A regional study of the East Jordan valley, with special relation to the problems of soil and water utilization

Hassan ABD EL Kadir Saleh

A REGIONAL STUDY OF THE EAST JORDAN VALLEY,

WITH SPECIAL RELATION TO THE PROBLEMS OF SOIL AND WATER UTILIZATION.

Volume II : MAPS AND DIAGRAMS.

BY

HASSAN ABD EL KADIR SALEH

UNIVERSITY OF DURHAM

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List of Illustrations.

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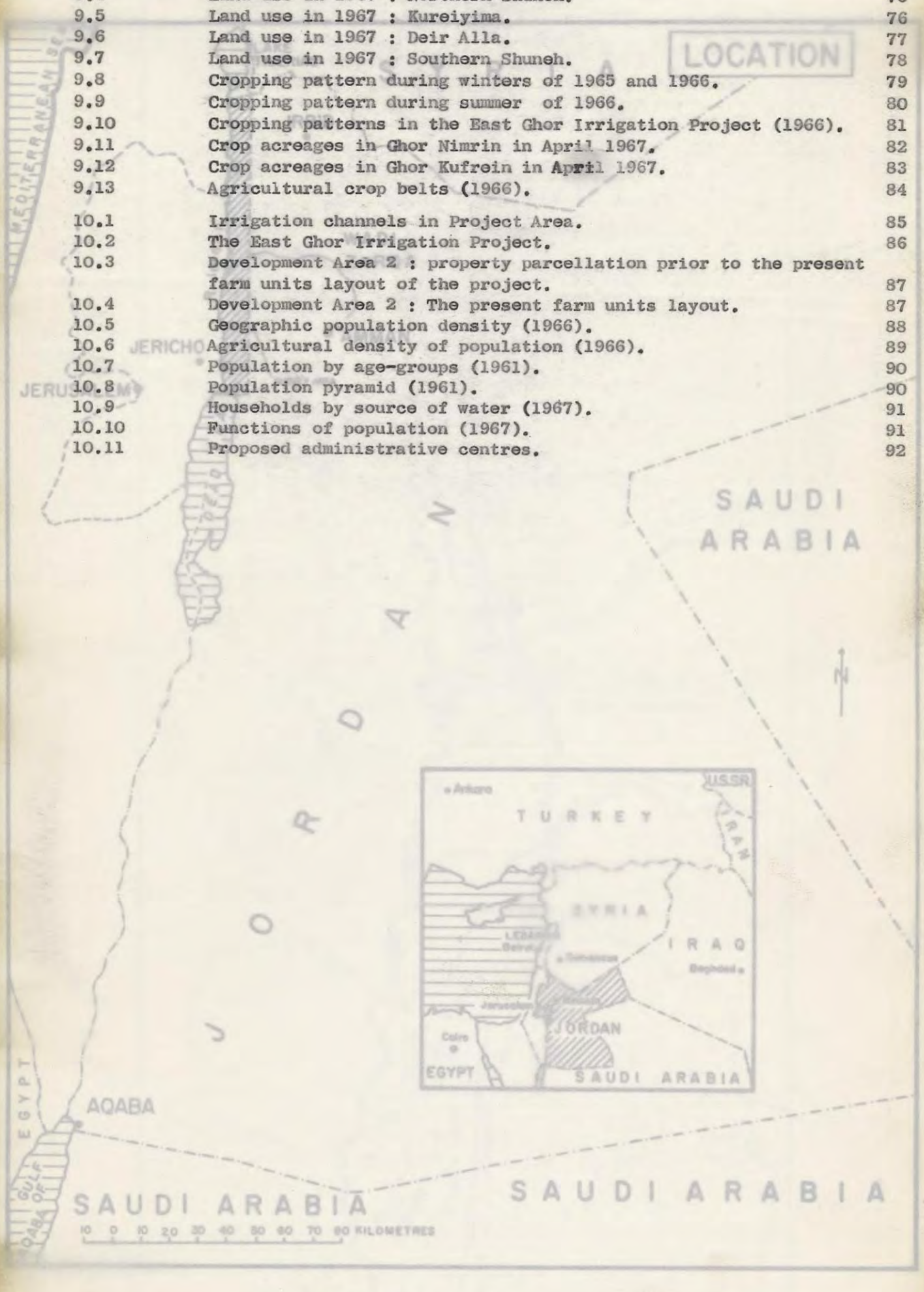


Figure. 0.1.

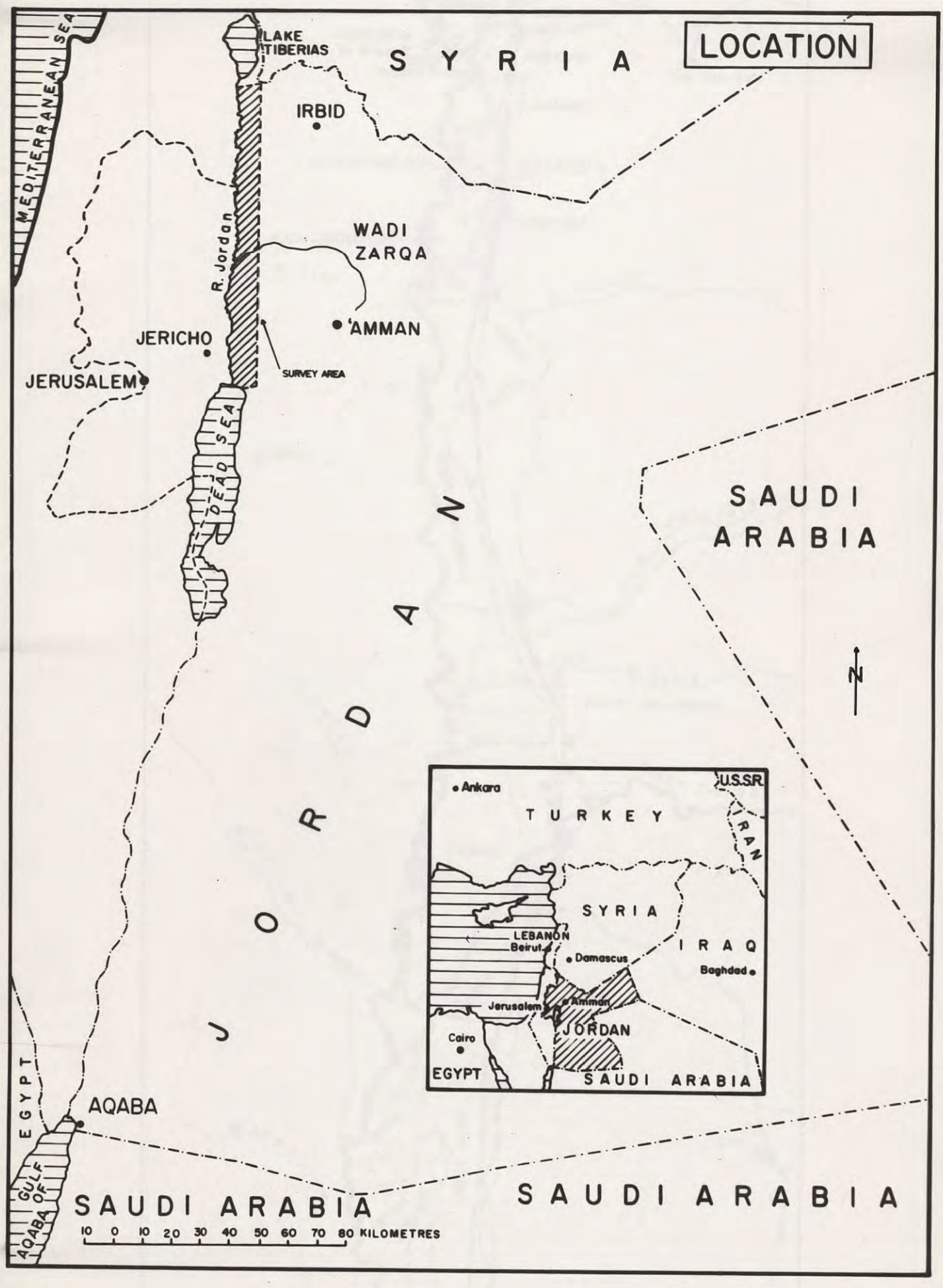

LOCATION
MEDITERRANEAN SEA
LAKE TIBERIAS
S Y R I A
IRBID
WADI ZARQA
R. Jordan
'AMMAN
JERICHO
JERUSALEM
SURVEY AREA
DEAD SEA
J O R D A N
SAUDI ARABIA
N
Ankara
U.S.S.R.
TURKEY
IRAN
SYRIA
LEBANON
Beirut
Damascus
IRAQ
Baghdad
Jerusalem
Amman
JORDAN
Cairo
EGYPT
SAUDI ARABIA
EGYPT
AQABA
GULF OF AQABA
SAUDI ARABIA
SAUDI ARABIA
10 0 10 20 30 40 50 60 70 80 KILOMETRES

Figure. O.1.

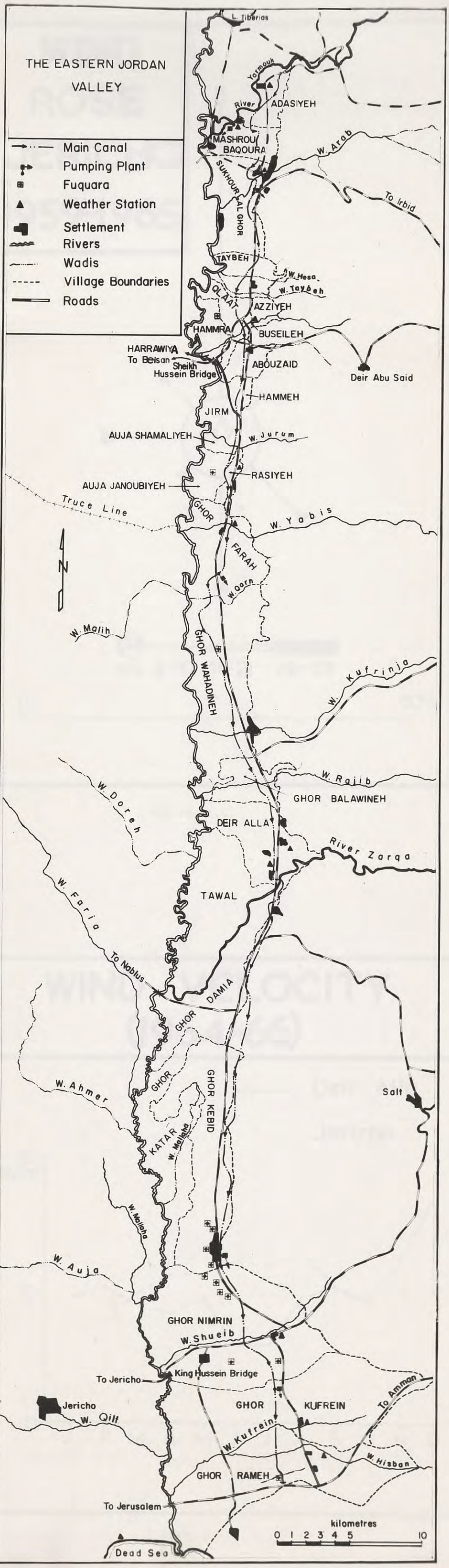

THE EASTERN JORDAN VALLEY
Main Canal
Pumping Plant
Fuquara
Weather Station
Settlement
Rivers
Wadis
Village Boundaries
Roads
L. Tiberias
Yarmouk River
ADASIYEH
MASHROU BAQOURA
W. Arab
SUKHOUR AL GHOR
To Irbid
TAYBEH
W. Hesa
W. Taybeh
QLAAT AZZIYEH
HAMMRA
BUSEILEH
HARRAWIYA
To Beisan
Sheikh Hussein Bridge
ABOUZAID
Deir Abu Said
HAMMEH
JIRM
AUJA SHAMALIYEH
W. Jurum
RASIYEH
AUJA JANOUBIYEH
Truce Line
GHOR
W. Yabis
FARAH
W. Oarn
W. Malih
GHOR WAHADINEH
W. Kufrinja
N
W. Rajib
GHOR BALAWINEH
W. Doreh
DEIR ALLA
River Zarqa
TAWAL
W. Faria
To Nablus
DAMIA
GHOR
GHOR KEBID
W. Ahmer
Salt
KATAR
W. Malliha
W. Auja
GHOR NIMRIN
W. Shueib
To Jericho
King Hussein Bridge
Jericho
W. Qilt
GHOR KUFREIN
To Amman
W. Kufrein
W. Hisban
GHOR RAMEH
To Jerusalem
kilometres
0 1 2 3 4 5 10
Dead Sea

Figure. 0.2.

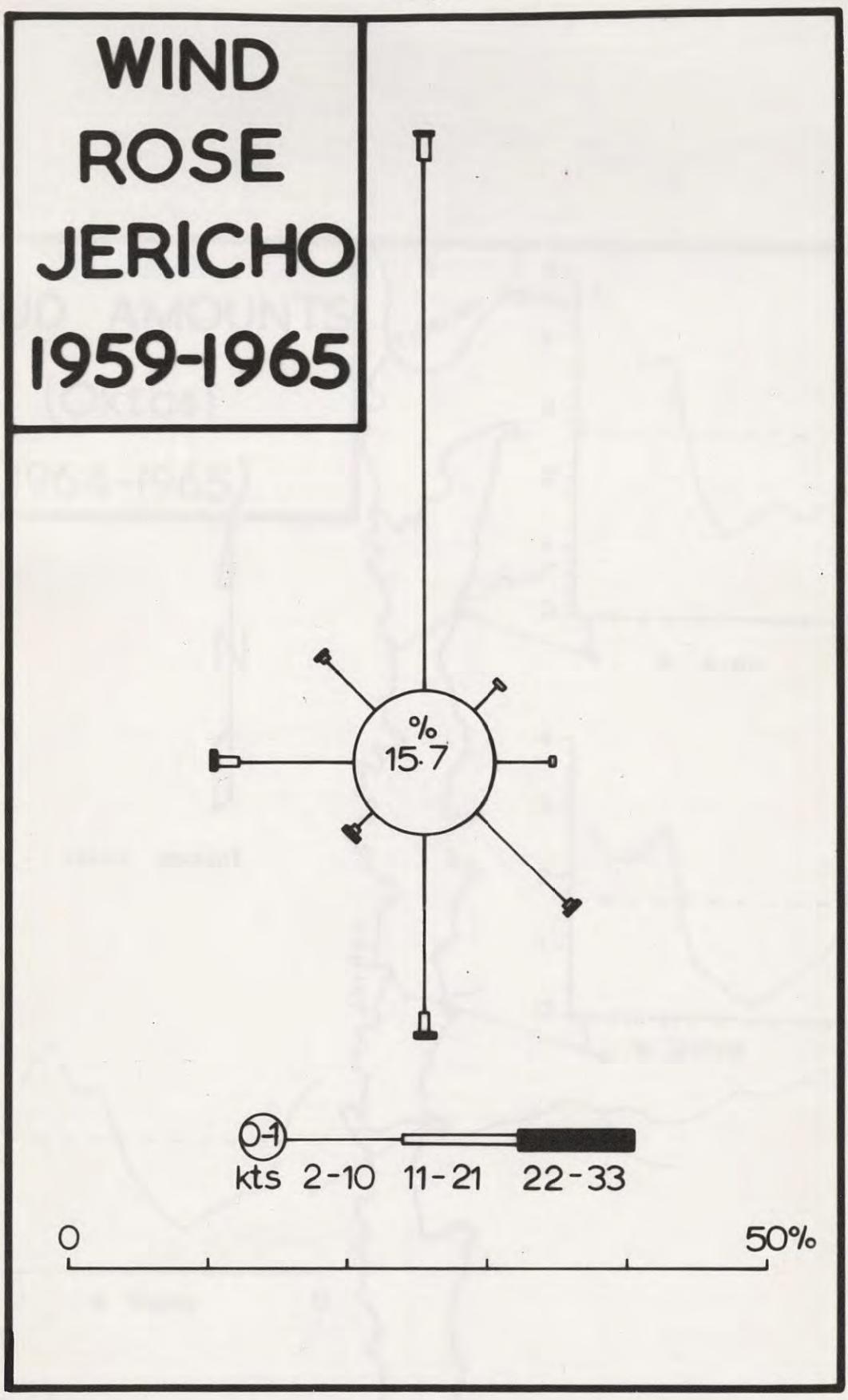


Figure. 1.1.

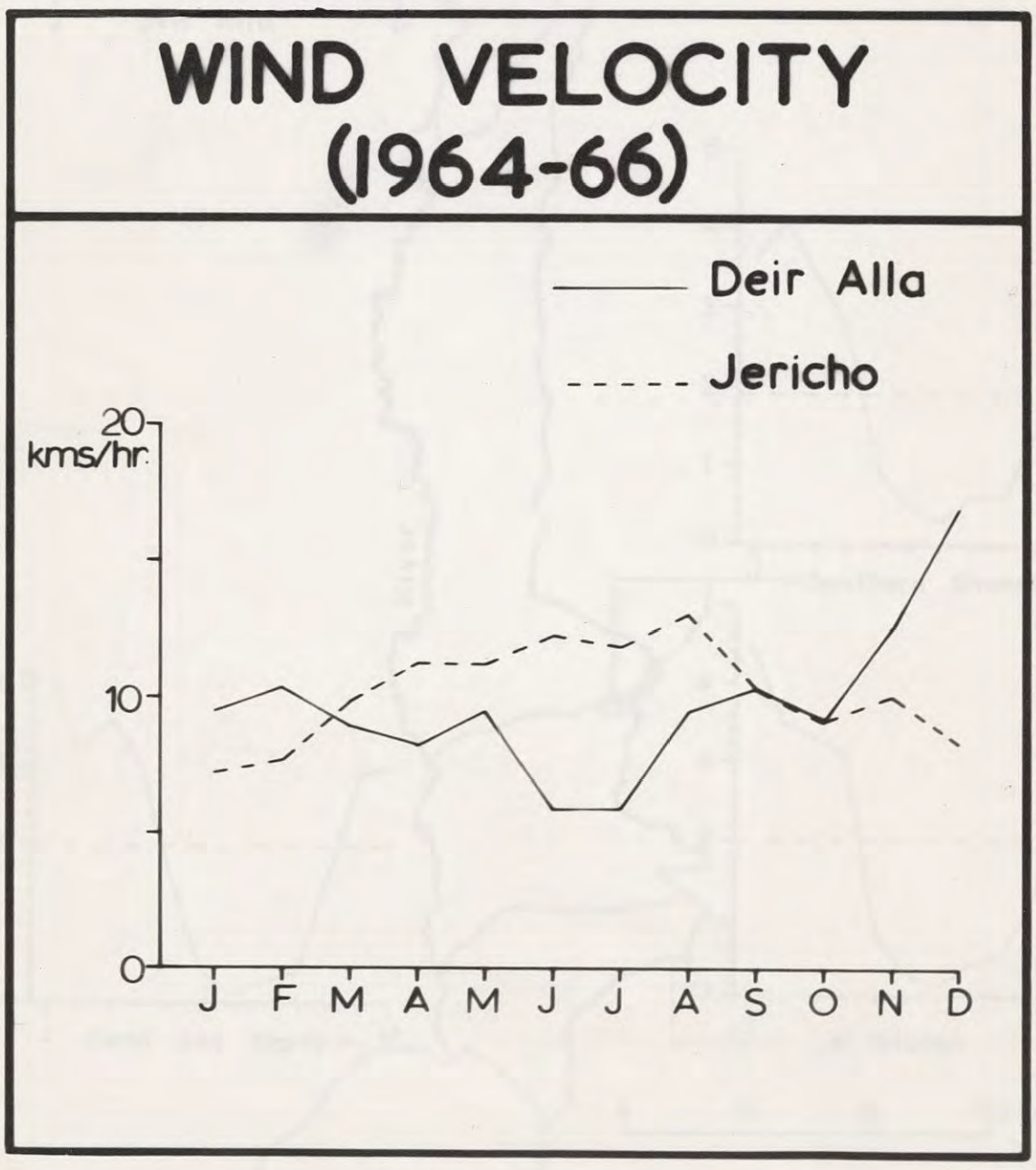


Figure. 1.2.

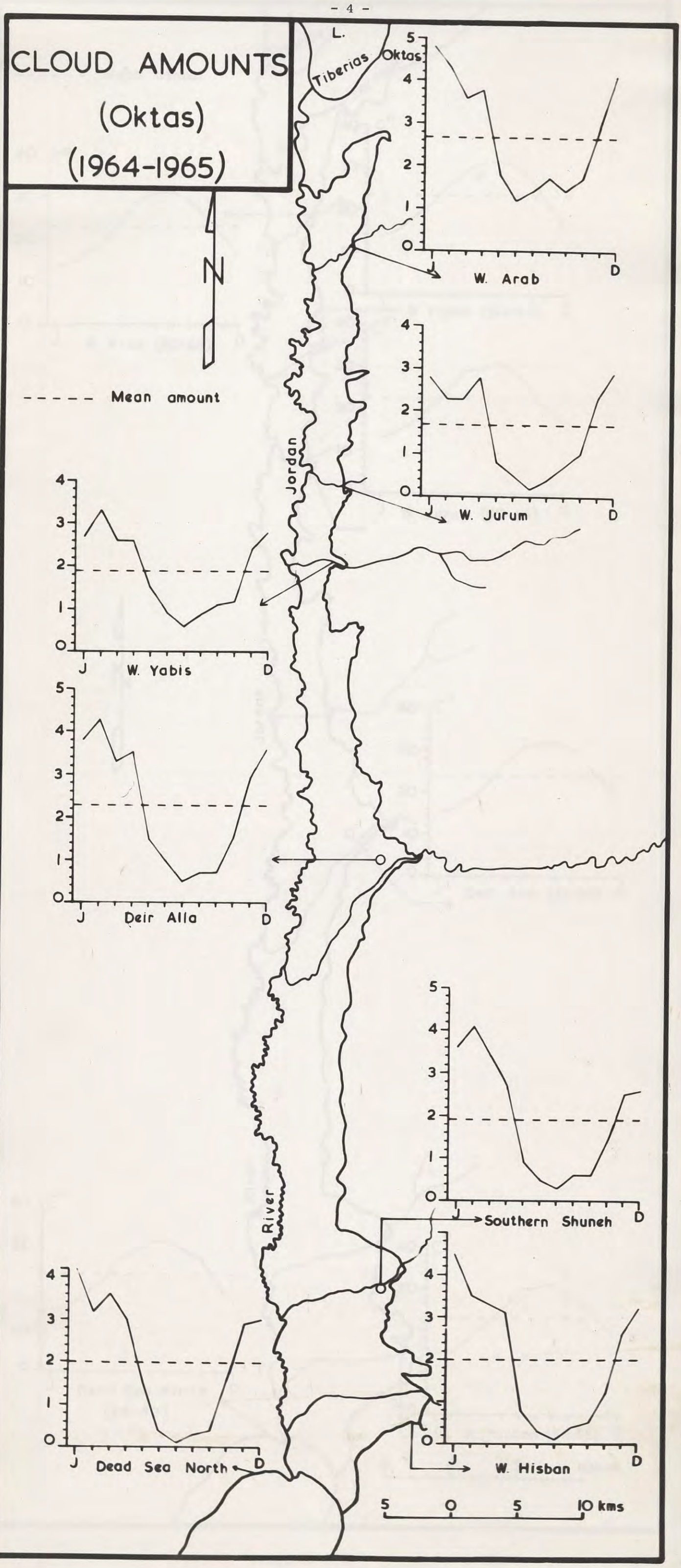

CLOUD AMOUNTS
(Oktas)
(1964-1965)
N
Mean amount
L.
Tiberias
Jordan
River
Oktas
W. Arab
W. Jurum
W. Yabis
Deir Alla
Southern Shuneh
Dead Sea North
W. Hisban
J
D
0
1
2
3
4
5
5 0 5 10 kms

Figure. 1.3.

MEAN MONTHLY TEMPERATURES

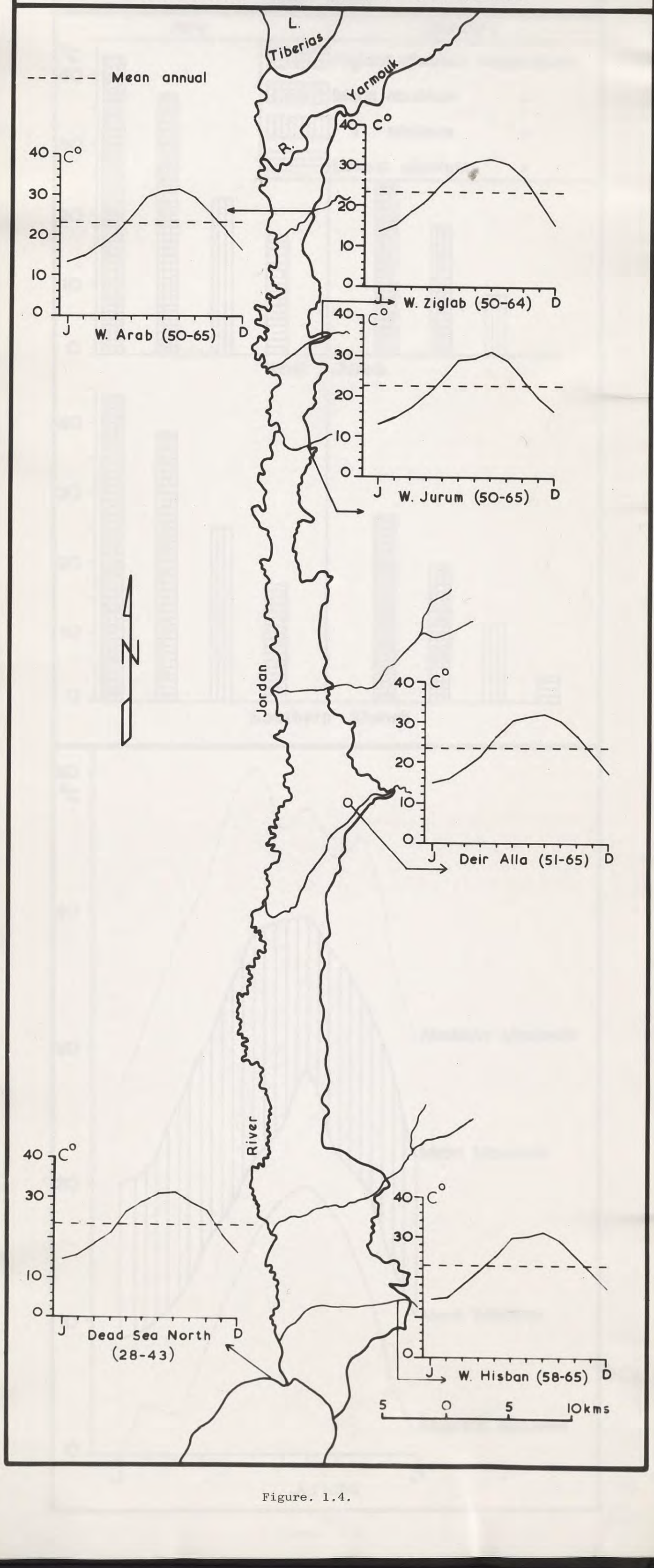


Figure. 1.4.

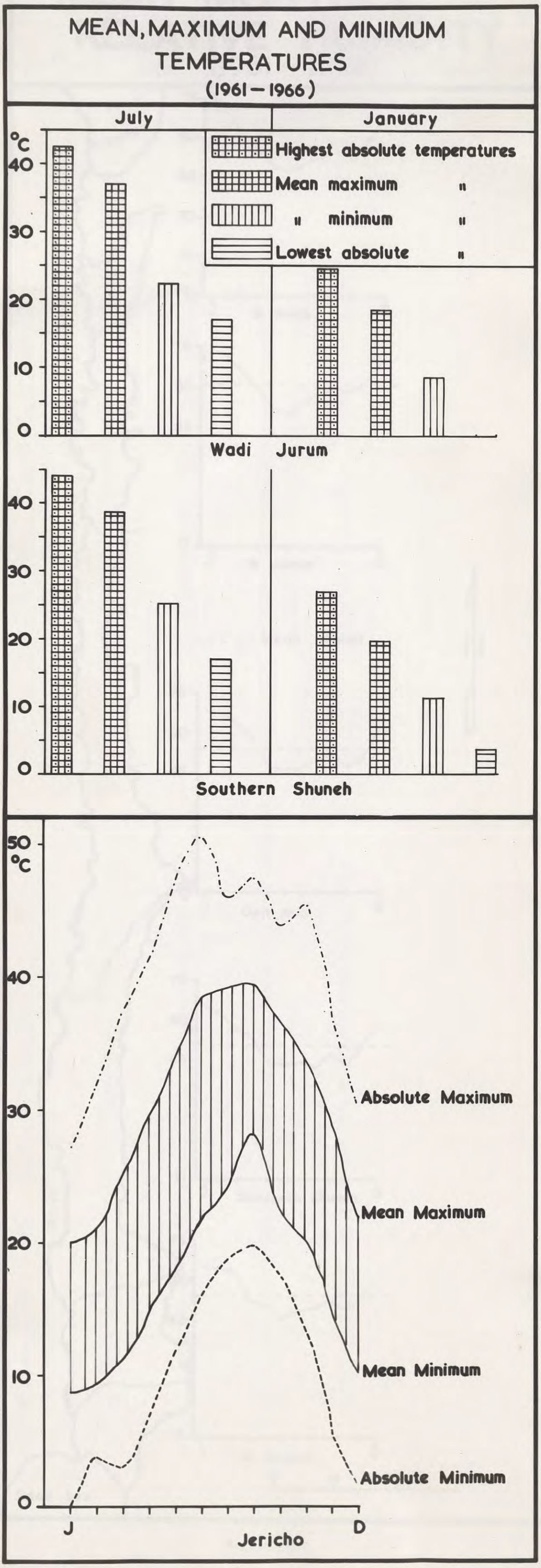

MEAN, MAXIMUM AND MINIMUM TEMPERATURES
(1961 – 1966)
July
January
°C
40
30
20
10
0
Highest absolute temperatures
Mean maximum "
" minimum "
Lowest absolute "
Wadi Jurum
Southern Shuneh
50
°C
Absolute Maximum
Mean Maximum
Mean Minimum
Absolute Minimum
J
D
Jericho

Figure. 1.5.

MEAN MONTHLY RELATIVE HUMIDITY (1961 – 1966)

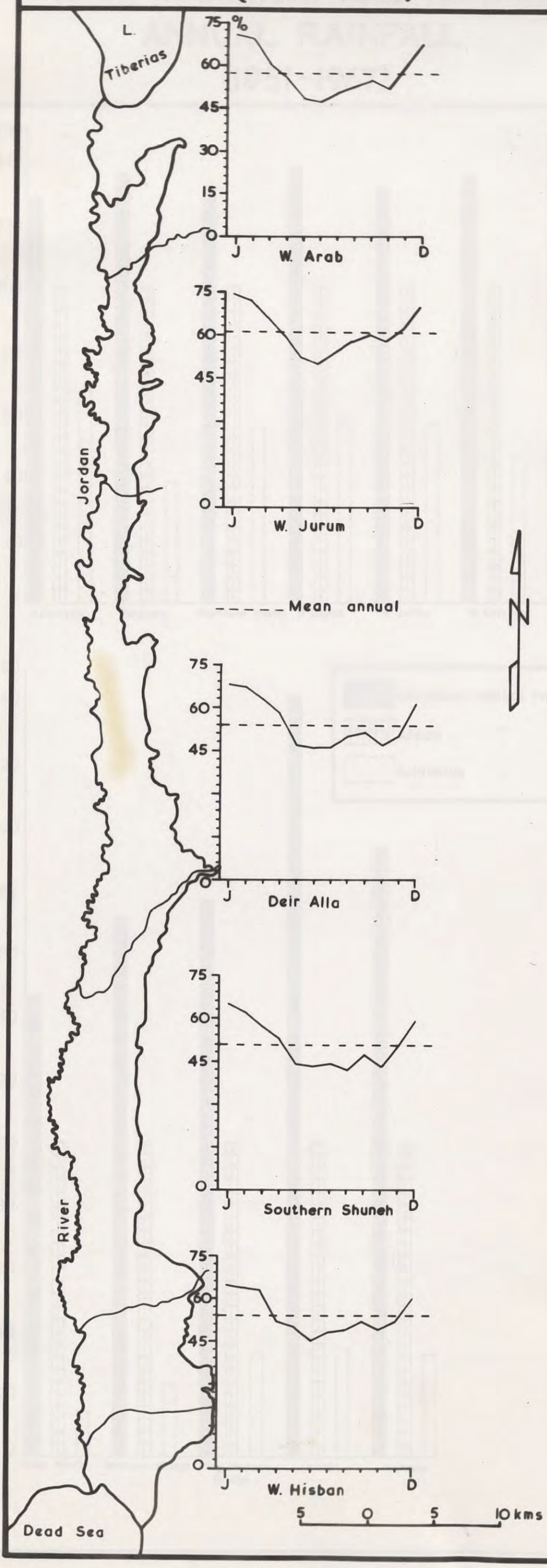
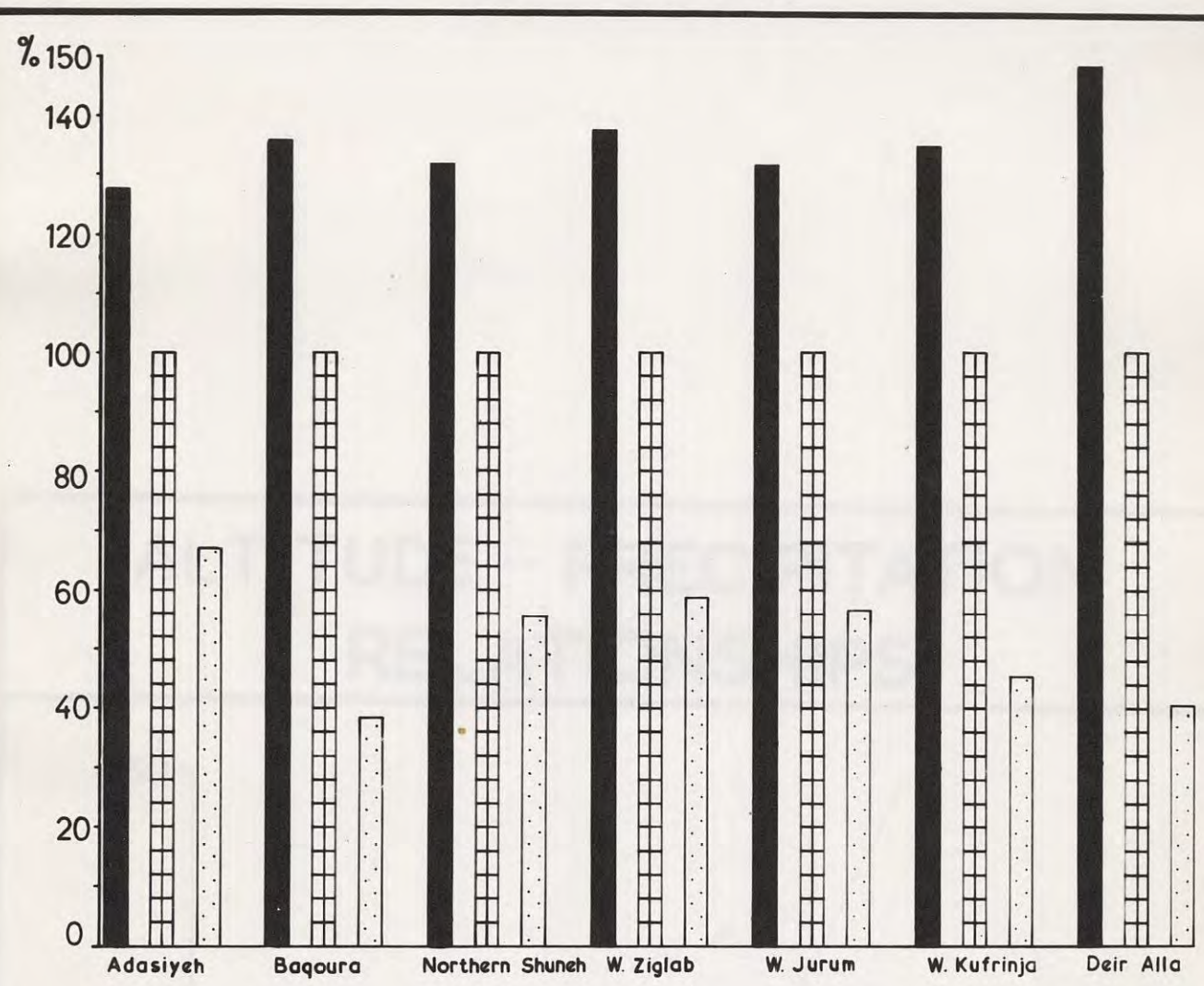


Figure. 1.6.

MEAN, MAXIMUM AND MINIMUM ANNUAL RAINFALL (1951-1967)



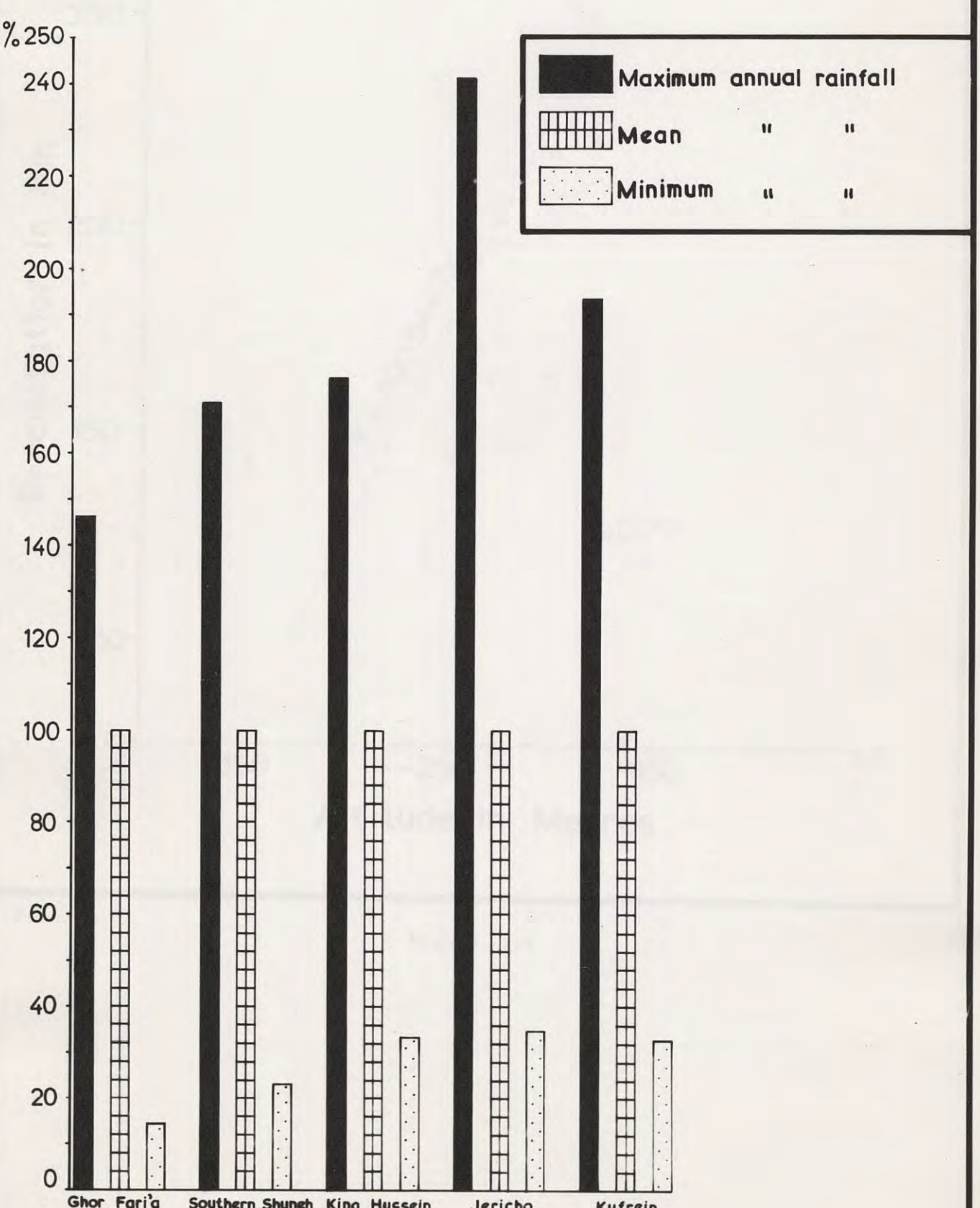


Figure. 1.7.

ALTITUDE – PRECIPITATION RELATIONSHIPS

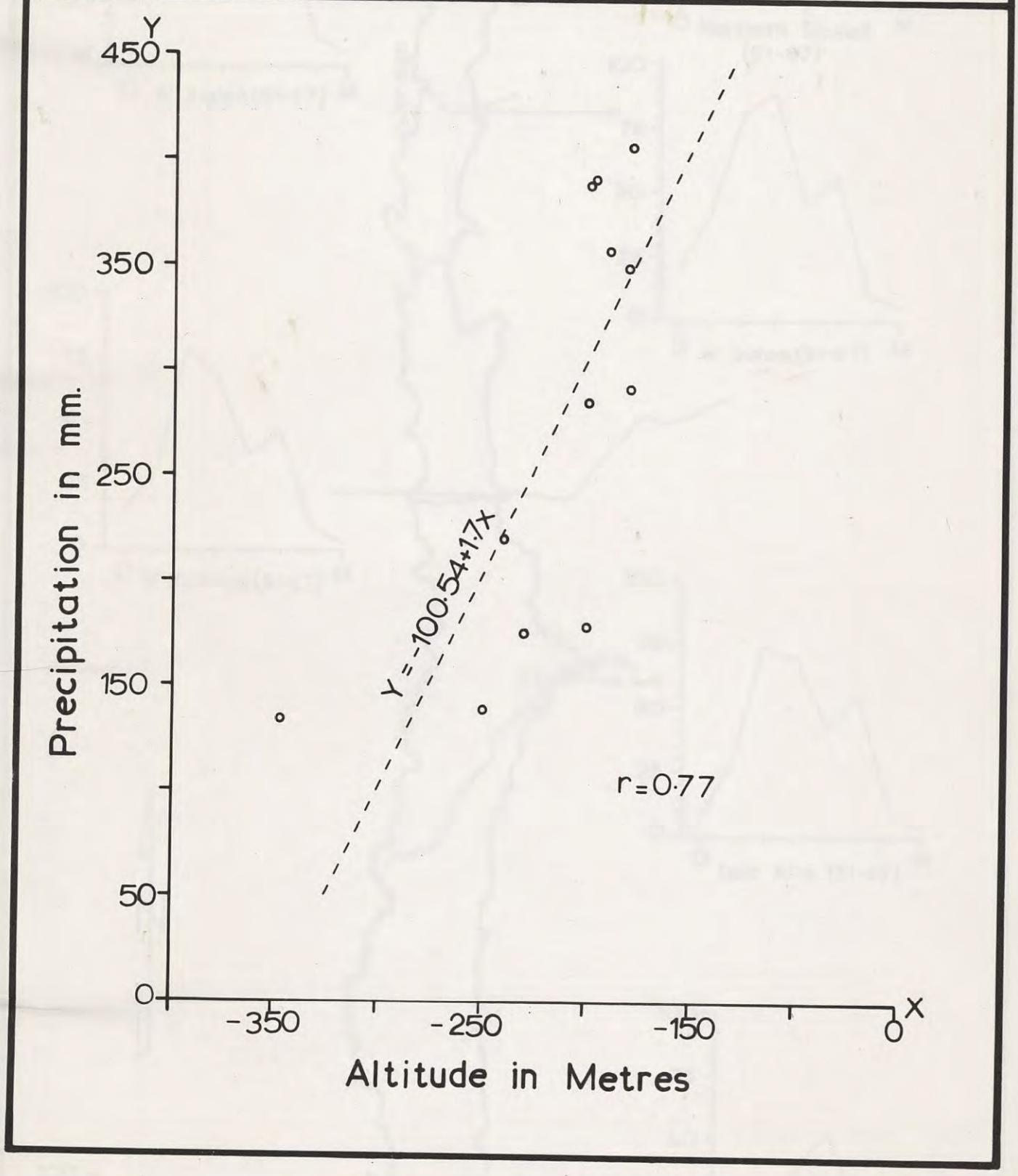


Figure. 1.8.

MEAN MONTHLY RAINFALL

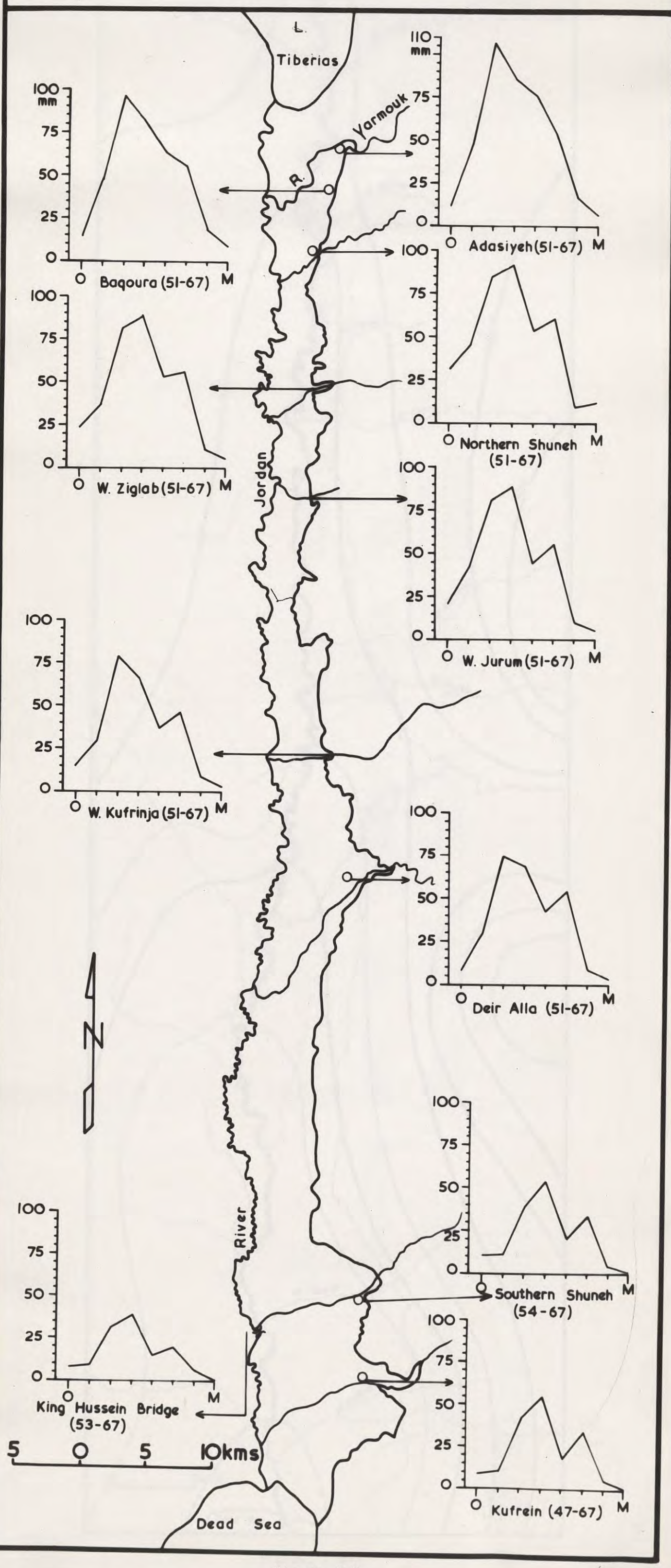


Figure. 1.9.

