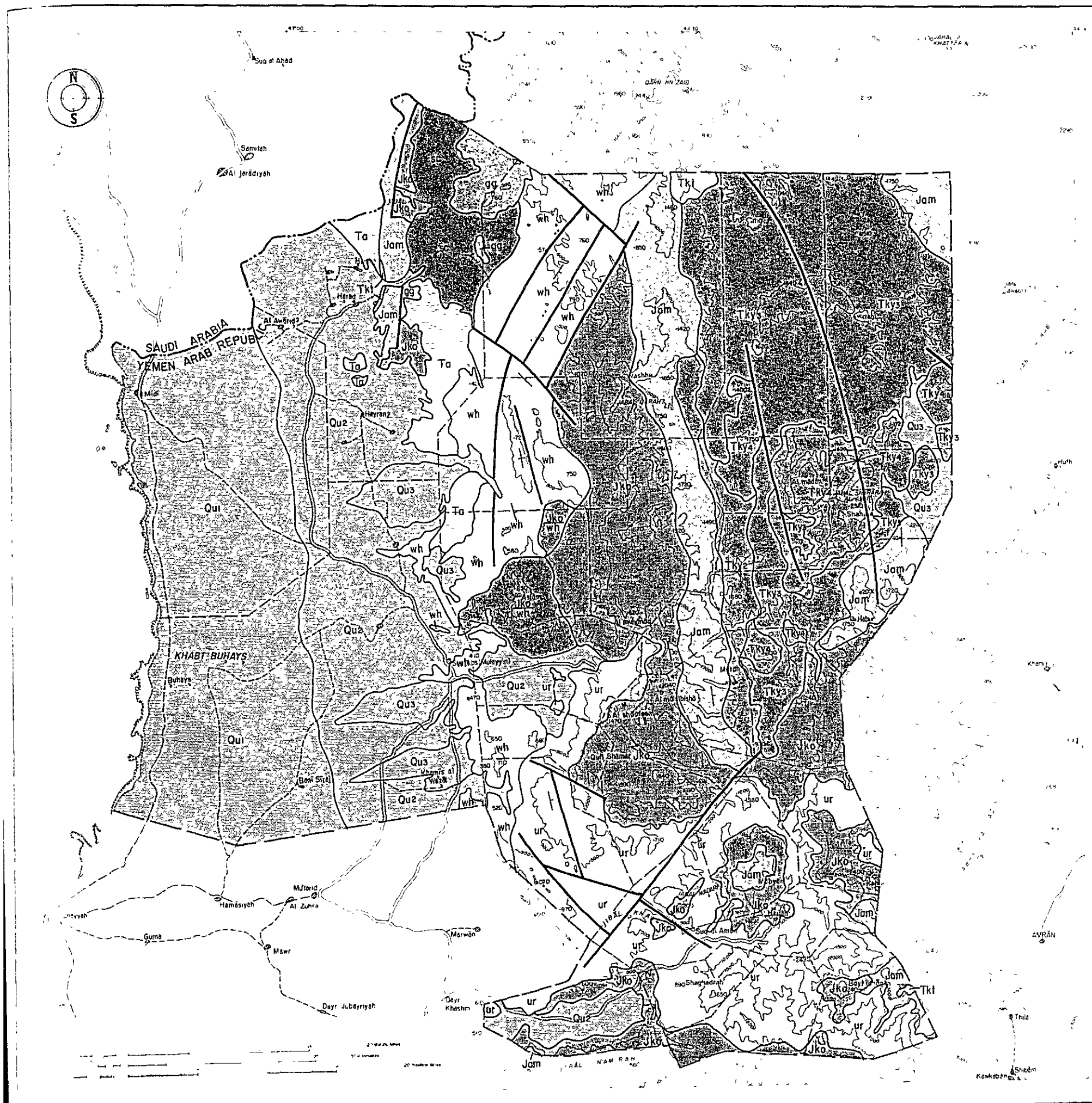


Fig. 4.4 Bird's-eye View of Hajjah Province



LEGEND

- QUATERNARY**
- Qu
 - Qu1 Coastal sand
 - Qu2 Alluvial fans
 - Qu3 River-terrace deposits
- TERTIARY ~ CRETACEOUS**
- Miocene**
- Ta Hypabyssal andesite and diabase intrusives
- Lower Miocene YEMEN VOLCANICS**
- Tky Leucocratic felsic tuff with some dark basaltic flows
 - Tky4 Predominantly felsic and tuffaceous older than Tky4
 - Tky3 Predominantly felsic and tuffaceous older than Tky3
 - Tky2
 - Tkt **TAWILAH GROUP AND MEDJ-ZIR SERIES**
- Eocene**
- Jam Continental type coarse crossbedded sandstone with lenses of conglomerate and gravel
- JURASSIC**
- Upper Jam AMRAN SERIES**
Limestone, marl and shale
- Lower Jko KOHLAN SERIES**
Green shale with sandstone and conglomeratic bands in lower part; sandstone and some conglomerates in upper part
- PRE-CAMBRIAN**
- ur Predominantly granite, gneiss
 - wh Chlorite-sericite schist, amphibole schist, graphite schist, marble quartzite, slate, conglomerate and greenstone
 - gg Gneissic granite, gneissic granodiorite and injection gneiss
 - Low-grade metamorphosed sedimentary rocks
 - Jko/wh Area includes two undifferentiated units
- Fault ↗ Dip and strike of bed
 * Syncline

Fig.4.5 Geology

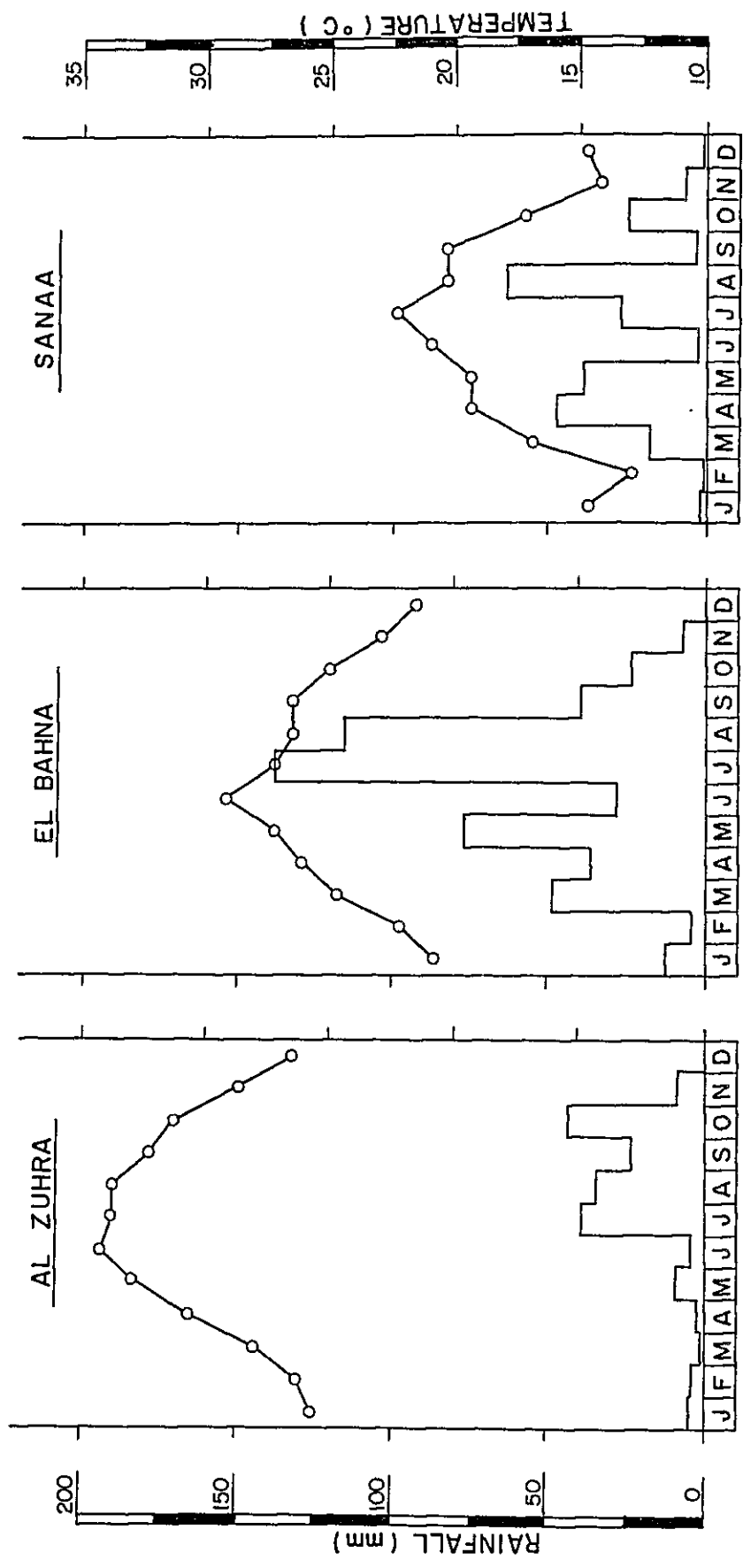


Fig. 4.6 Monthly Rainfall and Temperature

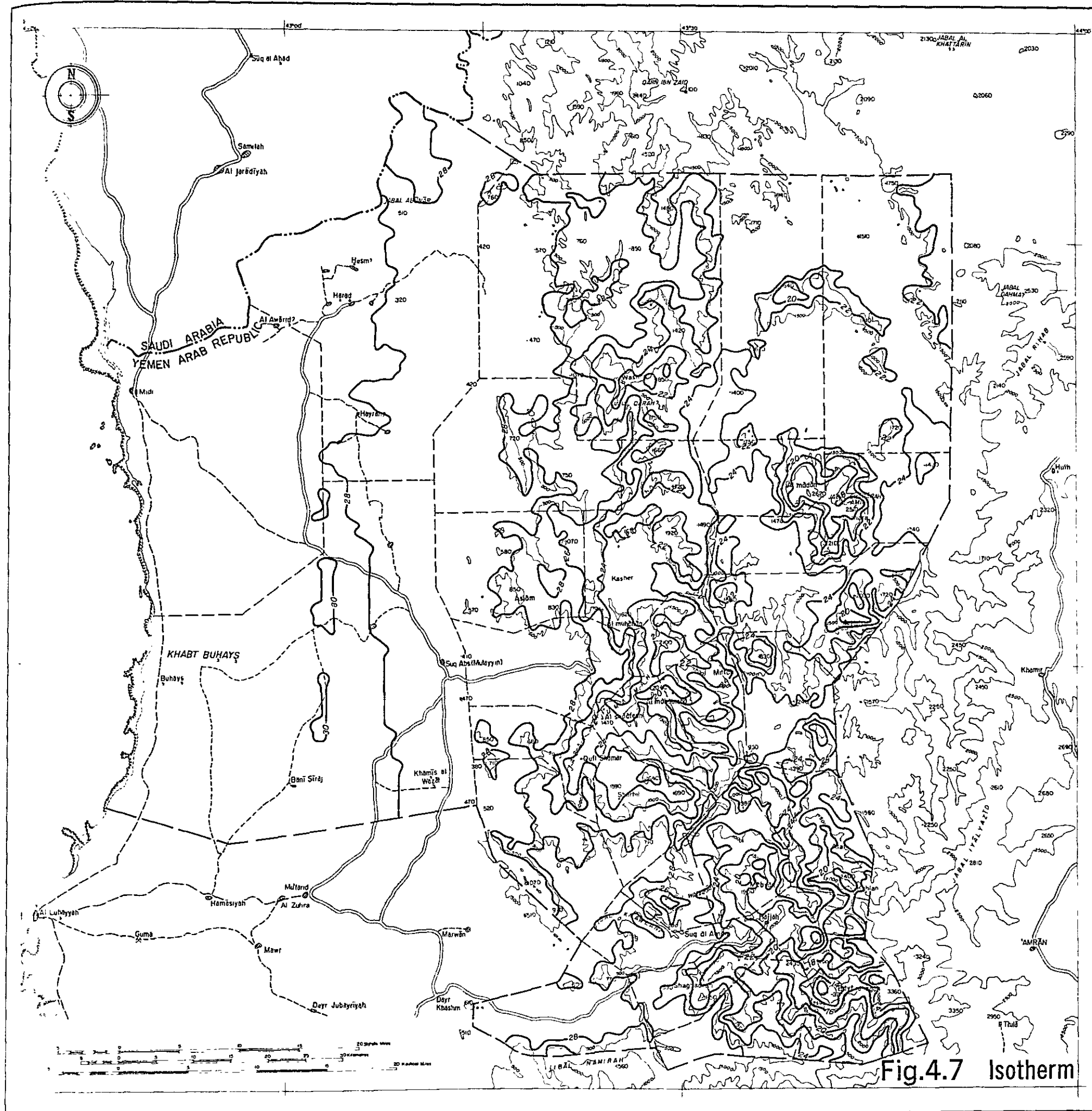
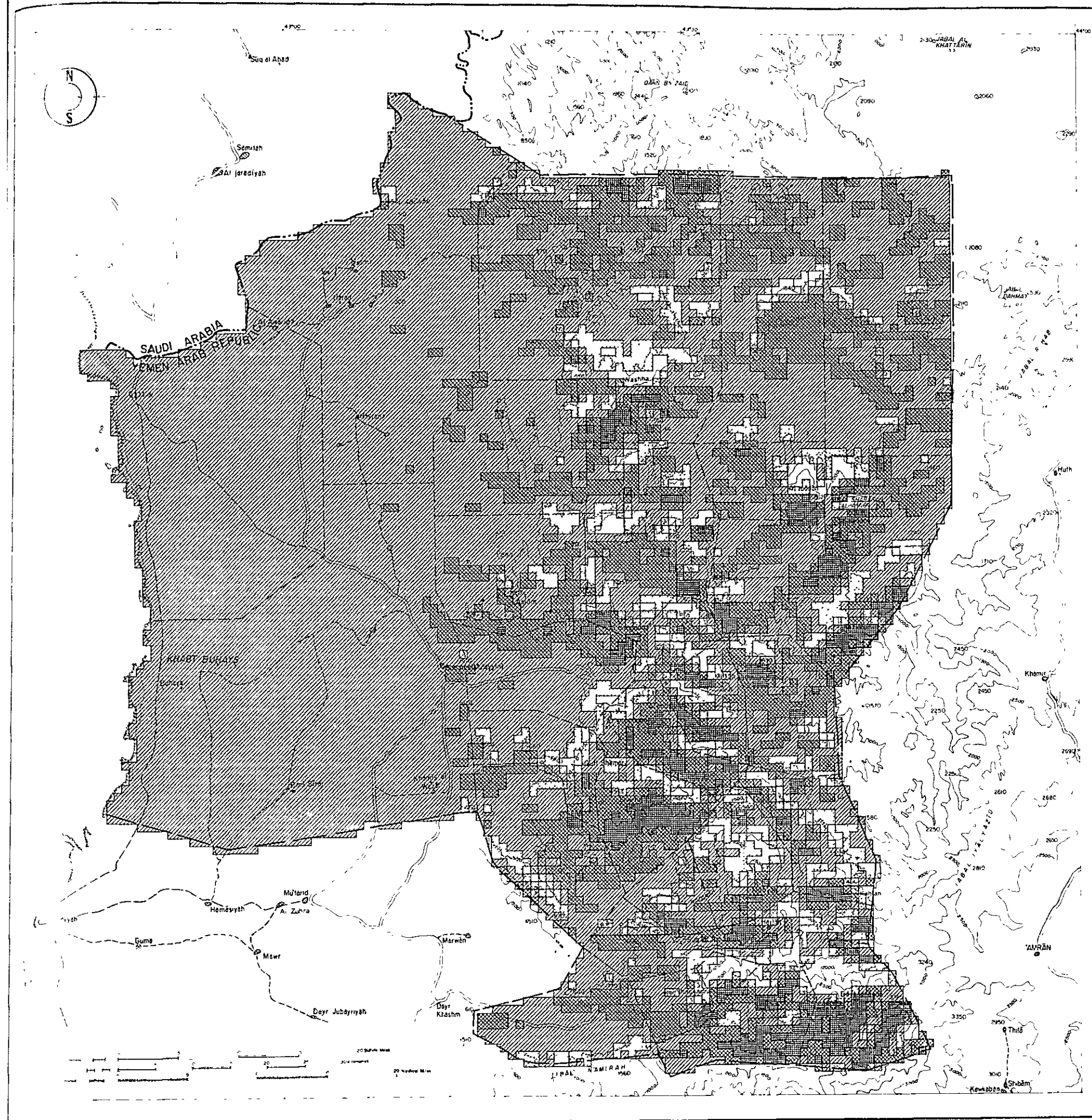


