

FIGURES

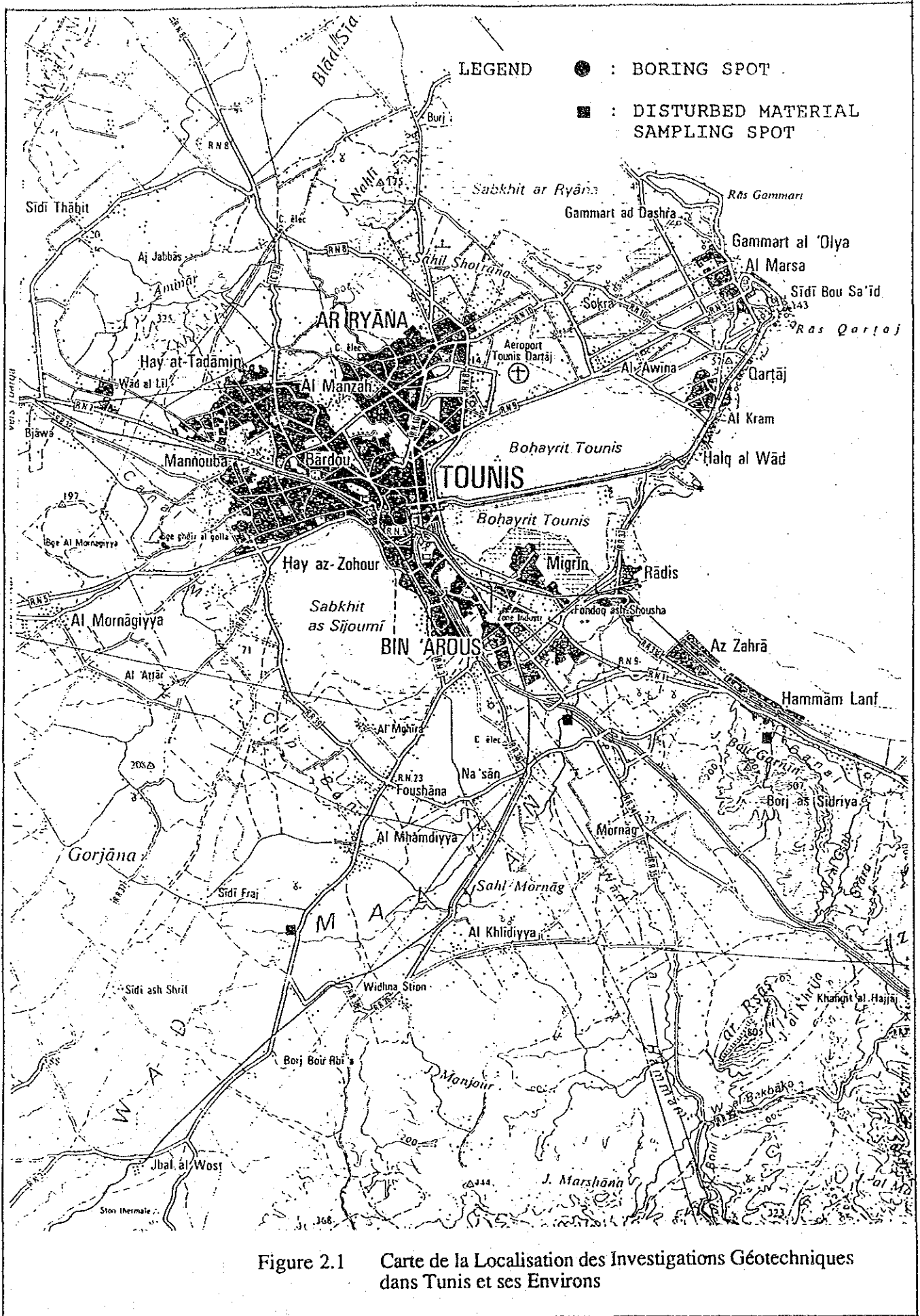


Figure 2.1 Carte de la Localisation des Investigations Géotechniques dans Tunis et ses Environs

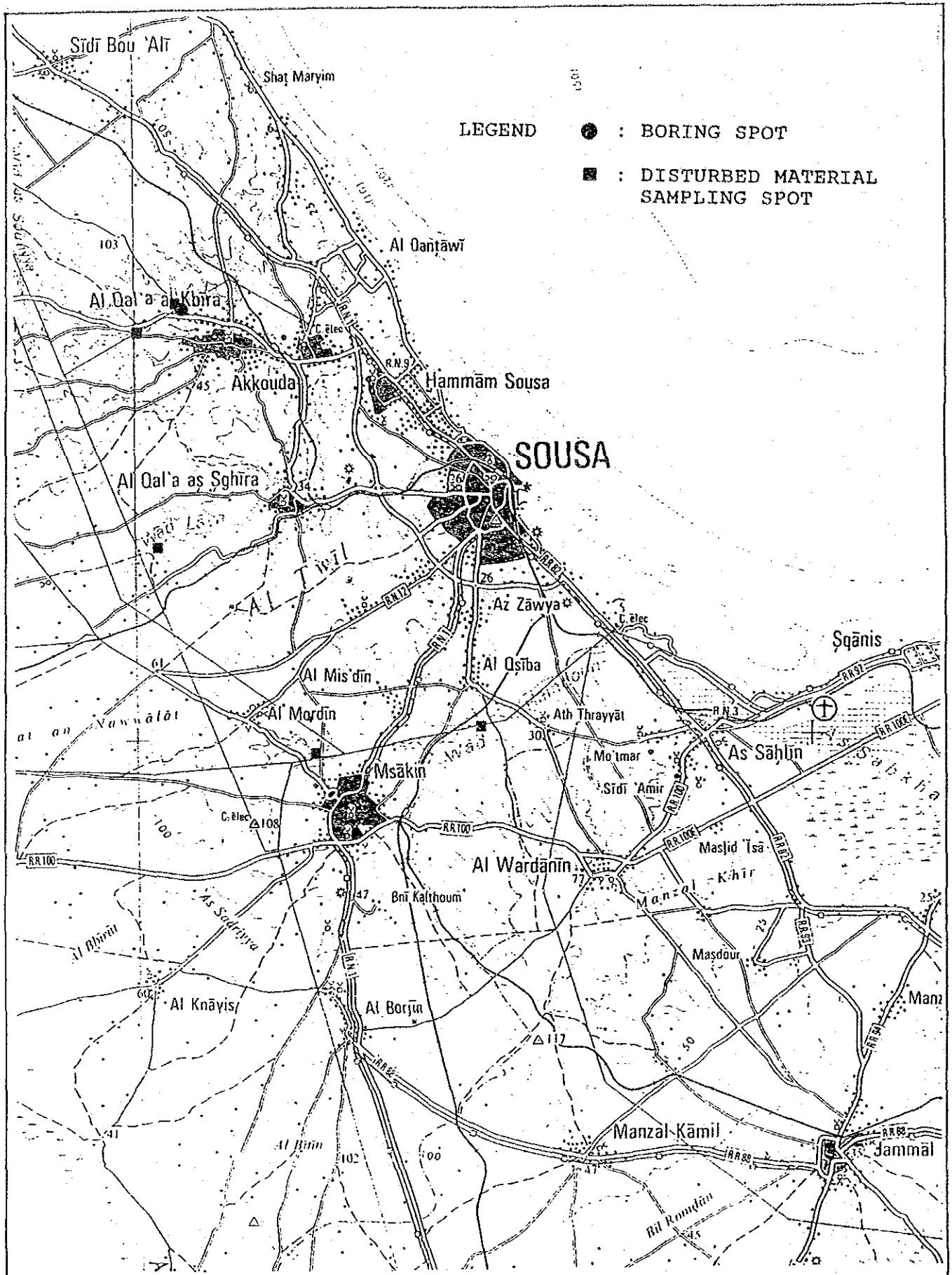


Figure 2.2 Carte de la Localisation des Investigations Géotechniques dans Sousse et ses Environs

Figure 2.3 Carnet des Carottages (1)

BORING No. : SC 1 Drilled from April 26 to 28

SCL (m)	SYMB	DEPTH (m)	STRATUM DESCRIPTION	STANDARD PENETRATION						PERMEABILITY
				N	0	10	20	30	40	
0		0.55	Marlaceous silty sand, light grey							
1		1.55	Clay, yellowish brown; locally marlaceous	56						
2		2.55	Sandy clay, yellowish brown	55<						
3		3.55	Fine sand, yellowish brown	36						
4		4.55	Fine sand with intercalation of thin clay layer light brown	40						
5		5.55	Clay, brown	72						1.7 E-4
6		6.55	Clay, red	55<						
7		7.55	Clay with a little sand, reddish brown	55<						
8		8.55	Marlaceous silty sand, red	55<						
9		9.55		57						
10		10.55	Silty sand, reddish brown	55<						1.22 E-5
11		11.55	Silty sand with a little clay, yellowish brown	47						
12		12.55	Silty sand, red	55<						
13		13.55	Cleyey/silty sand	53						
14		14.55	Silty fine sand, yellowish brown	55<						
15		15.55	Silty fine sand with hard lumps, yellowish brown	55<						6.2 E-5
16		16.55	Silty fine sand with reddish clay lumps, yellowish brown	55<						
17		17.55		55<						
18		18.55	Silty sand, reddish brown	55<						
19		19.55		73						
20		20.55	Silty sand with reddish clay	55<						1.3 E-4

Figure 2.3 Carnet des Carottages (2)

Drilled from April 16 to 18

SCL (m)	SYMB	DEPTH (m)	STRATUM DESCRIPTION	STANDARD PENETRATION						PERME- BILITY	
				N	0	10	20	30	40		50
0											
1		1.00	Silty fine sand, yellowish brown	37							
		1.40	Sandy clay, brown								
2				27							
3			Silty fine sand, yellowish brown	28							
4		4.00		26							
5		5.30	Fine sand, whitish yellow	21						1.8 E-4	
6			Marlaceous silty sand,	31							
7		7.00		25							
8			Clay with sand, reddish	90<							
9		9.00		90<							
10			Sand, yellowish brown	30						1.22 E-5	
11		11.30		29							
12				43							
13			Silty fine sand with intercalation of clay layers	56							
14				63							
15		15.00		48						1.4 E-5	
16											
17											
18											
19											
20											

Figure 2.3 Carnet des Carottages (3)

BORING No. : SC 3 Drilled from April 19 to 20

SCL (m)	SYMB	DEPTH (m)	STRATUM DESCRIPTION	STANDARD PENETRATION						PERME- BILITY	
				N	0	10	20	30	40		50
0											
1				9							
2				32							
3				28							
4				31							
5			Silty fine sand with intercalation of clay layers yellowish brown	36<						5.8 E-5	
6		6.20		18							
7			Sandy clay, brown	36<							
8		8.35		78							
9			Sand with a little silt	30							
10				29						1.0 E-5	
11		11.00		25							
12			Clayey sand, reddish	28							
13		13.00		30							
		13.35	Hard clay								
14		14.00	Silty fine sand, reddish	36							
		14.80	Clay								
15		15.00	Martaceous fine sand, light grey	36<						2.4 E-5	
16											
17											
18											
19											
20											

Figure 2.4 Carnet des Trous d'échantillonnage

T-1

SCL (m)	SYMB	DEPTH (m)	STRATUM DESCRIPTION
0			Gravelly clay, dark brown
1			
2			
3			
		3.00	

S-2

SCL (m)	SYMB	DEPTH (m)	STRATUM DESCRIPTION
0			Fine sand, yellowish brown
1			
2			
3			
		3.00	

T-2

SCL (m)	SYMB	DEPTH (m)	STRATUM DESCRIPTION
0			Plastic clay, yellowish brown
1			
2			
3			
		3.00	

S-3

SCL (m)	SYMB	DEPTH (m)	STRATUM DESCRIPTION
0			Clayey fine sand, yellowish brown
1			
		1.30	
2			Fine sand with a little clay and small gravel yellowish brown
3			
		3.00	

T-3

SCL (m)	SYMB	DEPTH (m)	STRATUM DESCRIPTION
0			Silty clay, brown
1			
2			
3			

S-4

SCL (m)	SYMB	DEPTH (m)	STRATUM DESCRIPTION
0			gravelly fine sand, reddish
1			
2			
3			

S-1

SCL (m)	SYMB	DEPTH (m)	STRATUM DESCRIPTION
0			Fine sand, yellowish brown
1			
		1.70	
2			Fine sand with some clay, Grey
3			
		3.00	

S-5

SCL (m)	SYMB	DEPTH (m)	STRATUM DESCRIPTION
0			Fine sand with a little clay and gravel with organic matters
1			
		0.80	
2			Sandy clay with a little gravel, yellowish brown
3			
		3.00	

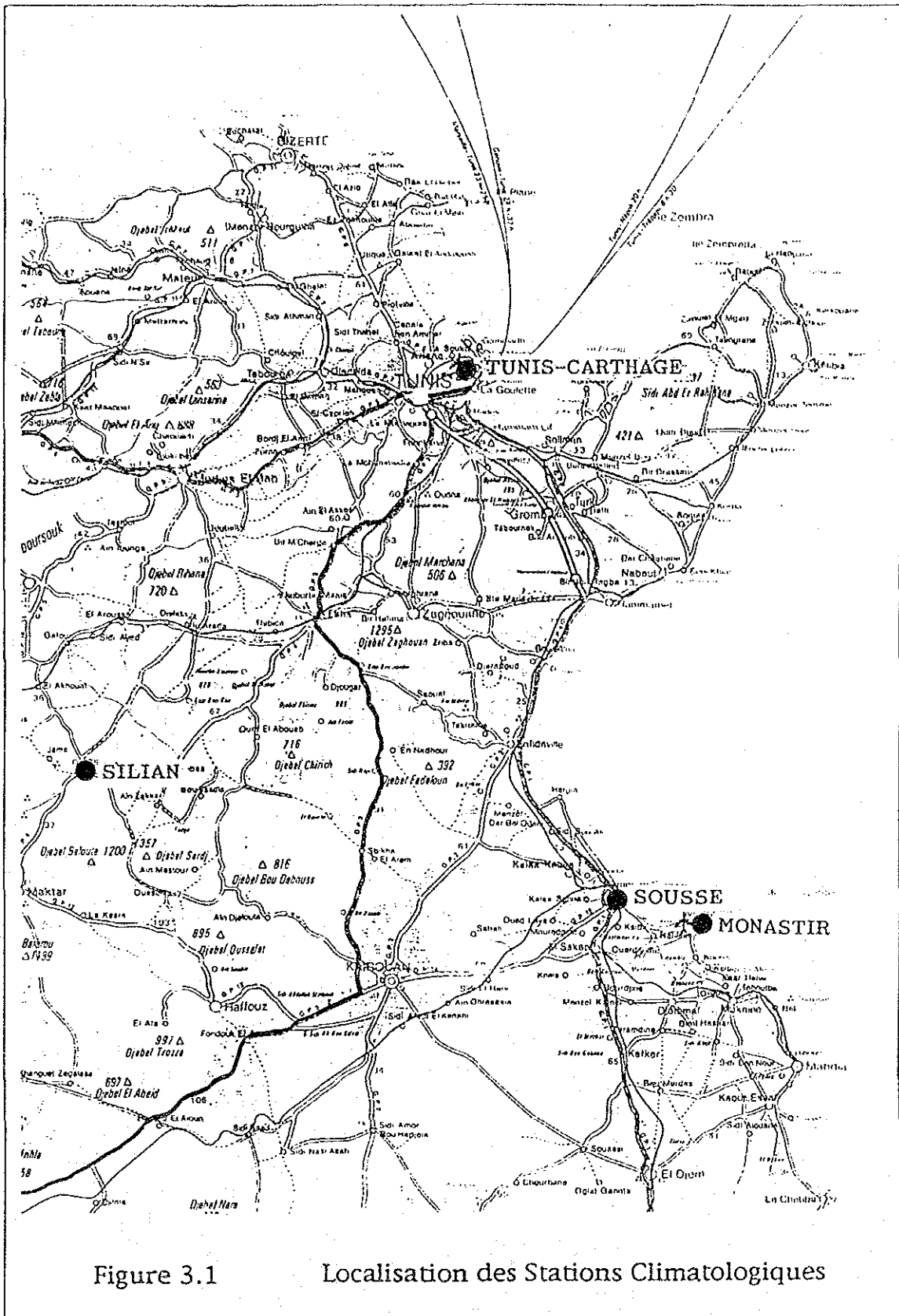


Figure 3.1

Localisation des Stations Climatologiques

Figure 3.2 Enregistrements Disponibles de Pluies Journalières (2/3)

									1940's	1950's	1960's	1970's	1980's	1990's	
		Code	Name of Station	Creation	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	1990's 0 1 2
31	T	44185	MARJA PT DU FAHS	1972											
32	T	44415	MENZAH 6 LE PADDAGE												
33	T	44503	MOGRANE CSA/SM	1953											
34	T	44886	OUED EL KHADRA												
35	T	45198	POTIN BERGERIE	1957											
36	T	45238	FAHS OMVVM												
37	T	45246	PONT DU FAHS ESSOUANI	1969											
38	T	45416	ROBAA GN	1970											
39	T	45496	OUED EZZIT												
40	T	46088	SIDI AOUIDET												
41	T	46108	SIDI ARFA	1960											
42	T	46232	SIDI BOU BAKER BGE KB SM	1921											
43	T	46386	SIDI HAMID	1984											
44	T	46968	SMINDJA DEPIENNE	1951											
45	T	47054	SOKRA												
46	T	47406	BARRAGE TAHOUNA												
47	T	47422	TARF CHENA	1927											
48	T	47620	TELLET ERRAIB	1980											
49	T	47623	TELLET ESSAFRA												
50	T	47816	TUBURBO MAJUS	1969											
51	T	47882	TUNIS CARTHAGE SM	1924											
52	T	47836	TUNIS MANOUBIA	1872											
53	T	48000	MNIHLA EX VILLE JAQUE												
54	T	48075	ZAGHOUAN SM	1908											
55	T	48076	ZAGHOUAN DRE												
56	T	48077	ZAGHOUAN PF	1960											

Note : (-) Data collected

Source : "Annuaire Pluviométrique de Tunisie", Direction General des Ressources en Eau

Figure 3.2 Enregistrements Disponibles de Pluies Journalières (3/3)

			Code	Name of Station	Creation	1940's	1950's	1960's	1970's	1980's	1990's
57	S	1	70583	AKOUDA SM		0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2 3 4 5 6 7 8 9	0 1 2
58	S	2	70747	BALAOUM KALAAAT KEBIRA		> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > >
59	S	3	71637	CHOTT MARIEM CRGR	1900	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > >
60	S	4	72004	JEMMEL	1970	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > >
61	S	5	72523	EL ONK SE	1960	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > >
62	S	6	73068	HAMMAM SOUSSE		> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > >
63	S	7	73509	KALAA KEBIRA	1900	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > >
64	S	8	73510	KALAA SEGHIRA	1966	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > >
65	S	9	74386	JEMMEL GFPA		> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > >
66	S	10	74603	MASAKEN DELG SM	1933	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > >
67	S	11	74951	OUED LAYA	1929	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > >
68	S	12	76210	SIDI BOU ALI		> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > >
69	S	13	76400	SIDI EL HANT CTY		> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > >
70	S	14	76788	SKANES MONASTIR SM	1968	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > >
71	S	15	77072	SOUSSE PF	1967	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > >
72	S	16	78232	ZERAMDINE		> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > > > > > > > >	> > >

Note : (=) Data collected

Source : 'Annuaire Pluviometrique de Tunisie', Direction General des Ressources en Eau

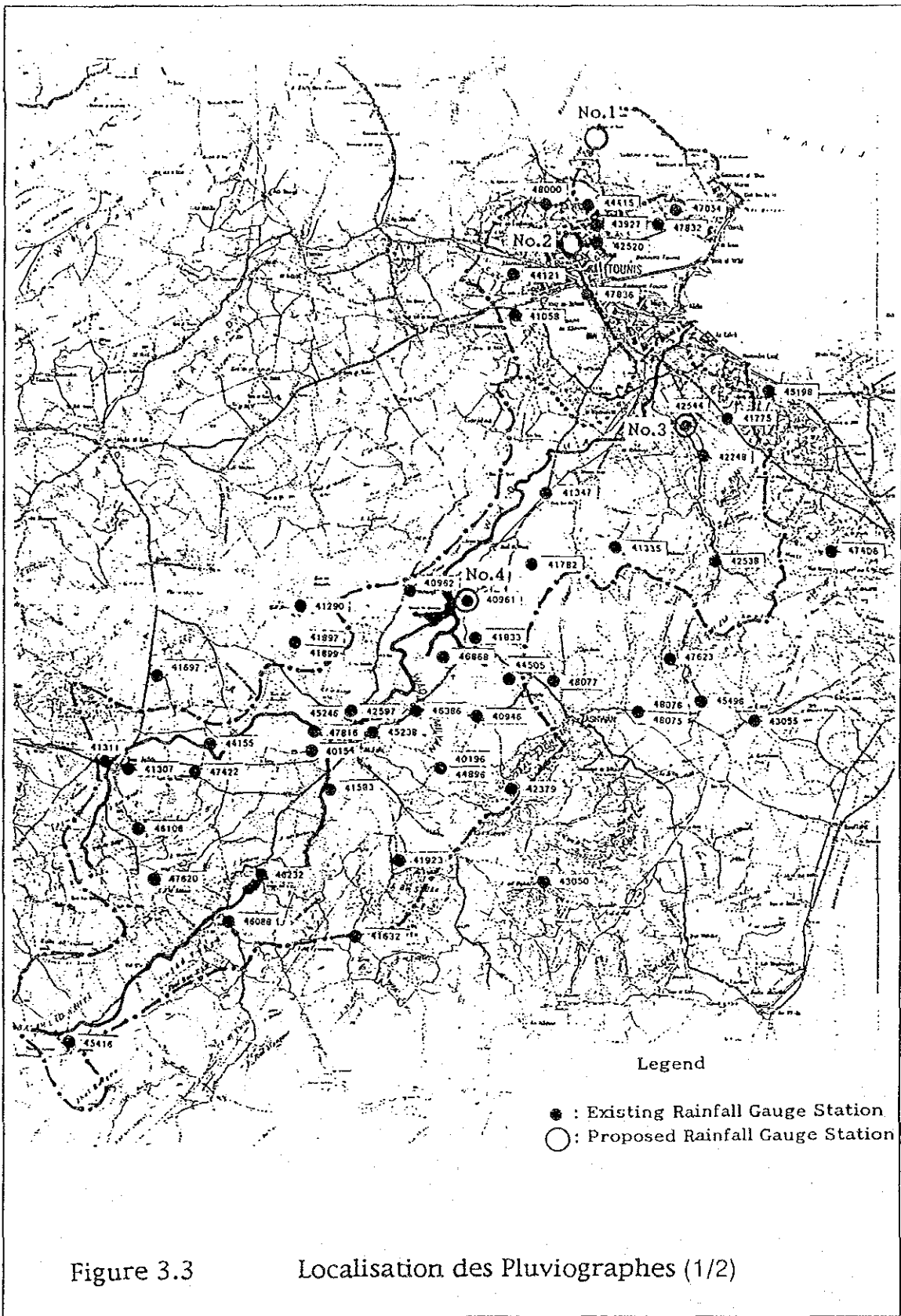


Figure 3.3

Localisation des Pluviographes (1/2)