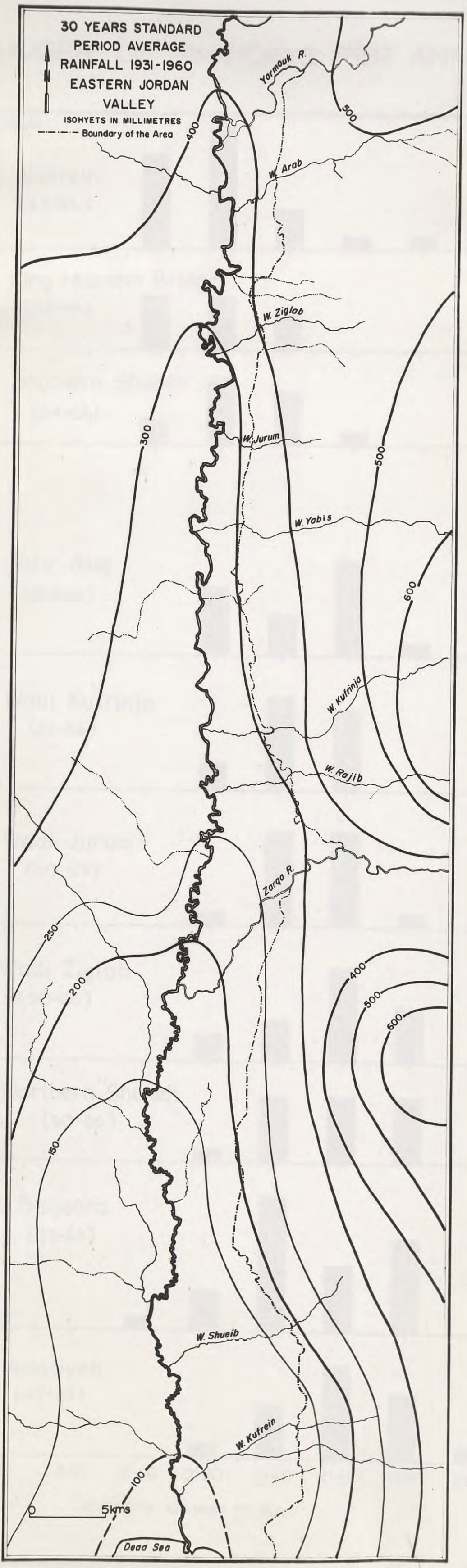

30 YEARS STANDARD
PERIOD AVERAGE
RAINFALL 1931-1960
EASTERN JORDAN
VALLEY
ISOHYETS IN MILLIMETRES
Boundary of the Area
N
Yarmouk R.
W. Arab
W. Ziglab
W. Jurum
W. Yabis
W. Kufrinja
W. Rajib
Zarqa R.
W. Shueib
W. Kufrein
Dead Sea
100
150
200
250
300
400
500
600
0
5kms

Figure. 1.10.

NUMBER OF RAINDAYS PER ANNUM

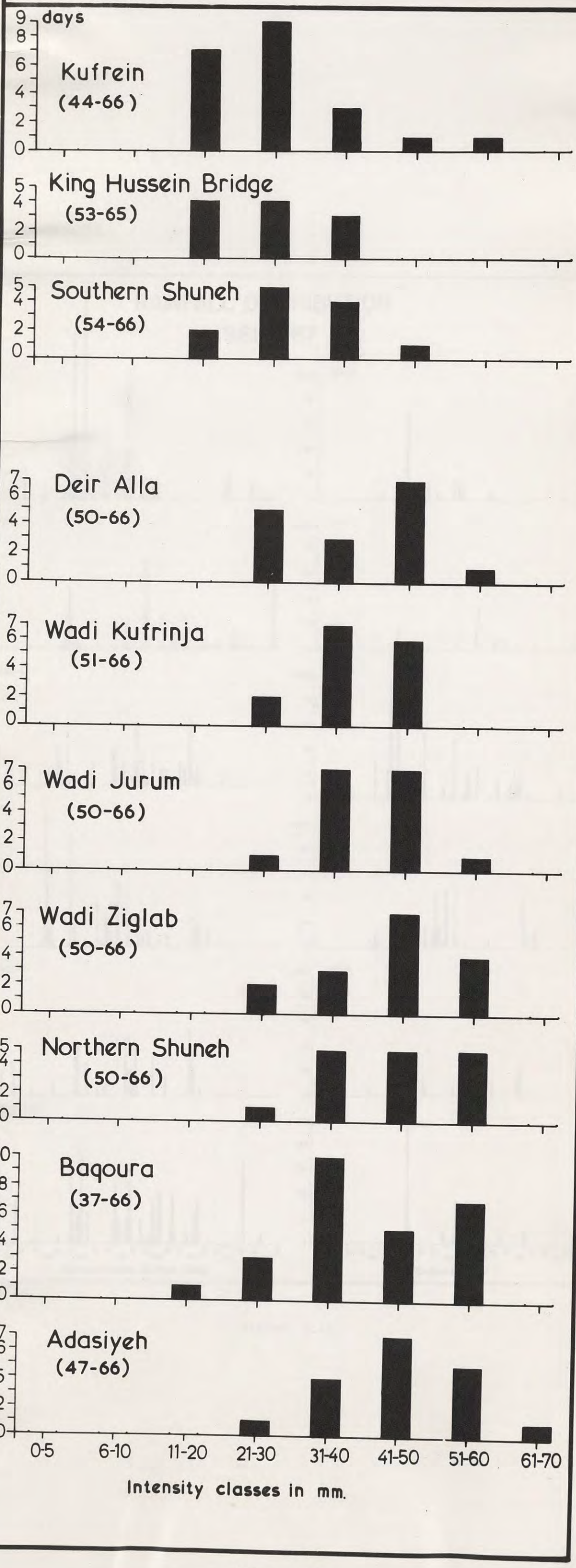


Figure. 1.11.

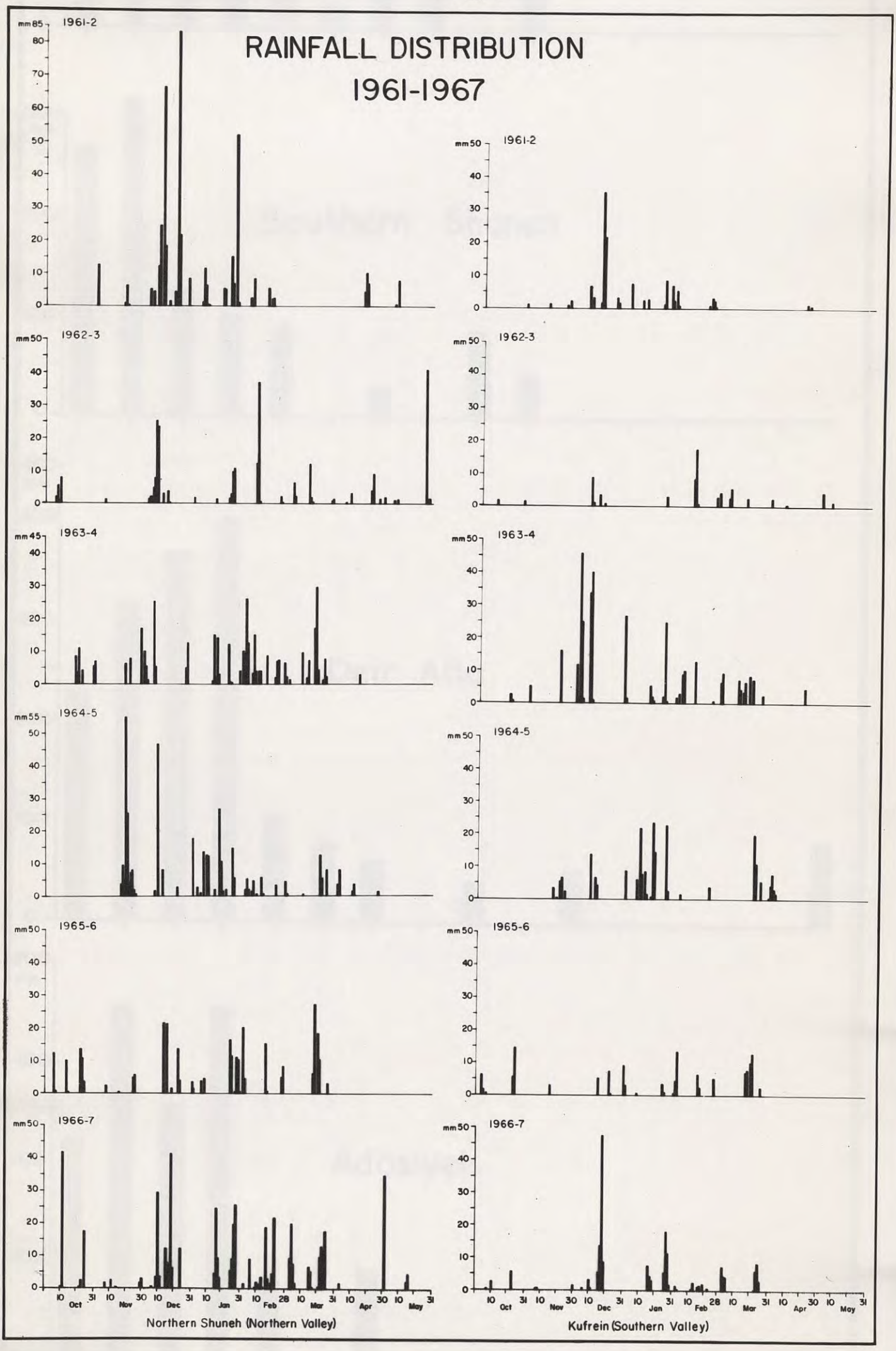

RAINFALL DISTRIBUTION
1961-1967
1961-2
1962-3
1963-4
1964-5
1965-6
1966-7
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
Northern Shuneh (Northern Valley)
Kufrein (Southern Valley)

Figure. 1.12.

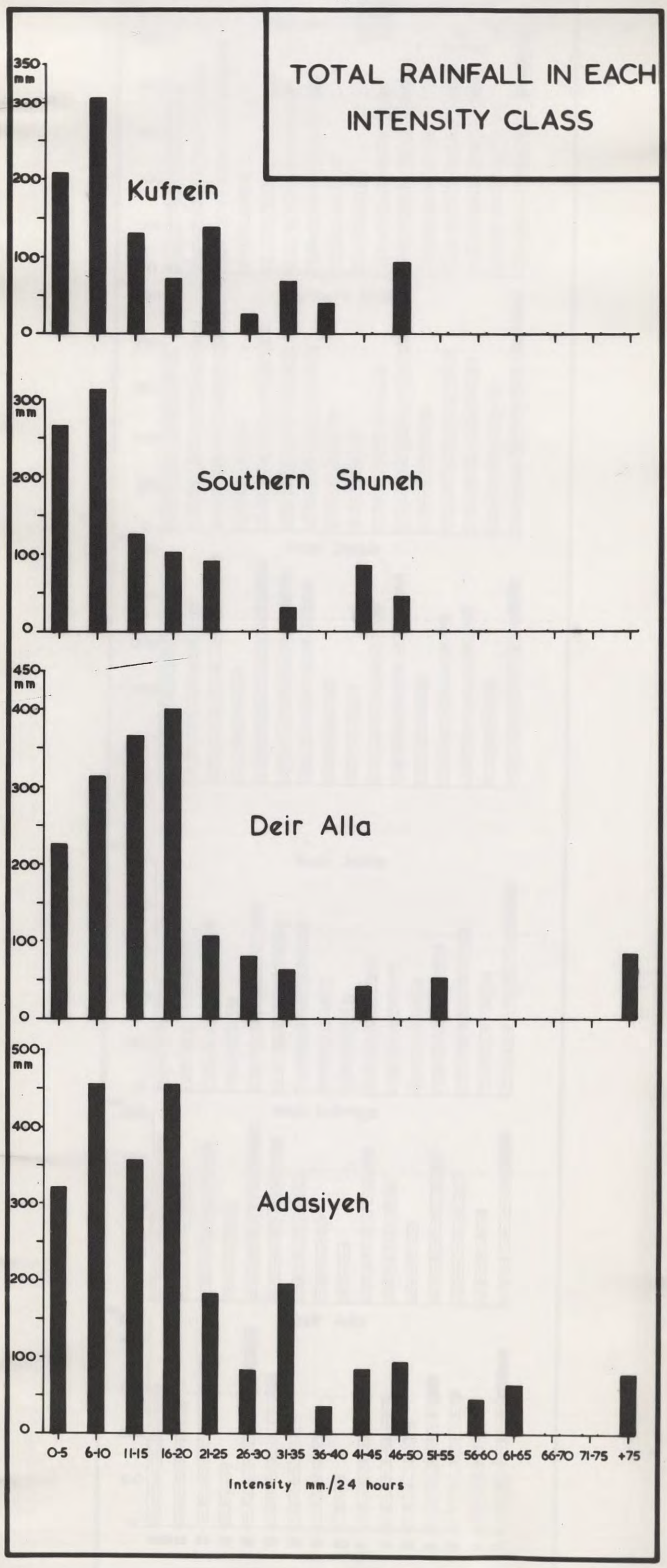

TOTAL RAINFALL IN EACH INTENSITY CLASS
350 mm
300
200
100
0
Kufrein
300 mm
200
100
0
Southern Shuneh
450 mm
400
300
200
100
0
Deir Alla
500 mm
400
300
200
100
0
Adasiyeh
0-5 6-10 11-15 16-20 21-25 26-30 31-35 36-40 41-45 46-50 51-55 56-60 61-65 66-70 71-75 +75
Intensity mm./24 hours

Figure. 1.13.

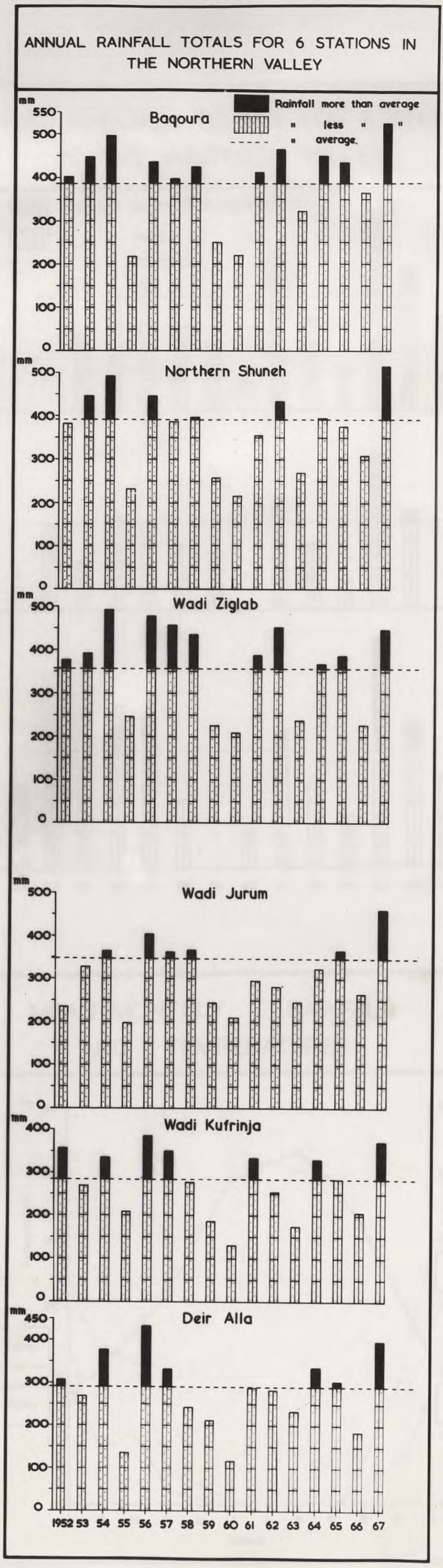
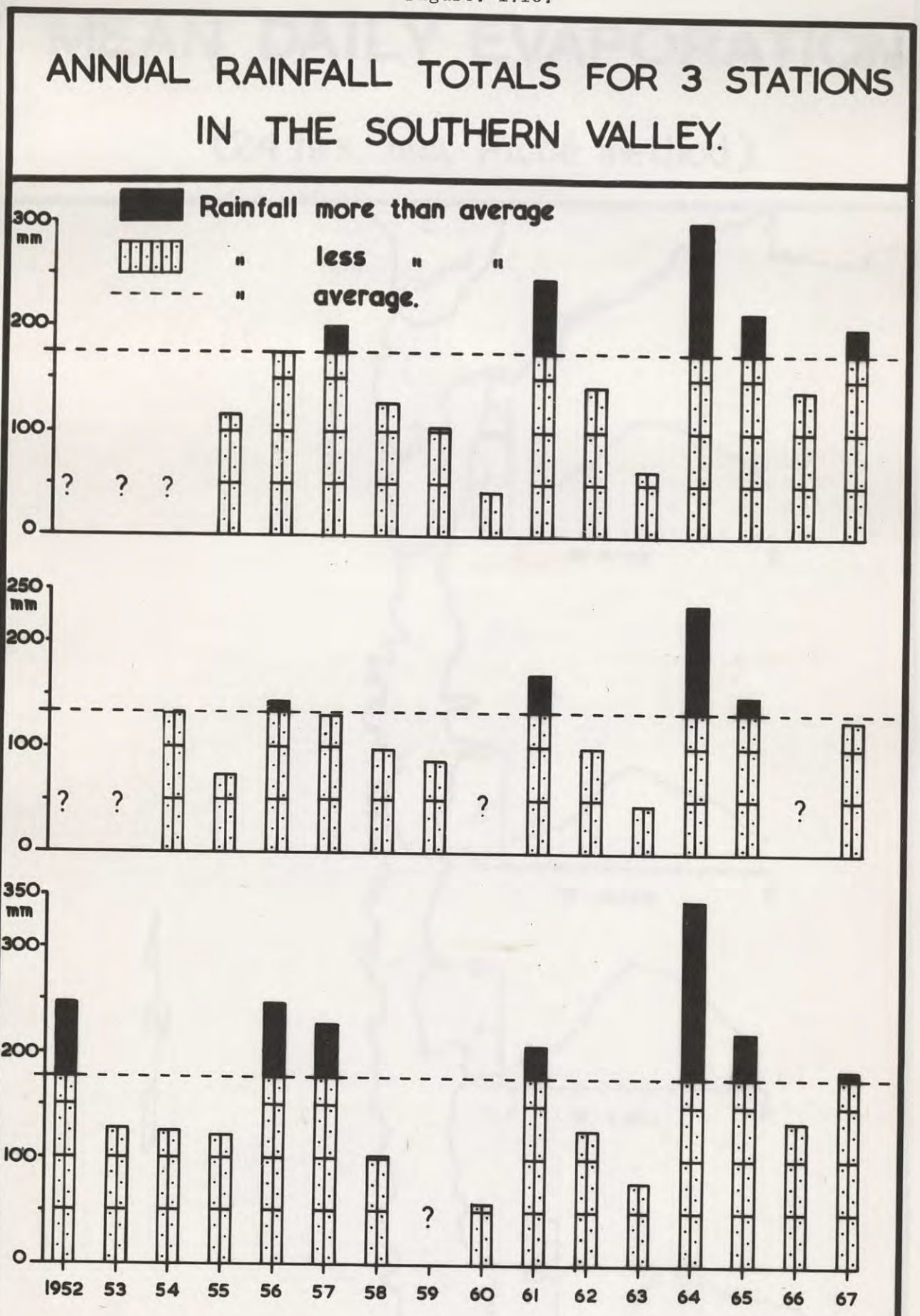

ANNUAL RAINFALL TOTALS FOR 6 STATIONS IN THE NORTHERN VALLEY
Rainfall more than average
" less "
" average.
Baqoura
Northern Shuneh
Wadi Ziglab
Wadi Jurum
Wadi Kufrinja
Deir Alla
mm
0
100
200
300
400
500
550
450
1952 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67

Figure. 1.14.

Figure. 1.15.



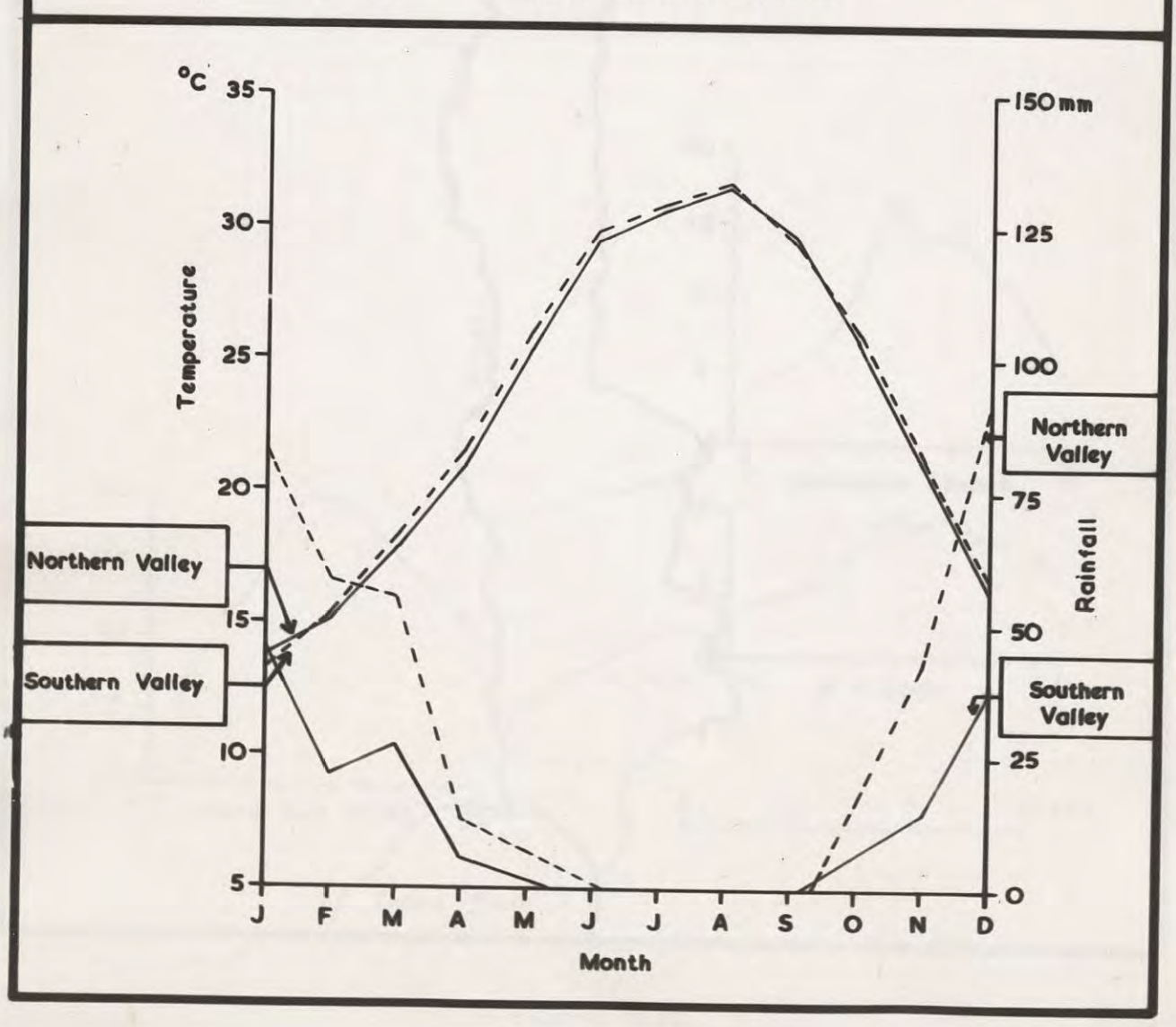


Figure. 1.16.

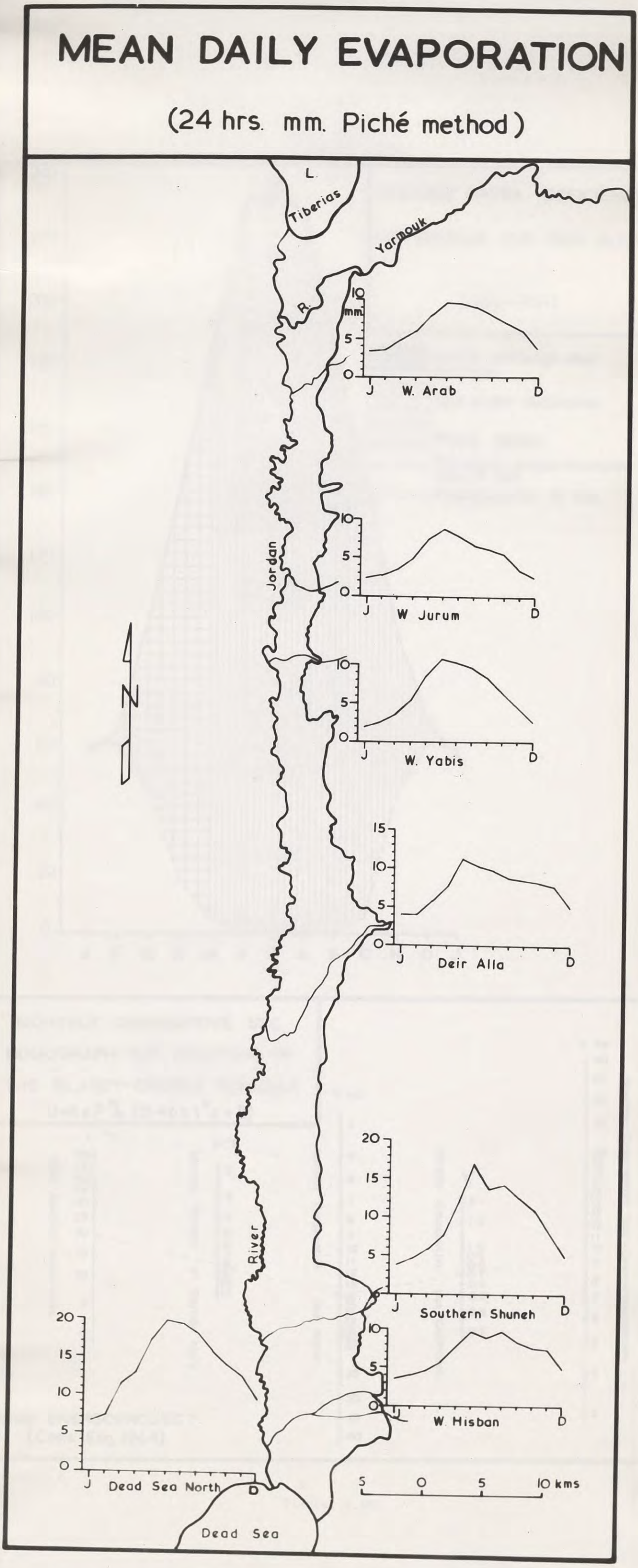

MEAN DAILY EVAPORATION
(24 hrs. mm. Piché method)
L.
Tiberias
Yarmouk
R.
Jordan
River
10
mm
5
0
J
W. Arab
D
W Jurum
W. Yabis
15
Deir Alla
20
Southern Shuneh
W. Hisban
Dead Sea North
5 0 5 10 kms
Dead Sea

Figure. 1.17.

Figure. 1.18.

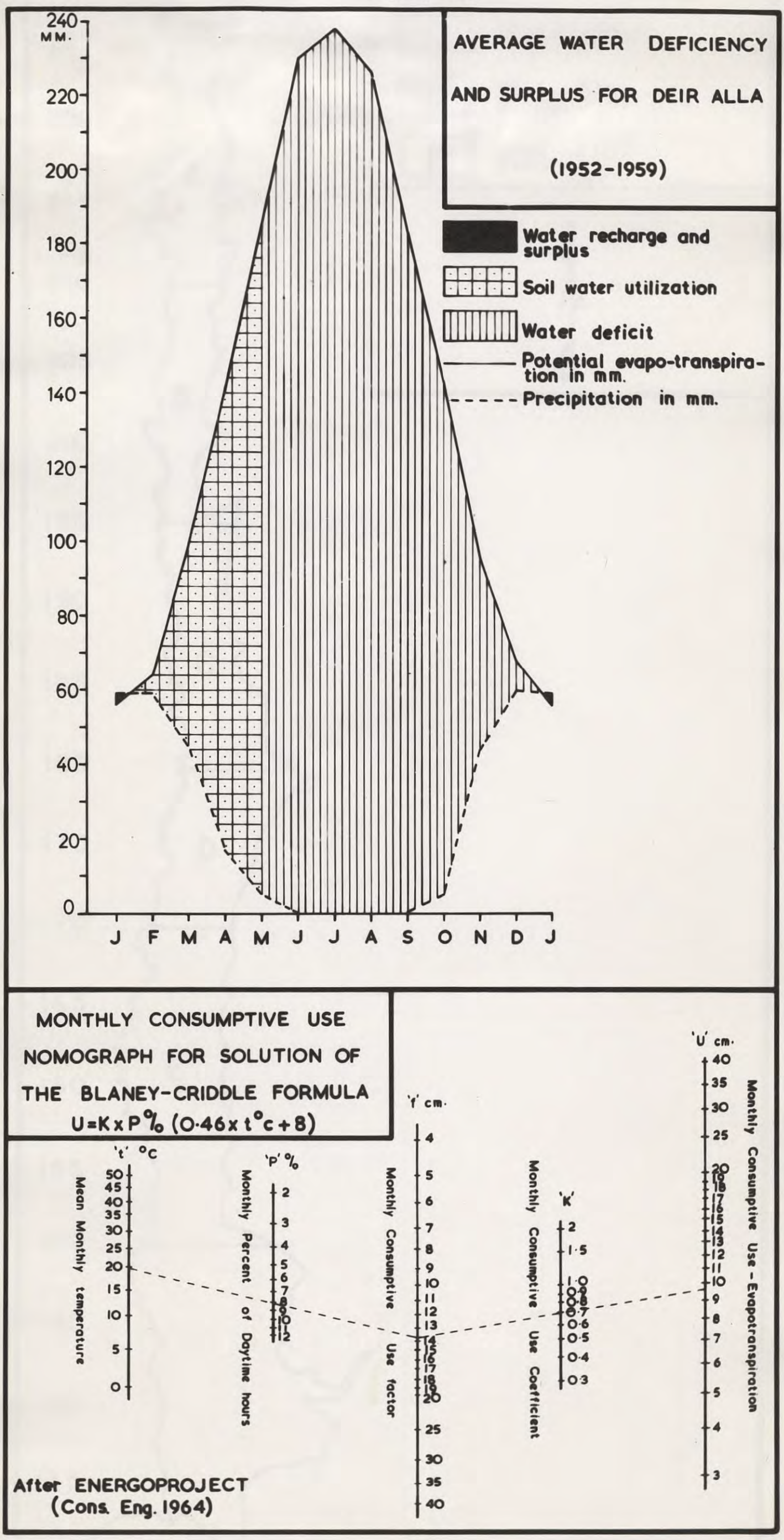


Figure. 1.19.

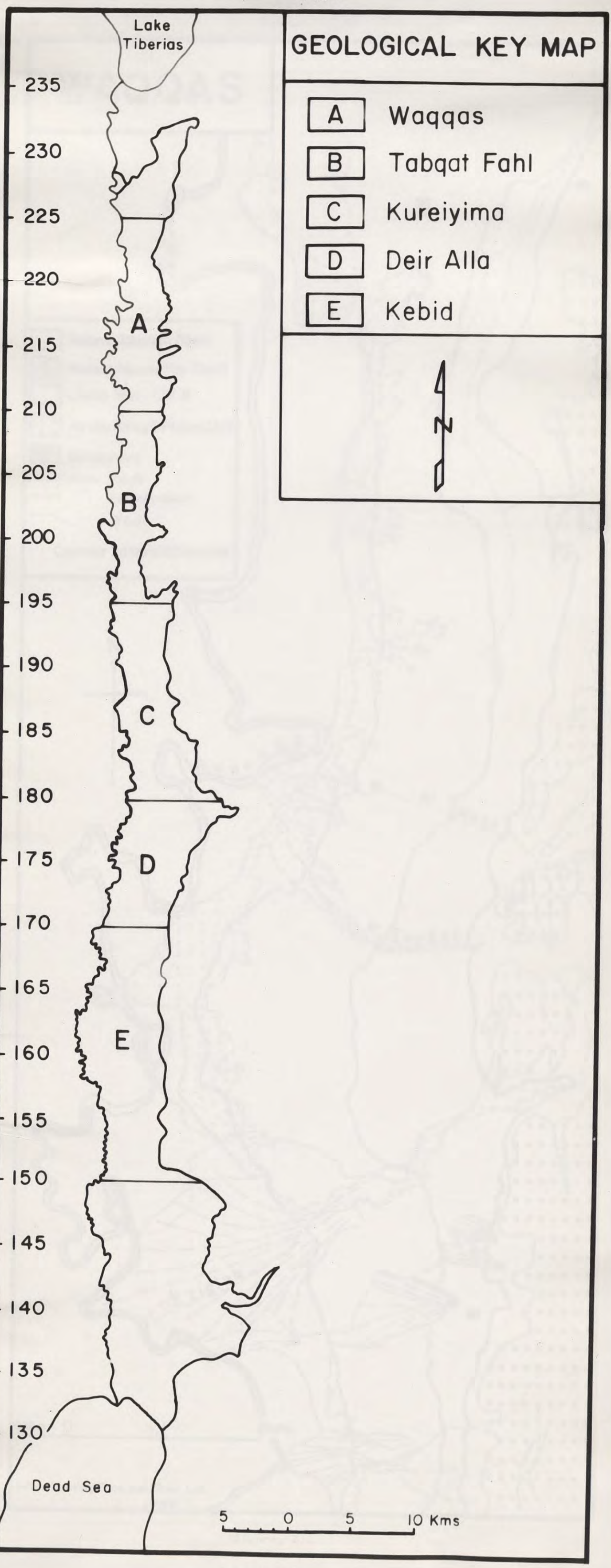

Lake
Tiberias
235
230
225
220
215
210
205
200
195
190
185
180
175
170
165
160
155
150
145
140
135
130
A
B
C
D
E
Dead Sea
GEOLOGICAL KEY MAP
A Waqqas
B Tabqat Fahl
C Kureiyima
D Deir Alla
E Kebid
N
5 0 5 10 Kms

Figure. 2.1.

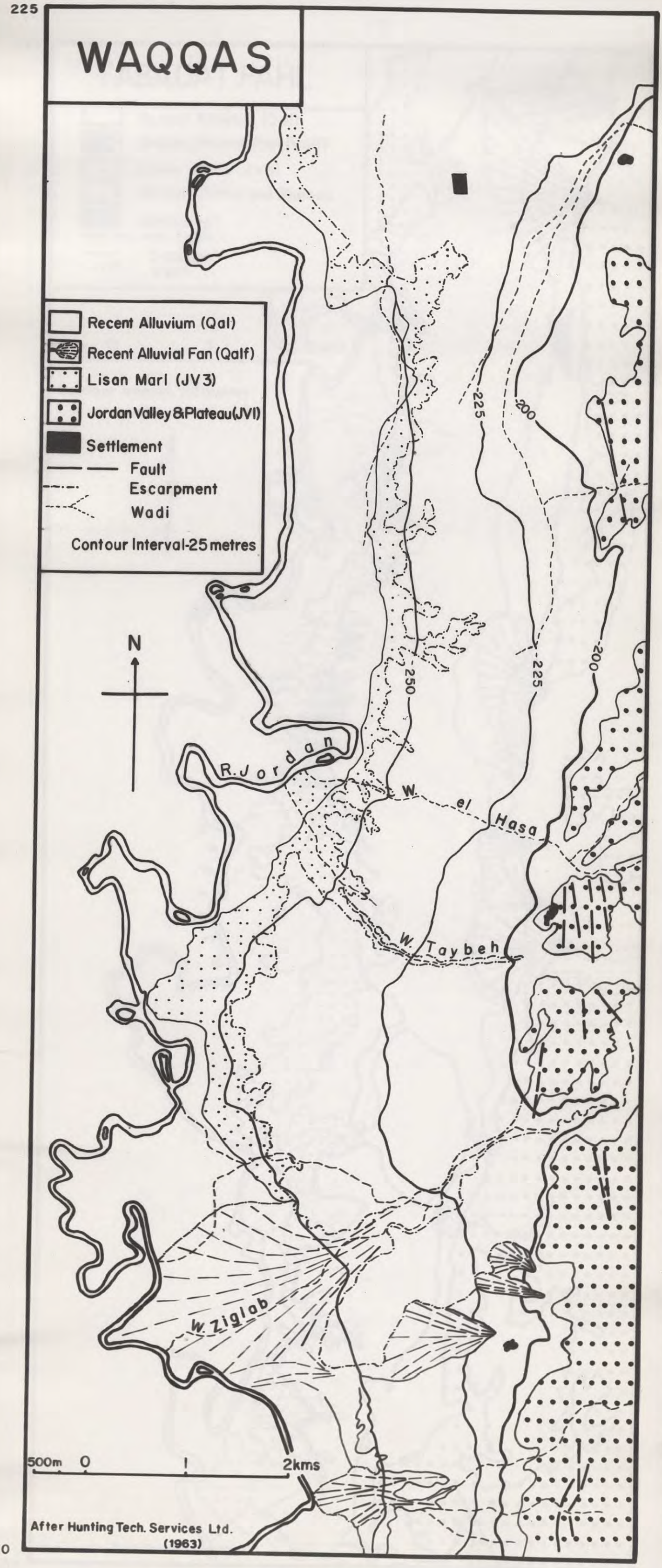
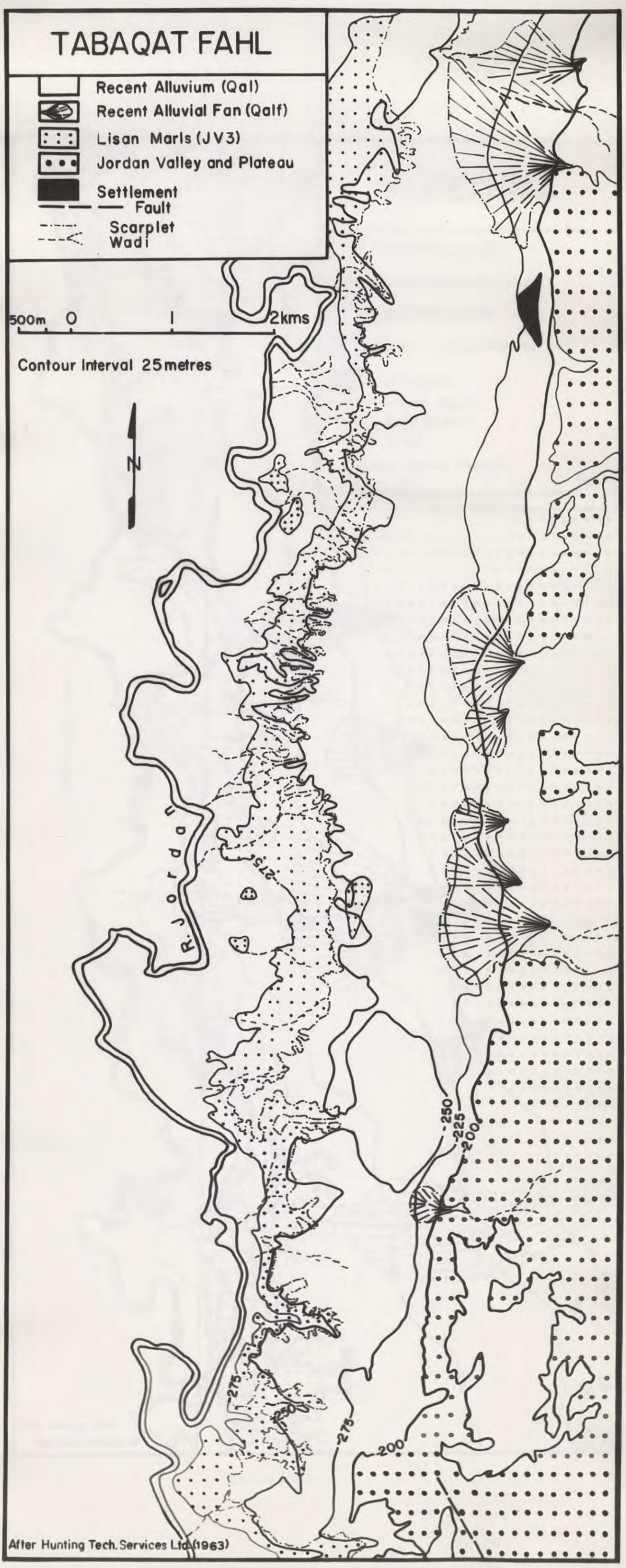

225
WAQQAS
Recent Alluvium (Qal)
Recent Alluvial Fan (Qalf)
Lisan Marl (JV3)
Jordan Valley & Plateau (JVI)
Settlement
Fault
Escarpment
Wadi
Contour Interval-25 metres
N
R. Jordan
W. el Hasa
W. Taybeh
W. Ziglab
225
200
250
225
200
500m 0 1 2kms
After Hunting Tech. Services Ltd. (1963)
210

Figure. 2.2.

210



195

Figure. 2.3.

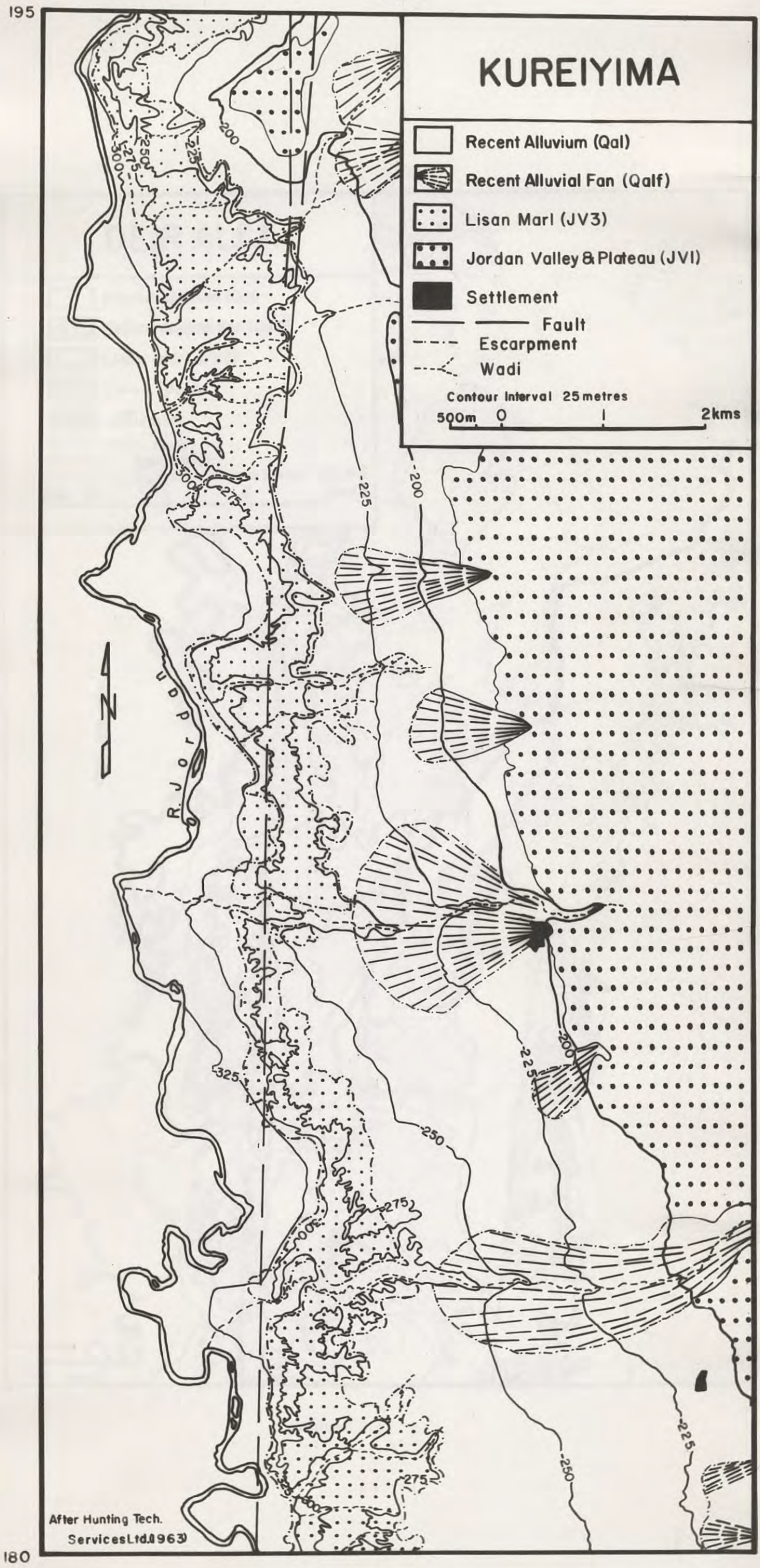

195
KUREIYIMA
Recent Alluvium (Qal)
Recent Alluvial Fan (Qalf)
Lisan Marl (JV3)
Jordan Valley & Plateau (JVI)
Settlement
Fault
Escarpment
Wadi
Contour Interval 25 metres
500m 0 1 2kms
R. Jordan
N
325
300
275
250
225
200
After Hunting Tech. Services Ltd. (1963)
180

Figure. 2.4.

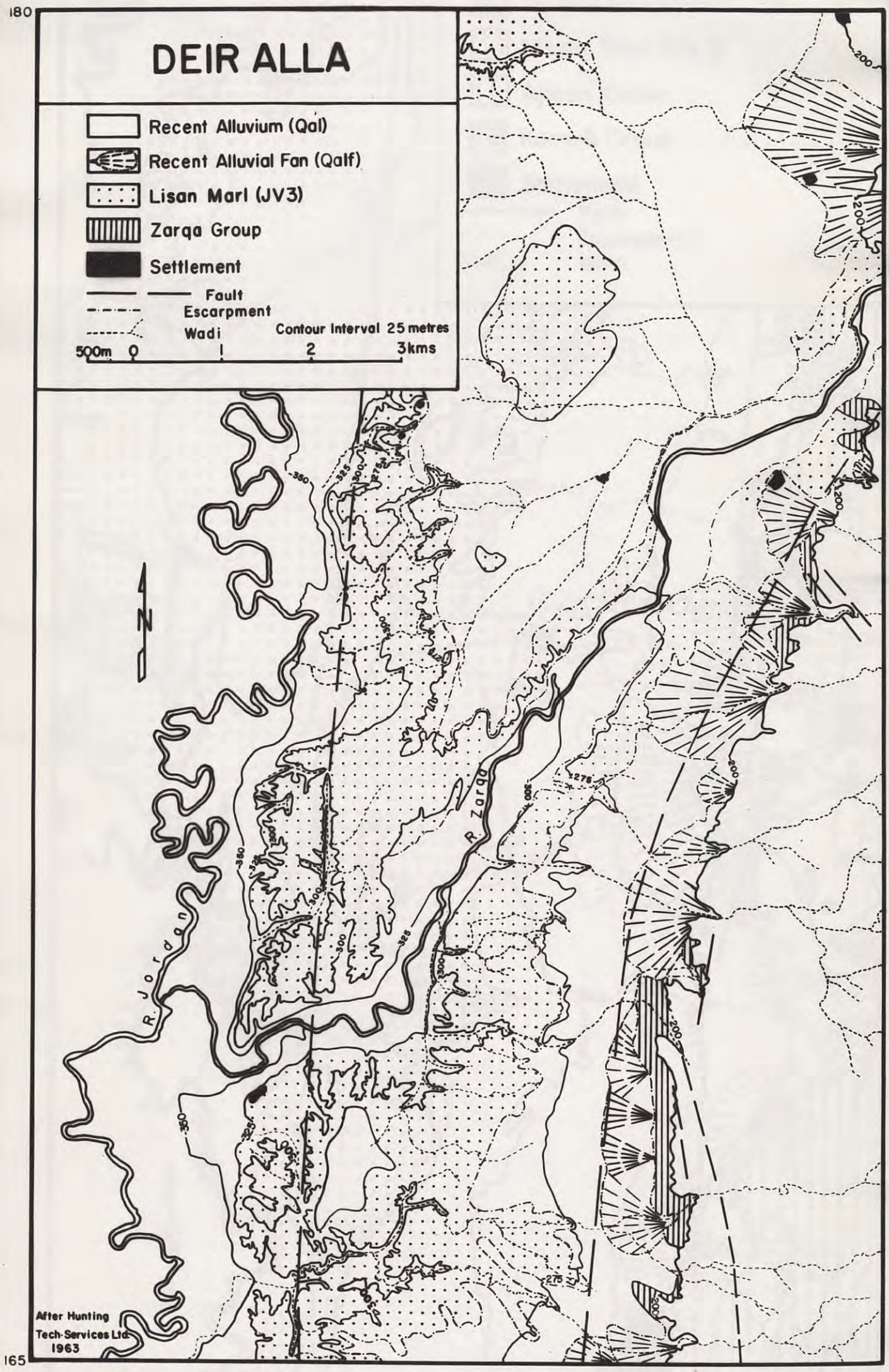

DEIR ALLA
Recent Alluvium (Qal)
Recent Alluvial Fan (Qalf)
Lisan Marl (JV3)
Zarqa Group
Settlement
Fault
Escarpment
Wadi
Contour Interval 25 metres
500m 0 1 2 3kms
N
R Jordan
R Zarqa
After Hunting Tech-Services Ltd 1963
180
165

Figure. 2.5.