Fig.4.7 Isotherm



LEGEND		
□	LESS THAN 50 PERCENT	
▣	50 - 55 PERCENT	
▤	55 - 60 PERCENT	
▥	60 - 65 PERCENT	
▧	OVER 65 PERCENT	

Fig.4.8 Sunshine Intensity

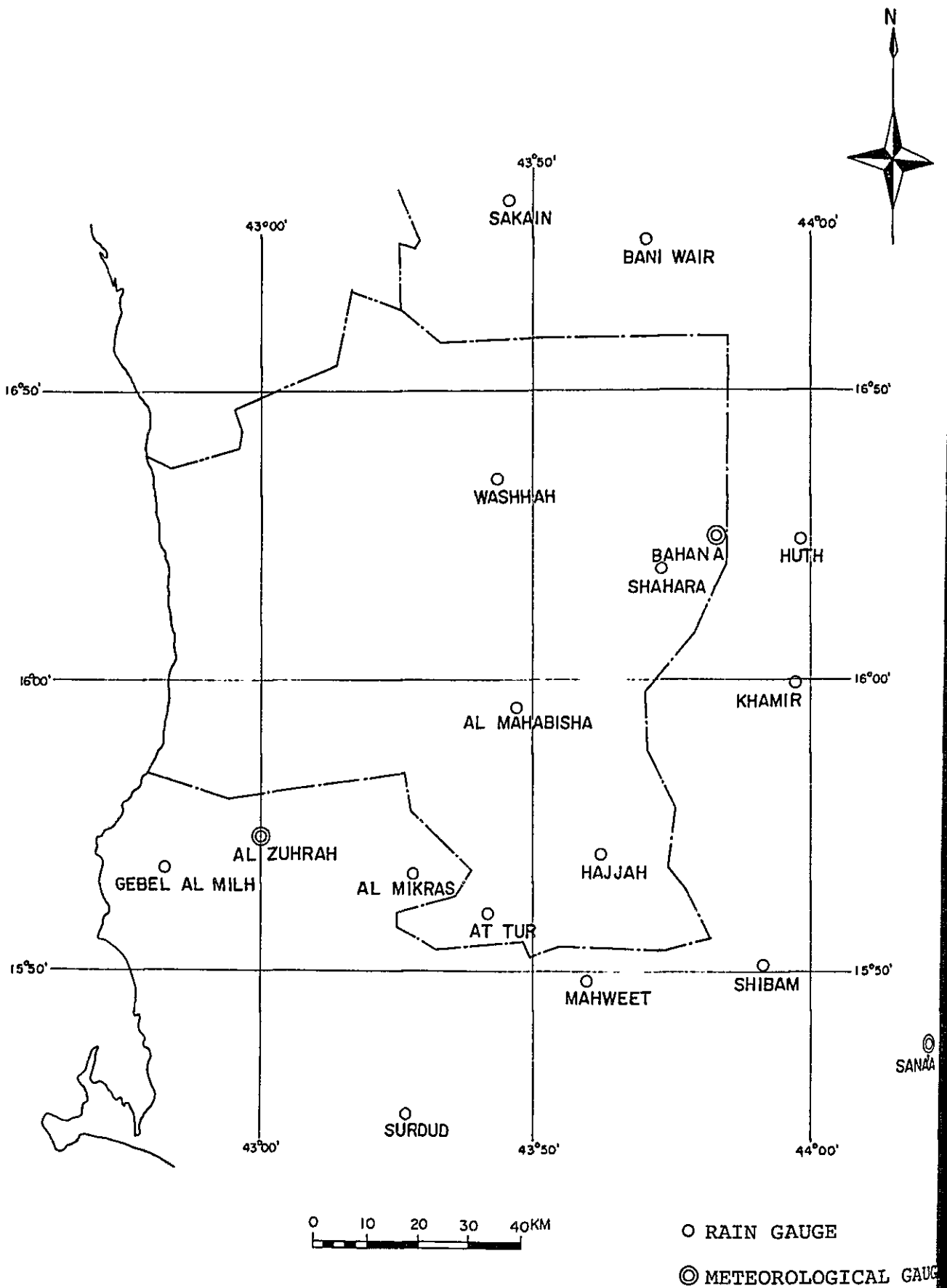


Fig. 4.9 Location of Gauge Station

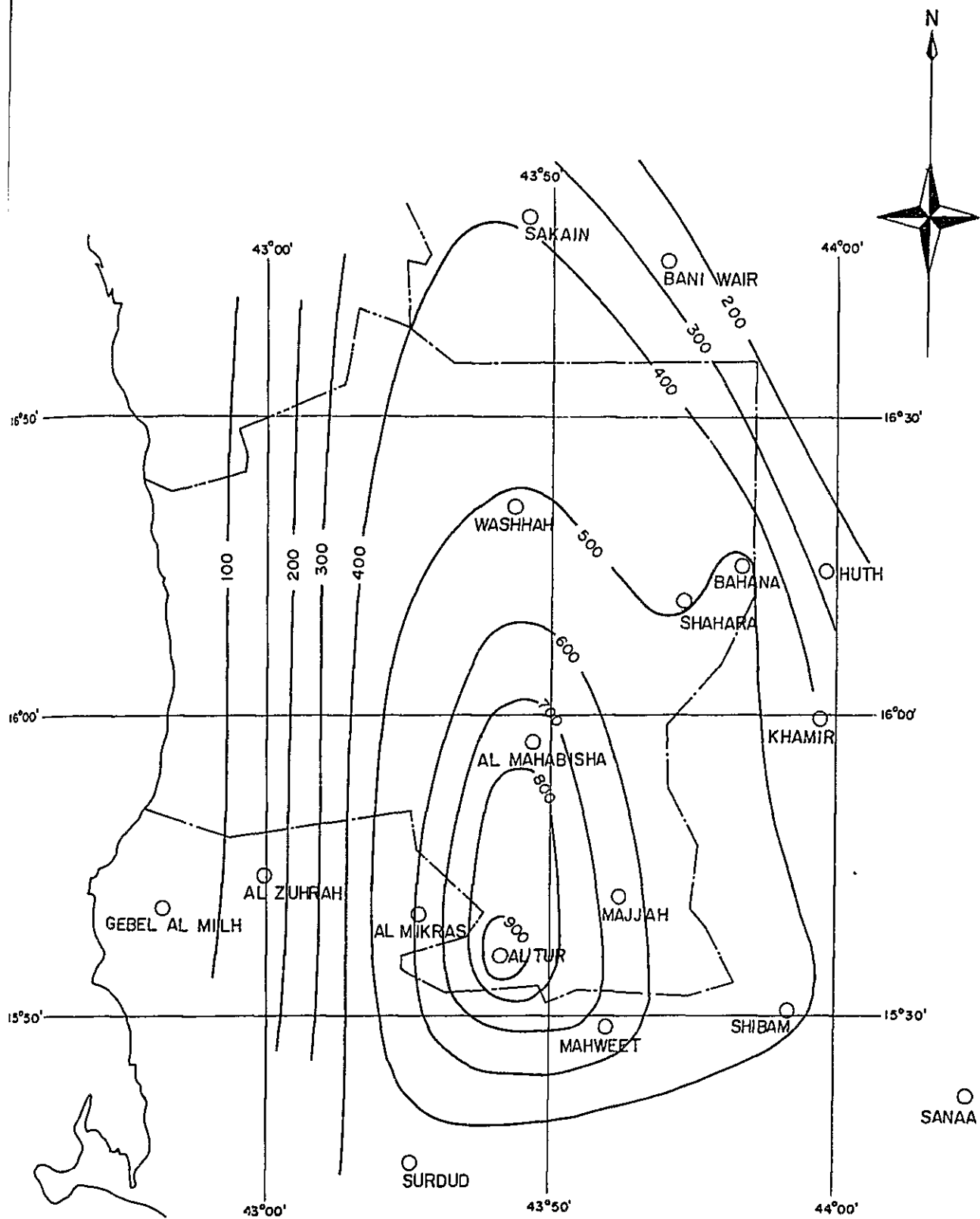


Fig. 4.10 Isohyetal Map

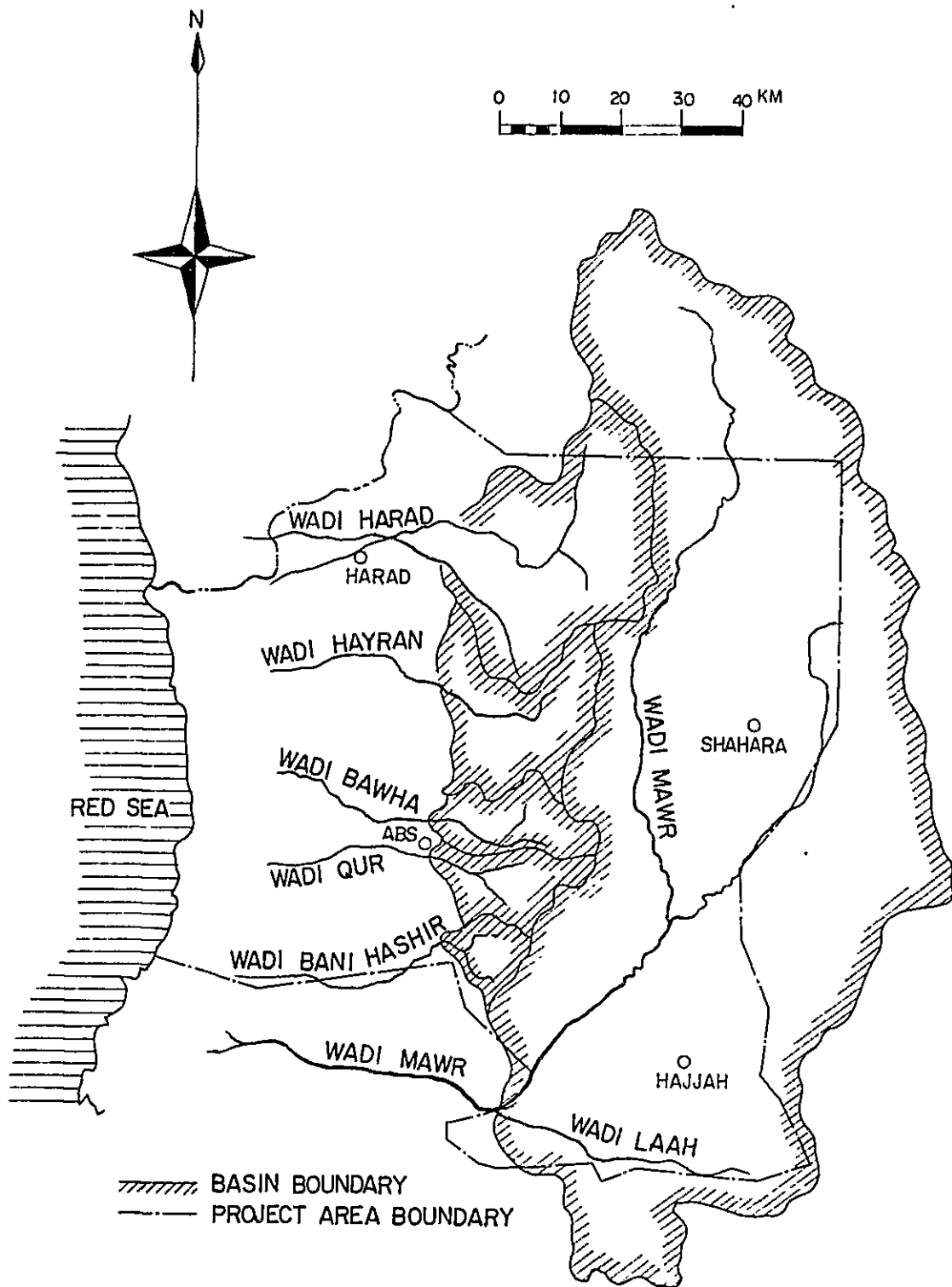


Fig. 4.11 River System and River Basin

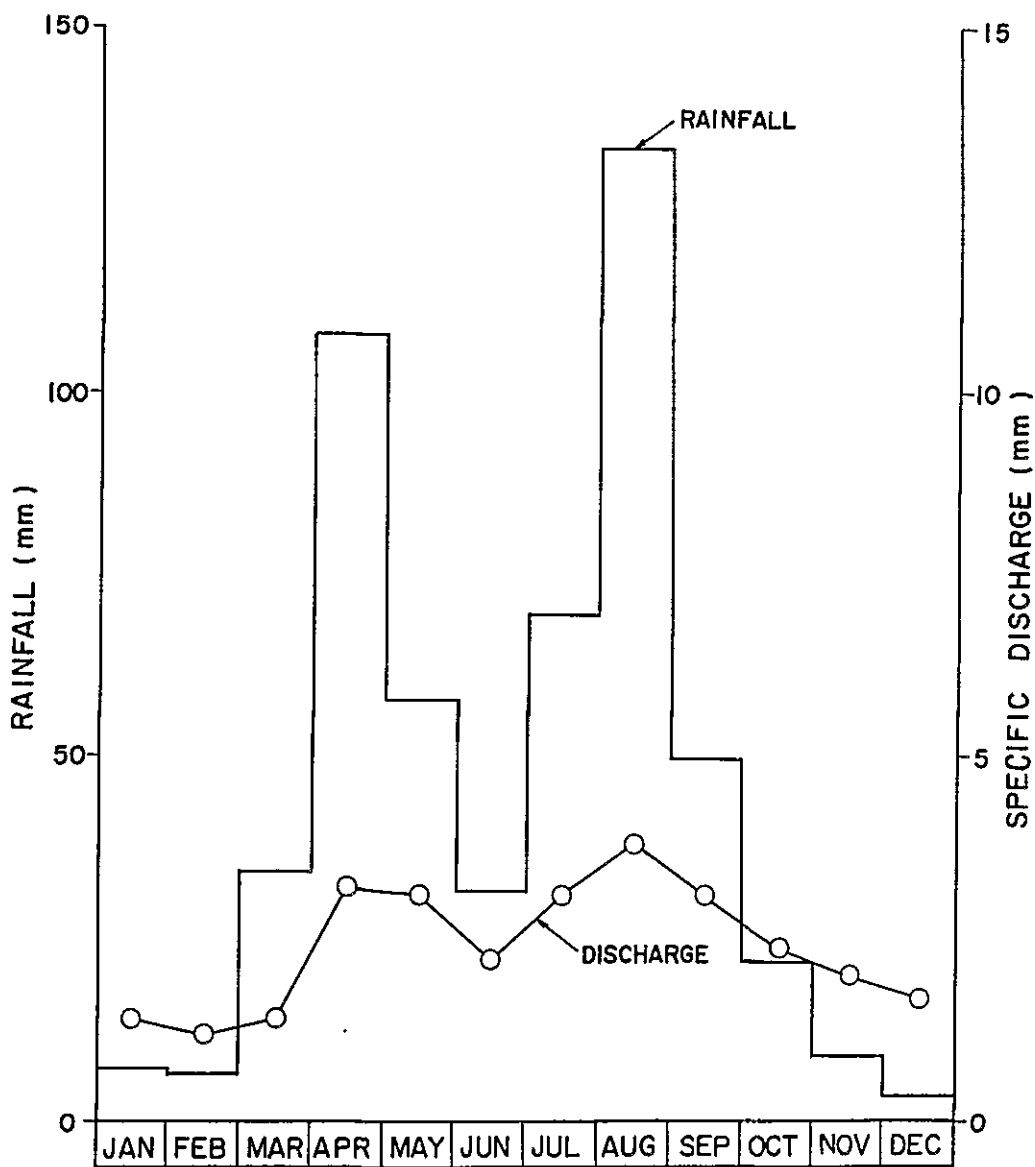
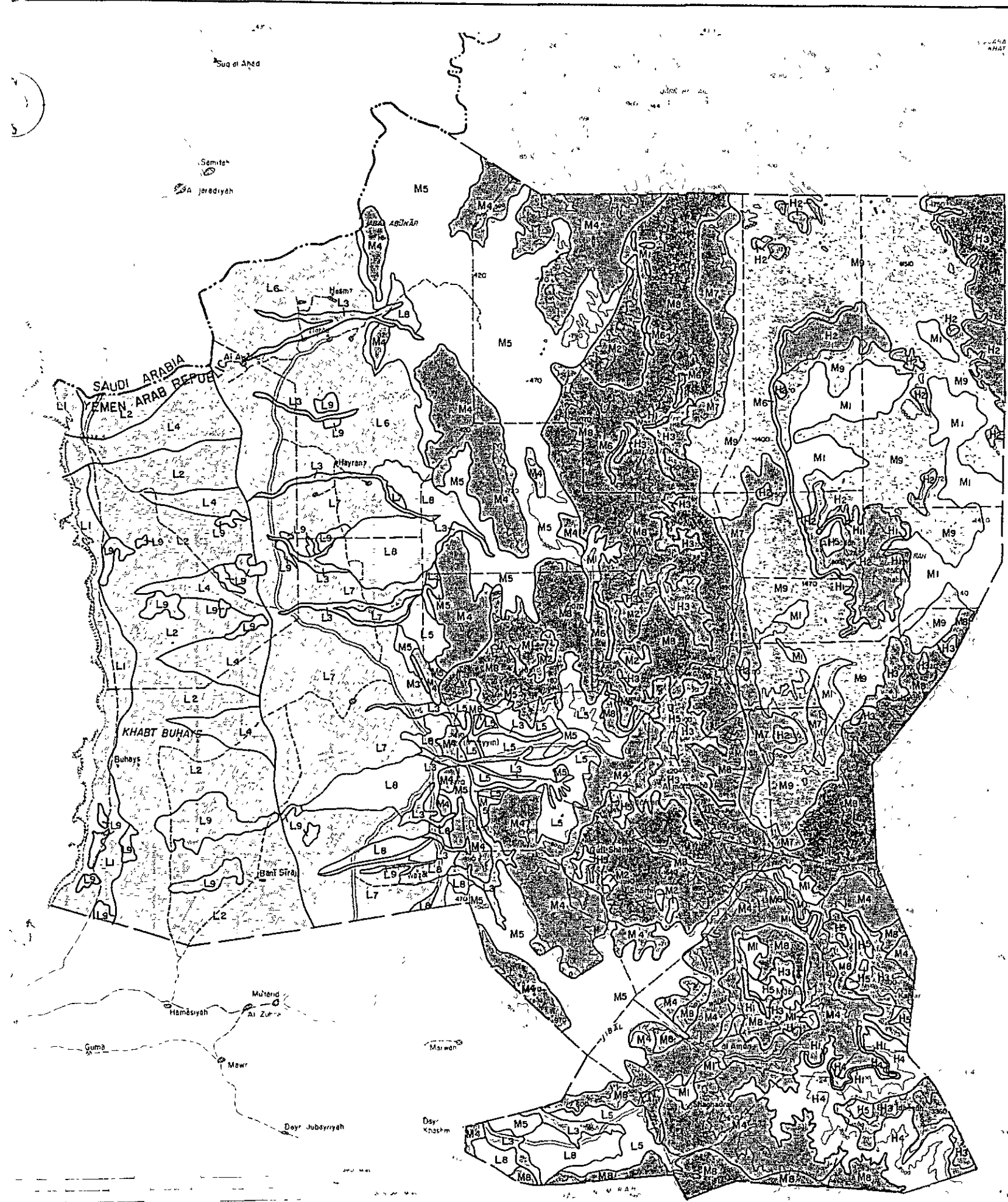


