No.

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

MINISTRY OF AGRICULTURE, RURAL DEVELOPMENT AND SEA FISHERIES
REGIONAL AGENCY FOR RURAL DEVELOPMENT OF THE TAFILALET

THE DEVELOPMENT STUDY
ON
RURAL COMMUNITY DEVELOPMENT PROJECT
IN
SEMI-ARID EAST ATLAS REGIONS
WITH KHETTARA REHABILITATION

ANNEXE

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ANNEXE

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A.1 Collecting and Analyzing Existing Data & In Situ Groundwater Survey by Local Subcontractor

A.1.1 Existing Documents and Data

On due course the Project survey starting since February 2003 till now, the documents and data relating geohydrology (meteorology, hydrology, geology, hydrogeology and groundwater) in the project area have been collected and analyzed. Those documents and data are shown in the following.

[DOCUMENTS]

(1) Ressources En Eau Du Maroc 1963

(2) Etude Du Plan Directeur De L'Amenagement Des Eaux Des Bassins Sud-Atlasiques :
Mission 1 : Etudes Des Ressources En Eau
Sous Mission 1.2 : Hydrogeologie
Rapport Definitif Juan 1996 [DGH]

(3) Projet De Reserve De Biosphere Des Palmeraies Du Sud Marocain, Provinces De: Ouarzazate, Errachidia, Zagora
Etude Abiotique Janvier 2000.

(4) Utilisation Des Ressources En Eau Et Developpement Futur Des Amenagements Hudroagricoles
Bassin Ziz Et Gheriss (Zone A-D-E-F)
Bassin Guir (Zone B Et C)
Bassin Maider (Zone G) [ORMVA/TF]

(5) Projet De Mise En Valeur Agricole Des Terres Collectives Dans La Plaine De Boudenib
Mai 2002 [DRH/GuirZizGheris]

[DATA]

(1) Meteorological Data

Three organizations as shown in the followings have their own meteorological stations in the project area. The location of respective stations is shown in the Figure A.1.1.

(SMN) Service Meteorologique Nationale

Number of location: one (1) = Rachidia

Observation start year: 1973

Observation items: Precipitation, Temperature (Average, Maximum, and Minimum), Humidity (6:00, 12:00, 18:00), Evaporation, Sunshine hours, and Wind velocity

(DRH) Direction Regionale Hydraulique du Guir Ziz et Gheris

Number and Name of station: 21 locations (Anoual, Ait Haddou, Tit N'Aisha, Bni Yatti,

Kaddoussa, Bouanane, Tazouguert, Amougouer+Mzizel, F.Zaabel, B.H.Adakhil, R.D'Erfoud, F.Tilichit, Tirgha, AitBouajane, Tadidghoust, Akerouz, Merroutcha, L'Hmida, Taouz, Alnif, Tazarine)

Observation start year: 1962 ~ 1978

Observation items: Precipitation, Temperature, (Average, Maximum, Minimum), Wind velocity (Average), and Evaporation

(ORMVA) Office Regionale Mise en Valeure Agricole du Tafilalet

Number and Name of station: 5 (Rachidia [SEMVA], Rissani, Goulmima, Beni-Tadjit, and Rich)

Observation start year: SEMVA = 1982, others = 2003

Observation items: from 1982 to 2002 = Precipitation, Temperature (Average, Maximum and Minimum) and Evaporation

From 2003 = Precipitation, Temperature (Average, Maximum and Minimum), Humidity (Average, Maximum and Minimum), Sunshine hours, and Wind velocity

At 22 developments center of ORMVA (CMV: Centre Mise en Valeure) is also measured precipitation.

On due course the study, the data of DRH main stations and of ORMVA Rachidia [SEMVA] and Goulmima have been collected among the above.

(2) Hydrological Data

Only DRH has the hydrological stations in the project area.

There are 12 main stations in the area (Tit N'Aisha, Bni Yatti, Tazouguert, Mzizel, F.Zaabel, B.H.Adakhil, R.D'Erfoud, F.Tilichit, Ait Bouajane, Tadighoust, Merroutcha, and L'Hmida) and the collected data are as follows (monthly basis). In the Maider river basin, Hydrological stations are not situated so that the hydrological data do not exist.
(The location of stations are shown in the Figure A.1.1)

Name of Station		Collected data
Guir Basin	Tit n'Aissa	1976~2000
	Ben Yatti	1970~1993 since then not observed
	Tazouguert	1970~2001
Ziz Gheriss Basin	Mzizel	1985~1997
	F.Zaabel	1970~1997
	B.H.Adakhil	1970~2003
	R.D'Erfoud	1970~2001
	F.Tilichit	1970~2001

	AitBouajane	1975~2001
	Tadighost	1970~1998
	Merroutcha	1978~2001
	L'Hmida	1976~2001

(3) Groundwater Data

Groundwater observation wells are set at some places in the area. Most of them is of DRH du Guir Ziz et Gheris. However, they stopped observation after 1996 except few stations. ORMVA/TF (ORMVA du Tafilalet) has also observed the groundwater levels around the area Zone D and F, using the communal pumping station situated at Jorf, Erfoud, and Rissani since 1995.

Number of established observation wells in the project area by DRH so far is 35 in the Guir basin, 75 in the Gheris basin, 181 in the Ziz basin (namely 256 in the Ziz-Gheris basin), and 6 in the Maider basin. However, functioning one is 14 in the Guir basin, 121 in the Ziz-Gheris basin, and 4 in the Maider basin only at the time 1996.

The number of pumping stations established by ORMVA/TF is 8 before 1998 and 5 after 1998 at the Jorf area, 8 before 1998 and 5 after 1998 at the Erfoud area, 16 before 1998 and 9 after 1998 at the Rissani area. Collected data on due course the study are as follows.

Established by	River basin	Area	Number	IRE or Station Name	Period
DRH/ Guir Ziz et Gheriss	Guir	Gourrama	3	547, 596, 553	1980~
		Kaddoussa	1	998	1976~
		Boudenib	3	952, 941, 49	1973~
	ZizGheris	Rich	4	597, 498, 587, 1195	1980~
		Errachidia	8	98, 1204, 29, 581, 1210, 1309, 1343, 1511	1980~
		Tinejdad	11	1471, 1485, 1445, 1357, 1360, 1358, 1361, 1363, 1510, 1368, 2199	1976~
		Goulmima	6	755, 682, 670, 678, 691, 765	1973~
		Tafilalet	21	4093, 4096, 4036, 4034, 1028, 3628, 3630, 1029, 1048, 1307, 457, 3904, 3907, 525, 1038, 3254, 3107, 2379, 3669, 3666, 3887	1979~
	Maider	Daya Maider	4	192, 187, 185, 178	1991~
ORMVA /TF	ZizGheris	Jorf	5	Hannabou, Bouya, Ouled Ghanem, Laachori-a, Ouled Charki	1995~
		Erfoud	5	Maadid, M'hiriguia, Ouled Bouzian, K.Ben Lahcen, Coord-Erfoud	1995~
		Rissani	9	Ksar Zir, Ouled Saidane, Chorfat Bahaj, Toboaassahmet, Zet Sidi Ali, Ammar, Ksar Jdid, Sidi Boubker, Dar My Taleb	1995~

note) IRE: Inventoire du Ressources en Eau (Inventory of Water Resources)

A.1.2 In Situ Groundwater Survey by Local Subcontractor

As a groundwater survey in this project, we carried out the Drilling and Geophysical prospecting by contracting local companies. The specification and quantities are as follows.

[Specification]

- Drilling and In Situ Investigation in the borehole

  Drilling:

  Average drilling depth 50 meters; however, final depth depended on the geological conditions at the respective location.

  Specifications: Mud water drilling (using bentonite) and borehole washing by Air Lift water pumping system after drilled; Installing 4" PVC strainer casing as a piezometer (Filling and packing sand and gravel into the space between borehole wall and the casing); Setting the steel stand pipe at the borehole mouth and plug it by openable screwed stopcock; and Protected by concrete mass around the borehole mouth)

  Permeability test: Open-end Method; Basically once every 5-meter depth, but the final testing depth depends on the geological conditions.

  Geophysical Logging: Specific Resistivity (electrode interval is three ways), Specific potential, Gamma Ray, Caryper, Water temperature.

  Logged after completing drilling before casing; once at every location.

  Periodical groundwater measurement: once 7~10 days (Automatic piezometer measurement equipment are intended to set in the borehole later)

- Geophysical Prospecting: Vertical geoelectrical probing by Schlanberger method. Ten (10) probing points (including drilling points) at respective survey area. Probing depth is more than 100 meters. Disposition of probing points is on the cross point of the grid system arranged around the khettaras at the survey area, where drilling point are basically set at the uppermost of that grid system.

[Quantity]

- Drilling and In Situ Investigation in the borehole

Drilling Average 50m×7 location	350m (at the time M/P study 5 location 250m, F/S 2 location 100m)
Permeability test	35 nos. (M/P 25 nos., F/S 10 nos.)
Geophysical Logging	7 nos. (M/P 5 nos., F/S 2 nos.)
Piezometer (PVC strainer casing)	7 nos. (M/P 5 nos., F/S 2 nos.)

- Geophysical prospecting 70 points (M/P 50 points, F/S 20 points)

[Tender]

When selecting local contractors, first we checked the concerning public organizations (ORMVA/TF, DRH/Guir Ziz et Gheris、and DGH) regarding their name, address, telephone number, their past experience and achievements, their reliabilities and so on. As a result of that, six (6) contractors (LPEE, SJS MAROC, AFRIQUIA FORAGE, SOLSIF, FORASOL, and SNTM) are taken as candidates for drilling survey. However through those processes, it became clear that the company achievable geoelectrical prospecting survey is only two in morocco, that is LPEE and GEOATLAS. Then after checking their achievements so far, their engineering ability, and reliability, we invited LPEE and GEOATLAS + some other drilling companies for tendering. Finally the joint venture of SJS + GEOATLAS was selected as subcontractor as a result of public tender between two groups.

[Sites]

JICA study team and ORMVA/TF discussed closely when deciding the sites for drilling and geophysical prospecting survey area. Finally agreed each other for deciding the site according to the following conception. At the time of M/P Study, survey site shall be decided considering the whole study area and their specific condition, and one site shall be selected from respective zones. However, Zone B and C belongs to the same river Basin and may be similar groundwater condition so that they can be treated as one zone as far as the groundwater condition concerned. And also, due to Zone E situates between Zone D and Zone F, it shall be possible to consider from the results of the survey at Zone D and Zone F.

Finally selected sites for the drilling and geophysical prospecting survey are as follows:

	Zone	Comune
1.	Zone A	Tizrhagine (Tinejdad – Goulmima)
2.	Zone B	Almou Choura (Beni Tajit)
3.	Zone D	Hannabou
4.	Zone F	Merzouga
5.	Zone G	Ammar (Alnif)

At the time F/S Study, the three sites for khettars rehabilitation are selected (Ait Ben Omar / Laksiba, Mounkara, and Hannabou). Then except Hannabou area where is already done at the time M/P Study, drilling and geophysical prospecting survey was done at the other two areas.

A.2 Topography and Geology around the Study Area

A.2.1 Topography

The study area is the whole command area of ORMVA/TF, where is almost all area of Errachidia Province and western half of Guir Province.

The command area of ORMVA/TF is located in between longitude 5°17'~2°17'W, and latitude 30°17'~33° 04' N. High Atlas is ranging in northern side of the study area orienting WSW-ENE with the highest peaks J.Aderdonz（3,057m）, and J.Iouigharacene（3,058m）, lowering its peak to southern side gradually and those peaks around the southern end of the mountain range is around 2,000 m above sea level. The eastern extension of High Atlas is also called the Oriental Atlas Haut Plateau area due to that relative height difference between mountain peaks and basin bottom becomes smaller.

The southern end of High Atlas is limited by steep cliffs continuing to Errachidia and Boudenib wide flat basin where its altitude situates between around 1,000 and 1,200 m above sea level. This basin is limited south forming terrace-like topography by the steep cliffs having the relative height 100 to 200 meters along the connecting line on Erfoud and Goulmima.

Further southern side is the area of alluvial plain extending East and West formulated by Todrha-Ferkla river, Gheris River and so on. Ziz River is crossing the High Atlas from North to South and accesses to Gheris River. The vast accumulation area of river and flood deposits of Ziz and Gheris River is the Plain Tafilalet where Jorf, Erfoud and Rissani locate. This lowland continues from Ouarzazate basin so called Sillon Preafrican where altitude is in between 600 and 800 m.

J.Ougnate (1,719 m), J.Gaiz (1,425 m) and Bou Gafer of Anti Atlas situate in the western side of Tafilalet Plain facing to High Atlas locating Todra-Ferkla basin between them, and the vast flat land so called Guir Hammada with its altitude around 1,000 m is widely extending in the eastern side of Tafilalet Plain.

Sahara desert area continues to the further southern side.

From the above topographical viewpoint, the area is divided into the following five:

1. High Atlas area (including Oriental Atlas Haut Plateau area)
2. Errachidia－Boudenib basin area
3. Sillon Preafrican area (Todra-Ferkla~Gheris river alluvial plain and Tafilalet Plain)
4. Anti Atlas area and
5. Sahara desert area

Guir Hammada of the eastern area situates instead of above mentioned number 3 and 4 continuing from Errachidia-Boudenib basin to Sahara desert.

In the south-eastern part of Tafilalet Plain, Merzouga-Chebbi Sand Dunes exist which are formed by the sands derived from the erosion and transported by the river (Beida river and its tributaries) from the

western end of above mentioned Guir Hammada and whirled-up material by the wind where is famous for one of tourist spots. These dunes develop generally in the area at the foot of Errachidia-Boudenib basin, Guir Hammada (Tizimi~Maadid, Left bank side of Gheris middle-stream area and Tanguerfa river) and around the river mouth flowing out from Anti Atlas (Right bank side of Todra-Ferkla river, downstream area of Maider river tributaries, Anti-Atlas mountainside of Tafilalet plain = around Hannabou).

General topographic view in the study area is mentioned as the above, while the river basins in the area is largely divided into three such as Guir, Ziz-Gheris, and Maïdre basins.

Further, these basins can be subdivided into some branch basins and they can compare to the zonings used in the study as Zone A to G. Those comparison between subdivided basins and zonings are shown in the following tables describing topographical summary of each area.

Subdivision of the Guir, Ziz-Gheris, and Maïdere basins and the Study Area Zonings

		Main River and/or Area	Main Palmairaia	Topographycal Summery	**Zoning**
Guir Basin	**1**	Guir River	Gourrama、Boudenib、Oulad Alis	The highest peak is jbel Mesrouch（2736m）. Khan el Rhar River confluences from left side and flow to south-ward. The flowing out point from High Atlas to southward is Tazouguert (alt. 1029m). Boudenib area in the Guir River gorge situates between High Atlas and Guir Hammada (alt. 900 to 1100m) and River there flows to westward.	**C**
	2	Bouanane River	Bni-Tadjit、Anoual、Taisint、Bouanane	The highest peaks are Bourr（2642m） and Ari-Oumsed（2519m）. Ait Aissa River confluences to right side and flows to southward. The flowing out point from High Atlas to southward is Bni-Yatti (alt. 891m).	**B**
	3	Guir River: Mid-stream Area	Ain Chouater	The area from the confluence of Guir & Bouanane River to about 25km downstream area (Ain Chouater). Tafejjarht River confluences at the midpoint. Altitude is around 800m. Generally composed of fan-shaped alluvial flood deposits of River.	
Ziz Gheris Basin	**1**	Todrha River, Imitate River and Tarhia River	Todrha-Tinrhir El Hart	locate at the foot of High Atlas and confluences with Imitate River at the 30km downstream. Todrah Palmairaie situate between 1150 and 1400m of altitude.	**—**
	2	Tanguerfa-Ferkla-Ichem River up to the confluence with Gheris River	Tinejdad、Mellab・Touroug~Ksar El Kebir	In the area of distance 50km between High Atlas and Anti Atlas, some palmairaie distribute at some places which altitude is in between 880 and 1030m.	**A**
	3	Gheris River: Upstream Area	Assoul、Amellago、Tadirhost、	flowing in the area High Atlas from altitude around 2500m to 1150m of Tadighoust. The area between Tadighoust and Goulmima entrance is Errachidia-Boudinib basin.	
	4	Gheris River: Midstream Area（Gheris &Tarda River）	Goulmima、Tilouine、Tarda	situating from Goulmima to the entrance of Fezna. Alluvium of width 3~10km deposits widely. Goulmima locate around the exit point from Errachidia-Boudenib with altitude 930~1050m. Altitude of the entrance to Fezna is around 850m. Tarda River has its source at the border between Gheris and Ziz River and flows from the point of altitude around 1200m to SSE and confluences to Gheris River around 25 km west of Touroug.	
	5	Ziz River: Up- to Mid-stream Area (Ziz River、Aoufous River）	Rich、Errachidia、Meski、Aoufous	Ziz River has its source in the High Atlas with higer than 2000m and flows to southward until Errachidia (1030~1050m) where is the flowing out point from mountains: and further flows in the Errachidia-Boudenib basin up to the confluence point of Aoufous River (alt. 900m). Errachidia-Boudenib basin is generally high flat land of altitude around 1000m, however along Aoufous River and the right bank side of downstream from Meski is remarkably reliefed by erosion.	**—**
	6	Ziz River: Midstream Area（Tizimi）	Zrigat、Zaouia Jedida、Douira	after flowing through the Errachidia-Boudenib basin, the flat land of altitude around 850m extends orienting WNW-ESE. Southern side is bordered by small and elongated hills of Nebka el Kara and Assalha and so on.	**—**

		Main River and/or Area	Main Palmairaia	Topographycal Summery	Zoning
Ziz Gheris Basin	**7**	Tafilalet Plain: Right bank side of Upstream Area (Gheris River)	Fezna、Jorf、Bouia･Krair、Hannabou	Fezna-Jorf situate between alt. 800 and 850m. Right bank side of upstream area of Tafilalet Plain is limitted SW-ward by Jbel Ougnate, and NNE-ward by straight elongated hills orienting WNW-ESE called Nif el Hamar、Nebka el Kara. Left bank side of Gheris river is called Marha, El Hajeb and El Hamda where is dried and desertificated area.	**D**
	8	Tafilalet Plain: Left bank side of Upstream Area (Ziz & Gheris River)	El Maadid、Erfoud	the area from the downstream of Tizimi along Ziz River and the area between Ziz and Gheris River up to Jebel Erfoud. Erfoud is the centeral palmairaie of this area.	**－**
	9	Tafilalet Plain: Mid- to Downstream Area (Tafilalet s.s.)	Sifa、Oulad Zohras、Rissani	The vast palmairaie area of width (E-W) about 10km and length (N-S) mostly 20km situating Rissani as the center. Gheris River along right end, Ziz river along center, and Amerbou river (Ziz river tributary) along left end of this palmairaie flows from north to southward. Altitude is in between 740 and 780m.	**E: Right bank F: Left bank and downstream area**
	10	Merzouga-Chebbi Dunes Area (Beida River)	Merzouga、Khemlia Taouz、Hassi-Remlia	The vast sand dune (Merzouga-Chebbi) area along Beida River and its tributaries. Alluvium deposits in the area of width 4 to 5 km. The altitude around the mouth of Beida River is a little less than 700m, however the top of most sand dunes are over 800m and some are over than 900m.	**F**
Maider Basin	**1**	Msisi River (el-Mharch River)	Msisi、Tarherat、Azag	Northern part is the eastern end of Jbel Ougnate and over 1200m altitude. Upstream area is subdivided into four basins. Altitude of Msisi is 825m. Downstream area is wide flood deposit area called Chouaraf where dried and desertificated. The altitude of river mouth from Jbel Maharch is 645m.	**G (Except for the upstream area of number 3 and 4)**
	2	Regg River (Fezzou River)	Alnif, Achbaro, Fezzou, Boudib	More than 70km distance in northern part is in Jbel Ougnate and Sarhro where the altitude is around 1500m. The highest peak is J. Bou. Tasra (2057m). The area is composed of some alluvial land in the gorge continuing to Daya el Maider (650~660m) in the downstream after Fezzou gorge.	
	3	Ahssia River (Hassaia River)	Fecht、Amougguer、Ait Saadane	Ahssia River has its source in Jbel Sarhro (mostly 1500m) existing north-eastern side and flows to southwest ward. The area is divided largely into three alluvial land by Lbel Achich･Rahiat and Jbel Amrharfi･Bouinagai.	
	4	Tarhbalt River	Taghbalt、Tazzarine	has the largest branch basin of Maider River basin. The source is in Jbel Sarhro of north-eastern part and flows to WSW-ward. Like Ahssia River basin, the area is divided into three alluvial land by two mountain ranges, of which the most downstream is the largest. Tarhbalt (alt. 800m) locate in that area.	
	5	Bou-Haiara River	Tagouki、Mackouda	occupies the southern part of Maider River basin and flows from SW to NE. Southward of the basin is KemKem flat land where altitude is around 800m and facing to Jbel Bani to westward.	**－**
	6	Daya el Maider		The flat land confluenced above mentioned five basins before flowing into Maider River, where altitude is around 650m. Two groundwater systems exists (Regg River system in northern part and Tarhbalt River system in western part). Northern system is called ＜Maidere-Ouchene＞(hydraulic gradient 2.1~3.3% orienting N-S in general), and western system is called ＜big Maidere＞(hydraulic gradient 0.8~3.5% orienting E-W in general).	

A.2.2 Geology and Hydrogeology

As the above-mentioned, topography in the Study area is largely divided into five. This division is basically depending upon the geological distribution in the area, namely:

- High Atlas mountain area; this is the folded and faulted mountains formed by Hercinian Orogeny before Cretaceous and basically composed mainly of Jurassic and partly of Triassic and Paleozoic. Southern end of this mountain is limited by straight tectonic line so called South Atlasic Fault orienting WSW-ENE, forming very steep cliffs and clearly divide the southern area.
- Errachidia-Boudenib basin; as called Cretaceous Basin in general, these are composed mainly of the horizontal layers of Cretaceous limestones.
- Sillon Preafrican; this is the depression area and alluvial deposits sediment thickly on the bedrock.
- Anti Atlas mountain area; composed of Paleozoic and Precambrian, and includes many type of Igneous rocks.
- Sahara desert area and Guir Hammada area; formed by stable craton and composed of Precambrian as basic complex overlaid by horizontal layers of Paleozoic, Mesozoic and partly Tertiary.

Structurally geology in the area is formed as the above-mentioned in general, the three main river basins in the area is classified into the following geological provinces. And also, the startigraphy is shown the following tables.