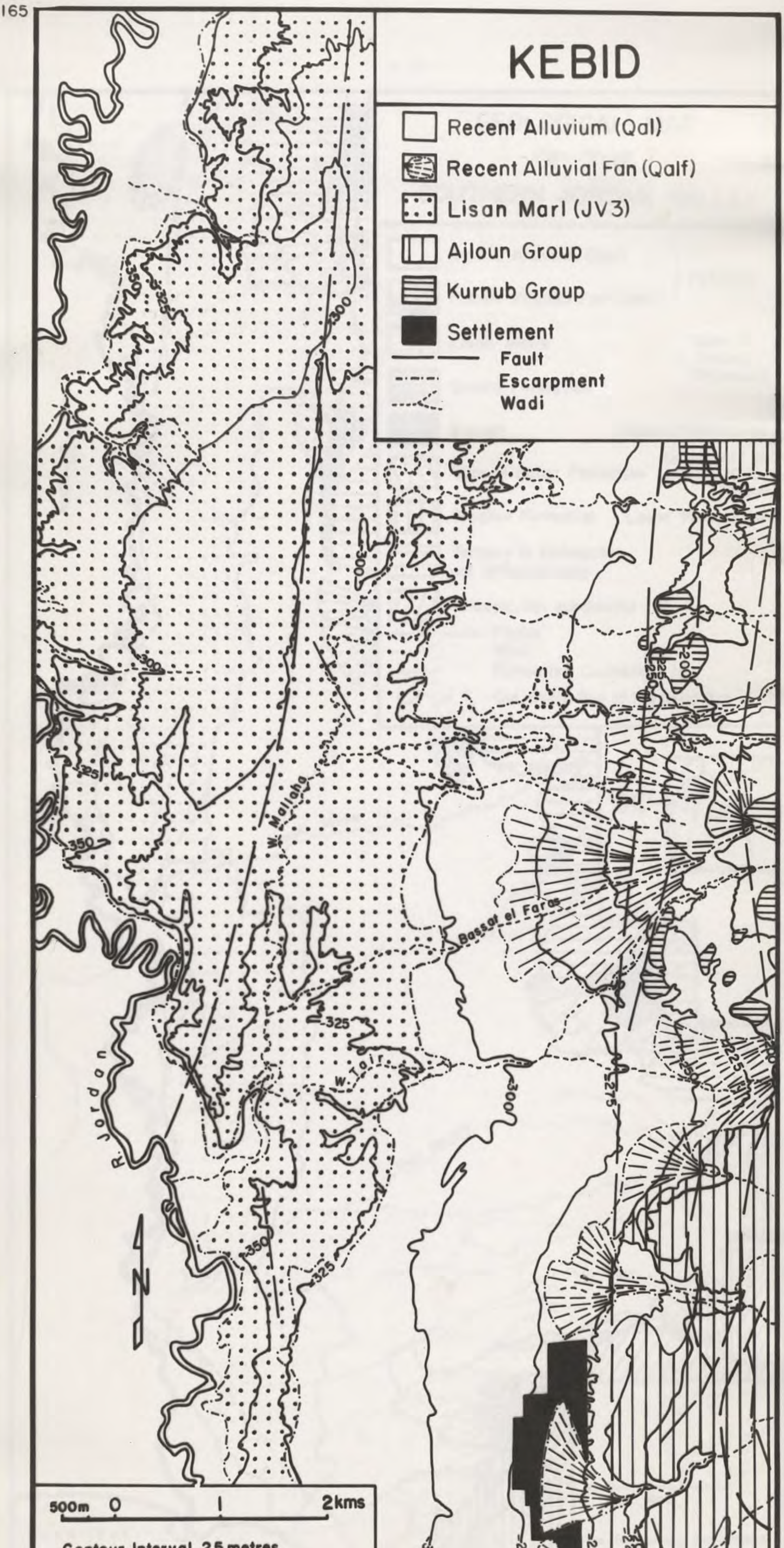

165
KEBID
Recent Alluvium (Qal)
Recent Alluvial Fan (Qalf)
Lisan Marl (JV3)
Ajloun Group
Kurnub Group
Settlement
Fault
Escarpment
Wadi
W. Mallaha
Bassat el Faras
R. Jordan
500m 0 1 2kms
Contour Interval 25 metres
After Hunting Tech. Services Ltd.(1963)
150

Figure. 2.6.

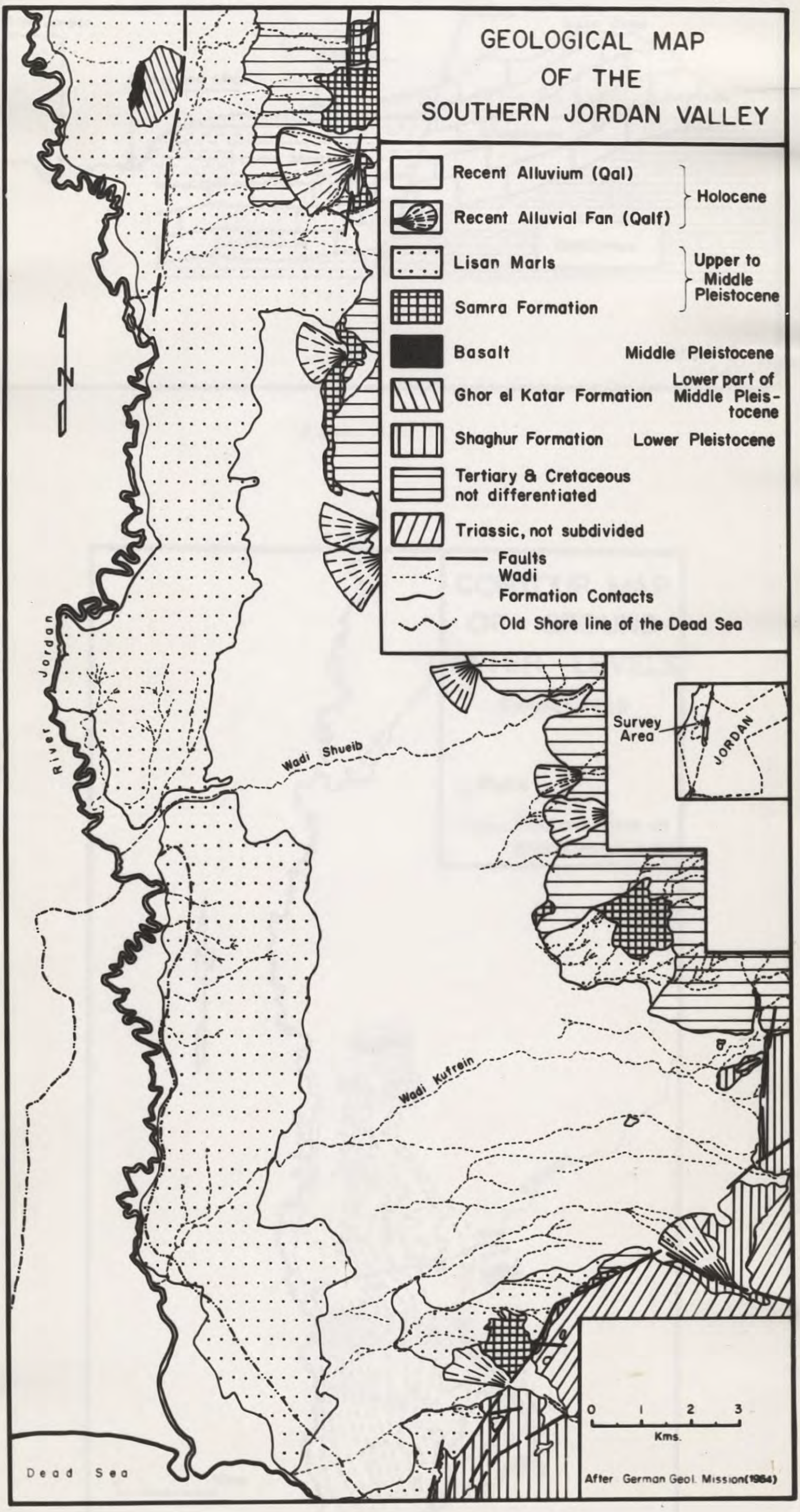

GEOLOGICAL MAP
OF THE
SOUTHERN JORDAN VALLEY
Recent Alluvium (Qal)
Recent Alluvial Fan (Qalf)
Holocene
Lisan Marls
Samra Formation
Upper to Middle Pleistocene
Basalt
Middle Pleistocene
Ghor el Katar Formation
Lower part of Middle Pleistocene
Shaghur Formation
Lower Pleistocene
Tertiary & Cretaceous not differentiated
Triassic, not subdivided
Faults
Wadi
Formation Contacts
Old Shore line of the Dead Sea
N
River Jordan
Wadi Shueib
Wadi Kufrein
Survey Area
JORDAN
Dead Sea
0 1 2 3
Kms.
After German Geol. Mission(1964)

Figure. 2.7.

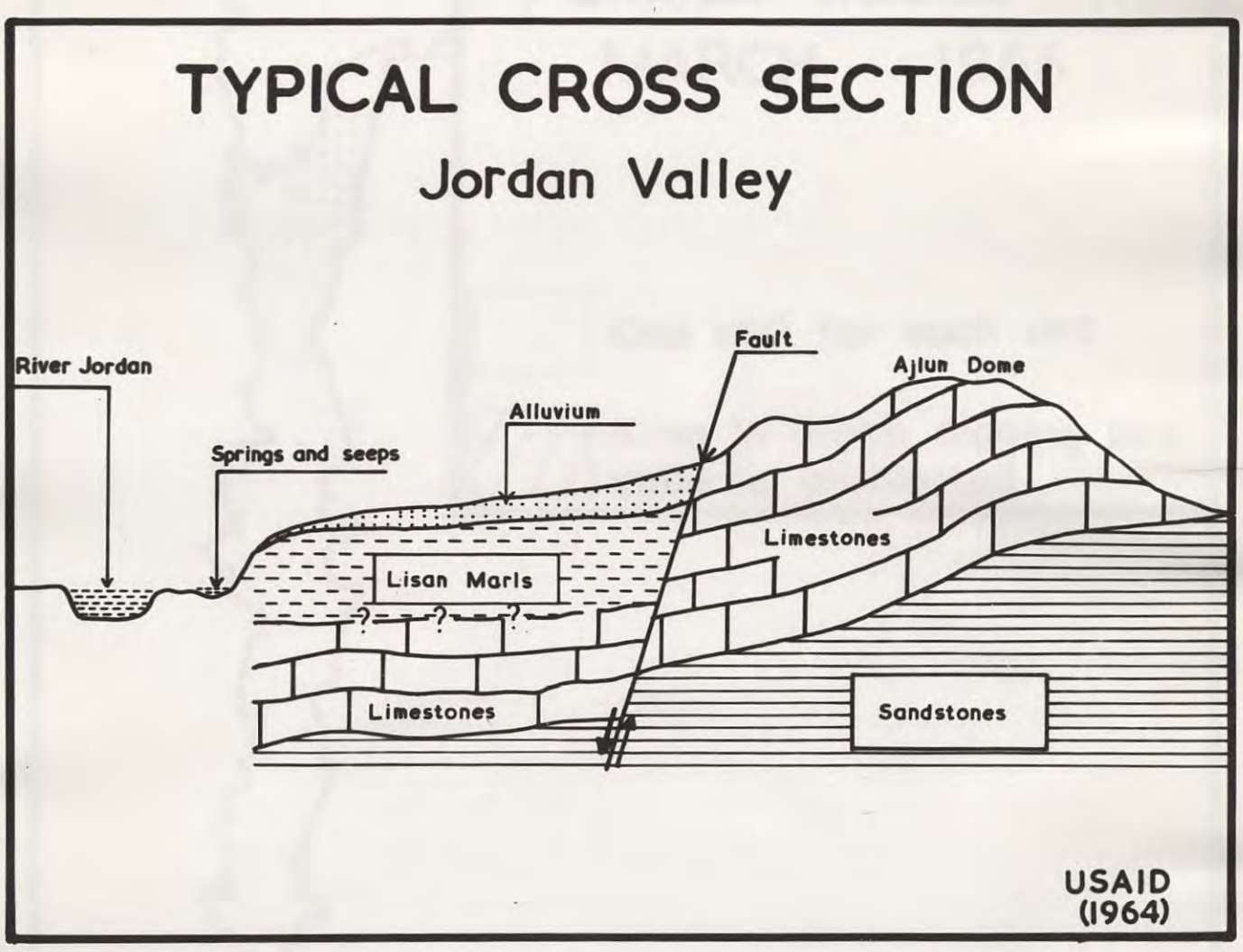


Figure. 2.8.

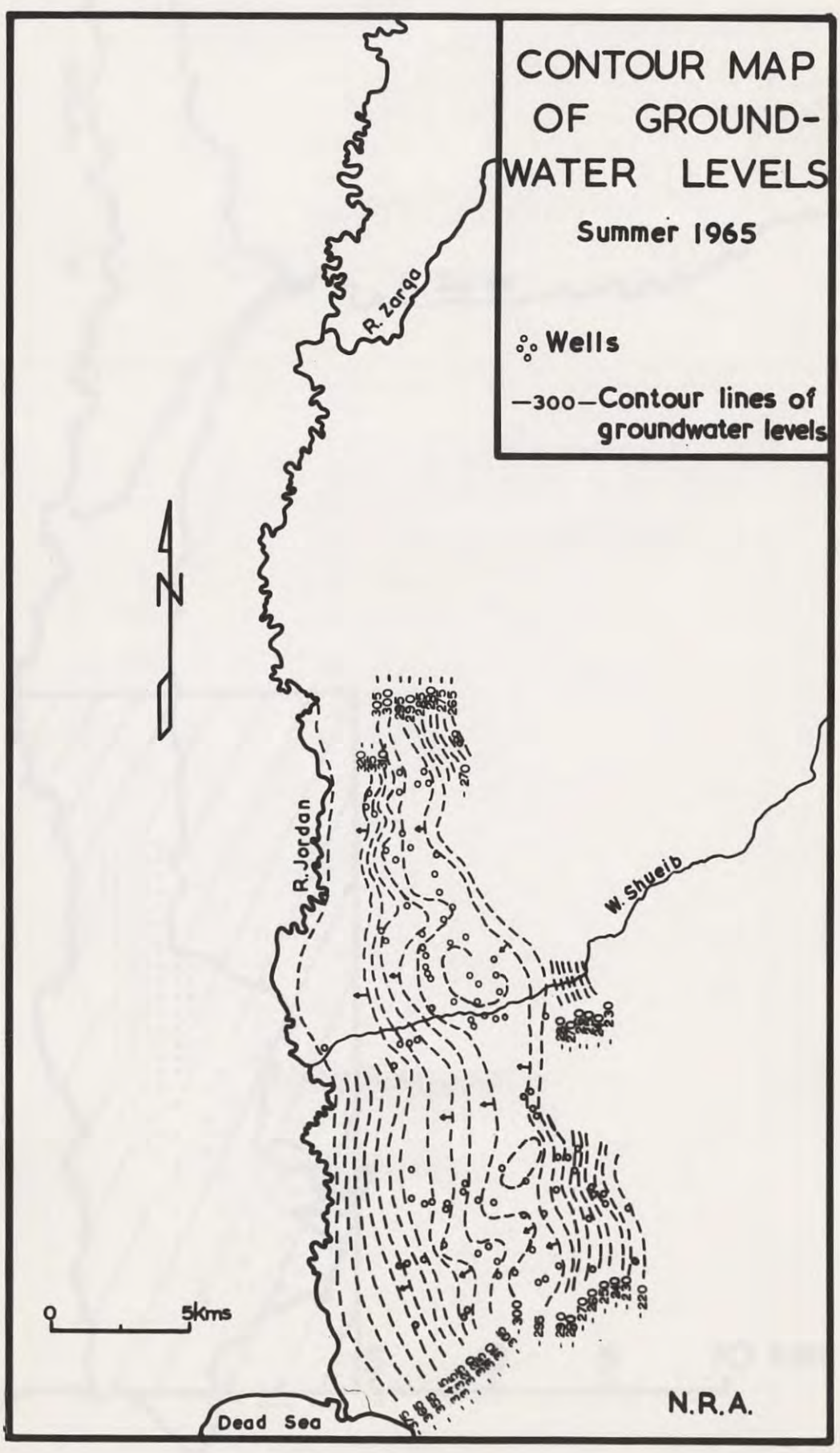


Figure. 2.9.

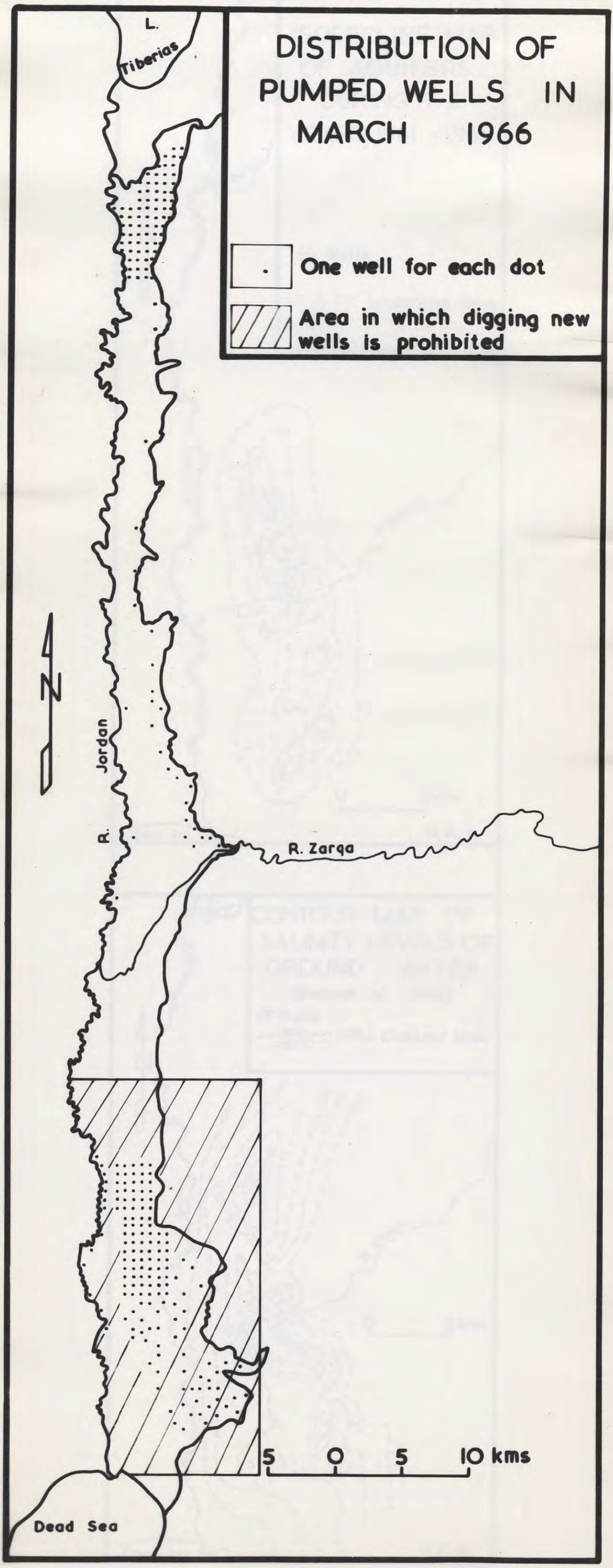
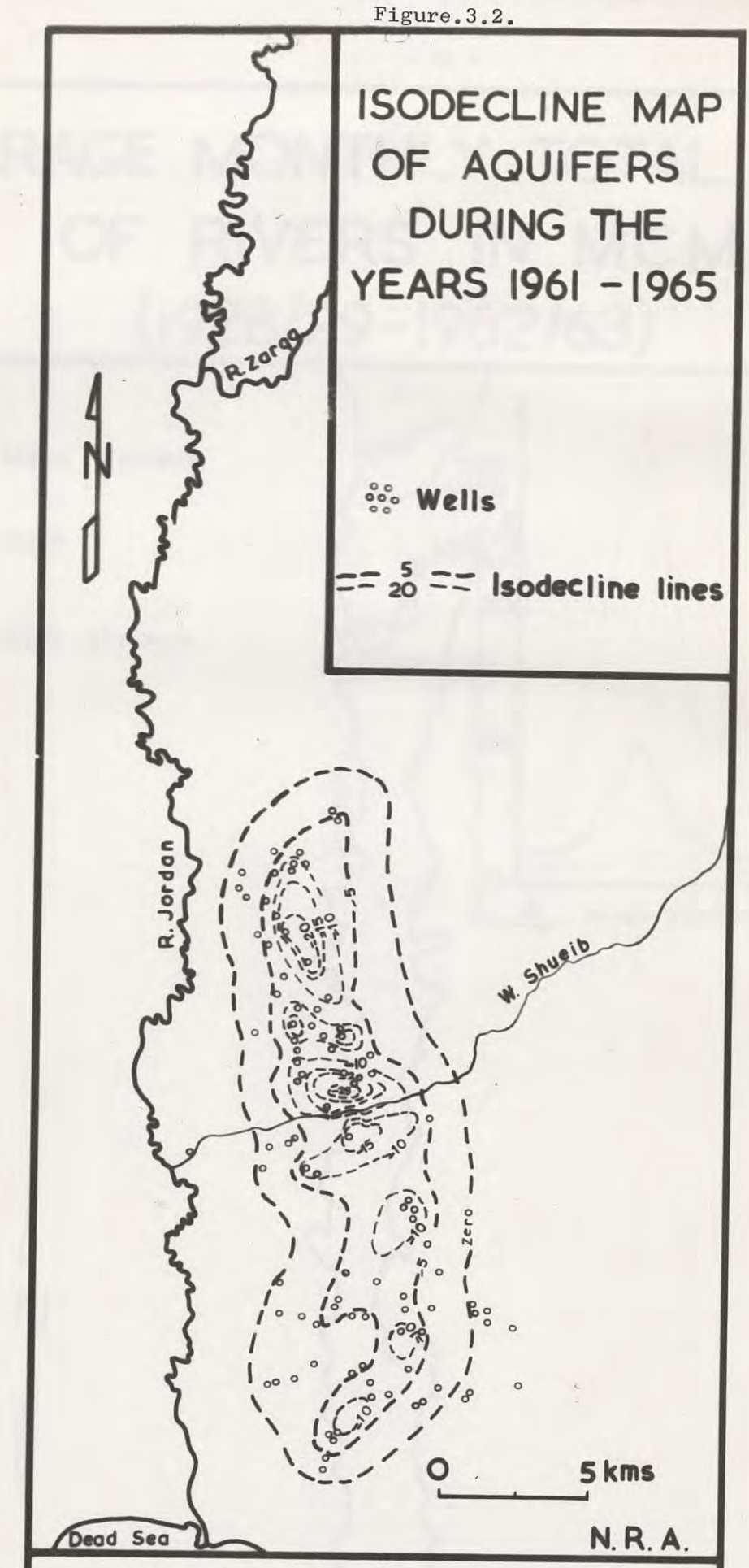

DISTRIBUTION OF PUMPED WELLS IN MARCH 1966
One well for each dot
Area in which digging new wells is prohibited
L. Tiberias
Jordan R.
R. Zarqa
5 0 5 10 kms
Dead Sea

Figure. 3.1.

Figure.3.2.



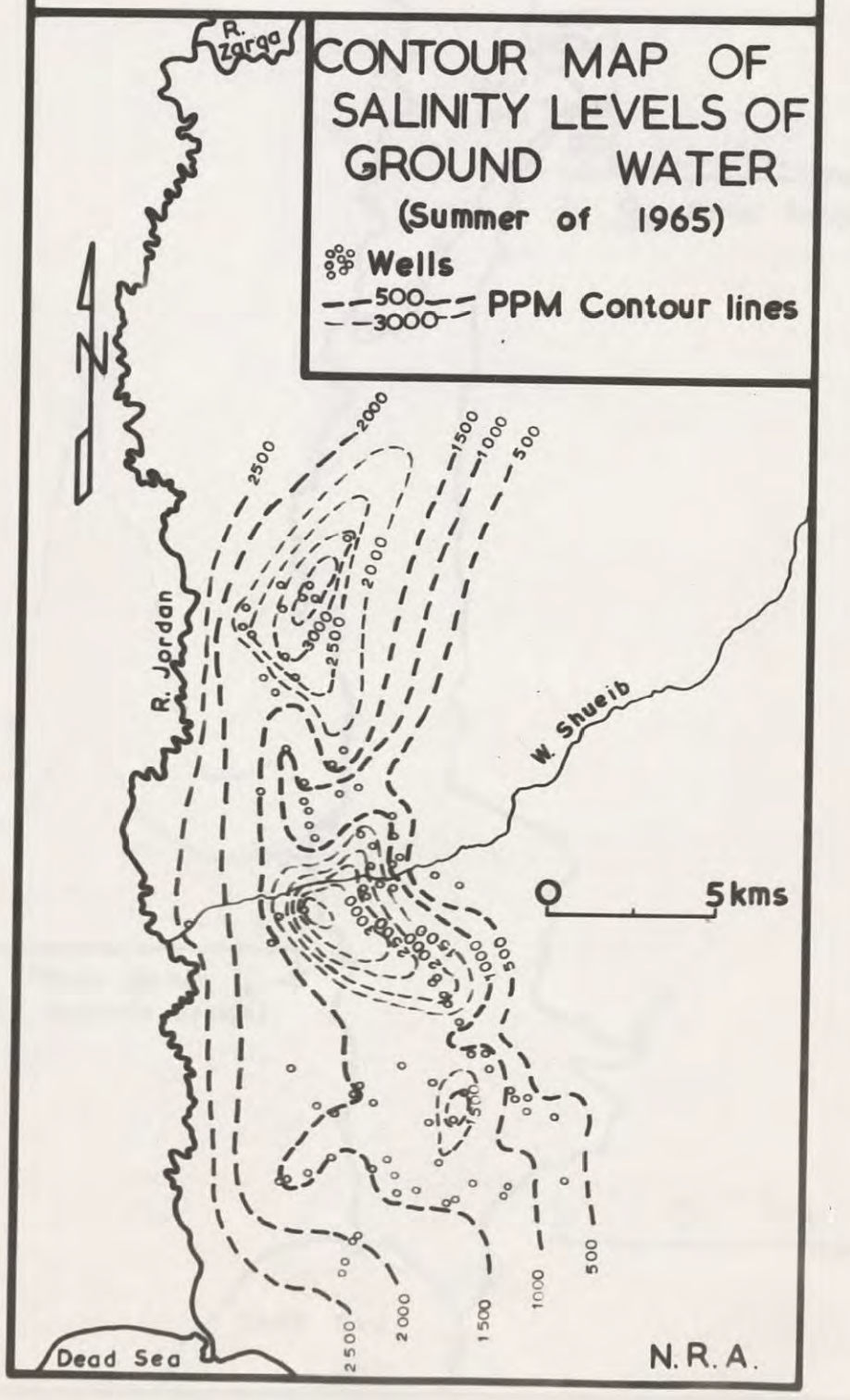


Figure. 3.3.

AVERAGE MONTHLY TOTAL FLOW OF RIVERS IN MCM. (1928/29-1962/63)

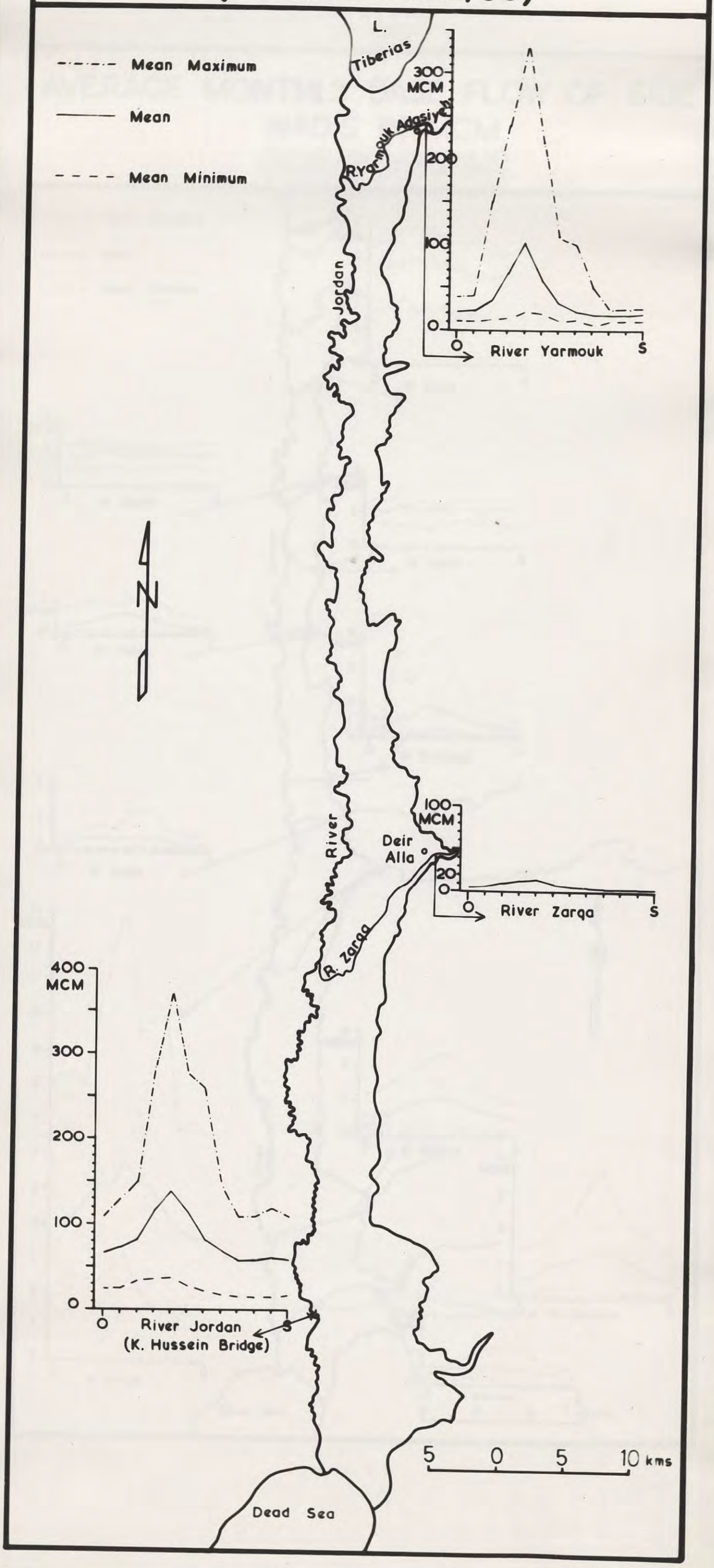


Figure. 3.4.

AVERAGE MONTHLY BASE FLOW OF SIDE WADIS IN MCM (1928/29-1962/63)

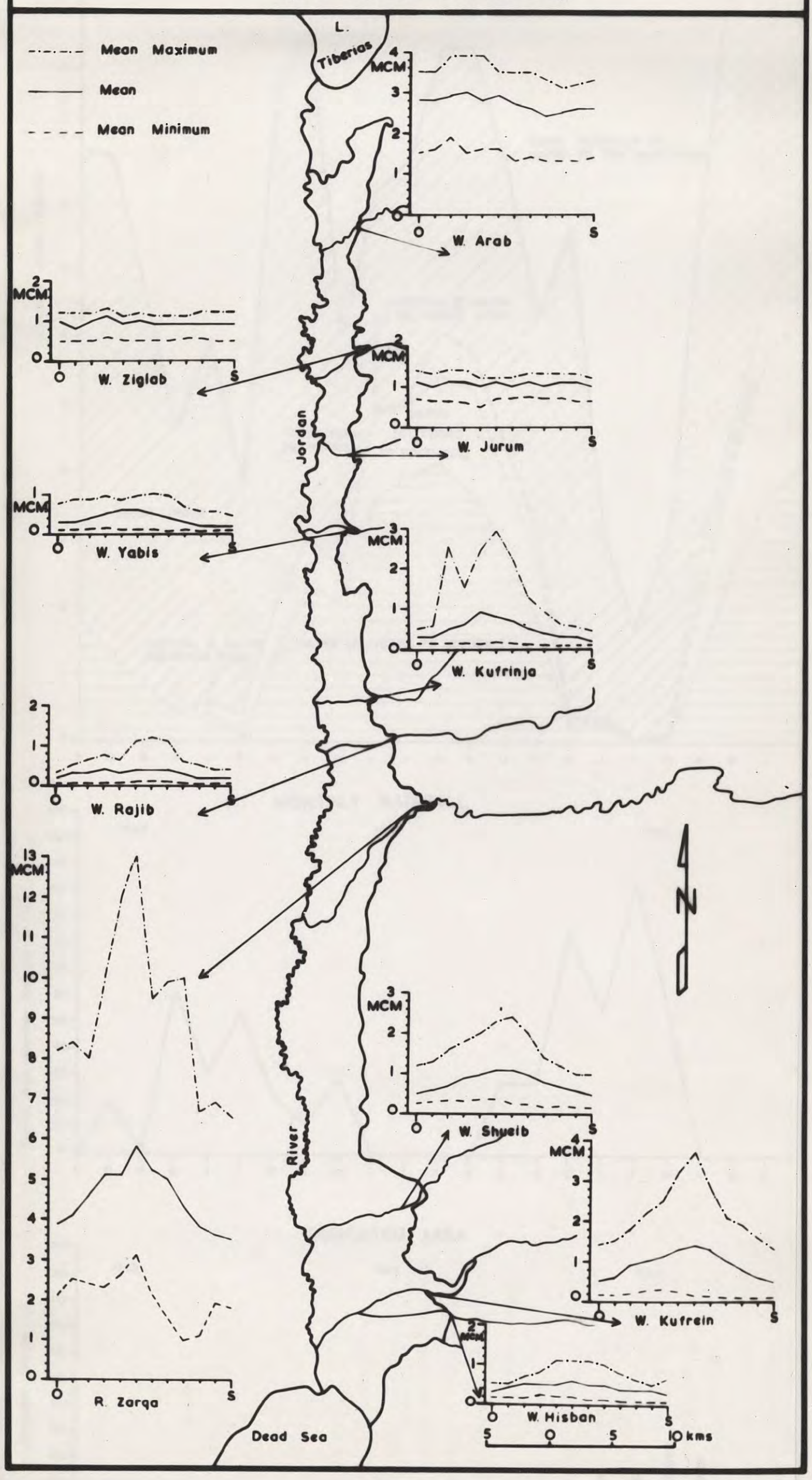


Figure. 3.5.

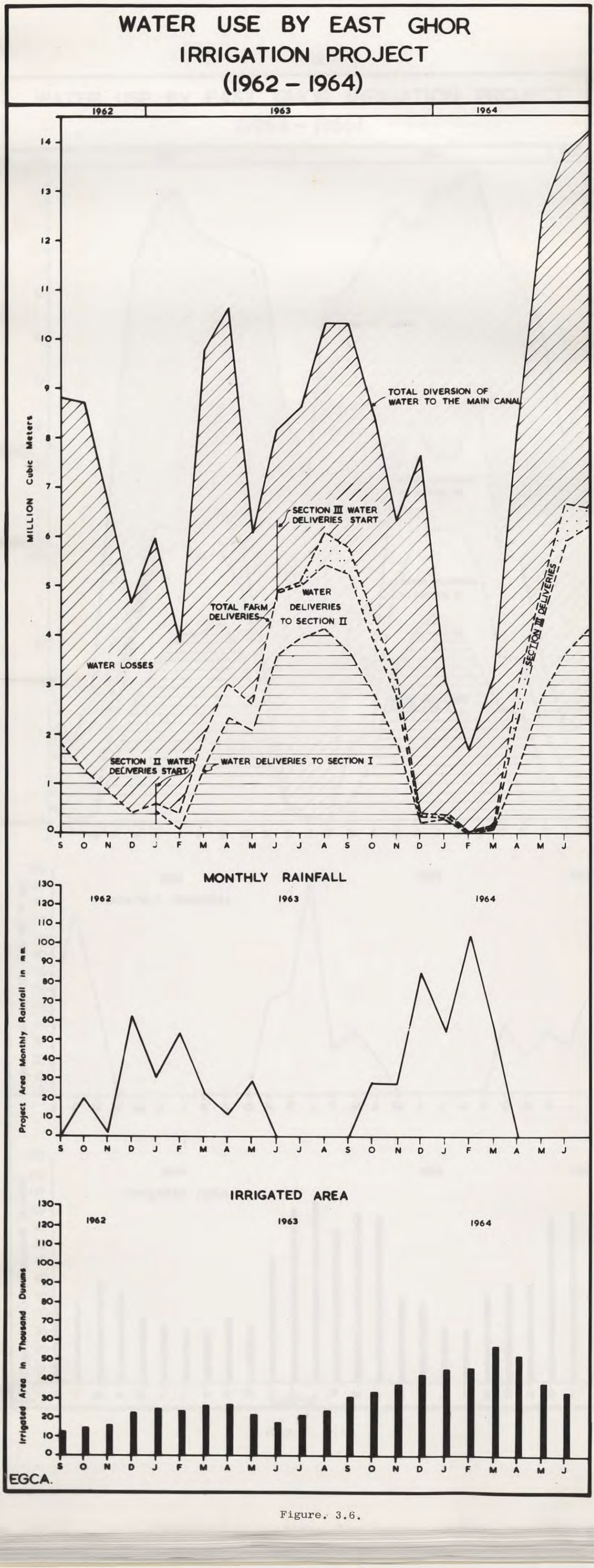

WATER USE BY EAST GHOR
IRRIGATION PROJECT
(1962 – 1964)
1962
1963
1964
MILLION Cubic Meters
TOTAL DIVERSION OF WATER TO THE MAIN CANAL
SECTION III WATER DELIVERIES START
WATER DELIVERIES TO SECTION II
TOTAL FARM DELIVERIES
WATER LOSSES
SECTION II WATER DELIVERIES START
WATER DELIVERIES TO SECTION I
SECTION III DELIVERIES
S O N D J F M A M J J A S O N D J F M A M J
MONTHLY RAINFALL
Project Area Monthly Rainfall in mm.
IRRIGATED AREA
Irrigated Area in Thousand Dunums
EGCA.

Figure. 3.6.

WATER USE BY EAST GHOR IRRIGATION PROJECT (1964 - 1966)

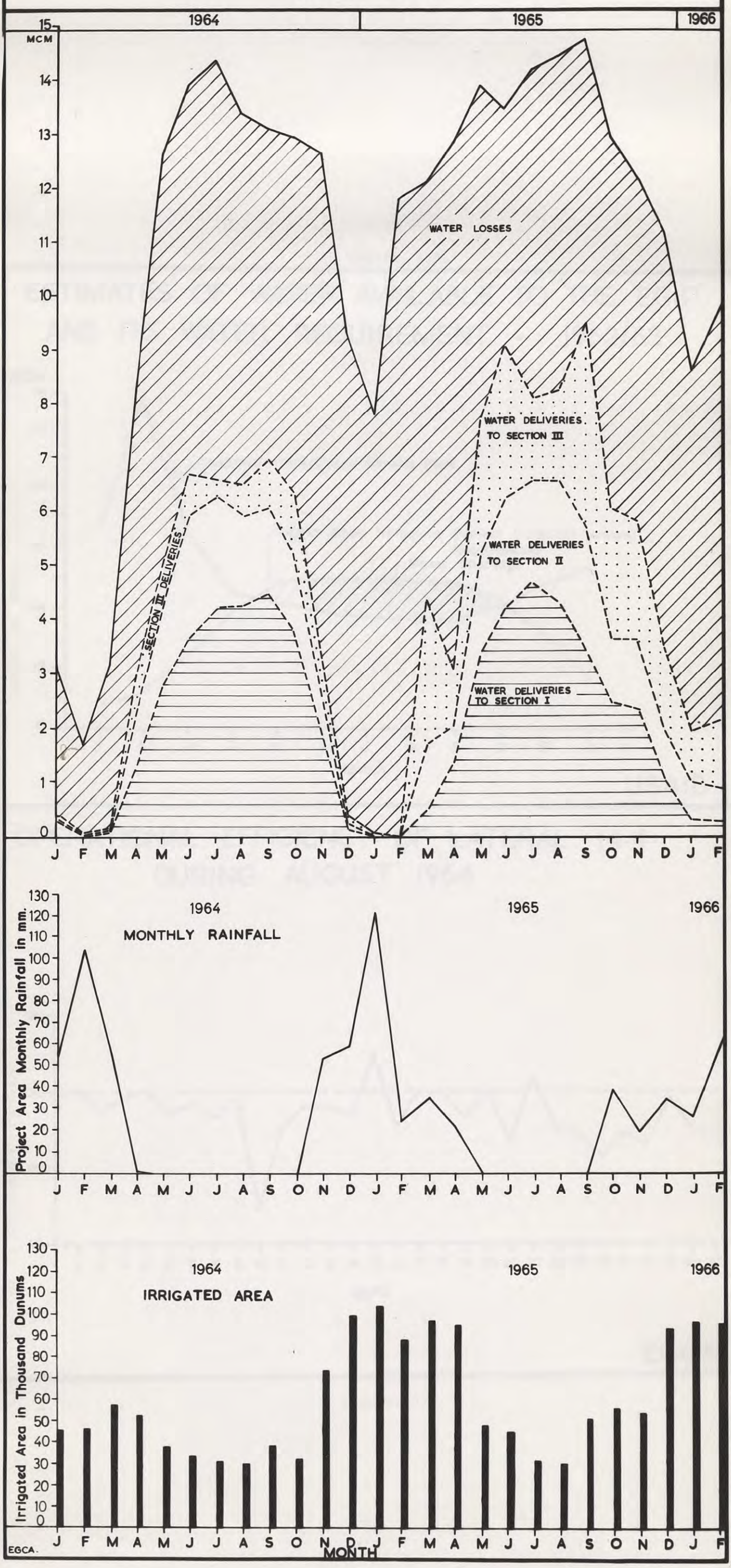
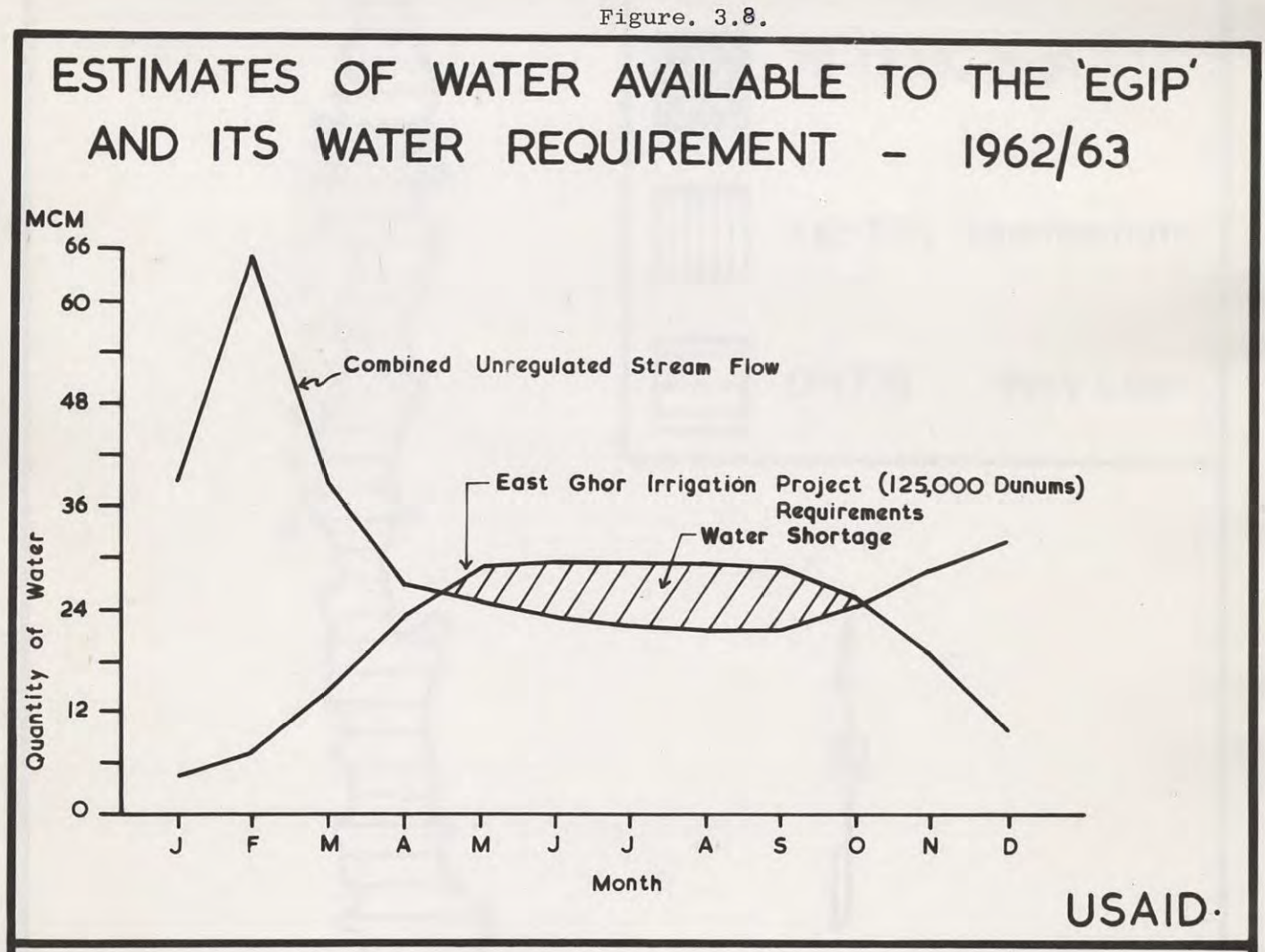


Figure. 3.7.

Figure. 3.8.