Fig. 4.12 Average Rainfall and Specific Discharge



LEGEND

Physiography/Terrain Units	Soil Units			Area (10 ³ ha)
	Dominant >50%	Associated Inclusions 20~50%	<20%	
L LOWLAND				
469				
L1	Sally flats	Zg-2/3a	Zl-2/3a	6 32
L2	Low dunes and sand sheets	Re-1a Je-2a Yh-2a		4 116
L3	Recent wadi alluvium	Je-1/2a Jc-1/2a		2 25
L4	Alluvial plain (old wadi alluvium)	Yh-1a Jc-1/2a(g) Re-1a(g)		3 37
L5	Alluvial fan (pedmont), gravelly surface	Yh-2a(g) Yk-2a(g) Je-2a(g)		4 32
L6	Northern alluvial fan, medium textured	Je-2a Re-2a Yh-2a		1 70
L7	Southern alluvial fan, coarse textured	Jc-1a Rc-1a(g)		3 100
L8	Fluvial terrace (old wadi terrace)	Yh-2a Je-2a		1 37
L9	Isolated hills	I	Yh-2bc(l)	6 20
M MIDLAND				
409				
M1	Piedmont, gravelly surface	Yh-2a(g) Yk-2a(g)		4 25
M2	Colluvial slopes and talus	Je-1b(s) Jc-1b(s) Re-1/2b		4 7
M3	Lower midland escarpment	I Yh-2bc(l) Yk-2ab(l)		6 0
M4	Dissected upland, coarse textured	Je-1a(g) I Xh-1b(s)		4 89
M5	Dissected upland, medium textured	Xh-2ab Je-1ab(g) Xh-2b(g)		3 71
M6	Higher midland escarpment	I Yk-2bc(l) Yk-2ab(l)		6 3
M7	Dissected plateau on Old Yemen Volcanics, gravelly surface	Re-1a(g)	I	4 10
M8	Dissected plateau on inclined limestone and green shale, stony surface	Re-1bc(l) I		6 17
M9	Rock floor on Old Yemen Volcanics	I	Je-1b(l)	6 87
H HIGHLAND				
81				
H1	Highland escarpment	I Je-1c(g)		6 3
H2	Dissected mountain on Yemen Volcanics	Yk-1bc(l) Yh-1bc(l)	I	6 20
H3	Highland plateau on limestone and green shale	Xh-2ab Je-2a		2 36
H4	Dissected mountain on granite and gneiss	Yk-1ab(g) I		4 17
H5	Small inter-mountain plain	Yh-2a Yk-2ab Re-2ab	I	5
				959

Fig.4.13 Physiography and Soils

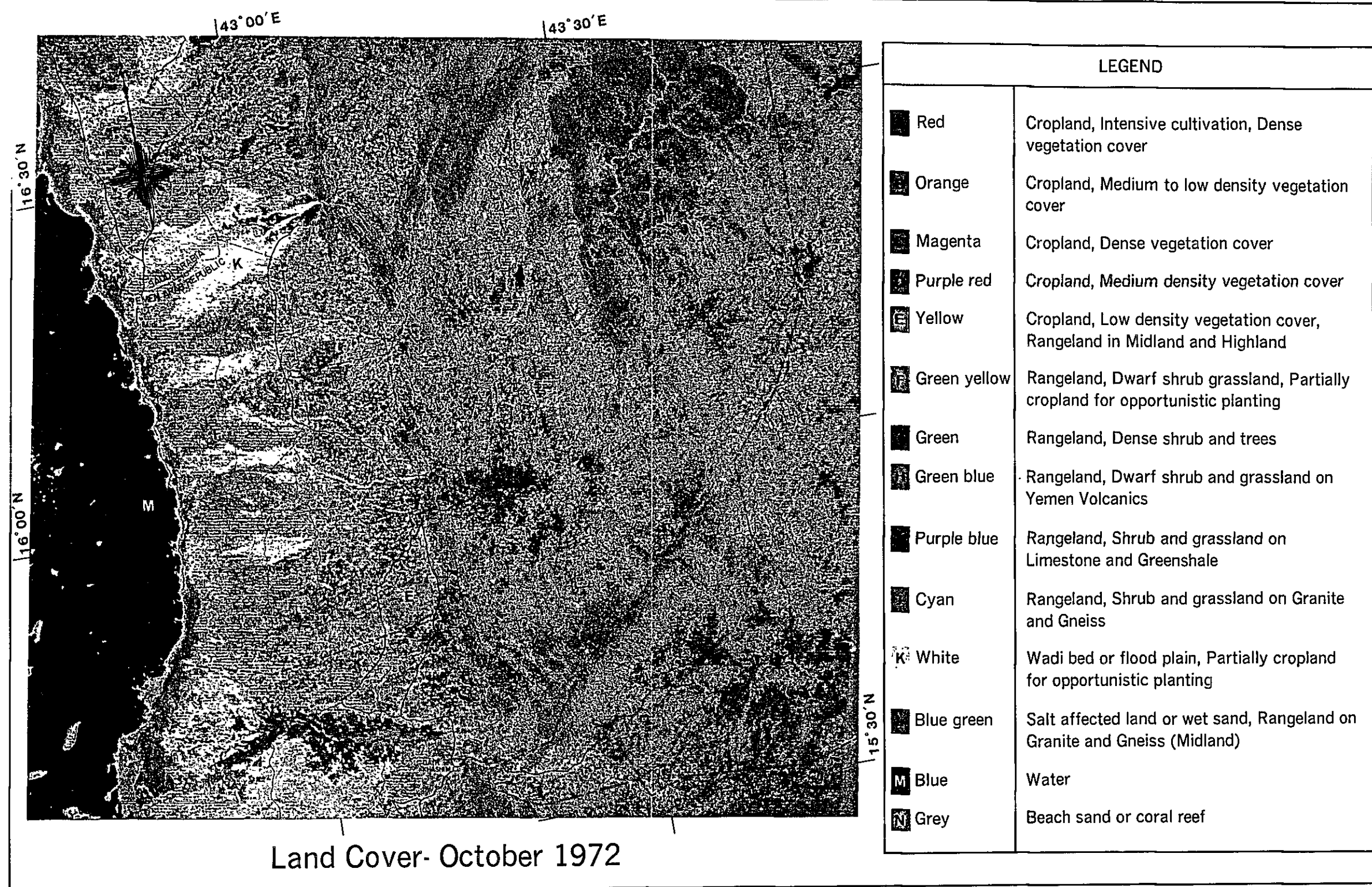
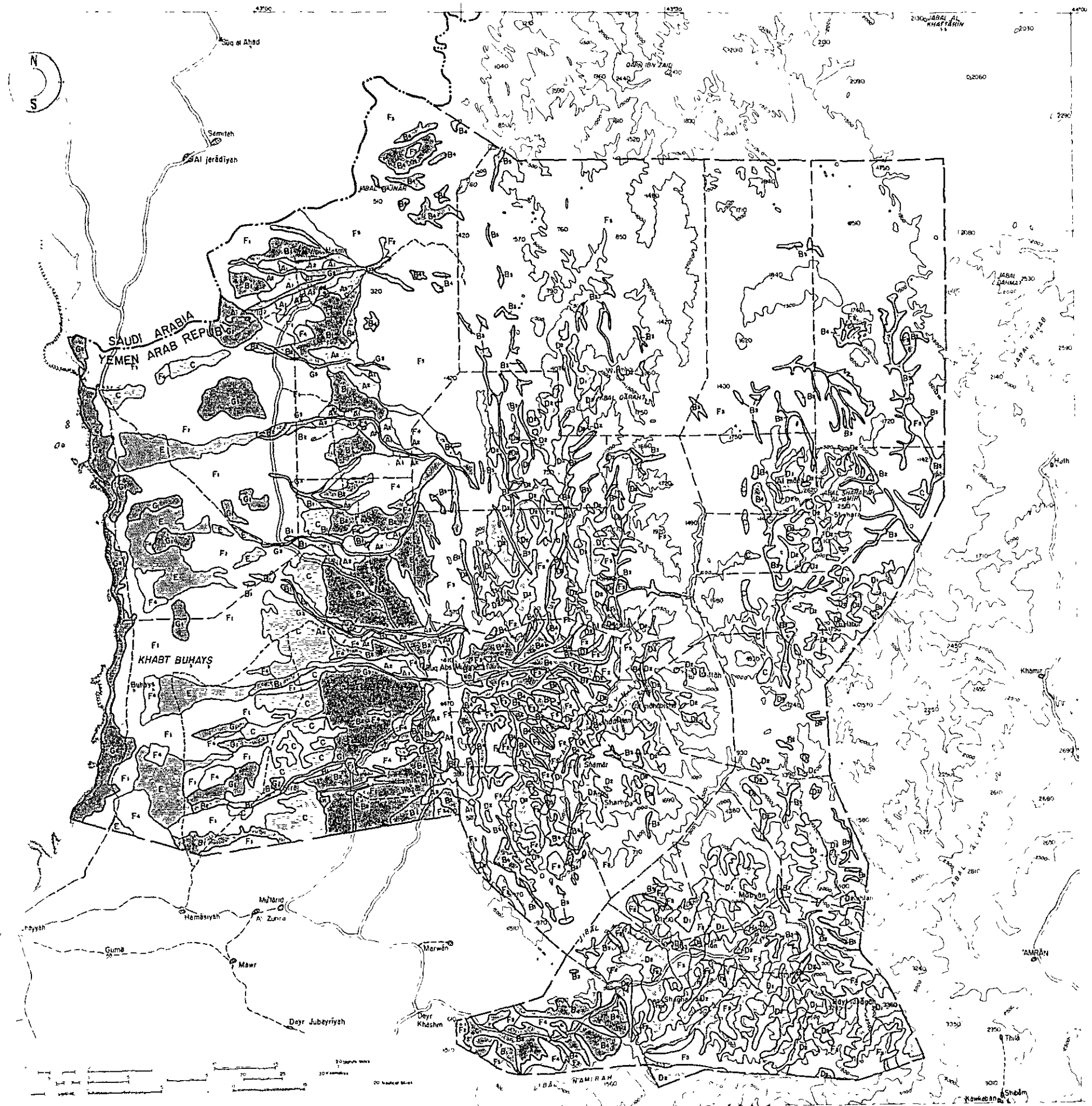


Fig.4.15 Land Cover Map (October 13, 1972)



LEGEND	
Category of Land Use	Land Use Subdivision
Irrigated Cropland	A1 Intensively cultivated under irrigation / Pumping and diverted stream flow / Sorghum, vegetables and tropical fruits
	A2 Intensively cultivated under irrigation / Diverted stream flow / Mainly sorghum
Rainfed Cropland/ Annual Cultivation	B1a Densely cultivated / Irregular spate irrigation / Mainly sorghum
	B1b Densely cultivated / Sorghum and millet
	B1c Wadi lands / Vegetables and sub-tropical fruits
	B1d Gently sloping lands receiving hill slope runoff / Sorghum and maize
Rainfed Cropland/ Opportunistic Cultivation	C Mainly millet and sorghum
Rainfed Cropland/ Terraced	D1 Densely cultivated / Sorghum, wheat, barley, and oat
	D2 Sparsely cultivated / Sorghum, millet, wheat and barley
Rainfed Cropland/ Rangeland	E Opportunistic planting, otherwise dwarf shrub grassland / Mainly millet
Rangeland	F1 Dwarf grassland
	F2 Trees and shrub
	F3 Open shrub and grassland on rocky slopes
	F4 Grassland and scattered shrub
Unused	G1 Sand dunes and isolated hills
	G2 Salt affected land
	G3 Wadi bed

