4.8	12.2
(2) Mining & manuf'g sector		53.1	3.4	6.4
(3) Other productive sector		60.8	2.9	4.8
(4) Services sector		114.6	3.3	2.9
(5) Public services sector		234.7	14.4	6.1
(6) Total		502.4	28.8	5.7
4. GDP/GRDP	JD 10^6			
(1) Agriculture sector		112.1	9.3	8.3
(2) Mining & manuf'g sector		223.2	47.2	21.1
(3) Other productive sector		159.2	5.6	3.5
(4) Services sector		538.9	15.0	2.8
(5) Public services sector		325.2	21.1	6.5
(6) Total GDP/GRDP		1,358.6	98.2	7.2
(7) Per capita GDP/GRDP	JD	509	687 (381) 3/	-
(8) Per capita household income (1980)	JD	641	495 4/	-
5. Total planned investment (1986-1990)	JD 10^6	2,706	227	8.4

Note: Basic data year 1985
1/: Land area of the East Bank
2/: Population ratio who live in urban with more than 5,000 population.
3/: Per capita GRDP excluding mining sector contribution
4/: Old Karak Governorate

Table 1 REGION'S PRESENT POSITION IN JORDAN (2/2)

Aspects	Unit	Figure		Share of Study Area (%)
		Jordan	Study Area	
6. Infrastructure				
(1) School enrollment ratio	%	30	30	-
(2) Higher education institute	nos.	n.a.	3	-
(3) Hospital beds	nos.	n.a.	190	-
(4) Number of physician per 10,000		11.3	5.6	-
(5) Electrification ratio	%	90.8	87.1	-
(6) Electric power consumption	GWh/yr	2,151	174.7 1/	8.1
7. Water	MCM/yr			
(1) Mean rainfall		6,000	1,240	20.7
(2) Surface water potential		480 2/	80	16.7
(3) Groundwater recharge		220	46	20.9
(4) Total renewable water		700 2/	126	18.0
(5) Municipal water supply		68	3.5	5.1
(6) Industrial water supply		41	10.1	24.6
(7) Irrigation water supply		409	11.0	2.7
8. Agriculture				
(1) Arable land	1000 ha	364	124.7	34.3
(2) Irrigated land	1000 ha	56	3.2	5.7
(3) Farm household	1000	58	13	22.4
(4) Holding size of arable land	ha/farm household	6.3	4.8	-
(5) Wheat production	1000 ton/y	120 3/	10.7	8.9
(6) Yield of cereal crops	ton/ha	1.03 3/	0.62	-
(7) Number of sheep	1000	1,000 3/	185	18.5
(8) Number of goats	1000	500 3/	158	31.6
9. Mineral resources				
(1) Phosphate production	10^6 ton/yr	5.92	5.33	90.0
(2) Cement production	10^6 ton/yr	2.07	0.54	26.1

1/: Karak, Tafila and Shaubak areas
2/: excluding runoff of the Yarmouk river of 400 MCM/yr since it includes that from the Syrian part of its basin.
3/: data in 1983
Source: Compiled by the Study Team

Table 2 SOCIO-ECONOMY BY SUB-REGION

Governorate	Sub-region	Population	No. of Settlements	Major Cities	Characteristic of socio-economy
Karak	Karak	37,800 (26.5)	39 (21.7)	Karak, Ader	- Capital City of the Governorate (Karak Municipality) - Centre of administrative, industrial and commercial activities - Tourism resources such as Karak Castle
	Qasr	18,500 (12.9)	22 (12.2)	Qasr, Rabba Faqqoo, Selfa	- Agriculture-based area with the plantation of trees, cereals and fodders as well as sheep breeding
	Mazar	26,700 (18,7)	42 (23.3)	Mazar, Mu'tah, Tayybeh, Hussiniyyeh, Moab	- Higher density of population - Flat agriculture land - Historical remains as tourism resources - Small scale industrial and commercial activities - Mu'tah University
	Ayy	10,600 (7.4)	6 (3.3)	Ayy	- Agriculture by fruit tree plantation and poultry farms
	Badia	2,700 (1.9)	3 (1.7)	Qatrana	- Transportation node of the Desert Highway - El Abiad Phosphate Mine
Tafila	Tafila	24,400 (17.1)	23 (12.8)	Tafila Ain El Baida	- Capital City of the Governorate (Tafila Municipality) - Centre of all activities in the Governorate
	Bsaira	8,500 (5.9)	10 (5.6)	Bsaira Qadisyyeh	- Natural resources such as limestone, mineral water and forests - Good agricultural land - Cement Factory at Rashadiya
	Hasa	4,500 (3,1)	3 (1.7)	Hasa	- Phosphate mine at Hasa and other mineral resources - Good access to the transportation along the Desert Highway
Amman	Madaba/ Dhiban	9,200 (6.4)	32 (17.8)	Dhiban	- Agriculture by vegetables