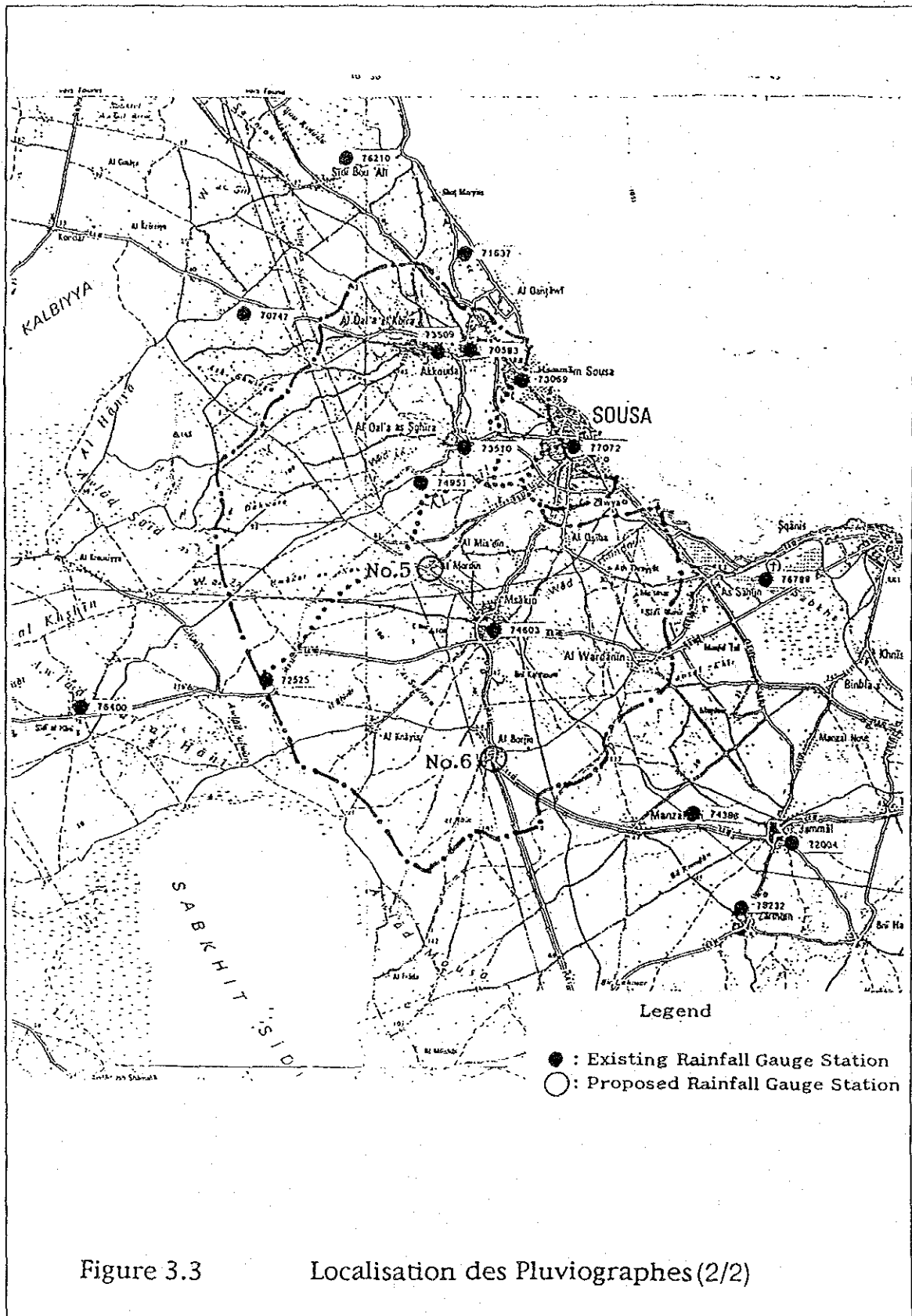


Figure 3.3

Localisation des Pluviographes (2/2)

Figure 3.4

Courbes Intensité-Durée-Fréquence (1/4)
Tunis-Carthage ($I = b / t^a$)

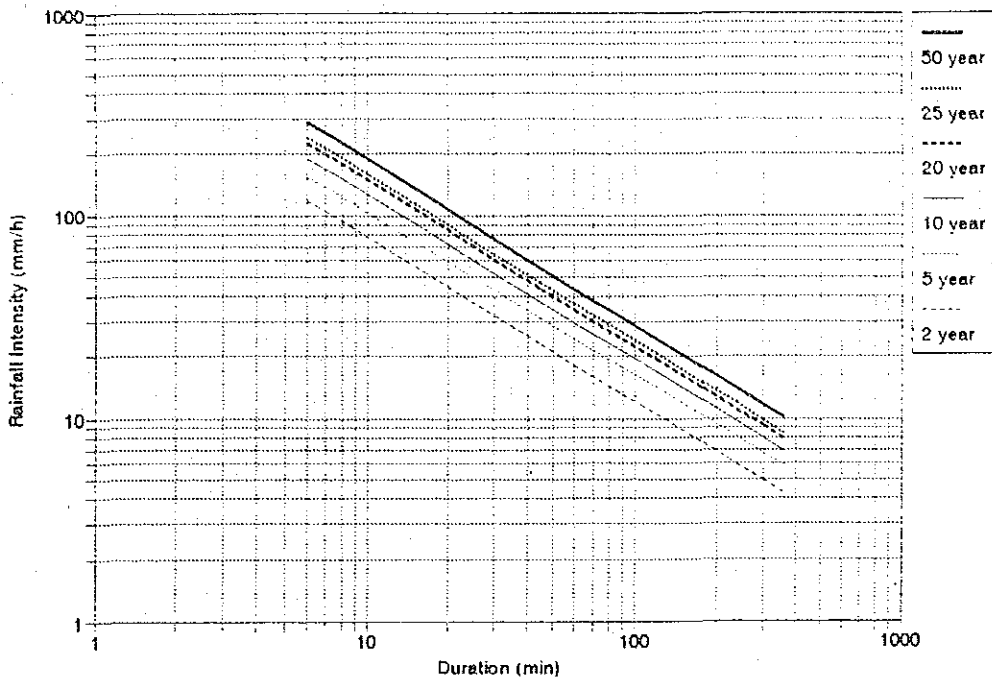


Figure 3.4

Courbes Intensité-Durée-Fréquence (2/4)
Tunis-Carthage ($I = a \times T^b / t^c$)

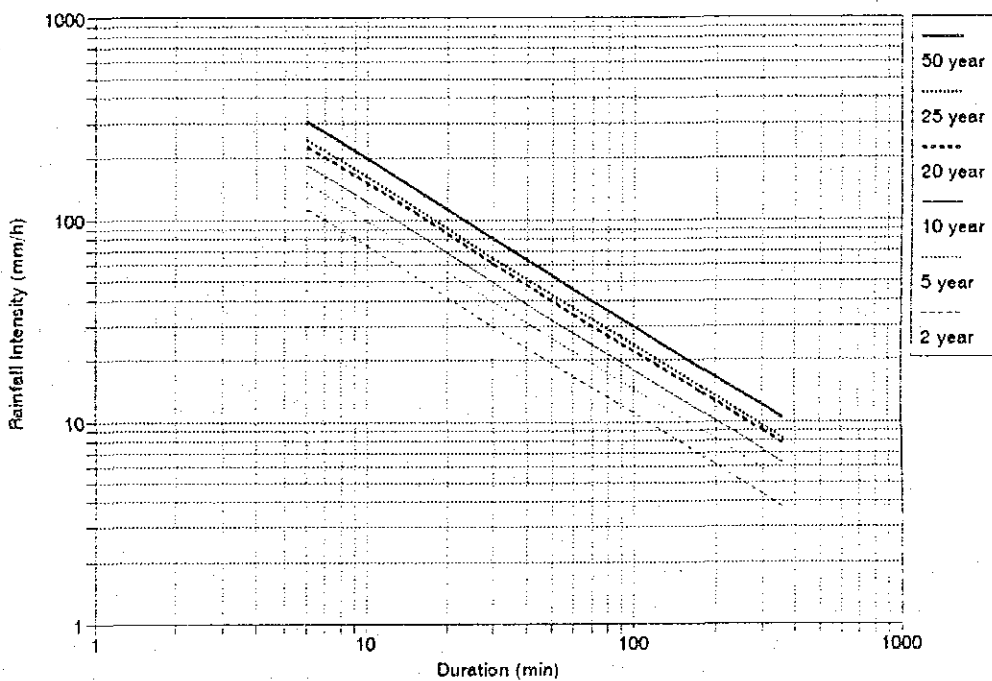


Figure 3.4

Courbes Intensité-Durée-Fréquence (3/4)
Monastir ($I = b / t^a$)

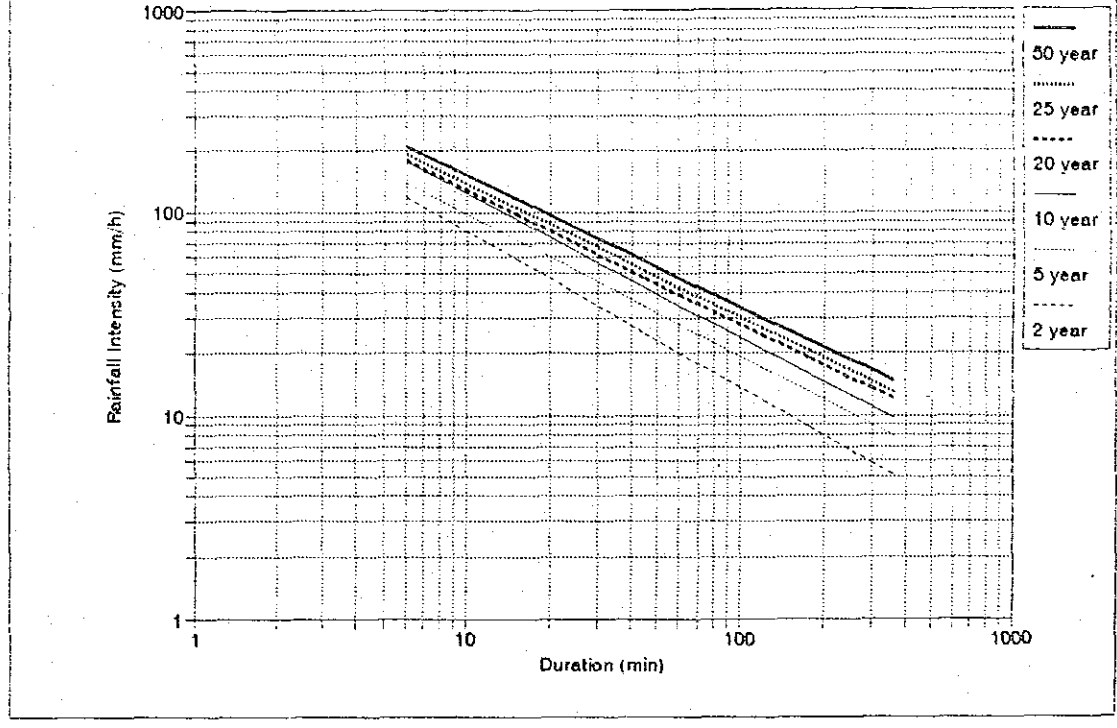
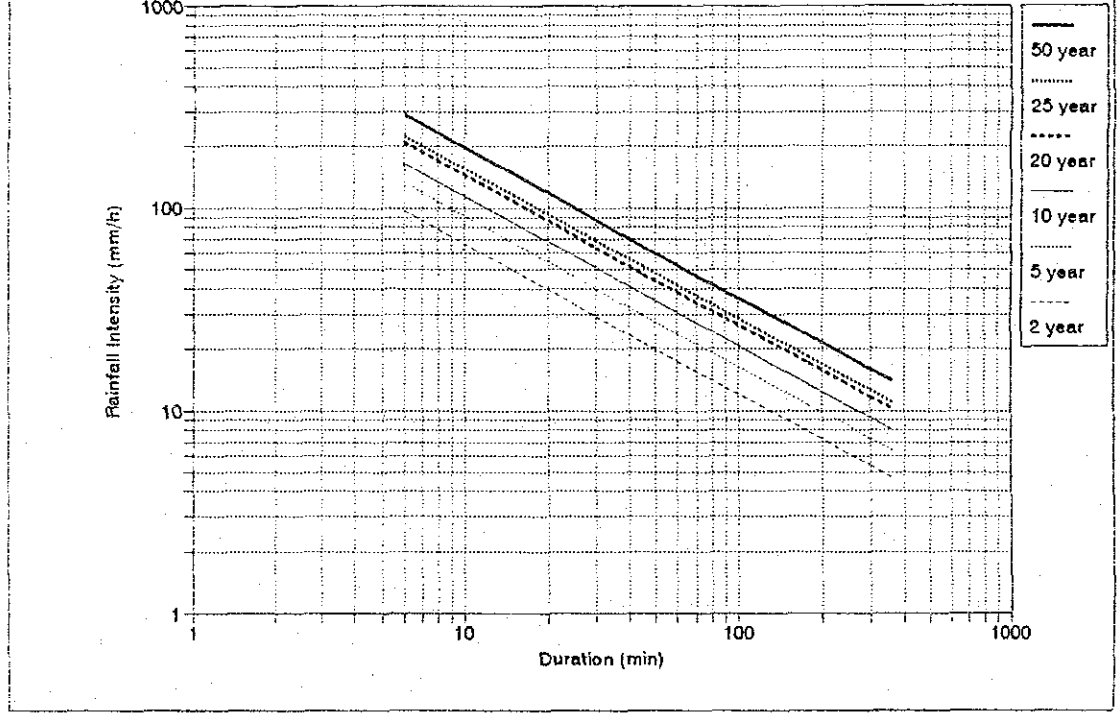


Figure 3.4

Courbes Intensité-Durée-Fréquence (4/4)
Monastir ($I = a \times T^b / t^c$)



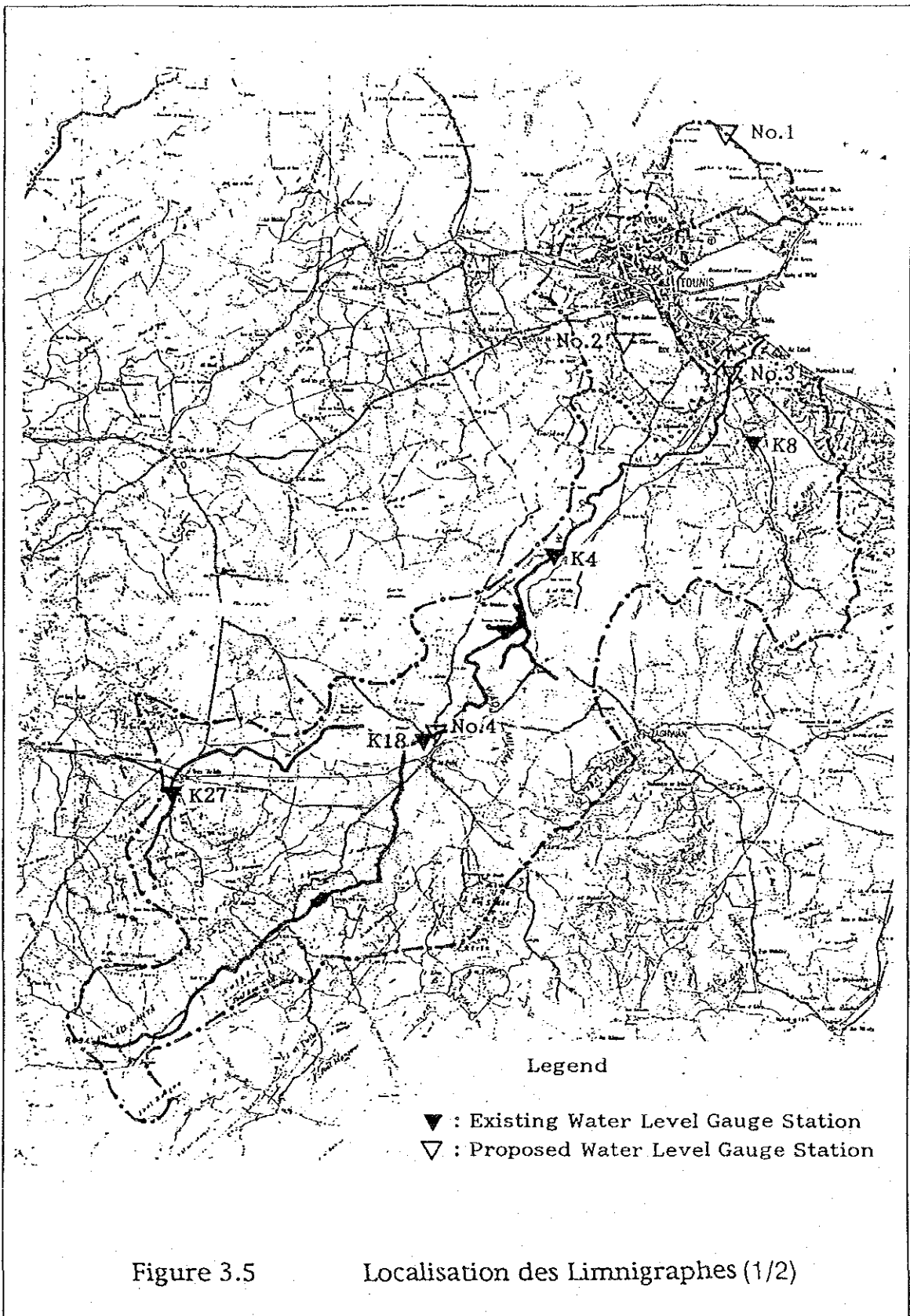


Figure 3.5

Localisation des Limnigraphes (1/2)

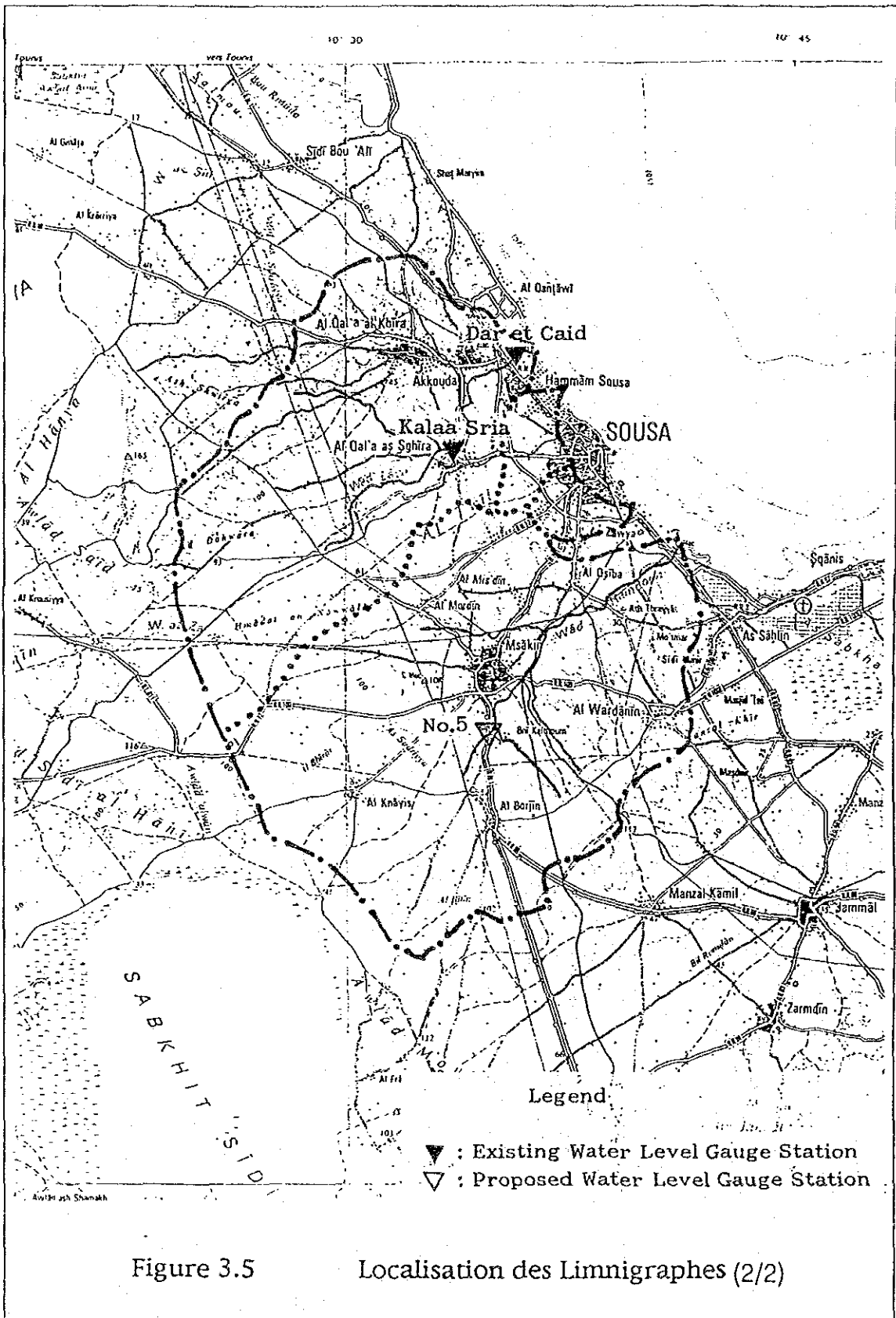


Figure 3.6

Température Mensuelle Moyenne de l'air (1/3)

Station: TUNIS-CARTHAGE (Sect. 1996 - Dec. 1991)

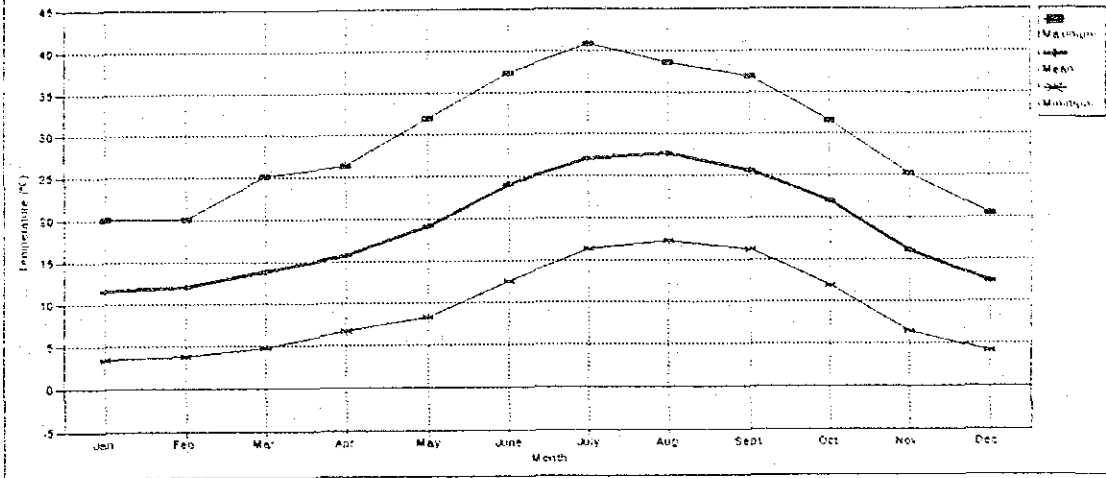


Figure 3.6

Température Mensuelle Moyenne de l'air (2/3)

Station: SILIANA (Sect. 1996 - Dec. 1991)