Fig.4.16 Present Land Use

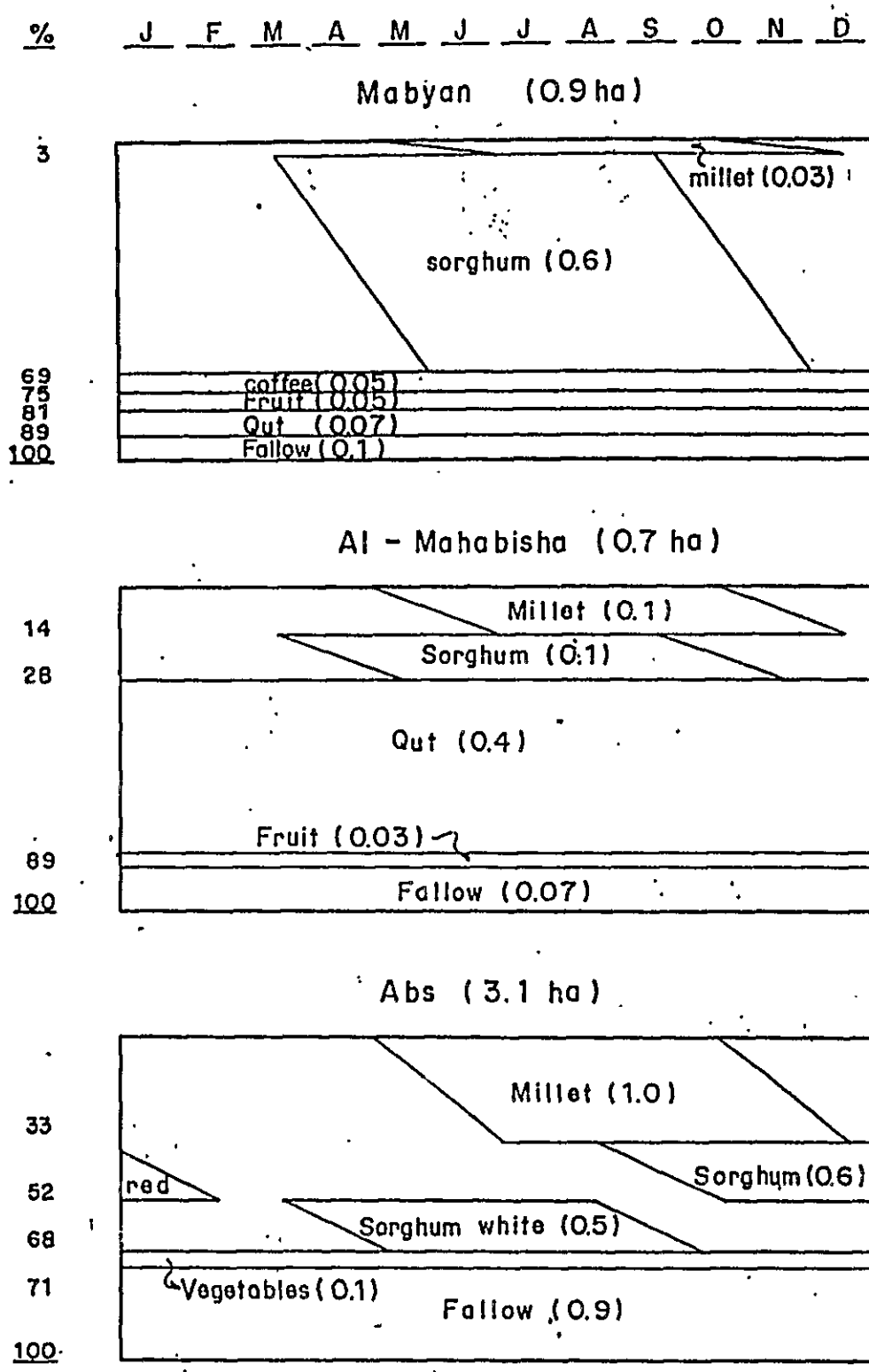
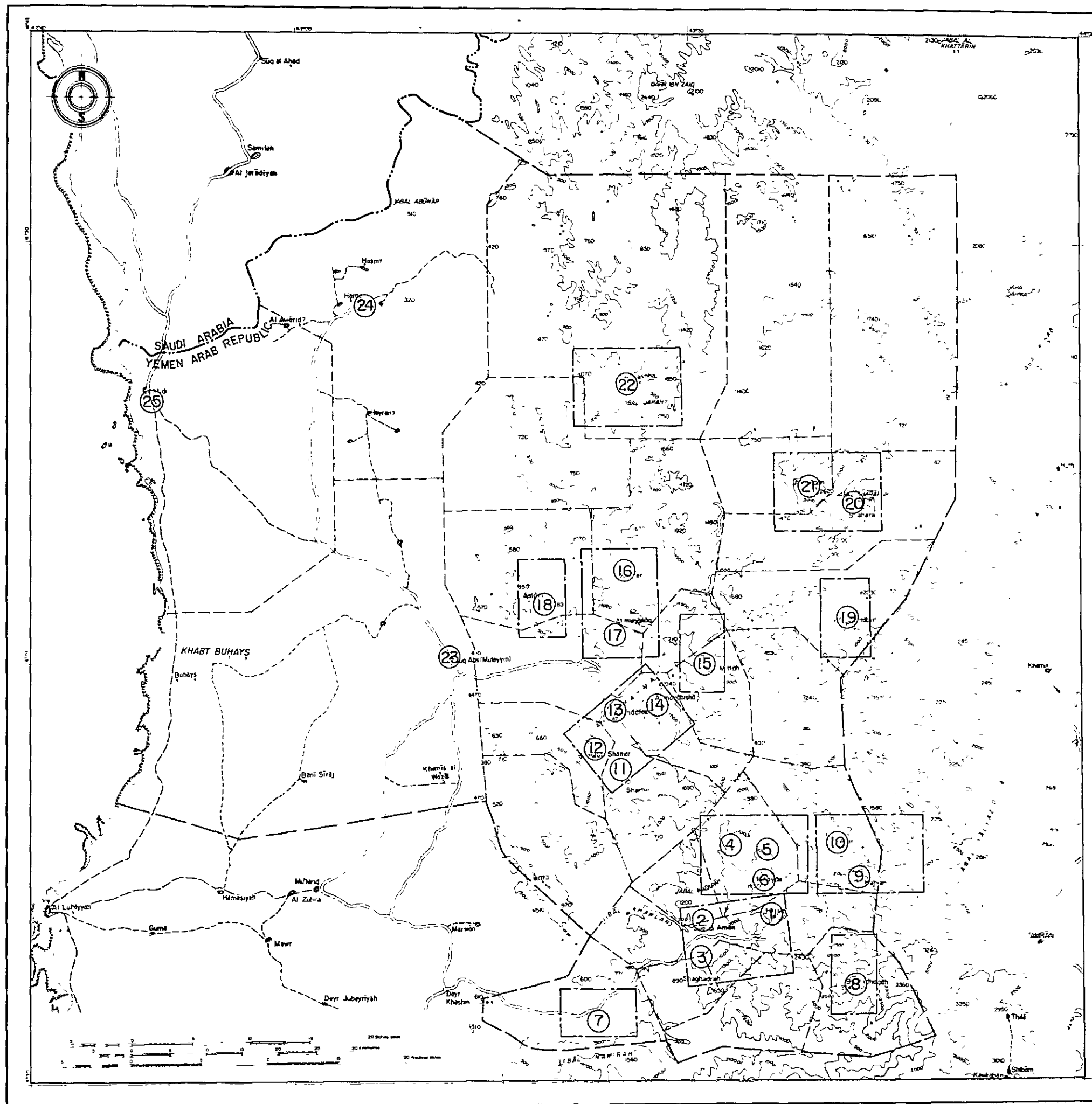


Fig. 4.17 Present Cropping Pattern



List of Water Supply Schemes

Name of Town or Village	Planned Service Population (Persons)
1 Hajjah	15,000
2 Suq Al Aman	1,800
3 Ash Shafadirah	9,500
4 North Mabyan	5,400
5 Jabal Al Dafir	4,800
6 Mabyan	5,100
7 Bani Kais	5,200
8 Bayt Idhaqah	5,200
9 Kuhlan	5,900
10 Affar	3,700
11 Sharhil	4,000
12 Qufi Shamal	2,300
13 Al Shaafeen	3,100
14 Al Mahabisha	15,000
15 Miftah	2,000
16 Kuser	3,400
17 Al Muhanaq	4,000
18 Aslam	1,600
19 Habour	2,100
20 Shahara	2,000
21 Al Madan	6,700
22 Washha	12,500
23 Abs	5,300
24 Harad	2,300
25 Midi	3,800

Boundary of Maps Scaled 1/50,000

Fig. 6.1 Location of Water Supply Scheme

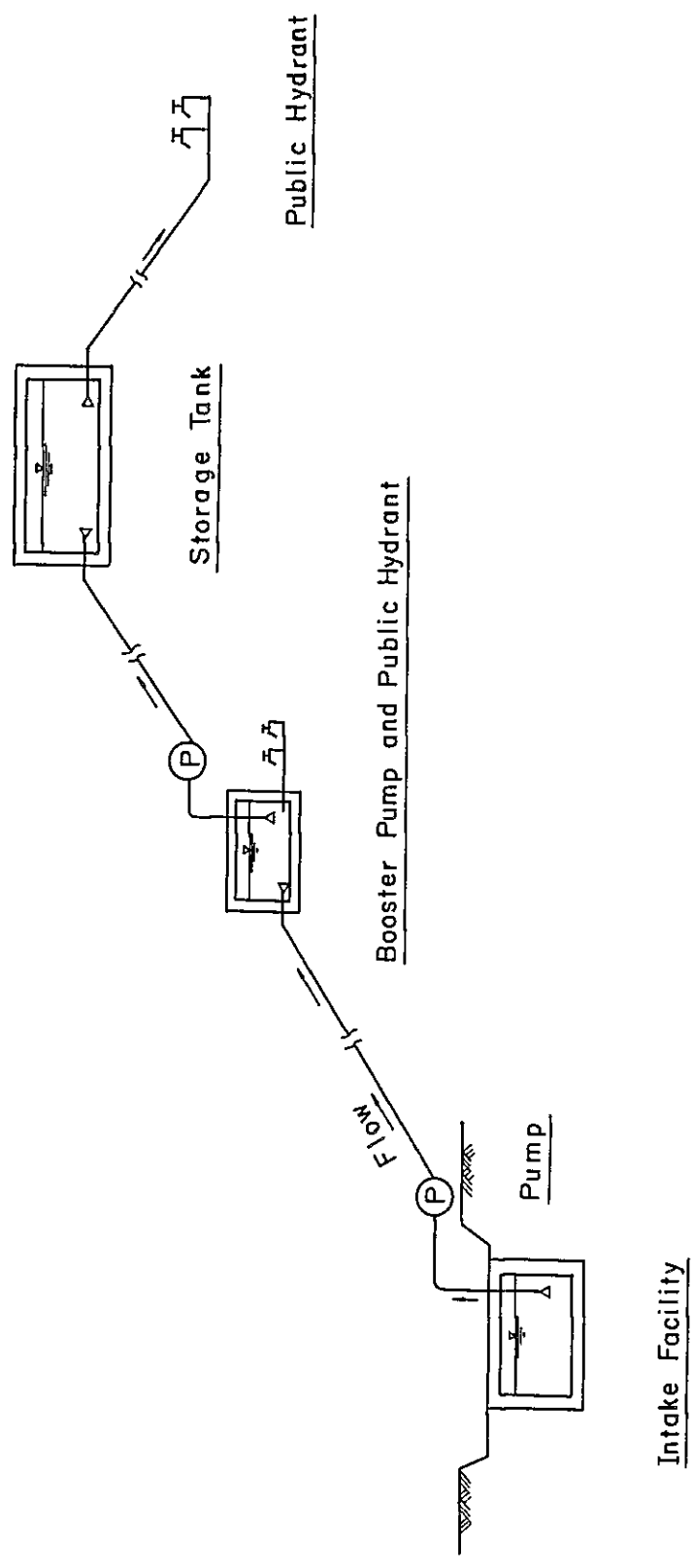


Fig. 6.2 Typical Profile of Water Supply System

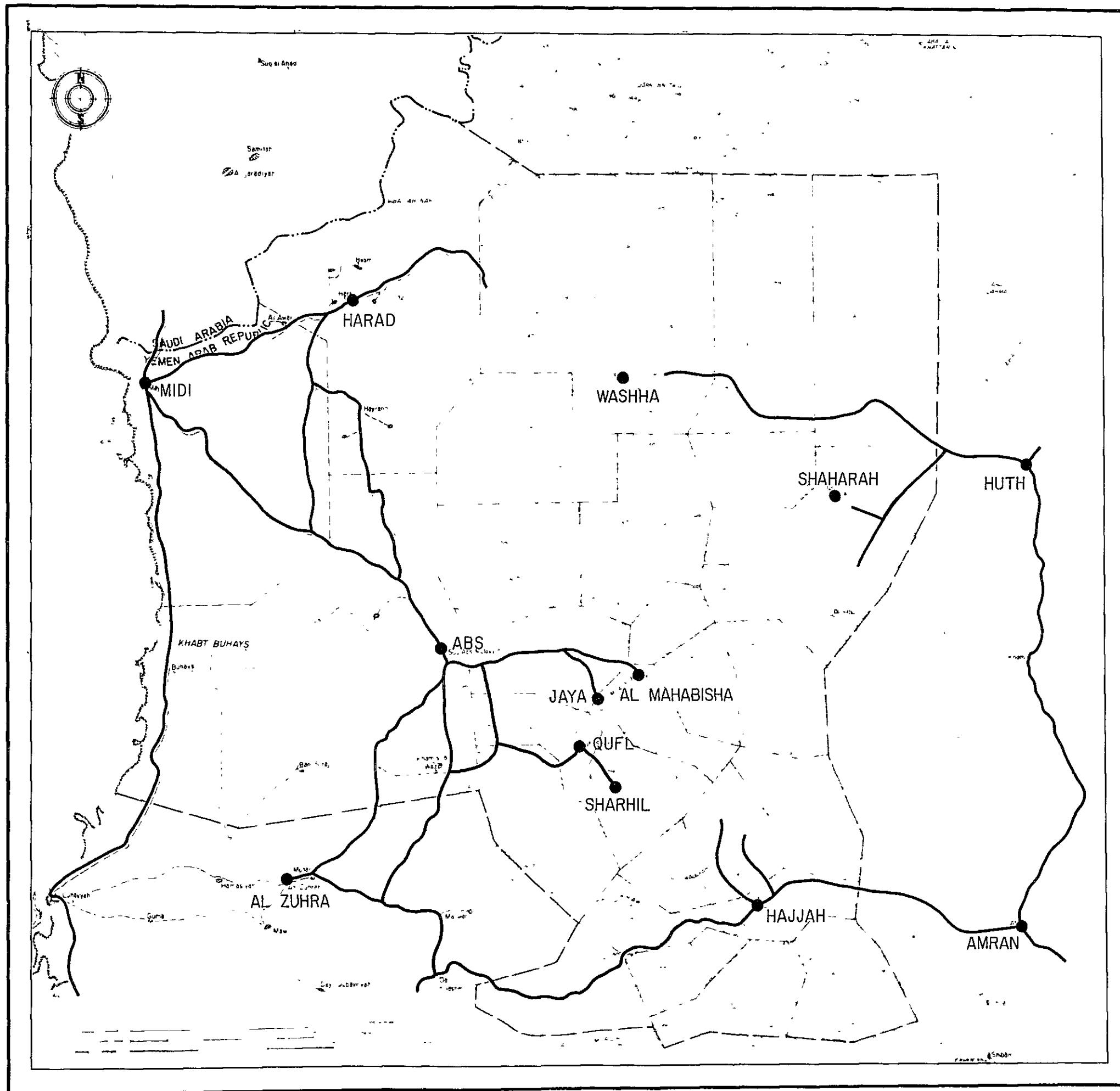
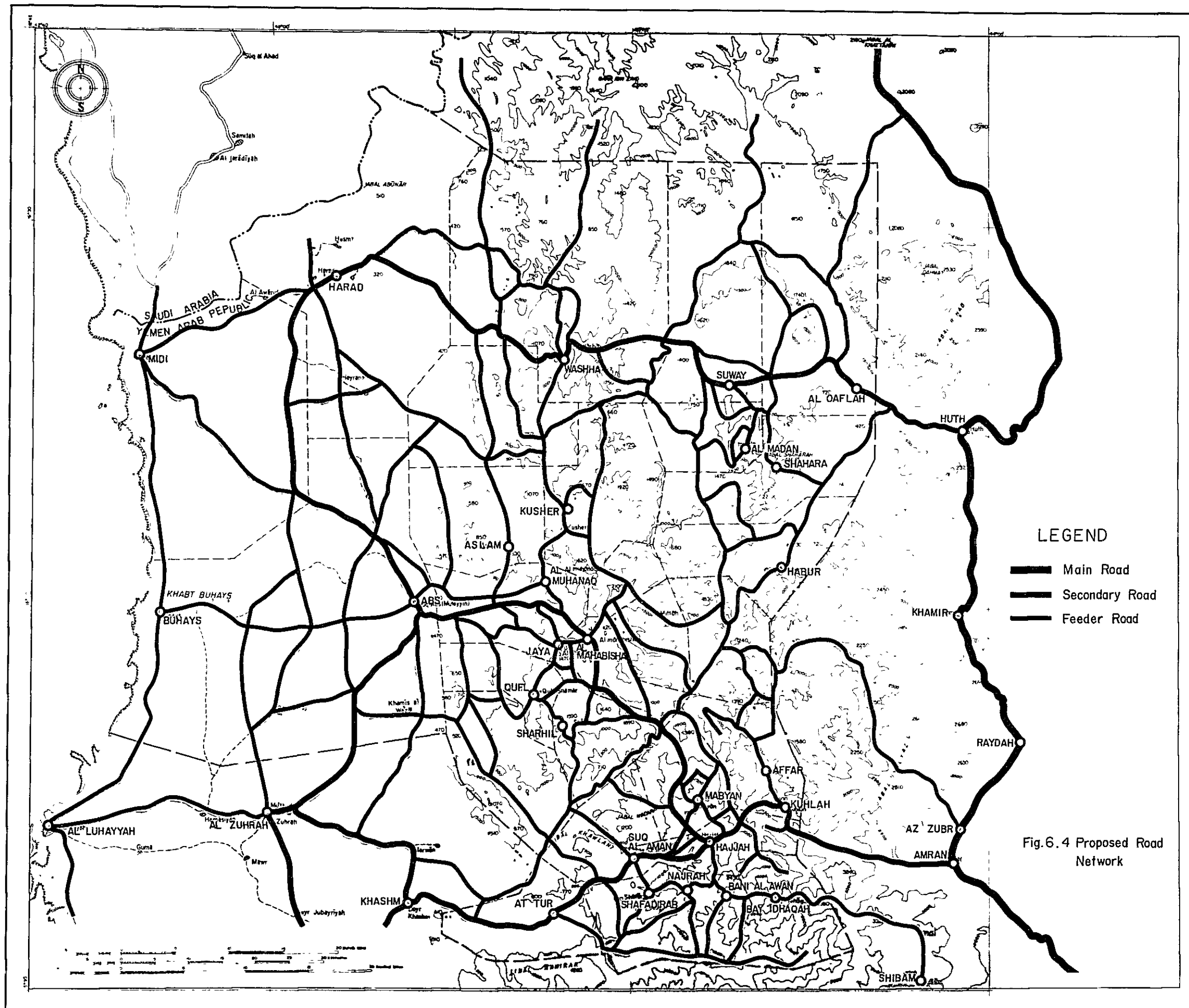