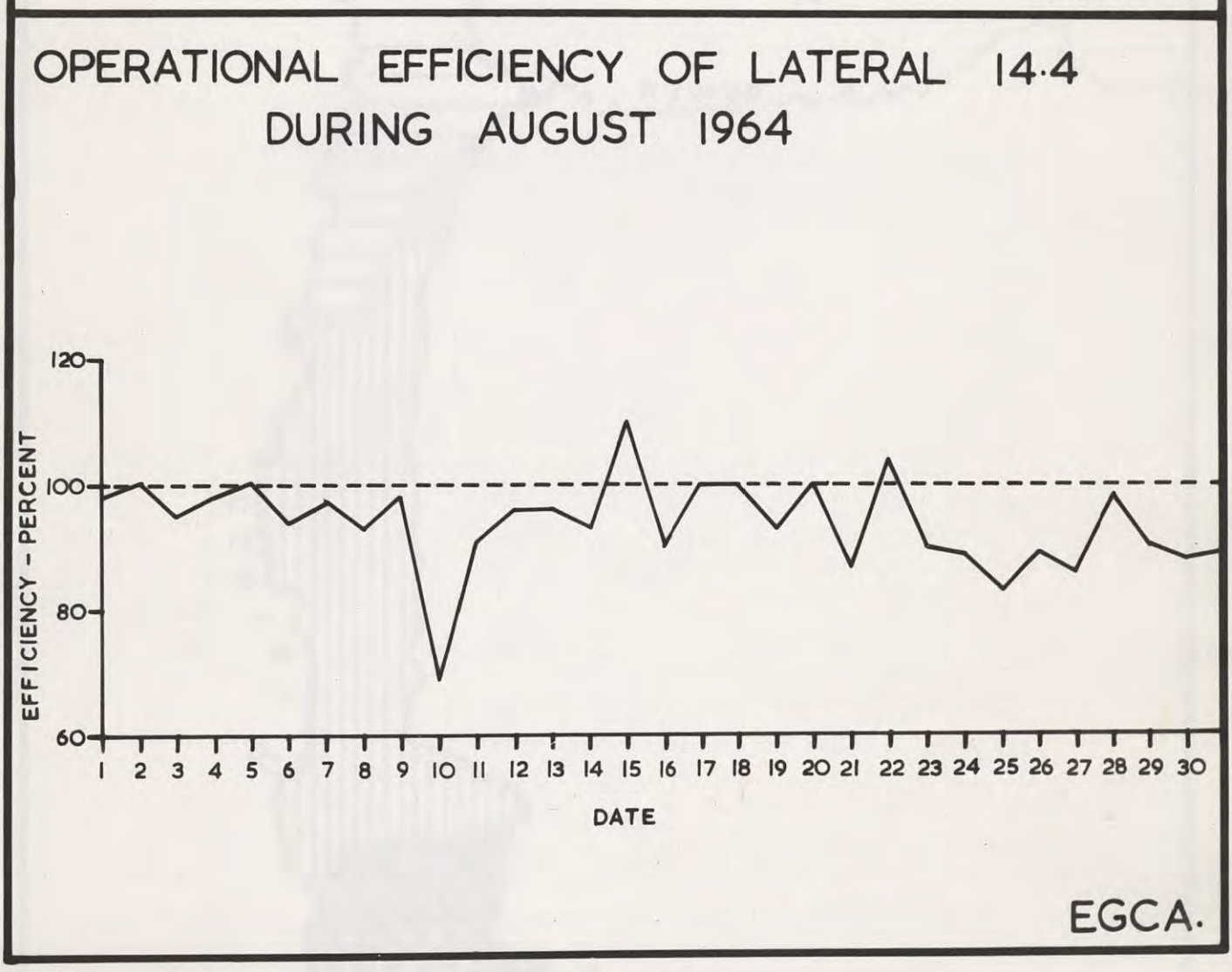


Figure. 3.9.

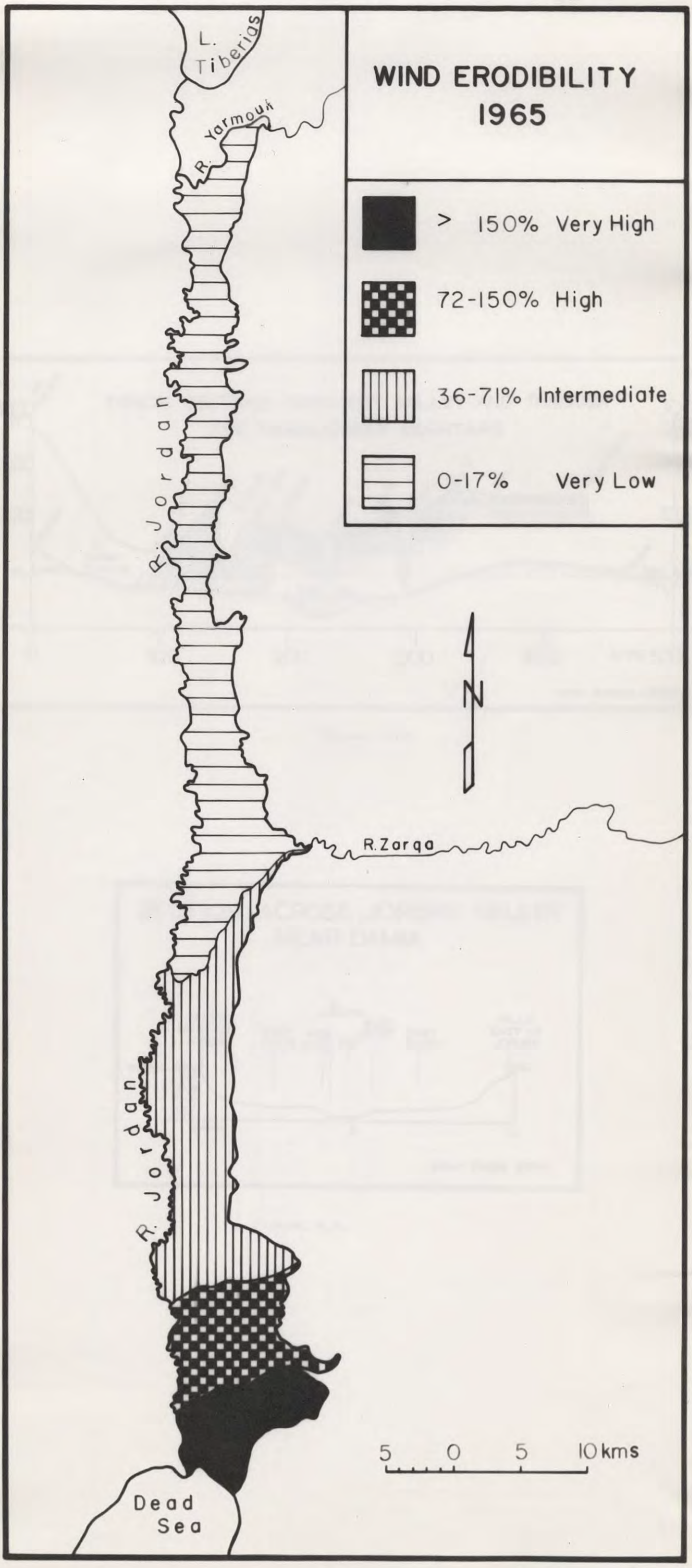

WIND ERODIBILITY
1965
> 150% Very High
72-150% High
36-71% Intermediate
0-17% Very Low
L. Tiberias
R. Yarmouk
R. Jordan
R. Zarqa
R. Jordan
Dead Sea
N
5 0 5 10 kms

Figure. 4.1.

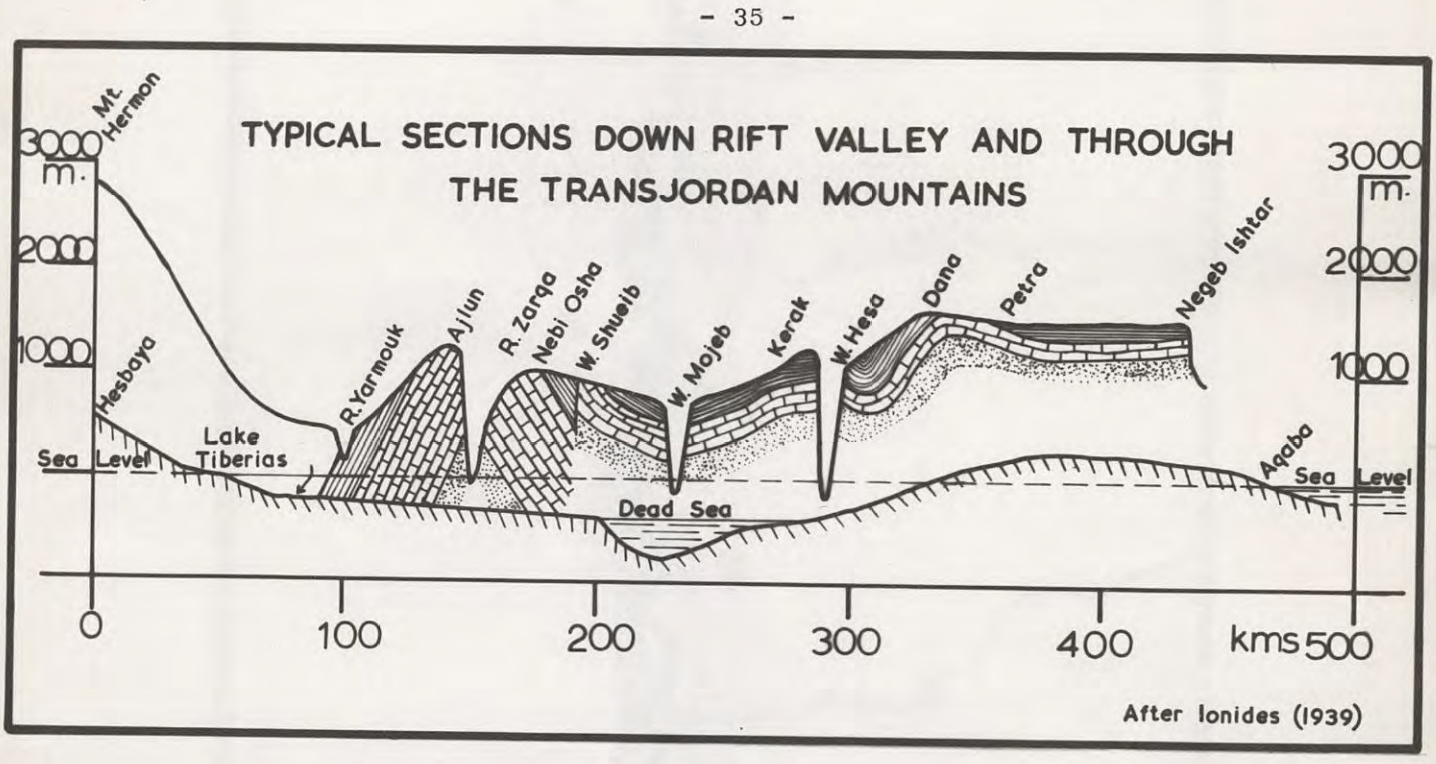


Figure. 4.2.

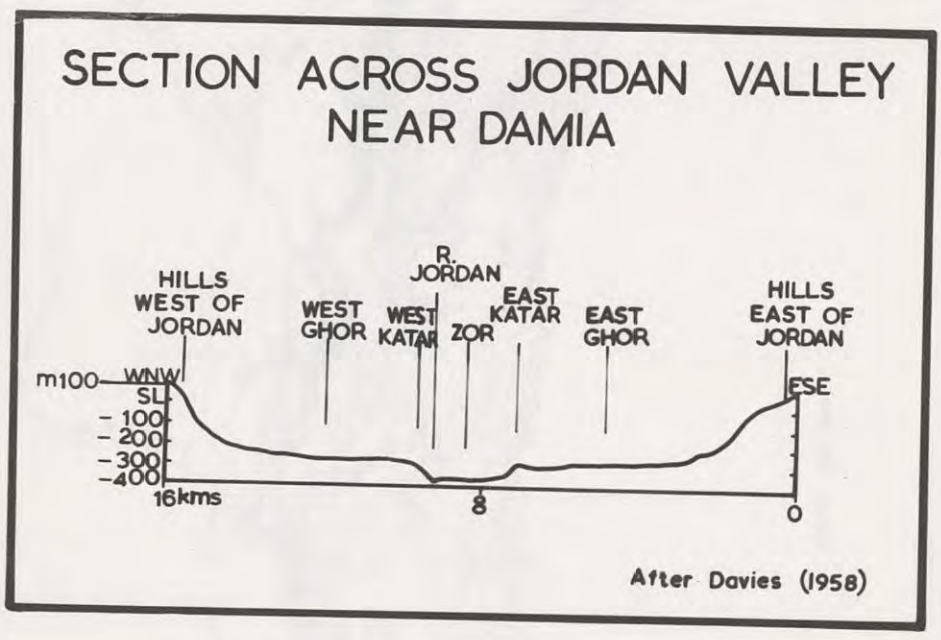


Figure. 4.4.

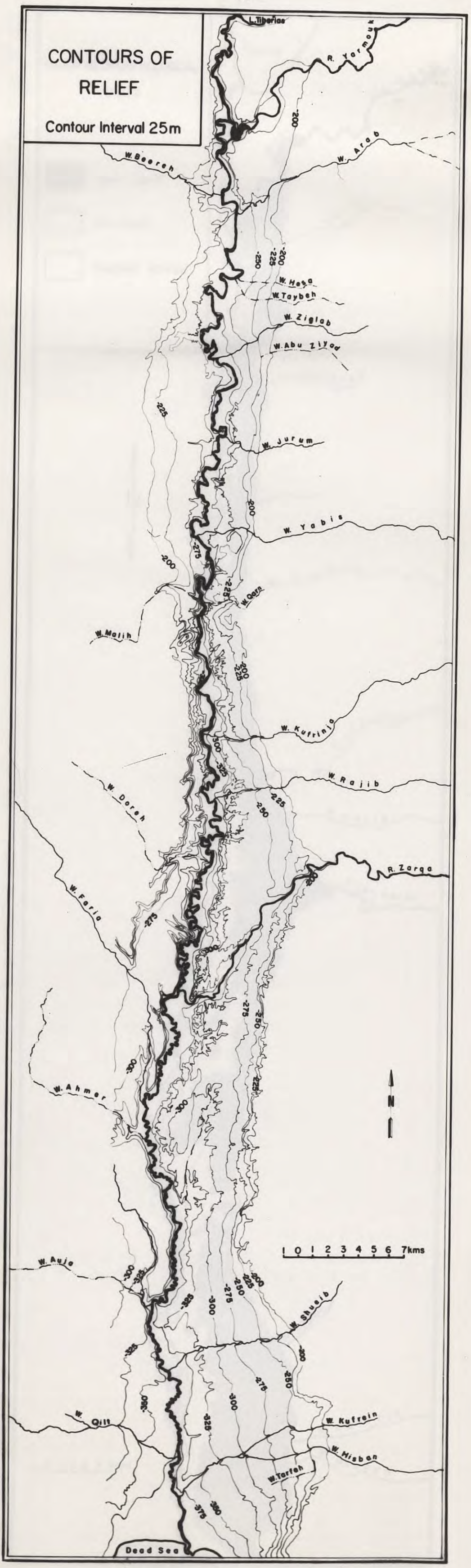

CONTOURS OF
RELIEF
Contour Interval 25m
L. Tiberias
R. Yarmouk
W. Arab
W. Beareh
W. Hasa
W. Taybeh
W. Ziglab
W. Abu Ziyad
W. Jurum
W. Yabis
W. Qaun
W. Malih
W. Kufrinja
W. Rajib
W. Doreh
R. Zarqa
W. Faria
W. Ahmar
W. Auja
W. Shueib
W. Qilt
W. Kufrein
W. Hisban
W. Tarfah
Dead Sea
N
0 1 2 3 4 5 6 7kms

Figure. 4.3.


MAJOR GEOMORPHOLOGICAL UNITS
Ghor Land
Zor Land
Badland (Katar)
L. Tiberias
Yarmouk River
W. Arab
W. Ziglab
N
Jordan River
W. Yabis
W. Kufrinja
W. Rajib
River Zarqa
W. Shueib
W. Kufrein
W. Hisban
0 1 2 3 4 5kms
Dead Sea

Figure. 4.5.

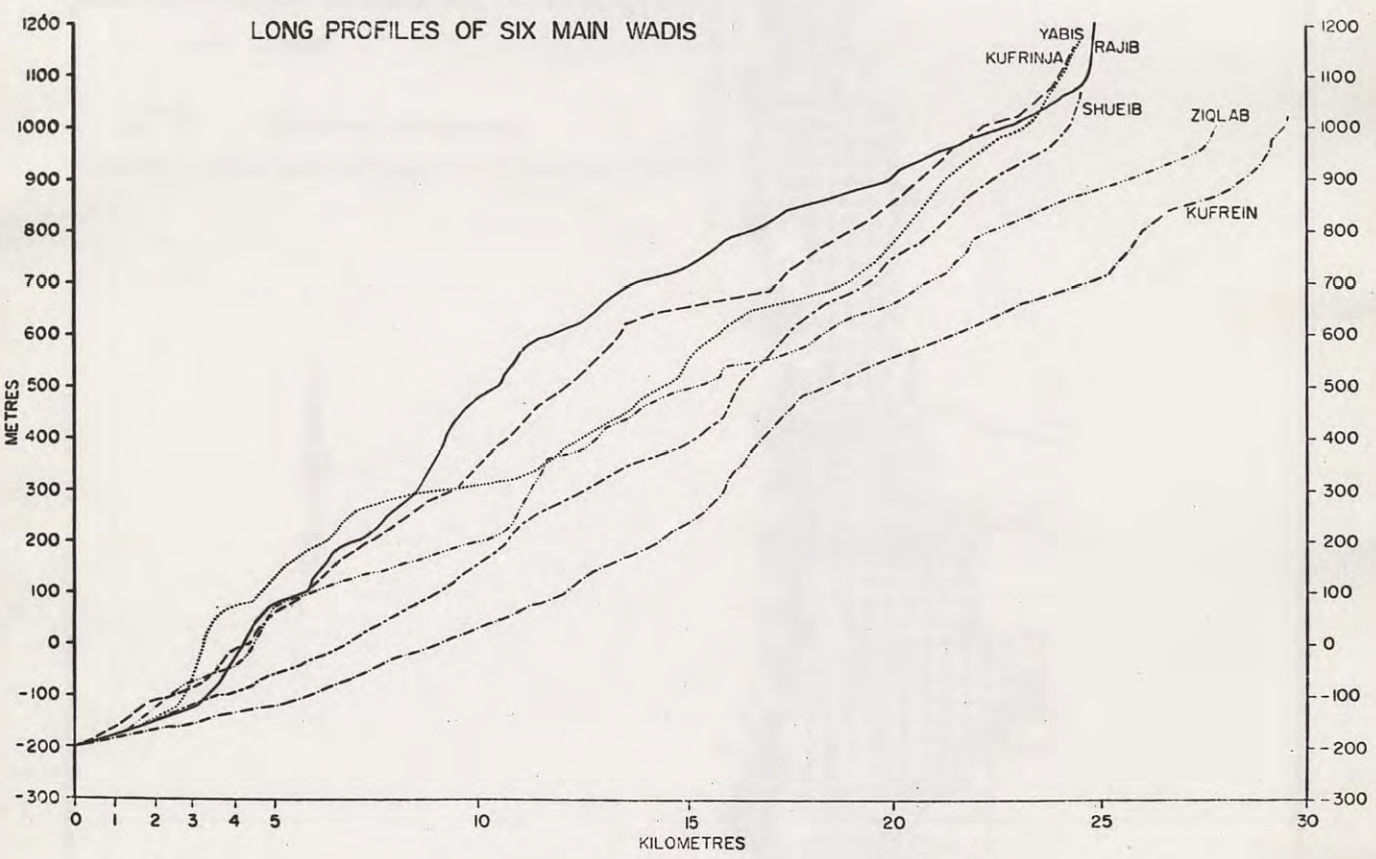


Figure. 4.6.

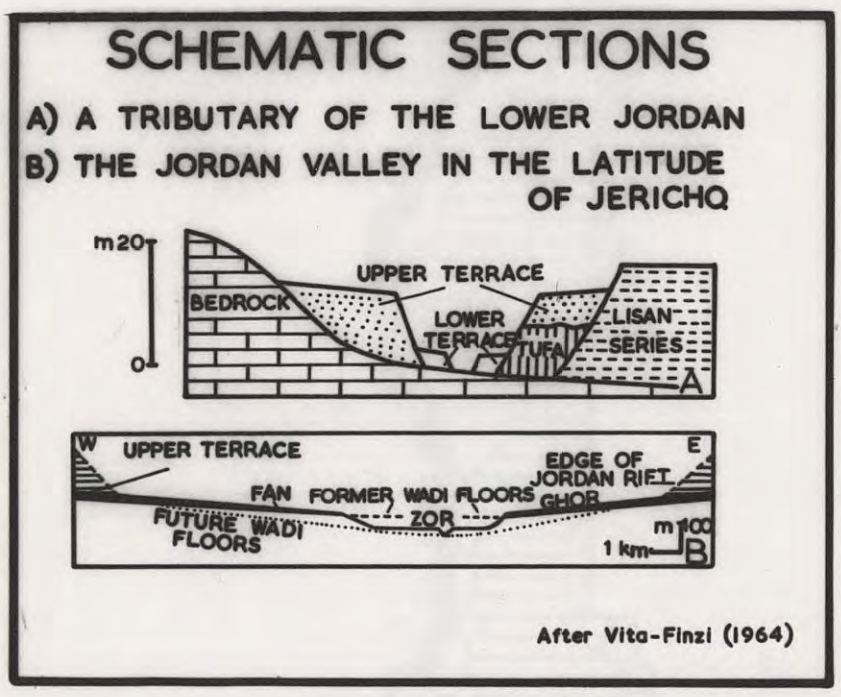


Figure. 4.7.

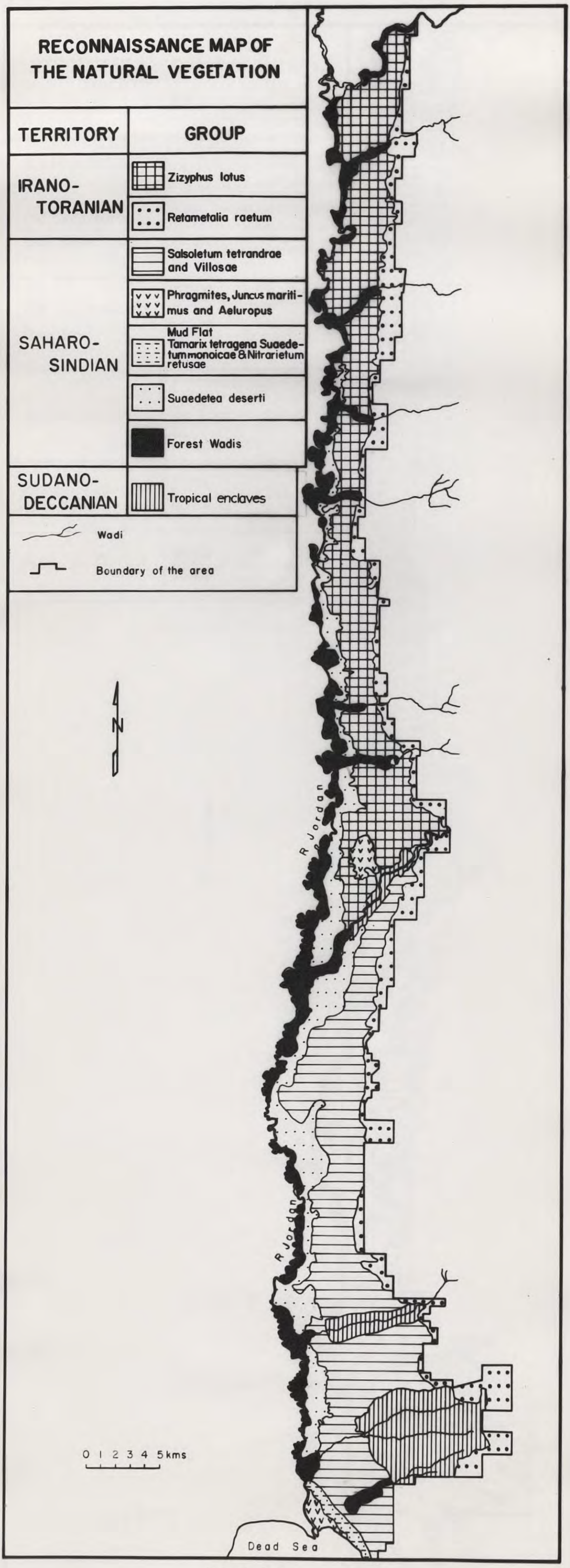

RECONNAISSANCE MAP OF THE NATURAL VEGETATION
TERRITORY
GROUP
IRANO-TORANIAN
Zizyphus lotus
Retametalia raetum
SAHARO-SINDIAN
Salsoletum tetrandrae and Villosae
Phragmites, Juncus maritimus and Aeluropus
Mud Flat
Tamarix tetragena Suaedetum monoicae & Nitrarietum retusae
Suaedetea deserti
Forest Wadis
SUDANO-DECCANIAN
Tropical enclaves
Wadi
Boundary of the area
N
R Jordan
R Jordan
0 1 2 3 4 5kms
Dead Sea

Figure. 4.8.

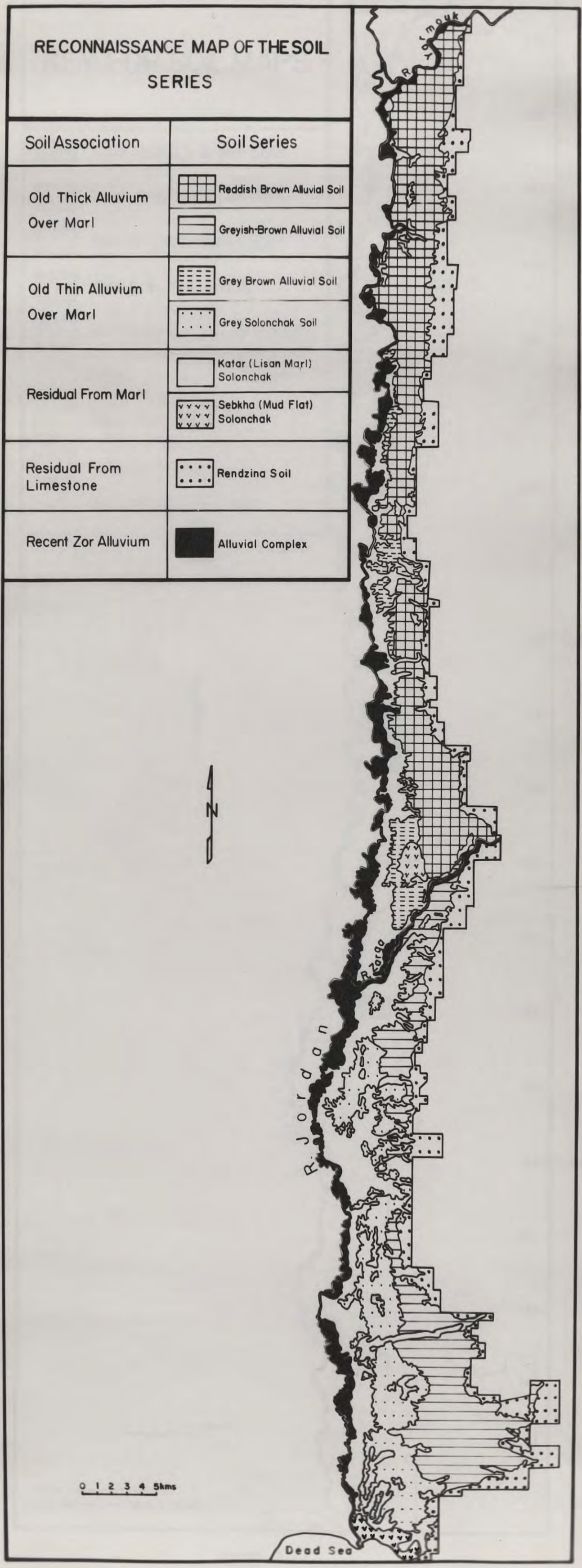

RECONNAISSANCE MAP OF THE SOIL SERIES
Soil Association
Soil Series
Old Thick Alluvium Over Marl
Reddish Brown Alluvial Soil
Greyish-Brown Alluvial Soil
Old Thin Alluvium Over Marl
Grey Brown Alluvial Soil
Grey Solonchak Soil
Residual From Marl
Katar (Lisan Marl) Solonchak
Sebkha (Mud Flat) Solonchak
Residual From Limestone
Rendzina Soil
Recent Zor Alluvium
Alluvial Complex
N
R. Yarmouk
R. Jordan
R. Zerqa
0 1 2 3 4 5kms
Dead Sea

Figure. 5.1.

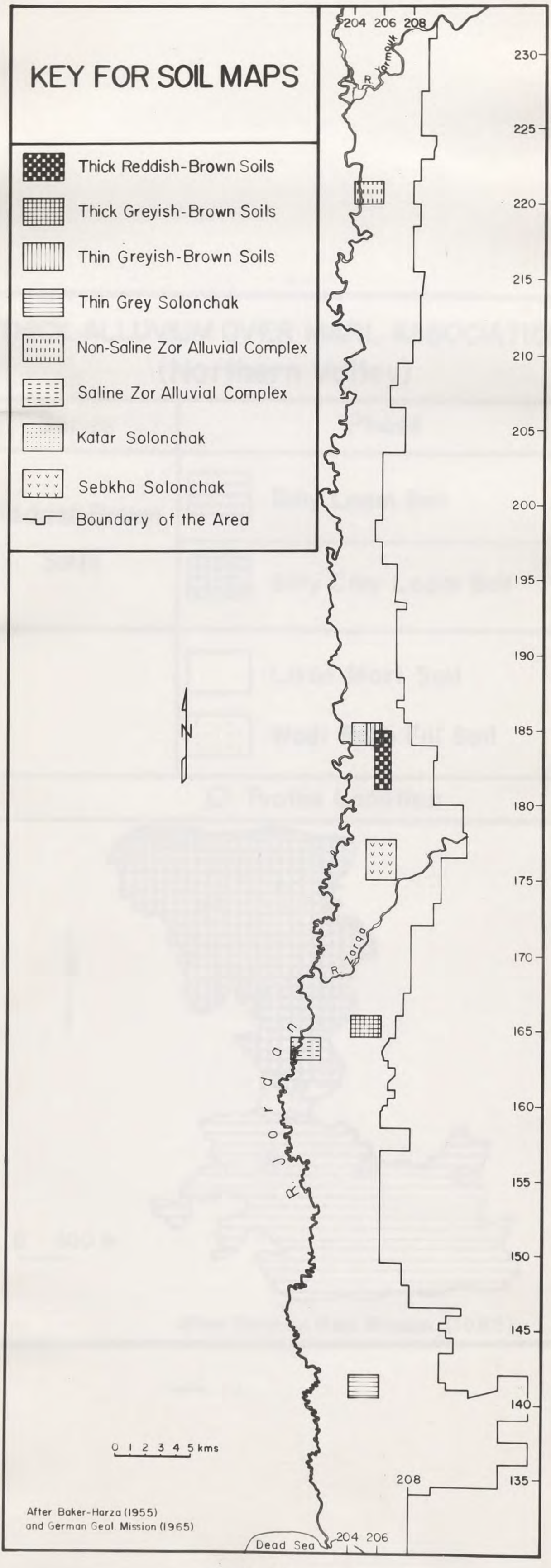

KEY FOR SOIL MAPS
Thick Reddish-Brown Soils
Thick Greyish-Brown Soils
Thin Greyish-Brown Soils
Thin Grey Solonchak
Non-Saline Zor Alluvial Complex
Saline Zor Alluvial Complex
Katar Solonchak
Sebkha Solonchak
Boundary of the Area
N
0 1 2 3 4 5 kms
After Baker-Harza (1955)
and German Geol. Mission (1965)
R. Yarmuk
R. Zarqa
R. Jordan
Dead Sea
204 206 208
230
225
220
215
210
205
200
195
190
185
180
175
170
165
160
155
150
145
140
135
208
204 206

Figure. 5.2.

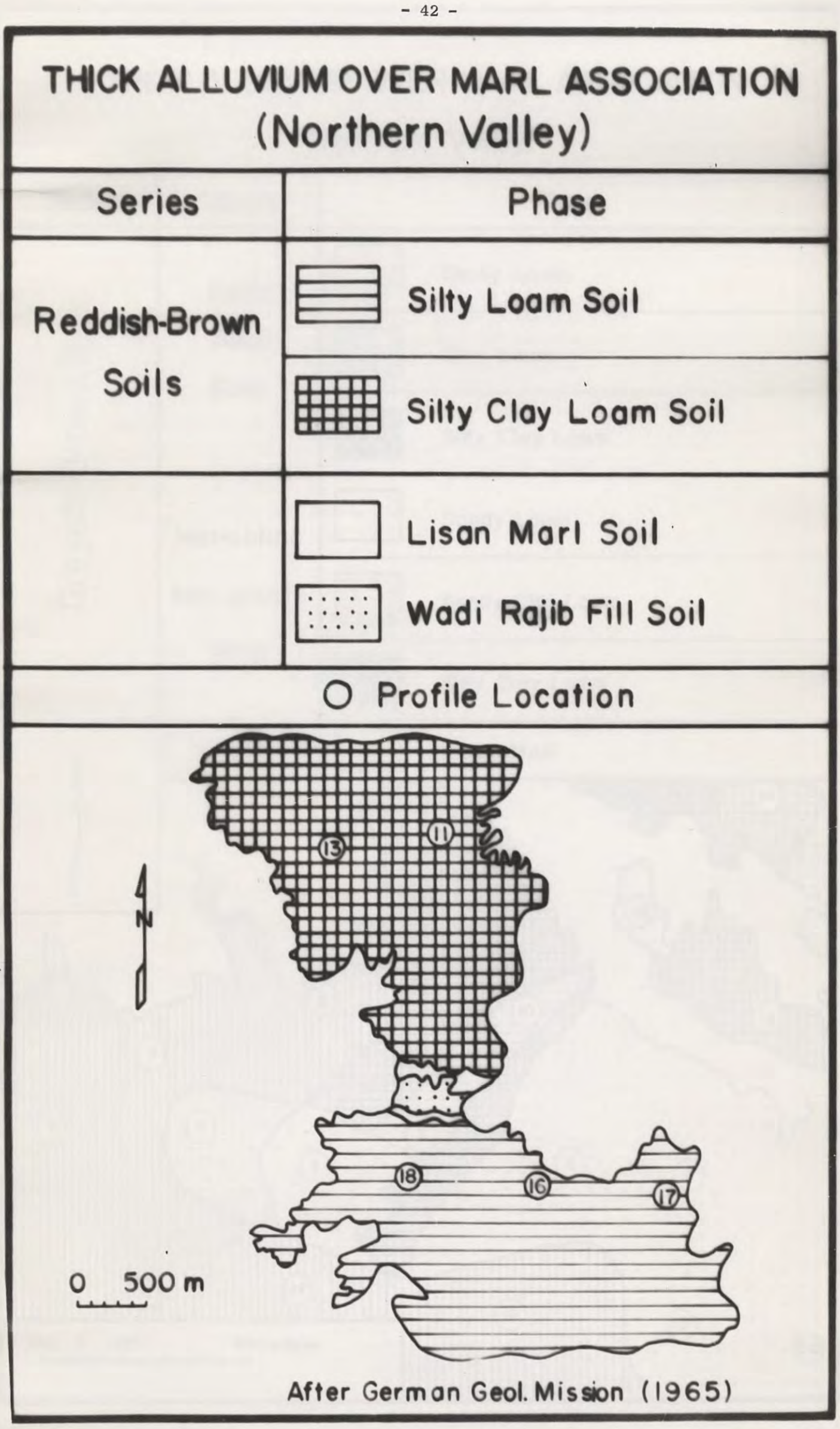

THICK ALLUVIUM OVER MARL ASSOCIATION
(Northern Valley)
Series
Phase
Reddish-Brown Soils
Silty Loam Soil
Silty Clay Loam Soil
Lisan Marl Soil
Wadi Rajib Fill Soil
O Profile Location
N
13
11
18
16
17
0 500 m
After German Geol. Mission (1965)

Figure. 5.3.

THICK ALLUVIUM OVER MARL ASSOCIATION
(Southern Valley)

Series	Salinity	Phase
Greyish-Brown Soils	Saline Alkali Soils	Sandy Loam
		Clay Loam
		Silty Clay Loam
	Non-saline Non-alkali Soils	Sandy Loam
		Sandy Clay Loam
		Silty Clay Loam
	Profile location	Lisan Marl

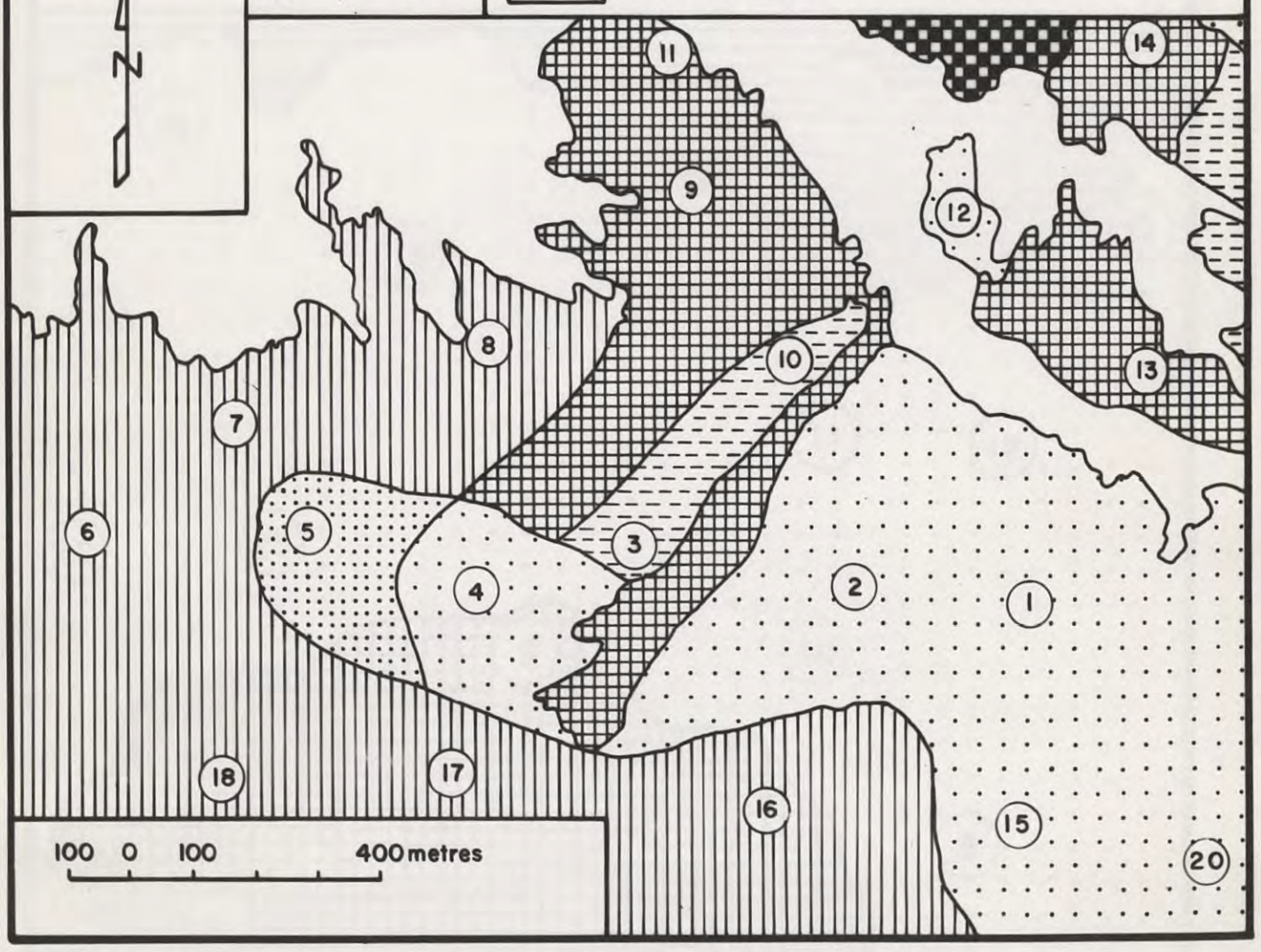


Figure.5.4.

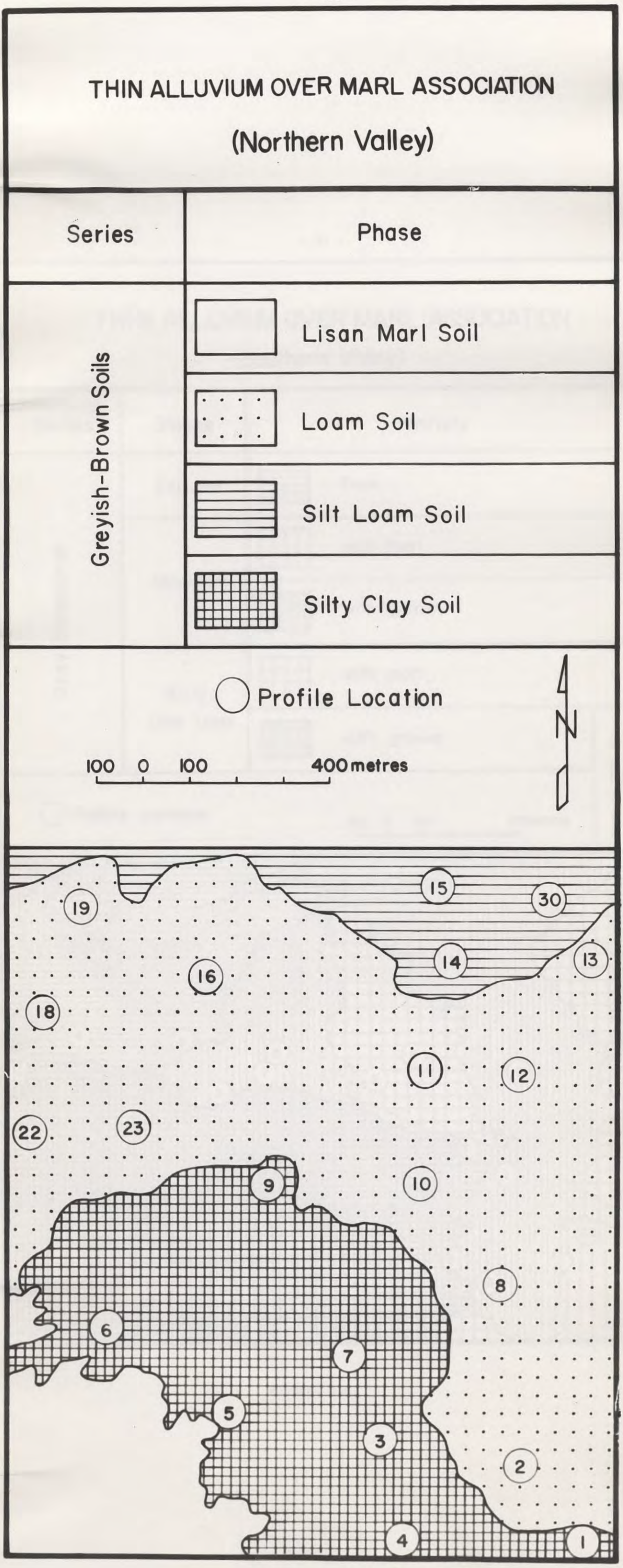

THIN ALLUVIUM OVER MARL ASSOCIATION
(Northern Valley)
Series
Phase
Greyish-Brown Soils
Lisan Marl Soil
Loam Soil
Silt Loam Soil
Silty Clay Soil
Profile Location
100 0 100 400 metres
N
19
15
30
14
13
16
18
11
12
22
23
9
10
8
6
7
5
3
2
4
1

Figure. 5.5.

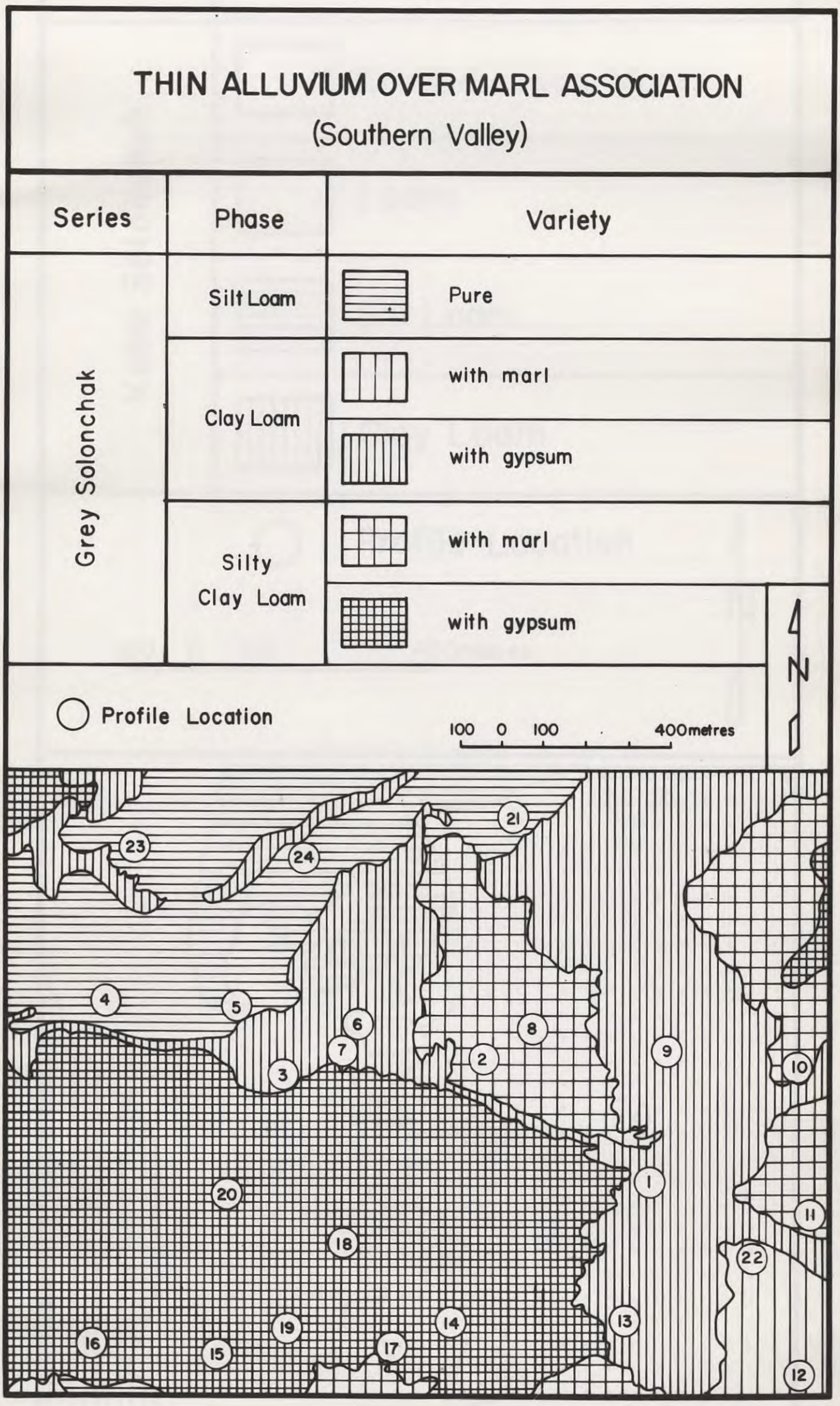

THIN ALLUVIUM OVER MARL ASSOCIATION
(Southern Valley)
Series
Phase
Variety
Grey Solonchak
Silt Loam
Pure
Clay Loam
with marl
with gypsum
Silty Clay Loam
with marl
with gypsum
N
Profile Location
100 0 100 400metres
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

Figure. 5.6.