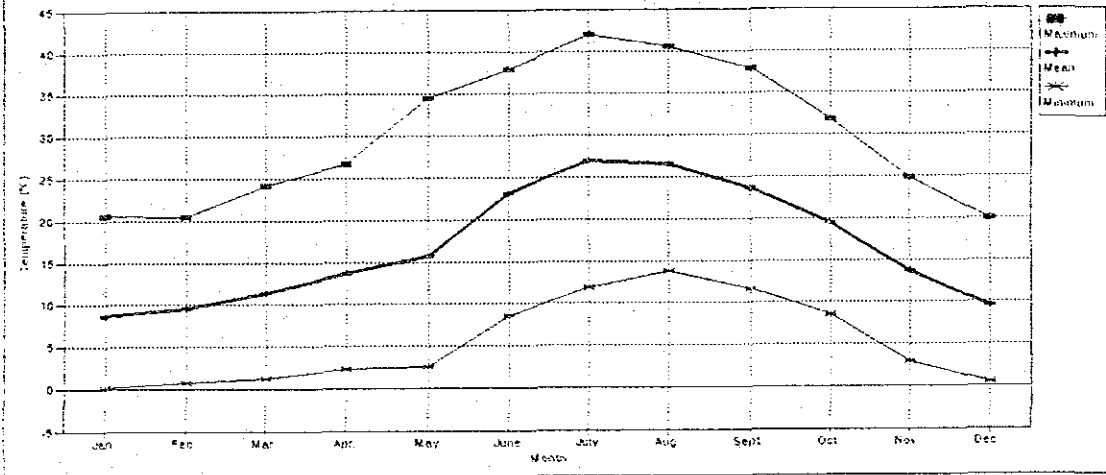


Figure 3.6

Température Mensuelle Moyenne de l'air (3/3)

Station: MONASTIR (Sect. 1996 - Dec. 1991)

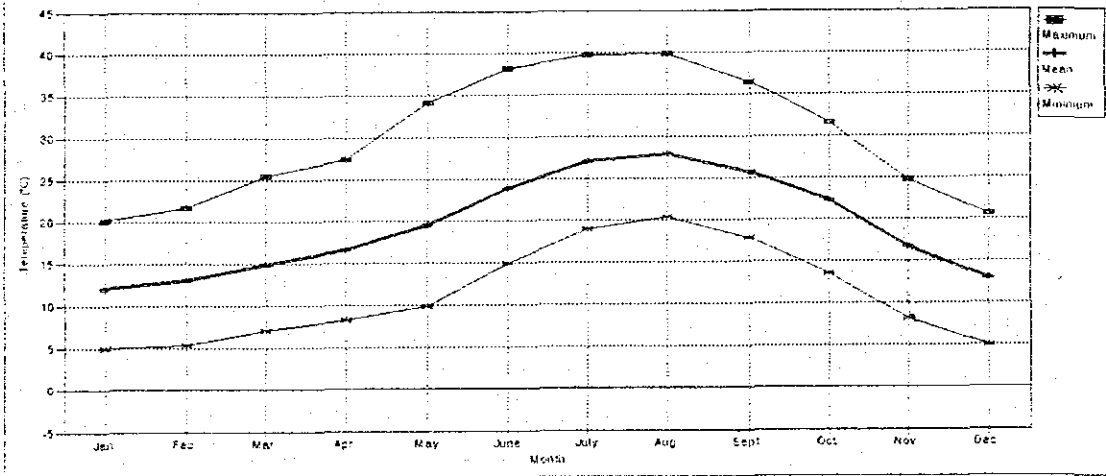


Figure 3.7

Humidité Relative Mensuelle Moyenne
(Sept. 1986 - Dec. 1991)

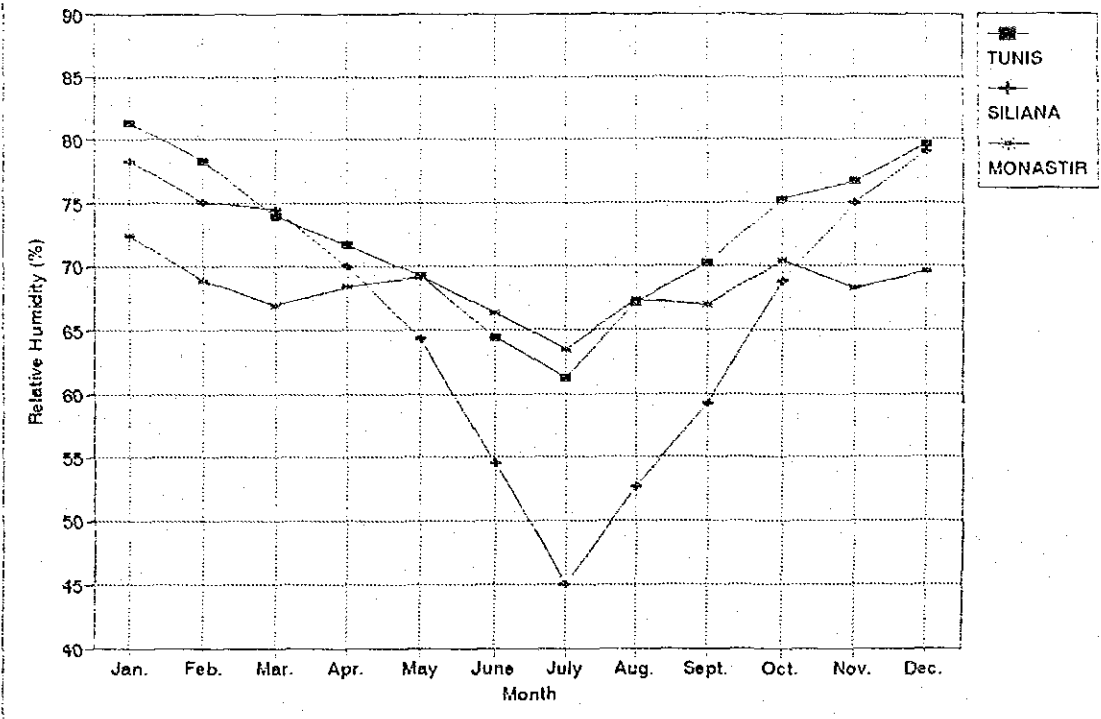


Figure 3.8

Durée Mensuelle de l'Ensoleillement
(Sept. 1986 - Dec. 1991)

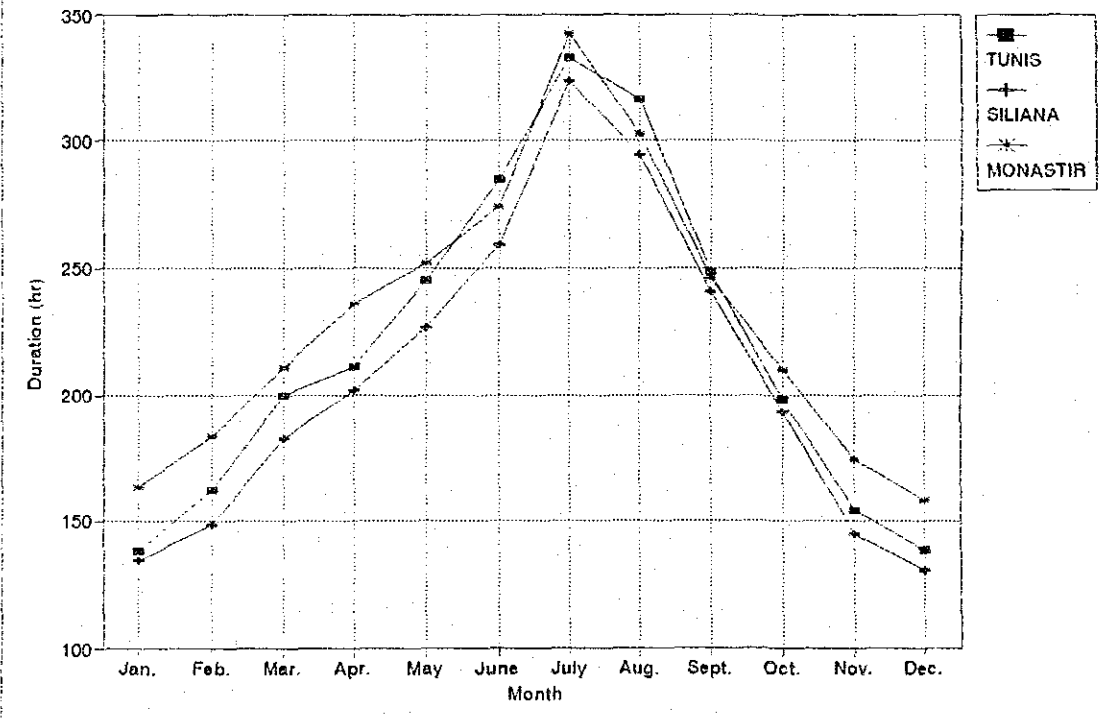


Figure 3.9

Evapotranspiration Mensuelle et Pluie (1/2)
Tunis (Sept. 1986 - Aug. 1991)

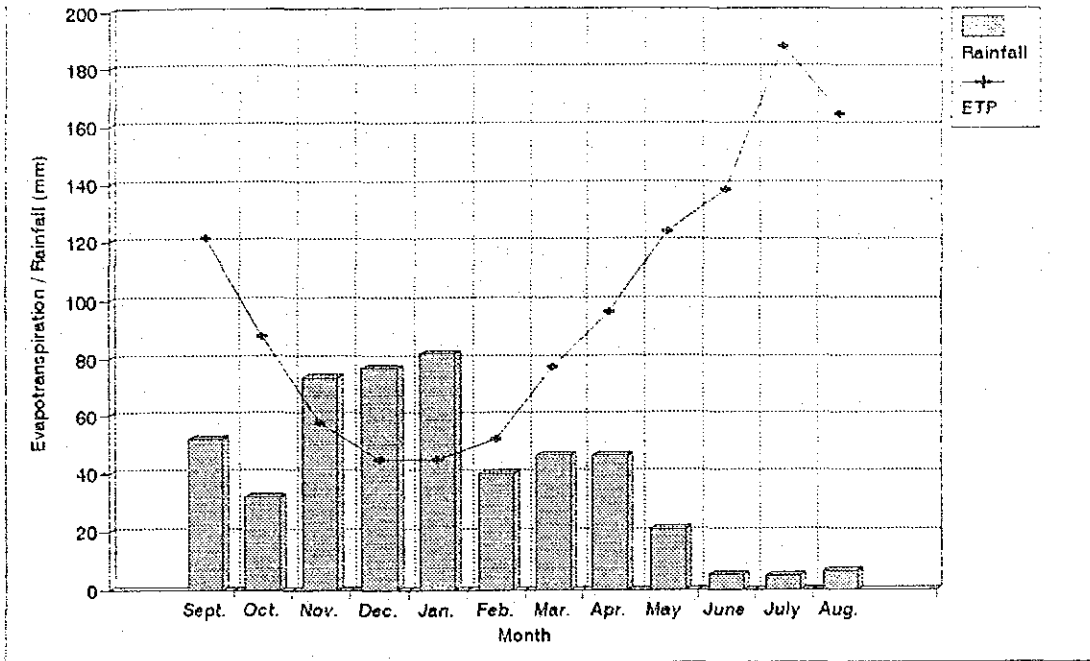


Figure 3.9

Evapotranspiration Mensuelle et Pluie (2/2)
Sousse (Sept. 1986 - Aug. 1991)

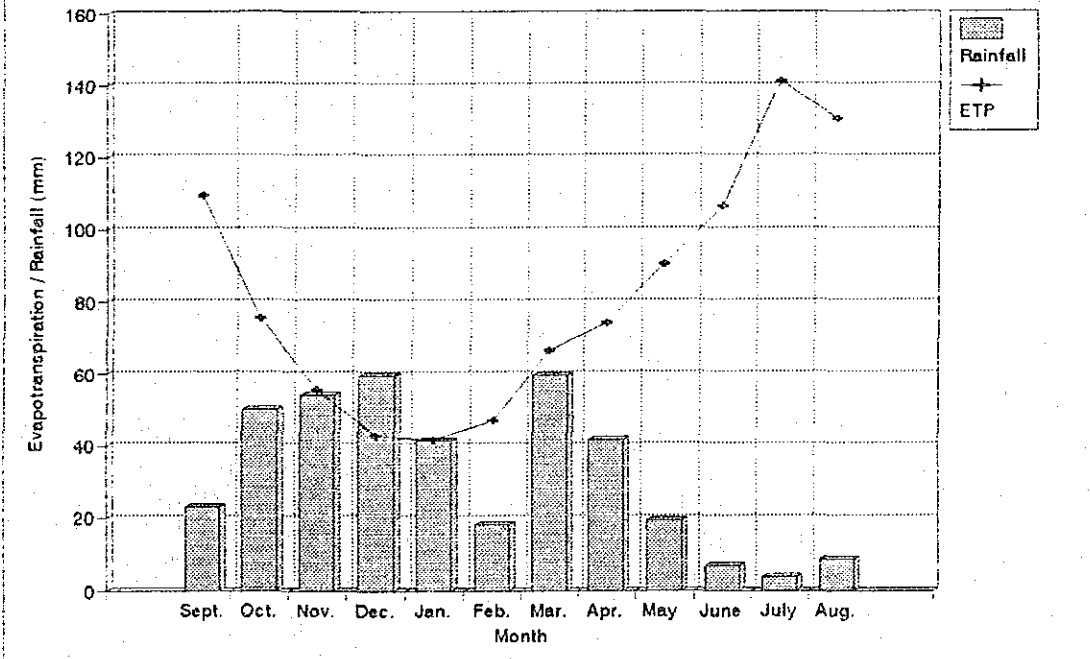


Figure 3.10

Hauteur de la Pluie Mensuelle (1/3)

Tunis-Carthage (Sept. 1985 - Dec. 1991)

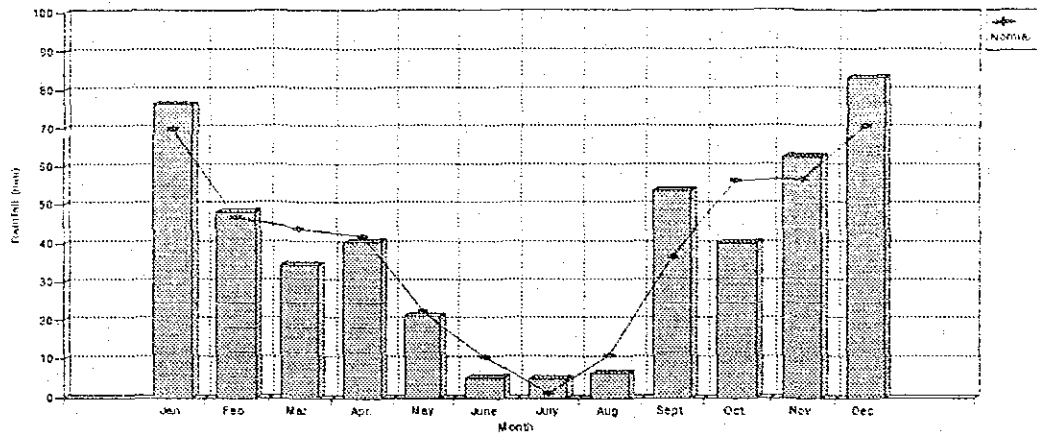


Figure 3.10

Hauteur de la Pluie Mensuelle (2/3)

Siliana (Sept. 1985 - Dec. 1991)

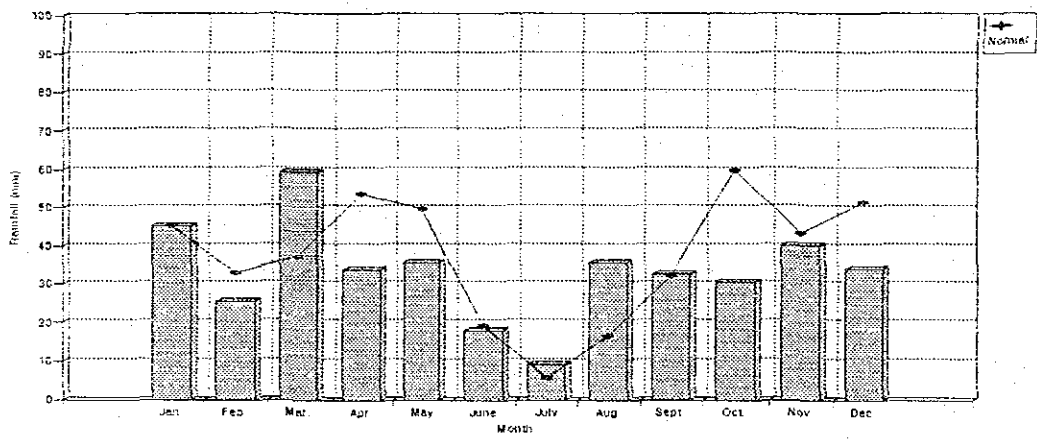


Figure 3.10

Hauteur de la Pluie Mensuelle (3/3)

Sousse (Sept. 1985 - Dec. 1991)