Fig. 6.3 Existing Road Network in Hajjah Province



LEGEND

- Main Road
- Secondary Road
- Feeder Road

Fig.6.4 Proposed Road Network

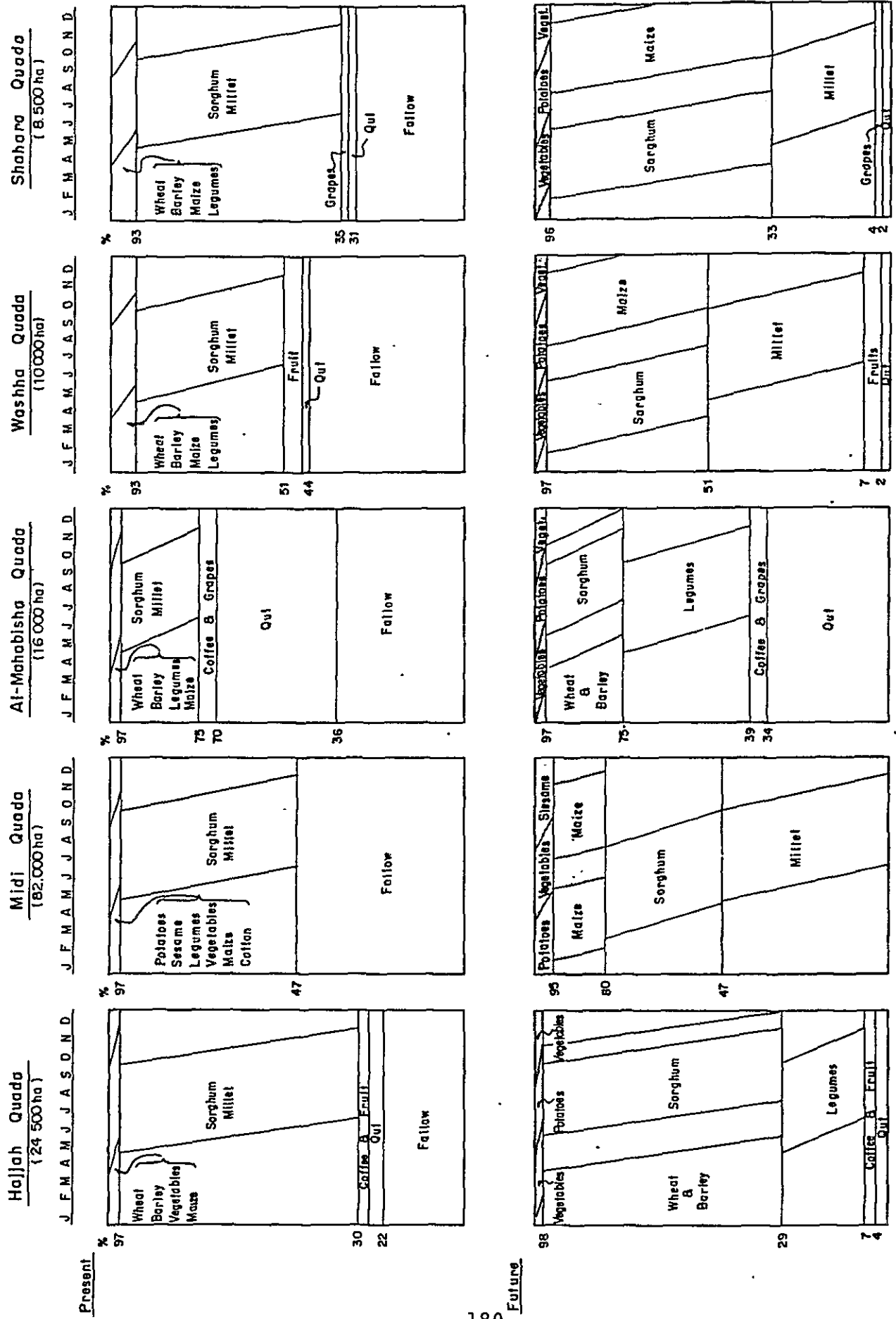
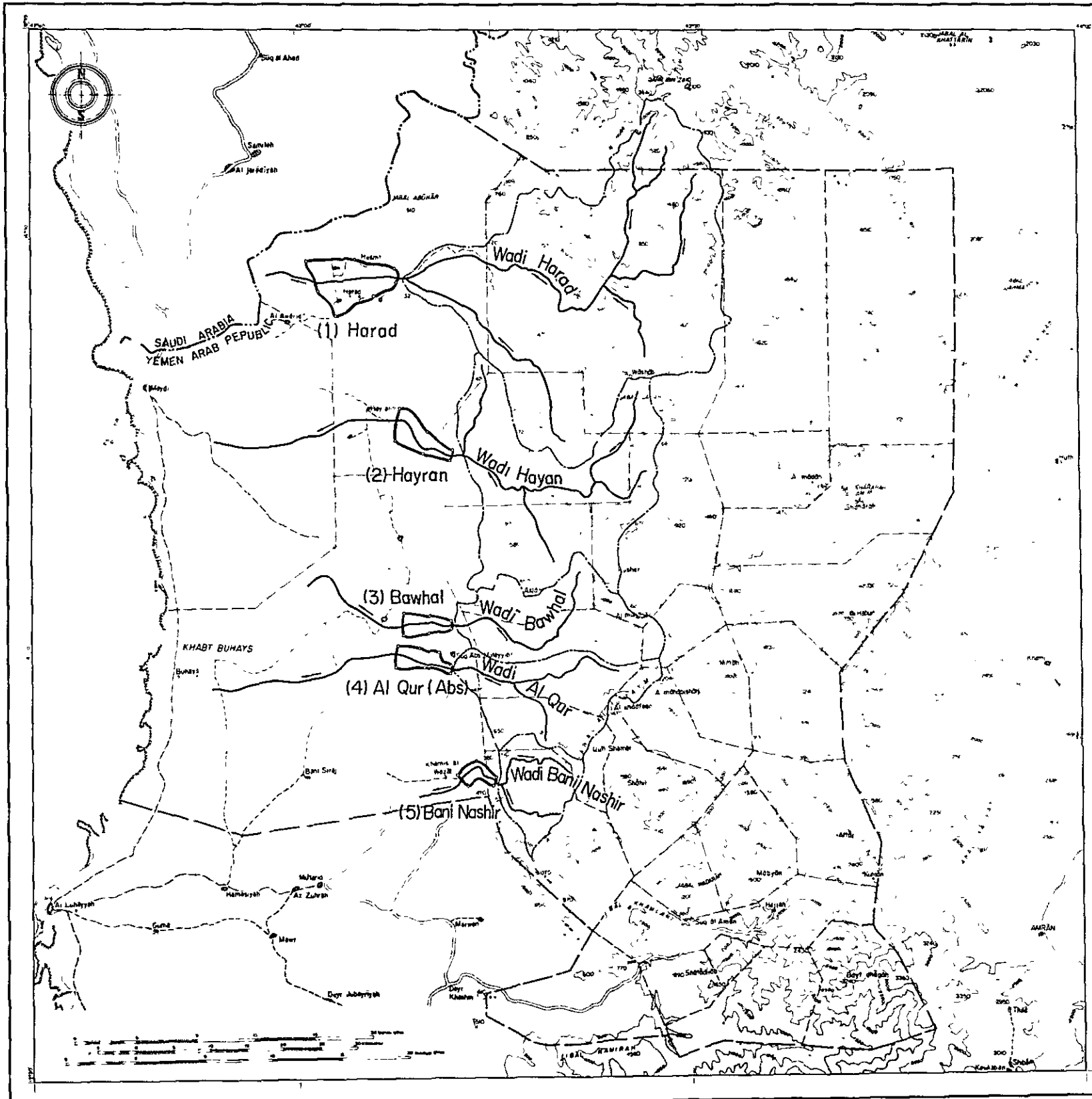


Fig. 6.5 Present and Future Cropping Pattern



Irrigable Area in Lowland

Name of Wadi	Catchment Area (sq km)	Irrigable Area (ha)
(1) Harad	994.7	3,500
(2) Hayran	414.6	1,800
(3) Bawhal	249.8	1,200
(4) Al Qur	243.0	1,300
(5) Bani Nashir	126.7	700

Legend

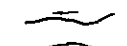


-  Wadi
-  Catchment Area
-  Irrigable Area

Fig. 6.6 Irrigable Area in Lowland

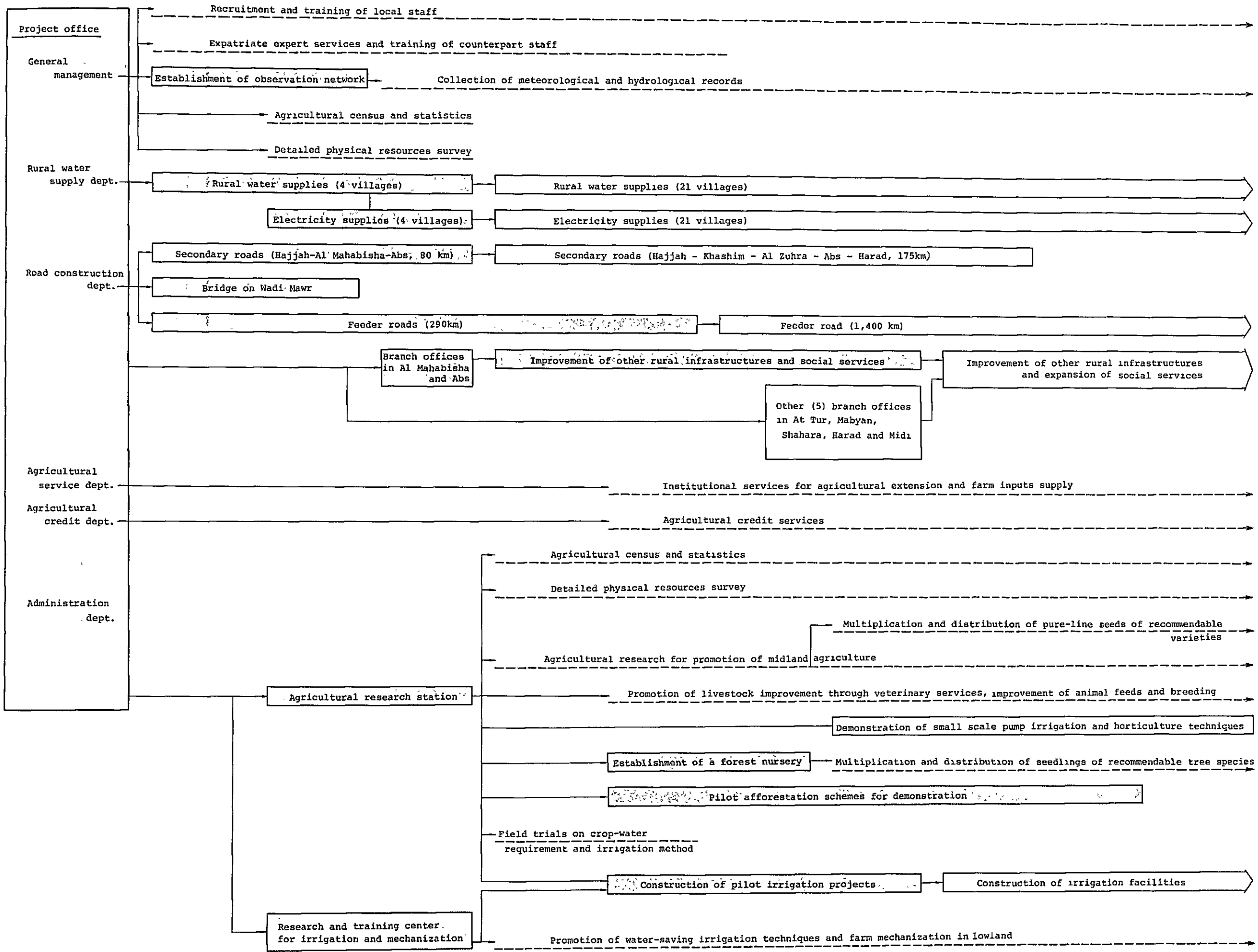


Fig. 7.1 P f

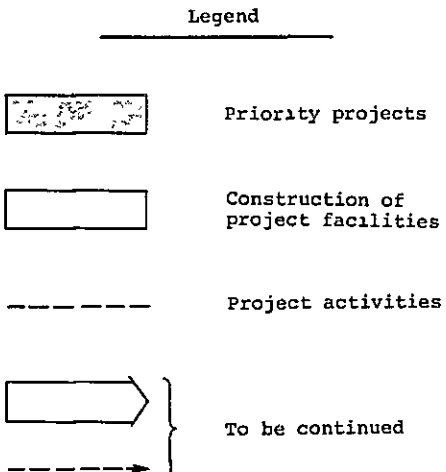
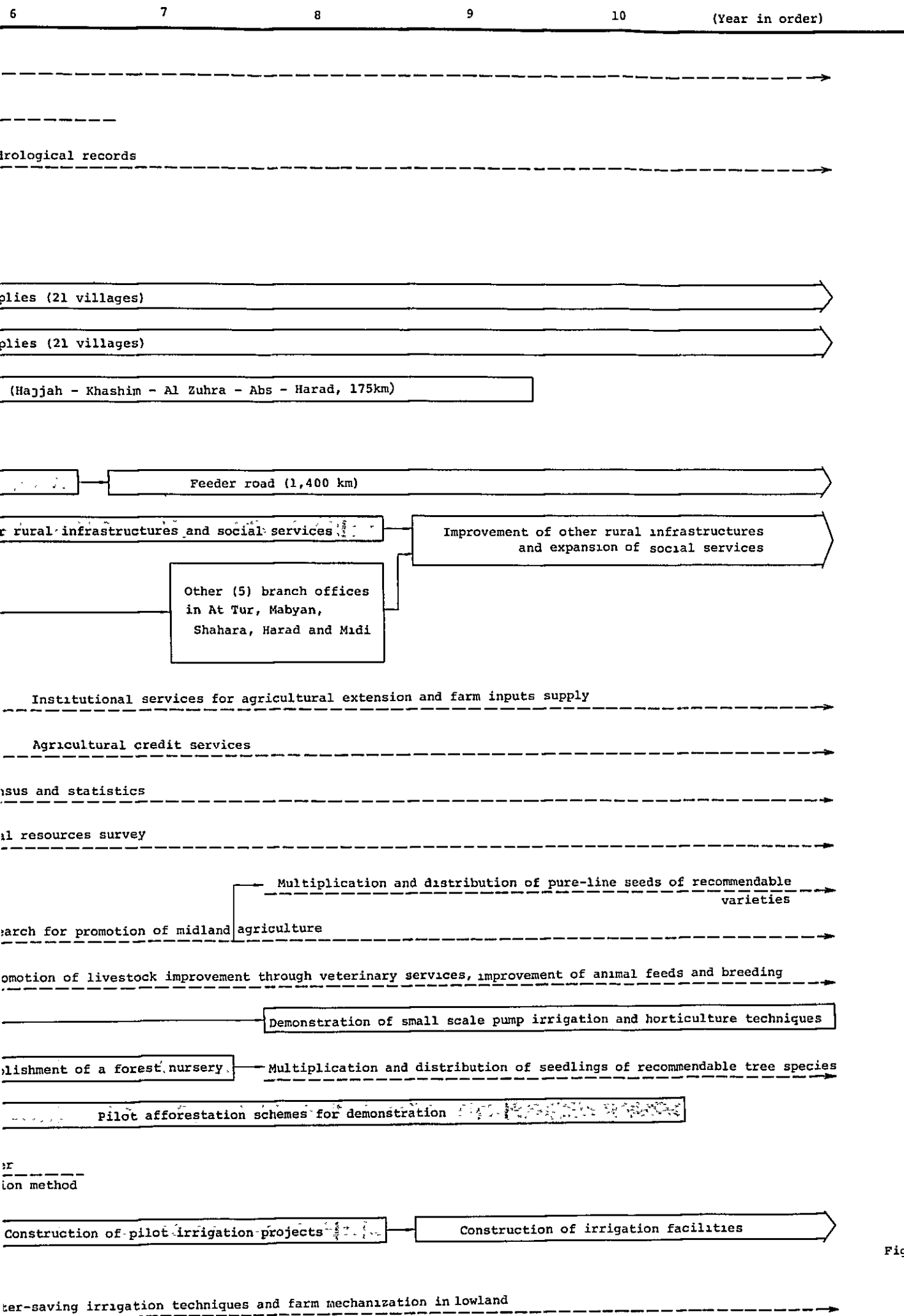