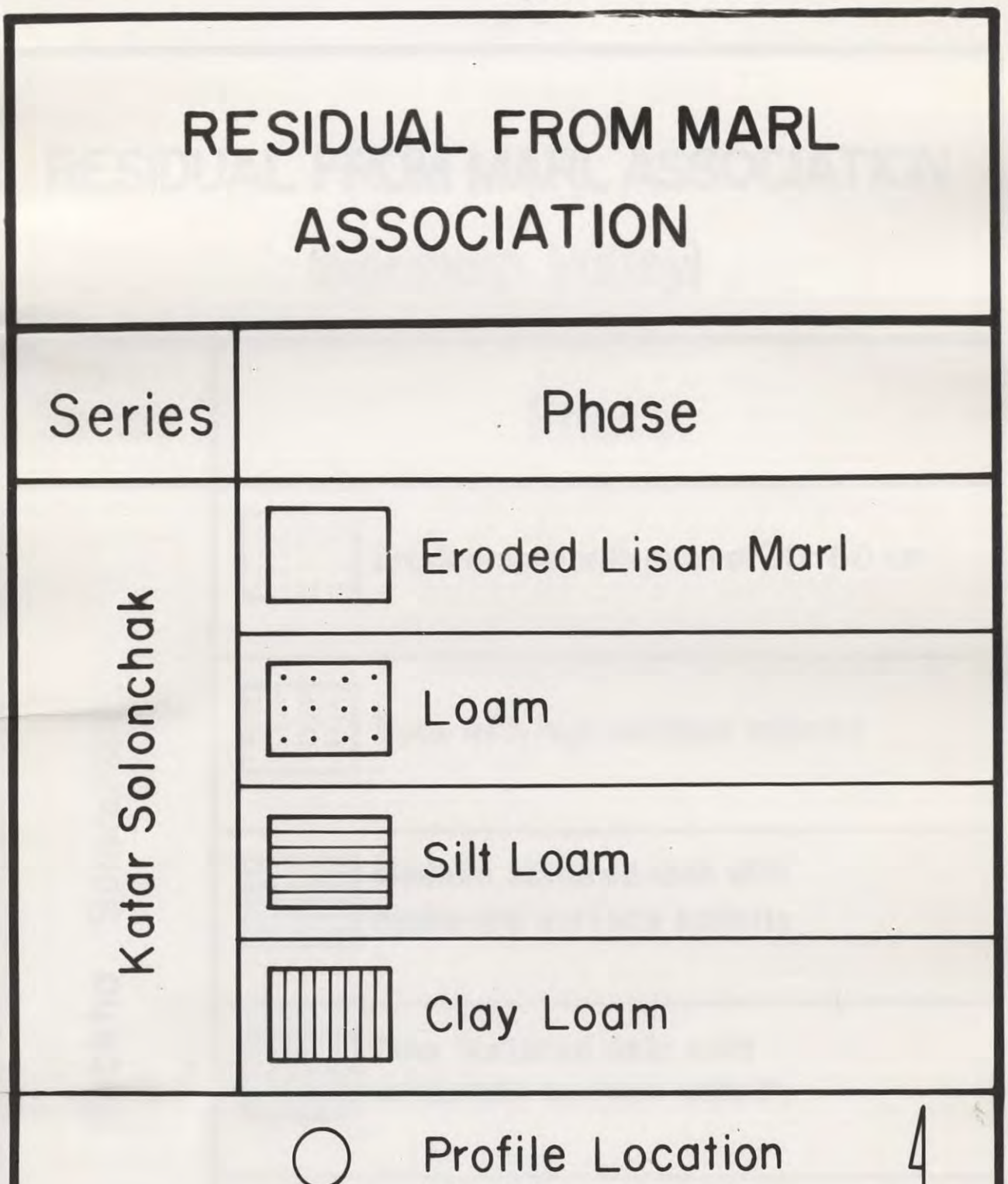

RESIDUAL FROM MARL ASSOCIATION
Series
Phase
Katar Solonchak
Eroded Lisan Marl
Loam
Silt Loam
Clay Loam
Profile Location
100 0 100 400metres
N
20
21
22
23
24
25
26
27
28
29

Figure. 5.7.

RESIDUAL FROM MARL ASSOCIATION

(Northern Valley)

Series	Phase
Sebkha Solonchak	Eroded soils with marl at 30-60 cm
	Soils with high surface salinity
	Medium textured soils with moderate surface salinity
	Fine textured soils with moderate surface salinity
	Fine textured soils highly saline throughout the profile
	Profile Location

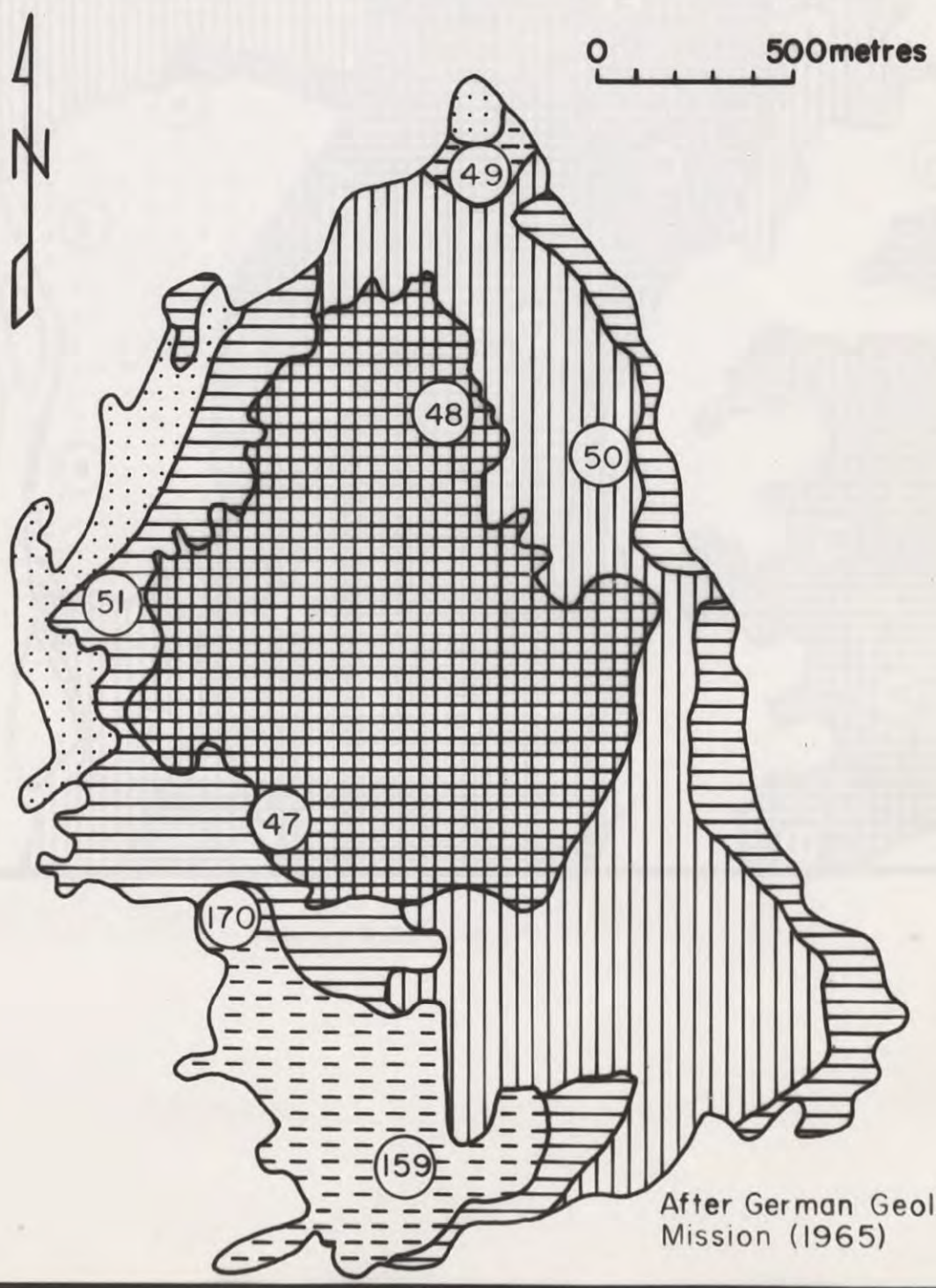


Figure. 5.8.

ALLUVIAL COMPLEX ASSOCIATION
(Northern Zor)

Series	Phase
Non-Saline Alluvial Complex	Lisan Marl Loamy Sand Loam Clay Loam Clay

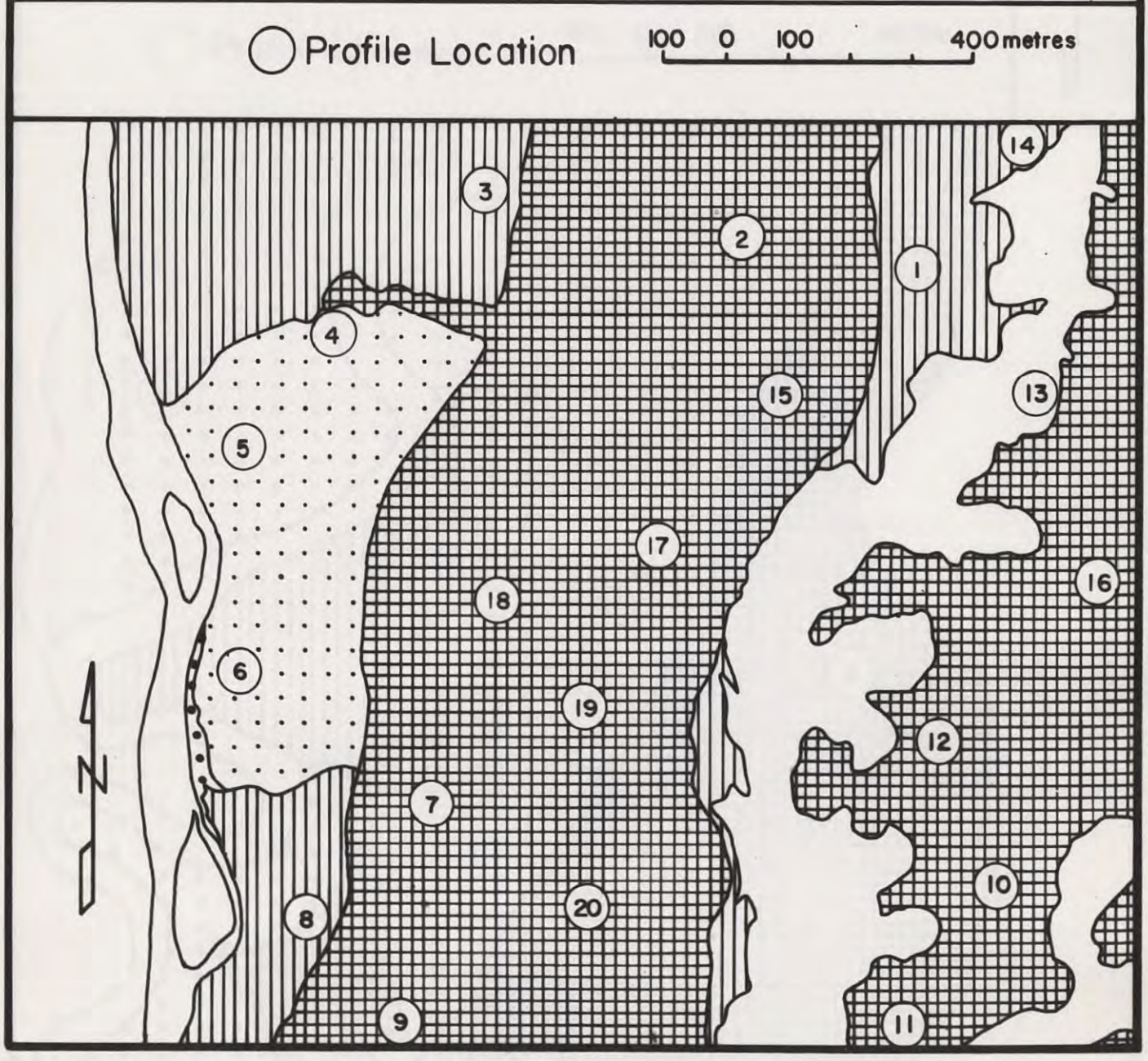


Figure. 5.9.

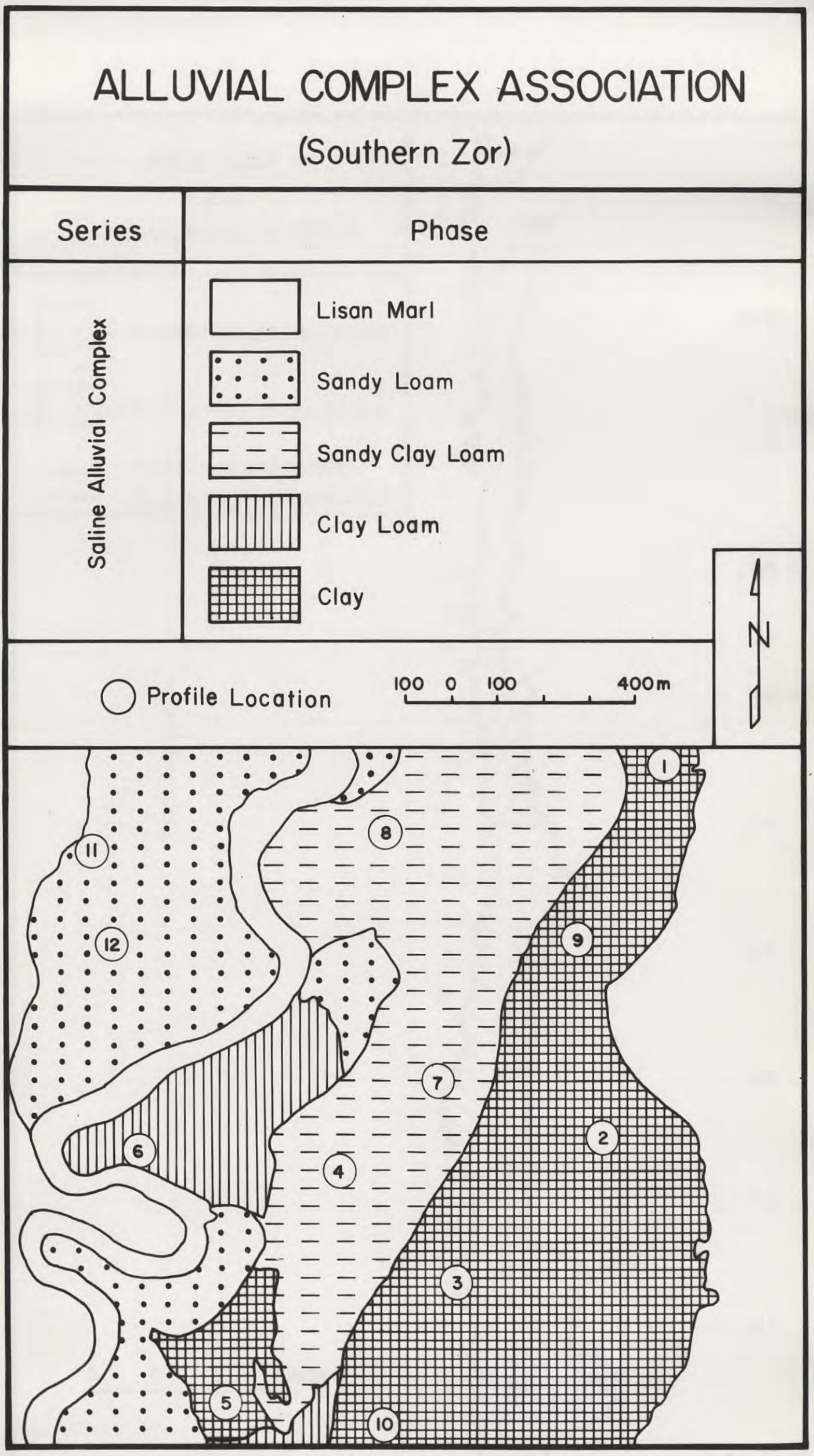

ALLUVIAL COMPLEX ASSOCIATION
(Southern Zor)
Series
Phase
Saline Alluvial Complex
Lisan Marl
Sandy Loam
Sandy Clay Loam
Clay Loam
Clay
Profile Location
100 0 100 400m
N
1
2
3
4
5
6
7
8
9
10
11
12

Figure. 5.10.

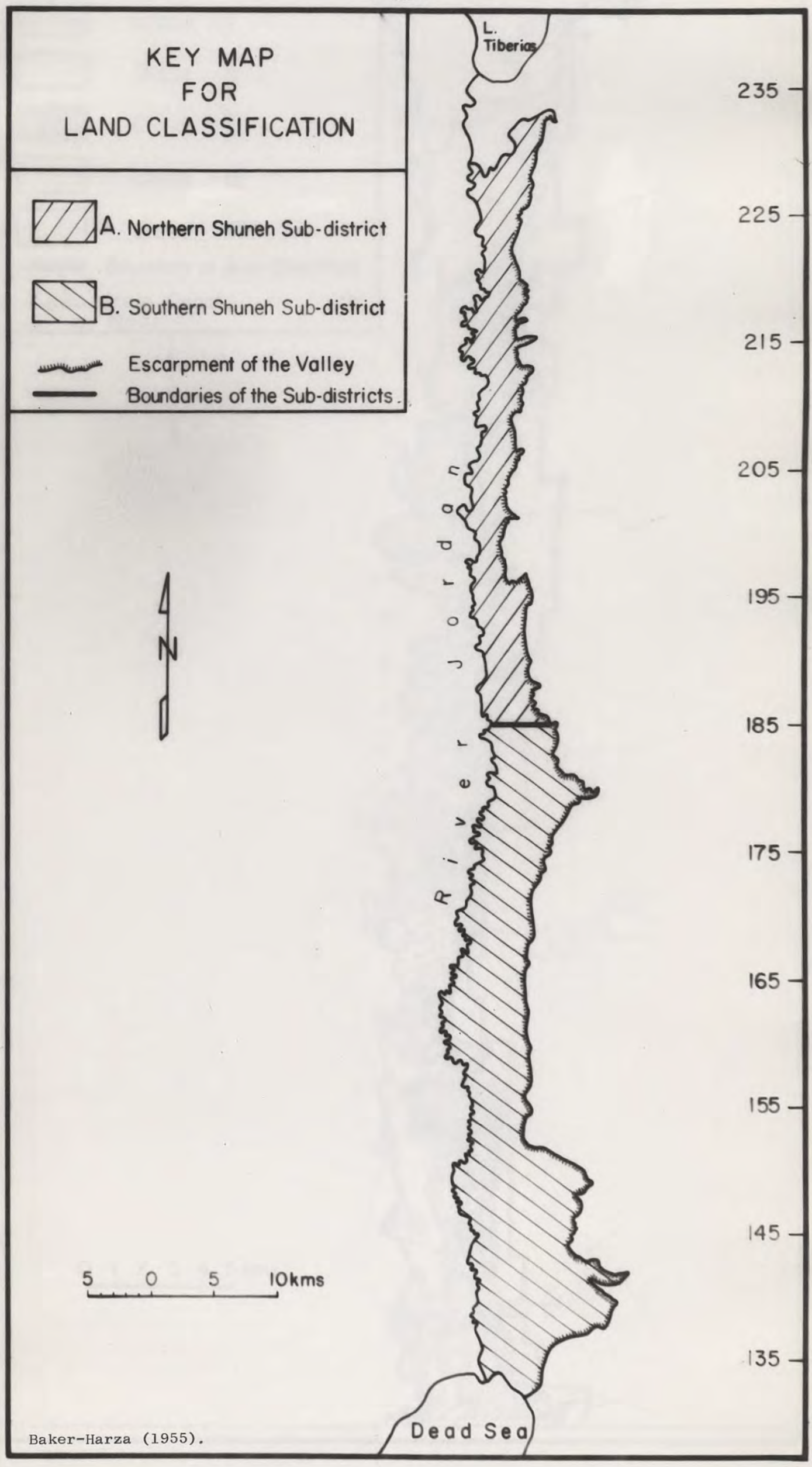

KEY MAP
FOR
LAND CLASSIFICATION
A. Northern Shuneh Sub-district
B. Southern Shuneh Sub-district
Escarpment of the Valley
Boundaries of the Sub-districts
L. Tiberias
River Jordan
Dead Sea
N
5 0 5 10kms
235
225
215
205
195
185
175
165
155
145
135
Baker-Harza (1955).

Figure. 6.1.

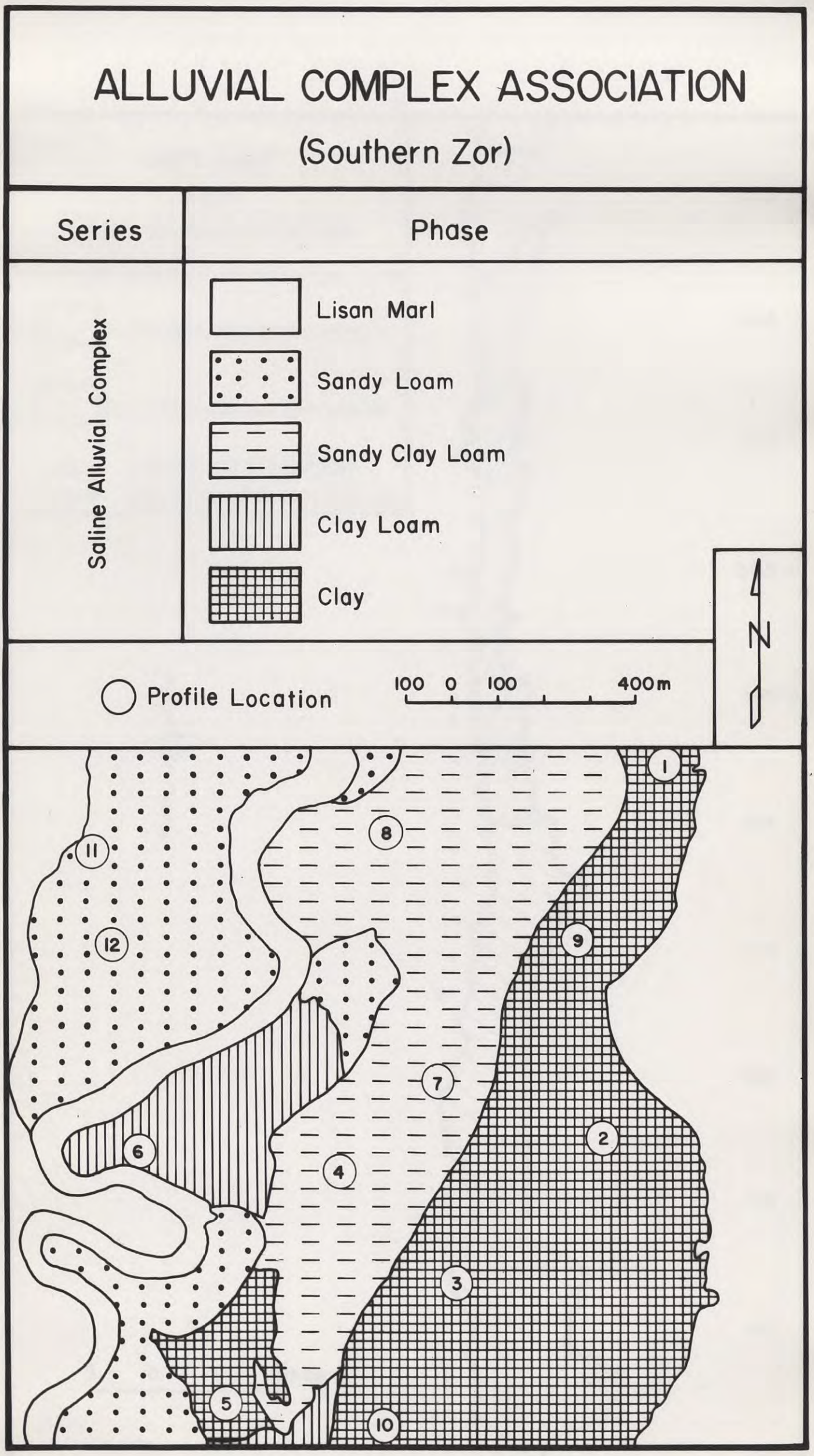

ALLUVIAL COMPLEX ASSOCIATION
(Southern Zor)
Series
Phase
Saline Alluvial Complex
Lisan Marl
Sandy Loam
Sandy Clay Loam
Clay Loam
Clay
Profile Location
100 0 100 400m
N
1
2
3
4
5
6
7
8
9
10
11
12

Figure. 5.10.

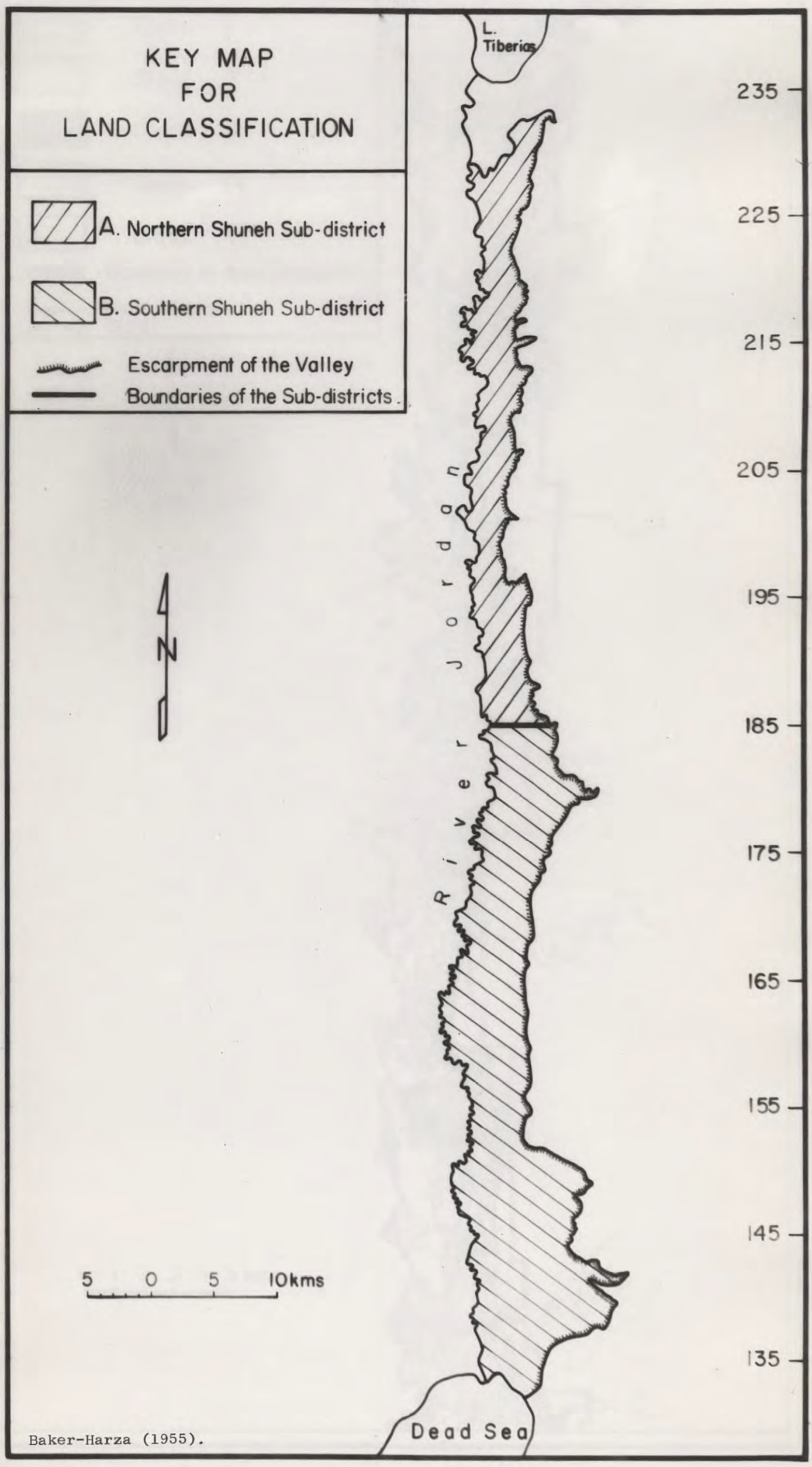

KEY MAP
FOR
LAND CLASSIFICATION
A. Northern Shuneh Sub-district
B. Southern Shuneh Sub-district
Escarpment of the Valley
Boundaries of the Sub-districts.
L.
Tiberias
River Jordan
Dead Sea
N
5 0 5 10kms
235
225
215
205
195
185
175
165
155
145
135
Baker-Harza (1955).

Figure. 6.1.

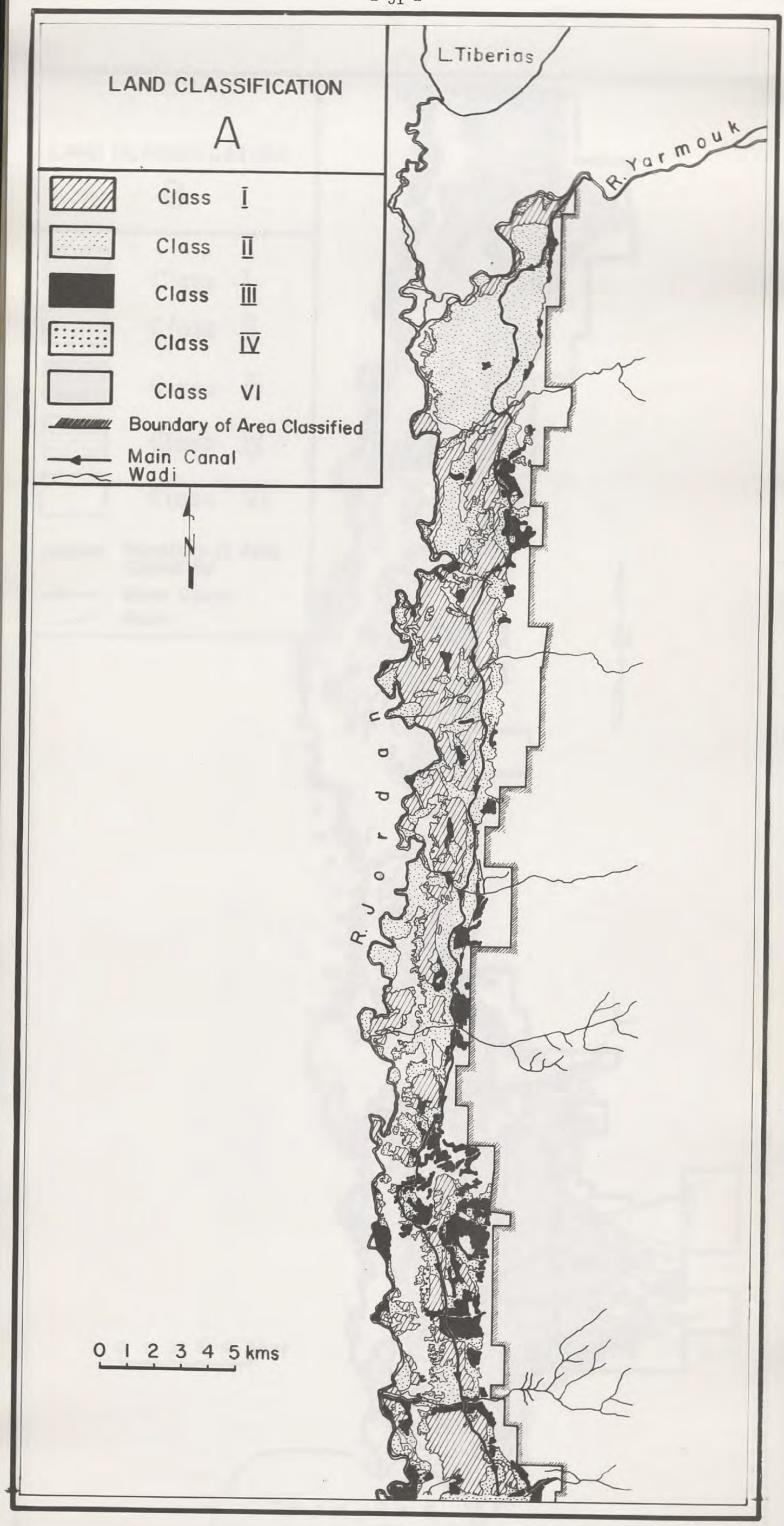

LAND CLASSIFICATION
A
Class I
Class II
Class III
Class IV
Class VI
Boundary of Area Classified
Main Canal
Wadi
N
L. Tiberias
R. Yarmouk
R. Jordan
0 1 2 3 4 5 kms

Figure. 6.2.

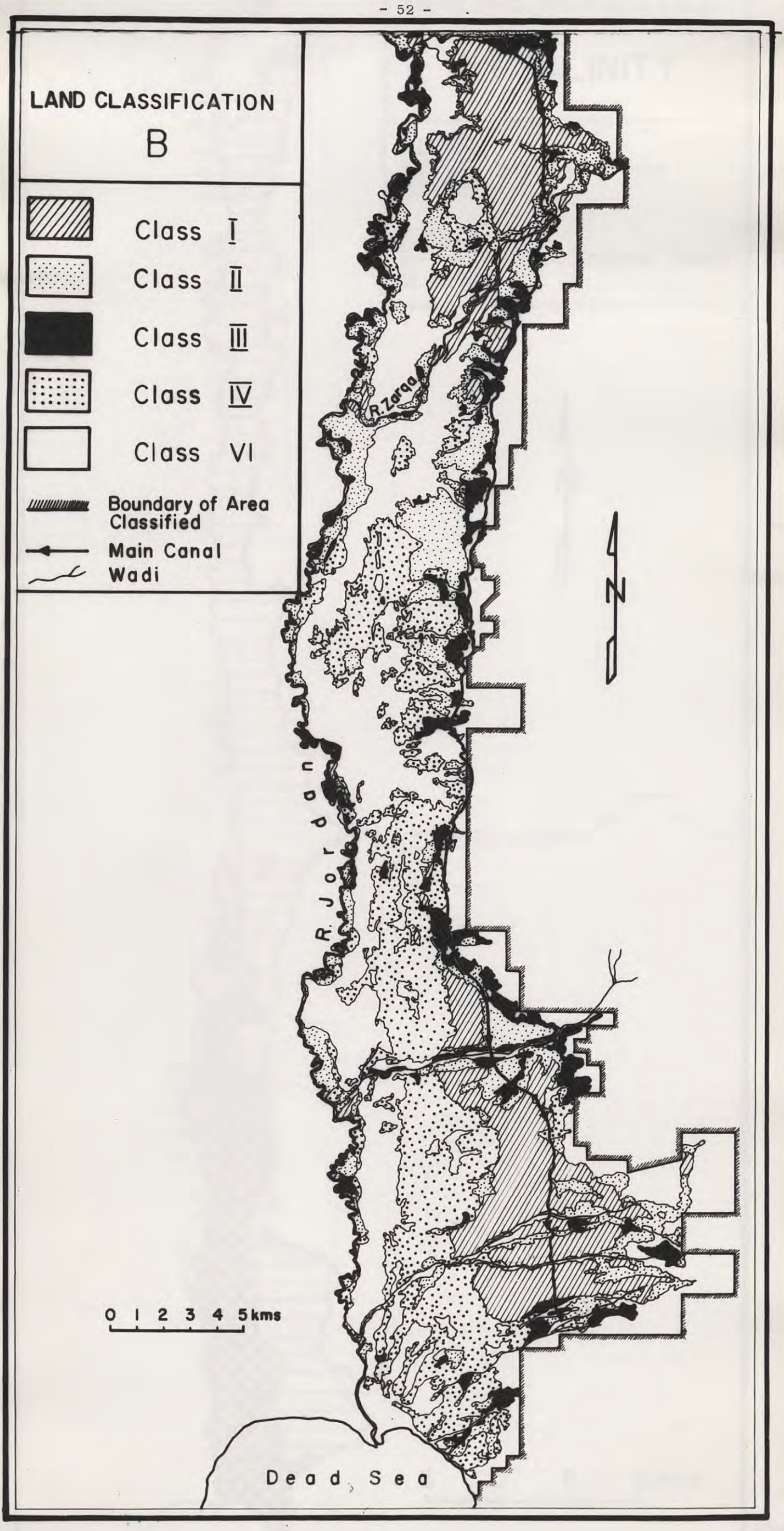

LAND CLASSIFICATION
B
Class I
Class II
Class III
Class IV
Class VI
Boundary of Area Classified
Main Canal
Wadi
R. Zarqa
R. Jordan
N
0 1 2 3 4 5kms
Dead Sea

Figure. 6.3.

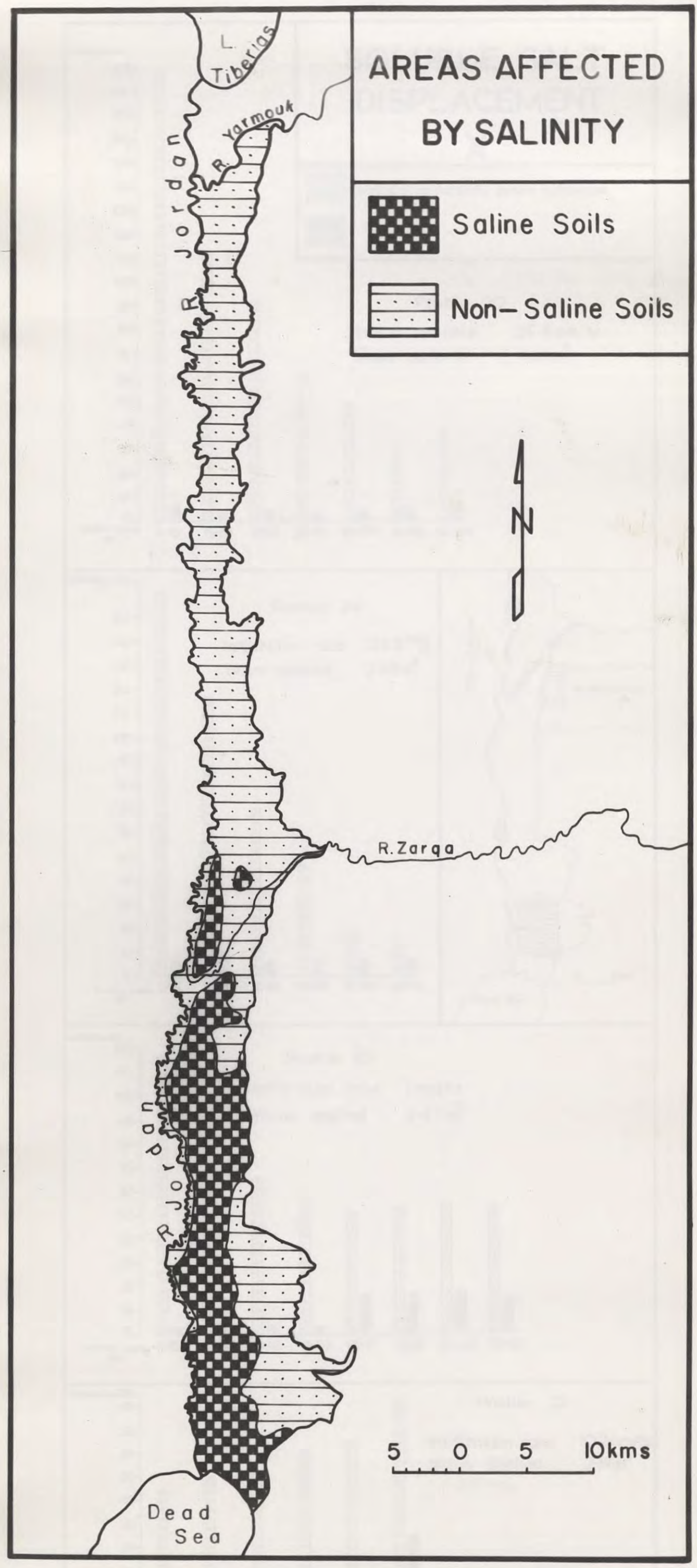

AREAS AFFECTED
BY SALINITY
Saline Soils
Non–Saline Soils
L. Tiberias
R. Yarmouk
R. Jordan
R. Zarqa
R. Jordan
N
5 0 5 10kms
Dead Sea

Figure. 7.1.

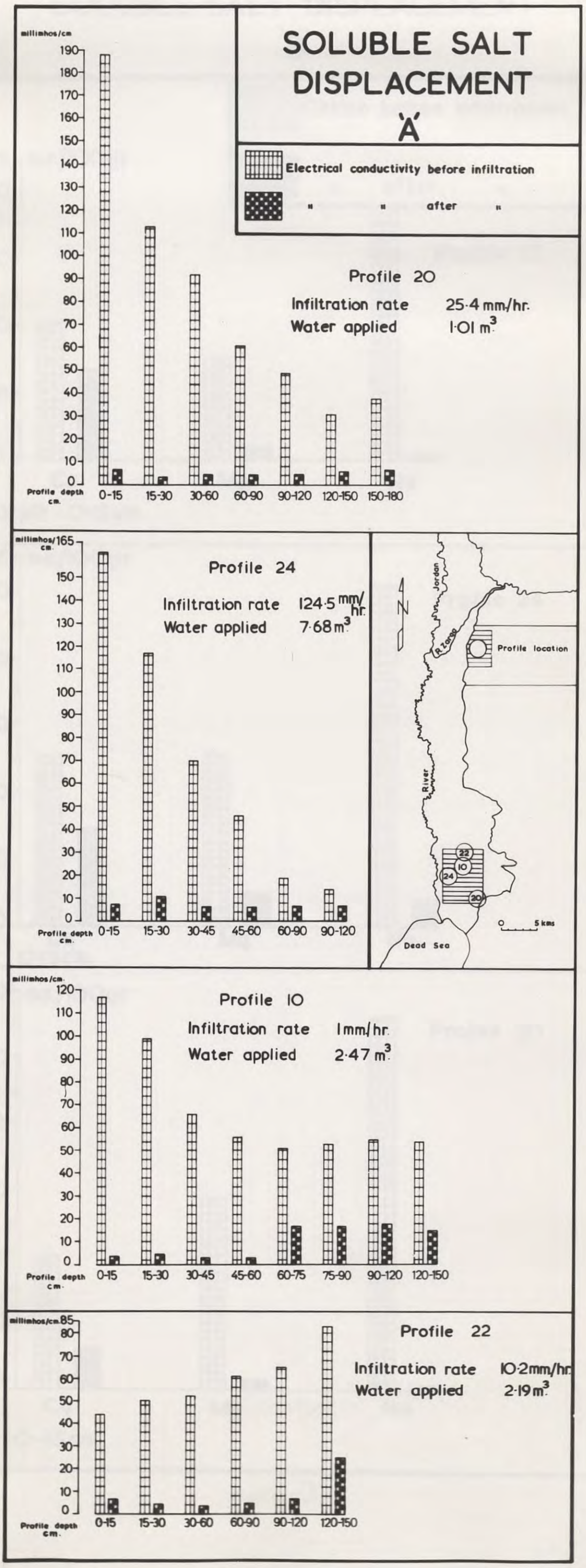

SOLUBLE SALT DISPLACEMENT
'A'
Electrical conductivity before infiltration
" " after "
millimhos/cm
Profile depth cm.
0-15
15-30
30-60
60-90
90-120
120-150
150-180
Profile 20
Infiltration rate 25·4 mm/hr.
Water applied 1·01 m³
Profile 24
Infiltration rate 124·5 mm/hr.
Water applied 7·68 m³
30-45
45-60
Profile location
Jordan
R. Zarqa
River
Dead Sea
22
10
24
20
5 kms
Profile 10
Infiltration rate 1mm/hr.
Water applied 2·47 m³
60-75
75-90
Profile 22
Infiltration rate 10·2mm/hr.
Water applied 2·19 m³

Figure. 7.2.

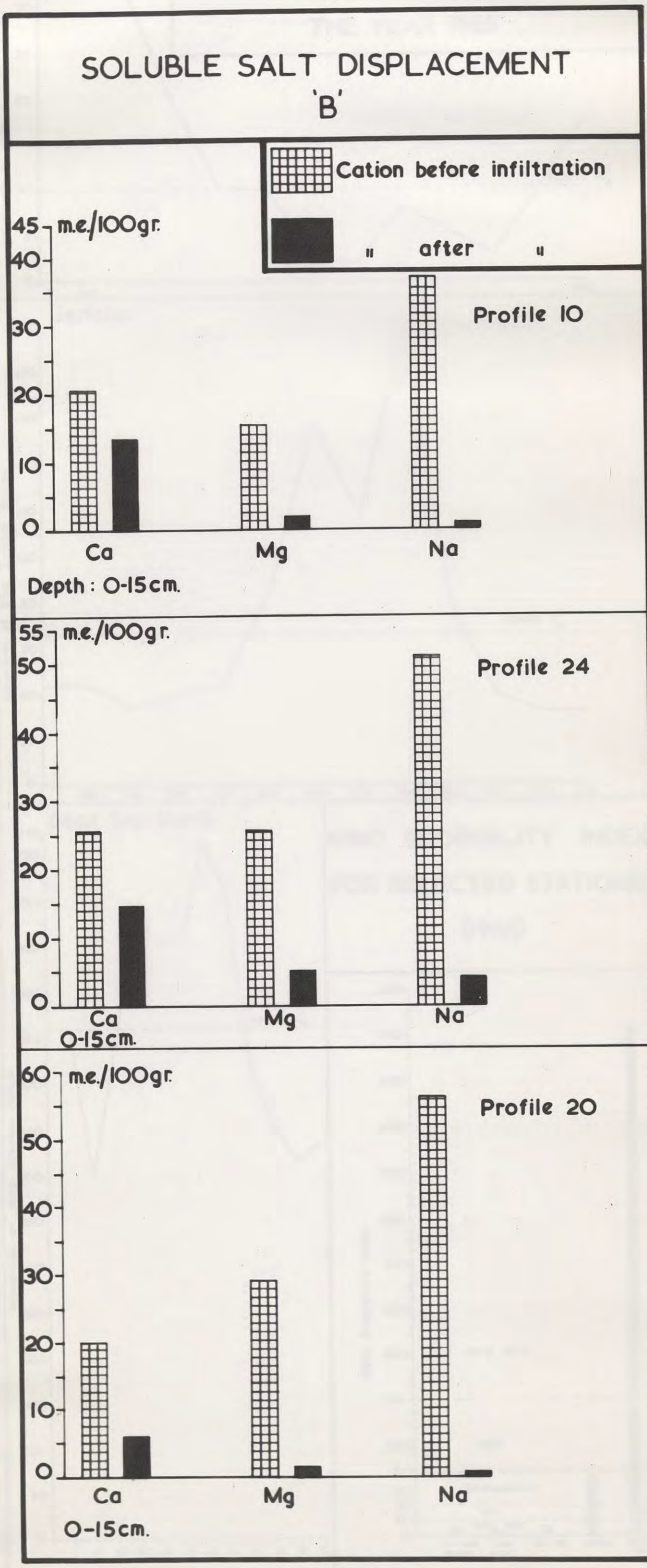
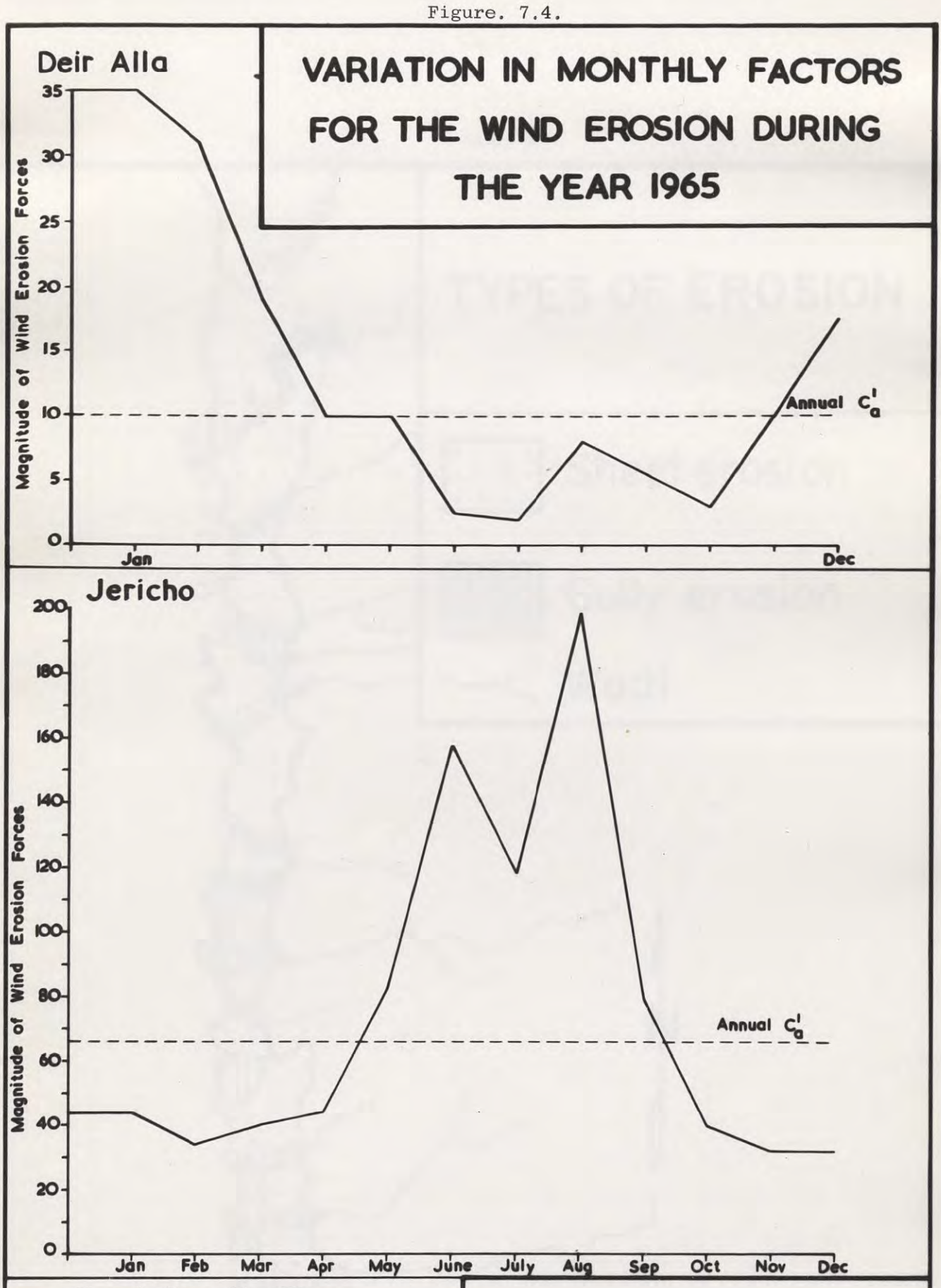

SOLUBLE SALT DISPLACEMENT
'B'
Cation before infiltration
" after "
45
40
30
20
10
0
m.e./100gr.
Profile 10
Ca
Mg
Na
Depth : 0-15cm.
55
50
40
30
20
10
0
m.e./100gr.
Profile 24
Ca
Mg
Na
0-15cm.
60
50
40
30
20
10
0
m.e./100gr.
Profile 20
Ca
Mg
Na
0-15cm.