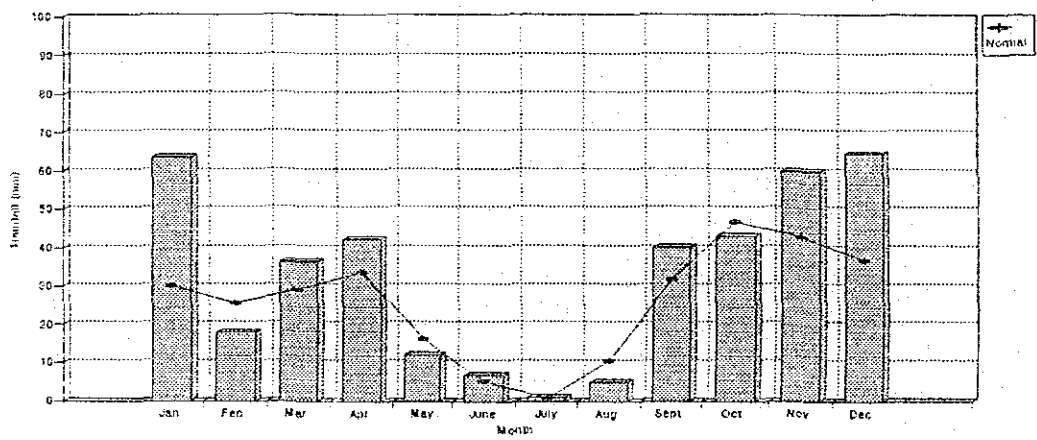


Figure 3.11 Pluie Annuelle à Tunis (1/5)
AIN DJAJA PONT DU FAHS

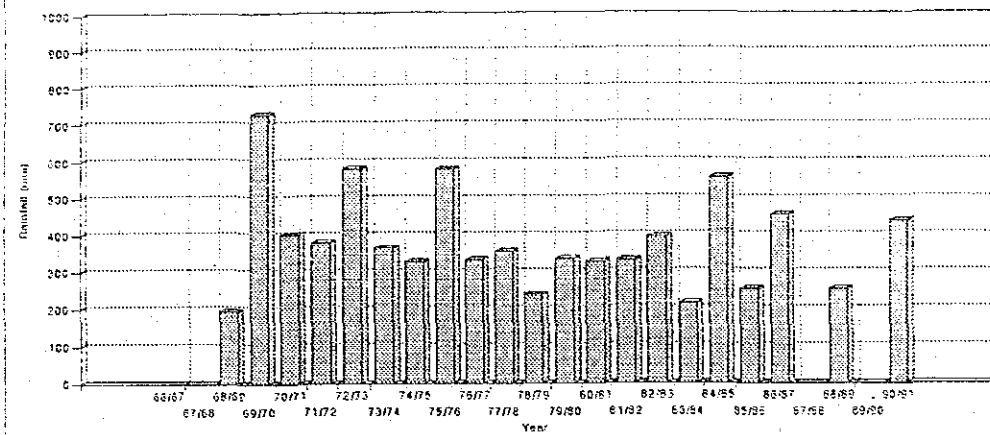


Figure 3.11 Pluie Annuelle à Tunis (2/5)
BIR MCHERGA SM

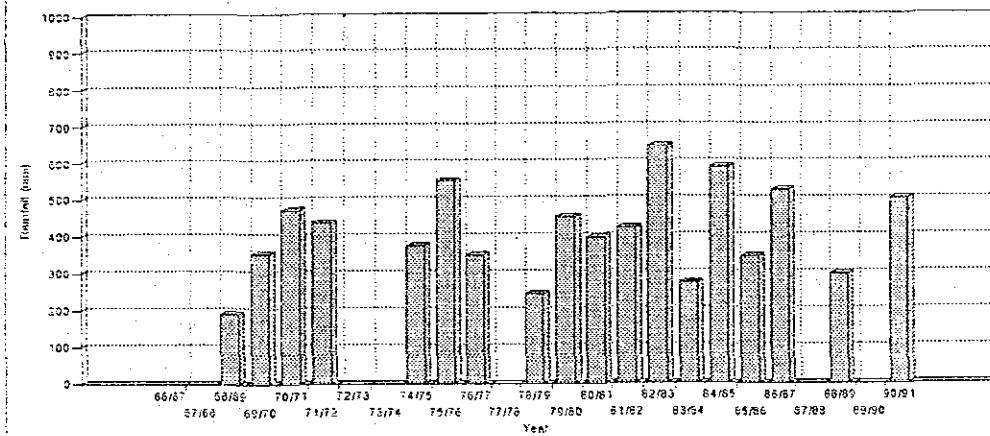


Figure 3.11 Pluie Annuelle à Tunis (3/5)
DOMAINE DECHAMUNE

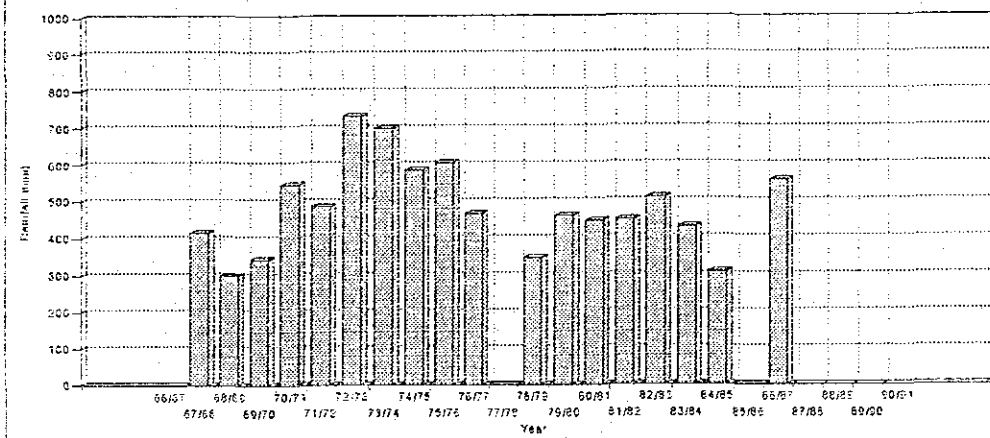


Figure 3.11 Pluie Annuelle à Tunis(4/5)
ROBAA GN

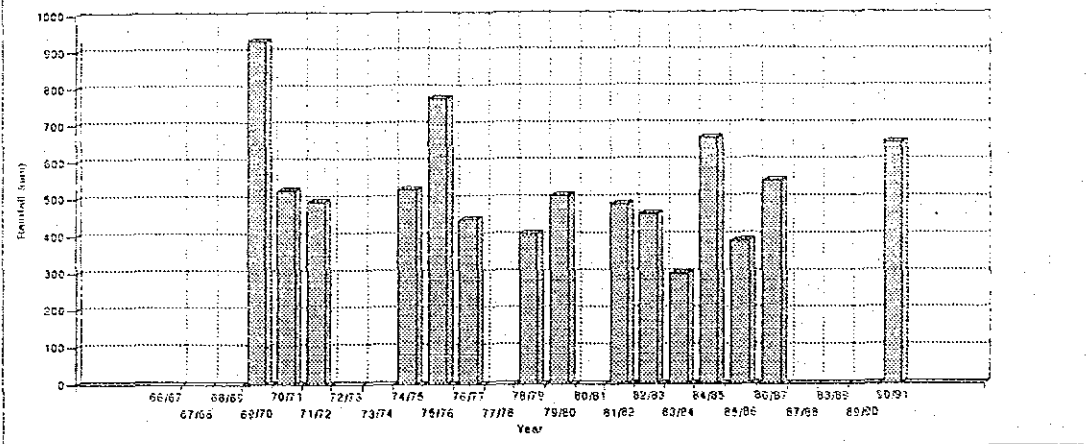


Figure 3.11 Pluie Annuelle à Tunis (5/5)
TUNIS CARTHAGE SM

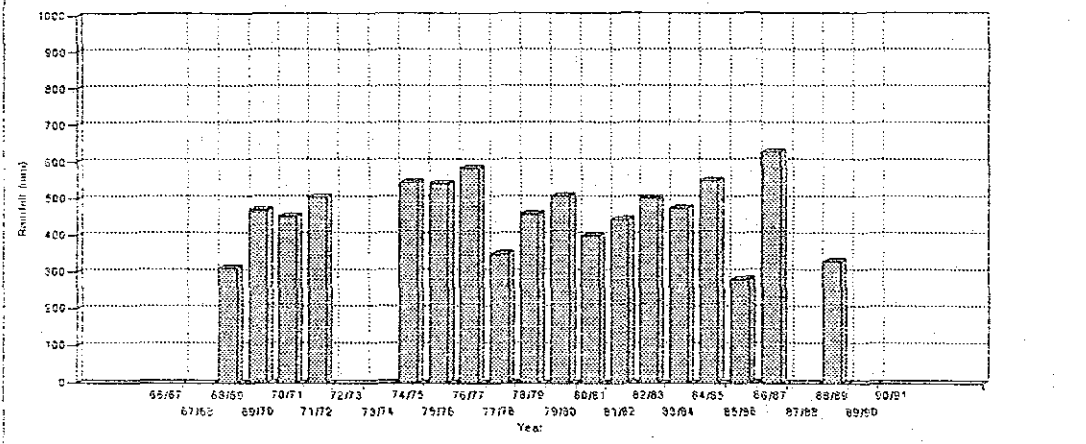


Figure 3.12

Pluie Mensuelle à Tunis (1/5)
AIN DJAJA PONT DU FAHS

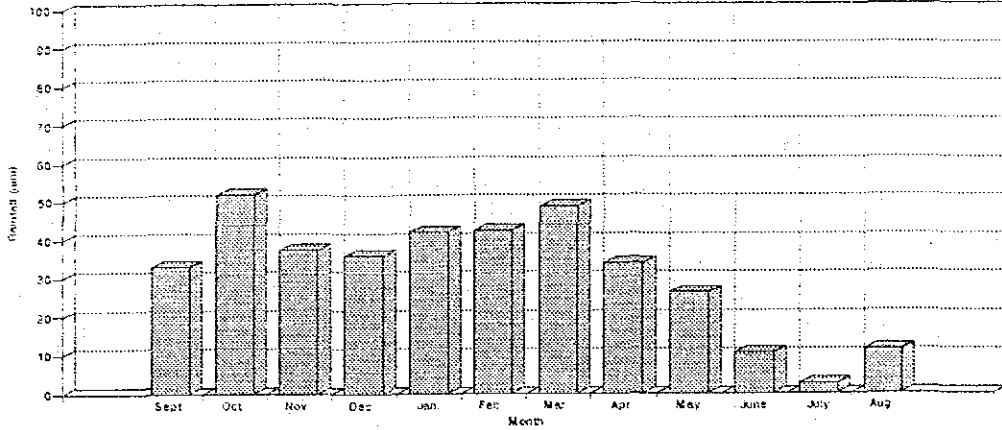


Figure 3.12

Pluie Mensuelle à Tunis (2/5)
BIR MCHERGA SM

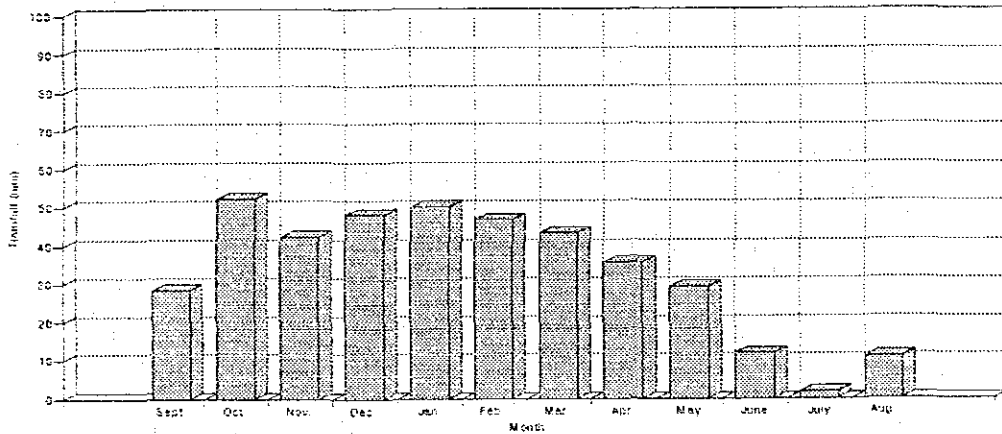


Figure 3.12

Pluie Mensuelle à Tunis (3/5)
DOMAINE DECHAMUNE

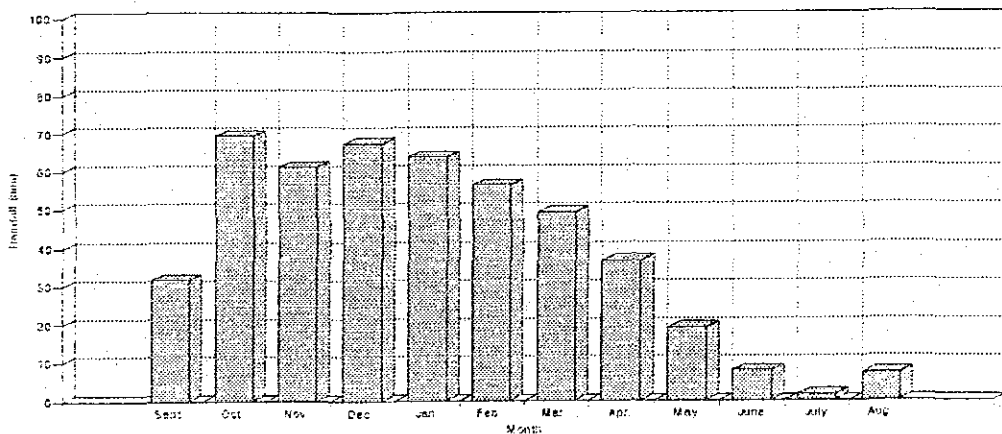


Figure 3.12 Pluie Mensuelle à Tunis (4/5)
ROBAA GN

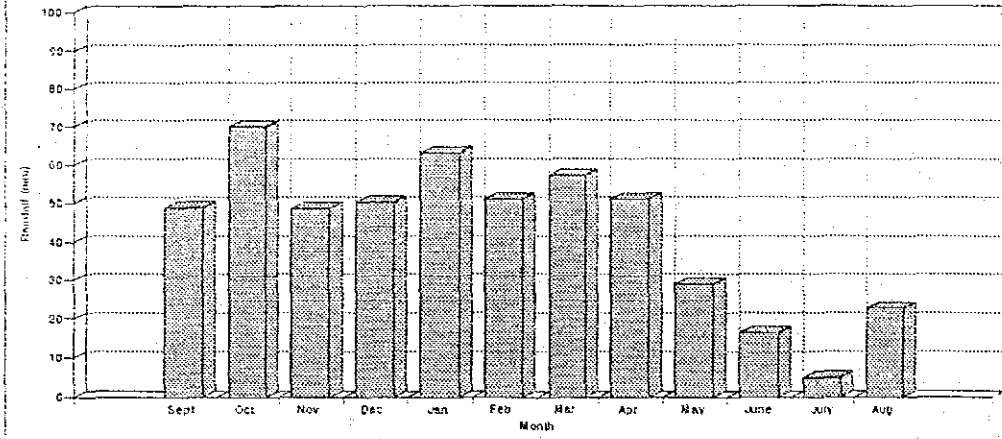
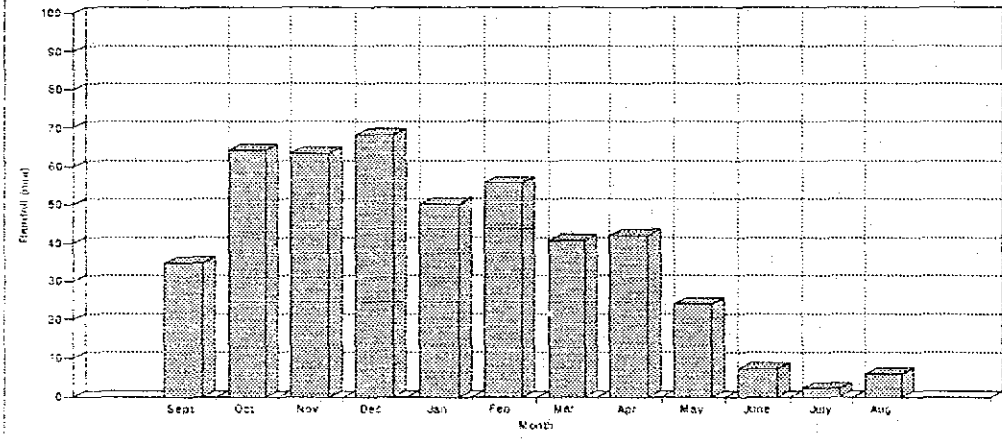
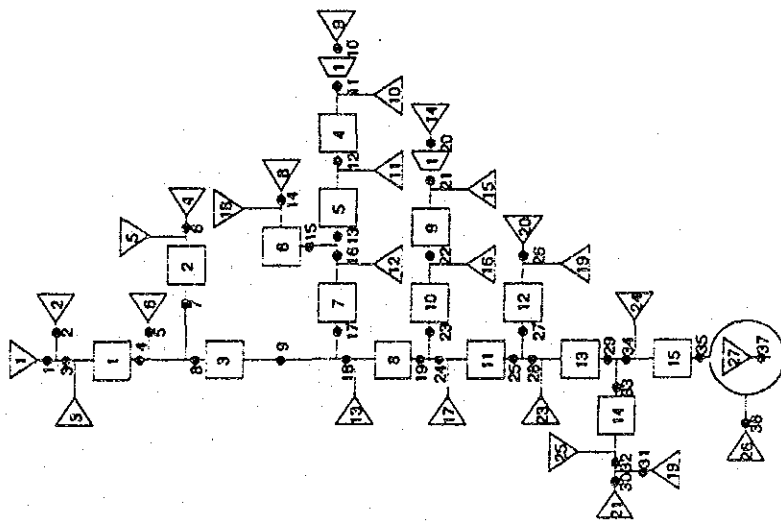


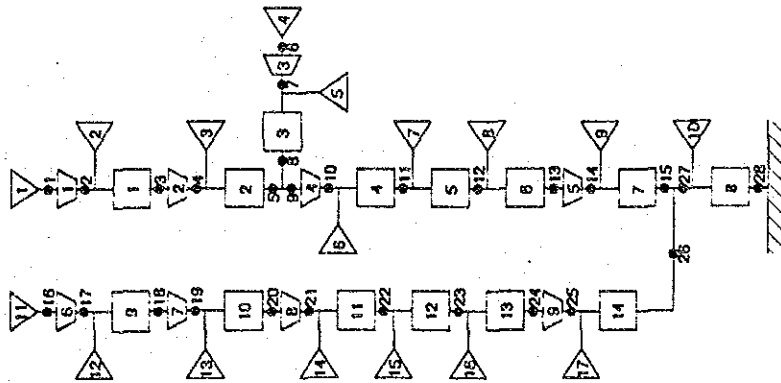
Figure 3.12 Pluie Mensuelle à Tunis (5/5)
TUNIS CARTHAGE SM



Oued Ennkhitlet



Oued Greb



LEGEND




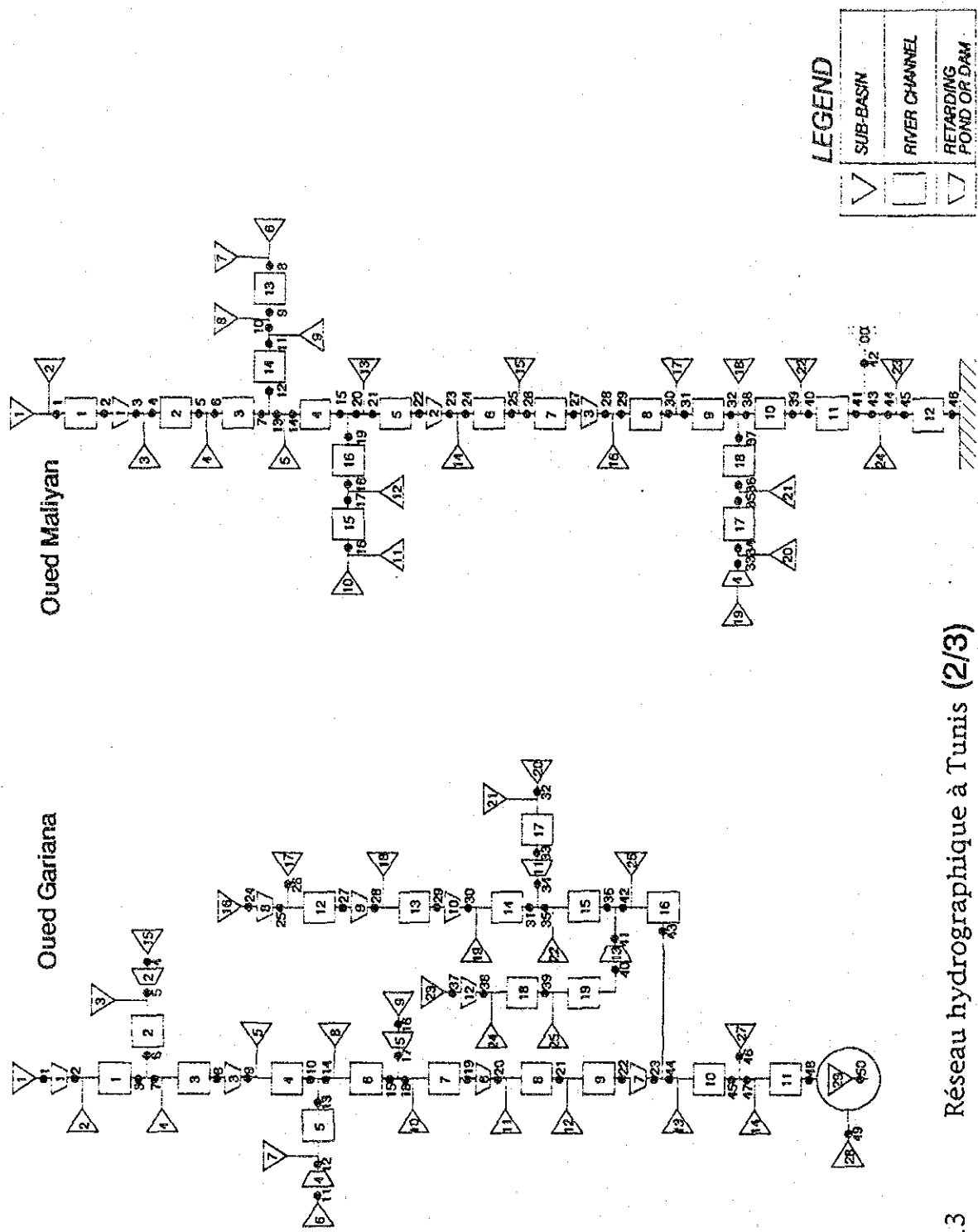
	SUB-BASIN
	RIVER CHANNEL
	RETARDING POND OR DAM

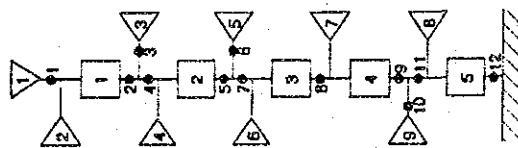
Figure 3.13 Réseau hydrographique à Tunis (1/3)



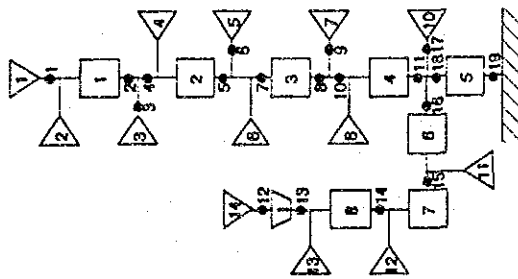
Réseau hydrographique à Tunis (2/3)

Figure 3.13

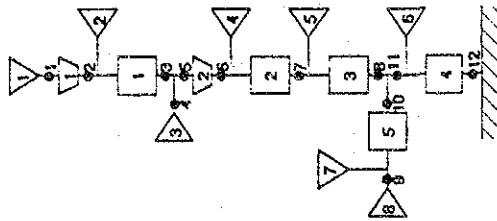
Oued Magzette



Oued Bou Khamsa



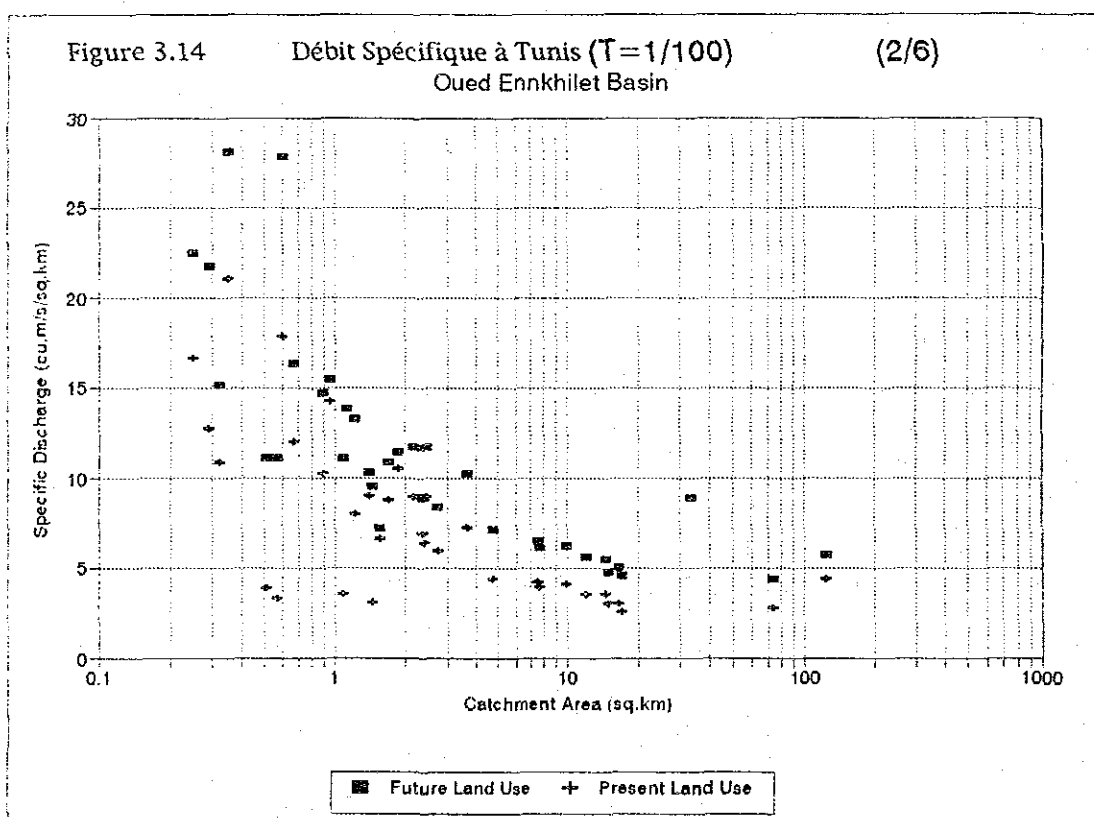
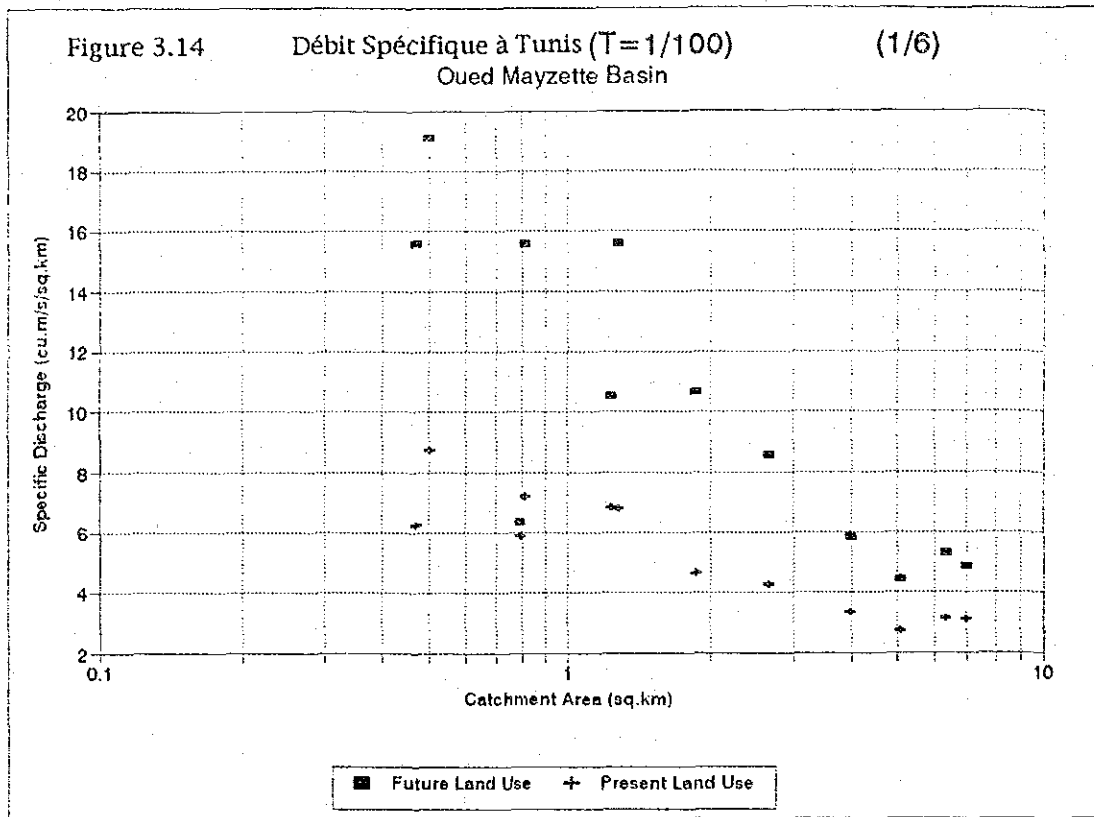
Oued Ain Zerga