Source: MOP, National Village Survey

Note: (1) Numbers in parentheses show the share of each sub-region in total of the Study Area
(2) Population is estimation in 1985

Table 3 SOCIOECONOMIC FRAMEWORKS

	Unit	1985	2005 Scenarios (1)	(2)	(3)
Population	1000	143	220	248	270
Population share in Jordan	%	5.3	4.4	4.9	5.4
Average population growth rate	%/yr	-	2.2	2.8	3.2
Per capita GRDP excl. mining	JD	381	720	720	720
GRDP excl. mining	Mil.JD	52	153	173	190
GRDP	Mil.JD	98	214	233	250
Agriculture	Mil.JD	9	21	21	21
Industry	Mil.JD	53	112	130	145
Services	Mil.JD	36	81	82	84
Employment	1000	29	56	59	62
No. of new job creation	1000	-	27	30	33
Required investment (1986-2005)	Mil.JD	-	930-1,160	1,080-1,350	1,210-1,520
Share of required investment in Jordan (1986-2005)	%	-	6.9-8.6	8.0-10.0	9.0-11.3

Source: The Study Team

Table 4 PROJECTED POPULATION (SCENARIO 3)

(No.)

Municipalities/Villages	1985	1995	2005
Karak Governorate			
Karak	o 15,655	o 24,000	o 36,000
Mu'tah-Mazar	o 8,515	o 18,000	o 30,000
Moab	o 5,701	o 8,000	o 10,000
Ayy	o 5,116	o 7,000	o 9,000
Tayybeh	3,174	4,000	o 6,000
Faqqoo	2,886	4,000	o 5,000
Rabba	2,838	4,000	o 5,000
Ader	2,546	3,000	o 5,000
Qatrana	2,172	3,000	4,000
Serfa	2,159	3,000	4,000
Idiedeh	1,869	2,000	3,000
Qasr	1,841	2,000	3,000
Tafila Governorate			
Tafila	o 14,917	o 22,000	o 33,000
Hasa	3,824	o 6,000	o 25,000
Bseira	3,453	o 5,000	o 6,000
Qadisyyeh	2,766	4,000	o 5,000
Ain Al-Baida	2,749	4,000	o 5,000
Amman Governorate			
Dhiban	3,020	4,000	o 5,000
A. Pop. who live in Municipalities with 5000 or more	49,904	86,000	178,000
B. Pop. in the Study Area	143,000	183,000	270,000
C. Urbanization ratio (%)	35	47	66

Sources: National Village Survey, MOP, 1984
The Study Team's Estimation

Note: o denotes urban population, i.e. more than 5,000

Table 5 WATER ALLOCATION PLANS FOR 2005

(MCM/yr)

No.	Water Use	Demand in 2005	Water Allocation Plan			
			Case 1 Highland	Case 2 Amman	Case 3 Ghor	Case 4 Potash
1.	**Municipal**					
1.1	Local demand	13.11	13.11	13.11	13.11	13.11
1.2	To Greater Amman	36.00	**29.0**	36.0	**24.0**	**17.0**
	Municipal sub-total	49.11	42.11	49.11	37.11	30.11
2.	**Irrigation & livestock**					
2.1	Exist. groundwater irri.	22.8	22.8	22.8	22.8	22.8
2.2	Exist. spring irrigation	12.5	12.5	12.5	12.5	12.5
2.3	New irrigation projects	5.0	5.0	5.0	5.0	5.0
2.4	Livestock farming	1.8	1.8	1.8	1.8	1.8
2.5	Southern Ghor					
	(1) Stage I	37.6	37.6	37.6	37.6	37.6
	(2) Stage II	23.5	23.5	**16.5**	23.5	23.5
	Irrigation sub-total	103.2	103.2	**96.2**	103.2	103.2
3.	**Industry**					
3.1	Phosphate	11.0	11.0	11.0	11.0	11.0
3.2	Cement	0.6	0.6	0.6	0.6	0.6
3.3	Industrial complex in Karak, Tafila & Hasa	2.9	2.9	2.9	2.9	2.9
3.4	Oil shale at Lajjun	5.0	5.0	5.0	5.0	5.0
3.5	Oil shale at Sultani	2.0	2.0	2.0	2.0	2.0
3.6	Potash	12.0	12.0	12.0	12.0	12.0
3.7	Dead Sea Chemical Complex	14.0	**2.25**	**2.25**	**7.0**	14.0
	Industry sub-total	47.5	**35.75**	**35.75**	**40.5**	47.5
4.	**Environment** (Greenbelt, water park and green park)	3.6	3.6	3.6	3.6	3.6
	Total	203.41	**184.66**	**184.66**	**184.41**	**184.41**

Note: (1) Water resources development potential is 184.9 MCM/yr.
(2) Figures in boldface shows partial allocation to the demand.