Figure. 7.3.

Figure. 7.4.



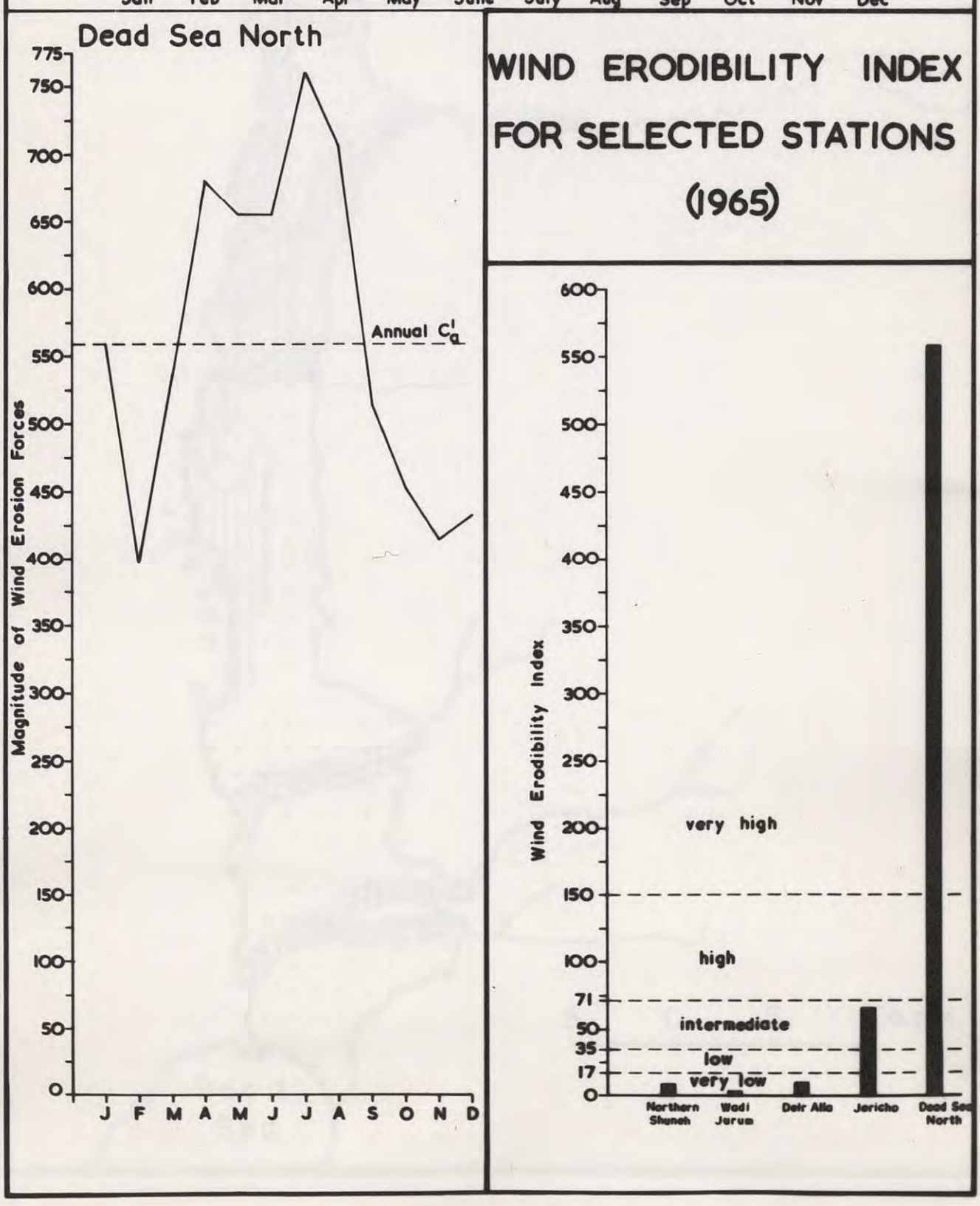


Figure. 7.5.

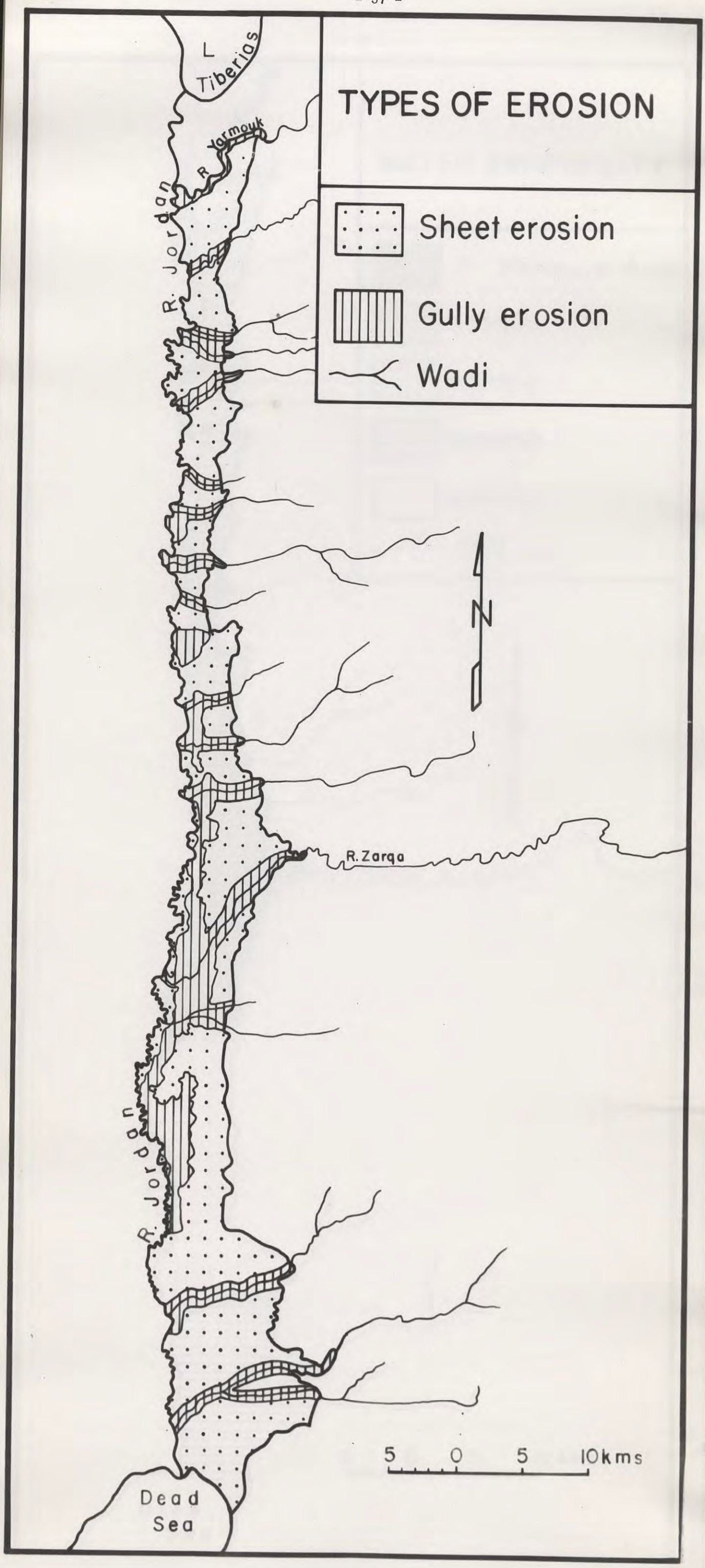

L Tiberias
R. Yarmouk
R. Jordan
TYPES OF EROSION
Sheet erosion
Gully erosion
Wadi
N
R. Zarqa
R. Jordan
5 0 5 10kms
Dead Sea

Figure. 7.6.

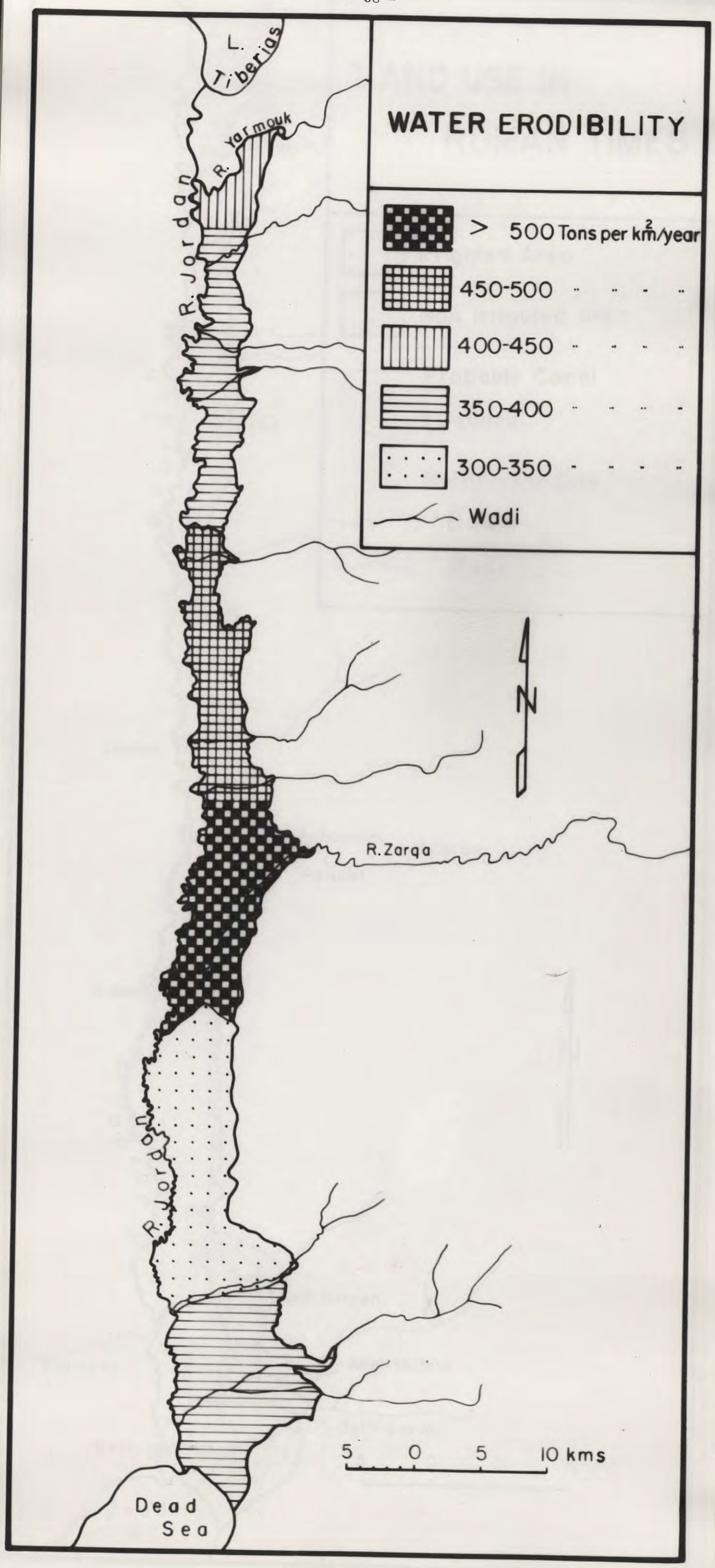

L. Tiberias
R. Yarmouk
R. Jordan
WATER ERODIBILITY
> 500 Tons per km²/year
450-500
400-450
350-400
300-350
Wadi
N
R. Zarqa
R. Jordan
5 0 5 10 kms
Dead Sea

Figure. 7.7.

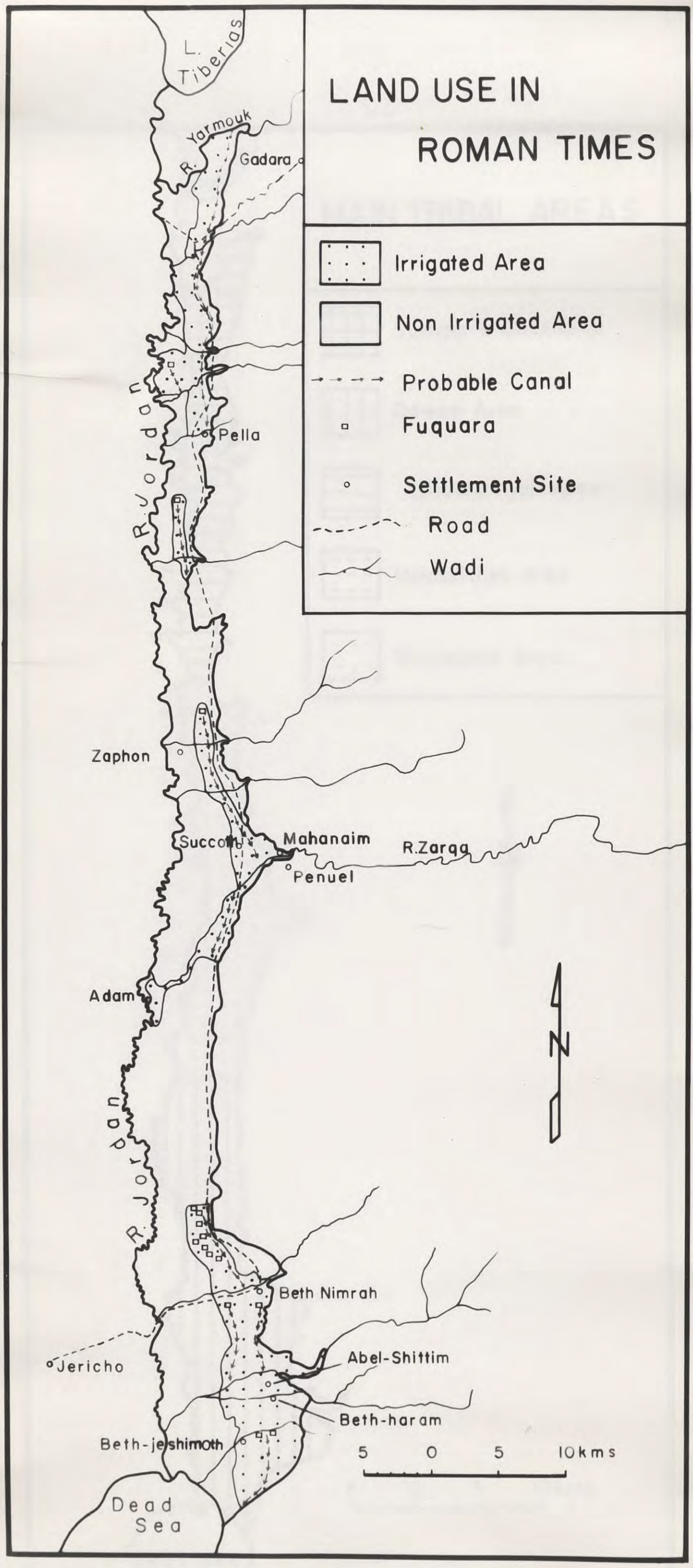

LAND USE IN
ROMAN TIMES
Irrigated Area
Non Irrigated Area
Probable Canal
Fuquara
Settlement Site
Road
Wadi
L. Tiberias
R. Yarmouk
Gadara
R. Jordan
Pella
Zaphon
Succoth
Mahanaim
R.Zarqa
Penuel
Adam
R. Jordan
Beth Nimrah
Jericho
Abel-Shittim
Beth-haram
Beth-jeshimoth
Dead Sea
N
5 0 5 10kms

Figure. 8.1.

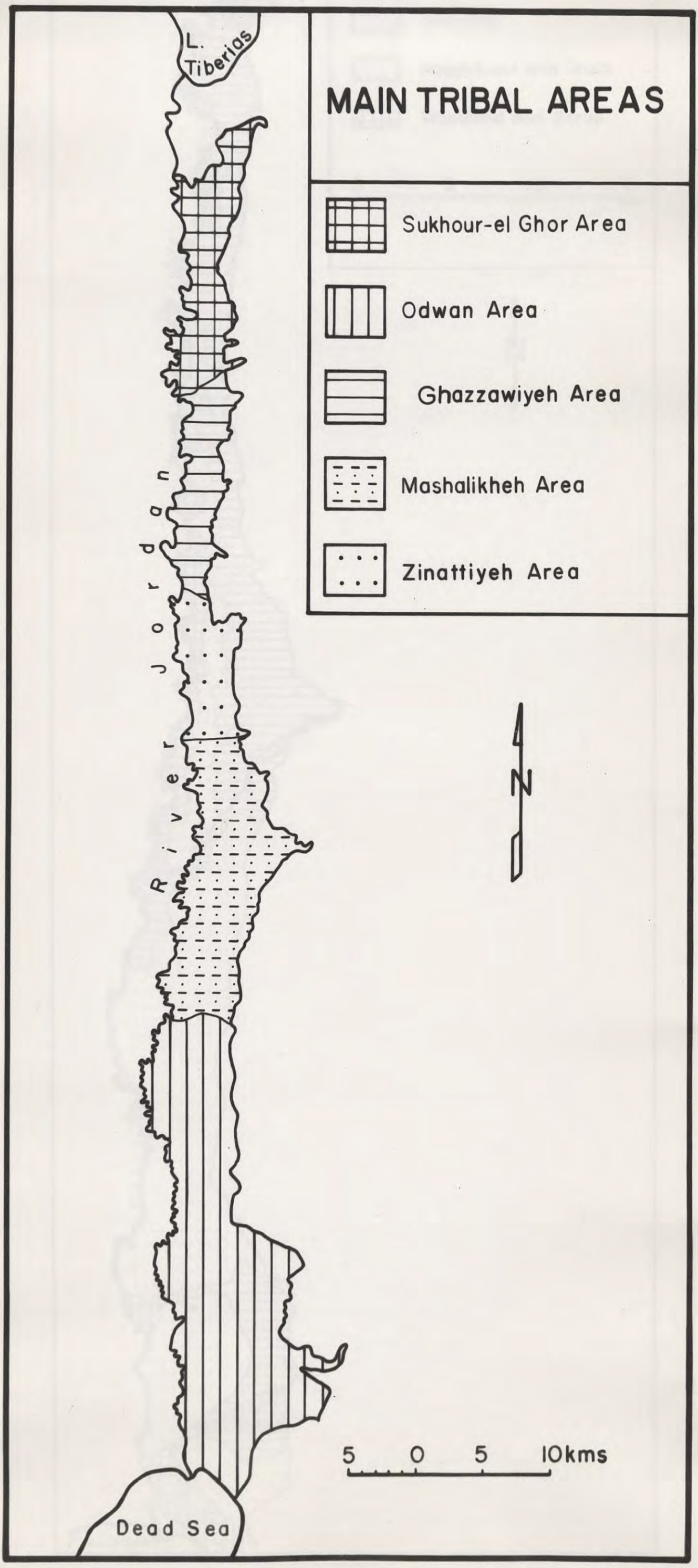

L. Tiberias
MAIN TRIBAL AREAS
Sukhour-el Ghor Area
Odwan Area
Ghazzawiyeh Area
Mashalikheh Area
Zinattiyeh Area
Jordan River
N
5 0 5 10kms
Dead Sea

Figure. 8.2.

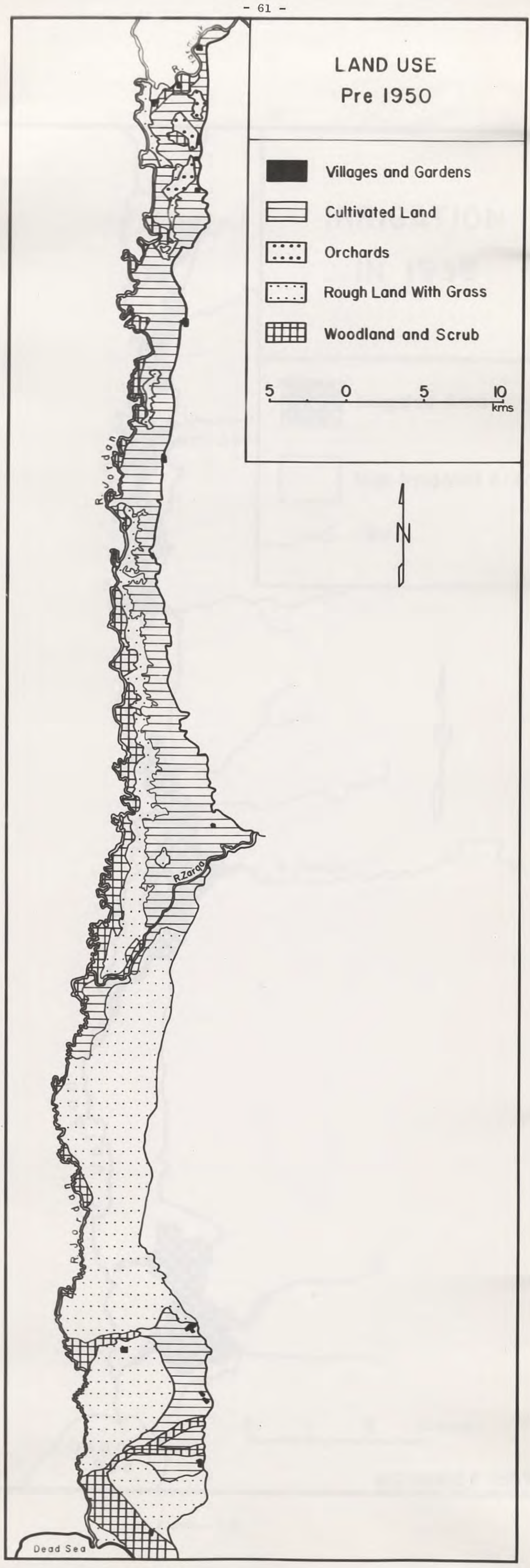

LAND USE
Pre 1950
Villages and Gardens
Cultivated Land
Orchards
Rough Land With Grass
Woodland and Scrub
5 0 5 10
kms
N
R. Jordan
R. Zarqa
R. Jordan
Dead Sea

Figure. 8.3.

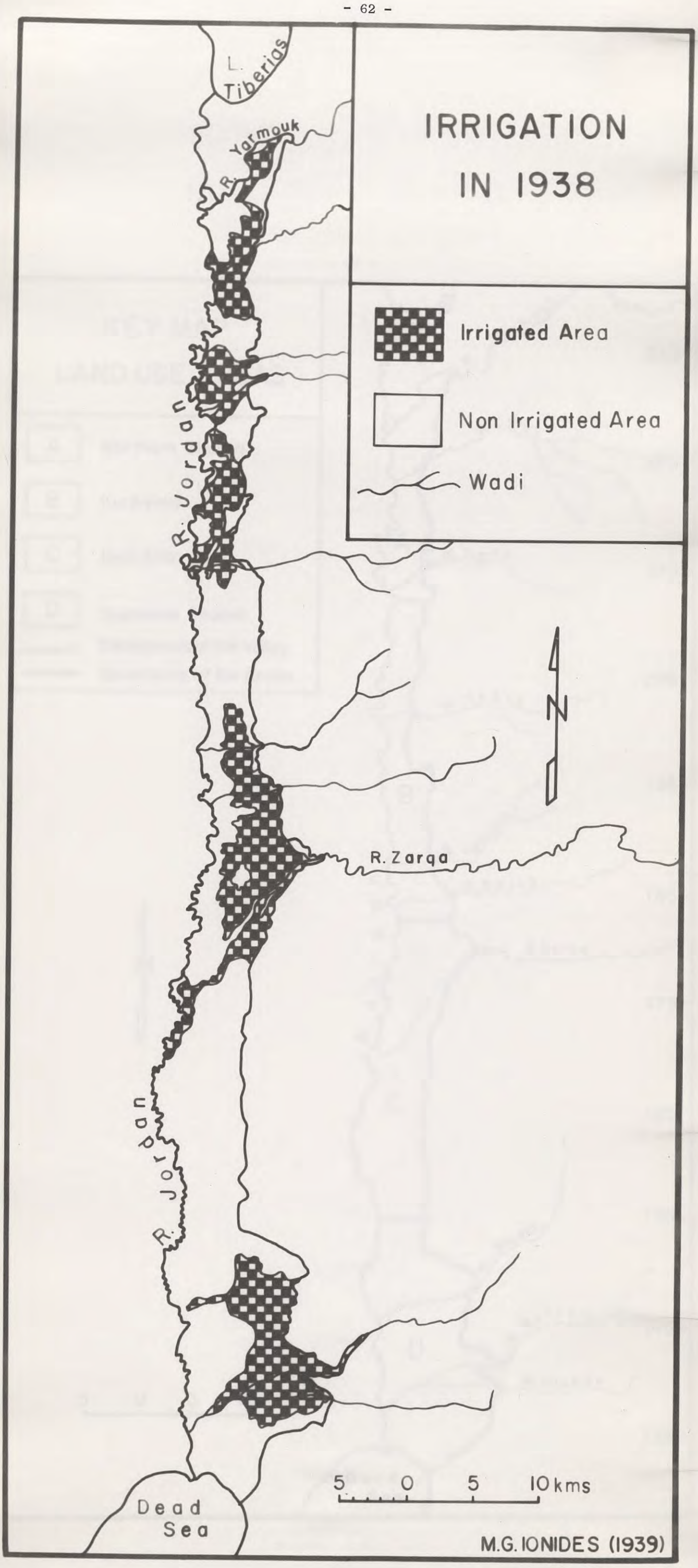

IRRIGATION
IN 1938
Irrigated Area
Non Irrigated Area
Wadi
L. Tiberias
R. Yarmouk
R. Jordan
R. Zarqa
R. Jordan
Dead Sea
N
5 0 5 10 kms
M.G. IONIDES (1939)

Figure. 8.4.

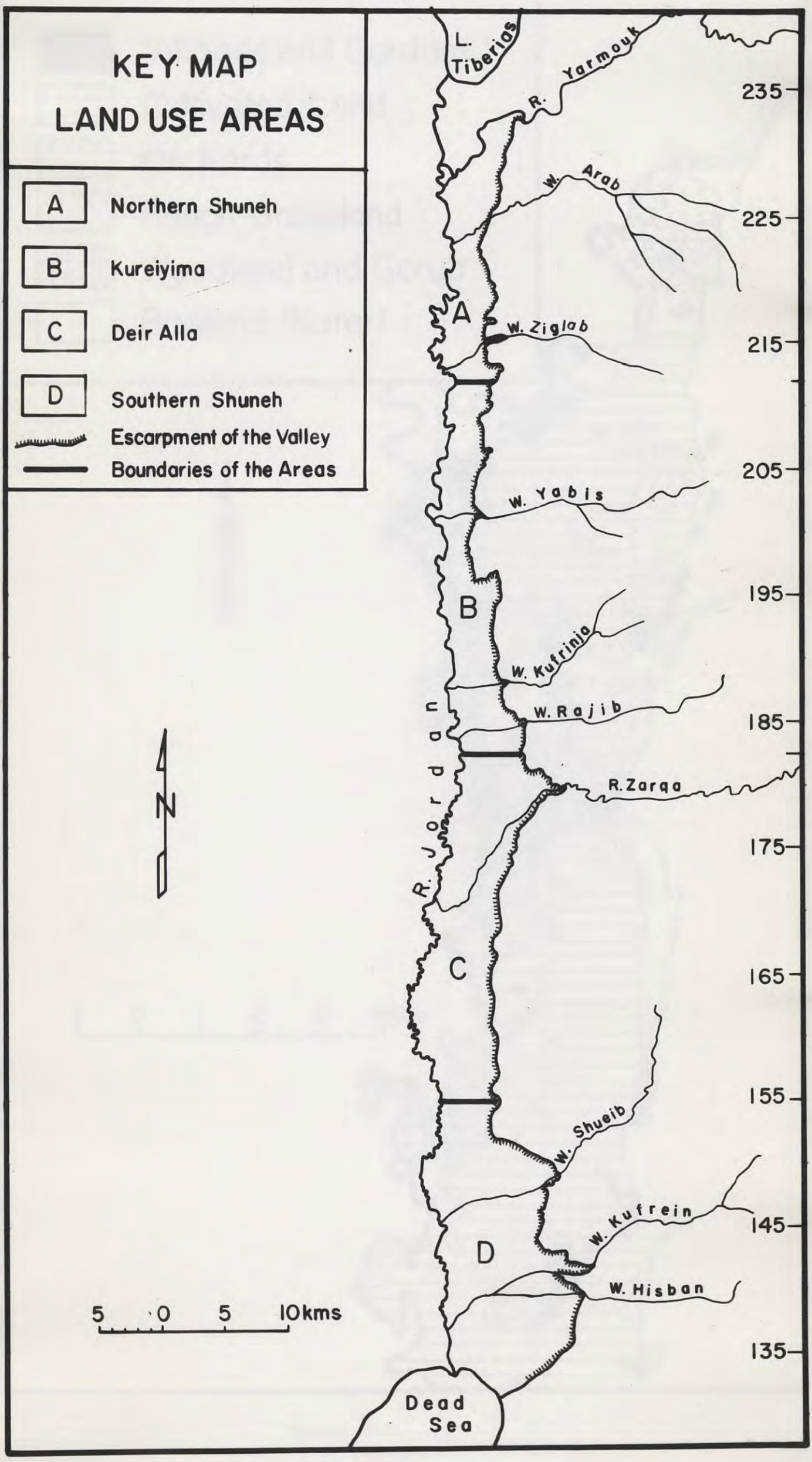

KEY MAP
LAND USE AREAS
A Northern Shuneh
B Kureiyima
C Deir Alla
D Southern Shuneh
Escarpment of the Valley
Boundaries of the Areas
L. Tiberias
R. Yarmouk
W. Arab
W. Ziglab
W. Yabis
W. Kufrinja
W. Rajib
R. Jordan
R. Zarqa
W. Shueib
W. Kufrein
W. Hisban
Dead Sea
N
5 0 5 10kms
235
225
215
205
195
185
175
165
155
145
135

Figure. 8.5.

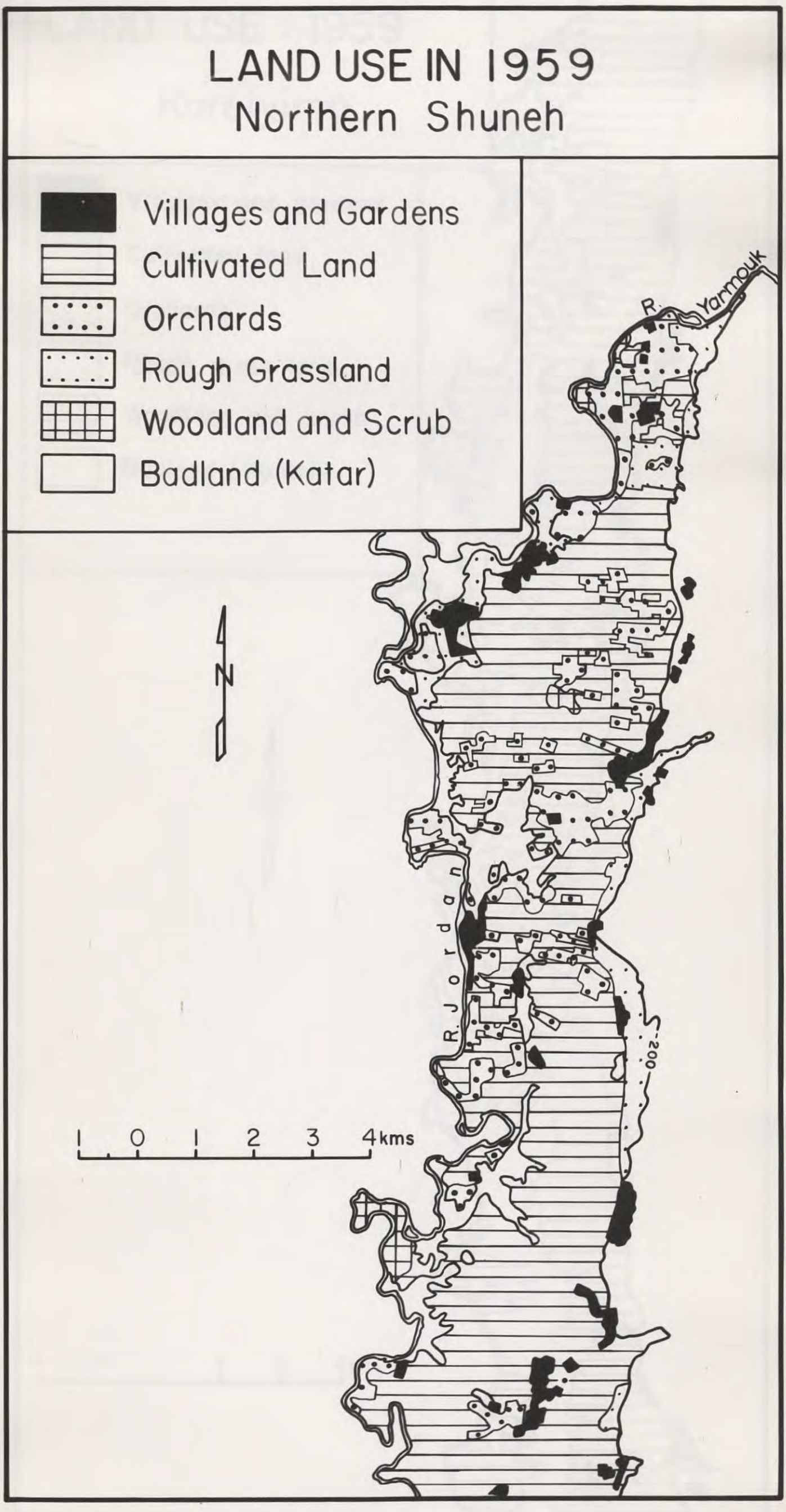

LAND USE IN 1959
Northern Shuneh
Villages and Gardens
Cultivated Land
Orchards
Rough Grassland
Woodland and Scrub
Badland (Katar)
R. Yarmouk
R. Jordan
-200
N
0 1 2 3 4kms

Figure. 8.6.

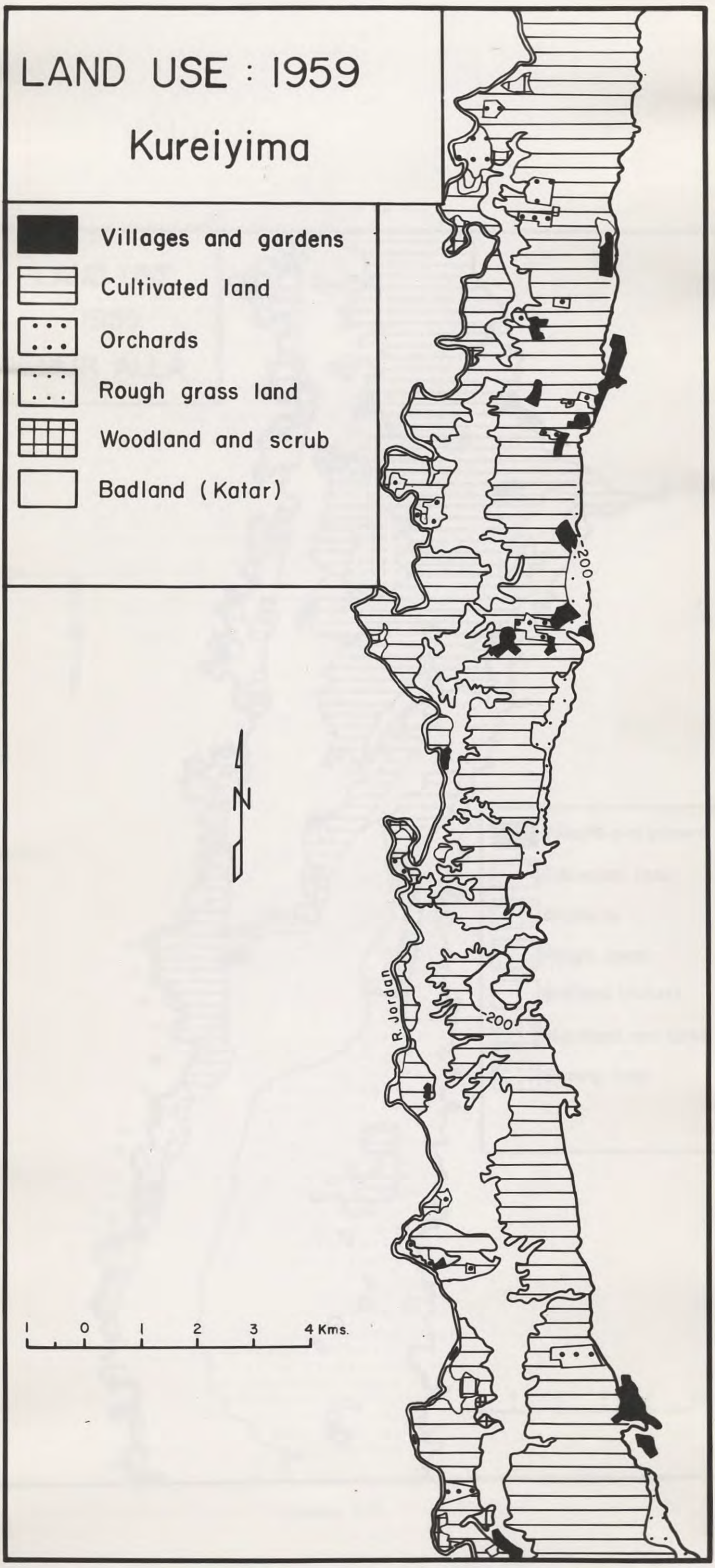

LAND USE : 1959
Kureiyima
Villages and gardens
Cultivated land
Orchards
Rough grass land
Woodland and scrub
Badland (Katar)
N
200
200
R. Jordan
0 1 2 3 4 Kms.

Figure. 8.7.

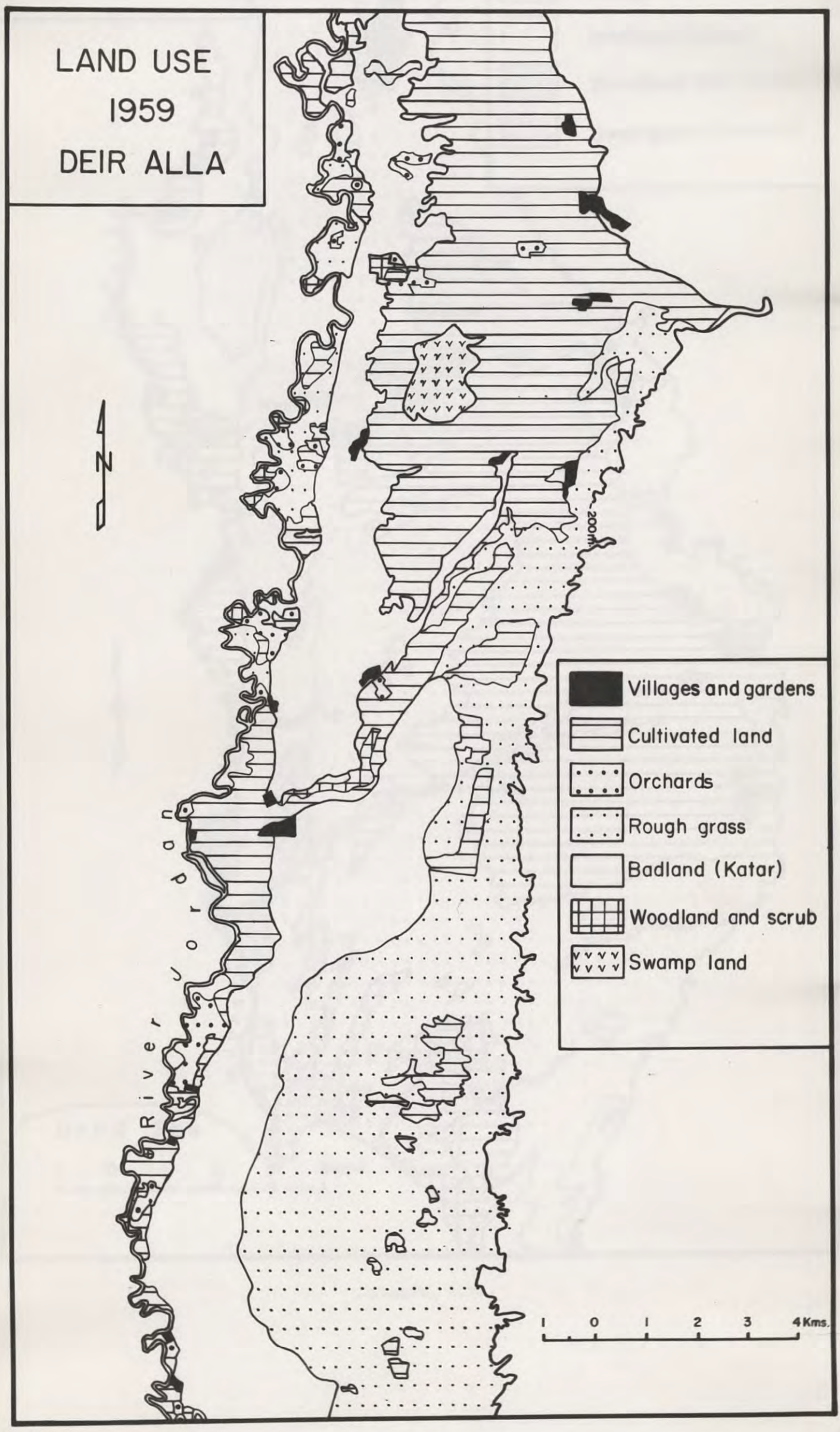

LAND USE
1959
DEIR ALLA
N
200m
River Jordan
Villages and gardens
Cultivated land
Orchards
Rough grass
Badland (Katar)
Woodland and scrub
Swamp land
1 0 1 2 3 4Kms.

Figure. 8.8.

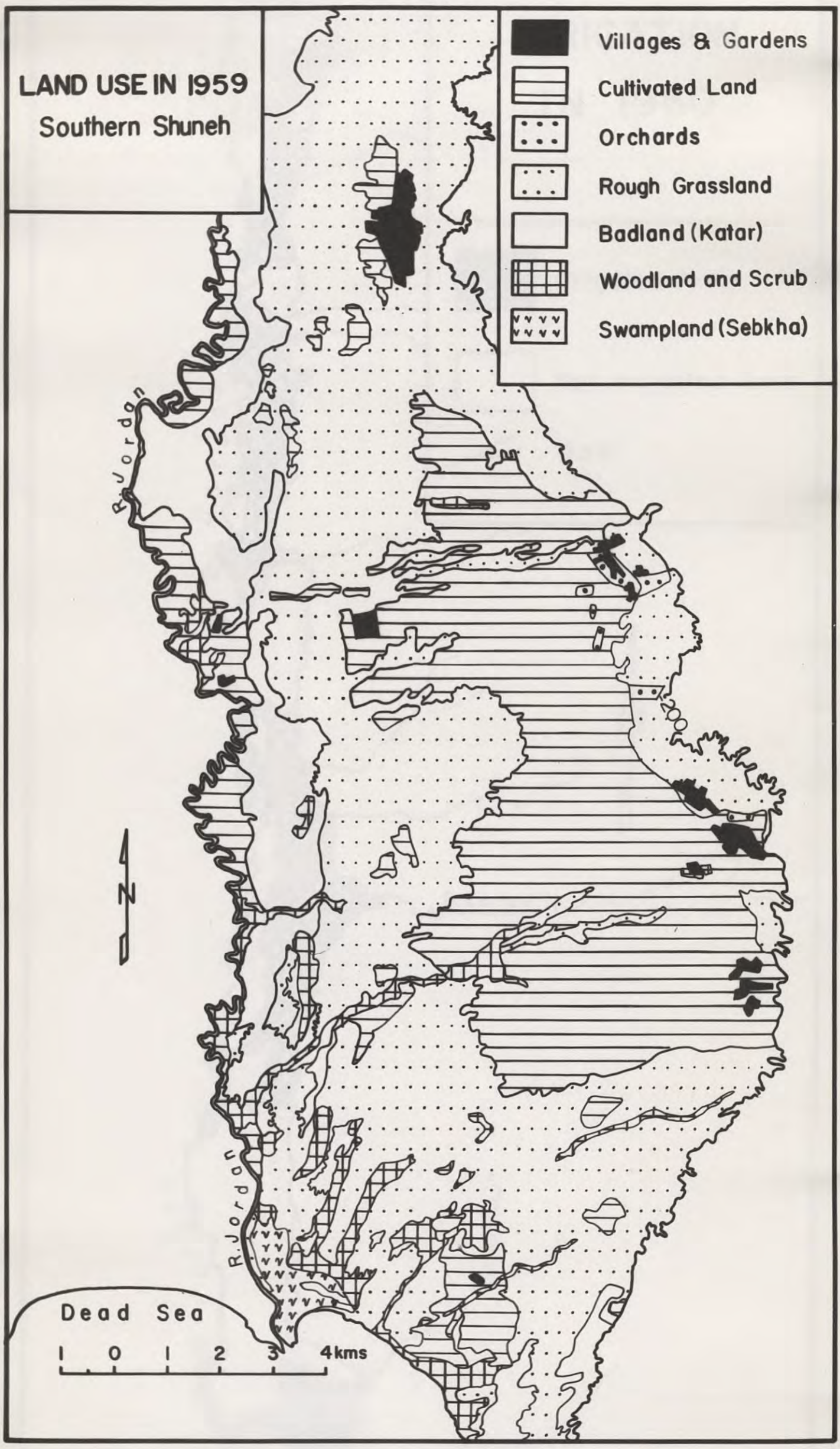

LAND USE IN 1959
Southern Shuneh
Villages & Gardens
Cultivated Land
Orchards
Rough Grassland
Badland (Katar)
Woodland and Scrub
Swampland (Sebkha)
R.Jordan
N
R.Jordan
Dead Sea
1 0 1 2 3 4kms

Figure. 8.9.