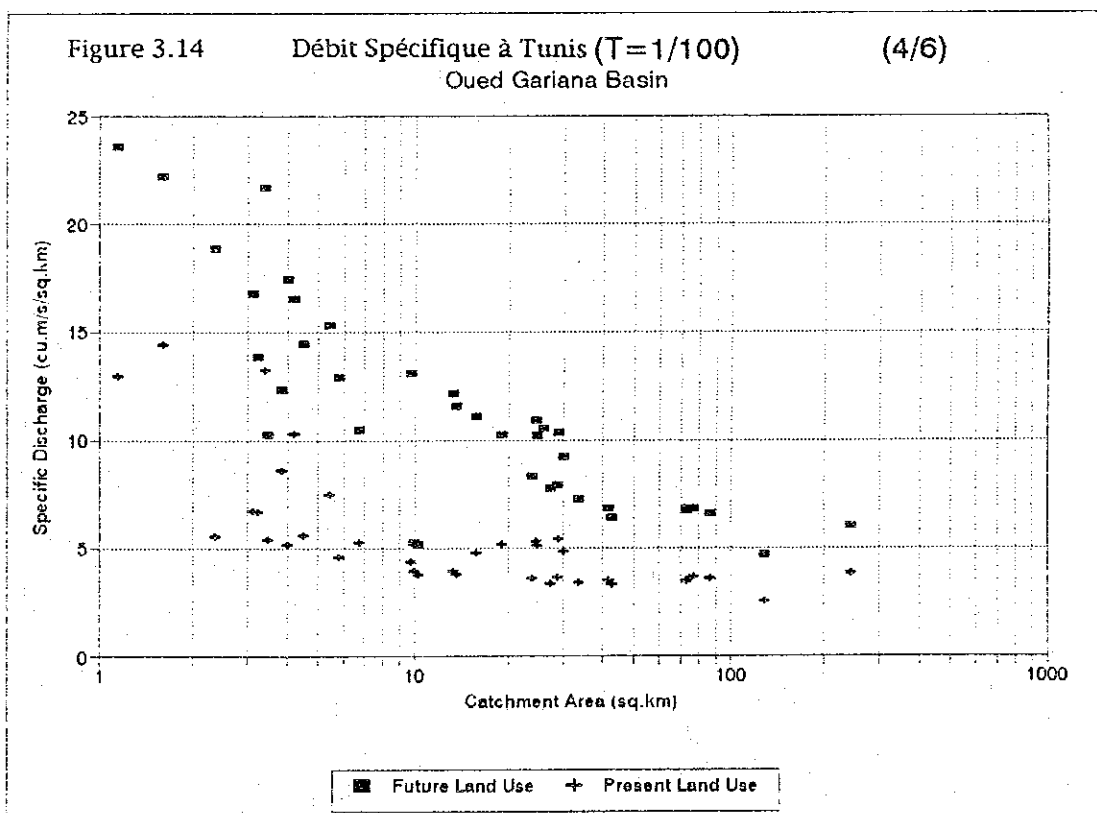
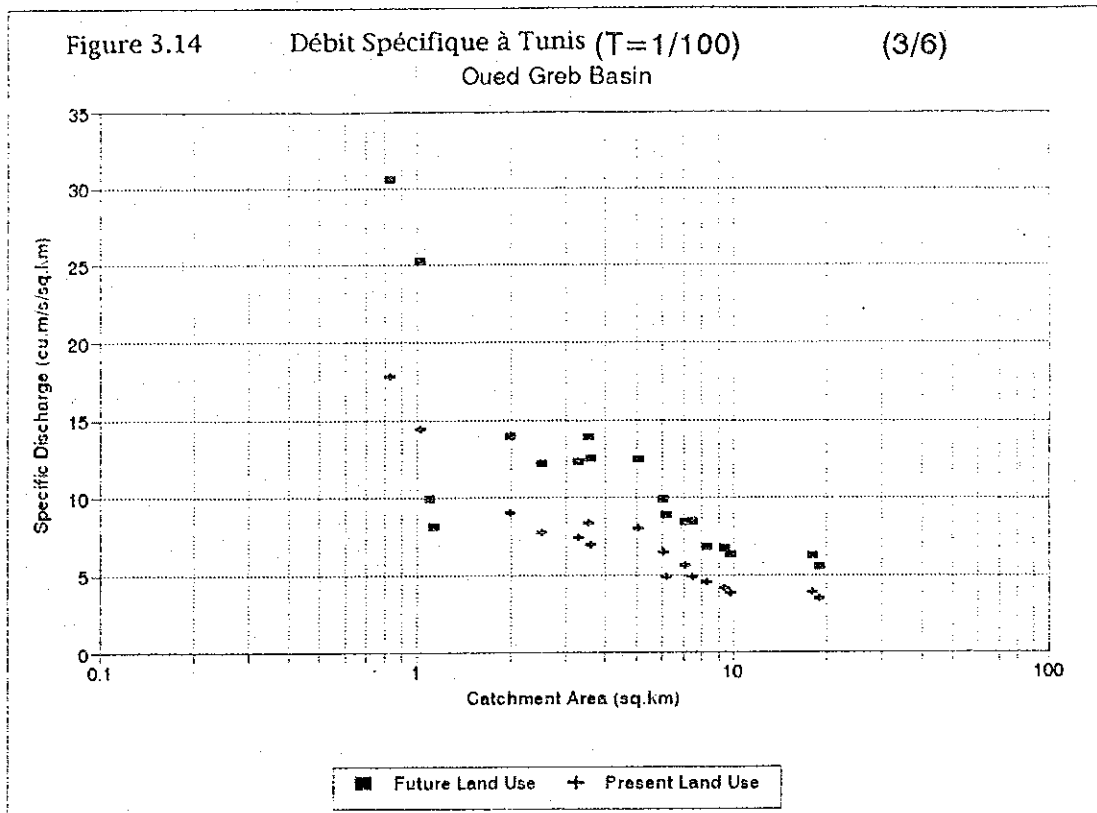


LEGEND

	SUB-BASIN
	RIVER CHANNEL
	RETARDING POND OR DAM

Figure 3.13 Réseau hydrographique à Tunis (3/3)





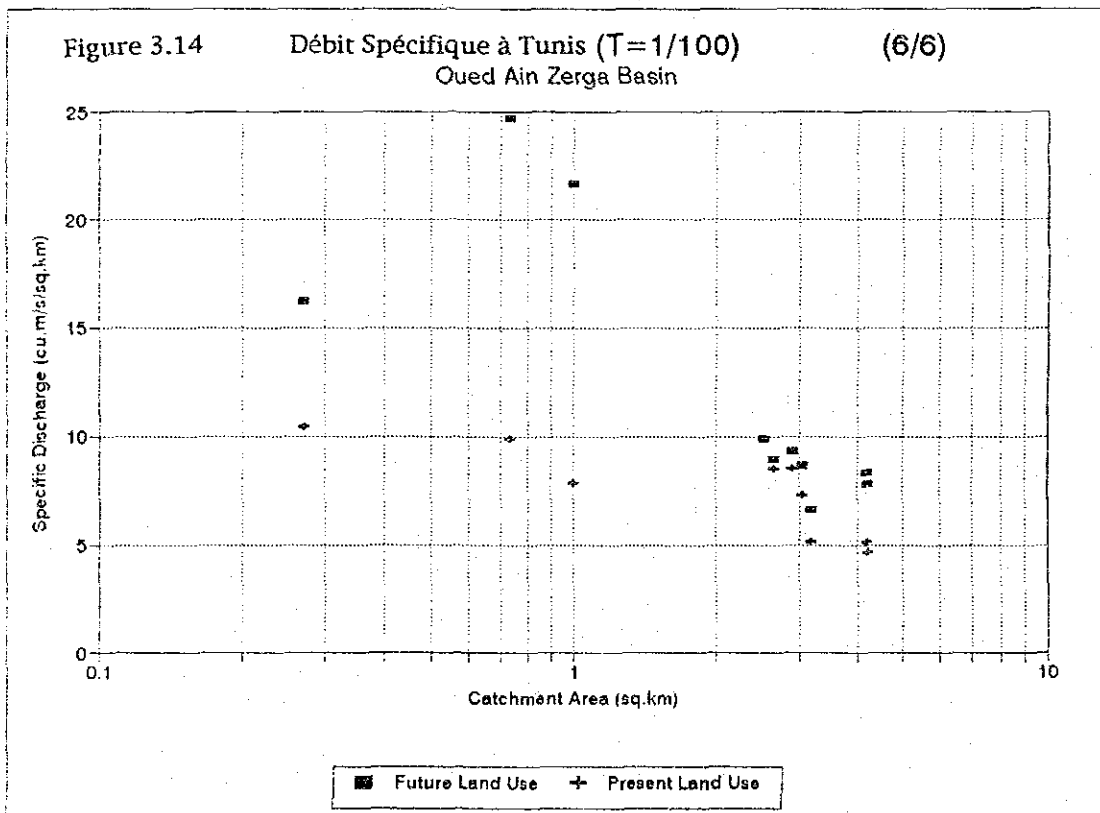
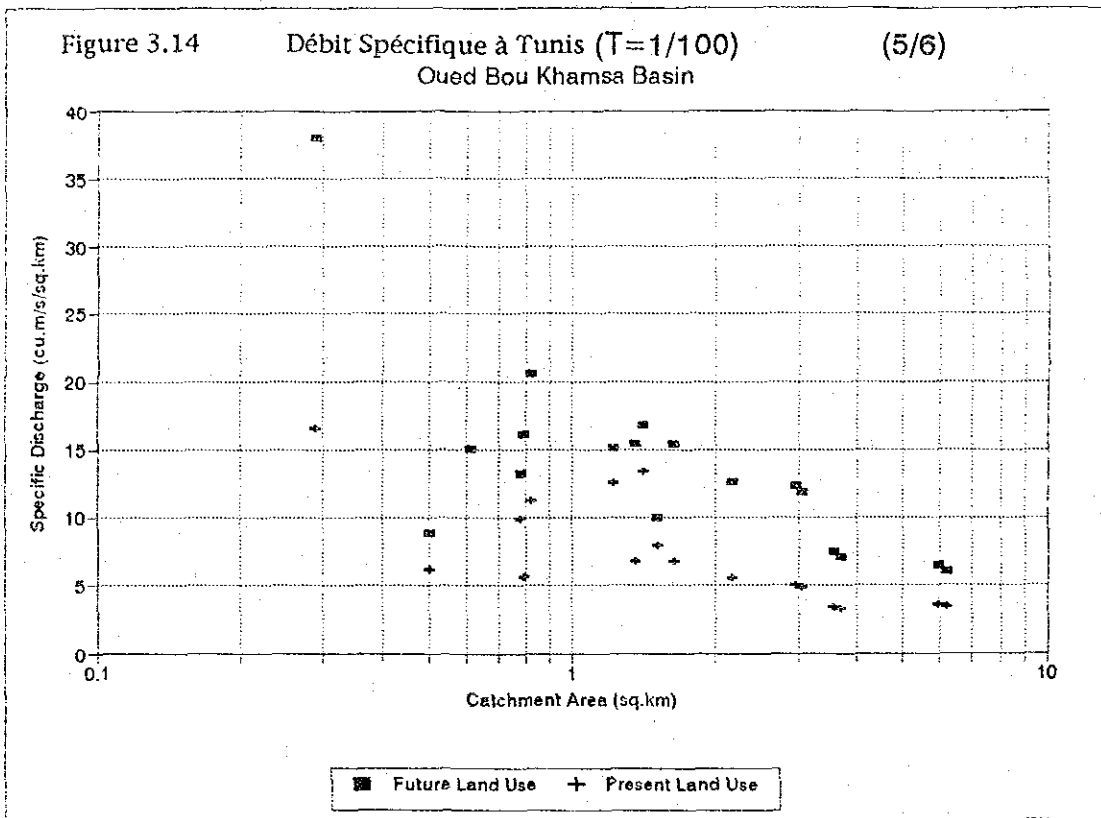


Figure 3.15 Pluie projet à Tunis (par la méthode des blocks alternatifs) (1/2)
 (example : developed in 60-min increment for 100-year 24-hour)

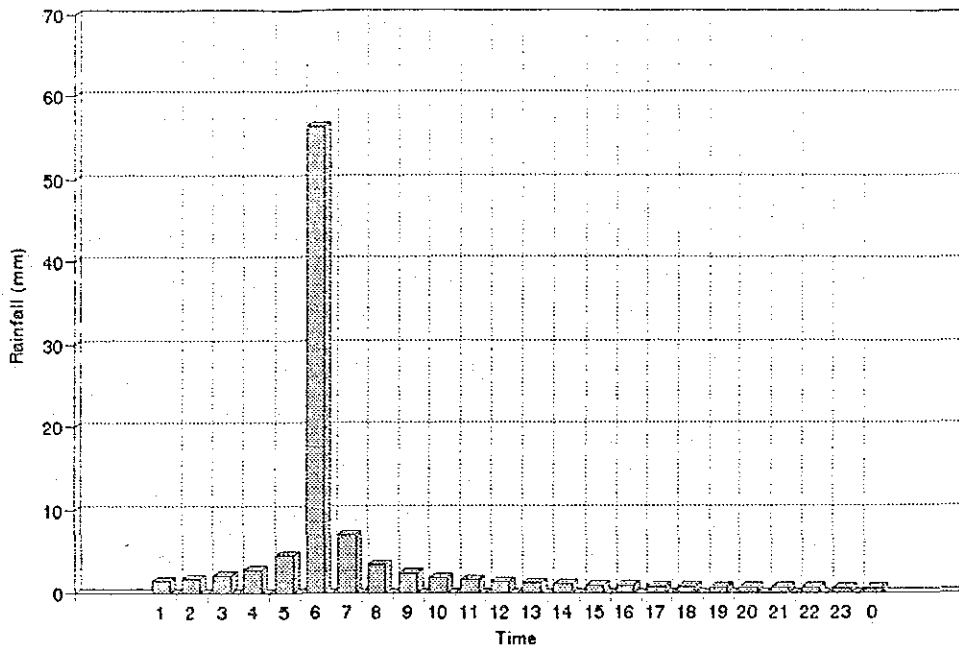


Figure 3.15 Pluie projet à Tunis (par la méthode des blocks alternatifs) (2/2)
 (example : developed in 60-min increment for 10-year 24-hour)

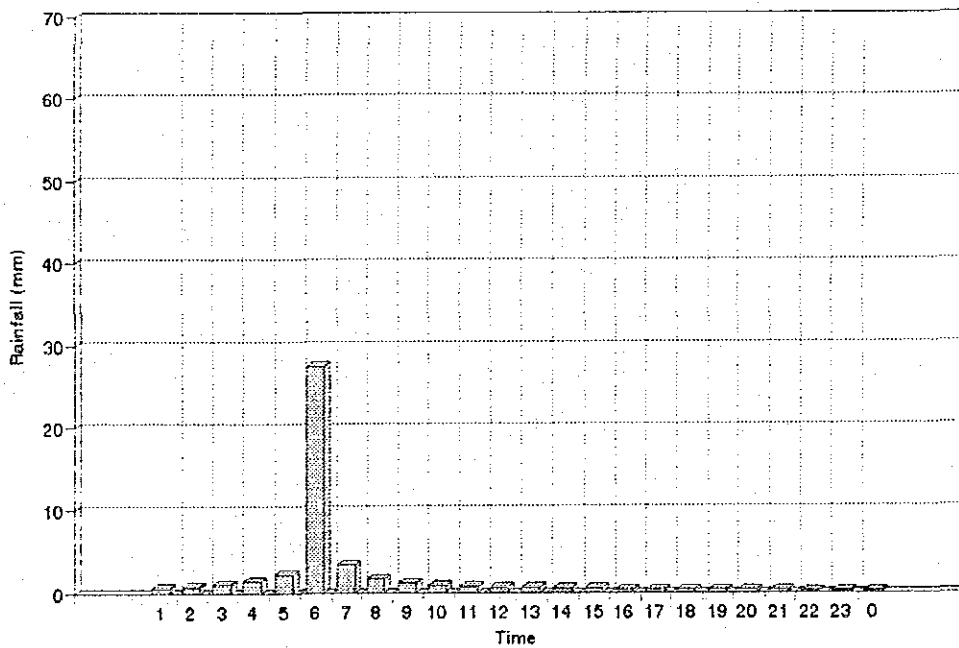


Figure 3.16

Hyétogramme observé à Tunis (1/6)
Station : Tuni-Mancubia (47835) 27 - 29. Mar. '73 Flood

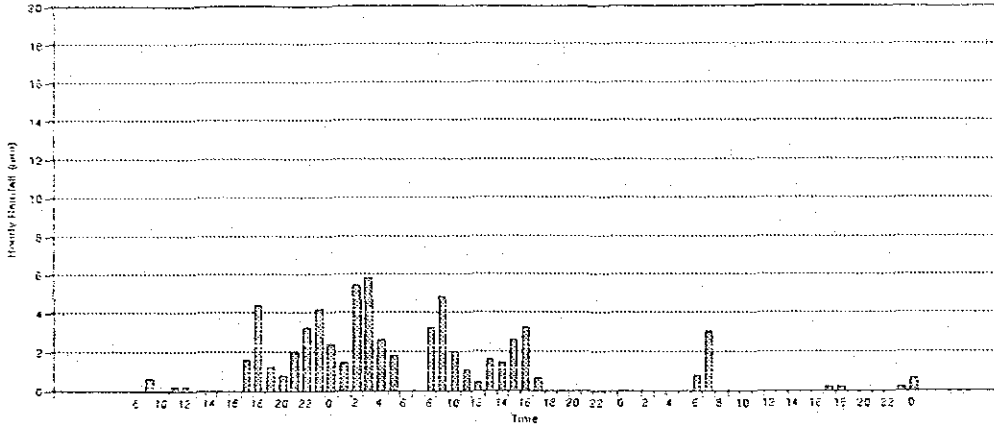


Figure 3.16

Hyétogramme observé à Tunis (2/6)
Station : Pont Du Fahs (45246) 27 - 29. Mar. '73 Flood

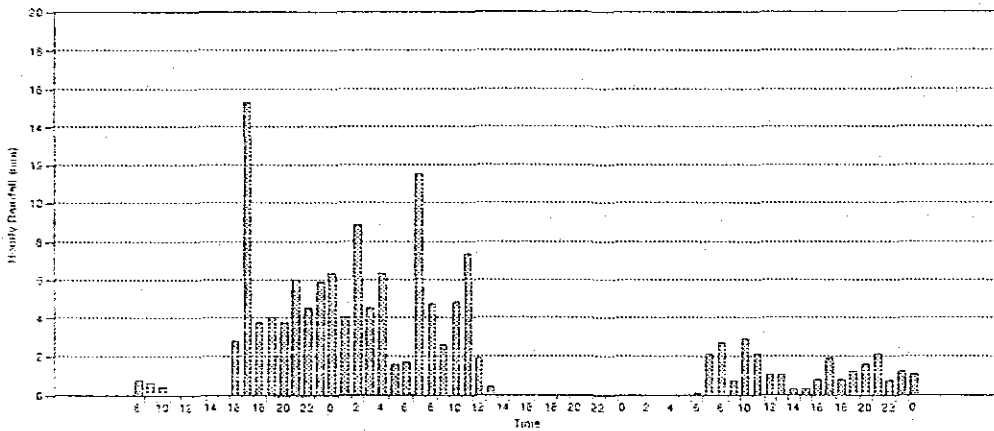
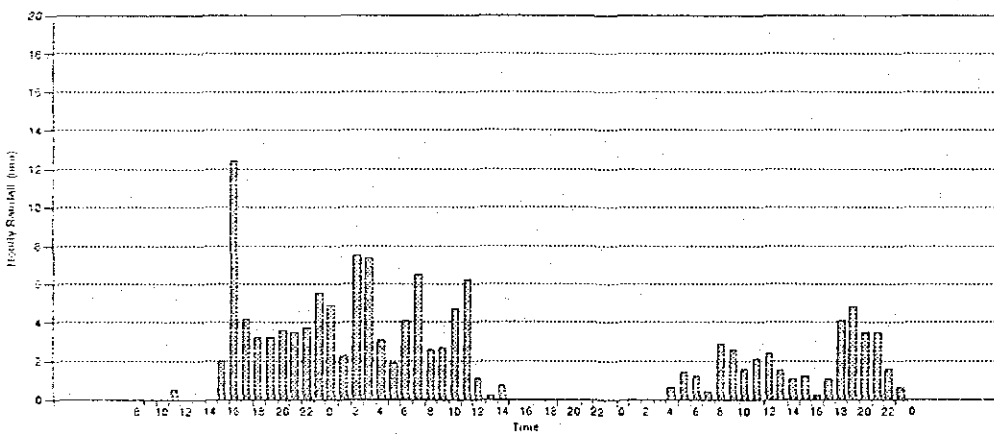


Figure 3.16

Hyétogramme observé à Tunis (3/6)
Station : Barrage Kebir (45232) 27 - 29. Mar. '73 Flood



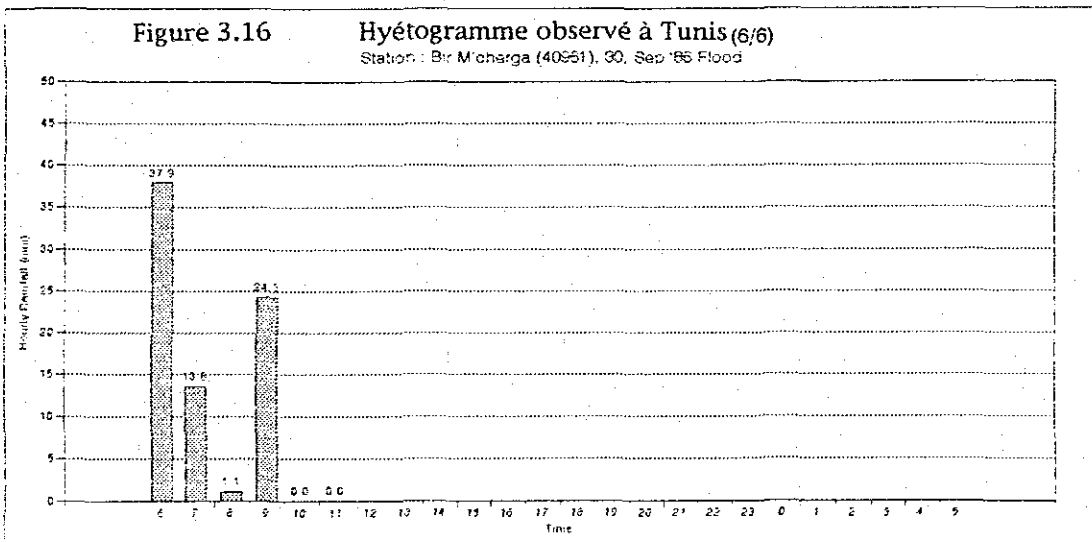
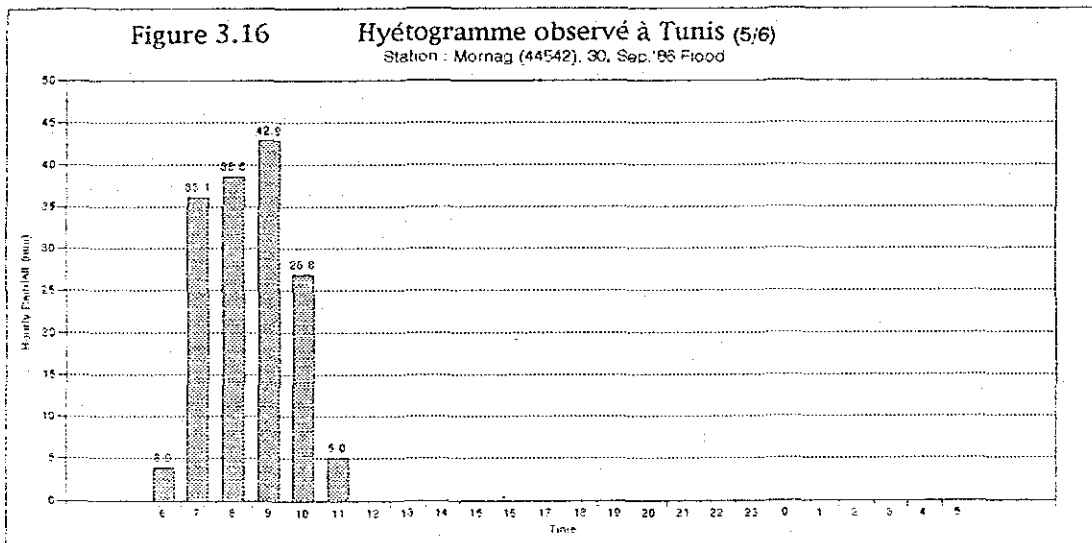
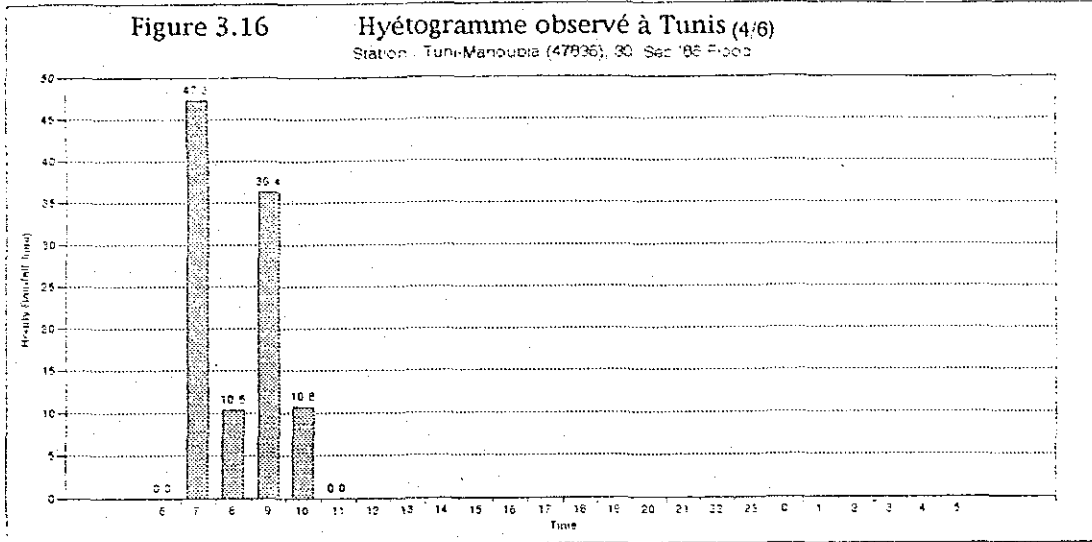