Geological Provinces in the Study Area

River Basins	N°	Geologic Provinces	Geologic Structures	Facies of Strata
Guir Basin	1	High Atlas high mountains	Synclinorium and anticlinorium folded Triassic and Jurassic formations orienting the axes E-W.	a. Precambrian to Paleozoic (Schists, Quartzite, Intrusive rocks): along aniticlinal fault in high mountains. b. Triassic (Doleritic Basalt, Marl and Argillite) c. Jurrasic: most popular in the area -Limestone ~ Dolomite: high permeability, well continuousness forming the higher area. -Toarcien-Aalenien Marl: Limestone, Marl (Main Limestone is of Upper Aalénien and Dogger) -Uppermost Jurassic: Continental Sandstone and Red formations (~Lower Cretaceous) d. Cretaceous -Lower Cretaceous Sandstone and Red Marl -Cenomanien verious Marl -Upper Cretaceous Red continetal formations e. Tertiary and Quaternary: Continental formations.
	2	Errachidia-Boudenib basin	E-W orienting Cretaceous basin: northern side contact to South Atlasic Fault and southern side dipps gently to the center of basin.	-Red formations, Sandstone, Conglomerate, Gypsum and Lagoonal formations (thickness 200~400m) : Lower Cretaceous -Sandy Marl and Mudstone intercalated thin Limestone and Dolomite (50~60m) : Infra Cenomanienne -Coastal limestone (40~100m) , thick Dolomite: Cenomano-Turonien -Muddy Sandstone, Lagoonal formations: Senonien (thickness reaches 1000m) In the depressional basin, Alluvial deposits exist.
	3	Guir Hamada	Vast rocky flat plain. Turonien limestone forms steep cliffs and bordering to the southern area.	-Oligocene to Recent: Boudenib Hamada -Pontico pliocene~Recent

River Basins	N°	Geologic Provinces	Geologic Structures	Facies of Strata
Ziz Gheris Basin	1	High Atlas high mountains	Synclinorium and anticlinorium folded Triassic and Jurassic formations orienting the axes E-W.	・Dolomite and Anhydrite intercalated muddy stones ・Argillite and Siltstone intercalated calcareous and dolomitic stones: Upper Lias (Aalenien~Toarcien) ・Limestone, gray Dolomite, calcareous Marl: Dogger ・Argillite, Siltstone, Sandstone and Conglomerate: Infra-Cenomanie
	2	Errachidia-Boudenib basin	flat highland orienting E-W composed of Continental starata of Cretaceous. Synclinal axis orienting E-W is gradually converging to South Atlasic Fault.	・Northern side contact to South Atlasic Fault. ・ Derivative faults zone of South Atlasic Fault: Northern side of Tadirhoust~Errachidia ・Cenomanien Marly Limestone with Claystone and siltstone ・Turonien bluish gray Limestone intercalated with Anhydrile. ・Senonien sandstone. ・Plio-Quartenary: Conglomerate and Alluvium.
	3	Sillon PreAfrican	Depressional basins sedimenting widely the river deposits, flood deposits derived from Todrha-Ferkla and Gheris River.	
	4	Anti Atlas	Anticlinal structure of Precambrian and Paleozoic axising E-W forming jebel Ougnat.	・forms right bank side of Gheris River basin ・Precambrian Igneaous rocks and Paleozoic (schistose): in the lowland they are covered with Plio-Quaternaries.
Maider Basin	Maider river basin belongs to wholly Anti Atlas mountain area having anticlinal mountains of Jbel Ougnate etc, orienting E-W.			
	1	Precambrien high mountains	Anticlinal area axising E-W forming Jbel Ougnate and Jbel Sargho.	Schistes, Quartzite, Granite, Ryolite and Andesite.
	2	Infracambrien (Southern periphery of Precambrian mountains)	Adoudounien~Acadian: forming monoclinic structures dipping to southward from Jebel Sarho.	Limestone, Dolomite, Schistose Sandstone, Conglomerate.
	3	Ordovicienne, Devonian and Viseean mountain ranges	Further southern and eastern area of the above: some monoclinic and some folded area.	Schistes, Quartzite, Sandstone, Dolomite, limestone, Marl and Argillite.
	4	Depressional area between mountain ranges	Mostly sheared and faulted along these depresion.	Covered by river deposits and flood deposits.

Stratigraphy in the Study Area

River Basins	Geologic Time		Stratigraphy
Guir	Quaternary ~ Neogene	Recent	Forming unconfined aquifers.lacustrine deposit is travertin and tufa: partly thin layers distribut in the area.
		Pontico-Pliocene	Terrestrial formations; various type of rocks (Sandstone, Conglomerate, Marl and lacustrine deposit Limestone); thickness 300~500m
		Villafranchien	relatively widely extending in the area: Conglomerate and clastic rocks. Aquitard.
	Paleogene	Upper Eocene	Lagoonal~continental red clastic formations. Marly calcareous Sandstone, Pink gypsiferous Marl. Maximum thickness is 200m.
		Middle Eocene	Limestone intercalated with Marl. Thickness 30~40m. Relatively high permeability forming deep aquifer.
		Lower Eocene	Marine deposits. Partly sandy, calcareous, coarse clastic formations. Thickness is around 40 m in general.

River Basins	Geologic Time		Stratigraphy
Guir	Mesozoic	Cretaceous	Mainly 4 Formations -Senonien: Lagoonal Clay~Sandstone, Thickness 50~120m in average, at Boudenib, reaches 500m. -Cenornano-Turonien: Marine formations, Dolomite. Thickness 20~30m, at Boudenib 100m。 -Upper Cenomanien: Upper level is Sandstone, others Claystone. Thickness 60m. -Lower Cenomanien: Red sandstones, Conglomerate, Gypsum, and Lagoonal deposits. Thickness 100~500m.
		Jurassic	Limestone, Dolomite, and Marl
		Lias	Marl, Marly Limestone, Dolomitic Limestone, and Siltstone.
	Paleozoic		Schists, Limestone, and Sandstone.
ZizGheris	Quaternary ~ Neogene	Recent	・Mainly Flood deposits, silty soil. ・Small sand dunes｛derived from river deposits, ancient sand dunes（Siffa, Right bank of Rheriss, Western Hannabou, Northern to Northwestern Tizimi)｝. ・Deposits derived from the erosion and transported material of Rharbian~Recent deposits.
		Rharbian~Recent	・Outcrop is not so much in the area（surface crust layer and Travertine, Alluvial terrace deposits）. Post-soltanien travertins: Partly distributing at Ziz riverbed.
		Soltanien	・outcrops in the main deposited portion of the area. Sandy silt~Gravelly alluvium. Thickness 30m; include fossil ・never forming surface crust layers ・Subrecent sand dunes
		Tensiftien	・widely distributing in the area. Thickness 約 20m. Well-consolidated. not receiving erosion so much. ・covered by soltaniens deposits, then outcrops is relatively few (seen on the riverbed) ・In the eastern side of Tafilalt, not outcrops. ・Subrecent sand dunes. Cementation and hard crustization of the surface layer is progressing. Mainly extending in the area of Northern Tafilalt Plain and Upstream of Rheriss-Goulmima Palmeria（Tifounassine）. In the northern Tizimi, silty small hill of this deposit exists（very thin hard surface crust develops）
		Amirien	・cobered by soltanienne deposits（around Rissani: Sigilmassa gravelly layer） ・Sand dunes are few ・forming gentle slope at the foot of Limestone cliffs in the northern part（northern Jorf and Tizimi: lacustrine deposit Limestone）. generally intercalated with many sandy to silt-clayey layers. forming middle-level terraces. strata is nodulous and porous.
		Saletien	・very fewly ditributing in the area（only forming one portion of terrace gravelly deposits）. ・coarse deposits include landslide mass of jbel Erfoud.
		Moulouyen（ Villafrancien, plio-villafrancien)	・only partial distribution; thickness is 200m. ・relatively thin layer of gravelly layer of jbel Erfoud（130~140m）. Supplying material for the deposits to middle-level and low-level terrace deposits.
	Cretaceous	cenomano-turonien	Platy Limestone, Mudstone and Siltstone（Thickness 30~50m）
		Upper cenomanien	White Marl, Marly Limestone
		Lower cenomanien	Gypsum, Marl（Thickness about 700m）
		Infracenomanian	Mainly Continental Red Sandstone. Thickness about 200m
	Jurassic		Limestone, Dolomite, and Marl
	Lias		Marl, Marly Limestone, Dolomitic Limestone, and Siltstone.
	Paleozoic	Ordovician	Sandstone（Gara, Ouled-Zohra）
		Devonian	Limestone（Rich, Gaouz）

River Basins	Geologic Time		Stratigraphy
Maider	Quaternary	Recent~Subrecent	Coarse Alluvial deposits, Sand dune deposits, Gravelly layers, lacustrine deposit Limestone, and Silt. Silty layers are formed by irrigation, etc, and distributing in the palmeraie. Due to strong wind, sand dunes are formed at many places: equal grain size (fine size); existing from subrecent.
	Mesozoic	Cretaceous	Existing in the southern side of Bain; Kem-Kems（Cenomanien and Turonien）; overlying on Paleozoic.
	Paleozoic	Carboniferous	Green Schist and Sandstone with some strata intercated thin Limestone with nodulous layers.
		Devonian	occupies the central area of the basin; lowest level is Schist, as going to the upper Black Limestone exists（thickness 100~150m: Gedinnnien‐Siegenien）. Further upper level, Sciste and Sandstone interbedded with Limestone（thickness 100m: Emsien）, Limestone（thick. 50~100m）, and in the uppermost level, Calcareous Schist（thick. 100m）and Sandy Schist ~ Sandstone stratifying.
		Silurian	Fine grained rocks are superiour, partially platy Sandstone and Limestone existes; thickness about 500m and descreasing its thickness gradually to eastward.
		Ordovician	occupies almost half area of the basin; hard Schist（thick. 500m）= Feijases Schist; some Sandstone = First Bani; Ktaoua（Caradoc）formation ‐ equal grain size, and Quartzite（thick. 300m）; Second Bani Sandstone is very hard but very few.
		Middle Cambrian	the strata of marine degression era's deposits, outcropping in the western border area of the basin of Jbel Sarho and Jbel Ougnate; thickness 300~400m; Limestone, Schist, upper half level is occupied by Sandstone and uppermost portion is Sandy Quartzite.
		Lower Cambrian	In the basin, these formations are relatively thinly distributed comparing to the other Anti Atlas area; obserbed only in southern border area of Jbel Sarho and Jbel Ougnate; very few fossills exist; Limestone ~ Dolomite; Sandstone-rich formations.
	Precambrian		forming the mass of Jbel Sargho and Jbel Ougnate; Quartzitic Schist, Granite, Ryolite, and Andesite.

Hydrogeology in the study area and aquifers distribution is as described in the following table. Main aquifers is basically existing in the Pliocene – Quaternary formations in every basins, however in some area, the aquifer in the bedrock formations are important. Especially in Boudenib area, Senonien & Turonien Limestone recharges to and is recharged from Pliocene – Quaternary formations and forms the aquifers having large capacity. While around Tinejdad, this Limestone does not exist, but Infracenomanien Sandstone and Conglomerate form small scale of bedrock aquifers.

In Maider River basin, many fissures develop in the fault or sheared zone of Paleozoic and groundwater exists there.

Hydrogeology and Groundwater distribution in the Study Area

River Basin	Aquifers	Description	Hydrogeologic Properties
Guir Basin	Plio-Quaternary Aquifers	discharging to surface flow and being recharged from surface water: recharging also to Cretaceous formations. Especially in Boudenib basin Cretaceous formations and Quaternary deposits are recharged each other.	gravelly river deposits（k=1.5E-2 m/s）; silt and calcareous Sandstone（k=5E-5、2E-4m/s）: average hydraulic gradient 2~6%: groundwater flow velocity along Guir river at Boudenib = 4m/day; total groundwater flow volume 400~600ℓ/s.
	Turonien Limestone karst	The quantity of groundwater in this aquifer is not stable: in autumn, groundwater level goes up rapidly in short term, while in springs, it goes up slowly in long term due to snowmelt water recharging. Groundwater level is highest in May and June: forms Errachidia-Boudenib basin: some portion is intervened by some aquictard such as Cenomanien Marl, Senonien Marl etc,. Limestone in deep portion is massive: Turonien Limestone exists in the depth between 250~310m; porous, thickness 40~50m, flow rate is 800~1000ℓ/s at Ubasstnlau by the survey of 1993.	
	Cretaceous Sandstone	Aquifers exist in Continental Red formations and Upper and Lower Cretaceous Sandstone, however their properties are depend on places.	

River Basin	Aquifers	Description	Hydrogeologic Properties
Ziz Gheris Basin	<<Tafilalt Quaternary Basin>>: largely divided into three; (1)Todrha－Ferkla Basin（Tinerhir~Touroug） (2)Rheriss River Mid-stream Basin（Gouimima~Jorf） (3)Ziz River and Tafilalt s.s Basin		
	Quaternary Aquifers: Several levels	Unconfined aquifers. Main aquifer is in Soltanienne formations.	
		（Recent Quaternary）forming good type of aquifers as the followings; ・A little consolidated gravel layers and basement portions lacustrine deposit Limestone form the main part of aquifers（Tafilalet） ・Upper sand and gravel layers ・Alluvium is partly very coarse so that it may form very good layered or lens-like underground water passage. Interbedded silty layers form capillary fringe portion, in these area hydrogeological consideration against evaporation from groundwater is necessary.	sand and gravel layer: (k=1~3×10-1cm/s)
		（Middle Quaternary） widely extending in the area, and forming aquifers in general. Gravelly terrace deposits（upstream of Todrha River）; well consolidated; covered by Recent Quaternary（Todrha、Ferkla、Tafilalet）. forming lower aquifers: in the area Anti Atlas, this is gravel layers and forms good aquifers. This gravel layers sometimes outcrop in gorge, and show very high permeability（Imitere river ~ Tarhia gorge）.	
		（Ancient Quaternary）generally aquitard. lacustrine deposit Limestone; exists in Rheriss river, Ifere river, and northern side of Tizimi (hard sufface crust layer develops). Very few aquifers. （northern side of Tizimi）———（lacustrine deposit Limestone and Conglomerate）: slightly indurated, partly forms karstic groundwater flow.	lacustrine deposit Limestone: (k = 10-3~5×10-2cm/s); as far as the groundwater passage portion is concerned, its permeability is high; lacustrine deposit Marl, low porosity Limestone and silty soil（k =10-4cm/s）
	Downstream area of the basin (Tafilalt Plain)	Groundwater from Ziz & Rheriss river basin gathers this area.	
	Northern area: Infracenomanien sandy rocks	somewhere forms aquifers, somewhwere aquitard.	
	Paleozoic Bedrocks（Schist, Marl, Sandstone and cconsolidated Limestone)	generally aquitard. basement complex: Paleozoic partly Precambrian formations; Crystalline Schist and Granite（Ougnate）, Georgien Quartzite, Silurian & Viseen Schist, Middle Devonien Marl. Semi-permeable formations（Ordovicien & Viseen Sandy Scist, Devonien Limestone）: comparing to Quaternary, their permeability is low, then almost negligible, however in some portions they act a role some important water supply. In Tafilalet Plaain, Devonian Limestone forms protuberance shape like a natural underground dam.	(Rheriss Valley ~ northern Tizimi, Goulmima ~Tilouine, Upstream of Tanguerfa Valley, Right bank side of Ferkla River basin) --- some part of bedrocks show groundwater leakage and partly form aquifers.
Maider Basin	Groundwater in Maider basin area were developped mainly in Pliocene-Quaternary area. Generally in the mountain area composed of Pre-Pliocene formations, their permeability is low so that aquifers may exist few. However in some portion, they are faulted and sheared, then those area developps many fissures. In these area there is some potential to develop groundwater.		
	Alluvial deposits	Groundwater level is usually 5~8m depth from ground surface. In the downstream area (Daya el Maider), though groundwater flow can be observed, it is very few.	

Geology of Guir, Gheris & Ziz, and Maider River Basin is shown in Figure A.2.1.

A.3 Meteorology, Hydrology and Groundwater

A.3.1 Meteorology

Precipitation and Temperature of monthly basis and yearly average in the study area are shown in the following table.

Monthly Precipitation and its Yearly Average in the Study Area (mm)

Station	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Average
Amouguer	9	16	15	16	18	12	5	12	20	27	16	11	176
Tadighoust	12	19	11	16	12	5	1	7	13	21	23	15	142
Errachidia	12	20	9	11	10	9	5	4	7	21	18	19	107
Erfoud	5	8	4	4	4	3	1	2	6	7	6	6	51
Taouz	4	5	4	7	3	1	0	1	3	7	6	6	45

Monthly Temperature and its Yearly Average in the Study Area (℃)

Station	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Average
Amouguer	7	9	12	15	18	23	27	25	22	17	12	8	16
Tadighoust	8	11	15	18	23	28	32	30	26	20	14	10	20
Errachidia	7	10	13	17	21	26	29	29	24	18	12	8	18
Erfoud	10	13	17	20	24	29	33	29	28	22	15	11	21
Taouz	10	13	18	22	27	31	35	35	30	22	16	11	22

The station Amouguer shown in the above table situates in the High Atlas mountain, the station Tadighoust and Errachidia are at the outlet from High Atlas mountain, the station Erfoud is in Tafilalet plain, and the station Taouz is in further southern area near the border with Algeria. Then those values represent the tendency of rainfall and temperature in all of the study area.

Figure A.3.1 shows the contour map of precipitation in the study area.

Annual rainfall volume is very different year by year. According to the Figure A.3.2 showing the rainfall graph of past 20 years, the year around 1989 and 1993 – 1995 are rainfall-rich year, and the year around 1982 – 83 and from around 2000 to 2003 are draught year.

Monthly and Annual Evaporation by Evaporation Pan in the Study Area (mm)

Station	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Annual
Amouguer	121	131	188	213	283	329	382	345	244	180	134	117	2668
Tadighoust	124	137	192	256	318	395	466	381	320	177	126	85	2977
SEMVA	59	89	149	196	246	303	339	301	228	158	83	53	2189
Taouz	201	266	393	485	594	646	666	667	509	384	263	196	5268

The above table shows the monthly and annual evaporation by evaporation-pan. Generally, it shows such large values as 2,000 ~ 3,000 mm, especially at Taouz in southern area it goes over 5,000 mm. Though Tadighoust and Errachidia (SEMVA) both situate at the outlets from High Atlas Mountains, Errachidia (SEMVA) is in the experimental farm of ORMVA where many trees and vegetation grow so that its evaporation may be a little lower than that at Tadighost.

Humidity in the study area is generally low. The annual average humidity at Errachidia 41%, where lower than 30% from June to August, and a little exceed 50% from November to February.

The measured data at respective meteorological stations are shown in Tables A.3.1 ~ A.3.3.

A.3.2 Hydrology and Groundwater

The river system in the study area is largely divided into such three as Guir, Ziz-Gheris, and Maider river Basin. The respective catchments area is that Guir basin is about 13,400 km^2, Ziz-Gheris basin is about 20,200 km^2 (about 21,300 km^2 if including Chebbi Dune Area), and Maider basin is about 12,000 km^2. Further as shown in the following table, these basins can be subdivided into some small area or tributary basins. In the table, the hydrometrical stations are also listed both main and simple one which only water head of river flow is measured but not converted it into river flow rate yet.

In the following table, subdivided smaller area or tributary basin are listed with their catchments area and average annual rainfall calculated from Area × Rainfall.

The discharge at respective hydrometrical stations are shown in Tables A.3.4

Hydrometrical Stations and Hydrology in the Study Area

River Basin		Main Tributary or Area	Catchments Area	Hydrometric station		Average Rainfall
			km^2	Main	Simple	Mm^3/year
Guir Basin	1	Guir river	**4520**: upto confluent point with Bouanane river.	Tazouguert (1961 ~)	Kadoussa	679
	2	Bouanane river (main tributary Ait-Aissa river)	**8460**: upto confluent point with Guir river	Tit N'Aissa, Bni-Yatti (1961 ~)	Ait Haddou (1970 ~), Jbal Lagnul, Bouanane	1,636
	3	Midstream of Guir river	**13380**: upto Ain Chouater (25 km from confluence of Bouanane and Guir river.		Ain Chouatter	2,349
Ziz Gheris Basin	1	Todrha river, Imitate river Tarhia river	**655**: upto Ait Bouijane **910**: upto the confluence of Imitate **2300**: upto the confluence of Tarhia (just downstream of El Hart)	Ait Bouijane		356
	2	Tanguerfa-Ferkla-Ichem river ~ Gheris river confluent point	**4675**: upto Touroug palmairaie (theconfluence of Gheris river)	Merroutcha	Ifer, Ferkla	686
	3	Upstream of Gheris river	**2210**: upto Tadighost	Tadighoust	Amousder Taghia, El Haroun	478
	4	Midstream of Gheris river (Gheris & Tarda river)	**9850**: upto the confluence of Tarda river			1,577
	5	Midstream of Ziz river (Ziz and Aoufous river)	**7200**: upto the confluence of Aoufous river	F.Tlicht, Mzizel, F.Zabll, Amezouj, B.H Addakhil	Zaouia Sidi Hamza, Aoufous	1,150
	6	Midstream fo Ziz river (Tizimi)	**7630**: upto just downstream of Ziz bridge (Radier d'Erfoud)	Radier d'Erfoud		1,186
	7	Right bank of the Upstream of Tafilalet plain (Gheris river)	**10760**: upto Hannabou	L'Hmida		1,674
	8	Left bank of the upstream of Tafilalet plain (Ziz and Gheris river)	**18550**: the area of Gheris river upto Hannabou, and of Ziz river upto Erfoud			2,869
	9	Mid- to Downstream of Tafilalet plain (Tafilalet s.s.)	**20200**: upto Jbel Bou Maiz and Tamellaht in the southern end of Tafilalet plain		Megta Sfa	2,986
	10	Rivers in the Chebbi dune area (Beida river)	**1075**: upto the connecting line between the outlets of Oued el Beida, Merzougha and Khemiliya		Taouz	70

River Basin		Main Tributary or Area	Catchments Area km^2	Hydrometric station		Average Rainfall Mm^3/year
				Main	Simple	
Maider Basin	1	Msisi (el-Mharch) river	**1570**: upto the confluence of Maider **525**: upto the gorge just downstream of Msisi			60: upto Msisi
	2	Regg (Fezzou) river	**2870**: upto the most downstream of Daya el Maider **1962**: upto the gorge just down- stream of Fezzou			219: upto Fezzou 117: upto Achbarou
	3	Ahssia (Hassaia) river	**1970**: upto the most downstream of Daya el Maider **1395**: upto the gorge just down- stream of Ahssia			119: upto Fecht
	4	Tarhbalt river	**3760**: upto the most downstream of Daya el Maider **3274**: upto the gorge just down- stream of Tarhbalt		Tazarine	248: upto Tazarine
	5	Bou-Haiara river	**1790**: upto the most downstream of Daya el Maider			78: upto the confluence of Maider
	6	Daya el Maider				30: only Daya area

According to actual hydrometrical data at respective main stations, the average river discharge of respective stations are as shown in the following table. Annual fluctuation of discharge volume is as big as the case of rainfall, for example the discharge volume of 1980 ~ 85 and 2000 ~ 03 is remarkably low due to the draught.

Discharge	Tazouguert	TitN'Aissa	BniYatti	AitBouijane	Meroutcha	Tadighoust	F.Tillichit	M'Zizel	FoumZabeli	BHAddakhil	R.Erfoud	L'Hmida
(m^3/sec)	1.17	0.46	2.45	0.87	0.82	1.30	2.20	1.96	4.43	8.84	2.72	0.90
(Mm^3/year)	37	14	77	27	26	41	69	62	140	279	86	28

Regarding groundwater data, those of the No. IRE shown in the paragraph A.1.1 were collected, where the areas or tributary basins situating them is as follows. Their coordinates are shown in Table A.3.5. Those data and respective annual secular fluctuations are shown in the Tables A.3.6 and Figures A.3.5. The groundwater level used for the annual secular fluctuation in the Figures are the calculated mobile average of 12 months.