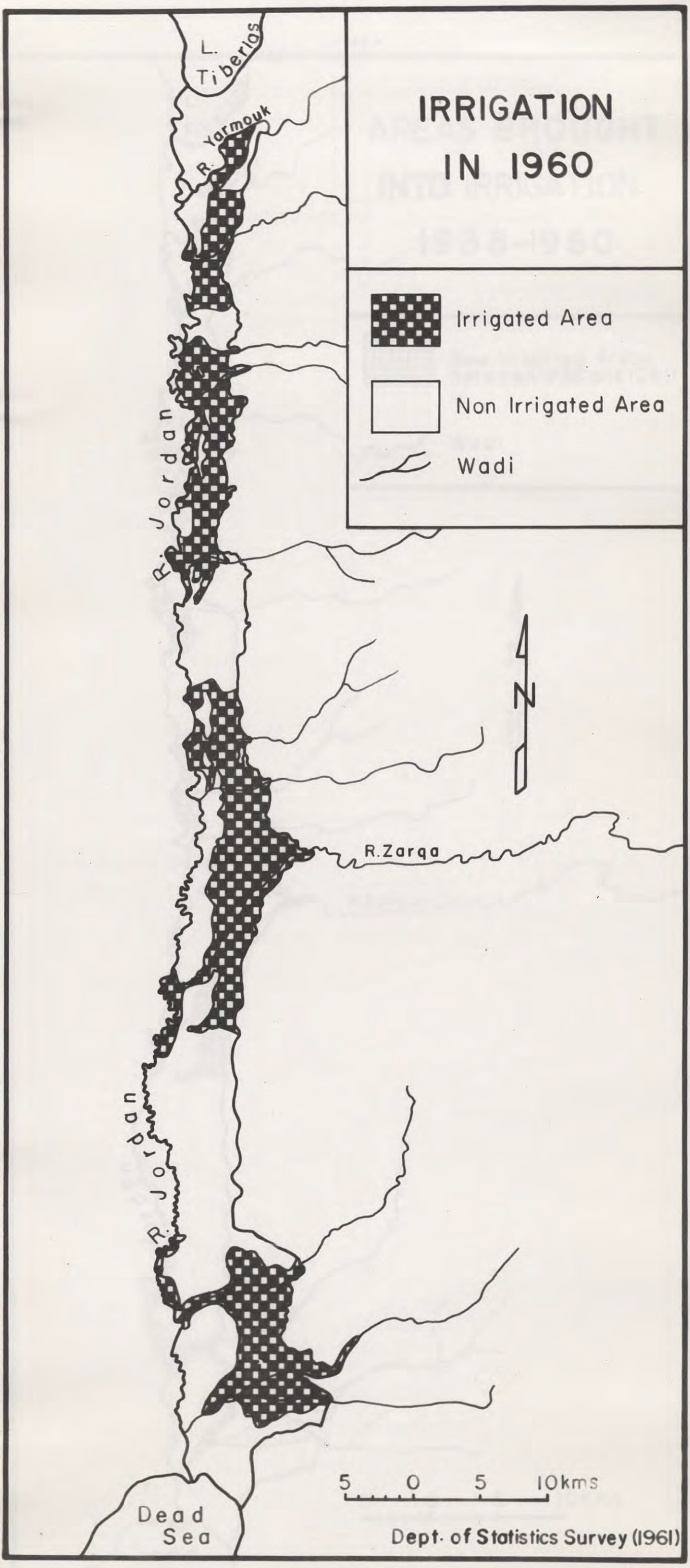

IRRIGATION
IN 1960
Irrigated Area
Non Irrigated Area
Wadi
L.
Tiberias
R. Yarmouk
R. Jordan
N
R.Zarqa
R. Jordan
Dead
Sea
5 0 5 10kms
Dept. of Statistics Survey (1961)

Figure. 8.10.

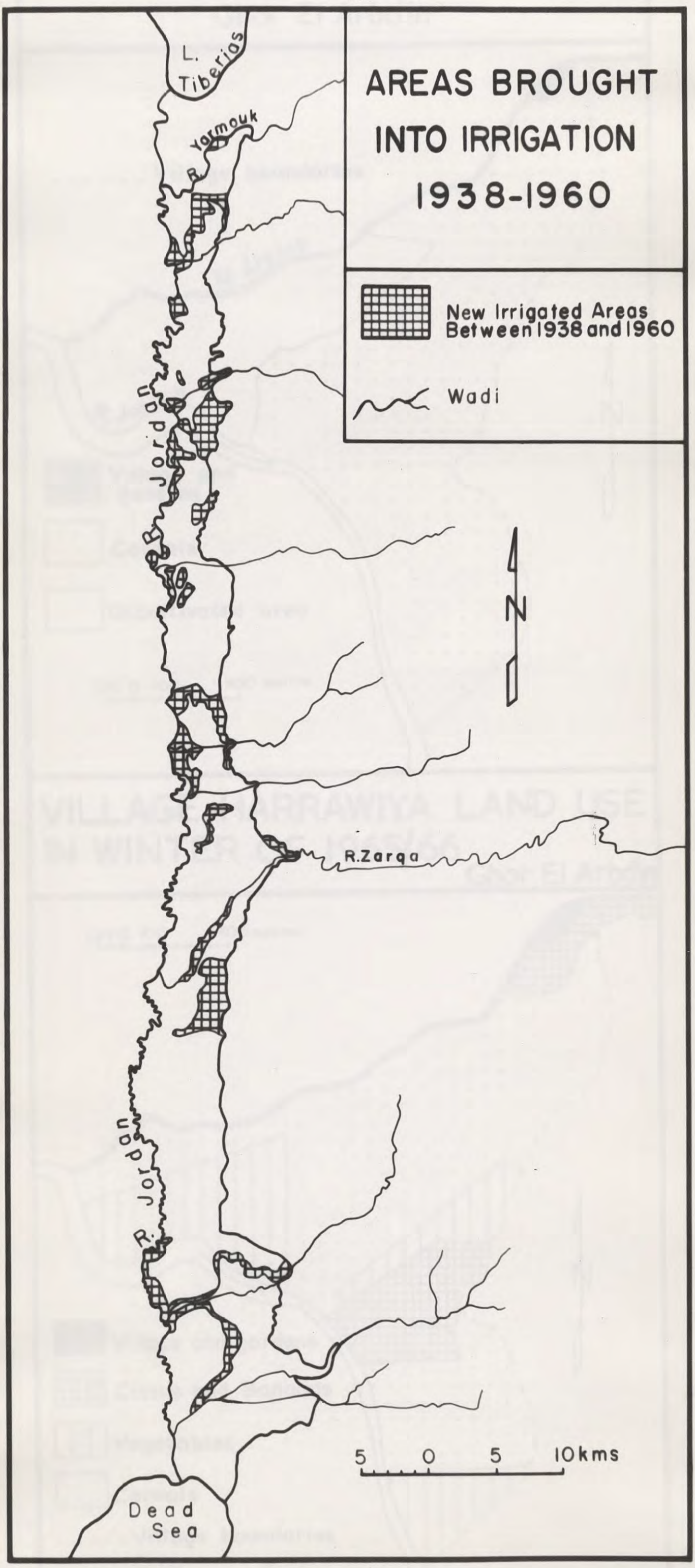

AREAS BROUGHT INTO IRRIGATION 1938-1960
New Irrigated Areas Between 1938 and 1960
Wadi
L. Tiberias
Yarmouk R.
R. Jordan
R.Zarqa
R. Jordan
N
5 0 5 10kms
Dead Sea

Figure. 8.11.

Figure. 8.12.

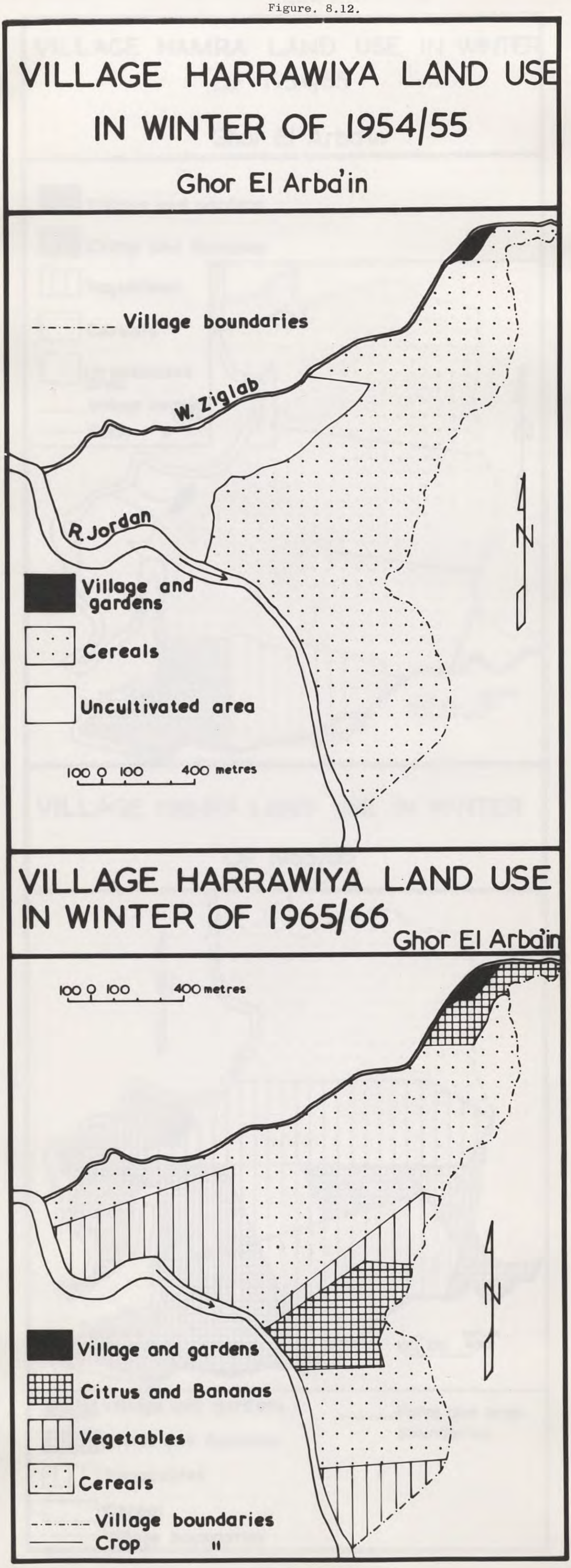
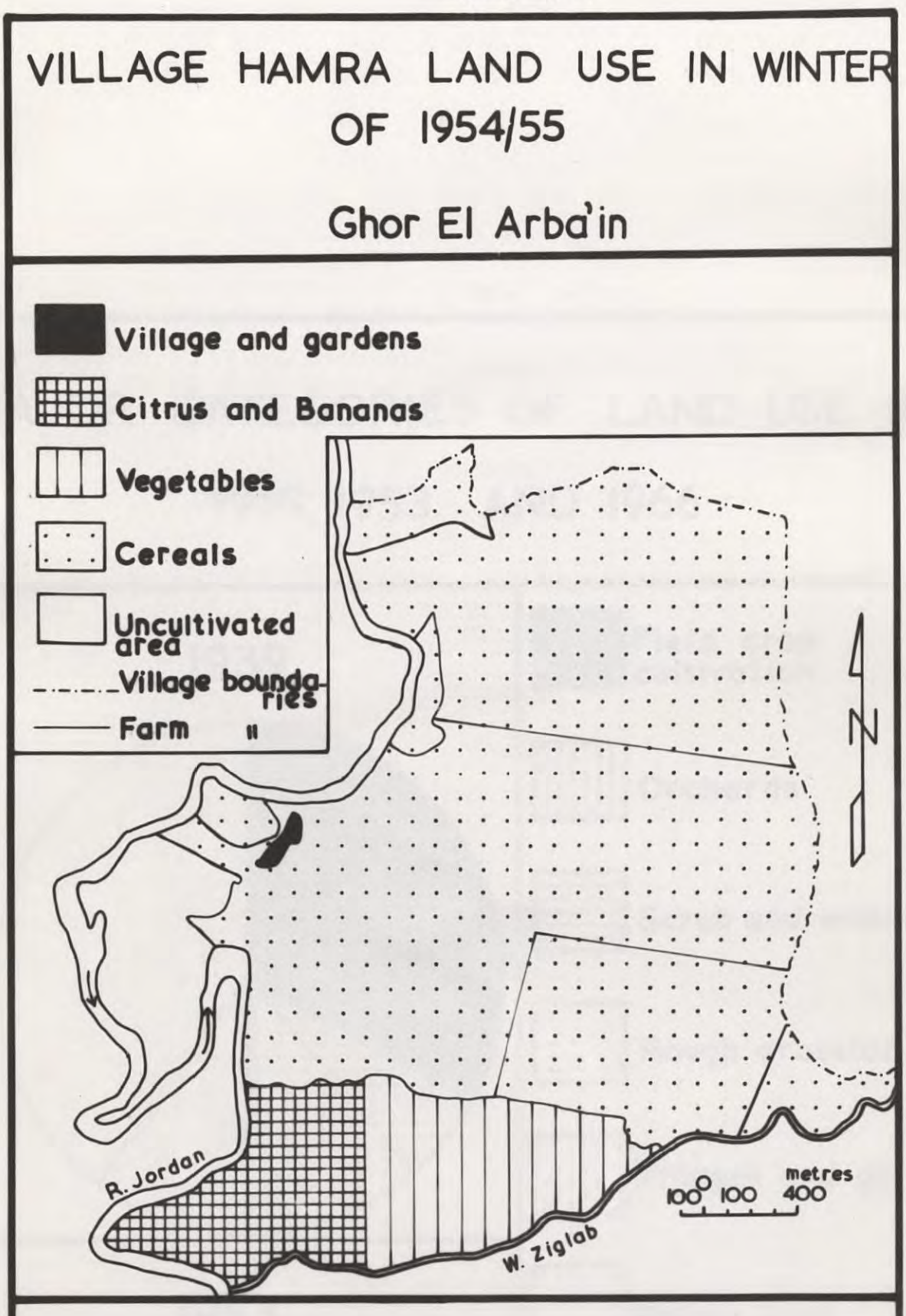


Figure. 8.13.

Figure. 8.14.



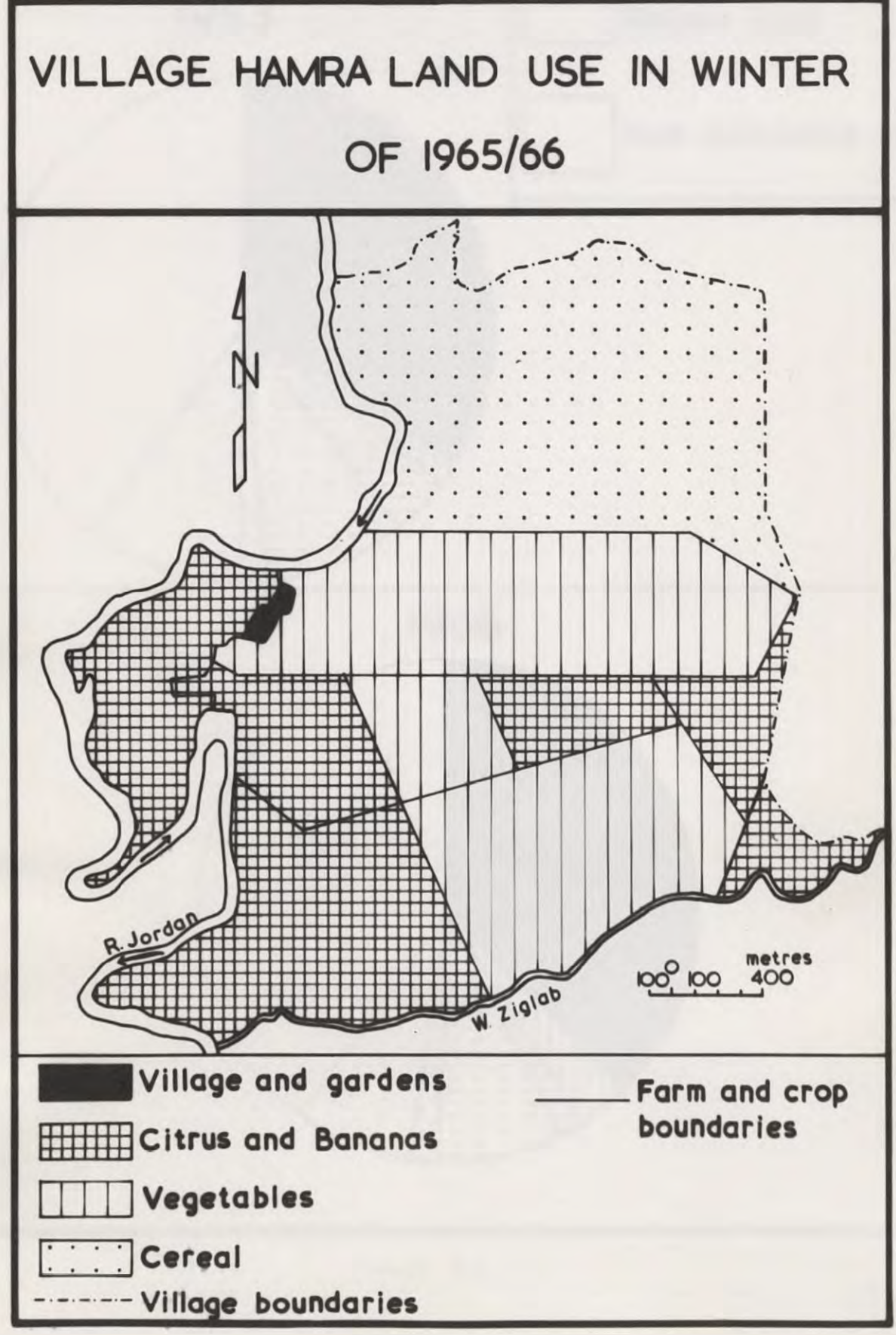


Figure. 8.15.

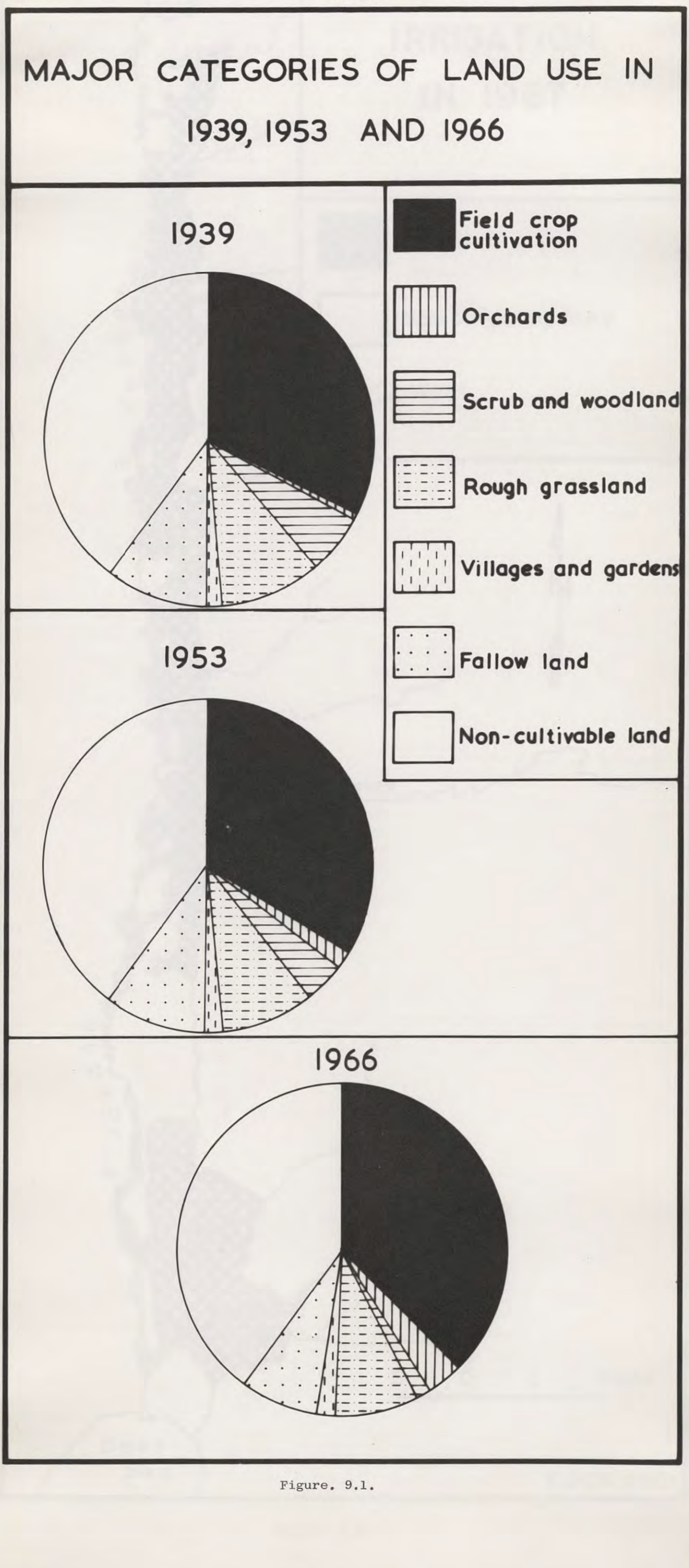

MAJOR CATEGORIES OF LAND USE IN
1939, 1953 AND 1966
1939
1953
1966
Field crop cultivation
Orchards
Scrub and woodland
Rough grassland
Villages and gardens
Fallow land
Non-cultivable land

Figure. 9.1.

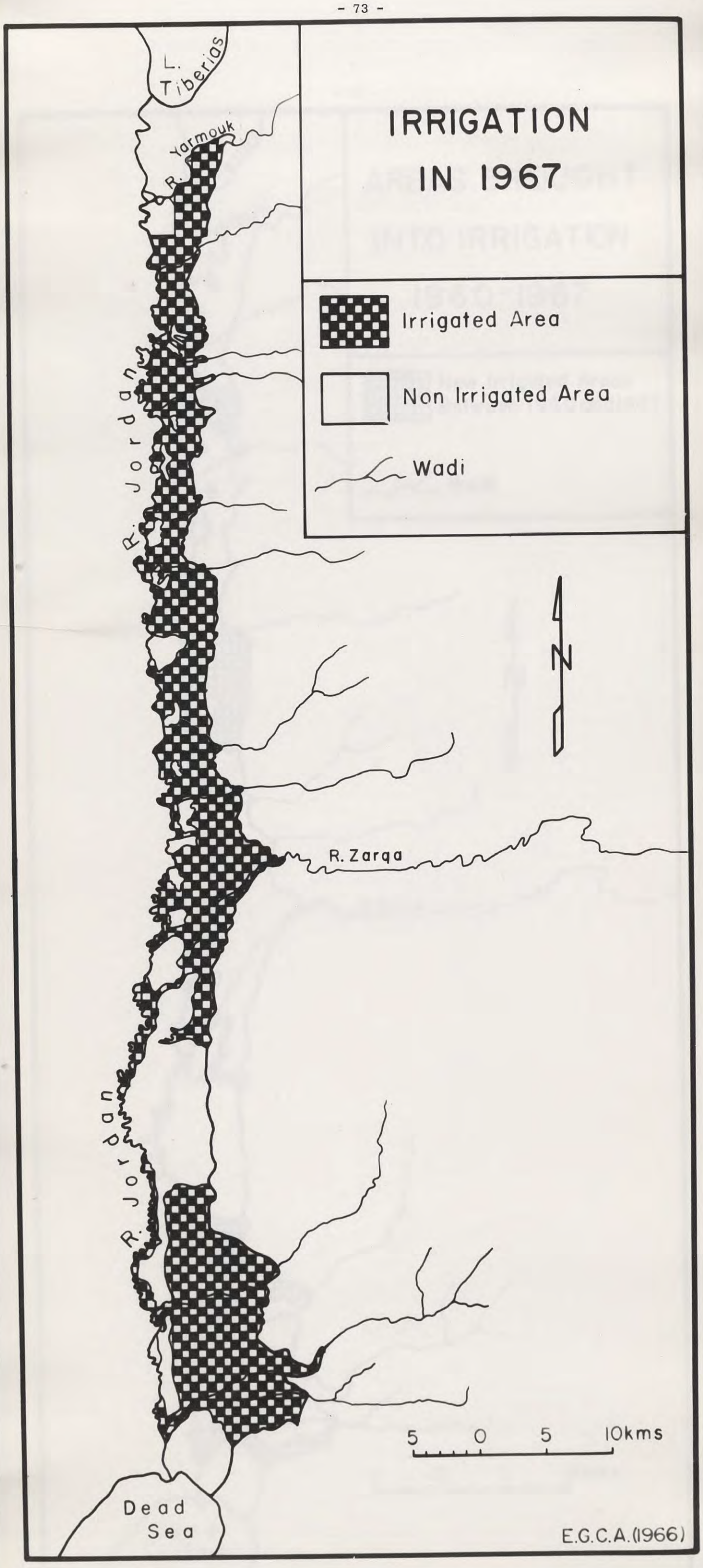

IRRIGATION
IN 1967
Irrigated Area
Non Irrigated Area
Wadi
L. Tiberias
Yarmouk R.
R. Jordan
R. Zarqa
R. Jordan
N
5 0 5 10kms
Dead Sea
E.G.C.A.(1966)

Figure. 9.2.

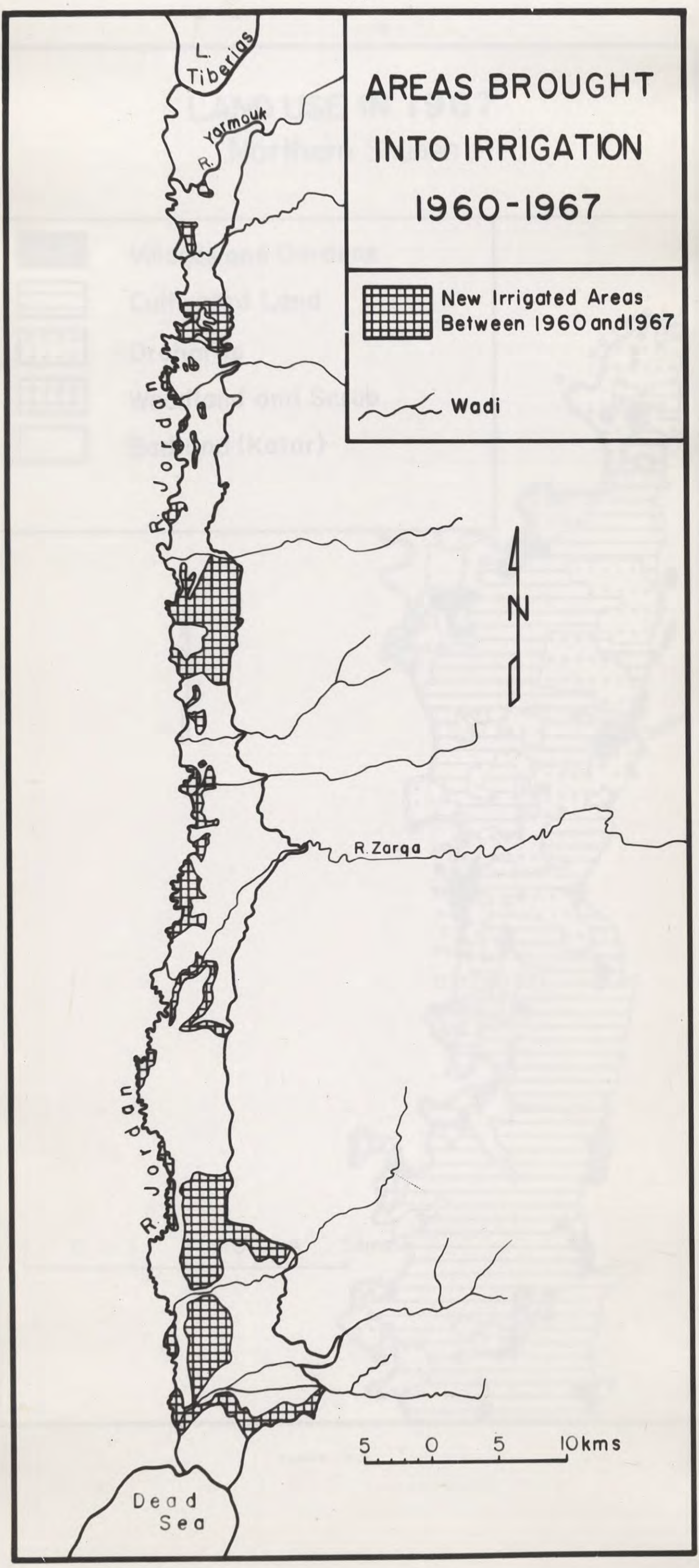

AREAS BROUGHT INTO IRRIGATION 1960-1967
New Irrigated Areas Between 1960 and 1967
Wadi
L. Tiberias
R. Yarmouk
R. Jordan
R. Zarqa
R. Jordan
N
5 0 5 10 kms
Dead Sea

Figure. 9.3.

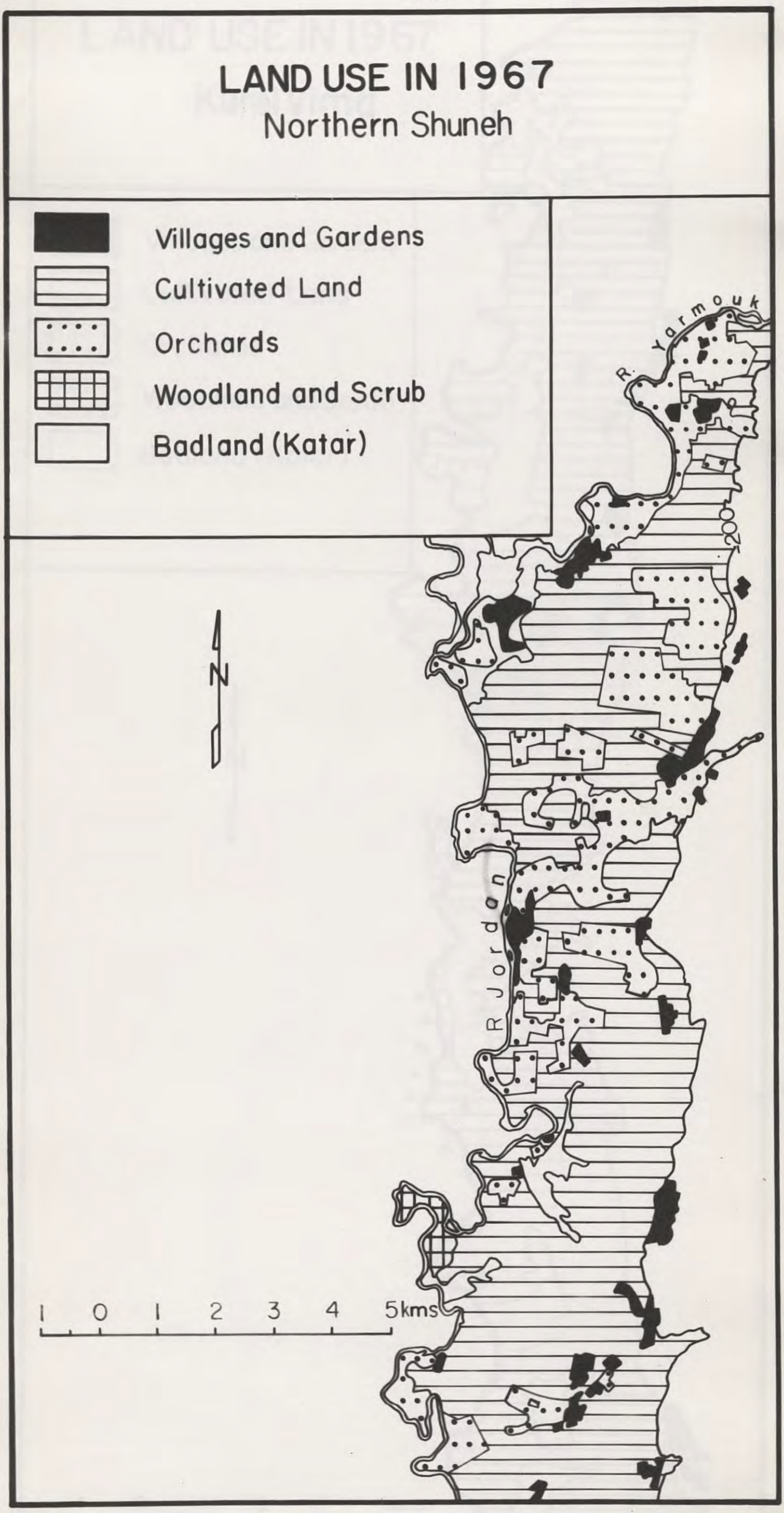

LAND USE IN 1967
Northern Shuneh
Villages and Gardens
Cultivated Land
Orchards
Woodland and Scrub
Badland (Katar)
R. Yarmouk
R Jordan
N
0 1 2 3 4 5kms

Figure. 9.4.

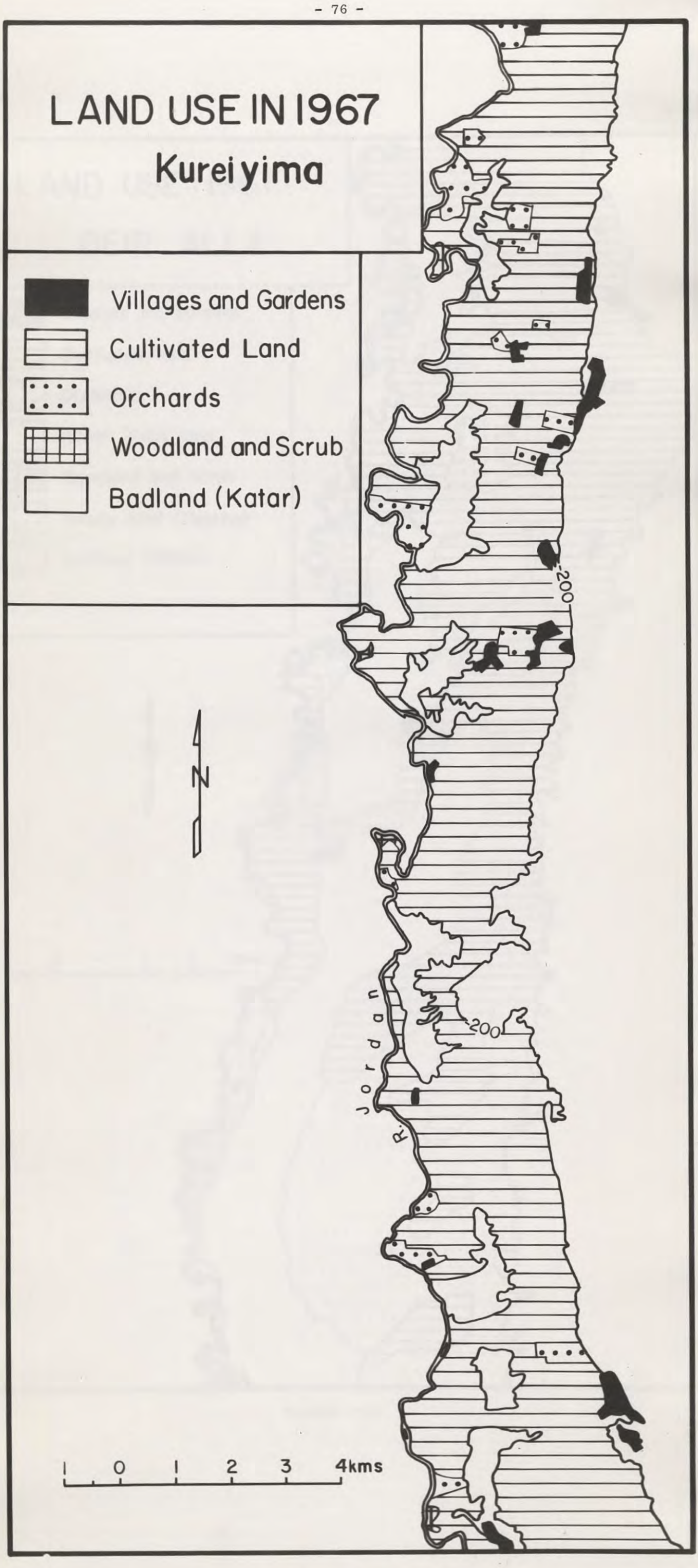

LAND USE IN 1967
Kureiyima
Villages and Gardens
Cultivated Land
Orchards
Woodland and Scrub
Badland (Katar)
N
200
200
Jordan
R.
0
1
2
3
4kms

Figure. 9.5.

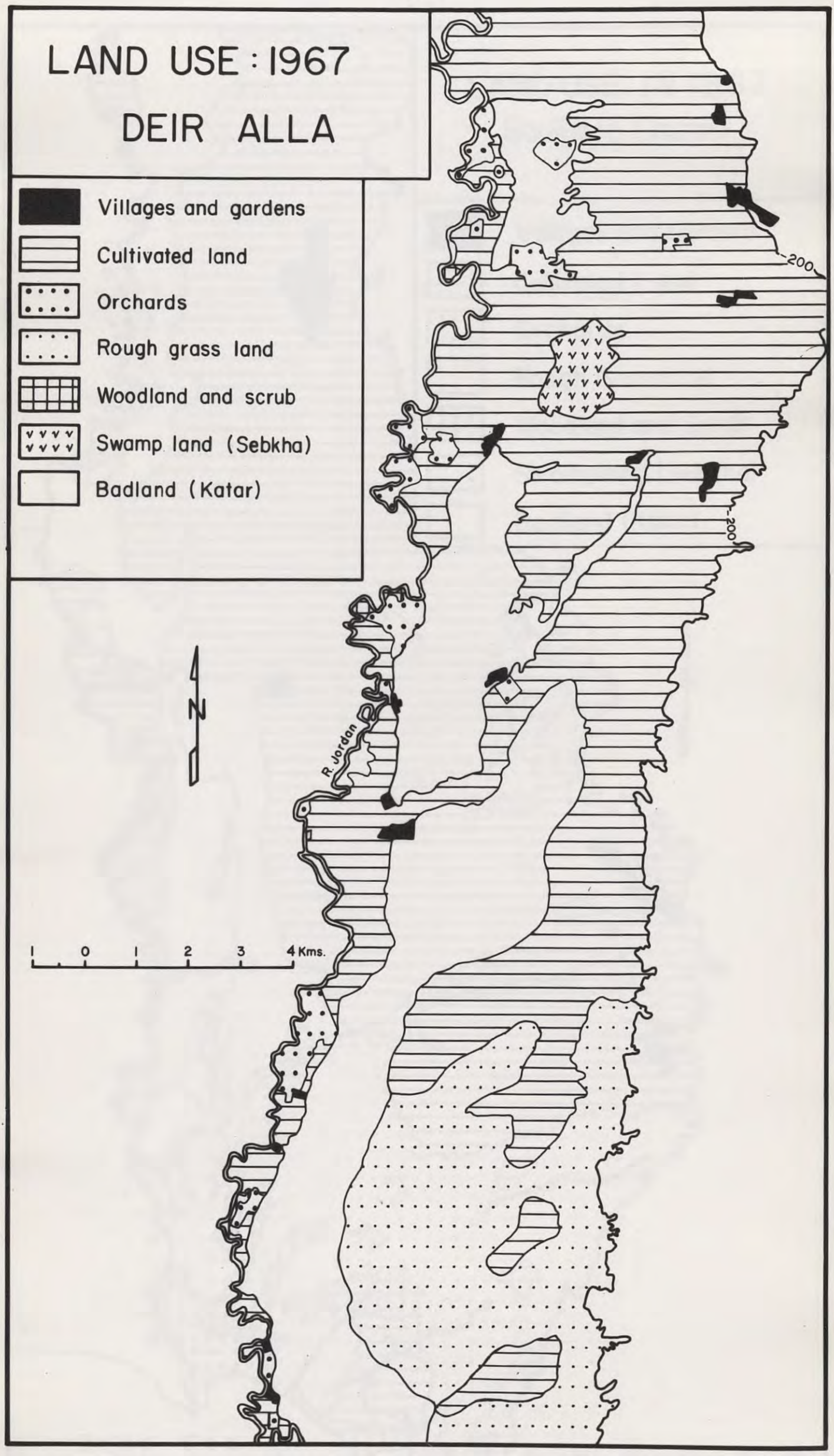

LAND USE : 1967
DEIR ALLA
Villages and gardens
Cultivated land
Orchards
Rough grass land
Woodland and scrub
Swamp land (Sebkha)
Badland (Katar)
200
200
N
R. Jordan
0 1 2 3 4 Kms.

Figure. 9.6.

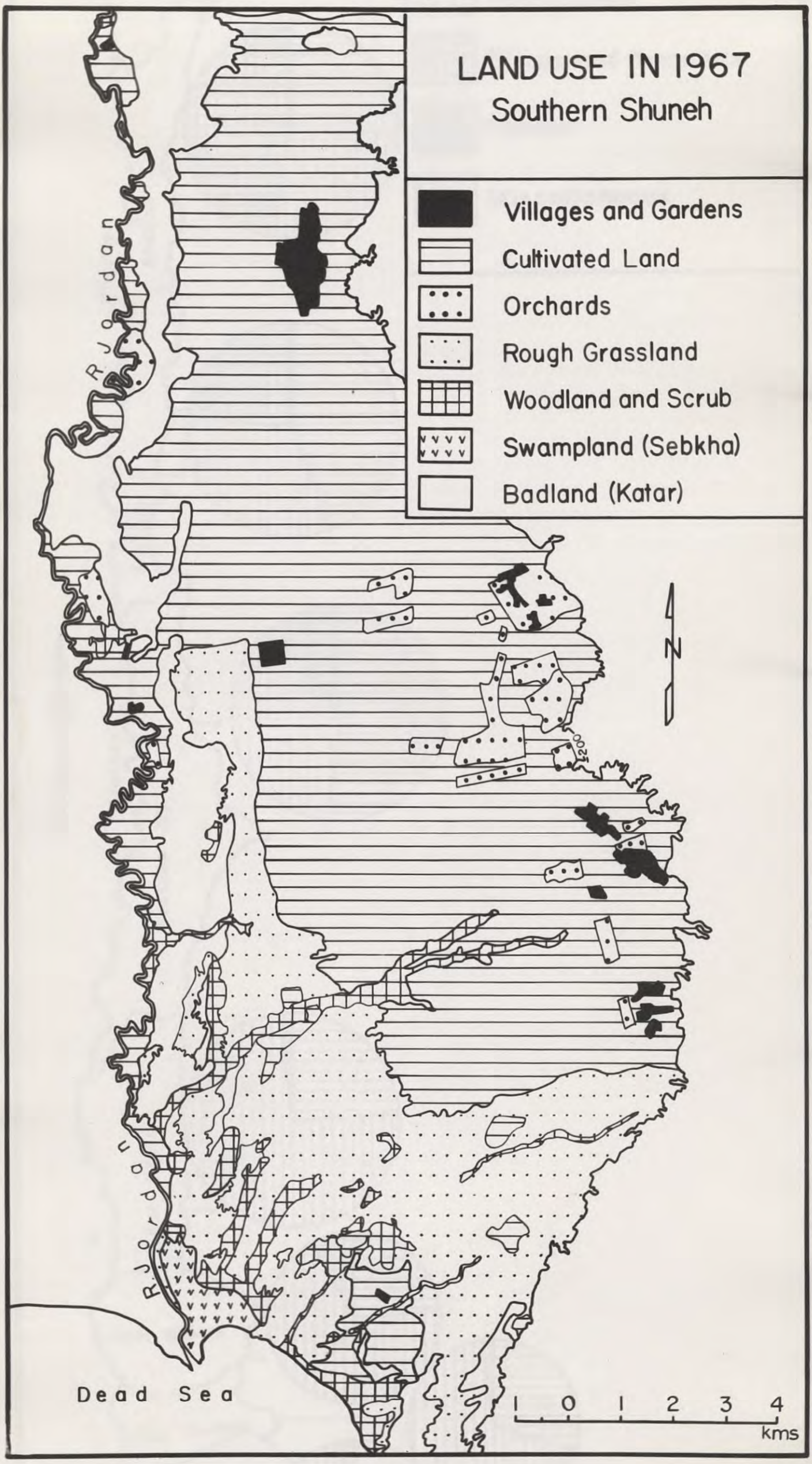

LAND USE IN 1967
Southern Shuneh
Villages and Gardens
Cultivated Land
Orchards
Rough Grassland
Woodland and Scrub
Swampland (Sebkha)
Badland (Katar)
R. Jordan
R. Jordan
Dead Sea
N
1200
0 1 2 3 4
kms

Figure. 9.7.

CROPPING PATTERN DURING WINTERS OF 1965 AND 1966

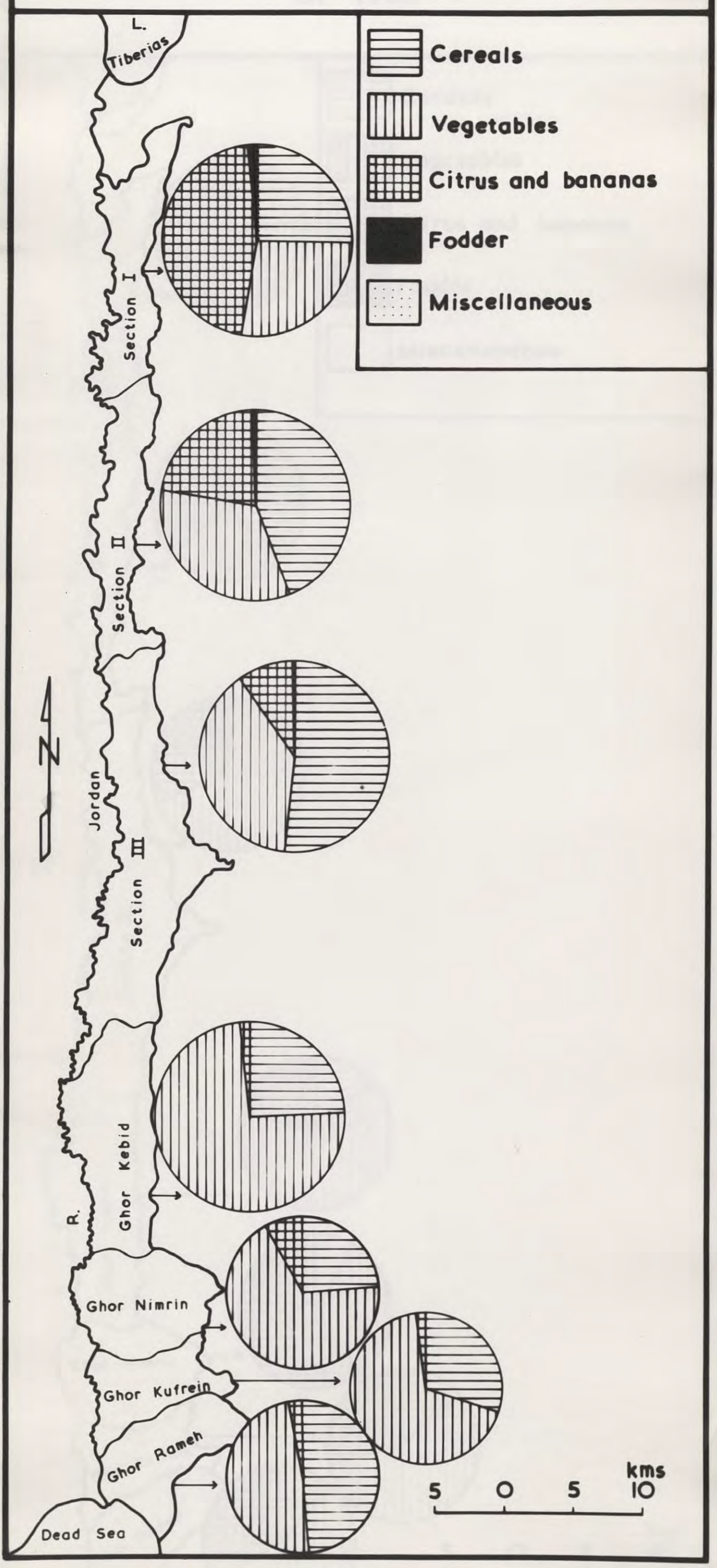


Figure. 9.8.