Figure 3.17 Résultat du Modèle de Simulation
 (Hydrograph at Bir M'cherga on Mar. 27 '73 Flood; 0.2K, f=0.25, Rsa=140mm)

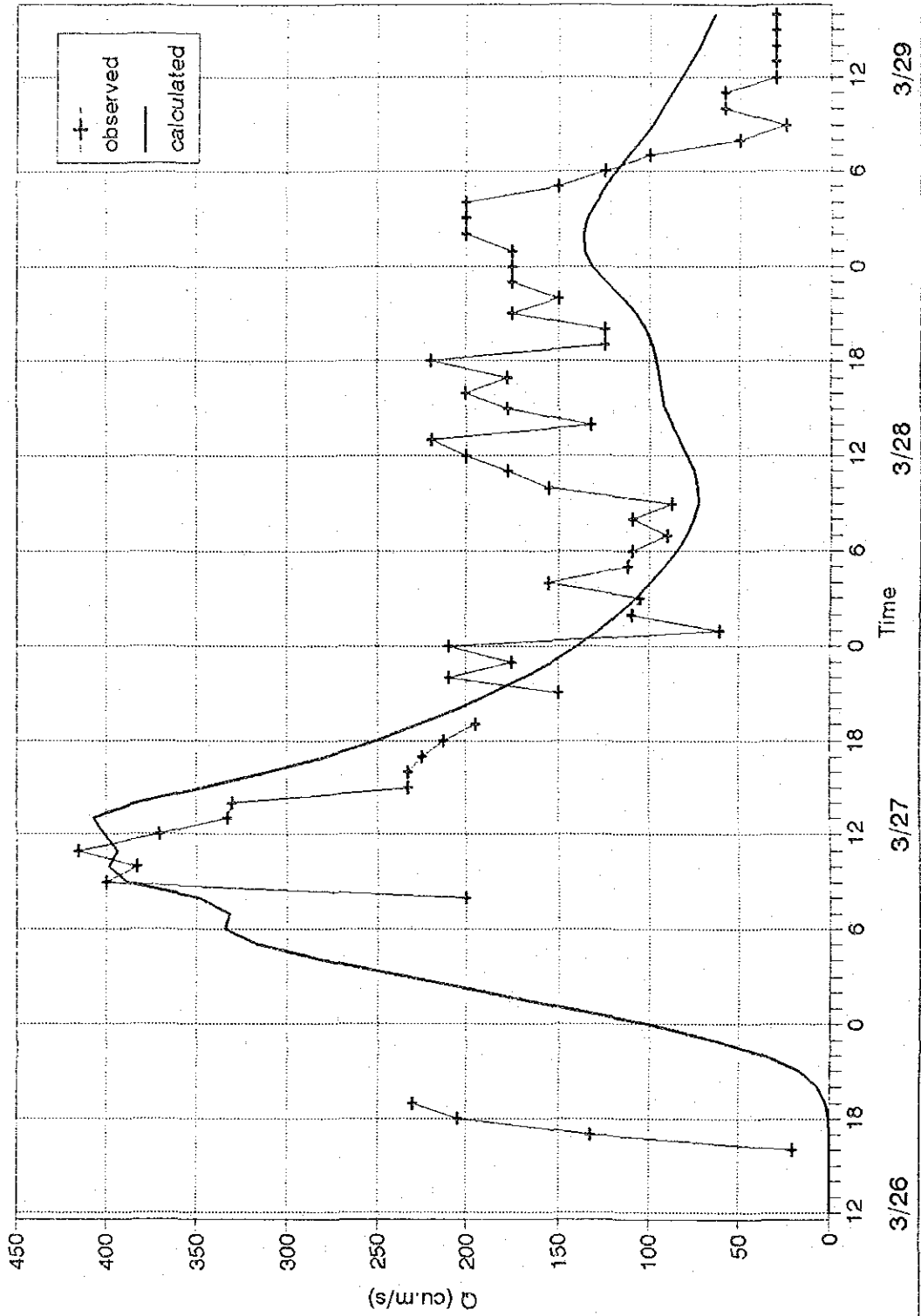


Figure 3.18 Débit Spécifique dans le Bassin de Meliyan ($T = 1/100$)
 Oued Maliyan Basin

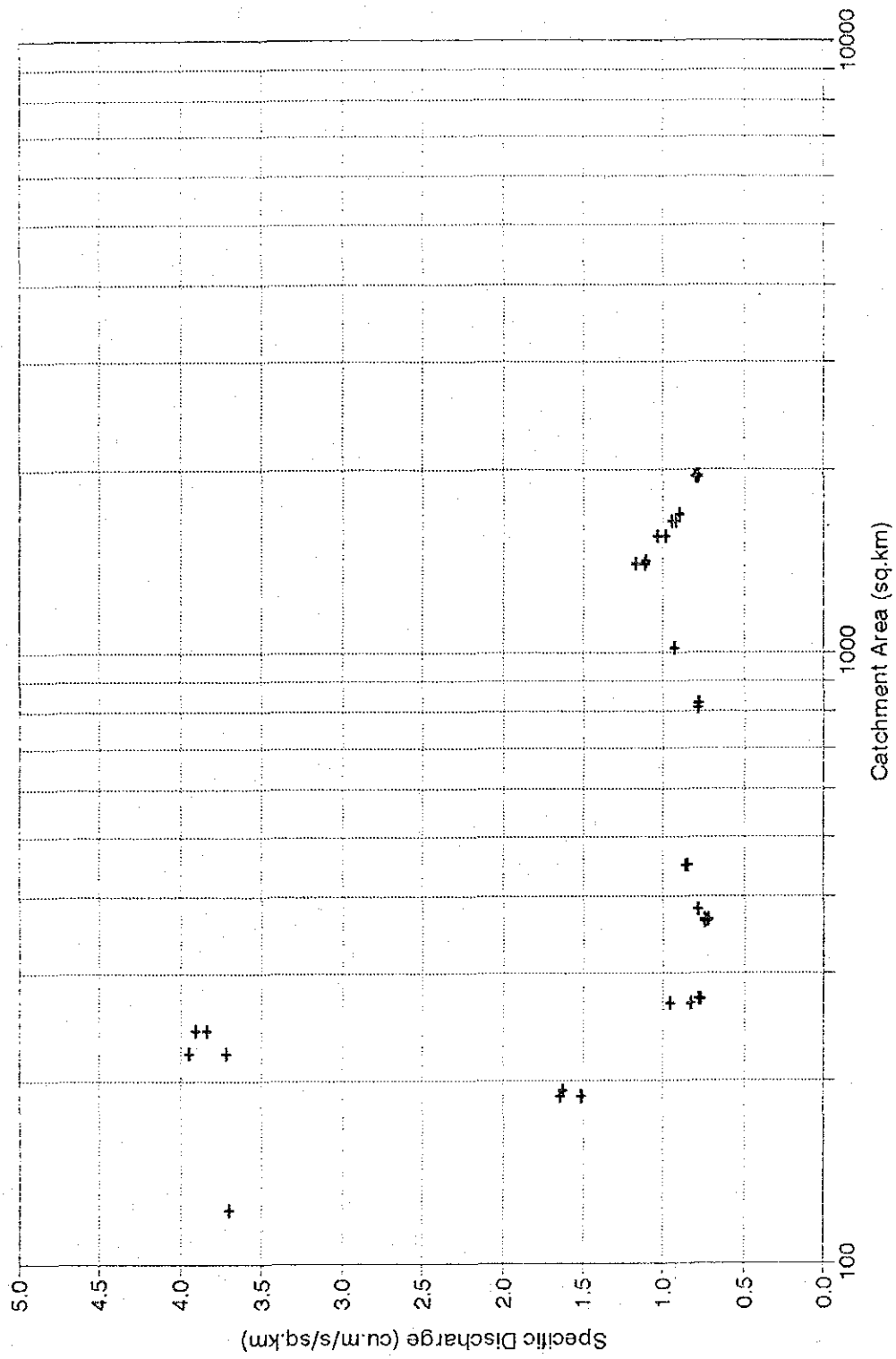


Figure 3.19

Pluie Annuelle à Soussse (1/2)

KALAA SEGHIRA

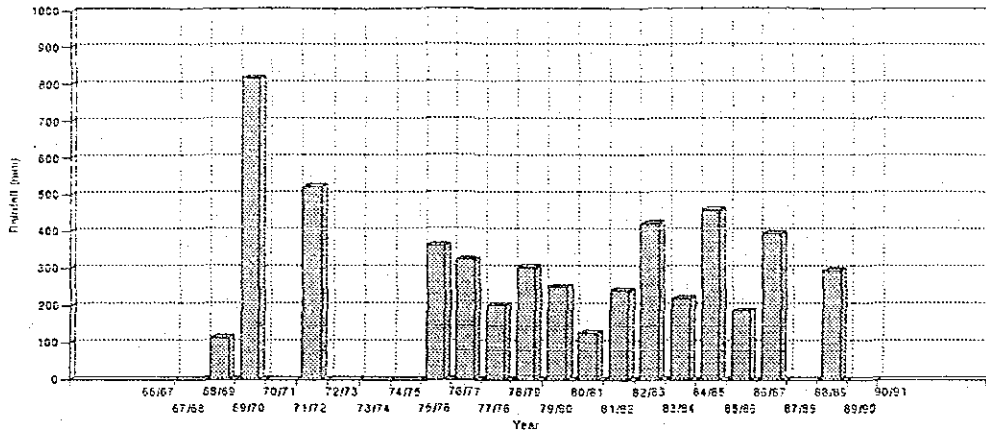


Figure 3.19

Pluie Annuelle à Soussse (2/2)

MASAKEN DELG SM

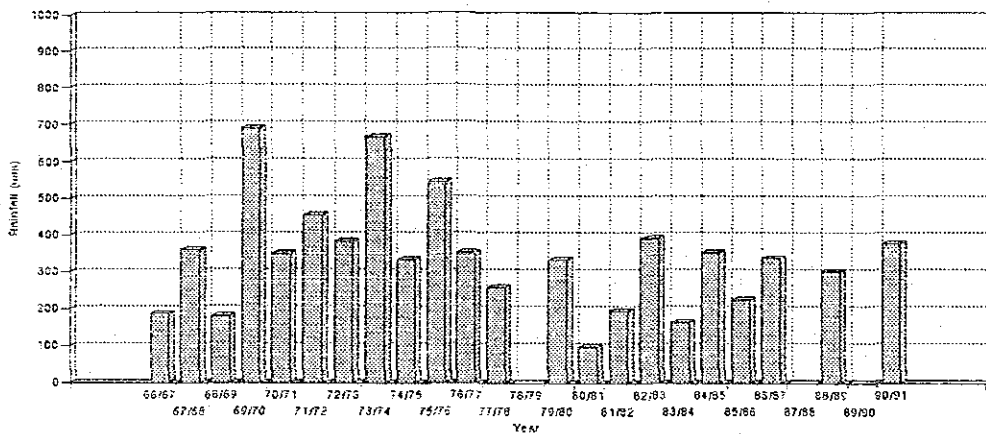


Figure 3.20 Pluie Mensuelle à Sousse (1/2)
KALAA SEGHIRA

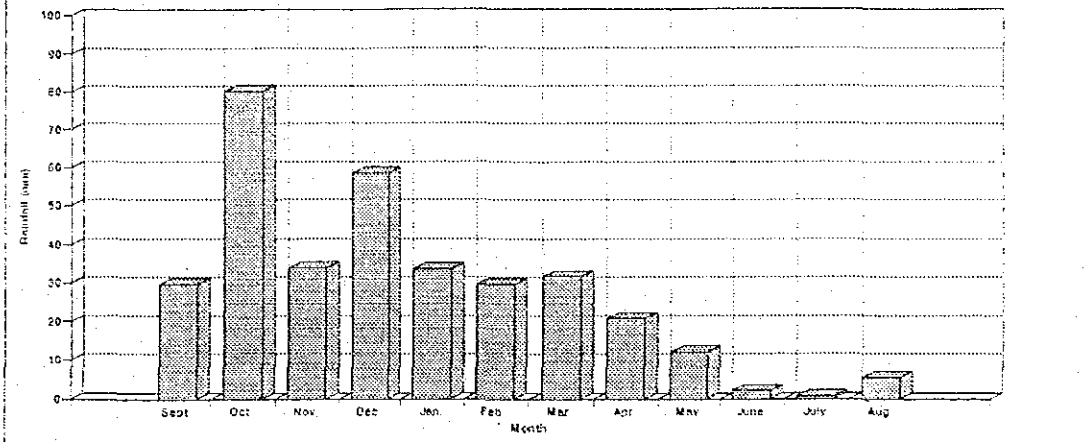
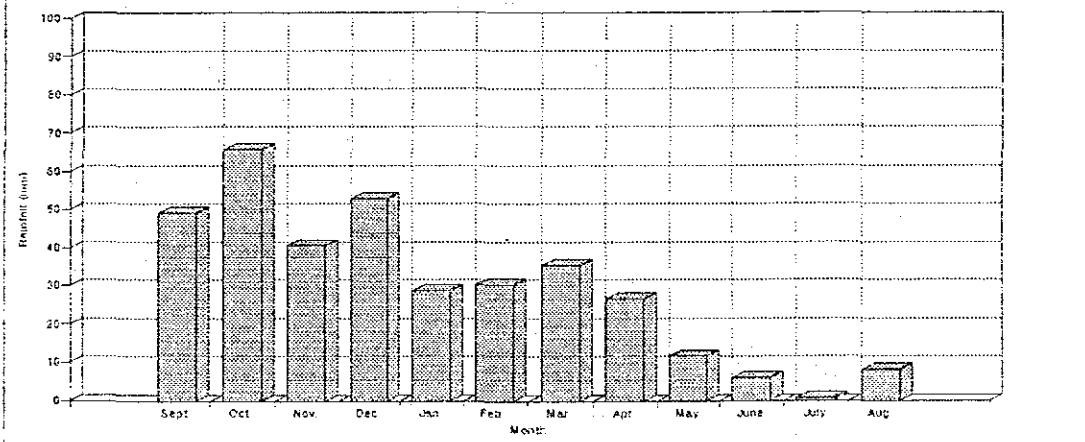
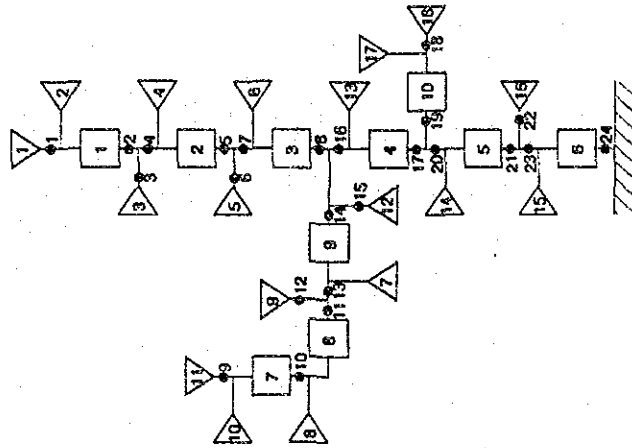


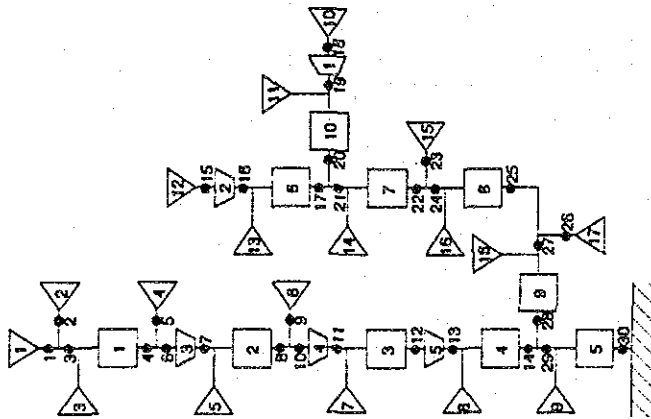
Figure 3.20 Pluie Mensuelle à Sousse (2/2)
MASAKEN DELG SM



Oued Bilbene



Oued Hammam



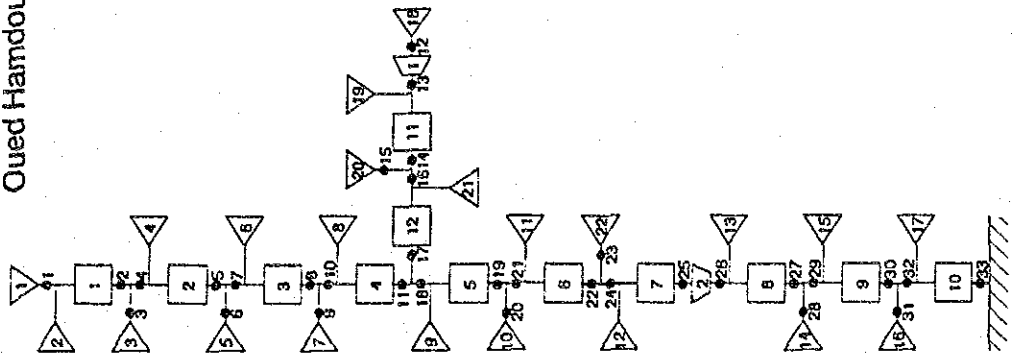
LEGEND

	SUB-BASIN
	RIVER CHANNEL
	RETARDING POND OR DAM

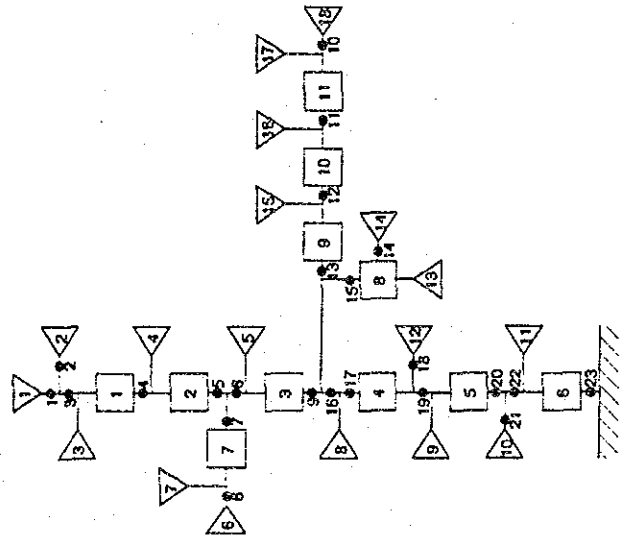
Réseau Hydrographique à Sousse (1/2)

Figure 3.21

Oued Hamdoun



Oued Hallouf



LEGEND

	SUB-BASIN
	RIVER CHANNEL
	RETARDING POND OR DAM

Figure 3.21 Réseau Hydrographique à Sousse (2/2)

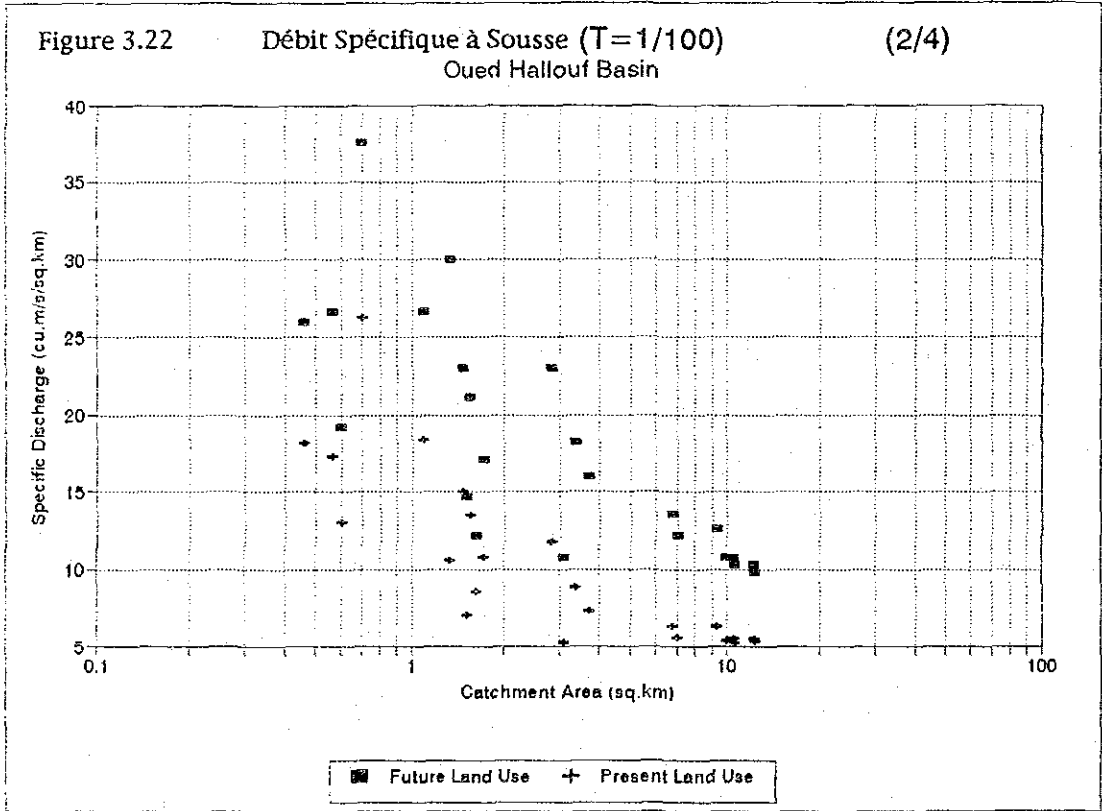
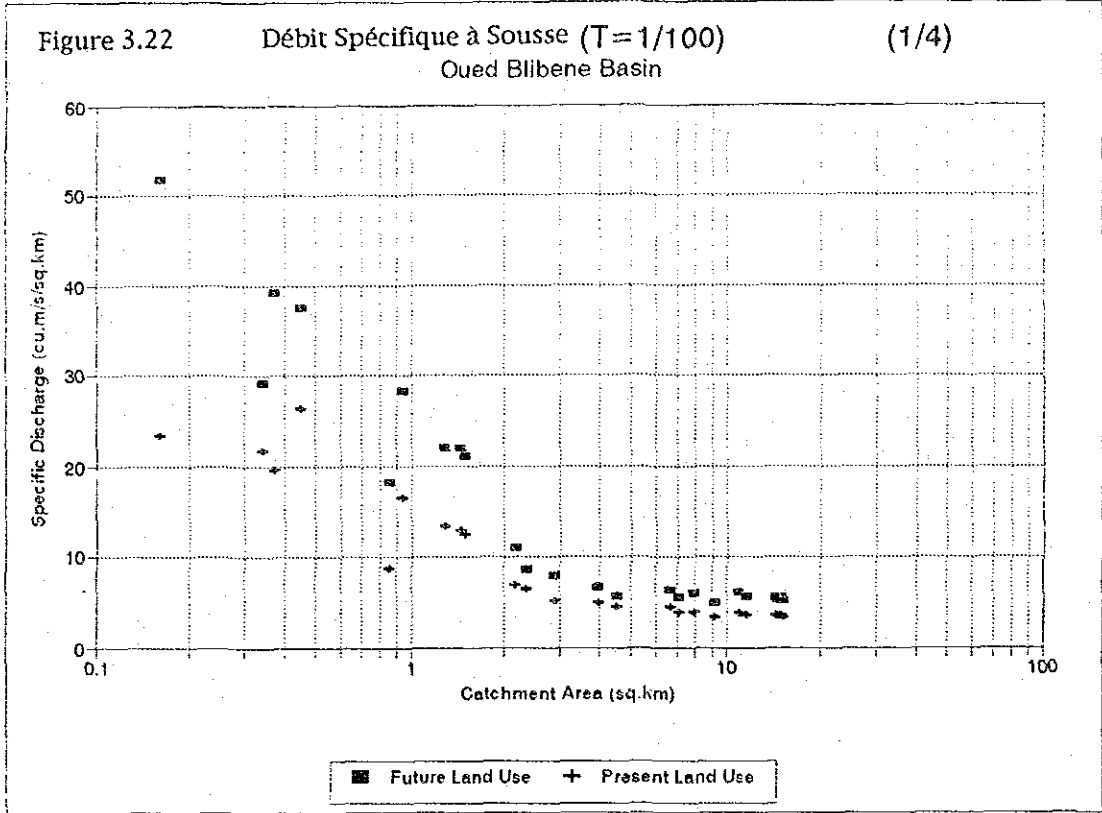