Basin	Main Tributary or Area		Main Palmairaie	Number of Functioning Observation Well	Obtained Data（N°IRE）
Guir Basin	1	Guir River	Tiouzaguine、Gourrama、Boudenib、Taouses、B'Ouzims、Oulad Alis、Sahli	14	547, 596, 553, 992, 952, 941, 49
	2	Bouanane River （Main Tributary Ait-AissaRiver）	Bni-Tadjit、Anoual、Talsint、Beni Bassia、Aourir、Bouanane		
	3	MiddleBain Guir River	Ain Chouater		
Gheris Ziz Basin	1	Todrha River･Imitate River Tarhia River	Todrha-Tinrhir		
	2	Upto Confluent point of Tanguerfa-Ferkla-Ichem River ～ Gheris River	Tinejdad Mellab･Touroug～Ksar El Kebir	20	1476, 1485, 1445, 1357, 1360, 1358, 1361, 1363, 1373, 1368, 1510
	3	Upper Basin of Gheris River	Assoul、Amellago、Tadirhost、	5	755, 682
	4	Middle Basin of Gheris River （Gheris River&Tarda River）	Goulmima、Tilouine、Tarda	12	670, 678, 663, 691, 764

Basin	Main Tributary or Area		Main Palmairaie	Number of Functioning Observation Well	Obtained Data（N°IRE）
	5	Up- and Middle Basin of Ziz River (Ziz River、Aoufous River)	Rich、Errachidia、Meski、Aoufous	44	597, 498, 587, 1195 98, 1204, 29, 581, 1210, 1343, 1511
	6	Middle Basin of Ziz River（Tizimi）	Zrigat、Zaouia Jedida、Douira	6	4093, 4096, 4035, (4034)
	7	Right Bank side of Upper Tafilalet Plain (Gheris River)	Fezna、Jorf、Bouia-Krair、Hannabou	6	1028, 3628, 3630, 1029, 1048
	8	Left Bank Side of Upper Tafilalet Plain (Ziz River、Gheris River)	El Maadid、Erfoud	7	1307, 457, 3904, 3907
	9	Mid- to Lower Area of Tafilalet Plain（Tafilalet s.s.)	Sifa、Oulad Zohras、Rissani	23	525, 1038, 3254, 3107, 2379, 3669, 3666, 3887,3640,3659
	10	River of Chebbi Sand Dune Area（Beida River）	Merzouga、Erg-Chebbi、Khemlia Taouz、Hassi-Remlia、Ouzina、Ait-Khebbache		
Maider Basin	**1**	Msisi River (el-Mharch River)	Msisi、Tarherat、Azag		
	2	Regg River（Fezzou River）	Alnif, Achbaro, Fezzou, Boudib		
	3	Ahssia River（Hassaia River）	Downstream side Fecht, midstream area Amougguer、El Hasbane、Ait Saadane、Aguddimi、Tazgzaout		
	4	Tarhbalt River	Outlet of Taghbalt mouth, upstream of Tazzarine、Bou Felouane		
	5	Bou-Haiara River	Tagouki、Mackouda		
	6	Daya el Maider		6	192, 187, 185, 178

Annual secular fluctuations in the figures shows clearly that the groundwater level started remarkable down from the draught year 1982-83, continued those low levels during some period, recovered gradually from 1988-89, and then reached near to original level in 1990. However in the area around Tinejdad, the groundwater level is observed going down gradually as a general tendency during long terms.

These kind of seasonal or annual large fluctuation and long-term lowering tendency of the groundwater level is clear especially around the lowland along main rivers, on the other hand, the groundwater level around the foot of mountain and along mid- to small scale of tributaries is relatively stable and their fluctuation is small comparing to those along main rivers.

Because DRH stopped measuring the groundwater level of their observation wells from 1997, we cannot found the recent their fluctuation so that the influence of the recent draught cannot be grasped.

At the communal pumping station in the area Jorf, Erfoud, and Rissani controlled by ORMVA, groundwater level have also been measured monthly from 1995 till present, which is shown in the Figures A.3.5-5 and A.3.5-6. From those data especially in the area Jorf, groundwater level decline influenced by recent draught is clearly found.

Locations of DRH observation wells and ORMVA communal pumping stations are shown in Figures A.3.3 and A.3.4.

A.3.3 Groundwater Quality

Through the analysis of existing documents etc., the groundwater quality in the study area may be

described as follows. The following standard judges groundwater quality from the density of dissolved salt from the viewpoint of drinkable or undrinkable. Namely, No.1 is drinkable, No.3 is undrinkable, and No.2 is depending on situations.

1. Good Density of dissolved salt is lower than 1.5 g/ℓ.
2. Medium Density of dissolved salt is 1.5 ~ 3.0 g/ℓ.
3. Bad Density of dissolved salt is more than 3.0 g/ℓ.

Groundwater quality in respective basins is as following paragraphs.

(1) Guir basin

The aquifer in Guir basin represents Plio-Quaternary and Cretaceous Senonien and Turonien, and respective groundwater quality is as follows.

- The groundwater in Upper Quaternary: considered direct recharged water from the surface water in High Atlas Mountains, and generally carbonate. TDS is usually lower than 1 g/ℓ.
- The groundwater in Plio-Villafranchien (= Lower Quaternary): recharged water each other with under-layered Cretaceous aquifer; a little hard water; TDS is usually exceed 1.5 g/ℓ, especially in southwestern area it is relatively high (2 ~ 10 g/ℓ).
- The groundwater in Senonien calcareous layers: Due to gypsum layer intercalated in the formation, generally calcium-sulfate; TDS depends on the area (0.5 ~ 10 g/ℓ).
- The groundwater in Turonien calcareous layers: soda- or calcium-bicarbonate. TDS is relatively low (Good or Medium: 1 ~ 3 g/ℓ).
- The groundwater in Infracenomanien (= Lower Cretaceous) sandstones: generally low TDS and Good quality (0.5 ~ 1.1 g/ℓ). However, those in the southwestern side of Boudenib are Bad quality (3.5 ~ 5 g/ℓ); calcium-sulfate.

(2) Ziz-Gheris basin

Water quality is very different place by place, and then classified largely as follows:

<u>(Bouïa, Tizimi, and the southern side of Tafilalet plain)</u>

- The groundwater in the southern side of Tafilalet plain shows high TDS ratio (2 ~ 70 g/ℓ), and the higher than 10 g/ℓ is common; Going more to downstream side, salts are tended to be more accumulated; Evaporation become higher as going to southern area so that subsurface water may be caused the suction by capillary action, and then the salts may concentrate around 1 to 2 meter depth from ground-surface forming hard-pan layers. These hard layers are called bekh-bakh, and usually underlain by salts-bearing soft sandy layer (salt density is more than 16%).

  Like this, evaporation influences strongly to salts accumulation, and generally salt density is in inverse

proportion to the depth of subsurface water level. The salt density up to the depth 5 ~ 6 m jumps up exponentially; soda-chloride or magnesium- to soda-sulfate.

The groundwater around Ksar Jorf~Bouïa has relatively higher salt density which seems to be due to capillary action through high evaporation mentioned like the above.

- Partly high salt density area can be found. In the area upstream side from Ziz bridge (northern side of Erfoud: Tizimi area), most of the groundwater has high TDS (2 ~ 11 g/l). Especially, those in northwestern side have generally more than 5 g/l. Also in the western area of Fezna, it tends to be higher. This tendency may be due to Infracenomanien formation existing in the area (mainly Marl) which has higher salt density.
- General TDS value: Ziz river water is around 0.4 g/l; Well water in Tizimi and Fezna area is 1.8 ~ 2.2 g/l.

(Cretaceous Basin in Ziz-Gheriss river basin)

- The groundwater in Plio-Quaternary: TDS is 0.15 ~ 4 g/l showing some difference nature place by place.
- The groundwater in Senonien sandstone: TDS shows wide range depending on place such as 0.5 ~ 10 g/l, but generally Medium Quality. The majority is calcareous sulfate, and calcareous bicarbonate (TDS lower than 1 g/l) is very rare.
- TDS in Mdarhra, Rteb~Aoufouss area is 0.9 ~ 4 g/l.

(Groundwater in Rock Formation)

- The groundwater in the basin of High Atlas Mountains: mainly existing in Cenomano-turonians calcareous formations; TDS is 1 ~ 1.3 g/l and Good Quality; calcareous bicarbonate and sometimes soda-chloride.
- In one part in the foot of High Atlas Mountains (Jebel Timetroute), TDS has relatively high (3.5 ~ 5.5 g/l, calcareous sulfate).
- The groundwater in the midstream area of Ferkla~Gheriss river: existing in Infracenomaniens formations; TDS is 0.5 ~ 1.1 g/l, Good Quality; mainly soda-chloride, rarely calcareous bicarbonate.

(Tafilalet plain and Todrha-Ferkla basin)

- As going more to downstream side, the density of dissolved salts becomes higher generally due to higher evaporation (0.2 ~ 70 g/l).
- The groundwater in the area recharged directly from the surface water derived of Anti Atlas Mountains such as J.Sarhro or J.Ougnate has a Good Quality. They are mostly calcareous bicarbonate rarely soda-chloride or alkali sulfate, and TDS is usually in between 0.2 ~ 0.5 g/l.
- Though the groundwater in the upstream area of Todrha river contacts to such bedrock as Devonian to

Carboniferous Schistes, its TDS is generally low (1 ~ 2.5 g/l). Also that in northwestern and southeastern area of Ferkla basin is generally low TDS (1 ~ 3 g/l: soda-bicarbonate). However as going to downstream side, especially of left bank side such as Mellab etc., TDS becomes a little higher (2 ~ 8 g/l: soda-chloride).

- The groundwater in between midstream of Gheriss river and upstream of Fezna and Jorf is usually Good Quality, TDS of which is lower than 2 g/l. That in the area near to Anti Atlas situating western side of Jorf, Hannabou, and Siffa is also generally Good Quality. However, the groundwater in eastern and southern side of ksar Jorff has higher TDS (2 ~ 34 g/l; normally exceed 10 g/l).
- The groundwater in the downstream area of Ziz River is generally alkali sulfate due to contamination of Paleozoic Pyrite Schistes or Quaternary Gypsum.

(Guir hammada area)

- Generally, TDS of groundwater in the area is in between 1 ~ 4 g/l.

(3) Maider basin

- The groundwater in the upstream area is generally Good Quality, for example TDS around Achbarou is around 0.5 g/l, that around Fezzou is around 1 g/l, and those are calcareous bicarbonate. Even the groundwater in the midstream side, its TDS is not so high.
- TDS of groundwater in downstream area is 1 ~ 5 g/l, and soda-chloride or soda-sulfate, and sometimes alkali sulfate due to evaporation or contamination by mineralized altered Schistes.

A.4 The Results of Drilling and Geophysical Prospecting

A.4.1 Drilling and In Situ investigation in the borehole

The location, coordinate and so on of excuted points of drilling and in situ investigation is shown in Figure and Tables A.4.1 Their results are also shown in Figures A.4.2 ~ A.4.3 and Tables A.4.2.

Geological and hydrogeological conditions at respective survey sites are as follows according to the result of drilling, borehole logging and geophysical prospecting.

- **Tizougarhine：ZoneA**

(Drilling): T.S.（B-1）- Final depth 70m, Groundwater Level (hereinafter GWL) GL- 11.5m

Depth (m)	Lithology	Permeability (cm/sec)	System
0.0 ~ 5.0	light brown silty gravel	4×10^{-3}	Quaternary Saltanien
5.0 ~ 11.0	red silty fine gravel	1×10^{-3}	〃
11.0 ~ 16.0	red clay	5×10^{-5}	〃
16.0 ~ 24.0	fine gravel rich alternation	5×10^{-4}	〃
24.0 ~ 31.0	clay rich alternation	2×10^{-4}	Quaternary Tensiftien
31.0 ~ 40.0	sand and gravel	3×10^{-3}	〃
40.0 ~ 49.0	clay to marl		〃
49.0 ~ 66.0	clay tracing sand or sand and gravel		〃
66.0 ~ 70.0	Marl		Infracenomanien

(Borehole Logging): Aquifer is inferred to be in the section ① 7 ~ 11m, ② 16 ~ 24m, ③ 31 ~ 40m, and ④ 49 ~ 66m, however, section ① exists shallower portion than GWL so that groundwater may not exist in it. As far as water temperature and conductivity are concerned, the deeper than 24m is stable, while the shallower than the section ② fluctuates in a little unstable situation probably caused by groundwater moving. Due to that, it seems to be possible to divide the aquifer into the shallower portion up to ② section as Upper Aquifer and the deeper portion than ③ as Lower Aquifer. Upper Aquifer may be unconfined, while Lower Aquifer may be confined. Considering their existing depth, the groundwater of aquifer ② may flow out to the khettars heading for Tizougarhine palm groves.

(Geoelectrical Prospecting): Clastic sediments in the area are divided into five (5) geoelectrical layers. Namely, it is: ① Uppermost layer; apparent specific Resistivity is 20 ~ 300Ωm and changes place by place probably due to soil moisture, their composition and so on. It may be correlated to light brown silty gravel and red silty fine gravel up to the depth 11m of drilling result. ② Second layer; around 20Ωm correlating to red clay, fine gravel rich alternation and clay rich alteration in the depth 11 ~ 31m of the drilling. ③ Third layer; 120~200Ωm and may be sand and gravel layers. ④ Fourth layer; Low Resistivity less than 10Ωm, and may be clay rich alternation. The deeper than ④ shows relatively high values 170 ~ 180Ωm; seems to be sand and gravel rich layers, underlain by the bedrock of Infracenomanien. The apparent specific resistivity of further deeper portion show the layers of 10Ωm or less and 200Ωm or less. Both are of Paleozoic, probably the former being argillaceous schist and the latter being limestone.

- **Hannabou：ZoneD**

(Drilling): H.S.(B-2)- Final depth 70m, GWL GL-15.8m

Depth (m)	Lithology	Permeability (cm/sec)	System
0.0 ~ 2.0	Dune sand (silty sand)		Recent
2.0 ~ 6.0	beige clay	3×10^{-4}	Quaternary Saltanien
6.0 ~ 16.0	plastic clay	3~ 4×10^{-4}	〃
16.0 ~ 21.0	gravel bearing clay	1×10^{-4}	Quaternary Tensiftien
21.0 ~ 30.0	sand and gravel	4~ 5×10^{-2}	〃
30.0 ~ 38.0	sandstone	3~ 4×10^{-2}	Silurien
38.0 ~ 70.0	argillaceous schist		〃

(Borehole Logging): The result is very clear that only one section of depth 21 ~ 29m can be aquifer. Piezometric level was GL.-15.8m then the aquifer is confined. The upper layer is wholly composed of cohesive soils forming cap-lock aquitard. Deeper portion from 30m is bedrock, and its upper portion until the depth 34m may be weathered layer from the analysis of logging curve. Drilling result shows that the depth 30 ~ 38m is sandstone and high permeability as 4 ~ 5×10^{-2}

cm/sec, but it may be very partial conditions because any result of borehole logging doesn't show these kind of properties.

(Geoelectrical Prospecting): Clastic sediments are divided into two (2) layers. The apparent specific resistivity of the upper layer is 2 ~ 170 Ω m, and changes a lot according to its place and its depth. The upper layer is correlated to dune sand and clay (partly gravel-bearing) of the depth 0 ~ 21m at the drilling point. The lower layer has its apparent specific resistivity 130 ~ 430 Ω m as showing the typical value of sand and gravel layers.

The bedrock portion is also divided into some layers, namely from upper to lower, 3 ~ 20 Ω m, 130 ~ 290 Ω m, 5 ~ 34 Ω m, 90 ~ 140 Ω m, and 20 ~ 70 Ω m.

- **Ammar (Alnif)：ZoneG**

(Drilling): A.S.(B-3) - Final depth 40m, GWL GL.-12.0m

Depth (m)	Lithology	Permeability (cm/sec)	System
0.0 ~ 4.0	fine gravel bearing muddy sand		Recent
4.0 ~ 9.0	Gravel and Boulder	3×10^{-1}	〃
9.0 ~ 40.0	pelitic schist	$5 \sim 10 \times 10^{-4}$	Ordovicien

(Borehole Logging): It is clear that aquifer is only one from the ground surface to bedrock where composed of sand or sand and gravel. Therefore it is unconfined aquifer. Though the portion deeper from 9 m is bedrock from the result of drilling, it shows very clear difference of the shallower than 12m and the deeper according to the curve of borehole logging result. The portion 9 ~ 12m may be composed of weak rock formation probably being weathered layer.

(Geoelectrical Prospecting): As shown in the result of drilling, the sediment thickness in this area is thin usually less than 10m. According to geoelectrical prospecting, the sediments portion can be divided into three, but uppermost high resistivity layer (370 ~ 7,000 Ω m), which may be talus deposits or galets, sometimes lacks at some places. Second layer shows 50 ~ 160 Ω m, and correlate to fine gravel bearing muddy sands. Lower sediment layer has its apparent specific resistivity 220 ~ 920 Ω m as showing the typical value of gravel or boulder.

Bedrock which is Paleozoic sedimentary rocks is also divided into some layers.

- **Merzouga：ZoneF**

(Drilling): M.S.(B-4) - Final depth 40m, GWL GL.- 12.0m

Depth (m)	Lithology	Permeability (cm/sec)	System
0.0 ~ 1.0	Dune sand		Recent
1.0 ~ 3.0	gravel bearing sands		〃
3.0 ~ 9.0	gray clay	1×10^{-5}	Quaternary Saltanien
9.0 ~ 40.0	pelitic schist	1×10^{-3}	Viseen

(Borehole Logging): Aquifer cannot be found clearly from logging curves. However, the portion of depth 9 ~ 11m shows some sign being aquifer, where weathered layer of the uppermost portion of bedrock probably forms some aquifer.

Some other groundwater-bearing portion in the bedrock can be read from logging curves at the depth around 20m and 28m. However, khettars in this area usually collects the water percolating through sand dunes and flowing on the clay bed lying under sand dunes.

(Geoelectrical Prospecting): Sediments in this area are divided into four (4) layers, and bedrock is also into some layers. Khettars in this area generally collect groundwater percolating through sand dunes and flowing on aquitard bed lying under dunes. The apparent specific resistivity of sand dunes is such high as 300 ~ 5,400 Ω m. Low resistivity layers seems to be aquitard, of which it is lower than 10 Ω m, and the layer showing resistivity around 30 Ω m lying just upper on this aquitard exists under dunes. The latter may be inferred to be aquifer. The aquitard having resistivity lower than 10 Ω m is generally contact directly to bedrock, however in one horizon, around 1m thick 40 ~ 50 Ω m thin layer (probably being sand layer) is intercalated in it and bearing groundwater.

Deeper than that is bedrock having some resistivity layers of the ranges 4 ~ 50 Ω m.

- **Almou Choura (BeniTadjit)：ZoneB**

(Drilling): B.S.（B-5）- Final depth 30m, GWL GL.- 8.6m

Depth (m)	Lithology	Permeability (cm/sec)	System
0.0 ~ 5.0	silt to fine sand		Recent
5.0 ~ 6.0	gravel	5×10^{-3}	〃
6.0 ~ 7.0	breccia bearing sand//mud		〃
7.0 ~ 8.0	silt tracing gravel		〃
8.0 ~ 10.0	silt tracing sand, gravel and bolder		Quaternary Saltanien
10.0 ~ 13.0	gravel	8×10^{-3}	〃
13.0 ~ 30.0	pelitic schist	4×10^{-4}	Lias

(Borehole Logging): Aquifer is inferred to be in the section ① 8 ~ 9m, ② 11 ~ 12m, ③ 14 ~ 15m, and ④ around 22m and 26m. ① and ② may be sand and gravel in sediments, ③ may be the weathered layer of the upper portion of the bedrock, and ④ may be the fissure-rich portions in rock.

(Geoelectrical Prospecting): Though the value of apparent specific resistivity scatter depending on places, sediments in this area can basically be divided into four (4) layers. Uppermost layer shows resistivity 50 ~ 60 Ω m or 100 ~ 260 Ω m depending on places. The former correlates to silt to fine sand of 0 ~ 5m at drilling point, the latter may be the area distributing galets. Then partly the former and partly the latter distribute depending on the place. Second layer has 100 ~ 500 Ω

m resistivity, and correlates to gravelly horizon of depth 5 ~ 8m at the drilling point. The layer 20 ~ 30 Ω m underlying the above normally may be capillary zone of the underlying aquifer, which shows the resistivity some mixture of gravel and clay-minerals. Underlying layer showing relatively high resistivity such as 180 ~ 900 Ω m may be aquifer and correlates to gravelly layer and weathered layer of the upper bedrock of the depth 10 ~ 13m at drilling point. Bedrock is also dividing into some layers.

- **Ait Ben Omar / Laksiba: ZoneA**

(Drilling): B-6, Final depth 50m, GWL GL.- 15.3m

Depth (m)	Lithology	Permeability (cm/sec)	System
0.0 ~ 4.0	Conglomerate		Quaternary Tensiftien
4.0 ~ 9.0	beige gravel bearing silt	1~ 2×10^{-3}	〃
9.0 ~ 16.0	silt ~ sandy pebble	3~ 8×10^{-3}	〃
16.0 ~ 23.0	marly soil: lacustrine marl	2~ 4×10^{-3}	Quaternary Amirien
23.0 ~ 50.0	pelitic schist	lower than 1×10^{-4}	Carbonifer

(Borehole Logging): According to logging curves, the layer up to the depth 15m seems to be permeable, but GWL is lower than this. Apparent aquifer cannot be found in the section deeper than 15m. Small scale of aquifer may be in the section ① 17 ~ 18m, ② 23 ~ 25m, and ③ around 41m. ① may be the border zone between lacustrine marl and overlying layer, ② may be the border zone between bedrock and lacustrine marl (probably gravelly layer exists), and ③ may be the fissure zone in rock.

(Geoelectrical Prospecting): In this area, the bedrock surface distributes complicatedly, then partly suddenly up and down. As a result of that, the thickness of sediments changes remarkably place by place. At the drilling point, the resistivity of conglomerate (0 ~ 4m) is 548 Ω m, silty soil (4 ~ 16m) 50 Ω m, lacustrine marl (16 ~ 23m) 18 Ω m, and the bedrock is divided into 90, 18, and 96 Ω m. The resistivity around the drilling point shows three layers, where first layer is high resistivity generally (350 ~ 1,200 Ω m), second layer is middle (40 ~ 60 Ω m), and third layer is low (15 ~ 40 Ω m). Though those can correlate to the drilling results, their distribution is very complicated depending on places and depths. The depth to bedrock is shallower in northern side partly outcropped forming a mound. These basement rocks forms anticline structure with its axis orienting ENE-WSW plunging to WSW.

・ **Mounkara：ZoneD**

(Drilling): B-7, Final depth 50m, GWL GL.- 23.0m

Depth (m)	Lithology	Permeability (cm/sec)	System
0.0 ~ 10.0	granule bearing marly soil 2~	4×10^{-3}	Quaternary Saltanien
10.0 ~ 22.0	beige clay	1×10^{-4}	Quaternary Tensiftien
22.0 ~ 26.0	sand, gravel and boulder	1×10^{-1}	〃
26.0 ~ 29.0	gray pelitic schist (weathered)		Silurien
23.0 ~ 50.0	pelitic schist		〃

(Borehole Logging): One aquifer may exists clearly in depth 21 ~ 27m, which may sequence layer from Hannabou area found at drilling B-2 in depth 21 ~ 29m. Another aquifer could be exist in shallower portion in depth 0 to 10m according to the drilling results, however from the logging it is not clear. But considering the altitude level flowing into khettars in Mounkara area, this aquifer may be important for collecting water. The khettars in the area may collects groundwater from this aquifer.

(Geoelectrical Prospecting): Sediments are basically divided into three, and bedrock into two. First layer correlating to granule bearing marly soil (0 ~ 10m) is further subdivided the upper having 10 ~ 30 Ω m and the lower 100 ~ 125 Ω m. The upper may be clayey soil rich sub-layer and the lower is gravel-rich. Second layer showing resistivity around 10 Ω m may correlate to beige clay. The resistivity of third layer is 150 ~ 210 Ω m and correlate to sand, gravel and boulder. As for bedrock, the highly weathered portion may be the layer of 10 ~ 35 Ω m, and slightly weathered or fresh portion may be of 200 ~ 300 Ω m.