CROPPING PATTERN DURING SUMMER OF 1966

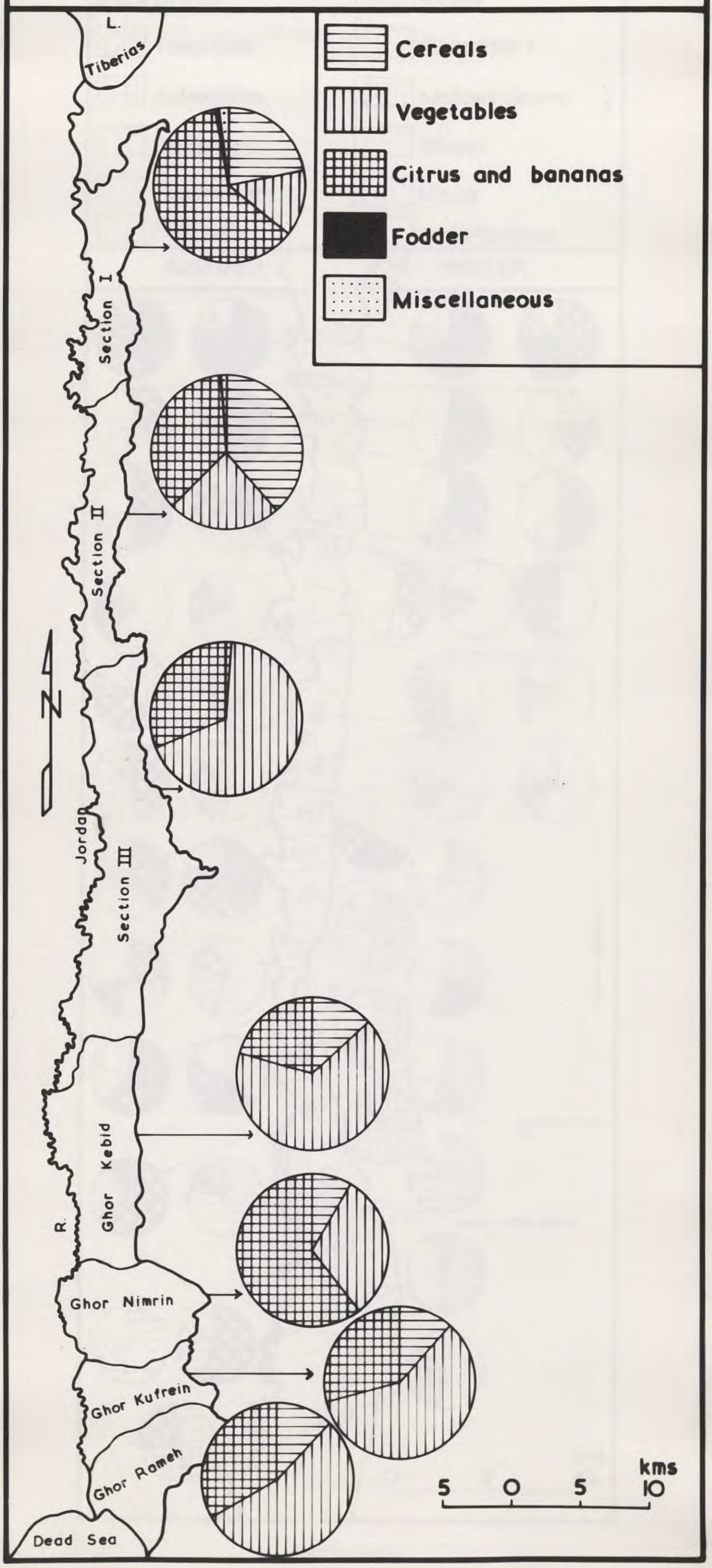


Figure. 9.9.

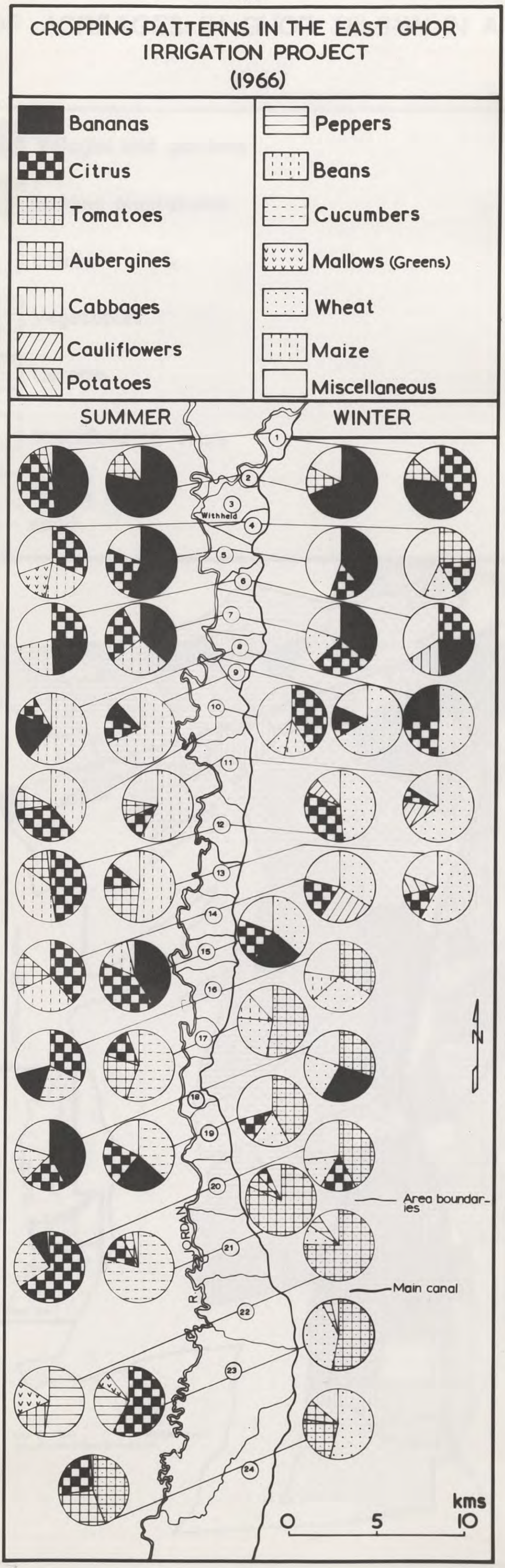

CROPPING PATTERNS IN THE EAST GHOR IRRIGATION PROJECT
(1966)
Bananas
Citrus
Tomatoes
Aubergines
Cabbages
Cauliflowers
Potatoes
Peppers
Beans
Cucumbers
Mallows (Greens)
Wheat
Maize
Miscellaneous
SUMMER
WINTER
Withheld
R. JORDAN
Area boundaries
Main canal
kms
0
5
10

Figure. 9.10.

CROP ACREAGES IN GHOR NIMRIN IN APRIL 1967

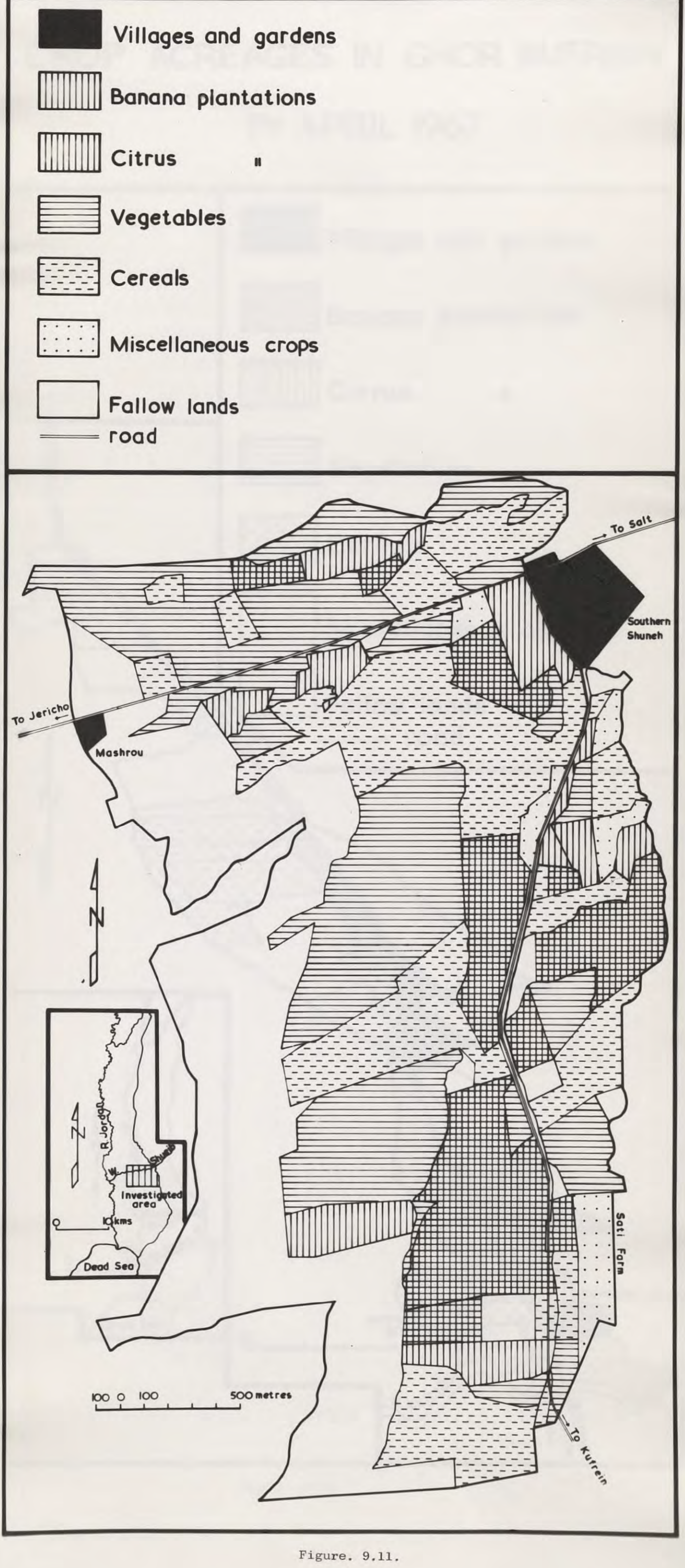


Figure. 9.11.

CROP ACREAGES IN GHOR KUFREIN IN APRIL 1967

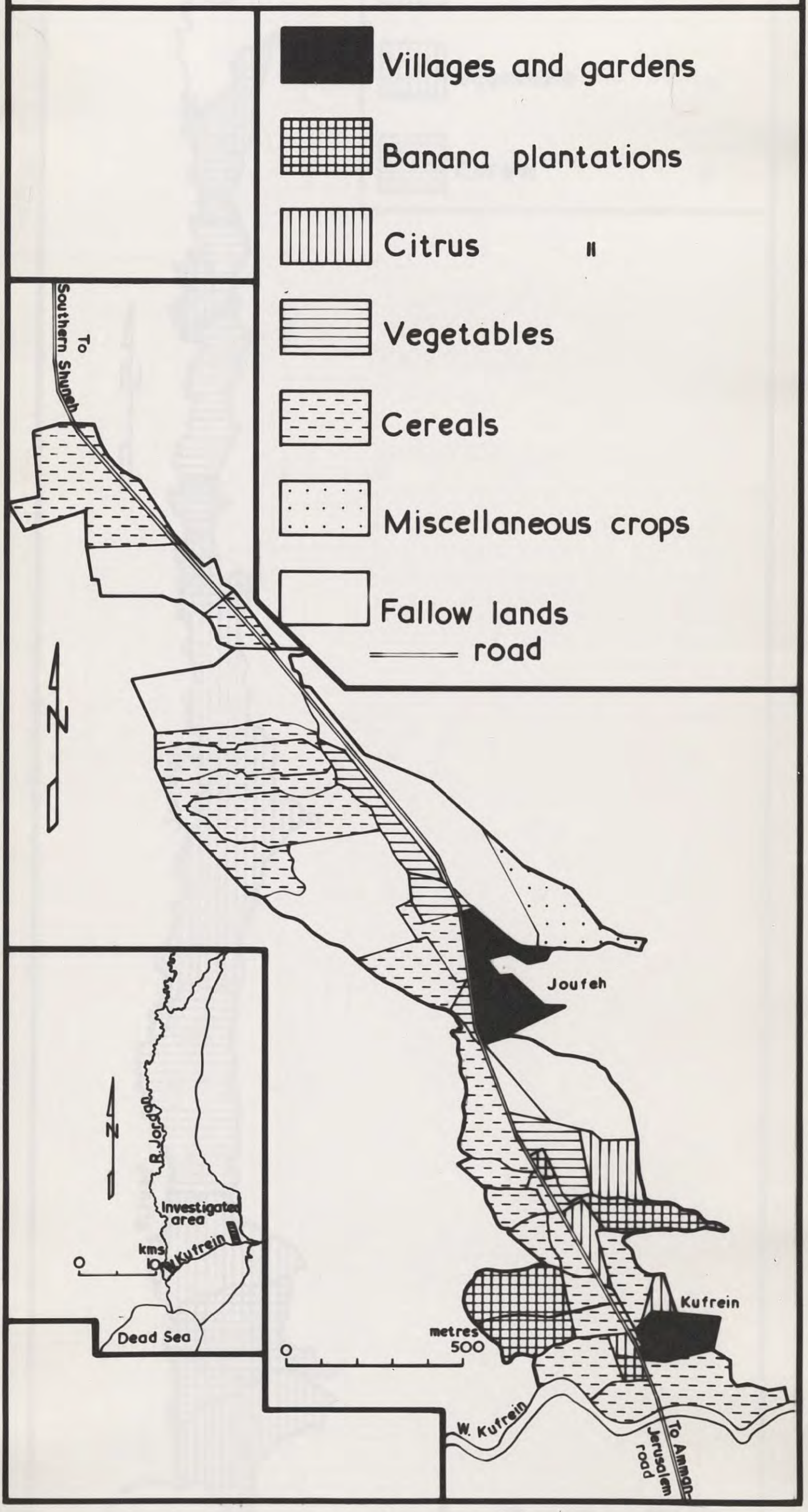


Figure. 9.12.

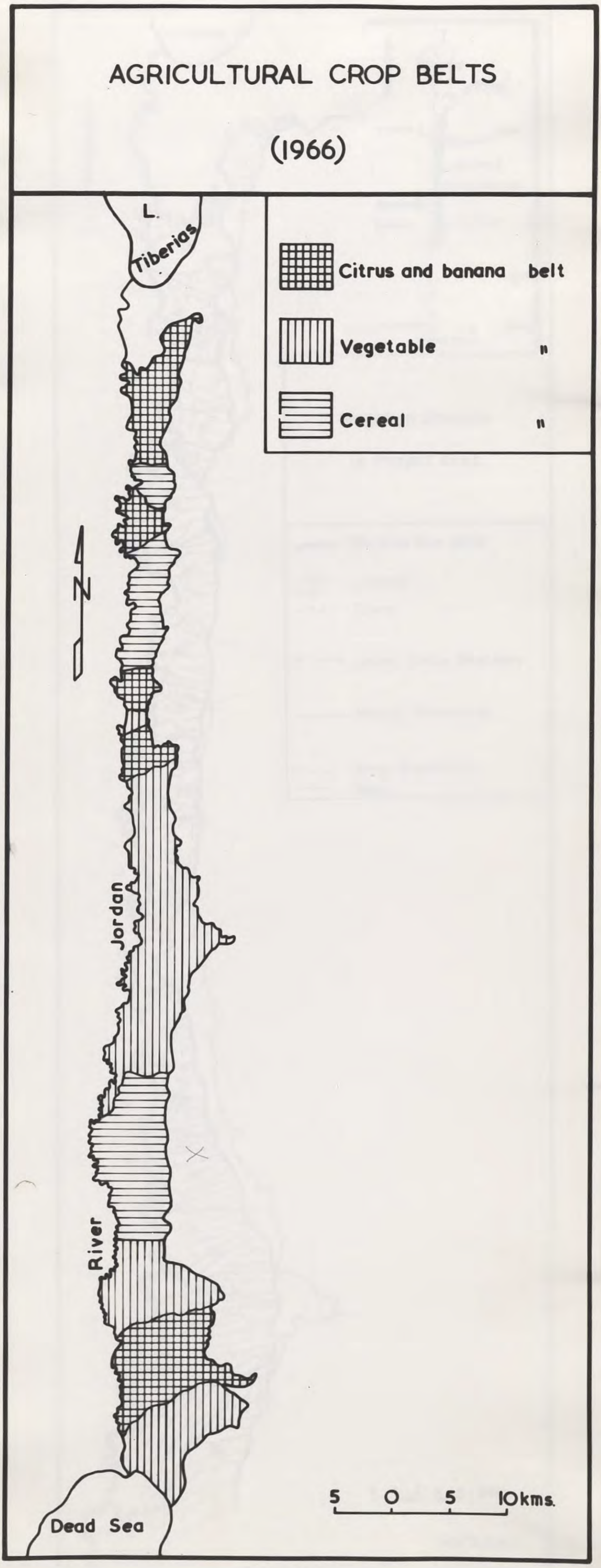

AGRICULTURAL CROP BELTS
(1966)
L.
Tiberias
Citrus and banana belt
Vegetable "
Cereal "
N
Jordan
River
Dead Sea
5 0 5 10kms.

Figure. 9.13.

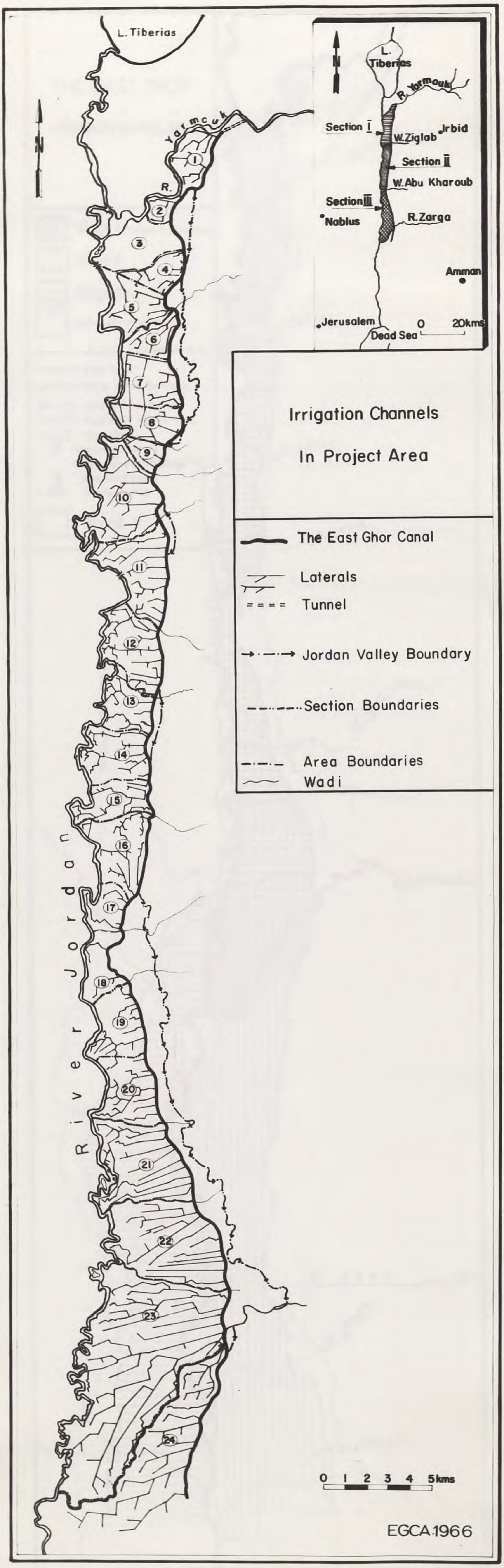

Irrigation Channels
In Project Area
The East Ghor Canal
Laterals
Tunnel
Jordan Valley Boundary
Section Boundaries
Area Boundaries
Wadi
L. Tiberias
Yarmouk
R.
River Jordan
L. Tiberias
R. Yarmouk
Section I
W.Ziglab
Irbid
Section II
W.Abu Kharoub
Section III
Nablus
R.Zarqa
Amman
Jerusalem
Dead Sea
0 20kms
0 1 2 3 4 5kms
EGCA 1966
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24

Figure. 10.1.

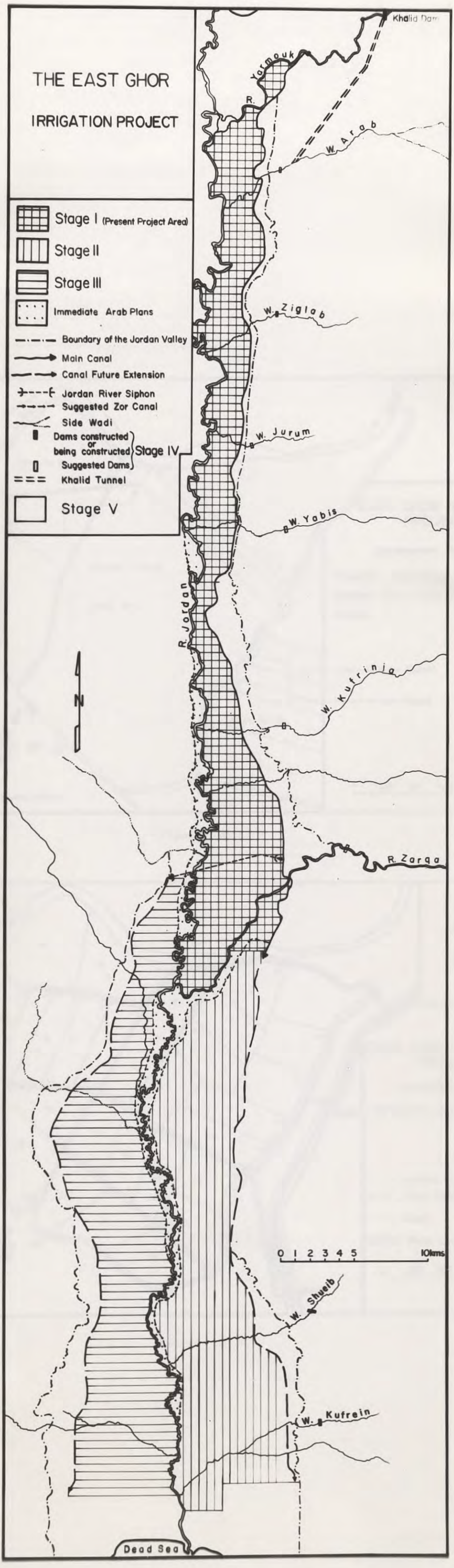

THE EAST GHOR
IRRIGATION PROJECT
Stage I (Present Project Area)
Stage II
Stage III
Immediate Arab Plans
Boundary of the Jordan Valley
Main Canal
Canal Future Extension
Jordan River Siphon
Suggested Zor Canal
Side Wadi
Dams constructed or being constructed
Suggested Dams
Stage IV
Khalid Tunnel
Stage V
Khalid Dam
Yarmouk R.
W. Arab
W. Ziglab
W. Jurum
W. Yabis
R. Jordan
W. Kufrinja
R. Zarqa
N
0 1 2 3 4 5 10kms
W. Shueib
W. Kufrein
Dead Sea

Figure. 10.2.

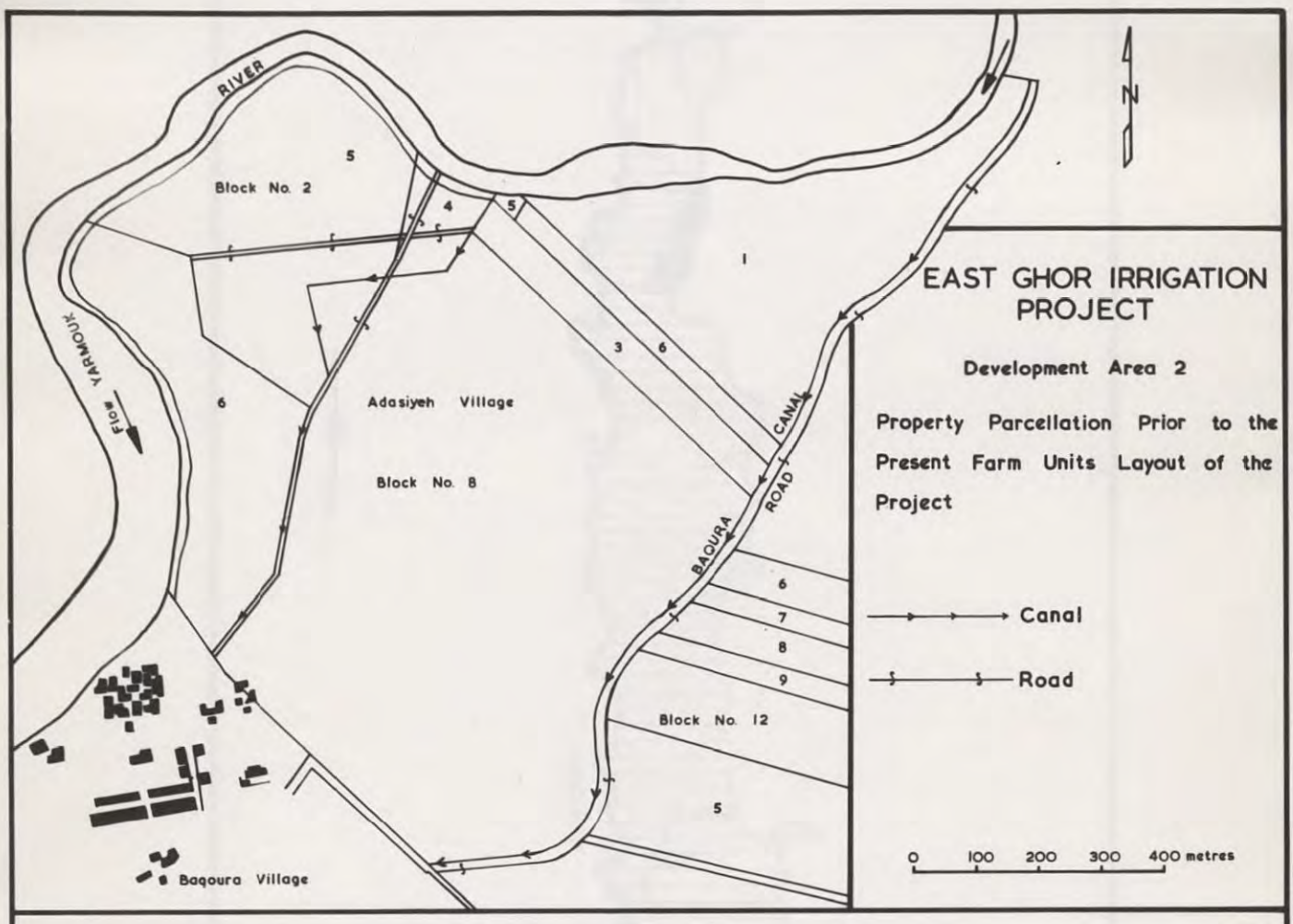


Figure. 10.3.

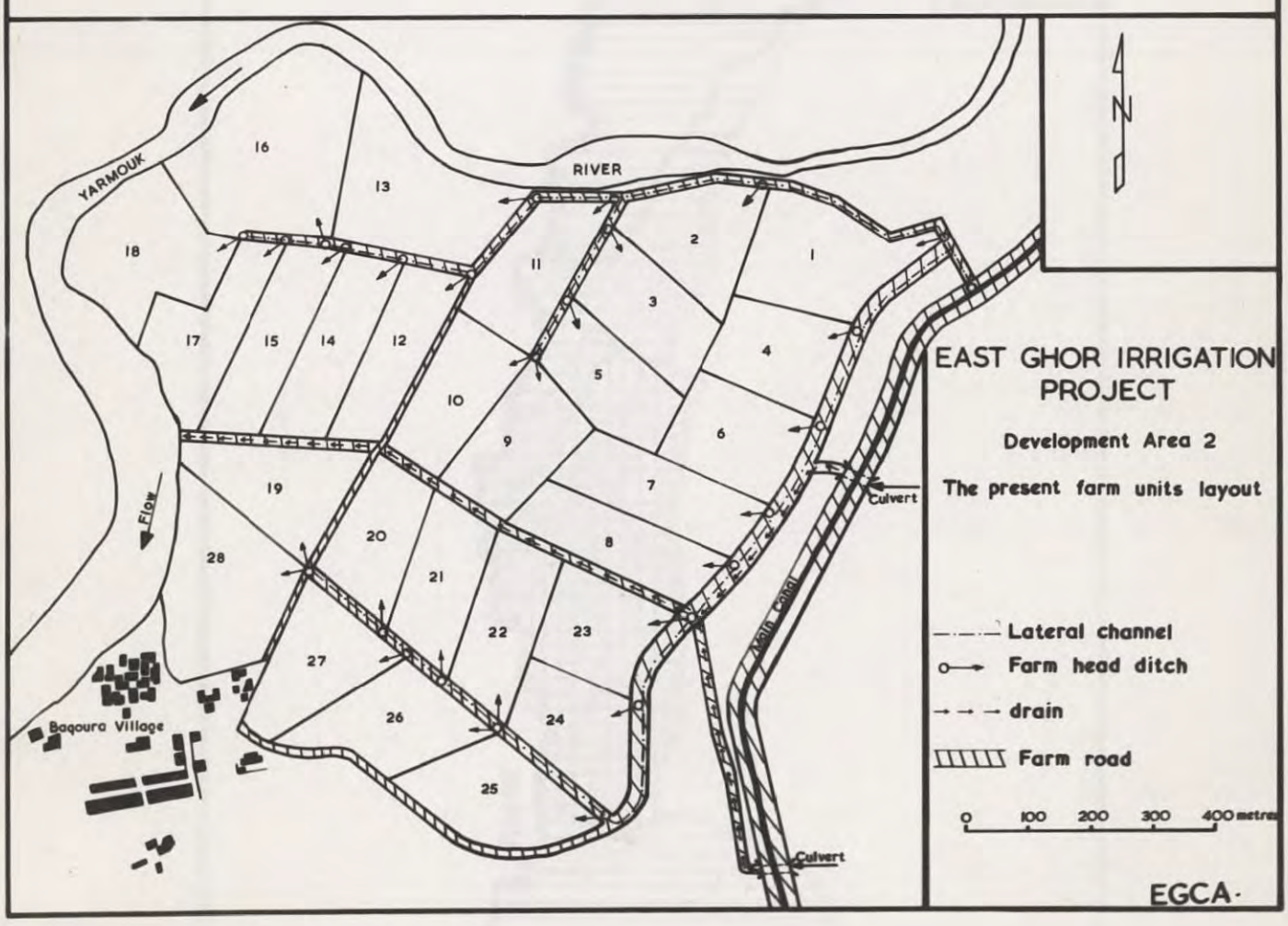


Figure. 10.4.


GEOGRAPHIC
POPULATION
DENSITY
(1966)
More than 450 persons/km²
301 - 450 " "
151 - 300 " "
Less than 150 " "
Village boundaries
N
R. Yarmouk
Jordan
River
R. Zarqa
Dead Sea
0
5
10
kms

Figure. 10.5.

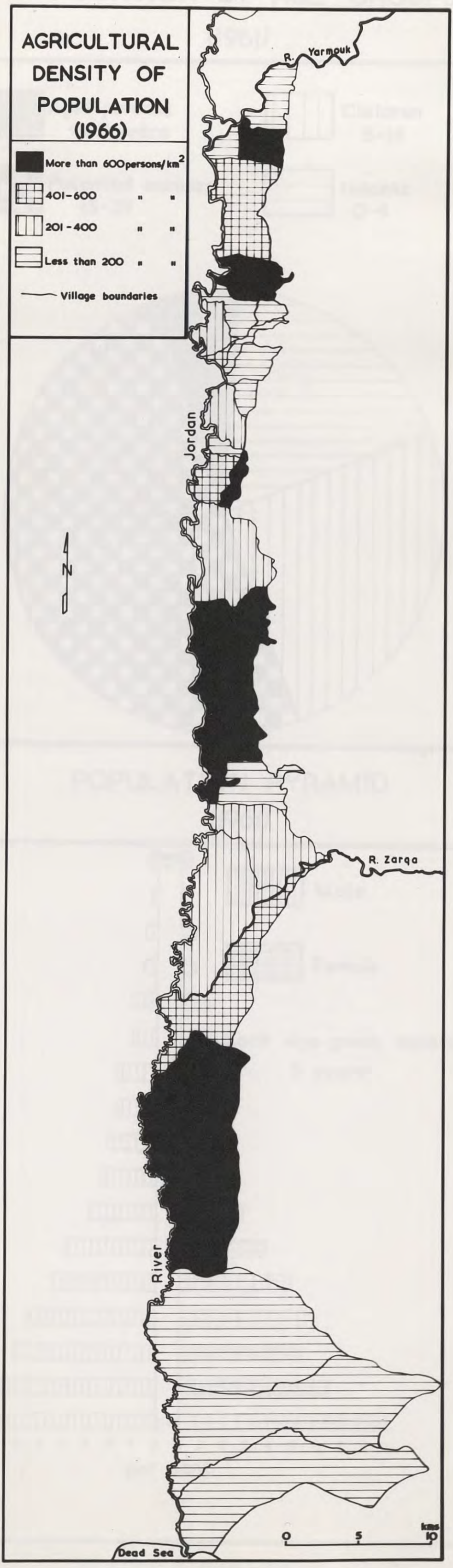
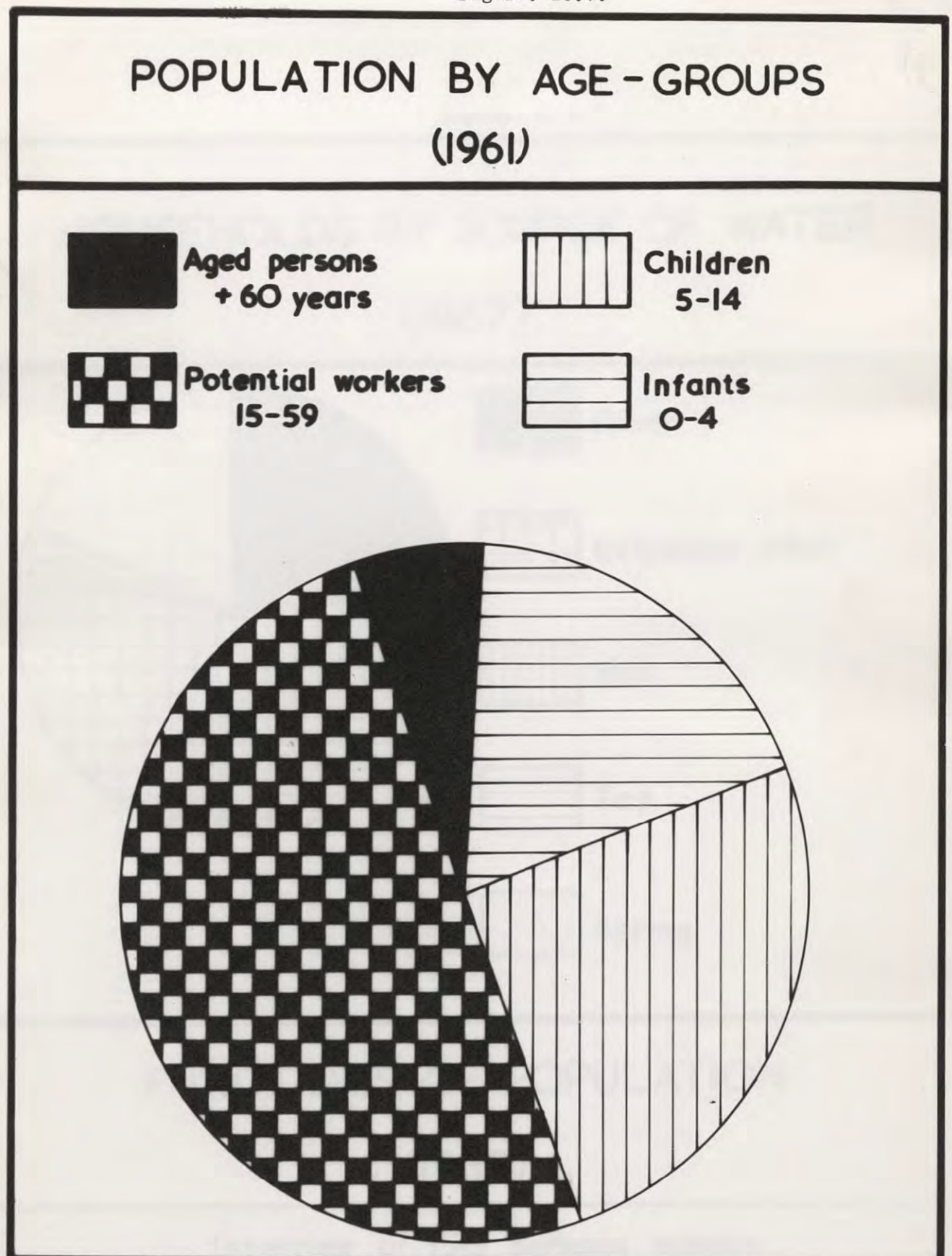

AGRICULTURAL DENSITY OF POPULATION (1966)
More than 600 persons/km²
401-600 " "
201-400 " "
Less than 200 " "
Village boundaries
R. Yarmouk
Jordan
R. Zarqa
River
Dead Sea
0
5
kms
10

Figure. 10.6.

Figure. 10.7.



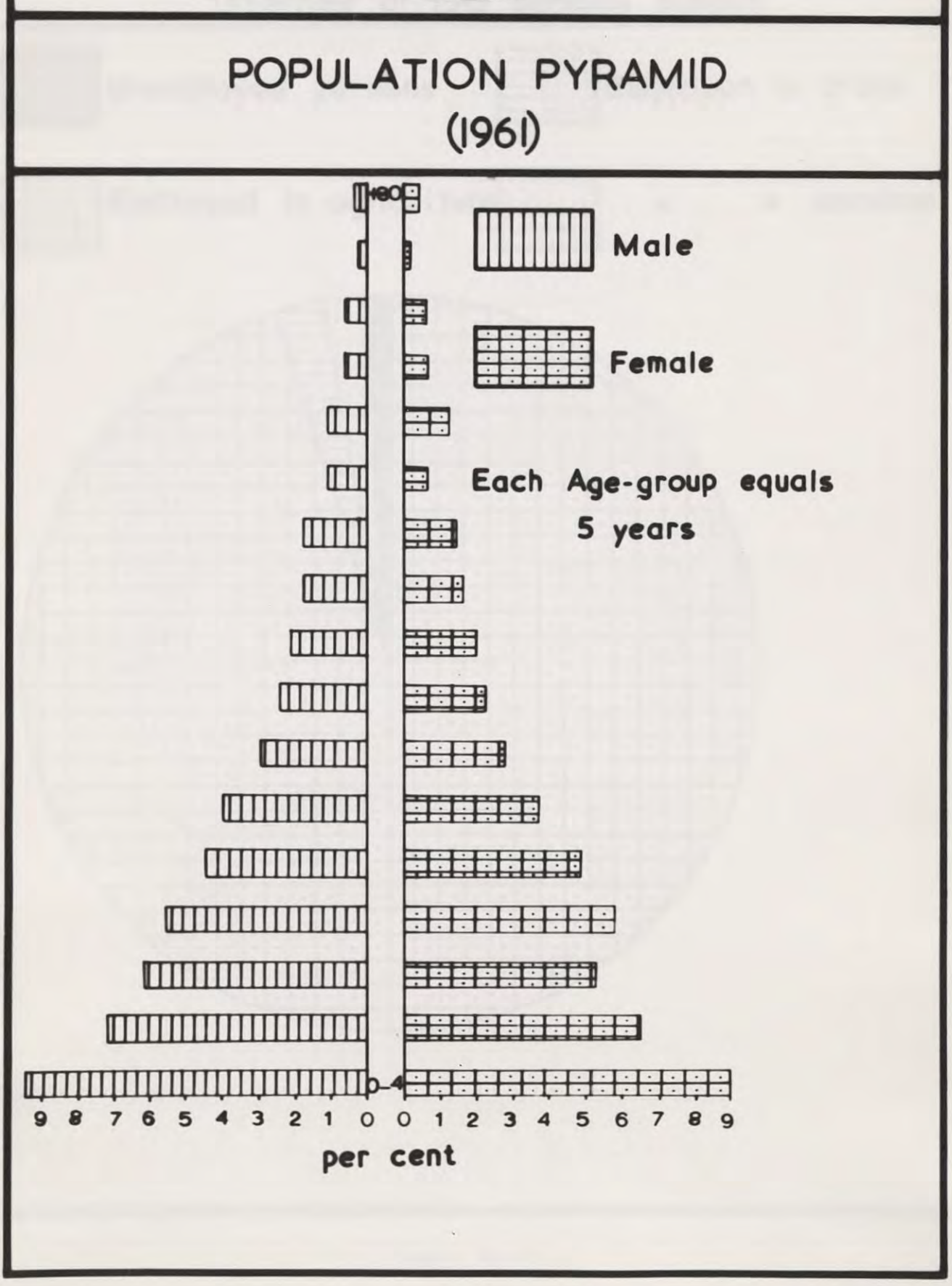


Figure. 10.8.

Figure. 10.9.

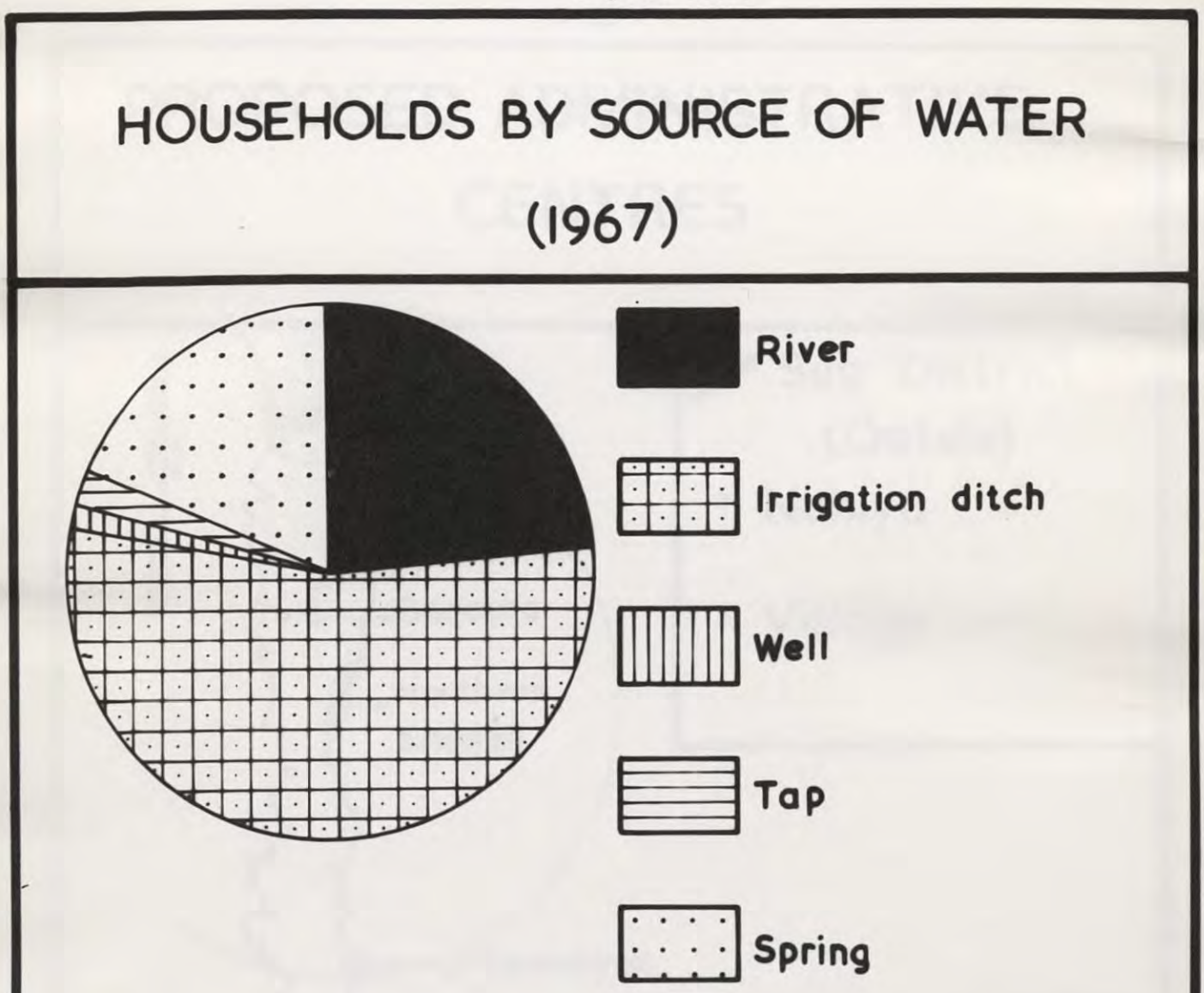


Figure. 10.10.

PROPOSED ADMINISTRATIVE CENTRES

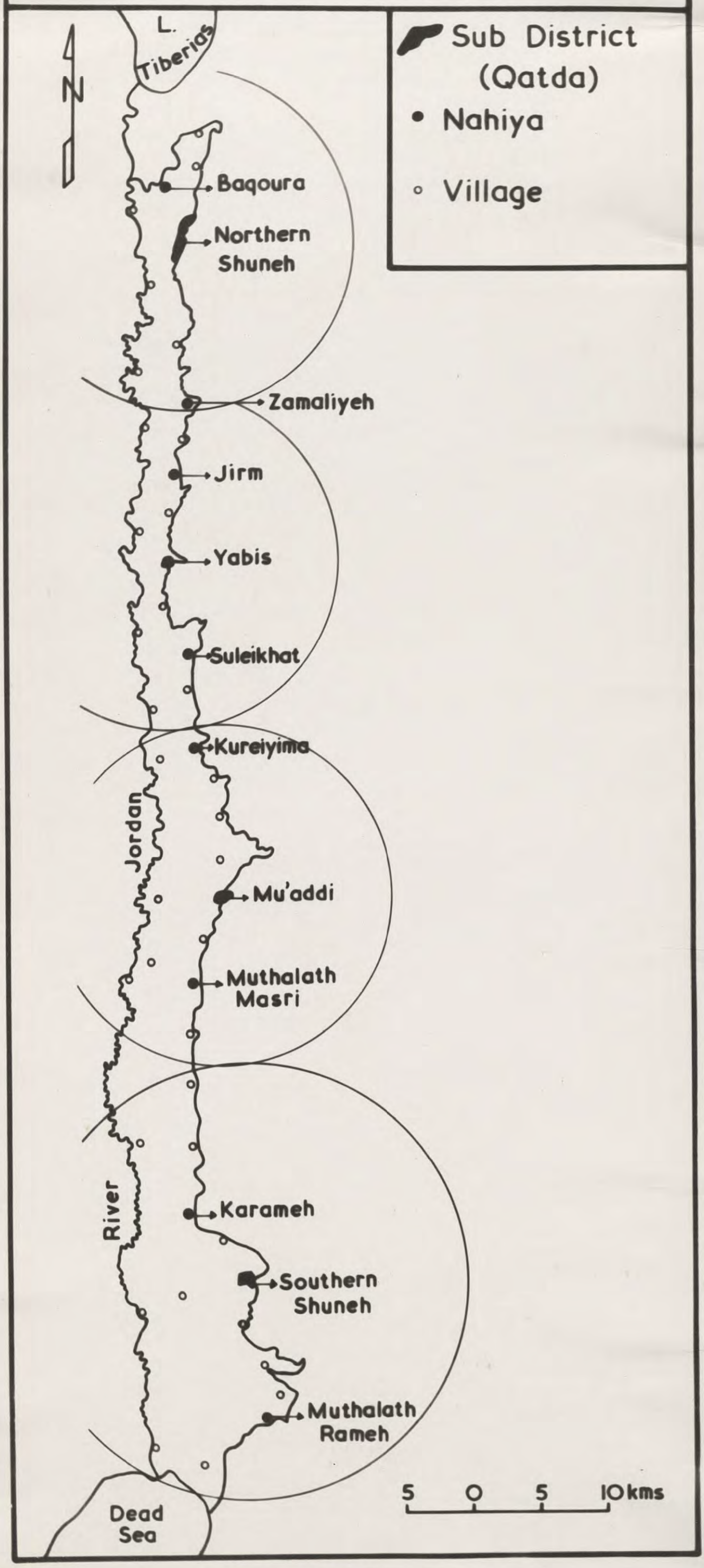


Figure. 10.11.