Figure 3.22

Débit Spécifique à Sousse ($T=1/100$)
Oued Hammam Basin

(3/4)

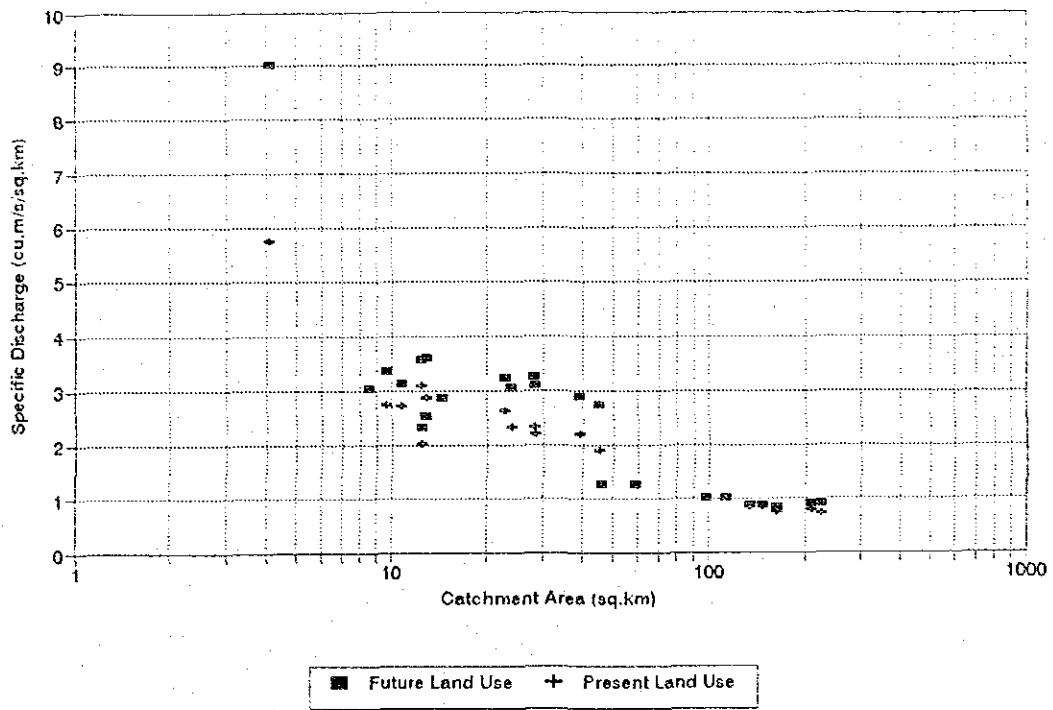


Figure 3.22

Débit Spécifique à Sousse ($T=1/100$)
Oued Hamdoun Basin

(4/4)

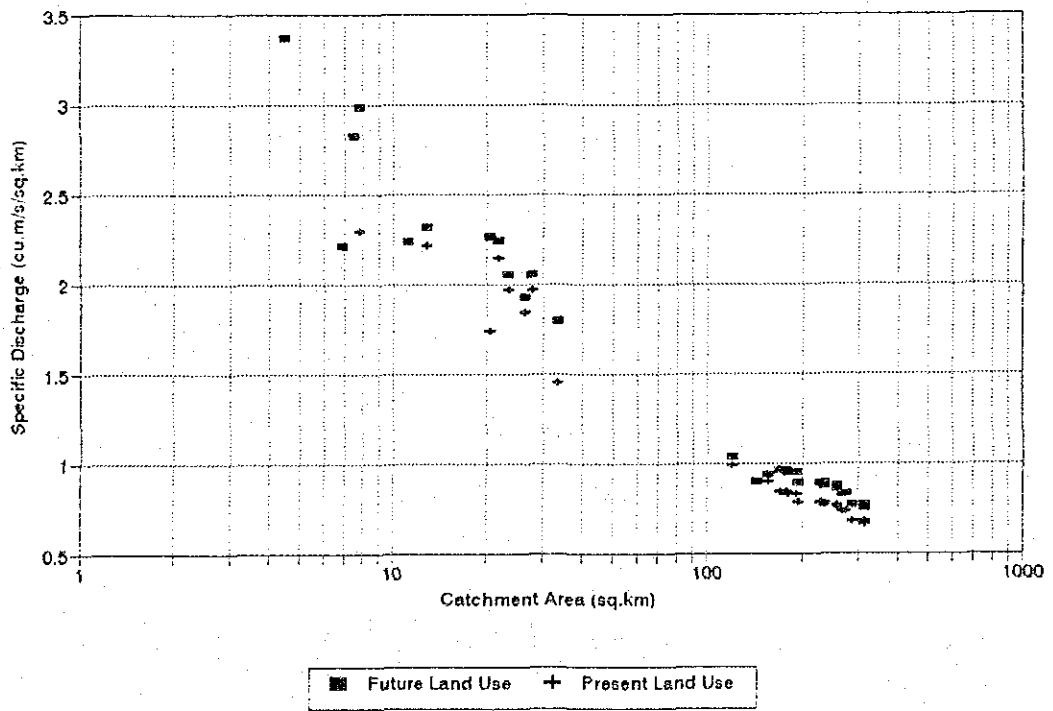


Figure 3.23 Pluie de projet à Sousse (par la méthode des blocks alternatifs) (1/2)
 (example : developed in 60-min increment for 100-year 24-hour)

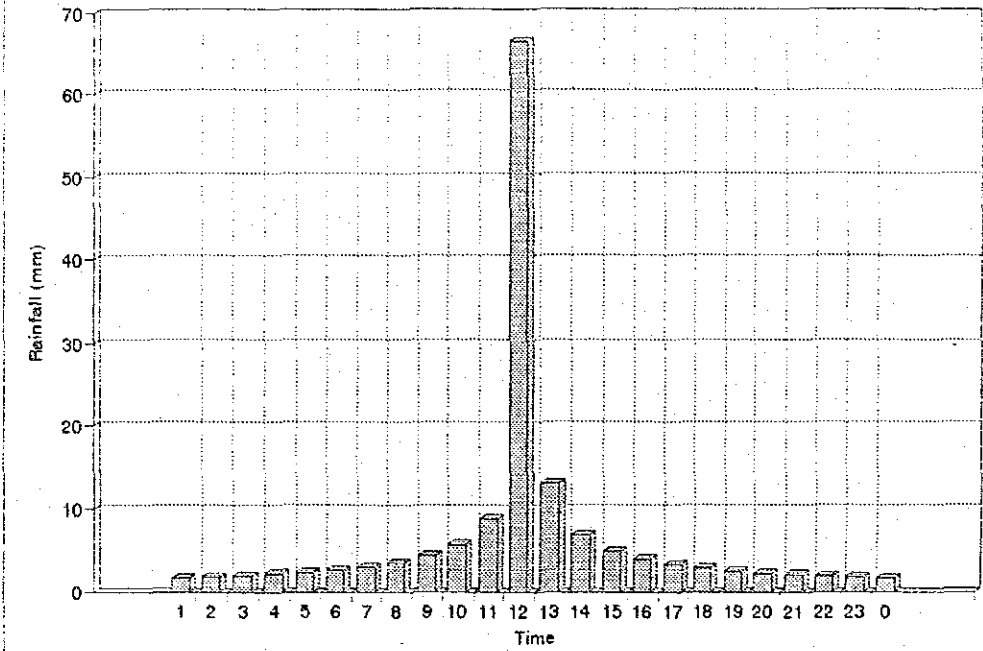
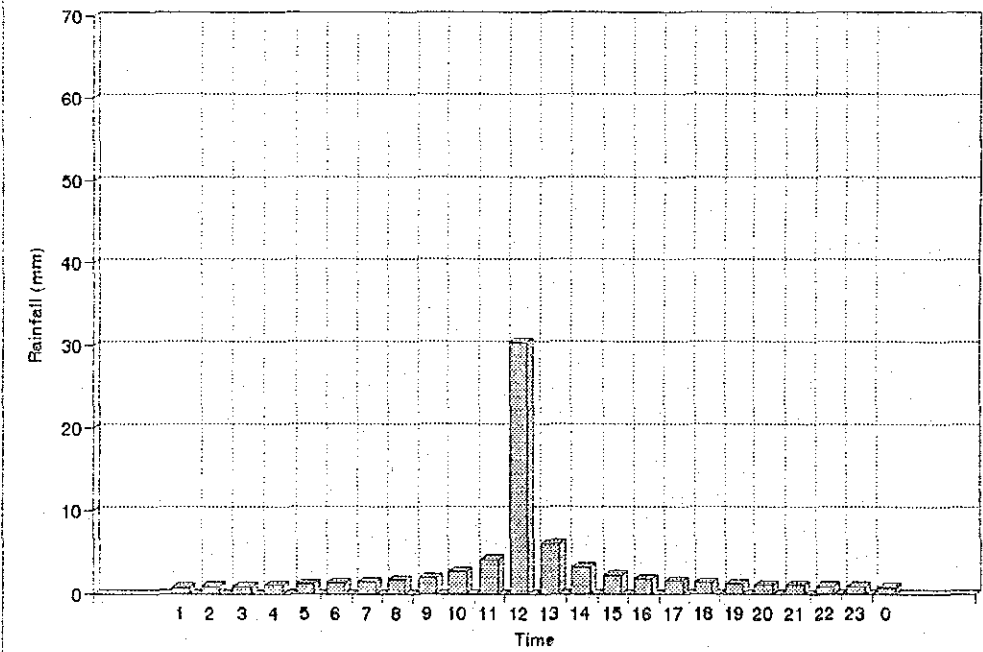
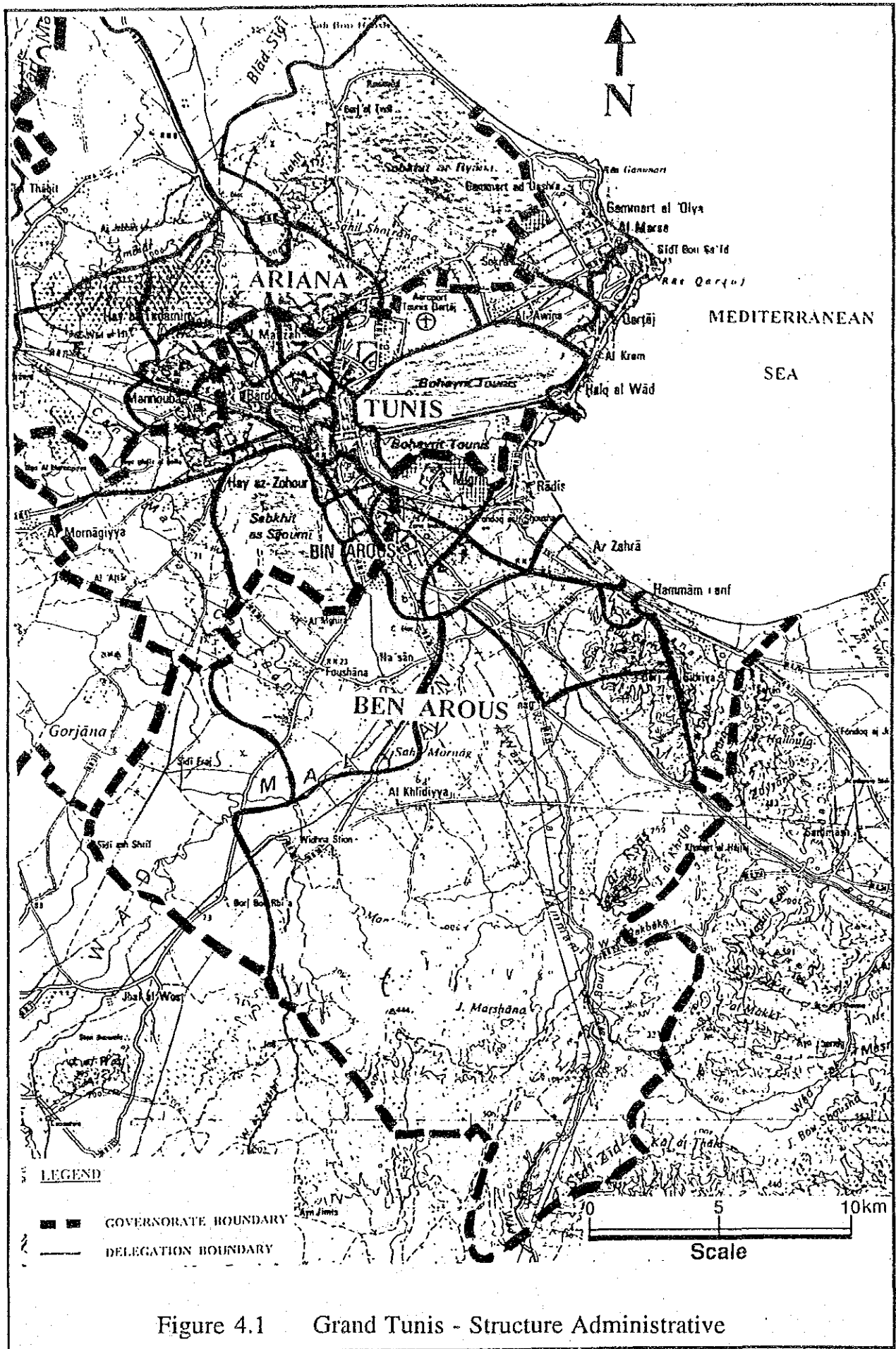


Figure 3.23 Pluie de projet à Sousse (par la méthode des blocks alternatifs) (2/2)
 (example : developed in 60-min increment for 10-year 24-hour)





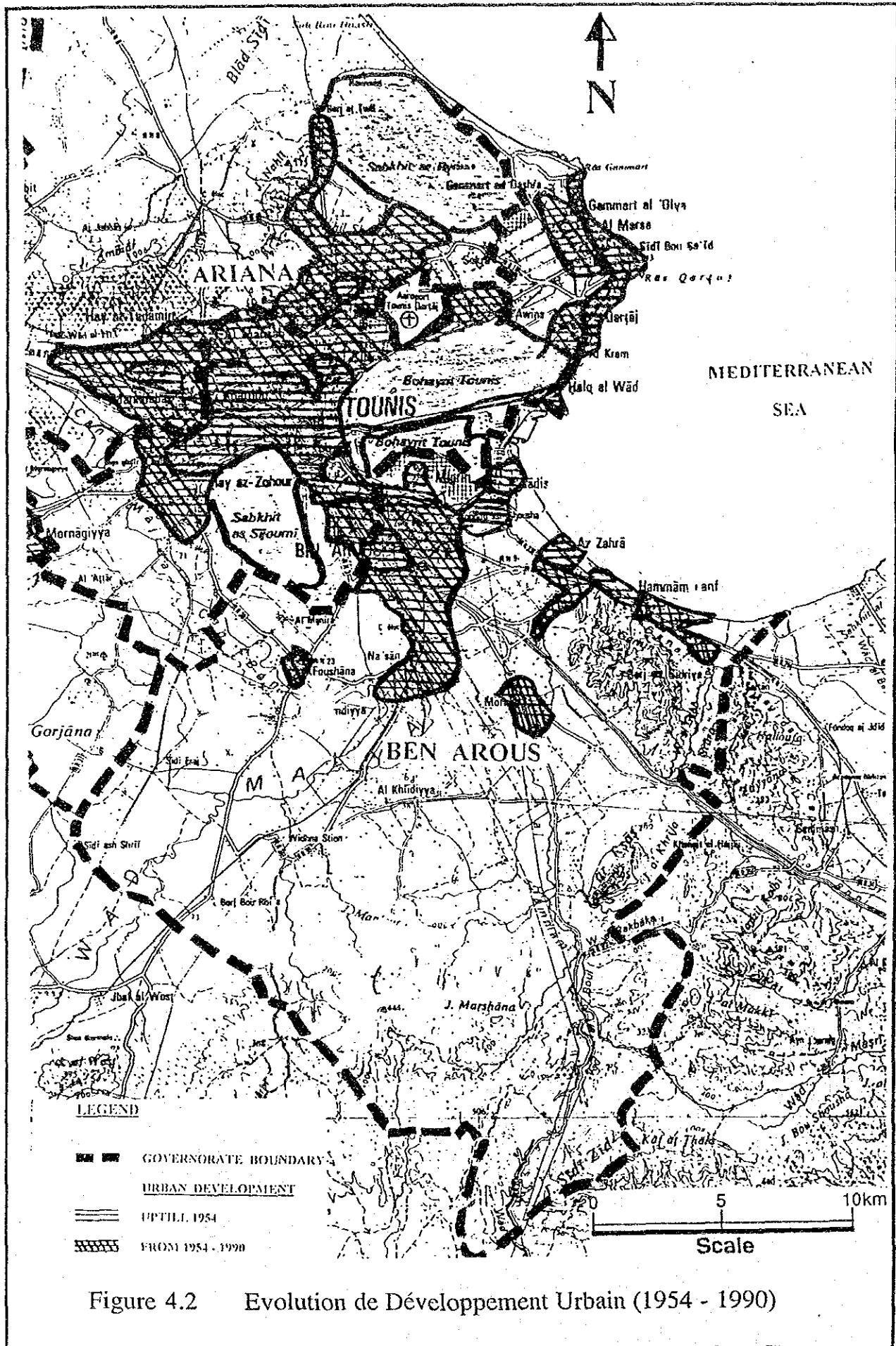


Figure 4.2 Evolution de Développement Urbain (1954 - 1990)