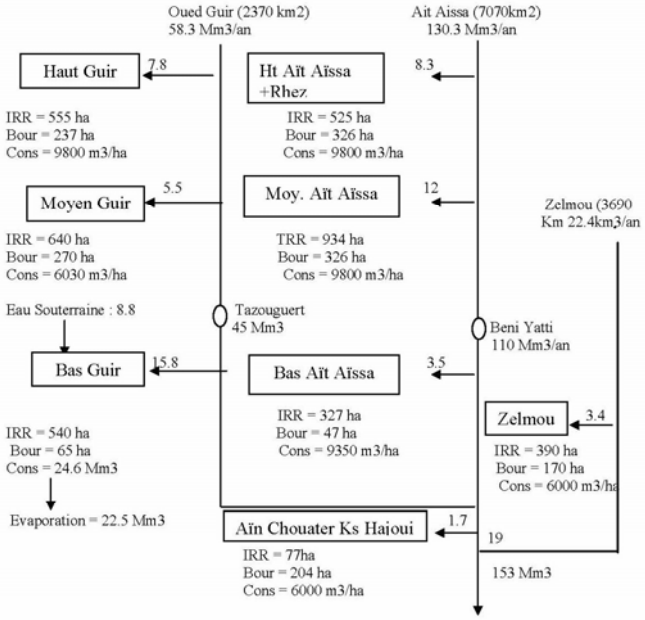
A.5 Water Resource

A.5.1 Consideration from Existing Documents

As mentioned in the paragraph A.2.2, the project area is divided into Guir river basin, Ziz - Gheris river basin, and Maider river basin. However, Todrha river basin (2,300km^2) situating in western side of Ziz-Gheris river basin belongs to Ouarzazate Province, and about western one-third area of Maider river basin belongs to Zagora Province.

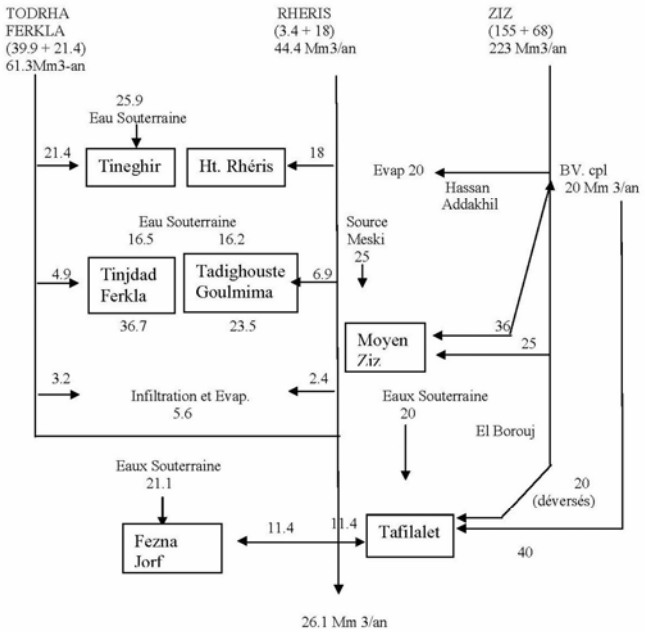
According to the study result of (ETUDE DU PLAN DIRECTEUR DE L'AMENAGEMENT DES EAUX DES BASSINS DU GUIR, ZIZ, RHERISS ET DRAA: VOLUME I, UNITES FIGUIG, GUIR-BOUANANE, ZIZ-RHERISS ET MAIDER; 1994) Carried out by Ministry of Public Works at that time (Secretariat of Hydraulics at present), water resources in the area is as shown in the following flow-charts.

BILAN RESSOURCES CONSOMMATIONS DANS LE GUIR- BOUANANE



IRR = Superficie irriguée par les eaux pérennes
BOUR = Superficie irriguée par les eaux de crue
CONS = Consommation en eau
O = Station hydrologique

BILAN RESSOUCES CONSOMMATION DANS LA SITUATION ACTUELLE



Ressource : eaux de surface	: 349 Mm 3/an
Eaux Souterraines	: 140 Mm 3 /an
Total	: 489 Mm 3/an
Utilisation	: 417 Mm 3 /an
Pertes par évaporation	: 26 Mm 3/an
Crues résiduelles à l'aval	: 24 Mm 3/an

Considering the above flow-charts, water resources of the respective basins may be as in the following tables, however, that of Maider river basins hasn't been ever shown such a analyzed flow-charts and their data is very few so that some result is not come out yet. Then, it is inferred from assumptional river discharge in the upstream and some measured river discharge data in the downstream.

Water resources and Water Use in Ziz-Gheris river basin

River Name		Ziz River	Gheris River	Remarks
Total Surface Discharge		243	105.7	
Utilization	Upper Basin	68	39.4	Irrigating to Cultivated Area 11,170 ha with Groundwater 26 Mm3
	Middle Basin	61	11.8	Irrigating to Cultivated Area 8,470 ha with Groundwater 72.7Mm3
	Lower Basin	94	22.8	Irrigating to Cultivated Area 19,440 ha with Groundwater 41.1Mm3. 11.4Mm3 of Gheris River is diverting to Ziz River.
Evaporation & Infiltration		20	5.6	The volume of Ziz River is evaporation from Hassan d'Akhil Dam Reaservoir.
Total		243	79.6	Total Utilization Ratio is 92.5%
%		100%	75%	

Unit: Mm^3/year

Water resources and Water Use in Guir river basin

River Name		Guir River	Bouanane River	Remarks
Total Surface Discharge		58.3	130.3	
Utilization	Upper Basin	7.8	8.3	Irrigating to Cultivated Area 1,643 ha.
	Middle Basin	5.5	12.0	Irrigating to Cultivated Area 2,170 ha.
	Lower Basin	15.8	3.5	Irrigating to Cultivated Area 979 ha with Groundwater 8.8 Mm3
	After Confluence	1.7		Irrigating to Cultivated Area 281 ha
Total		54.6		Ratio of Utilization is 50% along Guir River and 18% along Bouanane River
%		29%		

Unit: Mm^3/year

Water resources and Water Use in Maider river basin

River Name	Maider River		Remarks
	Surface Discharge	Utilization	
Upper Basin	40	25	Irrigating to Cultivated Area 3,360 ha
Lower Basin	24	20	Irrigating to Cultivated Area 1,630 ha
note) If the whole difference of surface discharge and utilization in the upper basin flows into the lower basin, catched water volume in the lower basin is 9 Mm3/year {24-(40-25)}. Then, total surface discharge in Maider Basin is 49 Mm3/year and 45 Mm3/year is utilized for Irrigation actually. Percentage of utilization of surface discharge water is 92%.			

Unit: Mm^3/year

From the above tables, the potential of water resources in respective basins is considered as described in the following tables.

Water Resources Developable Potential in Respective Basins

River basin	Water resources developable potential
Guir river	Average total river discharge is about 188Mm^3/year. The percentage of water use to river discharge is only about 30%, then the discharge to downstream not used effectively reaches 153 Mm^3/year. Zones B and C situate in this basin and the potentials of water recharge and developable water resources are high.
Ziz-Gheris river	Among about 349Mm^3/year as average total river discharge, 92.5% is already utilized at present. As far as Ziz river concerned, it is 100%. Then, average developable potential is only about 26Mm^3/year in Gheris river basin. Using this developable potential, it may be possible to facilitate flood irrigation and groundwater recharge to the area Zone A, D, and E, where are the area groundwater level remarkable lowering recently.
Maider river	Any hydrometrical data do not exist in this basin. As mentioned the above, if it is estimated that average total discharge is 49Mm^3/year and 11Mm^3/year among total water utilized volume 45Mm^3/year for irrigation is derived from groundwater, the remaining 34Mm^3/year is from surface water. Then, the percentage of water use to average total discharge is about 70%. Final developable water resource in future is calculated as 15Mm^3/year.

A.5.2 Tank Model Analysis

To study the detail about water resources in respective basins, we did the tank model analysis from the data of rainfall, evaporation and river discharge at respective stations.

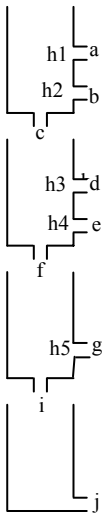
Model is considered ground surface area as first tank, unsaturated zone from ground surface to groundwater surface as second tank, saturated aquifer under groundwater surface as third tank, and the part

of hydrogeological aquitard basis or flowing out to downstream aquifer as forth tank which are shown in the following figure as four-stories typical arrangement tank. The utilized data is monthly basis. Evaporation value used for this analysis is input 65% of evaporation-pan measured monthly average value (one of FAO calculation method), and further in rainy day 50% of that value is input as a result of comparing actual daily data. Average rainy day in respective months is calculated from the available data at nearest meteorological station. And considering some of subsurface water should be also evaporated constantly due to there being arid area, some values need to be input into the model. However due to this values immeasurable, 10% of storage height of second tank and 1% of third tank is considered appropriate as a result of trial calculations.

Under these prerequisite the analyzed results at respective stations are shown in Figures A.5.1, and respective parameters are shown in the following table. Tazouguert and BniYatti stations belong to Guir river basin, and the other five stations belong to Ziz-Gheris river basin.

Stations situate more downstream, generally river discharges become smaller and the parameters for recharge become larger. This is not only because that rainfall becomes smaller and evaporation becomes larger as going to downstream, but also because that the river discharge utilized much as flood irrigation. Then, it seems to result that river discharges become remarkable lower, while groundwater recharges from flood irrigation area become larger in downstream area. This implies that to recharge groundwater is effective through flood irrigation.

Station	a	h1	b	h2	c	d	h3	e	h4	f	g	h5	i	j
Tazouguert	0.4	40	0.1	20	0.5	0.2	30	0.1	0	0.6	0.0001	5	0.01	0
BniYatti	0.5	50	0.2	10	0.65	0.05	50	0	0	0.4	0.0005	5	0.01	0
AitBouijane	0.1	50	0.05	10	0.6	0.25	60	0.07	0	0.2	0.003	50	0.01	0.0005
Merroutcha	0.1	30	0.1	10	0.6	0.2	50	0.005	5	0.4	0	5	0.01	0
Tdighoust	0.15	30	0.05	10	0.3	0.02	35	0.01	20	0.1	0.003	5	0.01	0
L'Hmida	0.2	80	0.05	5	0.6	0.05	50	0.03	20	0.4	0	5	0.01	0
B.H.Addakhil	0.4	40	0.2	10	0.3	0.4	20	0.2	0	0.2	0.001	5	0.01	0



From this tank model analysis, annual total rainfall, total recharge, and total discharge can be calculated. Respective average values at respective stations so far are as follows.

(Mm3/year)	Tazouguert	BniYatti	AitBouijane	Meroutcha	Tadighoust	L'Hmida	BHAddakhil
Total Precipitation	311	1,041	88	655	403	1,191	848
Total Recharge	123	396	25	232	120	408	102
Total Discharge	41	83	26	26	44	31	286

However these values fluctuate remarkably year-by-year, annual sequence of these three values are shown in Figures A.5.2. At some stations in remarkable draught year, groundwater recharge and river discharge

become zero due to severe evaporation.

Because reliable hydrological data do not exist in the downstream area of respective basins, it is difficult to analyze them for whole basins and show them numerically. As a general consideration, it is mentioned as follows.

- **Guir basin**

Annual average river discharge is 124Mm^3/year and annual average groundwater recharge is 519 Mm^3/year up to Tazouguert and BniYatti stations. Among annual average rainfall 1,352 Mm^3/year, it is calculated that more than half is lost by evaporation. The annual average rainfall up to Ain Choatter where is the end of Guir river basin is 2,349 Mm^3/year, therefore the rainfall in the area between both stations and Ain Choatter is about 1,000 Mm^3/year which is 74% that up to both stations. However evaporation in the area becomes larger, total water resources in whole basin may be inferred 30 to 40% increase of that up to both stations, namely, average river discharge is 160 ~ 170Mm^3/year and average groundwater recharge is around 700 Mm^3/year.

- **Ziz-Gheriss basin**

Average river discharge is 286 Mm^3/year, average groundwater recharge is 102 Mm^3/year, and average rainfall is 848 Mm^3/year up to Hassan Adakhil Dam in Ziz basin. Rainfall in the basin up to Aoufous situating downstream is 1,150 Mm^3/year, and then rainfall in the downstream of the Dam is average 300 Mm^3/year. As going to downstream area, evaporation becomes larger and water use from river discharge is also increasing. In the case Merroutch and L'Hmida station in Gheriss river basin where is considered the geographical and climate conditions may be similar to Aoufous area, the percentage of river discharge to total rainfall is only 2.5 ~ 4% and groundwater recharge is 30 ~ 40 %. And also considering the different condition that the downstream area of Hassan Adakhil Dam is basically irrigated from Dam Reservoir while the area along Gheriss river has many area irrigated by river flood, the rate of groundwater recharge derived from flood irrigation may become a little smaller and river discharge may become a little larger comparing to the case in Gheriss river basin. From the above consideration, increase volume is inferred that river discharge may be around 20Mm^3/year and groundwater recharge may be 70 ~ 80Mm^3/year. Evaporation from dam reservoir is calculated as 20 Mm^3/year, then water resources in Ziz basin is inferred that surface water may be around 280Mm^3/year and groundwater recharge may be 170 ~ 180Mm^3/year.

Ait Bouijane, Merroutcha, Tadighoust and L'Hmida stations are located in Gheriss river basin. Because surface water is utilized larger as going to downstream, river discharge becomes smaller and groundwater recharge becomes larger. At the L'Hmida station that is the most downstream station in Gheriss basin, groundwater recharge is 408 Mm^3/year, river discharge is 31 Mm^3/year, then total 439 Mm^3/year is average annual water resources. Hannabou situates further downstream side of L'Hmida station. Rainfall up to L'Hmida station is 1,191 Mm^3/year and up to Hannabou is 1,674 Mm^3/year, then rainfall between both areas is 483 Mm^3/year. The increase of water resource up to Hannabou from L'Hmida is considered around 30% (around 150Mm^3/year).

A.5.3 Water Resources and Water Use for Maintaining Khettaras

Though whole water resources is as mentioned the above, all resources are not developed as far as groundwater recharge concerned. To say the least, it is necessary to take attention when we consider khettaras as sustainable use in future. That is, khettaras discharge depends on water head around it, therefore khettara itself is difficult to cope with piezometric level draw-down by themselves when some draught happens. Recently, draught season is ongoing and due to over pumping-up by propagation of motor-pomp tube-well, groundwater level is gradually lowering year by year resulting in khettaras discharge lowering. Among more than 300 khettaras in the project area, only about 170 have some discharge according to the inventory survey in 2000 by ORMVA. And according to the inventory survey carried out in this project in the summer 2003, their number is further decreasing until around 110.

To make khettaras sustainable use, it is necessary to make water resource use effectively keeping water heads as much as possible. For that, the following countermeasure may be necessary.

- Promoting groundwater recharge from ineffective river discharge by such a groundwater recharge dam or flood irrigation, and increasing water resources.
- Constructing communal pumping station etc., and utilizing groundwater systematically, and then controlling groundwater use without wasteful pumping up.

To keep piezometric level, attention is necessary not to increase present groundwater use in future. About sustainable water resource development shall be described as the following paragraphs.

A.5.4 Sustainable Water Resource Development

Regarding Guir river basin, meteorological and hydrological data exist relatively much, but groundwater observation data is very few. As for Maider river basin, both data is very few. In Ziz river basin, though those data exist rich relatively, those relationships are a little complicated due to Hassan Addakhil Dam existing in the middle and river discharge artificially regulated. Therefore to consider sustainable water resource development, the case of Gheriss river basin furnishes with much information because of relatively much data and no dam to regulate artificially for long-term. Annual rainfall sequences at Merroutcha hydrometrical station (at the confluence point of Ferkla and Tanguerfa river) and L'Hmida station (in the midstream of Gheriss river) are shown in the Figure A.5.3. L'Hmida station is the typical point to consider about Gheris Basin, then for analyses of sustainable water resources development, we select it. Its analyzed result by Tank Model are shown in Figure A.5.4 selecting from Figures A.5.1 and A.12.

Groundwater Use in 1993 ~ 95 (revised and compiled the report of DGH)

Basin		Main Tributary or Area	Spring		Khettaras		Well	
			Mm^3/year	Area	Mm^3/year	Area	Mm^3/year	Area
Guir Basin	1	Guir river			3.1	Boudenib	3.3 0.7	Upstream basin Boudenib
	2	Bouanane river (main tributary Ait-Aissa river)	10		0.8	Upstream basin Beni-Tajit	2.2 0.2	Upstream basin Bouanane
	3	Midstream of Guir river			0.8 ~ 1.5	AinChouater	0.1	AinChouater
Ziz Gheris Basin	1	Todrha river, Imitate river Tarhia river	3 ~ 7	Upstream of AitBouijane, Poissons Sacres spring	12.5	Todra	9 30	Upstream area Downstream area
	2	Tanguerfa-Ferkla-Ichem river ~ Gheris river confluent point			0.3 0.65	Tinejdad-Touroug Nord Tinejdad-Touroug Sud	0.7 21 7.4	Tinejdad-Touroug Nord Tinejdad-Touroug Sud Tinejdad-Touroug Est
	3	Upstream of Gheris river	0.6 ~ 4	Tadighost, Mouy spring	 0	Assoul Tadighost	0.85	Tadighost
	4	Midstream of Gheris river (Gheris & Tarda river)	2.6 ~ 8.3	Goulmima, Tifounassine spring	 2 2	Goulmima (no khettara) Ksar Jedid El Guelta	4 4	Goulmima Nord Goulmima Dud
	5	Midstream of Ziz river (Ziz and Aoufous river)			—			
	6	Midstream fo Ziz river (Tizimi)			—			
	7	Right bank of the Upstream of Tafilalet plain (Gheris river)			5.6 3.5	Jorf Hannabou	4.9 7.2 0.01	Fezna Jorf Hannabou
	8	Left bank of the upstream of Tafilalet plain (Ziz and Gheris river)			—			
	9	Mid- to Downstream of Tafilalet plain (Tafilalet s.s.)			9.4 ~ 14.4: Both Khettaras and Wells			
	10	Rivers in the Chebbi dune area (Beida river)						
Maider Basin	1	Msisi (el-Mharch) river			0.44			
	2	Regg (Fezzou) river			3.5 ~ 5	Upstream of Boudib	2.6 3.8	Alnif Fezzou, Boudib
	3	Ahssia (Hassaia) river			1.3 ~ 1.6	Average year	6.1 5.6	El Fecht Nort El Fecht Sud
	4	Tarhbalt river			0.85		4.7	
	5	Bou-Haiara river						
	6	Daya el Maider						

Groundwater level fluctuation of observation well NoIRE 3628/57 (refer to Table A.3.-(2,3).2) near to L'Hmida station and the reserved height of third Tank in the Model Analysis which is correlated to be groundwater saturated zone (aquifer) are compared about their sequence each other, then storage coefficient (effective porosity) are calculated. Finally, the groundwater level fluctuation sequence can be simulated, as a case any groundwater in the upstream area of station have not be used so far as shown by blue line in the Figure A.5.5. Considering the difference between the value along this simulated blue line and actual measured groundwater data at NoIRE 3628/57, and further comparing them and the groundwater use shown in the DGH report「ETUDE DU PLAN DIRECTEUR DE L'AMENAGEMENT DES EAUX DES BASSINS SUD-ATLASIQUES」in 1996 (refer to the above table). Annual groundwater use sequence up to L'Hmida station is also shown in Figure A.5.5, which increases year by year. If these values are re-input to Tank Model Analysis, the groundwater level fluctuation curve in the case actual groundwater use are simulated as red line in this Figure.

Further to consider future case, the rainfall data in 1983 ~ 1995 at L'Hmida station are input into Tank Model as expected rainfall after 2003, future groundwater fluctuation until 2015 in some water use cases can be simulated as respective correspondent curves shown in Figure A.5.5.

As the case groundwater fluctuation curve be standard (zero) in future, the difference curves between some water use case and the standard are shown in the Figure A.5.6 respectively.

As a result of that, in case groundwater uses increase as the same rate so far (153 ~ 217Mm^3/year) groundwater level draws down 2 meters in 2015. In case it keeps as the present use (153 Mm^3/year), groundwater level draws down about 1 meter in 2015 though it converges gradually. To make groundwater balance as same as present, the volume of water use is 122 Mm^3/year.

To keep khettaras discharge, it is necessary to keep groundwater level if the khettaras condition is same. Otherwise their discharges become smaller and smaller gradually in future.

Average groundwater recharge up to the station L'Hmida calculated by Tank Model is 408 Mm^3/year and groundwater level sustainable use is 122 Mm^3/year, then sustainable groundwater use, when considered groundwater use is mainly by way of khettaras, is around 30% of groundwater recharge in the area.

As far as Gheris Basin up to Jorf area is concerned, one-third of recharged volume to groundwater is sustainable use for keeping khettaras as they are in that area, and at present the remaining two-third are flow out to the area Siffa, Rissani, Merzouga, and Taouz.

A.6 Feasibility Study

Following sites are selected for F/S among the whole M/P study area considering the verification study.

1. Zone D, Mounkara area, Khettara **Lambarkia**
2. Zone D, Hannabou area, khettara **Lagrinia**
3. Zone D, Hannabou area, khettara **Oustania**
4. Zone A, Ait Ben Omar / La'Ksiba area, khettara **Ait Ben Omar**
5. Zone A, Ait Ben Omar / La'Ksiba area, khettara **Diba**
6. Zone G, Timarzit area, khettara **Timarzit**
7. Zone G, Taomart area, khettara **Jdida**

Among them, mainly for khettaras rehabilitation are five khettaras in Zone D and A, and other two in Zone G are mainly for association organizing.

As geohydrological survey, the followings are carried out mainly at khettaras rehabilitation objecting sites.

- Except Hannabou site where the following survey was already done at the time M/P study, drilling and geophysical prospecting survey were carried out at Mounkara and Ait Ben Omar / La'Ksiba aiming khettaras rehabilitation (their specification and quantities are already mentioned in the paragraph A.1.2 and the results are in A.4.1).

- Topographic and geological survey around those khettaras, lithological and groundwater spring out condition survey in those khettaras, and lithological condition survey in khettaras adits (wells).
- Discharge analysis of those khettaras: Mounkara area; khettaras Lambarkia, Hannabou area; khettaras Lagrinia and Oustania, La'Ksiba & Ait Ben Omar area; khettaras Diba and Ait Ben Omar.

A.6.1 Geology, Hydrogeology and Groundwater at the Study Sites

(Mounkara and Hannabou Sites)

Those sites locate in the right bank side of the mid- to downstream area of Gheris river basin, where Anti Atlas Mountains situate to the western, and also in some kilometers width's plain composed of the clastic sediments from the mountain foot to Erfoud−Jorf−Tinejdad (or Goulmima) Road where some mountains or hills seriating from Anti Atlas Mountains lie sporadically and table-like rocky hills such as Mounkara Hill locate between around the road and Gheriss River. Khattaras in the area establishes their Mother wells usually at the foot of Anti Atlas Mountains or the hills and collect groundwater in the upper area conducting to the palm groove areas in the downstream area. In the area, desertification is ongoing and many small dunes develop in between Hannabou khattaras area. Lithological condition in the area is as follows:

Aeolian sand of ground surface: thickness 2 ~ 3 m.

Clastic sediment layers: sand, gravel and boulder layer lie directly on bedrock, and further to upper, silt ~ clay layer and gravel bearing silt ~ silty gravel (partly boulder) layer seriate, namely they are divided mainly into three layers. According to Morocco Quaternary System, the lowest sediment is Tensiftien (Middle Terrace), and the upper two layers are Soltanien (Lower Terrace). In Hannabou area, the uppermost layer does not exist.