Source: The Study Team and the Water Sector Committee

Table 6 PRESENT LANDUSE AND FUTURE PLAN

Landuse Category	Present Area (ha)	(%)	Future Area (ha)	(%)
Fallow	75,800 1/	9.3	-	-
Field crops	24,400	3.0	43,000	5.3
Irrigated vegetables	900	0.1	800	0.1
Fruit trees	3,600	0.4	45,200 2/	5.6
Forest	17,800	2.2	74,900	9.2
Fodder shrub	-	-	22,200	2.7
Built-up area	1,900	0.2	3,600	0.4
Mineral reserve/quarry	71,500	8.8	71,500	8.8
Grazing/unarable area	616,300	75.9	551,000	67.9
Total	812,200	100.0	812,200	100.0

1/: Estimated based on the total land area of field crops/fallow
2/: Gross area including lands for catching rainfall
Source: The Study Team

Table 7 LIST OF MASTER PLAN PROJECTS (1/2)

(1) Rural Development Plan

Projects related to the rural life

RDP-1 New Village Project
RDP-2 School Bus Project
RDP-3 Village Clinic Project
RDP-4 Home Garden Project
RDP-5 Darawish-Tafila Pipeline Project
RDP-6 Lajjun-Karak Pipeline Project

Projects related to the production sector

RDP-7 * Lamb Fattening Centre Project
RDP-8 * Rangeland Reservation Project
RDP-9 * Fodder Shrubs Planting Project
RDP-10 * Introducing Forage Crops into Farming Cycle Project

RDP-11 * Introducing Legumes into Farming Cycle Project
RDP-12 * Veterinary Clinics Project
RDP-13 * Development of Farming in the Highlands Project
RDP-14 * Production of Certified Seeds Project
RDP-15 * Mechanized Agricultural Services Project

RDP-16 * Fruit Tree Seedling Production Project
RDP-17 * Soil Conservation and Fruit Tree Planting Project
RDP-18 Water Harvesting Development Project

Note: Projects attached with "*" are included in the Third Five-Year Plan.

Table 7 LIST OF MASTER PLAN PROJECTS (2/2)

RDP-19 Spring Irrigation Improvement Project
RDP-20 Cottage Industry Development Project
RDP-21 El Lajjun Oil Shale Retorting Project
RDP-22 Unused Minerals Utilization Development Project

Projects related to the environment protection and tourism

RDP-23 Afforestation Project
RDP-24 Greenbelt Project
RDP-25 Afra-Burbeita Hot Spring Multipurpose Pilot Project
RDP-26 Dhana Valley Tourism Development Project
RDP-27 Environmental Assessment of El Lajjun Oil Shale Project

(2) Urban Development Plan

UDP-1 Karak Urban Development Project (Karak Handicraft Centre Programme, Karak Museum City Programme, and Karak Urban Development Programme)

UDP-2 Mu'tah-Mazar Urban Development Project (Mu'tah Industrial Estate Programme, and Mu'tah-Mazar Urban Development Programme)

UDP-3 Mu'tah University Related Project (Badia Research Institute etc.)

UDP-4 Tafila Urban Development Project (Tafila Handicraft Centre Programme, Outer Tafila Industrial Estate Programme, and Tafila Urban Development Programme)

(3) Green Badia Plan

GBP-1 Sustaining the Production Level of Existing Phosphate Mines
GBP-2 Local Materials Utilizing Project (aggregates, natural sand, phosphate slimes, etc.)
GBP-3 Green Badia Project (Water programme, Tourism and Environmental Programmes, Hasa New Town Programme (Phase 1), and New Energy Programme)
GBP-4 Desert Dam Project
GBP-5 Infrastructure and Housing Project (Phase 2)
GBP-6 Hasa Industrial Estate Project
GBP-7 Traffic Terminal Project
GBP-8 Sultani Oil Shale Power Plant Project
GBP-9 Environmental Assessment of Sultani Oil Shale Power Plant Project

Note: The Water Programme of GBP-3 includes groundwater development of the Darawish well field and the Darawish-Hasa Pipeline Project.