Fig. 7.1 Preliminary Implementation Schedule for Possible Projects

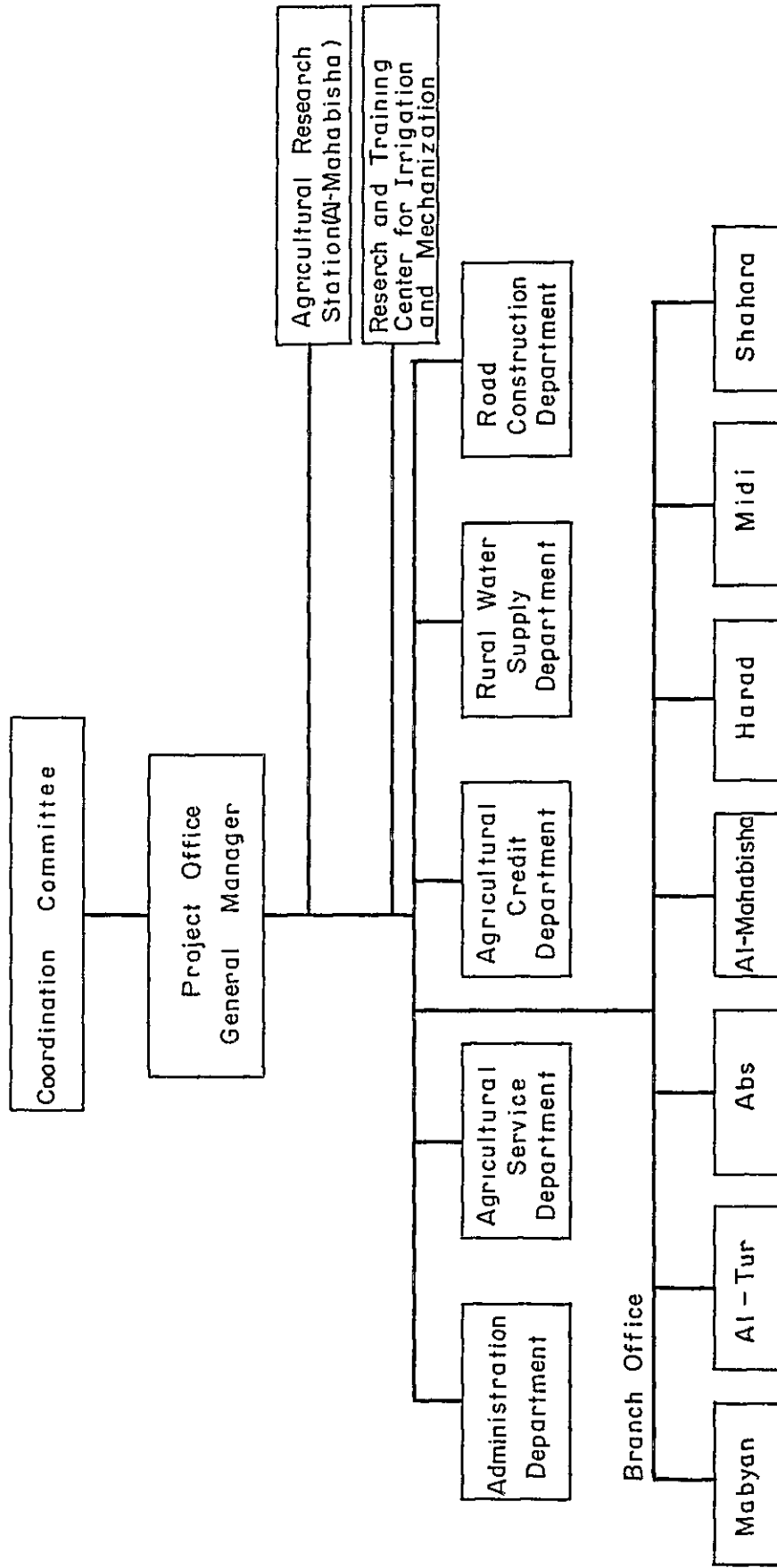
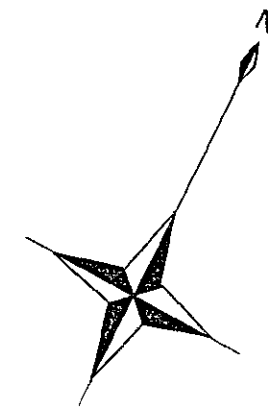
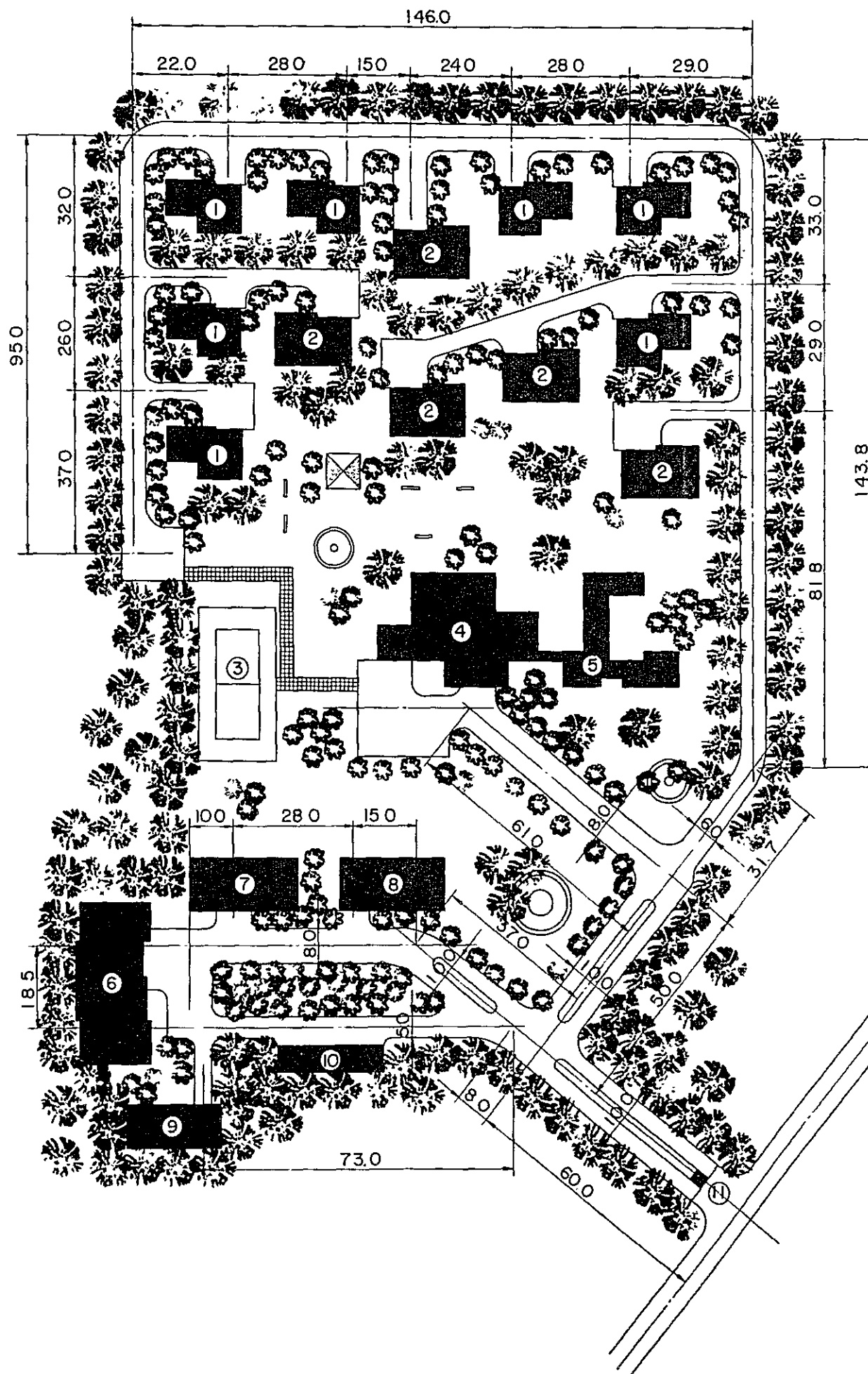


Fig. 8.1 Organizational Set-up of Hajjah Province Integrated Rural Development Project, Office



LEGEND

- 1 TWO BEDROOM RESIDENCE
- 2 THREE BEDROOM RESIDENCE
- 3 TENNIS COURT
- 4 CLUB
- 5 GUEST HOUSE
- 6 MAIN OFFICE
- 7 ROAD CONSTRUCTION DEPARTMENT
- 8 RURAL WATER SUPPLY DEPARTMENT
- 9 DRIVERS' DORMITORY
- 10 COVERED PARKING
- 11 MAIN GATE AND GUARD HOUSE

Fig. 8.2 Proposed Layout of Project Office

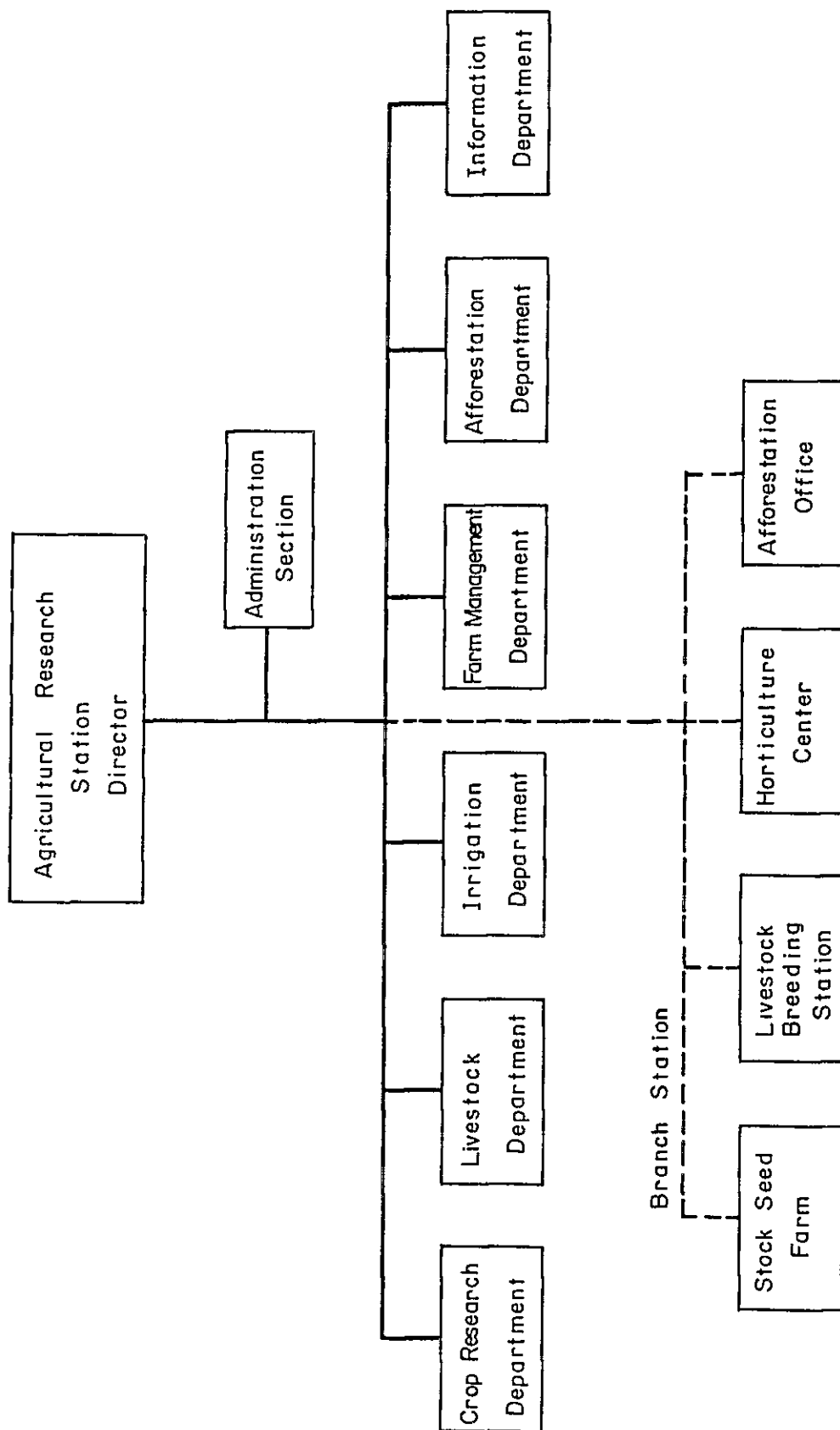


Fig. 8.3 Organization of Agricultural Research Station

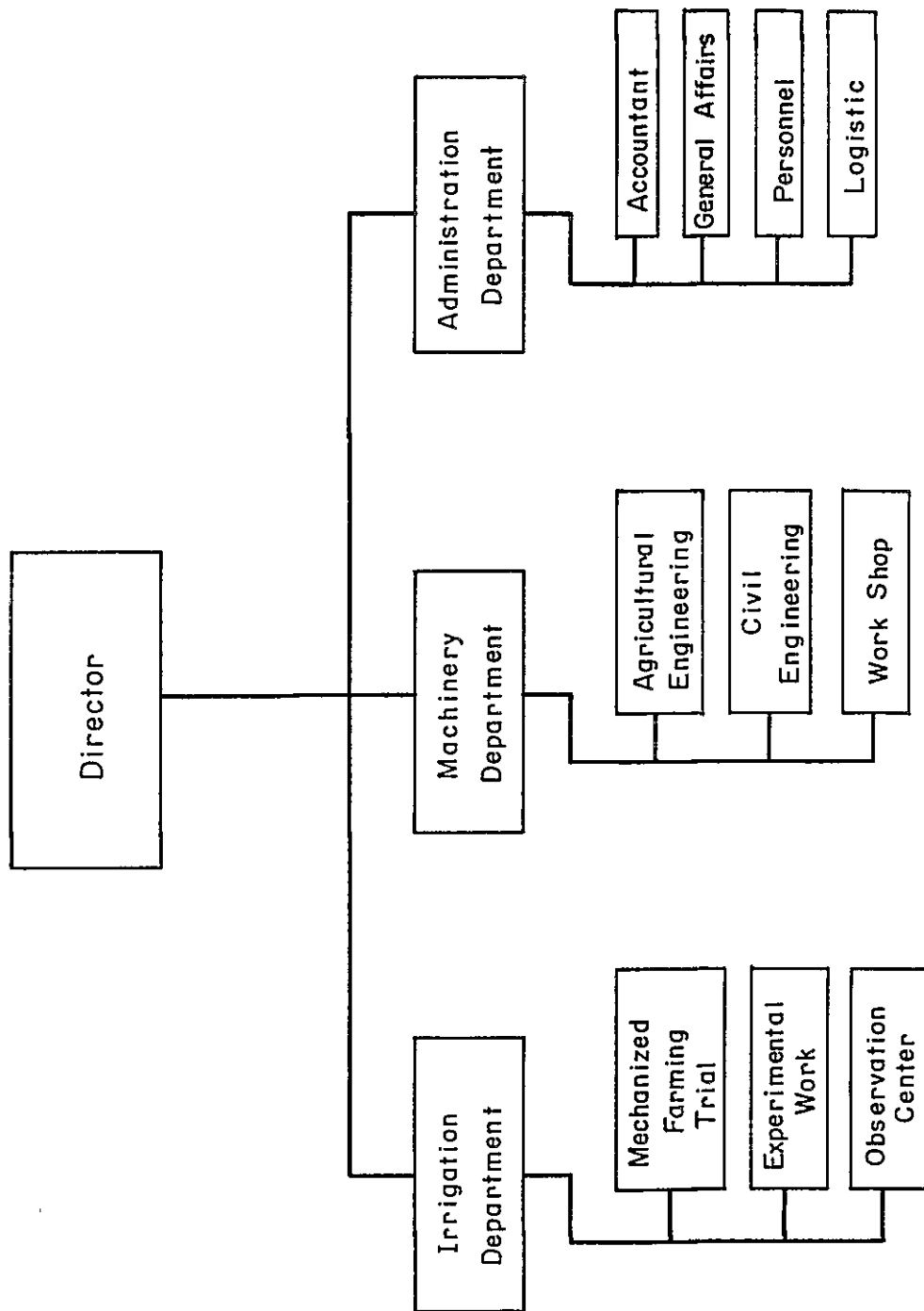


Fig. 8.4 Organization of Research and Training Center for Irrigation and Mechanization