Coefficient of Permeability is: the middle layer (silt ~ clay) is $1 \sim 3 \times 10^{-4}$cm/sec showing aquitard sandwiched by upper and lower aquifers. The lower aquifer is very permeable showing its coefficient $1 \times 10^{-1} \sim 4 \times 10^{-2}$cm/sec, while the upper aquifer shows its coefficient around $2 \sim 4 \times 10^{-3}$cm/sec.

Table-like Hills between around Mounkara and Gheris River: Devonian marly ~ carecareous Rocks and red-colored Sandstone ~ Sandy Limestone.

Anti Atlas Mountains: Ordovician Bani Sandstones (carecareous and phosphate rocks exist in lower portion) and Cambrian Sandstones (partly Exclusive volcanics, Sandy Argillite and Basaltic rocks).

- **Khattara Lambarkia (Zone D, Mounkara area)**

Soil Condition at Mother Well

Condition inside khattara

Groundwater spring condition

Judging from the elevation, the upper aquifer may supply water to the khattara. This aquifer distributes widely in the area from the foot of Anti Atlas to Jorf, and then the groundwater may be recharged from rainfalls, river flow in Anti Atlas basins and in the upper stream area of Gheris river basin.

Sediment condition along the khattara is as follows.

Upstream water collecting portion is in the upper aquifer. This layer becomes silt rich as going to upper, while gravel bears richer as going to lower forming as groundwater spring silty gravel portion around the bottom elevation of khattara (refering to the pictures). This gravelly portion lacks in the downstream Hannabou side.

Discharge from this khattara is relatively rich. It may be the cause of the above reason due that groundwater does not flow to downstream and spring relatively rich in the khettara.

Downstream conduit portion is in the aquitard composed of silt rich layer, then relatively few leakages.

Downstream condition of khattara Lambarkia

- **Khettara Lagrinia (Zone D, Hannabou area)**

Condition around the Mother Well. Bedrock of the bottom and side wall and gravel layer of upper side wall portion. Very few water.

Condition of gravel and sand layers in the upstream portion

Gravel and boulder layer condition forming the portion seepage groundwater.

Except for the uppermost Aeolian sand, sediment formations in the area are composed of such two horizons as the upper cohesive soil layer and the lower sand, gravel and boulder layer. The former is its thickness around 20m (the lower around 5m is bearing gravel) and forms aquitard (Coefficient of Permeability is 2×10^{-4}cm/sec). Sand and gravel layer forming good artesian aquifer lies on bedrock and be confined by the former, which thickness is around 10m and the coefficient is $4 \sim 5 \times 10^{-2}$cm/sec. The aquifers in this area and in Mounkara ~ Jorf area situate in different horizons. The aquifer in this area may be basically few connectability to surface water and shallow subsurface water in this area, and groundwater in this aquifer may be recharged in the upstream river basin, namely Todrha-Ferkla and Ichim rivers and so on in the upstream and the upstream of Gheris river.

A soil condition along the khettara is as follows.

Upstream water collecting portion: the bottom and lower side wall of the uppermost portion is dug through bedrock in the section around 500m from Mother Well. Water seepage from this portion is very few. Sand, gravel and boulder formation lie over bedrock and the khettara consist its upper sidewall and top wall around Mother well and the section around 500 ~ 1500m from the Mother well of this formation.

Condition of khettara downstream (Clayey soil)

Condition of top wall in the khettara downstream
Color is dark due to clay rich and hair cracks develop

The sand layer of thickness some ten centimeters in this formation is cemented well like concrete. Gravel and boulder layer is not cemented so much, but well consolidated.

Downstream conduit portion is dug through the upper clayey layer. Then basically this portion is low permeability, however due to its shrinkable properties of clay, dried hair cracks develop much at some portion.

- **Khettar Oustania (Zone D, Hannabou area)**

Because this khettara situate in the same area as Khettara Lagrinia, soil condition along the khettara is basically same.

Condition of a little downstream of Mother well. Very few water.

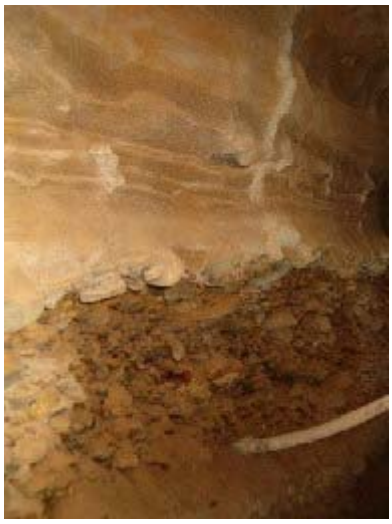
When digging to perpendicular direction In the gravel layer, water spring much.

Condition of the khettara upstream Gravelly portion and sand portion layer horizontally

Upstream water collecting portion: the bottom and lower side wall of the uppermost portion is dug through

bedrock in the section around 500m from Mother Well like khettara Lagrinia. Water seepage from this portion is very few. Very consolidated sand and gravel formation lies on the bedrock, and especially sand is cemented like concrete. The portion dug crossing direction from the point a little before the bedrock bottom in the gravelly strata can be found there, and relatively rich water springs from this portion.

Large view of gravel strata portion



Large view of sand strata portion

Condition of the midstream of khettara

Condition of the midstream of khettara

The downstream portion of the khettara is dug through the upper clayey layer. However at the midstream section of the khettara (around 2 km point from Mother Well), though sidewall is composed of clayey soil, the bottom is of sand and gravel so that this portion may become seepage portion when high groundwater level season and may become serious leakage portion when low groundwater level season due to such as draughts.

(Ait Ben Omar / La'Ksiba area)

The sites locate in the left bank side of Tanguerfa River. High Atlas Mountains consist mainly of Jurassic Series (Limestone, Sandstone and Mudstone), and the surroundings form some terraces continuing to Cretaceous Basin (mainly Limestone). In the valley, gorge or lowland, gravelly splashed flood deposits distribute widely on those rock basements.

Elongated hills orienting ENE-WSW situating just upstream of Ait Ben Omar / La'ksiba area consist mainly of Visean sedimentary rocks of Carboniferous so called Ras Sdaf Sandstone and Limestone, and partly of Breccia. Between these rock basements around the study sites, the above-mentioned flood deposits distribute continuously. While in the side of Tanguerfa River, Devonian Limestones gently dipping to High Atlas Mountains side get into under the Carboniferous. Sedimentaries in the area are lacustrine marl just on bedrock, lacustrine travertine-like limestone, and subrecent to recent gravelly splashed flood deposits. Those are as follows.

Aeolian Sand: thickness 2 ~ 3m.

Sedimentaries: gravelly splashed flood deposits; Coefficient of Permeability is $1 \sim 8 \times 10^{-3}$ cm/sec
lacustrine limestone and marl: Coefficient of Permeability $2 \sim 4 \times 10^{-3}$ cm/sec
(those are not checked by the drilling in this study)

High Atlas Mountains ~ Cretaceous Basin (Terraces): mainly of Jurassic (Limestone, Sandstone, and Mudstone), Carboniferous Limestone and marl.

Hills in the plain area: Visean Sedimentaries of Carboniferous.

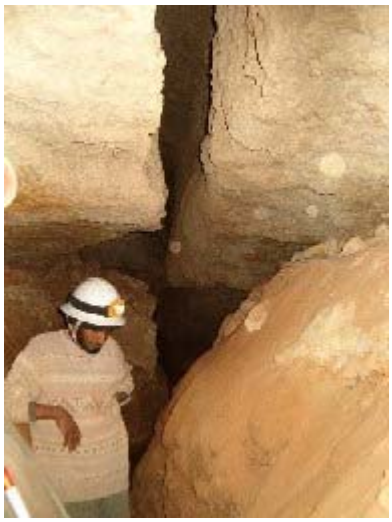
Bedrock of Tanguerfa riverbed: Devonian Limestone, Argillaceous Schist (Coefficient of Permeability is lower than 1×10^{-4} cm/sec).

- **Khettara Ait Ben Omar（Zone A）**

Calcareous cemented gravel and boulder formation in the upstream (seepage formation)

Condition of cementation by limy material just above water seepage level.

Condition of cementation of calcareous gravel (top wall)



The upper is cemented layers and the lower is brittle sand (downstream)

Khettara downstream is protected its sidewall by masonry and platy rock ceilings preventing for deposits in the bottom of falling soils from top wall.

There is some capability that groundwater in this area exists in the bedrock because they are composed mainly of Carboniferous and Devonian limestone. However, groundwater-supplying layer to the khettara is basically Plio-Quaternary. Quaternary lacustrine marl is generally aquitard, and then main aquifer in this area exists around the border of this one and the upper gravelly flood deposits. The case that in the border between bedrock and lacustrine marl interbed sand and gravel are reported many times, though the drilling in this study couldn't be found out, so that this portion may sometimes be aquifers. As a result of geophysical logging in this study, it shows that this portion may be aquifer. Permeability test in this portion shows its coefficient of permeability being in the order of 10^{-3} cm/sec. It is probably sand and gravel layer.

Lithology along the khettara is as follows.

The upstream of the khettara is dug through gravels and boulders forming groundwater spring formation. This formation is calcareous and cemented well forming conglomerate. Their grain size and content percentage is very different place by place.

The mid- to downstream of the khettara is through sandy soil lying under the above-mentioned conglomerate and further lower marl. The sandy soil is not cemented at all, so that the difference from the upper formation cemented well is very remarkable. Therefore, the top wall of the khettara is very stable because it is the lower plane of cemented formation, on the other hand sidewall is usually received erosion remarkably and sometimes collapsed. This portion is seemed to be relatively loose and permeable so that a lot of leakage may happen in this portion. Further downstream side is through marl.

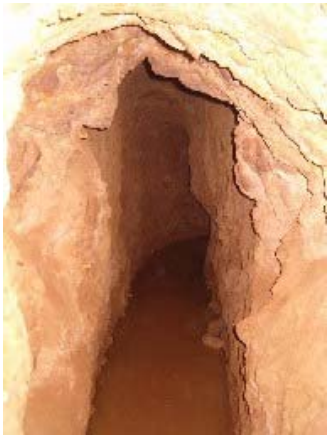
- **Khettara Diba (Zone A)**

Condition of the upstream. The bottom and lower side wall is bedrock. Upper sidewall is talus or weathered rock creek formation.

Large view of talus or weathered rock creek formation.

Condition of the upstream to midstream. Upper portion becomes a little wider.

Because khettara Diba situates in the same area as the above-mentioned Khettara Ait Ben Omar, basic geological condition in the area is same. However, lithological conditions around khettras are very different each other. The depth to bedrock around Khettara Diba area is shallower because the elevation of its surface is higher than the area along Khettara Ait Ben Omar. Then, the khettara is settled very near to bedrock surface or inside bedrock and collects groundwater in the creek formation of weathered bedrock or talus deposits as against Khettara Ait Ben Omar in conglomerate and lacustrine marl lying on bedrock. Further, its lithological or soil condition is differ place by place due to remarkable folding of bedrock.



Condition of the downstream Lithological condition around khettra is very different from the up- and midstream. It dug through completely in bedrock, then very stable

Condition of the downstream Weathered Argillaceous Schist(Vertical bedding)

Condition of the midstream. Because the lithology around khettara consists of not bedrock but loose soil, its section area becomes much wider due to collapse of side and top wall.

Lithological condition around the khettara is as follows.

The upstream of the khettara is that all bottoms and some sidewall consist of bedrock overlaid by breccia bearing talus deposits or weathered rock creek formation. Though the talus deposits or the creek formation

is generally composed of silty matrix, groundwater seepage can be found from this layers. These layers form aquifers as the bedrock hydrogeological aquitard basement.

The midstream of the khettara is generally composed of loose soil lacking the bedrock. Its side and top wall is crumbling little by little in a long period, and then the khettara section area becomes much larger comparing to the other portion. In this section, much leakage may be caused due to loose soils.

The downstream of the khettara; In the section around 900 ~ 1,300m from Mother Well, vertical bedding bedrock (Argillaceous Schist) expose suddenly. Though it is soft rocks due to highly weathered, the condition of side and top wall is stable and the section area of the khettara becomes much smaller comparing to that of the midstream. Further downstream is composed of soil but already protected by concrete lining.

(Taomart area: Zone G)

Khettara Taomart locates between Jbel Ougnate to northeast and Jbel Gaiz to southwest in Anti Atlas Mountains. Asif Tinififit flows on the valley between these mountains poured by Asif Bou as tributary from the side of Jbel Ougnate. The khettara is in line on Asif Bou. Jbel Ougnate is the main portion of eastern side of Anti Atlas and composed mainly of such Igneous rocks as Rhyolite (partly Granite), Gabbro, Andesite of Precambrian and so on. And, Taomart side of the mountain is mainly of NW-SE orienting bedded Red Sandstone or Conglomerate, Green Psammytic Schist of Cambrian. While, Jbel Gaiz is of Quartzite, Sandstone and Mudstone of Ordovician. Asif Tinififit forming straight lineament is tectonic (faults) valley between Jbel Ougnate Precambrian to Cambrian massif and Jbel Gaiz Ordovician massif. This tectonic valley curves gradually and orients NE-SW in eastern side. Gravelly alluviums bury these valleys but their thickness is relatively thin. The basement rocks forming valleys is generally such weak rock mass as Mudstone or Argillaceous Schistes or Sheared zones.

There are two khettaras as Khettaras Taomart, that is the new and the old. One is basically in Sedimentaries and the other is in bedrock (Argillaceous Schistes, partly Alternation with Psammytic Schistes). Sheared zone exists along the foot of upstream mountainside in this bedrock. Along the sheared zone, bedrocks are graphitized and fissured. Groundwater exists in these fissures. This groundwater is in more artesian condition, if existing deeper position. When drilled into this sheared zone, some small volume of groundwater springs out as the artesian. Groundwater in Sedimentaries exists only after rainfall, while groundwater in fissures of bedrock exists perennially but its volume is not much.

(Timarzit area: Zone G)

Khettara Timarzit locates few kilometers west of Taomart area, and basement rock distribution is same.

Jbel Ougnate mass is in northern side and two small mountain ranges seriating from Jbel Gaiz is in southern side orienting E-W or ENE-WSW. Ksar Timarzit locates in between of these two small mountain ranges on Asif n'Timarzit which flows from Jbel Ougnate through the one gorge of northern small mountain range. Khettara Timarzite is in line from Ksar toward Jbel Ougnate through the gorge. Bedding of rock basement composing two small mountain ranges, which is Ordovician Quartzite, Sandstone and

Mudstone but partly Devonian Limestone etc., is striking E-W or ENE-WSW and dipping to north. In the gorge and valleys, gravelly alluviums burying on bedrock deposit relatively thickly with ten and several meters at some parts. Upper few meters of this deposit consist of recent sand and gravel, and lower portion is semi-consolidated subrecent sand and gravel.

Khettara Timarzit is in line basically on Asif n'Timarzit and dug through river deposits. Topographically, this river catches all surface and subsoil water on the area between Jbel Ougnate and northern small mountain range, and main aquifer is in river deposits or valley deposits. Recent alluviums in upper portion of this deposits collect recharged water just after rainfall, while in subrecent alluviums in lower portion exists groundwater recharged with a little longer elapsed time so that groundwater may supply from this portion even during no rainfall. The upstream of khettara Timarzit is dug through these subrecent deposits. Further in fissures of bedrock that is the same Argillaceous Schist (Partly Psammytic Schist) as Taomart area, some artesian groundwater exists and recharge to aquifers in Sedimentaries. At present, Mother Well is on extended to upstream side to collect the water existing in these fissures of bedrock.

A.6.2 Discharge Analyses along Khettaras subjecting of the Verification Study for Rehabilitation

Among the above seven khettars on F/S, those subjecting of rehabilitation in verification study are three khettaras in Zone D and two khettaras in Zone A.

Khettara discharge analyses was carried out using the results of Tank Model Analyses executed in the time M/P study from collected meteorological and hydrological data at that time. First, also using groundwater fluctuation data at nearest observation wells (DRH observation wells: 1970's ~ 1996, ORMVA communal pumping station: 1995 ~), serial groundwater level in past, at present and in future are simulated, and then the groundwater level at the points of respective Mother Wells are substituted from these simulated levels.

Groundwater levels in future are simulated from inferred rainfall patterns after analyzed the past rainfall patterns. Characteristic point of rainfall patterns so far after 1970's is that draughts have happened periodically almost around ten years cycle during such periods as 1981 ~ 84, 1991 ~ 92 and 1999 ~ 2002, and one period between these draught seasons become rich rainfall season. Comparing these patterns and the data after the latest rainfall data, inferred and some adjusted patterns after 2004 are input from the data after 1980's for analyses. However as against that the rainfall around 1978 and 1988 ~ 89 is very rich, the peak rainfall of 1990's is only 60 ~ 70% of the former. Then the same patterns of rainfall in future as the former are not guaranteed. Considering that, input rainfall data in future is reduced around 60 % of sample rainfall data.

Utilized Tank Model analyses results are those which mostly influence to the groundwater level fluctuations in the study area.

Utilized data are as follows:

- Tank Model Analyses Results:

  Mounkara area; Result at L'Hmida DRH Hydrometrical Station

Hannabou area; Results at L'Hmida and Meroutcha DRH Hydrometrical Station

LaKsiba & Ait Ben Omar area: Result at Tadighoust DRH Hydrometrical Station

- Groundwater Level Fluctuation Data:

  Mounkara area; selecting the nearest one to Mounkara among the collected data in this study of DRH IRE No. 1028, 3628, 3630/57 in Jorf area, that is 3630/57.

  Hannabou area; selecting one in Hannabou area from the collected data in this study of DRH IRE No. 1029 and 1048/57, that is 1029/57.

  LaKsiba & Ait Ben Omar area: DRH IRE No. 1485/56, which is the only one collected in this study around the area.

  The groundwater data of ORMVA communal pumping station are also used to refer after simulated.

- Khettaras Discharge Measuring Data:

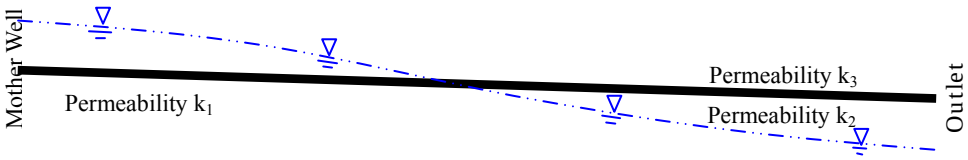
  Measured data at the upstream, the midstream, the downstream and outlet point in M/P study last year and in this F/S study.

- Hydrogeological Parameters:

  Referring to the permeability test carried out at the borehole drilled in this study basically, and used after optimizing.

As to the khettaras subject to rehabilitation on verification study such as Khettaras Lambarkia, Lagrinia, Oustaia, Diba, and Ait Ben Omar, using the above data and geological – hydrogeological analyses from reconnaissance, drilling and in situ investigations, and geophysical prospecting in the area, groundwater discharge models along respective khettaras are made first. And, the respective hydrogeological parameters are optimized from the actual measured discharge data at respective khettaras by trial. Storage coefficients are calculated inversely at the time converting storage height in Tank Model into groundwater level.

The models are simplified as showing the following figure. Calculation are carried out from monthly basis simulated groundwater level by Tank Model Analyses separately in the section of water seepage to khettara due to its bottom lower than groundwater level and of water leakage from khettara due to its bottom higher than groundwater level. Generally, the downstream of khettara is dug through in low permeability composition. Further due to some thick silty to clayey sediments on bottom, its permeability becomes very low. Then coefficient of permeability has three types usually, one is of water seepage portion (k_1) and the other two are water leakage portion (that of the bottom and some height of side wall $\{k_2\}$ and that of higher portion of side wall than that height $\{k_3\}$). The former one is decided basically from the result of permeability test, and the latter two is from trial. These parameters are as shown in Summarized Matrixes in the end of this chapters (p.p A-40 ~45).



For calculation of groundwater spring volume to khettra in the upstream, Depui-Forchheimer Equation for underdrain is used (the following equation).

$$Q = k\left(H^2 - H_0{}^2\right)L / R$$

Q: seepage volume out from the ground of permeability (k) in some length (L) section

H, H_0: groundwater head sufficiently far from khettra and that around khettara

R: range of influence $R = 2s\sqrt{Hk}$ s: drawdown ($H - H_0$)

Range of influence is by Pepeklimentov's experimental equation.

In discharge analysis, the models are simplified, as khettaras are such a culvert type that bottom width is 70cm and sidewall stands right. Considering each element with respective length of 10m, flow volumes through each element are calculated by the equation for canal flow. Then by computer, loop calculation was carried out until the flow volume on khettara from canal flow equation and the groundwater seepage volume by the above equation plus the volume flow into each element from upstream become equal. These calculations were carried out for each element and serial flow curve on respective khettaras at respective levels of groundwater head are made.

Further, the leakage loss in the section of khettara downstream was calculated as the wetted perimeter of canal flow by the coefficient of permeability {$Q = k(B + 2h)$: Q = infiltration volume (leakage loss), B = the bottom width of canal, h = flow water depth; this is the simple formula used consideration for the infiltration from road embankment or infiltration pond}. Then by computer, loop calculation was also carried out until the flow volume on khettara from canal flow equation and the volume flow into each element from upstream minus the leakage loss by the above equation become equal.

Like the above, respective parameters of each model were optimized by trial computation until they were fit to the measured discharge at some point of khettara studied in the time M/P and F/S. The flow serial curve in respective models by these trial are as shown in the attached figures in the end of this chapter, those are very fit to the measured discharge. Each parameter was fixed after these verification, and finally the discharge analysis by the computation serial distribution par month were carried out inputting the groundwater level simulated from Tank Model from 1970 to 2015.

Khettara discharges were analyzed for the maximum flow in the upstream seepage (spring) section, and computing the respective flow values at respective elements in the serial of leakage loss in the downstream, the discharge at khettara outlets, and at 1km upstream from outlets or the distance of maximum flow point from outlets were calculated respectively. Further, the discharge at the case when Mother Well will be extended 100 meters to upstream was also computed.

These results are as shown in Figures A.6.1.

By the above procedure, the increase or the decrease of khettaras in future when they will be lined by some methods such a concrete lining preventing from leakage or when Mother Well will be extended to upstream shall be simulated.