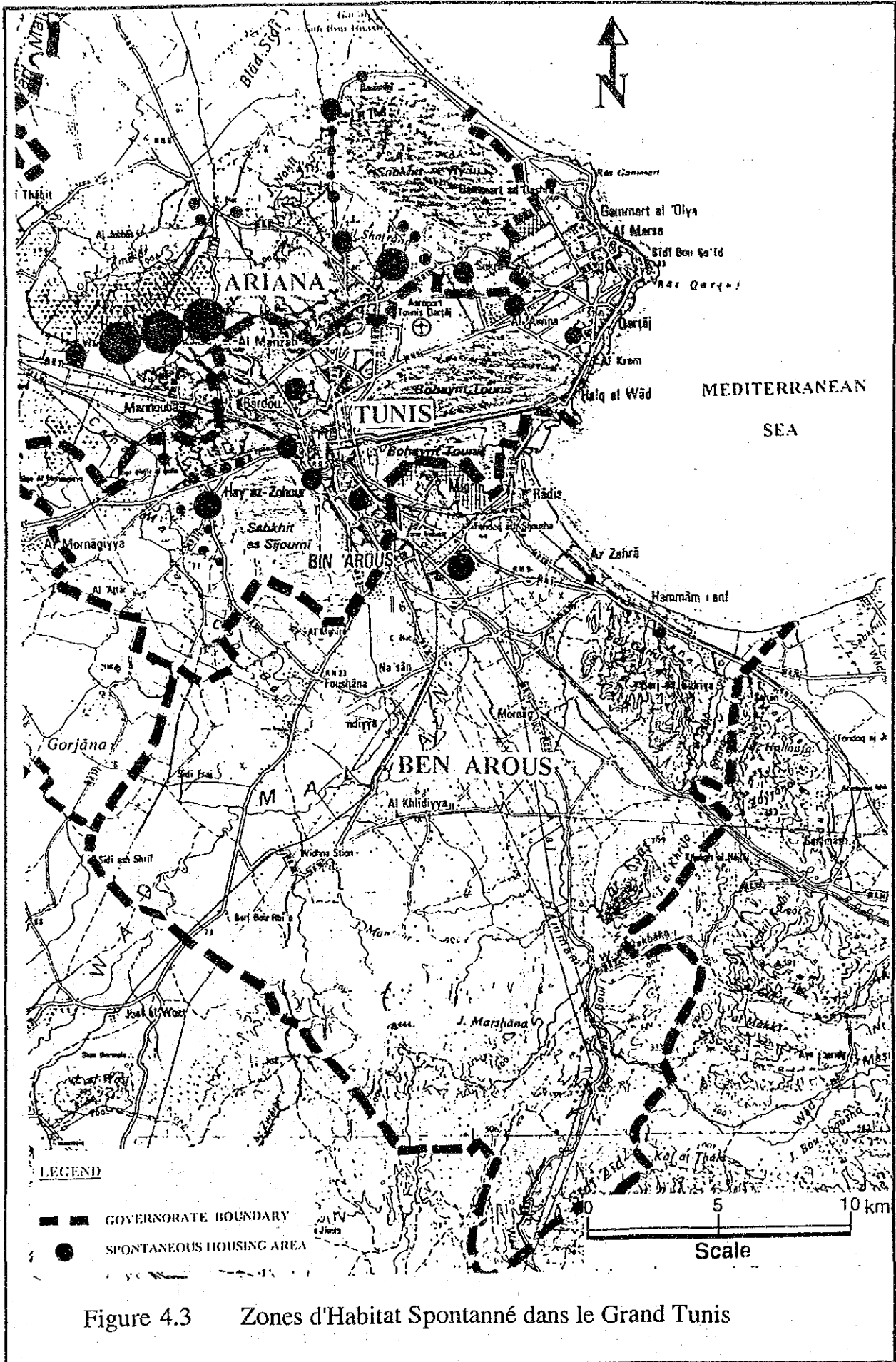


Figure 4.3 Zones d'Habitat Spontané dans le Grand Tunis

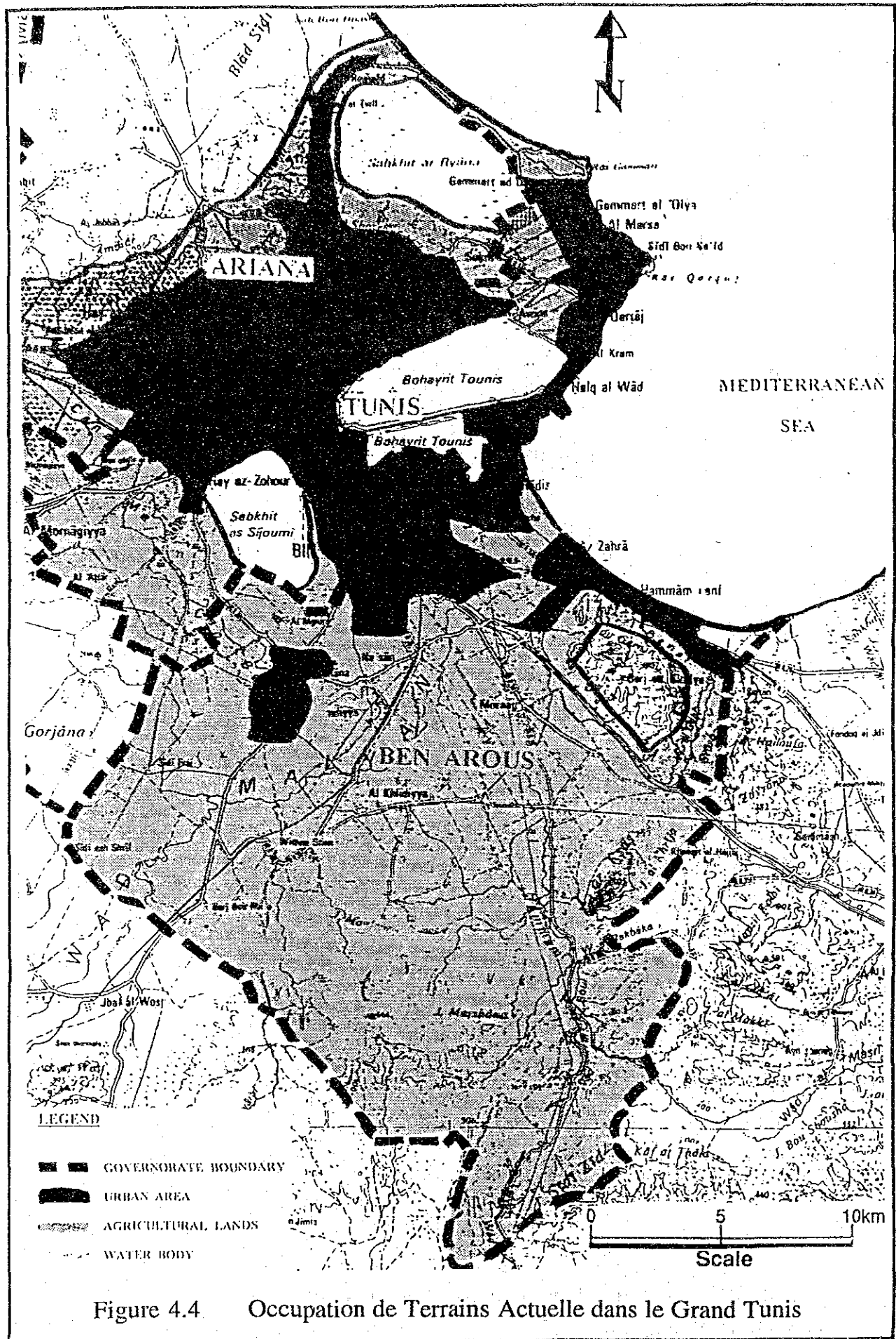


Figure 4.4 Occupation de Terrains Actuelle dans le Grand Tunis

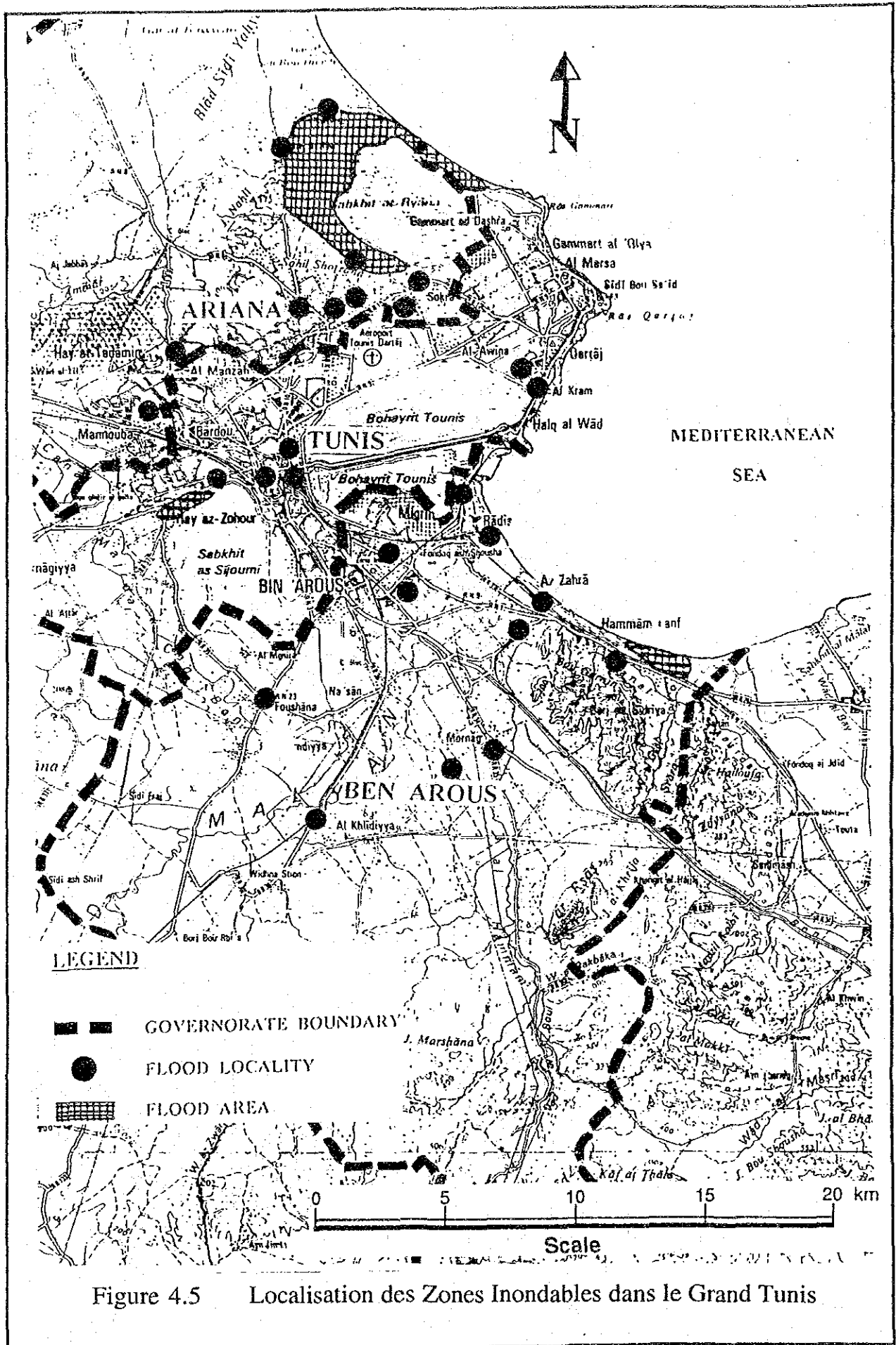


Figure 4.5 Localisation des Zones Inondables dans le Grand Tunis

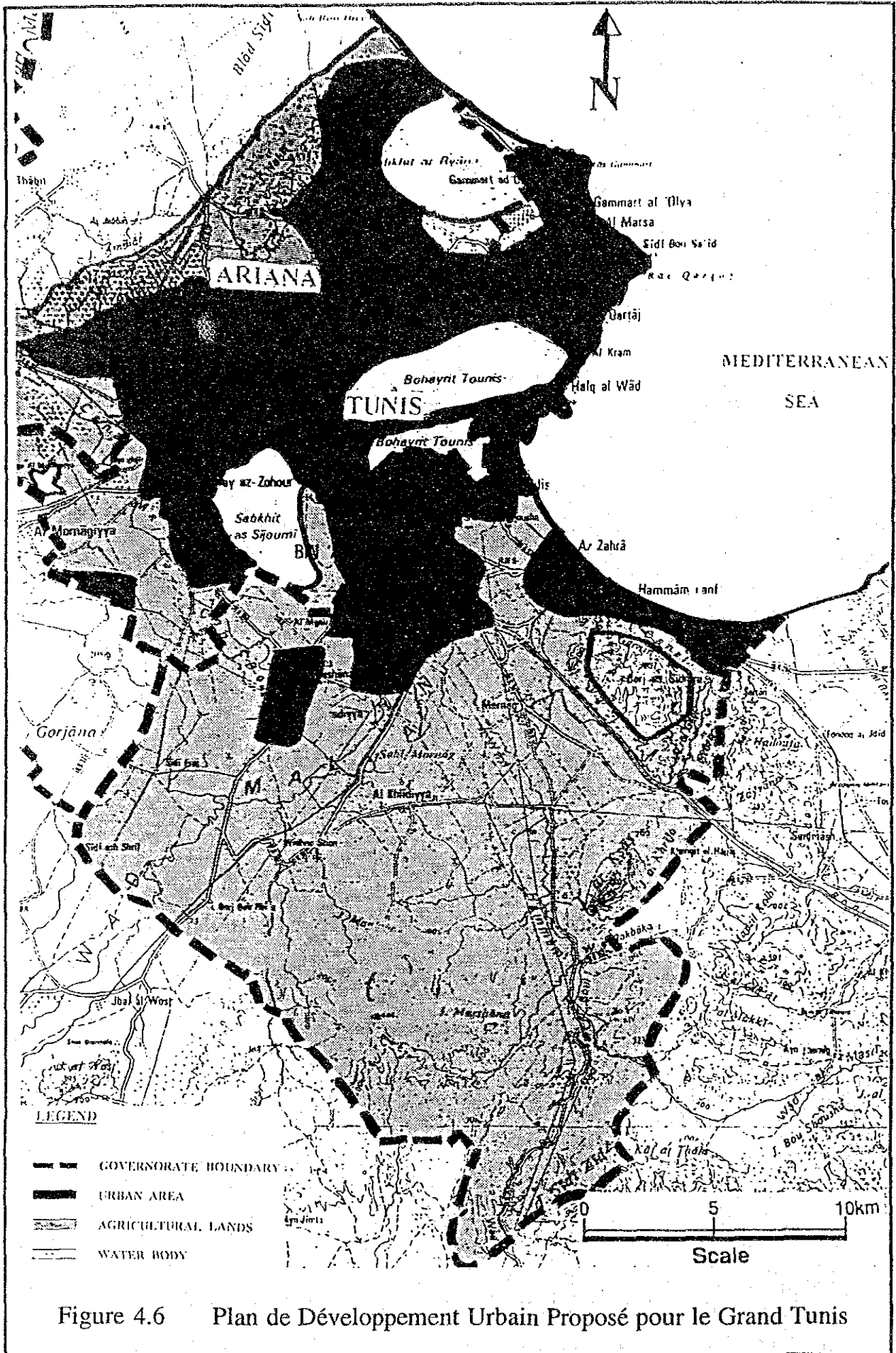
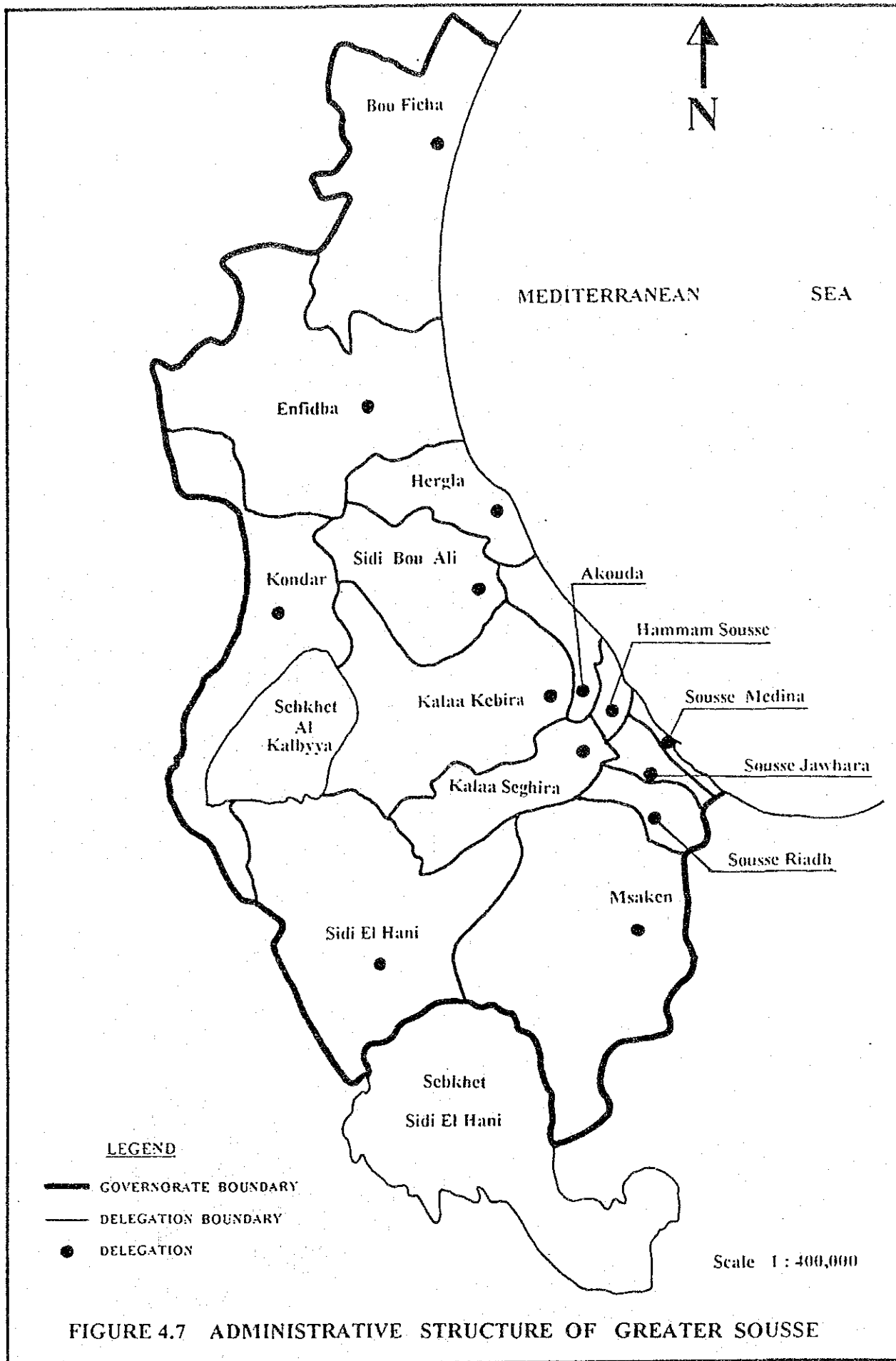


Figure 4.6 Plan de Développement Urbain Proposé pour le Grand Tunis



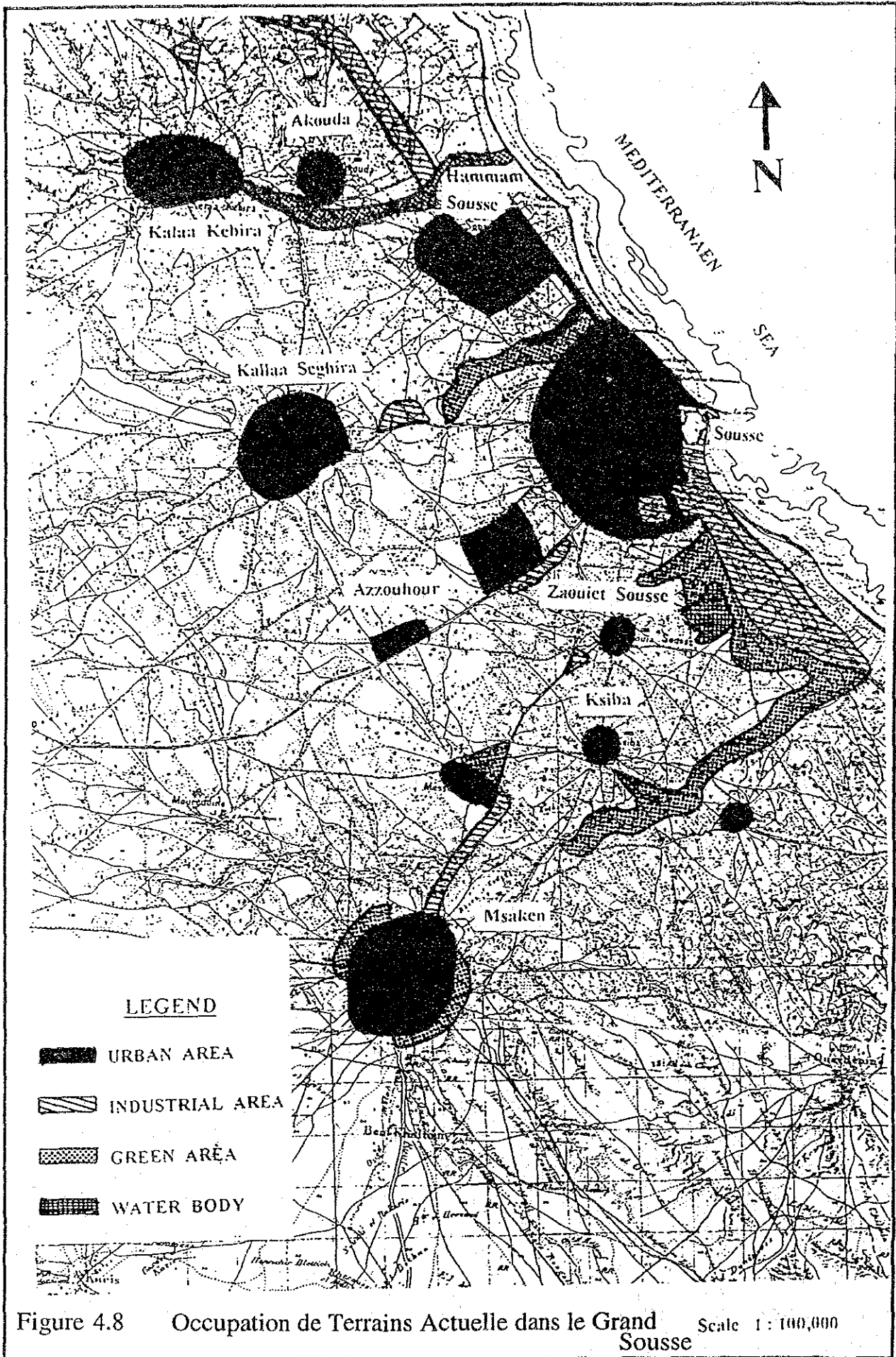


Figure 4.8 Occupation de Terrains Actuelle dans le Grand Sousse Scale 1:100,000

The Study on Flood Protection Program for Greater Tunis and Sousse in the Republic of Tunisia

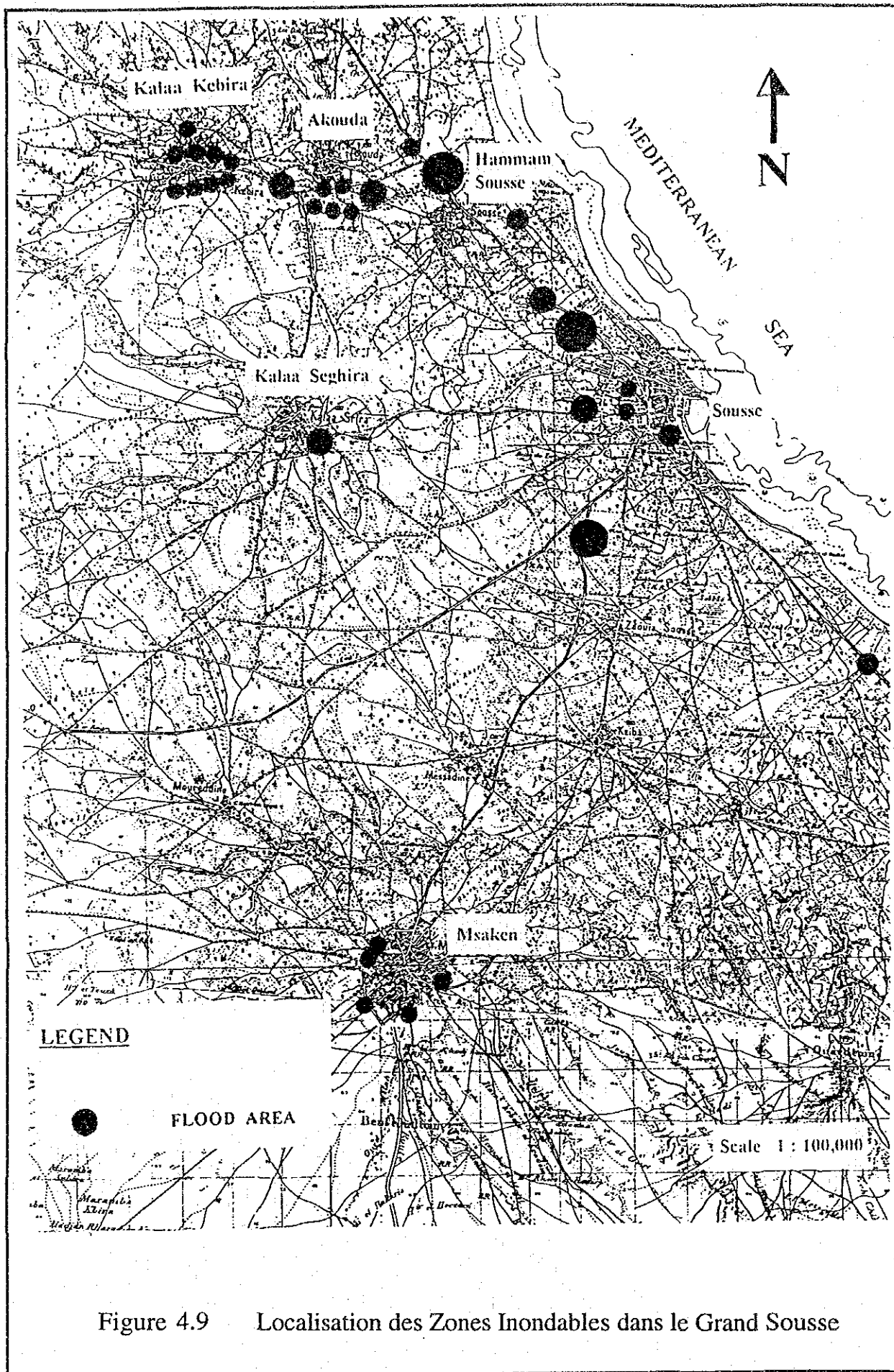


Figure 4.9 Localisation des Zones Inondables dans le Grand Souss