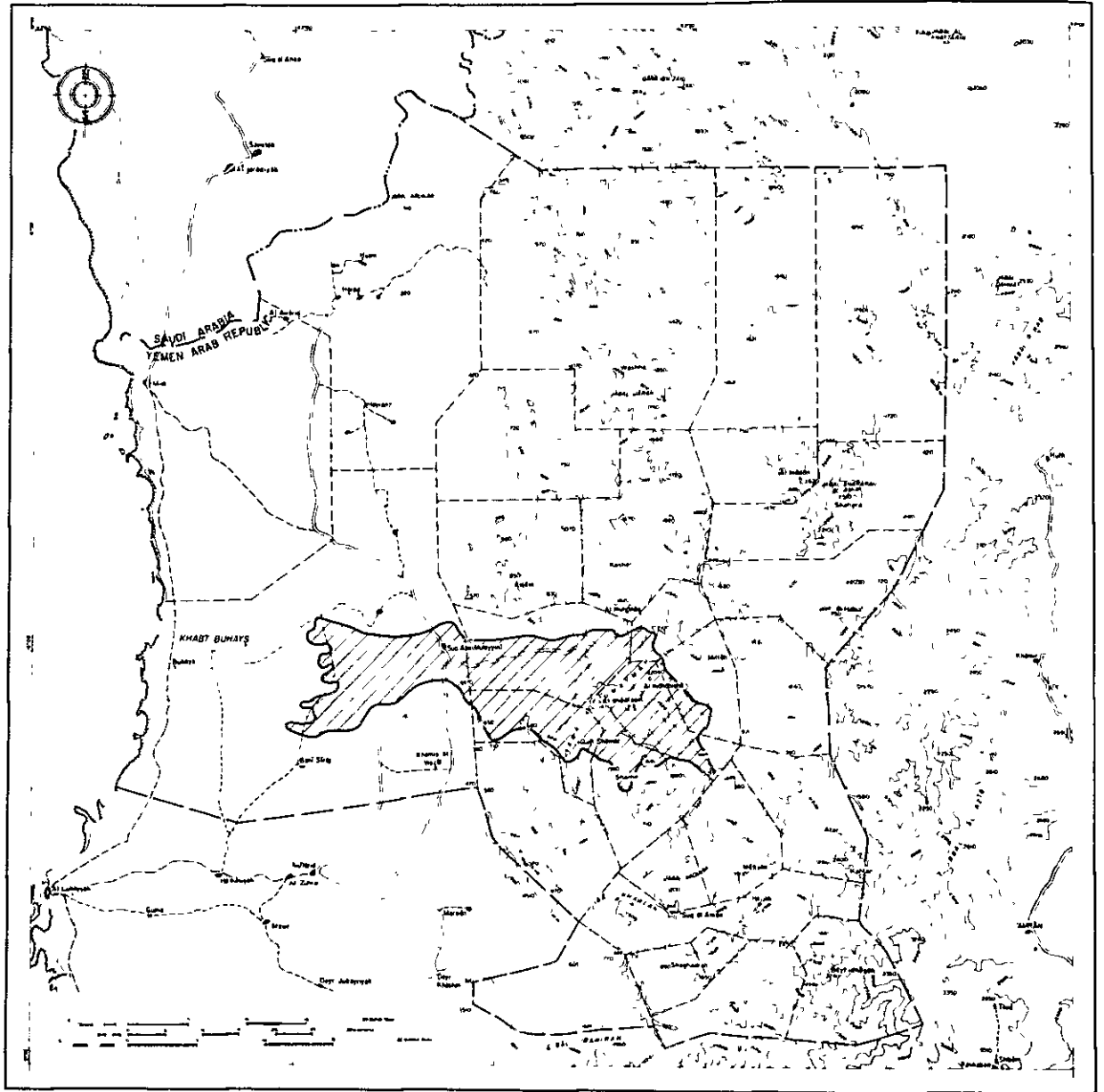
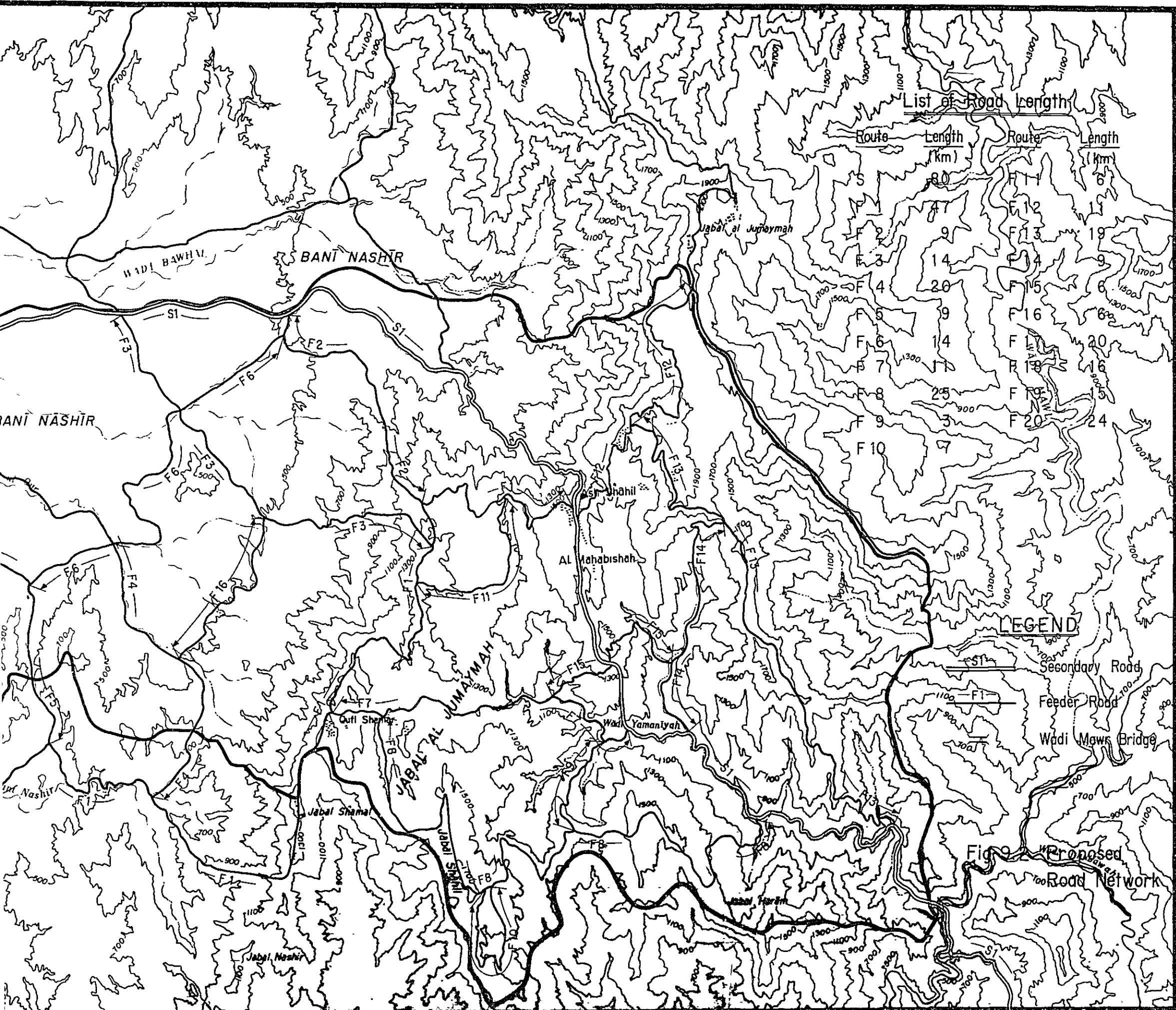


Fig.9.1 Location Map



List of Road Length

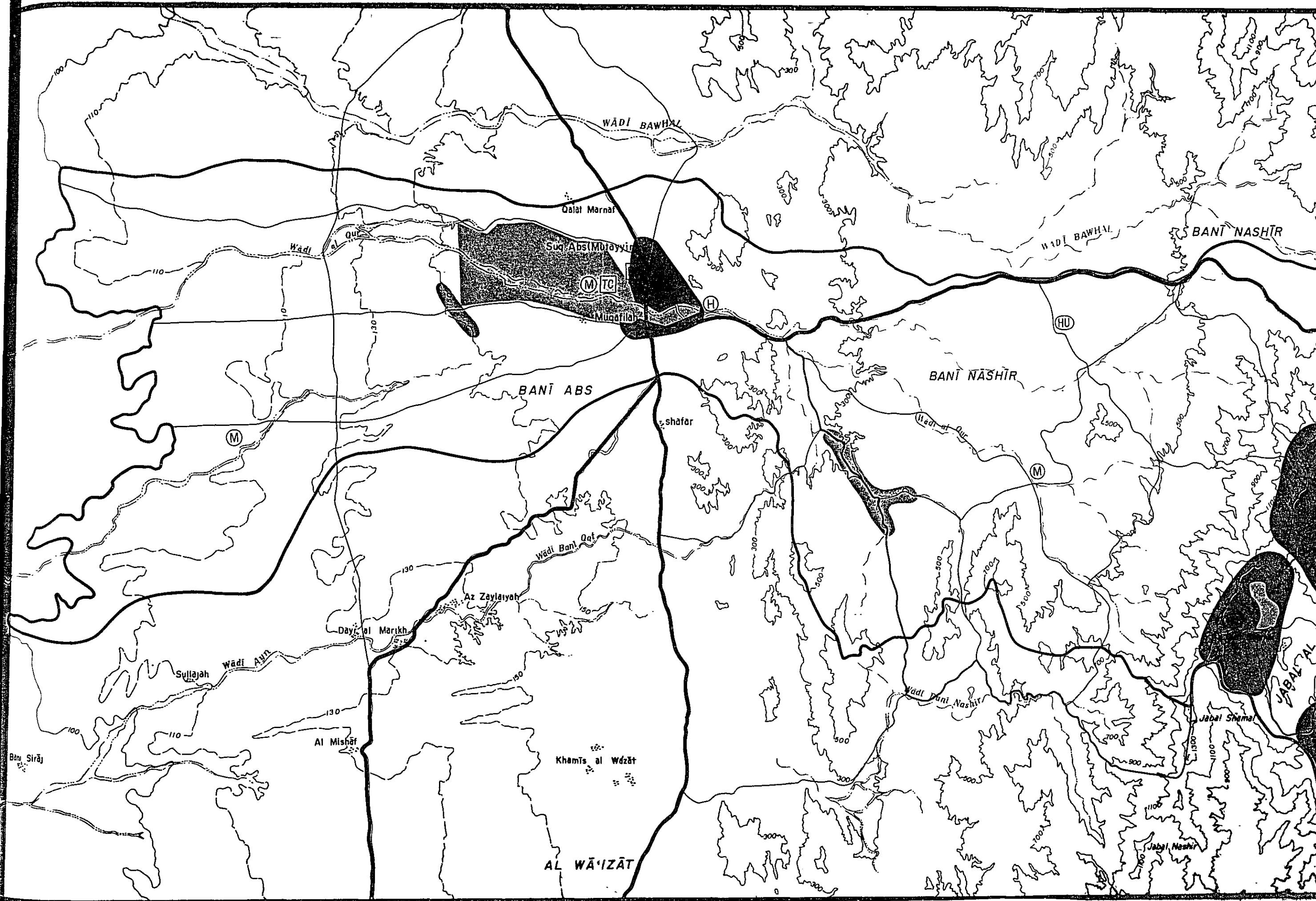
Route	Length (km)	Route	Length (km)
S1	80	F11	6
F1	7	F12	1
F2	9	F13	19
F3	14	F14	9
F4	20	F15	6
F5	9	F16	6
F6	14	F17	20
F7	11	F18	16
F8	25	F19	13
F9	3	F20	24
F10	7		

LEGEND

- Secondary Road
- Feeder Road
- Wadi Mawr Bridge

Fig. 2 Proposed Road Network

Kilometres



1 2 3 4 Statute Miles

0 1 2 3 4 Kilometers

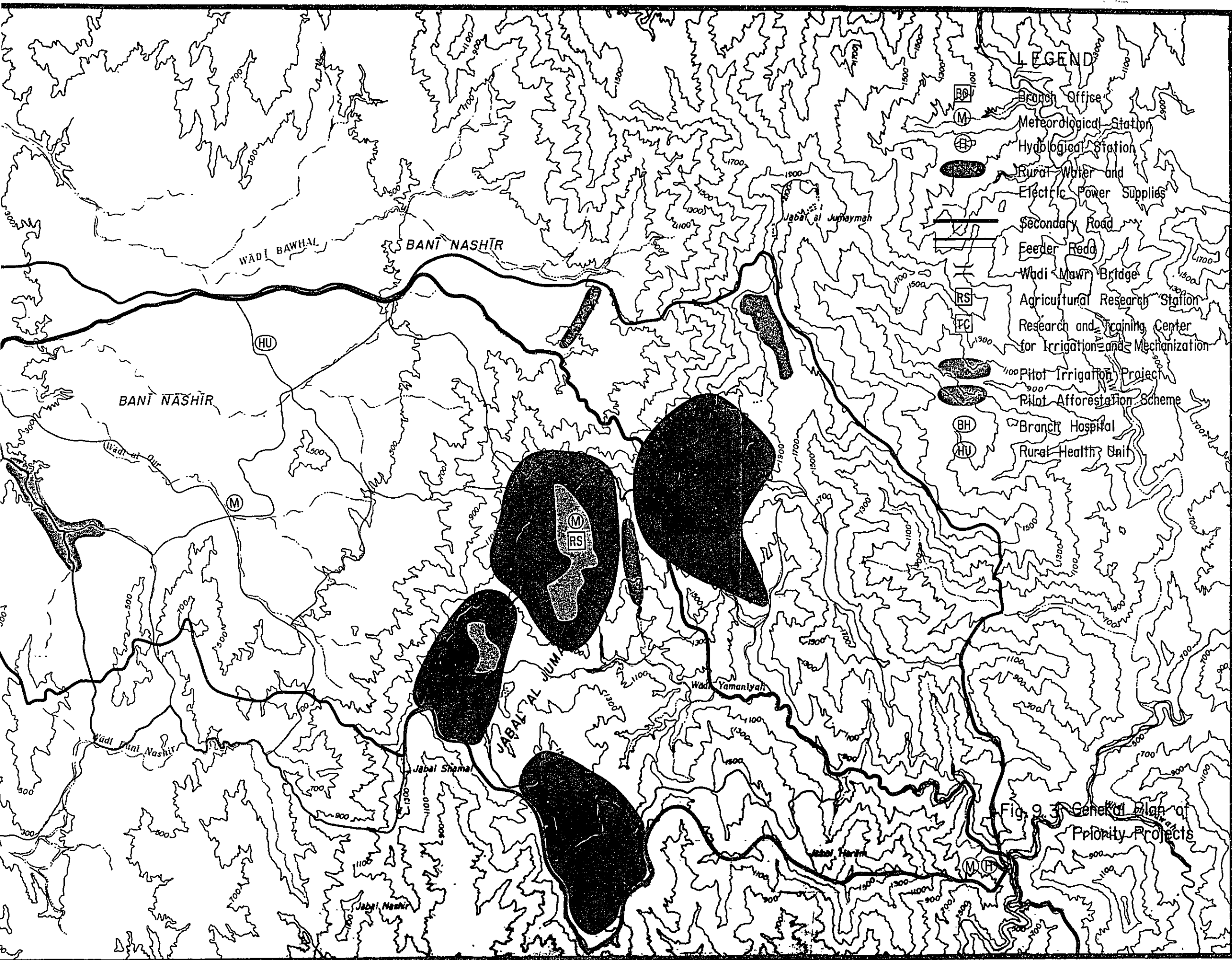
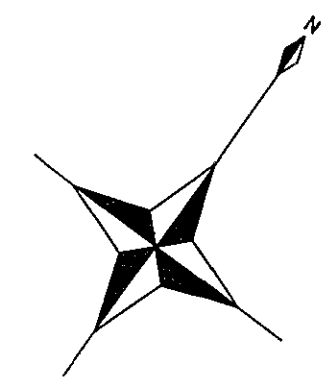
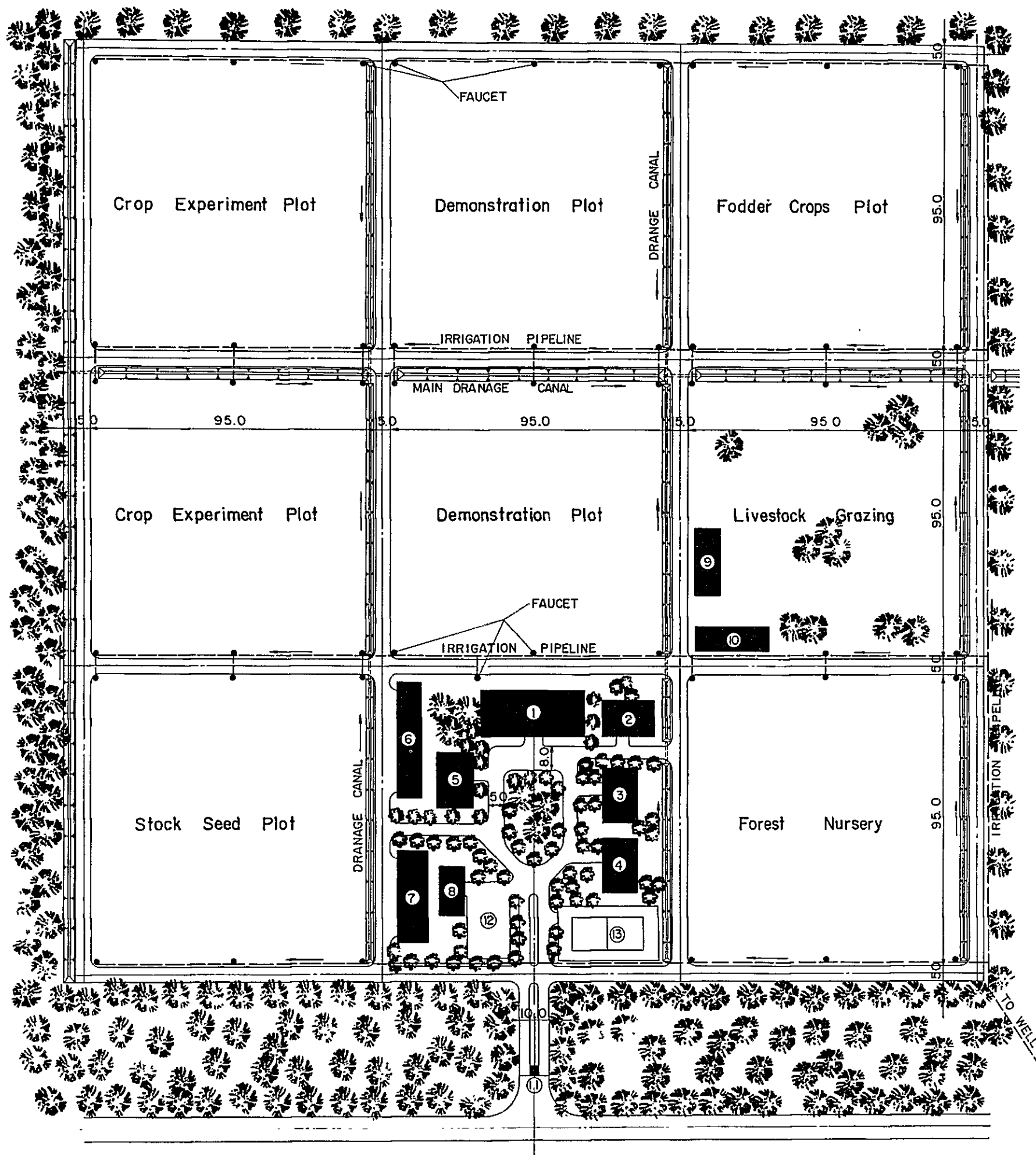