Tables

Table A.3.1-(ORMV.CMV) Annual Rainfall Data at respective CMV of ORMVA

Designation	81/82	82/83	83/84	84/85	85/86	86/87	87/88	88/89.	89/90	90/91	91/92	92/93	93/94	94/95	95/96	96/97	97/98	98/99	99/00
Rich	195.1	107.6	81.8	150.3	97.5	122.4	127.5	277.0	303.4	282.7	131.1	94.7	195.6	192.0	410.0	216.5	154.5	68.0	135.0
Gourrma	119.4	30.0	30.0	142.2	92.9	117.8	105.5	204.2	260.0	242.2	144.0	137.5	239.0	186.0	268.1	117.5	85.0	97.0	178.5
Imilchil	208.0	49.5	134.5	120.0	121.5	161.3	209.1	246.6	292.5	320.2	248.0	119.0	425.0	356.5	661.5	334.0	485.0	208.0	269.0
Kerrandou		705.0										65.5	171.0	103.5	361.5	186.5	89.0	60.0	112.5
Beni tadjit .	47.7	105.5	57.0	107.2	172.3	125.0	194.0	203.7	396.0	178.5	109.0	142.0	343.5	416.0	369.0	125.0	94.0	62.0	68.0
Talsint	149.0	45.0	46.2	111.5	150.7	196.5	142.0	196.3	355.0	182.5	118.5	165.0	453.5	519.5	447.5	149.0	98.0	61.0	94.5
Aghbalou				157.5	114.3	156.0	146.4	392.7	408.2	98.3	107.3	65.0	179.5	209.5	461.0	146.0	231.1	26.5	130.5
Assoul .			55.2		158.8	122.7	294.2	416.8	566.0	326.4	108.5	42.5	263.0	292.5	339.5	151.5	206.2	44.0	113.5
Ait hani .							122.7		262.2						234.3	134.0	149.8	16.5	82.5
Amellagou							87.5		310.0						180.0	54.5	51.8	44.5	60.0
T.z.montagne	719.2	408.1	404.7	788.7	908.0	1,001.7	1,428.9	1,937.3	3,153.3	1,630.8	966.4	831.2	2,270.1	2,275.5	3,732.4	1,614.5	1,644.4	687.5	1,244.0
M.z.montagne	143.8	68.0	67.5	131.5	129.7	143.1	158.8	276.8	350.4	233.0	138.1	103.9	283.8	284.4	373.2	161.5	164.4	68.8	124.4
Errachidia	127.6	36.0	28.1	85.5	95.7	114.3	117.2	142.7	225.6	121.7	138.1	97.8	158.7	127.9	273.1	92.9	118.2	43.5	87.3
Aoufous.	78.3	65.0	38.5	88.7	36.0	37.0	93.5	79.7	187.5	75.0	32.0	49.2	128.5	114.7	194.5	97.8	53.5	32.5	11.5
Boudnib	76.3	41.0	37.8	126.6	87.2	58.0	135.6	101.5	221.5	70.7	59.5	74.0	165.5	103.8	220.4	57.5	67.1	33.8	52.5
Goulmima					65.9	95.1	137.4	149.9	250.0	88.8	99.3	48.7	114.5	126.8	229.5	61.7	106.1	34.1	96.3
Tinejdad		32.3	9.8	50.0	80.3	84.5	107.5	161.1	263.7	119.2	103.5	64.3	144.6	123.1	295.3	85.8	115.8	71.8	123.5
Tadghoust		5.2	30.7	118.4	105.5	92.5	138.8	179.0	334.3	106.2	100.0	60.8	198.7	129.7	209.5	84.7	142.9	38.8	70.0
Mellab							50.0	88.0	199.0	80.0	46.5	53.5	135.0	173.4	210.2	117.3	102.5	49.0	91.5
T.z.intermed	282.2	179.5	144.9	469.2	470.6	481.4	780.0	901.9	1,681.6	661.6	549.3	448.3	1,045.5	899.4	1,632.5	597.7	706.1	303.5	632.6
M.z.intermed	94.1	35.9	29.0	93.8	78.4	80.2	111.4	128.8	240.2	94.5	78.5	64.0	149.4	128.5	233.2	85.4	100.9	43.4	90.4
Bouanane	122.8	48.8	44.7	81.6	96.7	116.0	200.7	62.0	234.1	143.2	69.6	69.5	151.5	241.0	212.5	88.0	54.8	34.5	58.8
Erfoud	40.8	25.5	38.2	91.5	97.2	57.9	86.7	76.9	132.6	57.0	24.5	67.7	77.6	119.9	135.0	103.7	52.4	20.6	79.0
Rissani	36.6	18.1	17.1	-97.8	127.2	49.5	85.6	52.3	144.5	69.8	22.5	53.6	79.3	108.3	124.0	51.3	80.5	6.9	22.2
Jorf	22.7	3.9		18.6	32.6	9.3	81.1	131.5	188.2	96.1	44.0	77.3	62.1	113.9	175.1	58.2	71.2	18.9	84.0
Merzougha	39.5	35.5	24.4	99.8	99.0	65.9	25.0	19.1	54.9	14.4	0.0	31.0	76.5	164.9	138.0	82.5	50.5	23.0	27.5
Alnif	17.3	25.5	10.9	77.0	44.5	112.1	51.3	155.2	143.4	77.0	38.0	59.9	63.6	124.5	156.9	74.6	83.9	27.3	72.5
T.z.plaine	279.7	157.3	135.3	466.3	497.2	410.7	530.4	497.0	897.7	457.5	198.6	359.0	510.6	872.5	941.5	458.3	393.3	131.2	434.4
M.z.plaine	46.6	26.2	27.1	77.7	82.9	68.5	88.4	82.8	149.6	76.3	33.1	59.8	85.1	145.4	156.9	76.4	65.6	21.9	72.4
T.z.action	1,281.1	744.9	684.9	1,724.2	1,875.8	1,893.8	2,739.3	3,336.2	5,732.6	2,749.9	1,714.3	1,638.5	3,826.2	4,047.4	6,306.4	2,670.5	2,743.8	1,122.2	2,311.0
M.z.action	94.8	43.4	41.2	101.0	97.0	97.3	119.5	162.8	246.7	134.6	83.2	75.9	172.7	186.1	254.5	107.7	110.3	44.7	100.5

Table A-2.1-(Goulmima).1 Respective Meteorological Data in 2003 at Goulmima Subdivision of ORMVA-1

Altitude 1150m, Latitude 31.43ºN 004.57ºW

ITEMs	Precip.	Tmax	Tmin	Tmoy	HR%max	HR%min	HR%moy	Rs	V24h(2m	ETo-PM
DATE	mm	℃	℃	℃	%	%	%	KJ/m2	Km/jour	mm/jour
1-janv		20.8	6.1	12.4	51.4	22.3	38.3	611.2	39.7	
2-janv		23.3	7.2	14.0	50.8	17.6	35.7	652.2	46.7	
3-janv		23.3	7.0	14.0	50.8	19.6	34.7	652.2	47.5	
4-janv		21.4	5.4	12.6	46.6	14.7	30.2	652.9	44.9	
5-janv		20.2	6.0	12.4	35.8	13.6	25.9	672.8	49.3	
6-janv		22.6	4.3	13.3	40.0	15.9	28.2	698.6	59.6	
7-janv		18.1	6.6	11.4	59.0	27.6	42.9	665.6	50.1	
8-janv		20.3	3.9	11.9	66.9	17.6	41.1	667.0	58.8	
9-janv		20.8	8.3	14.3	39.3	10.2	24.0	686.2	137.4	
10-janv		11.9	6.0	9.1	51.6	14.2	25.9	666.5	175.4	
11-janv		12.4	2.0	7.1	24.8	9.0	15.3	698.4	73.4	
12-janv		9.3	-0.1	4.3	38.7	22.6	29.6	714.0	57.0	
13-janv		8.2	3.1	5.4	55.6	34.3	43.9	533.7	43.2	
14-janv		8.6	-1.0	4.2	66.6	29.4	44.9	788.0	48.4	
15-janv		10.1	-0.3	5.0	63.5	27.2	43.9	695.0	53.6	
16-janv		11.1	-2.2	4.3	63.3	20.4	41.0	692.4	47.5	
17-janv		13.4	-1.4	5.2	46.0	12.3	30.7	717.0	43.2	
18-janv		19.1	0.1	7.6	42.0	8.4	21.9	725.0	53.6	
19-janv		18.5	2.2	8.4	30.7	8.7	20.4	801.0	39.7	
20-janv		19.0	3.6	9.6	23.9	9.7	17.2	721.0	57.9	
21-janv		21.4	6.0	11.9	24.0	11.6	17.3	760.0	50.1	
22-janv		20.4	7.6	13.2	32.7	18.6	21.9	557.7	39.7	
23-janv		21.9	4.8	14.3	44.5	23.0	31.4	728.0	40.6	
24-janv		18.0	1.5	10.8	62.8	22.7	45.7	731.0	41.5	
25-janv		16.2	1.4	8.4	62.0	15.3	40.7	735.0	57.0	
26-janv		16.0	-2.6	8.0	44.5	7.1	31.5	733.0	47.5	
27-janv		18.6	2.5	10.1	58.5	12.6	27.3	730.0	59.6	
28-janv		18.0	2.7	10.1	67.2	25.6	47.3	731.0	44.9	
29-janv		18.5	4.5	11.2	57.2	24.4	42.1	748.0	44.9	
30-janv		18.8	6.2	12.3	43.6	7.1	21.5	757.0	103.7	
31-janv		20.0	0.4	9.1	48.8	6.1	26.3	768.0	224.6	
Moyannes /somme		17.4	3.3	9.9	48.2	17.1	31.9	699.7	63.9	

ITEMs	Precip.	Tmax	Tmin	Tmoy	HR%max	HR%min	HR%moy	Rs	V24h(2m	ETo-PM
DATE	mm	℃	℃	℃	%	%	%	KJ/m2	Km/jour	mm/jour
1-mars	-	20.6	6.7	13.9	48.0	18.0	31.0	850.0	112.3	2.4
2-mars	-	23.6	6.0	14.5	53.8	14.2	32.0	851.0	95.0	2.4
3-mars	-	23.6	8.6	17.1	53.8	9.3	22.1	851.0	95.0	2.4
4-mars	-	25.5	10.2	18.0	41.4	14.7	25.5	853.0	121.0	3.0
5-mars	-	24.8	10.6	17.8	45.1	16.0	29.5	857.0	146.9	3.2
6-mars	-	25.0	9.9	17.8	54.6	16.4	32.5	862.0	198.7	3.8
7-mars	-	26.2	11.2	18.8	44.8	12.8	27.2	855.0	181.4	3.9
8-mars	-	25.7	12.0	19.4	33.1	11.8	21.3	1,002.0	198.7	4.3
9-mars	-	24.9	13.9	19.2	28.3	12.0	20.8	988.0	181.4	4.1
10-mars	-	24.1	11.9	18.3	46.2	14.2	26.7	878.0	198.7	3.9
11-mars	-	23.7	11.4	17.5	32.8	17.8	26.3	872.0	112.3	2.8
12-mars	-	20.2	11.6	15.9	44.7	25.0	31.6	873.0	121.0	2.4
13-mars	-	21.8	7.9	15.3	37.1	16.3	26.3	878.0	95.0	2.4
14-mars	-	25.3	10.2	17.9	32.9	12.1	21.7	873.0	224.6	4.6
15-mars	-	27.0	11.8	19.3	31.0	10.2	19.8	898.0	112.3	3.2
16-mars	-	24.1	14.1	19.1	32.0	12.2	22.4	831.0	103.7	2.8
17-mars	11.6	17.2	6.3	10.7	87.8	26.4	66.9	246.6	121.0	1.8
18-mars	-	16.6	7.5	12.0	88.3	31.5	51.4	876.0	112.3	1.6
19-mars	-	19.7	9.1	14.5	74.9	24.0	37.4	897.0	138.2	2.2
20-mars	-	20.0	10.6	15.8	63.5	16.6	32.1	1,066.0	233.3	3.4
21-mars	-	17.8	10.7	14.1	43.8	24.6	34.8	950.0	224.6	3.3
22-mars	1.4	15.9	9.9	12.6	71.4	31.4	45.4	755.0	164.2	2.1
23-mars	-	18.7	5.9	13.0	87.7	30.4	53.9	972.0	129.6	1.9
24-mars	-	18.9	9.8	15.0	66.1	29.1	43.1	1,030.0	224.6	2.8
25-mars	-	19.9	11.0	15.4	51.5	26.9	38.4	891.0	216.0	3.2
26-mars	-	20.6	9.9	15.6	56.1	23.0	34.5	906.0	190.1	3.0
27-mars	-	21.8	11.2	16.6	36.3	17.3	23.6	693.4	345.6	5.1
28-mars	-	25.3	12.6	19.5	33.7	18.7	25.3	916.0	155.5	3.4
29-mars	-	28.8	14.0	22.0	53.0	12.9	26.4	937.0	207.4	4.4
30-mars	-	29.3	12.9	21.6	43.1	10.9	21.6	935.0	146.9	3.8
31-mars	-	30.1	13.0	21.6	36.3	10.3	20.7	1,032.0	172.8	4.5
Moyannes /somme	13.0	22.8	10.4	16.8	50.1	18.3	31.4	876.6	163.9	3.2

ITEMs	Precip.	Tmax	Tmin	Tmoy	HR%max	HR%min	HR%moy	Rs	V24h(2m	ETo-PM
DATE	mm	℃	℃	℃	%	%	%	KJ/m2	Km/jour	mm/jour
1-Mai	-	30.7	15.5	23.5	55.1	11.0	29.1	1,273.0	86.4	2.7
2-Mai	-	31.0	17.5	25.0	48.7	13.1	26.4	1,095.0	121.0	3.3
3-Mai	-	31.0	17.9	25.5	48.7	10.3	23.8	1,095.0	121.0	3.4
4-Mai	-	33.3	19.6	26.7	34.5	8.4	17.9	1,109.0	121.0	3.9
5-Mai	-	33.2	17.8	25.0	44.3	5.0	24.1	1,085.0	233.3	6.0
6-Mai	-	27.3	13.9	19.7	30.1	6.4	17.5	1,129.0	190.1	4.8
7-Mai	-	22.8	10.0	17.2	42.4	15.0	25.5	1,093.0	155.5	3.2
8-Mai	-	29.2	13.4	21.5	30.2	9.0	19.2	1,103.0	95.0	3.1
9-Mai	-	28.7	12.6	21.2	54.2	12.9	27.8	1,104.0	103.7	2.9
10-Mai	-	27.8	15.2	22.0	37.9	13.7	22.7	1,000.0	103.7	2.9
11-Mai	-	27.8	19.8	23.6	35.7	14.7	23.3	974.0	267.8	5.5
12-Mai	0.2	28.5	16.3	22.1	54.3	16.4	36.2	1,127.0	190.1	4.1
13-Mai	0.6	30.3	15.3	23.9	57.5	15.6	30.6	1,040.0	112.3	3.0
14-Mai	-	31.3	17.8	25.9	45.0	13.3	23.9	1,011.0	311.0	6.1
15-Mai	-	30.6	19.9	25.8	39.9	14.8	25.2	1,009.0	172.8	4.2
16-Mai	-	29.3	16.9	24.5	46.5	16.8	27.2	1,040.0	103.7	2.8
17-Mai	-	31.4	16.2	25.2	51.6	15.2	25.9	1,041.0	164.2	3.9
18-Mai	-	30.8	16.5	25.4	39.5	14.5	22.2	1,065.0	155.5	3.9
19-Mai	-	29.9	22.5	26.8	30.9	18.0	23.1	839.0	172.8	4.2
20-Mai	-	33.8	18.0	26.9	42.4	11.2	23.2	1,050.0	112.3	3.5
21-Mai	-	35.0	18.8	28.5	23.5	7.9	13.6	1,067.0	112.3	3.8
22-Mai	-	35.5	21.6	28.8	27.6	9.3	15.9	1,045.0	198.7	5.7
23-Mai	-	35.8	23.6	29.2	25.4	8.6	17.1	1,051.0	181.4	5.6
24-Mai	-	32.3	22.4	27.3	28.2	11.5	18.9	1,134.0	190.1	5.1
25-Mai	-	32.3	17.9	25.6	31.5	10.8	18.8	1,052.0	121.0	3.7
26-Mai	-	32.0	17.8	25.1	30.5	10.7	17.9	1,064.0	95.0	3.2
27-Mai	-	33.1	17.5	25.8	23.3	9.4	13.6	1,064.0	112.3	3.7
28-Mai	-	33.6	19.7	26.8	27.9	12.2	19.8	1,022.0	190.1	5.2
29-Mai	-	33.9	19.6	28.0	36.7	9.4	18.4	1,044.0	241.9	5.9
30-Mai	-	34.3	19.0	27.9	26.9	5.8	13.0	1,069.0	181.4	5.2
31-Mai	-	33.7	20.4	27.6	30.6	8.9	17.5	1,050.0	103.7	3.5
Moyannes /somme	0.8	31.3	17.8	25.1	38.1	11.6	21.9	1,062.7	155.5	4.1

ITEMs	Precip.	Tmax	Tmin	Tmoy	HR%max	HR%min	HR%moy	Rs	V24h(2m	ETo-PM
DATE	mm	℃	℃	℃	%	%	%	KJ/m2	Km/jour	mm/jour
1-fevr	-	12.4	1.5	12.4	66.8	16.4	38.3	739.0	103.7	
2-fevr	-	15.4	-0.4	6.6	60.0	13.8	38.6	757.0	86.4	
3-fevr	-	15.4	0.2	9.3	60.0	9.9	23.6	757.0	86.4	
4-fevr		18.9	2.8	22.2	32.7	9.5		725.0	77.8	
5-fevr	-	20.0	4.6	11.8	29.6	9.6	18.4	796.0	103.7	
6-fevr	-	18.4	2.8	11.4	42.2	19.2	27.3	770.0	95.0	
7-fevr	-	16.9	4.5	10.4	64.4	27.1	45.5	761.0	86.4	
8-fevr	-	15.6	5.4	10.8	57.3	27.4	39.3	938.0	95.0	
9-fevr	-	14.1	3.5	8.7	75.0	30.6	49.7	831.0	95.0	
10-fevr	-	18.2	1.3	9.2	71.9	18.2	44.2	791.0	112.3	
11-fevr	-	18.5	3.2	11.0	46.8	16.5	29.4	795.0	112.3	
12-fevr	-	18.9	3.4	10.6	39.8	15.8	29.8	807.0	86.4	
13-fevr	-	21.7	4.2	13.0	44.0	14.3	27.7	811.0	103.7	
14-fevr	2.2	14.2	6.7	10.9	64.5	28.4	44.3	480.3	103.7	
15-fevr	0.6	13.4	2.7	8.6	91.8	25.1	55.5	758.0	138.2	
16-fevr	-	13.4	3.1	7.9	61.4	12.9	28.3	787.0	233.3	
17-fevr	-	14.4	-0.3	6.8	64.6	20.6	42.1	788.0	121.0	
18-fevr	-	18.1	2.1	10.0	49.7	16.4	34.7	788.0	95.0	
19-fevr	-	16.7	3.8	9.9	47.8	23.6	36.4	421.9	77.8	
20-fevr	-	17.3	5.1	11.2	54.1	18.3	34.9	735.0	86.4	
21-fevr	-	19.0	5.3	12.6	43.5	22.5	32.0	787.0	103.7	
22-fevr	-	21.4	6.3	13.9	47.9	15.0	30.6	800.0	95.0	
23-fevr	-	22.0	7.4	15.2	40.7	19.8	29.4	797.0	86.4	
24-fevr	1.0	19.9	10.1	15.0	49.7	19.5	36.7	813.0	164.2	
25-fevr	2.2	17.8	9.2	13.3	79.0	30.4	54.0	830.0	112.3	
26-fevr	-	23.1	10.2	16.1	62.9	17.2	39.2	849.0	172.8	
27-fevr	-	22.7	8.4	15.6	45.7	7.6	22.7	860.0	155.5	
28-fevr	0.2	22.2	7.1	14.7	37.9	12.8	24.3	844.0	103.7	
Moyannes /somme	6.2	17.9	4.4	11.7	54.7	18.5	35.4	772.0	110.5	

ITEMs	Precip.	Tmax	Tmin	Tmoy	HR%max	HR%min	HR%moy	Rs	V24h(2m	ETo-PM
DATE	mm	℃	℃	℃	%	%	%	KJ/m2	Km/jour	mm/jour
1-avril	-	29.1	14.9	22.0	72.3	12.1	27.6	945.0	129.6	3.1
2-avril	0.2	24.1	11.3	17.7	72.5	22.9	44.4	918.0	112.3	2.3
3-avril	-	24.1	12.1	22.1	72.5	6.1	23.6	918.0	112.3	2.5
4-avril	-	20.1	9.6	15.5	66.6	23.3	35.6	929.0	293.8	3.8
5-avril	-	22.7	8.4	16.0	46.7	12.3	25.5	913.0	103.7	2.5
6-avril	-	24.0	11.1	17.5	36.9	13.9	23.4	916.0	181.4	3.8
7-avril	-	24.8	12.0	19.2	32.3	13.0	20.5	901.0	293.8	5.2
8-avril	-	24.0	14.3	19.2	31.3	13.4	22.0	1,032.0	371.5	6.1
9-avril	-	22.9	10.5	17.0	54.5	17.6	33.5	1,053.0	224.6	3.8
10-avril	-	24.2	9.2	17.7	63.3	17.4	31.8	961.0	172.8	3.2
11-avril	-	27.6	12.0	20.2	42.6	11.2	23.4	965.0	190.1	4.3
12-avril	-	28.7	13.1	20.8	32.3	8.5	18.4	972.0	181.4	4.6
13-avril	-	28.8	12.4	21.1	29.4	6.2	15.5	1,064.0	406.1	7.7
14-avril	-	21.1	11.9	16.1	39.5	11.7	24.9	1,104.0	250.6	4.3
15-avril	-	21.4	10.0	15.7	33.9	13.8	23.6	993.0	172.8	3.5
16-avril	-	23.5	11.3	17.1	38.3	13.4	25.3	996.0	121.0	3.0
17-avril	-	24.0	9.9	17.3	58.1	19.6	35.2	973.0	103.7	2.4
18-avril	-	27.0	14.5	21.4	38.7	11.4	21.9	1,117.0	233.3	4.8
19-avril	-	27.8	14.3	22.3	39.8	7.9	18.7	998.0	181.4	4.3
20-avril	-	26.4	12.2	20.2	44.9	12.6	22.8	991.0	138.2	3.3
21-avril	-	27.3	12.6	20.5	38.3	6.4	19.8	995.0	259.2	5.4
22-avril	-	26.2	13.3	19.5	35.8	9.0	20.1	999.0	224.6	4.8
23-avril	-	25.5	10.0	18.8	37.1	12.0	21.0	1,007.0	207.4	4.3
24-avril	-	27.0	12.7	20.4	30.5	12.8	20.1	973.0	190.1	4.3
25-avril	-	29.5	16.0	22.4	26.0	9.3	17.7	921.0	207.4	5.2
26-avril	-	32.0	14.4	23.5	30.3	7.5	16.7	993.0	155.5	4.5
27-avril	-	33.2	18.2	25.2	36.9	6.5	17.4	998.0	259.2	6.6
28-avril	-	33.6	17.0	25.6	23.6	6.5	13.3	1,103.0	224.6	6.2
29-avril	-	35.1	18.0	27.0	21.3	5.9	12.4	1,044.0	267.8	7.2
30-avril	-	26.9	24.0	24.9	33.3	19.3	24.2	457.6	319.7	6.1
Moyannes /somme	0.2	26.4	13.0	20.1	42.0	12.1	23.3	971.7	209.7	4.4