Fig. 9.3 General Plan of Priority Projects

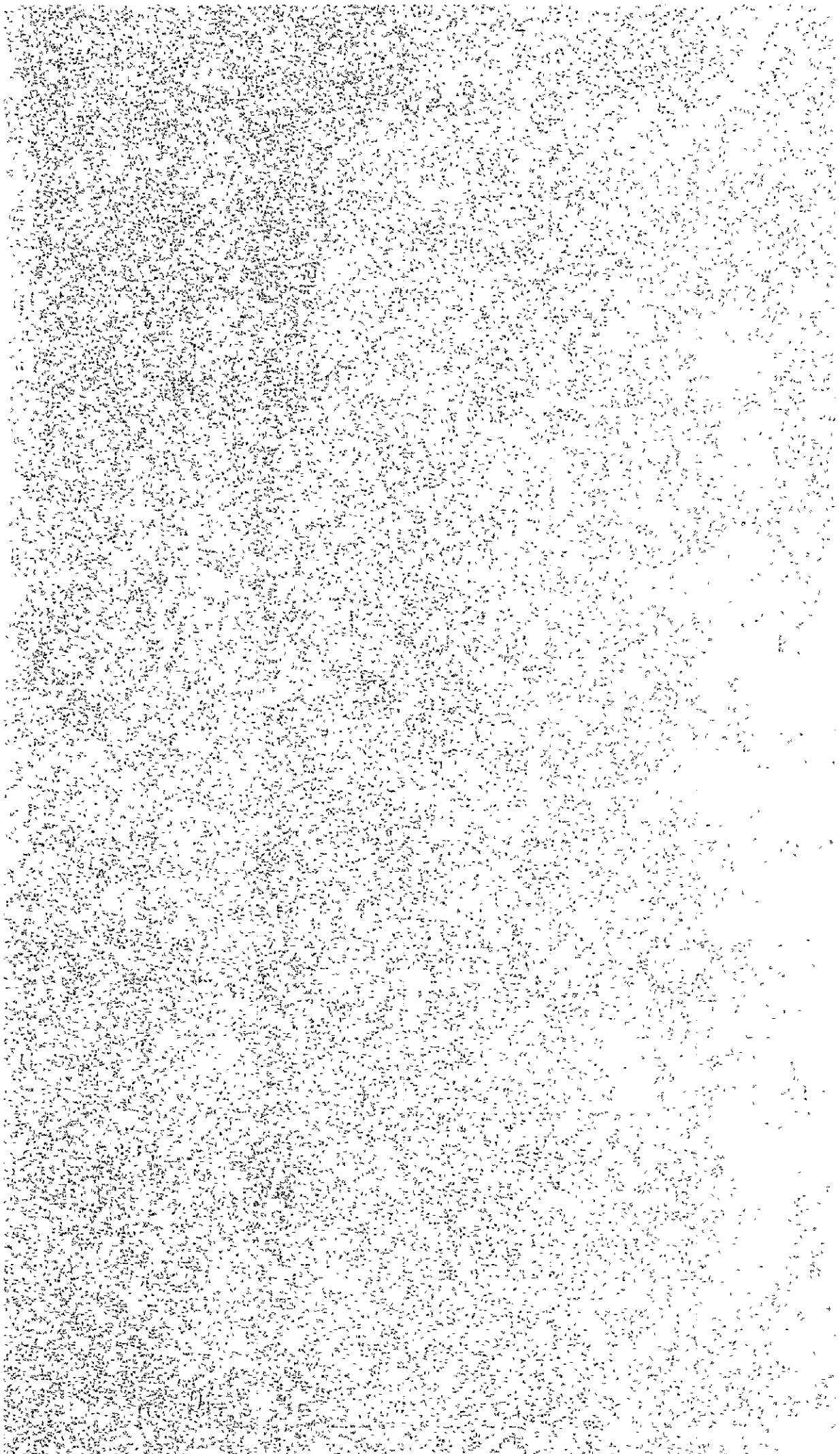


LEGEND

- 1. MAIN OFFICE
- 2. LIVESTOCK DEPARTMENT
- 3. AFFORESTATION DEPARTMENT
- 4. IRRIGATION DEPARTMENT
- 5. CROP RESEARCH DEPARTMENT
- 6. FARM TOOLS STORAGE
- 7. FERTILIZER STORAGE
- 8. WATCHMAN'S DORMITORY
- 9. FODDER STORAGE
- 10. STABLE
- 11. MAIN GATE AND GUARD HOUSE
- 12. PARKING AREA
- 13. TENNIS COURT

Fig. 9.4 General Layout of Agricultural Research Station

Description	1	2	3	4	5	6	7	8	9	10 (Year in order)
(1) Project office	_____			_____						
(2) Branch offices in Al Mahabisha and Abs										
(3) Establishment of observation network										
Meteorological stations (4)	_____									
Hydrological stations (2)	_____									
(4) Rural water supplies										
Abs, Al Shaafeen	_____									
Sharhil, Quf1 Shamal	_____									
(5) Rural road network										
Secondary roads										
Hajjah - Al Mahabisha (45 km)	_____									
Al Mahabisha - Abs (35 km)	_____									
Bridge on Wadi Mawr (200 m)	_____									
Feeder roads										
Abs - Quf1 - Al Mahabisha (47 km)	_____									
Quf1 - Sharhil (25 km)	_____									
Other feeder roads (220 km)										
(6) Agricultural research station (10 ha)										
(7) Research and training center (20 ha) for irrigation and mechanization										
(8) Pilot irrigation projects										
Wadi-delta plain — Abs area (1,300 ha)										
Swampy lands — Jaya, Tahannen and Sharhil area (500 ha)										
Wadi lands (200 ha)										
(9) Establishment of a forest nursery (1 ha)										
(10) Pilot afforestation schemes (200 ha)										
(11) Rural infrastructures										
Health facilities										
Electric power supply										



SCOPE OF WORKS ON MASTER PLAN STUDY FOR HAJJAH PROVINCE
INTEGRATED RURAL DEVELOPMENT IN THE YEMEN ARAB REPUBLIC

(1) Introduction

In response to the request of the Government of the Yemen Arab Republic, the Government of Japan has decided to conduct a study of Master Plan for Hajjah Province Integrated Rural Development in accordance with laws and regulations in force in Japan, and the Japan International Cooperation Agency (JICA), the official agency responsible for the implementation of technical cooperation programs of the Government of Japan, will carry out the study.

The present documents set forth the scope of works in regard to the above-mentioned study which to be carried out in close cooperation with the Government of the Yemen Arab Republic and authorities concerned.

(2) Objectives of the Study

The objectives of the study will be:

- a) to formulate, on the basis of the result of the preliminary survey conducted by JICA, the Master Plan for the Integrated Rural Development (hereinafter referred to as "IRD") in Hajjah Province area and
- b) to transfer technical knowledge to the Government staff of the Yemen Arab Republic concerned.

(3) Outline of the Study

The Master Plan study consists of the field works in Yemen and home works in Japan.

Field Works.

- a) Data collection and investigation

- 1) Natural environment
Topography, geology, soil, meteorology,
hydrology and vegetation
 - 2) Social and economic survey:
Culture and history
Land use and land classification
Industry and marketing system
Infrastructures (road, irrigation and etc.)
 - 3) Agricultural survey:
Agricultural infrastructures
Crops, cultivation
Livestock
Farm management and economy
Farmer's association, marketing of agricultural
products
- b) Plan formulation of the basic IRD
- 1) Objectives of the IRD
 - 2) Selection and delineation of priority regions
in the Province for the staged development
 - 3) Study of development strategy and identifica-
tion of possible projects
 - 4) Preparation of investment program

Home Works

The Master Plan shall be established in accordance with the findings in the field works, and based on the results of items 3-b and the followings:

- a) Data adjustments and analysis
- b) Assessment of capable resources and study of the obstructing factors for development
- c) Preparation of the Master Plan incorporating the outcome of item 3-b.

(4) Reports

The JICA will prepare and submit the following reports to the Government of the Yemen Arab Republic, according to the attached work schedule.

- a) Interim Report: Twenty (20) copies in English at the end of field study on Hajjah Province area.
- b) Draft Final Report: Twenty (20) copies in English after the completion of the field works. The Government of the Yemen Arab Republic is requested to provide JICA with its comments after the receipt of the draft final report.
- c) Final Report: Fifty (50) copies in English after the receipt of the draft final report.

(5) Undertakings of the Government of the Yemen Arab Republic

To secure the smooth performance of the study, the Government of Yemen Arab Republic is requested:

- a) to provide the study team with data and information necessary for the study.
- b) all equipments and materials are exempted from taxes and custom duties including personal effects.
- c) to assure security of the team during their services in Yemen.
- d) to assign the necessary number of counterpart personnel to cooperate and assist the team, as well as to be trained during the implementation of the project.
- e) to provide and arrange the study team with suitable office and accommodation in Hajjah Town for about 10 Japanese team members.
- f) to assist the team in hiring 4-wheel-drive vehicles.
- g) to make necessary arrangements for the work schedule.

W O R K S C H E D U L E

	1 9 7 8			1 9 7 9					1 9 8 0													
	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4
Scope of Works Mission	<u>2W</u>																					
Field Work Dry Season	<u>3M</u>																					
Wet Season	<u>4M</u>																					
Home Office Work	-----																					
Report	----- Interim Report																					
Draft Report Mission	----- Draft Report																					
	----- Final Report																					

JAPANESE MASTER PLAN STUDY TEAM

(1) First Study Team

<u>Assignment</u>	<u>Name</u>	<u>Present Position</u>
Leader	Mr. Shizen Inoue	Vice President Agricultural Development Consultants Association, Japan (ADCA)
Photogrammetry	Mr. Toru Kawasaki	Advisor (ADCA)
Remote Sensing	Dr. Mitsuru Nasu	Advisor (ADCA)
Agricultural Economy	Mr. Naoki Ariga	Advisor (ADCA)
Agricultural Engineering	Mr. Takao Kume	Advisor (ADCA)

(2) Second Study Team

<u>Assignment</u>	<u>Name</u>	<u>Present Position</u>
Leader	Mr. Shizen Inoue	Vice President Agricultural Development Consultants Association, Japan (ADCA)
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Geology	Mr. Toru Kawasaki	Advisor (ADCA)
Irrigation	Mr. Takao Kume	Advisor (ADCA)
Hydrology	Mr. Hironori Takahashi	Advisor (ADCA)
Regional	Mr. Shizuo Sato	Advisor (ADCA)
Agricultural Extension	Mr. Masashi Shono	Advisor (ADCA)
Remote Sensing	Dr. Mitsuru Nasu	Advisor (ADCA)
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Photo-Inter- pretation	Mr. Naokazu Monma	Advisor (ADCA)
Agricultural Economy	Mr. Kisaku Yamada	Advisor (ADCA)

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Mr. Yahya Al-Kaizel	Director, Statistics Dept.
Mr. Ahmed Mohmed Mogbil	Director, Credit Dept.
Mr. Ogale Eleriani	Director, Follow-up Dept.
Dr. Magdi El-Menshaui	Advisor
Mr. Ali Abdalla Ali	Advisor
Mr. Aquil Al-Iryan	Head, Follow-up Dept.
Mr. Abdelwaheb Elhaidari	Head, Planning Dept.
Mr. Anwar Al-Harazi	Head, Project Dept.
Mr. Abdel Rahim Saeed Tahir	Loans and Technical Assistance Dept.

Ministry of Agriculture

Mr. Mohammed H. Jagman	Deputy Minister
Mr. Mokbil A. Mokbil	Director-General, Planning and Statistics Dept.
Mr. Ismail M. Al-Motawakil	Director-General, Agriculture Services Dept.
Mr. Hussain A. Al-Fakeih	Director-General, Irrigation Dept.
Mr. Kamil Monsour	Chief of the World Bank Team
Mr. Hussain Al-Safargal	Planning and Statistics Dept.
Mr. Shawlik	Expert of Hydrological Dept.
Mr. Lutf El-Ansy	Director, Planning Dept.
Mr. Abdulla Al-Anashi	Director, Extension Dept.
Mr. Mahamoud Juneidi	FAO Forestry Officer
Mr. Fussain Al-Faki	Director, Irrigation Dept.
Mr. Kamil Monsour	IBRD Expert/ Team Leader
Mr. H. A. Hamni	IBRD Expert/ Statistics
Mr. Nafeh Orabi	IBRD Expert/ Agriculture
Mr. Ramiz Malik	IBRD Expert/ Irrigation

Hajjah Province

Mr. Yahya Nasser	Deputy Governor
Mr. Abdul Rahman Hamid	Chief of Cooperative Development Board
Mr. Ali Al-Moied	Director, Mahabisha District
Mr. Abdul Hamid Al-Mahdi	Director, Mahabisha Cooperative
Mr. Yahya	Director Abs Cooperative

Southern Uplands Rural
Development Unit

Mr. Hassan El-Huraibi	General Manager, Rural Development Office
Mr. El-Kheir Hag El-Amin	Chief Engineer
Mr. M. A. Hahboob	Acting Chief Engineer
Mr. Zein El-Abdin El-Borai	Expert, Finance and Administration

Central Agricultural Research
and Training Center

Mr. Abdul Rahman Sallam	Co-Manager of Research Station
Mr. Mahmoud Swelem	Training Expert, Taiz Training Center

Taiz Water Supply Office

Mr. Mohmed Abdul Aziz	General Director
Mr. Harold R. Jackson	Advisor

Tihama Development Authority

Mr. Abdul Moonren Hozza	Director, Research Station
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Confederation of Yemeni
Development Associations

Mr. Abdul Hamed Al-Mahdi	Head of CYDA
Mr. Morshed Muhamed	General Director, Planning Dept.

Ministry of Public Works

Mr. Gamal Mohammed Abdu	Deputy Minister
Mr. Abraham Al-Shamy	General Director, Rural Water Supply Dept.
Mr. A. M. Krishina	Deputy Chief Engineer, Highway Authority
Mr. Mohmed Yones	Expert, Rural Water Supply Dept.
Mr. Hasen Al-Shamy	WHO General Project Manager

Ministry of Foreign Affairs

Mr. Abdul Rahman Shuga	Third Secretary
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Ministry of Communication

Mr. Mohamed Mohamed Arashi	Under Secretary
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Ministry of Health

Mr. Yahia Mohamed El-Hila	General Manager, Hajjah Hospital
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Agricultural Credit Bank

Mr. Mohammed Basalama	Manager, Credit Dept.
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Central Bank of Yemen

Mr. Omar T. Bazara	Manager, Foreign Dept.
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