ITEMs	Precip.	Tmax	Tmin	Tmoy	HR%max	HR%min	HR%moy	Rs	V24h(2m	ETo-PM
DATE	mm	℃	℃	℃	%	%	%	KJ/m2	Km/jour	mm/jour
1-juin	-	33.7	21.0	28.0	41.6	11.4	22.6	1,033.0	138.2	
2-juin	-	32.9	19.7	27.2	43.4	14.3	24.6	1,030.0	129.6	
3-juin	-	32.9	22.0	29.2	43.4	10.8	16.0	1,030.0	129.6	
4-juin	-	34.3	22.2	29.1	37.7	9.7	16.1	917.0	250.6	
5-juin	-	35.4	23.4	28.8	25.7	12.1	17.7	975.0	138.2	
6-juin	-	34.0	24.1	29.3	29.0	12.2	18.0	1,028.0	181.4	
7-juin	-	35.4	24.1	29.6	26.5	9.7	17.9	1,085.0	138.2	
8-juin	-	34.8	20.1	28.2	37.4	12.5	22.0	1,008.0	121.0	
9-juin	-	34.8	23.1	29.0	31.0	13.9	21.4	1,022.0	216.0	
10-juin	1.0	34.3	23.3	27.8	44.1	14.1	27.1	1,048.0	181.4	
11-juin	0.4	34.7	20.6	28.2	58.0	12.4	28.8	1,096.0	362.9	
12-juin	-	35.2	22.7	29.4	34.4	9.9	19.2	997.0	172.8	
13-juin	-	36.3	26.0	30.4	20.3	11.0	16.4	1,227.0	216.0	
14-juin	-	36.4	24.4	30.6	30.2	12.0	19.9	1,045.0	136.2	
15-juin	-	35.7	24.1	29.3	37.0	12.1	23.9	1,016.0	181.4	
16-juin	-	35.8	21.0	29.3	42.5	10.9	22.8	1,024.0	138.2	
17-juin	-	36.6	21.5	29.6	36.3	10.5	21.1	1,015.0	121.0	
18-juin	0.4	39.3	25.5	32.6	24.1	7.6	14.5	1,043.0	190.1	
19-juin	-	39.3	26.0	32.2	19.7	3.5	11.2	1,009.0	190.1	
20-juin	-	39.7	21.9	31.7	14.9	5.3	8.8	1,065.0	190.1	
21-juin	-	38.9	21.0	30.8	18.1	2.3	9.1	1,074.0	190.1	
22-juin	-	37.6	21.0	30.2	11.9	2.6	7.5	1,086.0	224.8	
23-juin	-	37.3	21.3	29.9	12.5	4.5	9.0	1,067.0	233.3	
24-juin	-	36.4	20.5	31.0	14.3	5.5	8.7	1,067.0	259.2	
25-juin	-	39.2	24.5	32.4	14.8	6.5	10.0	1,042.0	112.3	
26-juin	-	37.8	23.0	32.1	19.5	6.6	11.2	1,045.0	172.0	
27-juin	-	38.4	24.5	32.5	19.2	6.5	11.6	1,056.0	181.4	
28-juin	-	38.5	29.3	34.2	18.4	7.7	11.3	1,236.0	224.6	
29-juin	-	39.0	26.6	33.7	23.1	7.2	12.2	1,206.0	181.4	
30-juin	-	40.0	28.4	34.3	11.7	5.5	8.6	1,017.0	155.5	
Moyannes /somme	1.8	36.5	23.2	30.4	28.0	9.0	16.3	1,053.6	181.9	

Table A-2.1-(Goulmima).2 Respective Meteorological Data in 2003 at Goulmima Subdivision of ORMVA-2

Altitude 1150m, Latitude 31.43ºN 004.57ºW

ITEMs	Precip.	Tmax	Tmin	Tmoy	HR%max	HR%min	HR%moy	Rs	V24h(2m	ETo-PM
DATE	mm	℃	℃	℃	%	%	%	KJ/m2	Km/jour	mm/jour
1-julli	-	40.1	24.9	12.4	38.3	5.2	30.3	1,048.0	190.1	
2-julli	-	40.5	25.2	33.5	14.6	5.5	9.8	1,054.0	181.4	
3-julli	-	40.5	26.0	33.8	14.6	7.8	14.7	1,054.0	181.4	
4-julli	-	40.7	26.6	33.8	24.3	6.3	14.2	1,022.0	267.8	
5-julli	-	41.6	25.1	34.0	22.0	5.7	10.7	1,054.0	250.6	
6-julli	-	41.1	26.7	34.2	28.9	5.8	13.7	1,003.0	207.4	
7-julli	-	41.0	26.4	35.1	23.4	7.7	13.1	999.0	414.7	
8-julli	-	39.9	29.5	34.9	23.0	9.5	14.1	1,001.0	198.7	
9-julli	-	40.9	26.8	34.0	26.0	7.0	15.2	959.0	146.9	
10-julli	-	39.9	27.0	33.9	23.1	9.9	15.0	953.0	224.6	
11-julli	-	40.7	28.6	34.0	24.4	8.6	15.4	1,096.0	276.5	
12-julli	0.4	38.3	26.1	31.9	31.3	10.6	18.5	994.0	172.8	
13-julli	0.2	37.5	25.6	30.4	32.5	12.2	22.8	979.0	181.4	
14-julli	-	38.3	22.4	30.6	40.3	10.3	23.8	955.0	311.0	
15-julli	0.6	37.5	26.3	31.2	47.2	11.6	22.7	952.0	181.4	
16-julli	0.2	37.3	26.9	31.3	37.4	14.5	23.6	715.0	311.0	
17-julli	-	36.8	25.7	30.7	39.6	14.6	26.7	1,007.0	138.2	
18-julli	-	39.7	23.8	32.9	41.0	10.0	21.1	949.0	121.0	
19-julli	-	40.0	26.0	34.1	28.7	7.2	14.2	948.0	121.0	
20-julli	-	40.7	26.0	33.4	16.0	5.4	9.9	947.0	146.9	
21-julli	-	41.7	24.8	34.4	16.8	4.6	8.6	984.0	207.4	
22-julli	0.6	39.6	29.1	34.0	19.7	9.4	13.4	913.0	233.3	
23-julli	-	39.4	27.0	32.9	27.4	9.7	17.1	983.0	207.4	
24-julli	-	38.6	26.3	32.3	26.6	9.9	17.3	962.0	172.8	
25-julli	-	37.4	24.4	32.2	25.5	9.3	14.9	969.0	95.0	
26-julli	-	38.8	24.3	32.4	24.3	7.9	13.7	990.0	146.9	
27-julli	-	39.3	25.0	32.9	25.3	7.8	14.4	979.0	121.0	
28-julli	-	40.4	26.0	33.8	25.5	7.8	14.9	970.0	103.7	
29-julli	-	40.3	27.4	34.3	19.0	6.6	9.9	1,045.0	112.3	
30-julli	-	40.9	27.2	34.3	17.3	6.5	10.0	1,076.0	196.7	
31-julli	-	40.9	30.4	35.7	17.9	7.7	11.3	967.0	112.3	
Moyannes /somme	2.0	39.7	26.2	32.5	26.5	8.5	16.0	984.7	191.4	

ITEMs	Precip.	Tmax	Tmin	Tmoy	HR%max	HR%min	HR%moy	Rs	V24h(2m	ETo-PM
DATE	mm	℃	℃	℃	%	%	%	KJ/m2	Km/jour	mm/jour
1-sept	0.2	38.0	25.5	31.5	38.3	10.9	21.5	1,005.0	207.4	5.9
2-sept	-	38.8	24.4	31.7	30.8	8.7	18.9	972.0	155.5	5.1
3-sept	-	36.8	24.7	31.9	30.8	8.9	15.9	972.0	155.5	5.1
4-sept	-	36.8	25.5	32.3	24.1	5.7	13.7	978.0	285.1	6.2
5-sept	-	37.2	26.5	31.5	26.3	6.8	15.5	982.0	181.4	5.7
6-sept	-	36.5	23.2	30.5	26.0	9.6	16.5	980.0	293.8	7.5
7-sept	-	38.8	22.5	31.7	29.6	7.6	16.0	997.0	207.4	6.2
8-sept	-	39.2	22.9	31.0	29.2	6.7	15.9	945.0	224.6	6.8
9-sept	-	36.9	21.9	30.0	19.4	7.4	12.3	959.0	129.6	4.5
10-sept	-	33.6	19.5	27.5	33.3	13.1	20.0	986.0	164.2	4.5
11-sept	-	33.1	21.0	27.2	24.7	11.7	16.7	1,038.0	112.3	3.7
12-sept	-	33.7	20.6	27.2	29.6	13.3	20.8	984.0	129.6	4.0
13-sept	-	34.2	20.3	27.4	30.7	12.4	21.1	1,038.0	155.5	4.5
14-sept	-	35.7	19.9	28.4	37.1	11.7	21.3	1,086.0	138.2	4.2
15-sept	-	36.6	20.2	29.2	37.5	10.2	19.0	1,353.0	121.0	4.0
16-sept	-	30.8	19.1	25.1	37.9	15.6	25.7	992.0	112.3	3.3
17-sept	-	30.5	19.8	24.8	43.0	17.8	27.6	1,005.0	241.9	5.2
18-sept	-	29.1	18.2	23.2	57.0	26.3	41.9	1,012.0	216.0	4.0
19-sept	0.2	30.9	18.0	24.3	67.6	20.1	40.7	1,069.0	259.2	4.8
20-sept	2.2	33.0	17.6	24.8	69.5	16.6	42.0	1,002.0	181.4	4.2
21-sept	3.0	31.5	18.4	23.9	69.0	14.8	44.1	1,102.0	233.3	4.9
22-sept	0.4	27.3	17.2	21.9	68.4	25.4	48.4	1,088.0	190.1	3.4
23-sept	3.4	29.4	14.7	20.3	77.8	23.6	55.9	943.0	155.5	1.4
24-sept	-	28.1	13.5	21.3	85.8	25.3	51.6	910.0	103.7	1.3
25-sept	-	29.2	18.2	23.6	61.5	24.8	41.7	921.0	95.0	1.5
26-sept	-	30.7	17.4	24.4	62.5	22.8	38.3	917.0	77.8	1.6
27-sept	-	31.0	18.3	24.9	51.8	20.1	33.6	913.0	95.0	1.7
28-sept	-	32.9	18.3	25.5	52.1	17.5	33.8	922.0	112.3	1.8
29-sept	-	34.5	19.5	27.0	45.3	11.9	28.0	926.0	138.2	2.4
30-sept	-	35.0	16.8	26.3	37.3	7.8	20.3	951.0	285.1	4.2
Moyannes /somme	9.4	33.7	20.1	27.0	44.5	14.5	28.0	998.3	171.9	4.1

ITEMs	Precip.	Tmax	Tmin	Tmoy	HR%max	HR%min	HR%moy	Rs	V24h(2m	ETo-PM
DATE	mm	℃	℃	℃	%	%	%	KJ/m2	Km/jour	mm/jour
1-nov'	-	21.4	12.3	16.6	41.1	15.3	28.0	813.0	198.7	
2-nov'	-	20.7	5.5	14.0	59.8	25.3	43.8	807.0	77.8	
3-nov'	-	20.7	5.2	14.7	59.8	22.3	41.0	807.0	77.8	
4-nov'	-	22.3	7.9	14.8	63.7	20.5	40.5	819.0	8.6	
5-nov'	-	23.0	9.2	15.7	58.2	18.8	38.0	792.0	8.6	
6-nov'	-	21.5	10.0	15.7	55.8	26.0	40.0	782.0	34.6	
7-nov'	-	20.5	7.9	14.4	64.1	26.2	44.1	770.0	34.6	
8-nov'	-	20.7	8.6	14.5	59.6	26.9	46.3	789.0	43.2	
9-nov'	-	22.7	9.3	15.9	60.1	23.6	40.2	762.0	8.6	
10-nov'	-	23.4	11.5	17.5	57.7	21.8	36.4	884.0	86.4	
11-nov'	-	20.0	9.6	15.2	61.4	26.3	40.5	757.0	103.7	
12-nov'	-	19.0	7.1	12.8	64.5	29.4	47.3	756.0	25.9	
13-nov'	-	22.4	8.4	14.9	65.0	23.6	44.5	751.0	8.6	
14-nov'	-	23.3	9.3	15.8	62.0	23.7	43.2	788.0	25.9	
15-nov'	-	23.3	9.4	16.7	63.9	23.6	39.4	731.0	181.4	
16-nov'	-	19.3	11.8	16.0	38.1	21.1	29.5	944.0	190.1	
17-nov'	-	18.1	7.8	13.2	68.0	24.1	42.2	903.0	51.8	
18-nov'	13.8	19.2	8.1	12.5	94.5	26.6	55.4	679.1	147.0	
19-nov'	-	15.1	7.4	10.9	95.7	55.2	79.2	745.0	17.3	
20-nov'	0.2	16.8	7.0	11.6	93.1	52.0	76.9	727.0	17.3	
21-nov'	-	18.2	7.4	12.5	92.4	45.1	71.3	699.0	-	
22-nov'	0.2	19.2	8.1	13.4	85.0	25.5	53.7	722.0	259.2	
23-nov'	-	17.7	7.3	13.6	79.9	25.0	51.6	820.0	276.5	
24-nov'	-	14.0	4.9	10.1	90.2	41.7	61.7	703.0	138.2	
25-nov'	-	17.8	6.4	12.0	79.4	25.1	48.3	707.0	216.0	
26-nov'	-	17.1	4.7	10.6	74.7	32.9	54.6	706.0	17.3	
27-nov'	-	19.4	5.0	11.5	79.7	27.0	54.9	708.0	-	
28-nov'	-	19.3	6.5	12.5	68.0	24.7	47.0	713.0	8.6	
29-nov'	-	20.9	6.2	13.0	69.3	19.3	46.2	705.0	-	
30-nov'	-	20.8	7.6	13.7	61.3	22.4	43.5	696.1	-	
Moyannes /somme	14.2	19.9	7.9	13.9	68.9	27.4	47.6	766.2	75.5	

ITEMs	Precip.	Tmax	Tmin	Tmoy	HR%max	HR%min	HR%moy	Rs	V24h(2m	ETo-PM
DATE	mm	℃	℃	℃	%	%	%	KJ/m2	Km/jour	mm/jour
1-aout	1.0	40.9	28.4	12.4	38.3	9.0	38.3	1,005.0	155.5	9.5
2-aout	-	39.6	26.7	33.9	20.6	8.7	13.8	972.0	112.3	4.2
3-aout	-	39.5	26.3	33.1	20.6	8.9	14.5	972.0	112.3	4.3
4-aout	-	37.9	25.8	32.1	19.7	9.9	14.1	978.0	121.0	4.3
5-aout	-	37.6	23.8	31.5	28.8	10.7	17.8	982.0	198.7	5.7
6-aout	-	37.7	24.1	31.3	31.1	10.5	19.3	980.0	198.7	5.8
7-aout	-	35.3	23.6	28.8	38.0	14.1	26.9	997.0	172.8	4.9
8-aout	-	35.3	23.9	29.2	39.0	13.8	24.3	945.0	155.5	4.5
9-aout	-	34.5	23.0	28.8	38.6	16.3	25.9	959.0	181.4	4.8
10-aout	-	35.4	22.3	29.6	39.5	13.3	24.4	986.0	164.2	4.5
11-aout	-	35.5	23.2	30.0	43.0	14.6	26.2	1,038.0	216.0	5.4
12-aout	3.0	35.3	22.5	28.5	71.3	16.7	39.2	954.0	146.9	3.6
13-aout	0.2	35.2	21.1	27.5	87.3	15.8	45.5	1,038.0	207.4	4.4
14-aout	0.2	34.9	21.6	28.5	57.4	18.6	35.3	1,086.0	250.6	5.4
15-aout	-	32.5	24.8	27.8	50.3	20.2	36.3	1,353.0	112.3	3.2
16-aout	6.0	34.2	20.1	24.7	73.3	18.8	48.1	992.0	241.9	5.2
17-aout	-	33.5	16.8	25.4	88.5	20.7	50.3	1,005.0	181.4	3.7
18-aout	-	36.0	23.1	29.3	54.2	16.9	34.4	1,012.0	164.2	4.3
19-aout	0.8	36.4	23.4	29.5	48.5	16.6	30.4	1,069.0	155.5	4.3
20-aout	-	37.3	21.7	29.7	55.4	10.9	28.4	1,002.0	198.7	5.3
21-aout	-	37.8	23.0	31.1	44.3	8.9	21.3	1,102.0	233.3	6.2
22-aout	-	37.9	26.5	32.1	25.6	8.4	15.4	1,088.0	241.9	7.0
23-aout	-	38.8	25.0	32.4	21.5	8.6	15.3	996.0	172.8	5.5
24-aout	-	40.6	23.5	32.9	27.7	6.2	13.9	1,008.0	207.4	6.5
25-aout	-	40.0	24.4	32.7	23.3	5.9	13.1	1,012.0	190.1	6.2
26-aout	-	38.9	24.0	31.9	29.1	6.8	15.1	987.0	233.3	6.8
27-aout	-	39.2	21.7	31.3	26.6	7.0	13.6	1,141.0	354.2	7.2
28-aout	-	38.8	23.9	31.8	19.5	6.9	11.7	966.0	276.5	7.9
29-aout	-	38.7	22.3	31.1	23.1	7.2	13.2	1,039.0	311.0	6.5
30-aout	-	38.1	22.5	30.9	21.1	8.1	12.8	985.0	224.6	6.5
31-aout	2.4	36.1	28.3	32.6	24.6	11.4	18.3	964.0	172.8	5.5
Moyannes /somme	13.6	37.1	23.6	29.7	39.7	11.9	24.4	1,019.8	195.7	5.5

ITEMs	Precip.	Tmax	Tmin	Tmoy	HR%max	HR%min	HR%moy	Rs	V24h(2m	ETo-PM
DATE	mm	℃	℃	℃	%	%	%	KJ/m2	Km/jour	mm/jour
1-oct'	-	33.2	18.7	27.4	24.5	10.5	15.7	990.0	259.2	
2-oct'	-	31.9	20.0	25.9	28.3	9.5	18.6	991.0	216.0	
3-oct'	-	31.9	20.8	25.1	28.3	17.5	23.4	991.0	216.0	
4-oct'	-	28.8	19.4	24.7	37.4	18.4	28.3	1,045.0	233.3	
5-oct'	-	23.5	18.2	21.6	59.3	29.2	38.8	385.5	224.6	
6-oct'	13.6	24.7	15.3	18.5	91.4	43.9	74.4	861.0	172.8	
7-oct'	-	26.5	13.7	19.5	87.0	24.0	56.9	902.0	77.8	
8-oct'	-	31.5	13.9	22.6	72.8	13.1	40.1	892.0	181.4	
9-oct'	-	33.0	16.5	25.1	53.7	11.6	29.3	884.0	181.4	
10-oct'	-	32.3	18.3	25.9	46.6	14.7	27.5	885.0	103.7	
11-oct'	-	27.9	21.7	24.5	36.5	25.5	31.3	452.9	86.4	
12-oct'	-	29.9	18.3	23.2	46.0	18.3	34.3	832.0	146.9	
13-oct'	1.2	27.8	16.3	21.5	80.2	20.2	46.0	600.5	250.6	
14-oct'	-	26.5	15.1	20.6	81.8	30.4	52.9	853.0	164.2	
15-oct'	-	26.2	15.8	20.7	70.9	31.4	51.1	920.0	86.4	
16-oct'	-	24.7	14.0	20.1	78.4	32.7	52.8	933.0	146.9	
17-oct'	-	24.0	14.6	19.6	73.6	29.3	47.4	871.0	121.0	
18-oct'	-	24.4	13.5	19.4	57.0	28.0	40.0	853.0	95.0	
19-oct'	-	27.9	14.4	20.9	54.3	19.7	36.1	838.0	129.6	
20-oct'	-	28.9	14.2	22.0	55.9	17.6	33.0	835.0	181.4	
21-oct'	0.4	24.8	16.3	20.7	82.3	24.1	42.2	297.4	241.9	
22-oct'	10.4	17.9	14.9	16.4	95.3	84.0	90.8	311.4	112.3	
23-oct'	7.2	20.1	14.4	16.5	95.1	70.0	83.7	661.0	181.4	
24-oct'	-	19.1	10.5	15.5	93.1	60.0	74.0	887.0	34.6	
25-oct'	-	21.0	12.5	16.7	94.5	32.2	64.8	794.0	138.2	
26-oct'	-	21.9	9.3	15.4	85.1	29.0	56.1	755.0	190.1	
27-oct'	-	23.6	11.9	17.7	92.7	37.3	67.5	894.0	216.0	
28-oct'	0.2	23.4	11.8	17.7	90.8	30.1	65.9	1,137.0	86.4	
29-oct'	-	23.1	13.9	18.3	90.0	34.2	66.9	752.0	43.2	
30-oct'	-	23.5	10.4	17.4	79.3	29.1	48.4	807.0	43.2	
31-oct'	-	25.3	10.1	17.7	80.9	17.2	49.9	805.0	103.7	
Moyannes /somme	33.0	26.1	15.1	20.6	69.1	28.8	48.0	803.7	150.5	

ITEMs	Precip.	Tmax	Tmin	Tmoy	HR%max	HR%min	HR%moy	Rs	V24h(2m	ETo-PM
DATE	mm	℃	℃	℃	%	%	%	KJ/m2	Km/jour	mm/jour
1-dec'	-	10.5	6.4	12.3	68.9	26.4	47.4	697.6	17.3	1.2
2-dec'	-	14.8	4.6	10.0	77.4	19.8	42.2	701.0	207.4	1.3
3-dec'	-	14.8	2.2	8.8	77.4	7.4	20.5	701.0	207.4	1.4
4-dec'	-	15.9	1.9	7.2	42.7	18.4	31.9	542.4	8.6	1.4
5-dec'	-	15.9	6.9	9.0	81.1	41.8	59.3	510.4	95.0	1.3
6-dec'	-	15.9	5.2	10.0	84.8	38.5	62.5	742.0	146.9	1.3
7-dec'	-	17.4	3.5	10.3	87.3	28.6	57.9	799.0	25.9	1.2
8-dec'	-	17.1	5.1	11.6	73.4	30.1	52.7	715.0	34.6	1.2
9-dec'	-	17.4	7.0	12.5	58.5	29.6	42.1	268.3	103.7	1.8
10-dec'	-	17.4	9.1	13.0	50.6	13.9	34.1	624.0	371.5	1.9
11-dec'	-	14.7	2.9	9.9	77.3	30.1	52.1	692.4	34.6	1.4
12-dec'	-	19.1	2.9	10.3	67.4	12.5	39.3	660.4	-	1.4
13-dec'	-	19.8	3.7	11.0	57.1	21.3	39.6	674.5	-	1.2
14-dec'	-	19.5	5.3	11.4	68.3	23.4	45.0	675.8	-	1.2
15-dec'	-	23.1	4.8	13.1	63.4	14.2	41.7	658.7	8.6	1.2
16-dec'	-	20.4	7.1	13.0	54.6	21.7	40.8	663.1	-	1.2
17-dec'	-	15.7	6.8	11.0	64.9	31.0	50.1	654.0	51.8	1.2
18-dec'	-	15.6	4.4	9.6	84.6	40.0	64.2	652.7	8.6	1.1
19-dec'	-	17.9	4.1	10.0	81.1	31.3	60.7	663.2	-	1.1
20-dec'	-	17.4	5.2	10.9	73.9	31.5	55.3	514.8	-	1.1
21-dec'	-	19.5	5.7	12.0	73.2	23.4	50.4	694.1	34.6	1.2
22-dec'	-	21.5	8.1	13.0	62.9	20.6	45.2	600.3	-	1.1
23-dec'	-	17.7	5.0	10.7	59.4	23.2	39.9	673.2	17.3	1.2
24-dec'	-	13.5	4.1	8.3	59.7	30.3	46.3	655.3	17.3	1.1
25-dec'	-	12.6	2.3	6.5	69.1	34.2	55.2	590.4	-	1.1
26-dec'	-	13.9	1.6	7.6	71.8	30.5	49.6	640.1	8.6	1.1
27-dec'	-	17.3	4.5	10.6	62.6	27.5	41.2	796.0	34.6	1.2
28-dec'	-	20.5	5.3	12.0	55.7	23.1	40.0	665.9	146.9	1.4
29-dec'	-	16.7	4.4	10.4	56.5	27.0	40.2	663.1	-	1.1
30-dec'	-	20.2	2.6	10.7	58.9	16.4	43.9	678.3	8.6	1.2
31-dec'	-	17.3	4.3	10.7	54.7	23.4	39.1	666.5	25.9	1.2
Moyannes /somme	-	17.1	4.7	10.6	67.1	25.5	46.1	649.5	52.1	1.3

Table A.3.1-(1).1 Rainfall Data (Monthly Basis in Guir River Basin)-1

Bassin-Versant: Bouanane

Station: Annoual

MOIS / Année-Hydr	SEP	OCT	NOV	DEC	JAN	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	ANNEE
74/75				-	-	-	8.9	137.6	79.8	-	-	-	226.3
75/76	-	2.2	7.7	8.7	3.9	15.8	4.4	39.5	23.9	-	26.4	10.0	142.5
76/77	16.6	3.4	-	17.1	41.3	-	-	8.6	28.3	-	-	-	115.3
77/78	15.4	15.8	24.3	-	8.1	13.8	-	-	-	-	-	-	77.4
78/79	-	-	-	-	42.0	-	8.3	-	10.1	-	-	-	60.4
79/80	31.9	134.1	-	-	-	9.6	9.8	4.4	1.4	-	-	-	191.2
80/81	9.4	-	17.0	-	3.0	32.9	-	17.5	-	2.4	-	-	82.2
81/82	-	-	8.0	-	40.5	-	2.4	50.3	31.2	-	-	-	132.4
82/83	-	18.3	16.4	-	-	2.0	-	8.5	25.2	-	-	-	70.4
83/84	1.8	2.0	1.0	-	13.0	-	4.4	-	-	8.0	-	-	30.2
84/85	2.0	-	25.6	-	29.2	25.4	-	-	35.0	-	1.4	2.0	120.6
85/86	16.1	30.4	31.2	41.6	4.0	4.0	-	-	-	17.6	-	6.2	151.1
86/87	7.0	18.4	4.0	-	3.0	-	6.0	-	7.0	-	-	-	45.4
87/88	14.4	3.0	38.0	-	18.0	39.6	-	-	4.0	-	2.0	-	119.0
88/89	11.4	6.0	31.3	-	5.4	-	17.4	4.0	3.4	36.0	4.0	33.4	152.3
89/90	25.4	47.0	49.4	35.8	4.2	-	2.4	48.8	23.6	-	6.4	-	243.0
90/91	11.4	-	-	55.8	-	18.0	75.0	63.6	1.4	81.3	-	4.2	310.7
91/92	17.0	12.1	1.0	2.8	1.0	7.7	1.9	-	22.4	-	2.6	-	68.5
92/93	-	-	96.2	2.7	20.8	0.1	10.7	2.0	-	-	-	9.0	141.5
93/94	20.4	9.7	128.0	10.0	13.9	2.4	25.9	13.3	17.0	6.6	-	19.5	266.7
94/95	79.9	95.1	-	14.0	-	1.0	20.1	111.6	-	11.5		20.7	353.9
95/96	8.6	37.8	3.0	37.5	54.7	92.8	90.5	-	-	51.3	10.6	-	386.8
96/97	-	2.7	-	18.2	23.0	-	3.0	4.0	7.0	-	3.0	12.0	72.9
97/98	28.3	8.5	-	-	21.0	17.5	-	-	30.0	8.0	-	14.0	127.3
98/99	8.0	-	7.0	17.5	8.0	-	8.0	-	-	3.0	9.0	32.0	92.5
99/00	-	4.0	47.0	-	5.0	-	1.0	-	26.0	-	-	-	83.0
00/01	-	186.0	15.0	1.0	-	-	-	-	3.0	-	-	-	205.0
01/02	10.0	27.0	-	5.0	-	-	12.4	53.0	14.0	-	-	13.4	134.8
02/03	-	-	31.0	5.0	-	11.0	20.0	-					
Average	12.0	23.7	20.8	9.4	12.5	10.1	11.5	19.5	14.1	8.1	2.4	6.3	150.1

Bassin-Versant: Ait Aissa

Station: Tit N'AISSA

MOIS / Année-Hydr	SEP	OCT	NOV	DEC	JANV	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	ANNEE
77/78	42.5	7.9	16.5	1.3	8.1	11.7	-	6.7	3.3	-	0.2	11.7	109.9
78/79	-	-	-	-	64.1	0.8	4.8	-	3.7	2.0	-	1.2	76.6
79/80	28.1	105.0	-	-	22.9	6.5	40.5	21.6	-	-	-	-	224.6
80/81	18.9	2.0	11.9	1.8	-	19.7	-	6.0	-	-	-	-	60.3
81/82	-	-	4.0	-	31.0	0.5	4.9	22.2	10.3	0.8	-	16.0	89.7
82/83	-	3.0	19.3	-	-	0.5	3.9	9.1	24.1	-	-	14.0	73.9
83/84	-	-	2.5	-	6.5	-	16.5	2.0	31.7	-	-	-	59.2
84/85	-	1.7	19.7	-	25.3	24.1	-	7.0	11.5	-	-	-	89.3
85/86	83.7	10.4	6.7	38.9	3.7	5.0	1.6	-	8.5	15.5	-	-	174.0
86/87	27.9	25.9	1.4	-	-	-	8.2	-	13.1	7.0	-	-	83.5
87/88	2.2	8.4	47.3	6.0	6.7	42.1	11.1	-	23.1	4.0	-	-	150.9
88/89	5.1	21.9	20.8	-	4.3	8.9	5.8	7.9	3.0	33.2	18.0	28.6	157.5
89/90	5.6	40.4	60.6	16.9	5.2	-	4.8	26.0	29.9	-	3.2	-	192.6
90/91	10.8	-	3.0	14.5	-	31.0	8.7	8.6	2.5	20.5	4.4	4.3	108.3
91/92	9.5	17.3	-	13.2	-	6.1	-	-	26.1	10.6	-	-	82.8
92/93	5.0	-	68.0	5.3	25.6	13.5	12.1	7.2	-	-	-	-	136.7
93/94	5.5	-	81.8	6.5	13.0	-	10.0	17.2	-	-	-	3.4	137.4
94/95	23.7	77.6	-	10.5	-	-	14.7	31.5	3.4	-	Néant		161.4
95/96	12.5	28.3	3.1	31.7	15.6	45.2	71.2	2.3	-	87.3	11.0	-	308.2
96/97	-	-	-	18.7	9.7	-	3.5	23.4	2.3	-	-	2.8	60.4
97/98	6.0	-	-	-	5.5	33.9	-	-	5.4	12.0	-	3.1	65.9
98/99	1.7	0.2	3.4	6.5	12.4	4.3	-	-	-	-	-	15.6	44.1
99/00	-	-	15.2	1.5	12.3	-	-	-	56.8	-	-	-	85.8
00/01	-	40.0	20.4	2.4	-	-	-	-	10.2	-	-	2.4	75.4
01/02	34.8	52.5	4.2	1.2	-	-	39.3	59.3	6.5	-	-	3.0	200.8
02/03	11.6	-	19.9	3.5	-	7.0	21.0	-					
Average	12.9	17.0	16.5	6.9	10.5	10.0	10.9	9.9	11.0	7.7	1.5	4.4	120.4

Bassin-Versant: Ait Aissa

Station: Ait Haddou

MOIS / Année-Hydr	SEP	OCT	NOV	DEC	JANV	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	ANNEE
68/69								9.0	4.6	15.2		3.0	
69/70			13.9		6.5		14.7						35.1
70/71				6.0				16.0					22.0
71/72		9.0	2.2	12.2	-	-	-	4.5	15.4	4.2	-	-	47.5
72/73	-	35.6	20.8	-	-	-	2.2	20.4	-	26.1	-	-	105.1
73/74	-	-	10.8	4.6	-	-	6.2	49.6	-	2.0	-	-	73.2
74/75	16.2	-	16.2	4.2	-	-	9.2	139.2	53.6	-	-	-	238.6
75/76	16.0	12.0	24.0	31.6	6.3	13.8	15.6	28.0	23.5	3.4	-	9.6	183.8
76/77	42.2	-	-	9.6	40.5	-	-	12.0	9.6	-	-	-	113.9
77/78	15.7	22.4	9.3	-	22.2	-	-	-	10.8	-	-	8.5	88.9
78/79	-	-	-	-	112.0	9.5	3.2	-	13.4	-	-	-	138.1
79/80	34.2	166.4	-	-	15.7	31.7	42.1	28.4	-	-	-	-	318.5
80/81	12.0		24.6	9.5	-	24.0	-	6.5	-	-	-	2.5	79.1
81/82	6.4	-	4.0	-	46.2	11.3	6.2	39.4	30.6	6.3	-	4.2	154.6
82/83	-	17.6	15.9	-	-	-	3.4	6.2	26.0	-	-	6.2	75.3
83/84	-	4.2	-	-	8.4	-	6.4	9.2	18.4	-	-	-	46.6
84/85	-	9.3	16.0	-	19.7	32.3	-	3.2	14.0	-	-	-	94.5
85/86	26.0	35.8	16.0	58.4	-	6.4	4.2	-		17.8	0.4	-	165.0
86/87	21.2	67.7	3.2	-	2.3	4.2	6.4	4.3	22.2	15.6	4.5	-	151.6
87/88	3.2	7.7	44.0	26.0	2.4	59.2	10.7	-	23.4	4.2	-	-	180.8
88/89	29.0	47.5	23.5	-	3.2	16.9	4.2	9.4	2.2	39.9	4.3	9.5	189.6
89/90	13.9	35.7	59.6	47.0	9.6	-	9.6	48.0	49.4	-	3.2	4.6	280.6
90/91	24.3	4.6	9.6	40.0	-	28.0	14.0	20.4	10.8	44.4	6.3	13.9	216.3
91/92	27.6	16.0	-	27.5	-	9.2	-	4.3	59.2	22.6	9.0	-	175.4
92/93	-	-	57.0	35.6	31.0	33.8	17.1	6.2	-	-	-	-	180.7
93/94	-	9.8	111.5	15.0		12.0	15.5	-	-	-	-	-	163.8
94/95	69.0	102.0	42.8	16.8	-	12.0	38.0	86.7	-	-	Néant	Néant	367.3
95/96	-	66.5	-	6.5	36.7	28.6	92.0	-	-	46.2	-	-	276.5
96/97	-	-	-	14.6	26.4	-	28.1	42.0	-	-	-	-	111.1
97/98	82.9	-	-	-	9.1	44.4	-	-	16.2	-	-	-	152.6
98/99	16.8	-	-	6.3	14.6	-	12.4	-	-	-	-	24.0	74.1
99/00	-		-	-	-	-	-	4.5	18.6	-	-	-	23.1
00/01	-	41.4	12.3	-	-	-	-	-	-	-	-	-	53.7
01/02	-	68.0	-	-	-	-	36.4	21.1	7.4	0.4	-	6.5	139.8
02/03	13.0	-	12.4	2.2	-	6.3	17.6	-					
Average	15.1	26.0	16.7	11.3	12.9	12.0	12.6	18.2	13.8	7.8	0.9	3.0	142.9

Bassin-Versant: Bouanane

Station: Beni Yatti

MOIS / Année-Hydr	SEP	OCT	NOV	DEC	JANV	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	ANNEE
94/95		85.3	7.4	3.5	0.8	3.1	13.4	29.6	2.6	1.0	0.3	1.5	148.5
95/96	6.0	25.3	T	52.4	37.5	42.8	62.2	-	0.1	16.0	11.0	1.1	254.4
96/97	-	0.3	-	37.5	9.4	-	15.0	93.0	2.3	T	-	12.7	170.2
97/98	10.8	15.0	-	3.2	9.4	18.7	-	0.2	11.8	10.1	2.5	0.4	82.1
98/99	4.2	2.3	0.5	7.2	35.8	0.9	6.2	-	-	-	0.4	9.2	66.7
99/00	6.0	4.0	15.6	5.8	5.7	-	-	-	32.7	4.2	-	-	74.0
00/01	6.9	46.7	6.7	9.5	-		-	10.9	-	-	-	2.6	83.3
01/02	5.7	19.3	1.8	2.1	-	-	2.9	23.3	7.7	-	-	4.5	67.3
02/03	12.2	4.1	25.5	7.8	-	12.9	0.3	-					
Average	6.5	22.5	7.2	14.3	11.0	9.8	11.1	17.4	7.2	4.5	1.8	4.0	118.3

Table A.3.1-(1).2 Rainfall Data (Monthly Basis in Guir River Basin)-2

Bassin-Versant: Guir

Station: Kaddoussa

MOIS / Année-Hydr	SEP	OCT	NOV	DEC	JANV	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	ANNEE
62/63	64.0	9.0	39.0	10.0	29.0				79.0				230.0
63/64	6.3			4.0	14.0				4.0	7.0			35.3
64/65	20.0		13.0	27.0	60.0	75.0		58.0		4.0			257.0
65/66	36.4	73.5	39.8				3.5		9.5				162.7
66/67	-	16.0	53.4	-	-	26.4	-	-	-	-	-	2.3	98.1
67/68	25.2	14.1	104.5	-	-	20.8	-	35.5	18.5	4.8	2.3	4.5	230.2
68/69	4.8	-	9.1	37.4	15.8	11.1	1.5	2.9	-	3.8	-	1.5	87.9
69/70	5.3	12.7	11.6	4.0	9.3	-	20.8	1.5	5.8	3.6	-	-	74.6
70/71	2.3	14.5	0.5	18.7	1.9	23.2	4.0	54.6	13.3	-	7.9	4.2	145.1
71/72	2.6	13.0	20.6	14.4	5.4	22.2	-	15.9	4.7	-	-	-	98.8
72/73	5.1	23.2	44.6	9.7	-	-	10.8	33.2	-	21.7	-	6.8	155.1
73/74	-	-	35.0	12.7	-	-	21.8	44.2	0.3	-	13.6	-	127.6
74/75	26.1	17.6	29.8	-	-	1.3	3.4	62.8	55.0	-	-	-	196.0
75/76	0.3	T	27.3		16.1	16.5	17.8	16.2	21.9	2.5	2.4	-	121.0
76/77	5.7	3.4	0.5	25.0	40.5	4.5	-	17.4	5.7	-	-	-	102.7
77/78	20.7	10.9	5.6	0.5	13.0	12.7	-	5.7	1.5	-	-	5.1	75.7
78/79	-	12.4	-	-	75.2	0.2	3.2	-	7.7	1.2	-	-	99.9
79/80	35.2	117.4	-	-	19.8	17.7	36.0	34.0	-	7.8	-	4.0	271.9
80/81	5.8	0.3	13.5	6.9	-	24.9	-	6.7	-	5.4	3.9	1.1	68.5
81/82	1.9	-	4.8	3.2	35.2	9.3	-	30.2	27.6	6.9	-	8.7	127.8
82/83	1.4	3.4	12.8	-	-	0.7	4.9	8.2	23.0	-	1.0	5.2	60.6
83/84	3.5	3.3	7.4	-	3.9	1.4	14.6	-	36.9	-	-	-	71.0
84/85	-	-	23.4	-	11.8	40.6	1.4	4.5	20.7	-	-	T	102.4
85/86	32.8	9.1	11.5	32.5	7.6	7.5	-	-	4.8	17.0	-	5.5	128.3
86/87	6.9	31.5	-	-	-	-	14.2	-	4.2	2.5	-	0.6	59.9
87/88	16.0	0.4	40.3	11.1	12.6	40.1	8.0	-	21.2	-	-	-	149.7
88/89	1.4	33.8	18.6	-	-	15.7	5.8	12.4	-	16.7	-	10.4	114.8
89/90	3.9	45.0	51.4	24.2	-	-	-	14.9	8.4	-	-	-	147.8
90/91	-	-	-	14.3	-	10.4	-	-	0.5	-	-	-	25.2
91/92	-	3.6	-	19.7	-	6.5	-	-	10.3	-	-	-	40.1
92/93	1.0	-	17.2	10.4	26.2	14.6	2.8	-	-	-	-	-	72.2
93/94	-	3.8	121.6	-	18.0	-	-	14.1	-	-	-	-	157.5
94/95	6.2	28.6	2.8	-	-	-	4.3	11.3	4.8	1.3	Néant	Néant	59.3
95/96	3.3	32.1	-	18.4	10.4	48.7	77.5	-	0.8	58.4	21.6	-	271.2
96/97	0.8	-	-	29.3	5.5	-	7.6	57.4	4.2	-	-	13.9	118.7
97/98	-	-	-	-	8.6	28.4	-	0.8	2.1	13.0	0.6	-	53.5
98/99	5.8	0.3	0.3	9.4	12.5	6.1	-	-	-	-	-	6.0	40.4
99/00	-	10.2	5.7	0.6	0.6	-	4.7	2.4	21.9	0.7	-	2.2	49.0
00/01	1.3	8.7	3.6	0.8	-	-	-	12.6	12.0	-	-	3.6	42.6
01/02	0.4	37.6	7.4	1.3	-	2.6	34.0	26.0	3.4	-	-	7.6	120.3
02/03	7.2	-	15.4	0.6	-	16.4	25.6						
Average	8.8	15.5	19.8	8.9	11.3	13.3	8.6	15.8	11.1	4.7	1.5	2.7	116.3

Bassin-Verssant: Guir

Station: Tazouguert

MOIS / Année-Hydr	SEP	OCT	NOV	DEC	JANV	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	ANNEE
71/72			5.8	12.2	6.0	21.1	2.2	11.4	1.8	-	-	-	60.5
72/73	4.4	22.7	44.4	13.8	-	-	5.7	47.6	-	16.3	-	6.5	161.4
73/74	-	-	44.0	5.9	-	0.3	18.3	23.7	-	2.4	3.8	-	98.4
74/75	21.5	18.6	12.6	11.0	-	1.5	0.7	128.2	38.5	1.8	-	0.8	235.2
75/76	0.1	-	13.6	13.6	19.2	12.9	24.5	17.3	11.4	5.0	0.9	T	118.5
76/77	14.9	1.5	-	21.7	39.1	8.2	-	14.9	4.9	1.2	T	T	106.4
77/78	11.7	8.6	5.4	1.0	15.1	17.5	-	3.4	1.7	-	T	10.8	75.2
78/79	T	2.8	T	0.3	81.1	T	1.3	0.1	1.8	10.6	T	T	98.0
79/80	18.9	110.6	0.7	-	11.5	31.1	38.9	26.4	T	2.7	-	T	240.8
80/81	19.0	T	13.3	7.4	T	16.4	-	3.4	T	2.4	1.5	1.5	64.9
81/82	1.1	T	4.7	0.1	44.5	7.1	0.2	32.1	40.9	4.1	T	0.1	134.9
82/83	0.2	1.7	31.6	0.8	-	9.8	0.4	4.4	56.8	-	0.5	1.7	107.9
83/84	4.0	0.8	T	T	1.2	3.2	0.4	T	26.9	-	-	-	36.5
84/85	5.2	0.8	12.0	0.4	17.3	32.3		4.5	15.8	-	-	T	88.3
85/86	32.0	9.7	10.6	25.7	10.3	4.8	1.1	T	1.5	23.6	0.6	0.2	120.1
86/87	7.9	20.6	0.4	T	1.4	T	7.1	T	1.4	1.3	-	T	40.1
87/88	4.0	0.2	35.6	18.7	13.0	42.0	7.7	T	14.8	0.6	T	T	136.6
88/89	0.2	33.0	18.8	-	1.8	12.0	2.8	14.0	T	24.6	-	7.5	114.7
89/90	5.9	53.5	37.8	24.0	1.8	-	1.0	23.3	23.1	-	4.4	-	174.8
90/91	7.8	9.4	-	32.3	T	30.4	15.7	6.7	0.2	6.4	T	4.6	113.5
91/92	8.7	4.0	T	12.5	-	7.5	T	4.0	25.7	1.3	1.2	8.0	72.9
92/93	-	T	17.7	10.7	25.7	14.9	10.4	-	T	T	T	-	79.4
93/94	T	3.0	77.7	2.2	25.2	T	1.3	13.5	T	T	-	-	122.9
94/95	4.5	55.1	6.5	1.3	-	T	17.7	17.7	0.6	0.4	Néant	T	103.8
95/96	2.8	35.6	-	11.8	13.0	39.1	70.4	-	0.3	53.7	22.7	4.9	254.3
96/97	T	2.0	-	23.2	10.7	-	19.1	24.6	2.6	-	-	0.9	83.1
97/98	T	6.9	-	-	9.4	31.4	-	-	0.4	2.7	-	-	50.8
98/99	3.8	1.5	2.5	10.6	17.0	10.9	T	-	-	T	T	13.0	59.3
99/00	1.6	9.8	11.4	0.7	1.6	-	5.2	T	38.9	1.4	-	0.3	70.9
00/01	T	4.1	8.4	4.8	-	-	-	12.2	14.5	T	-	0.4	44.4
01/02	1.2	27.2	1.4	0.5	-	-	24.2	40.6	1.5	-	-	6.5	103.1
02/03	15.9	7.5	35.1	1.0	-	6.5	23.6						
Average	7.6	16.1	15.6	8.9	12.2	12.9	10.3	18.2	12.5	6.0	1.6	2.9	108.8

Bassin-Versant: Bouananae

Station: Bouanane

MOIS / Année-Hydr	SEP	OCT	NOV	DEC	JAN	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	ANNEE
58/59	1.7	13.9	36.8	25.2	3.0	29.4	61.9	-	1.0	-	1.8	8.0	182.7
59/60	8.7	18.4	1.8	-	10.9	1.2	6.5	4.6	4.9	-	-	-	57.0
60/61	4.0	2.0	-	1.6	-	-	20.3	9.0	4.9	21.4	4.5	0.6	68.3
61/62	3.2	3.0	12.7	3.6	-	-	27.5	12.5	2.0	5.7	-	-	70.2
62/63	10.7	-	30.4	4.3	15.3	9.0	-	71.4	57.6	11.0	0.5	1.4	211.6
63/64	8.0	-	-	3.0	3.6	8.0	-	8.6	2.7	-	3.7	1.5	39.1
64/65	4.0	-	4.5	30.6	53.3	40.8	3.0	11.2	4.7	-	1.0	4.0	157.1
65/66	14.7	91.5	4.2	-	-	-	11.0	-	4.0	-	-	-	125.4
66/67	9.2	55.7	57.4	-	-	15.4	-	4.0	14.1	7.7	-	-	163.5
67/68	28.6	29.2	57.7	4.8	1.2	12.4	2.9	10.3	2.6	4.2	4.1	2.0	160.0
68/69	3.9	-	26.1	12.3	18.6	22.0	2.0	4.7	-	-	-	21.2	110.8
69/70	-	1.0	15.9	2.8	4.2	-	6.5	1.4	1.4	-	-	-	33.2
70/71	11.9	2.1	3.4	17.2	14.8	32.4	3.3	18.4	1.5	-	1.3	6.0	112.3
71/72	4.2	5.5	30.6	26.1	14.8	32.4	3.3	18.3	1.5	1.0	-	-	137.7
72/73	14.4	37.1	41.3	23.0	1.1	1.0	2.0	77.0	1.1	5.7	0.6	18.4	222.7
73/74	0.8	-	17.9	26.0	-	-	31.5	17.0	-	-	1.5	-	94.7
74/75	7.0	20.9	27.6	2.1	-	0.8	6.4	66.3	49.4	-	-	2.3	182.8
75/76	5.8	-	14.9	19.2	17.1	8.7	14.9	30.9	7.7	-	2.4	-	121.6
76/77	37.1	-	-	31.6	55.0	-	-	7.8	1.4	1.3	-	5.5	139.7
77/78	13.2	47.2	2.1	-	8.2	9.6	-	4.7	-	-	-	1.7	86.7
78/79	5.3	100.7	-	-	79.7	2.5	-	-	4.3	7.0	-	1.4	200.9
79/80	-	-	-	1.0	23.7	2.5	15.7	30.2	-	-	-	1.2	74.3
80/81	7.0	-	11.9	-	-	19.3	-	1.7	-	0.5	0.5	2.0	42.9
81/82	-	-	20.3	-	23.0	4.1	2.3	24.6	40.4	4.8	-	-	119.5
82/83	5.4	7.9	12.5	0.2	-	4.1	0.3	1.0	22.6	-	-	0.7	54.7
83/84	3.7	-	-	-	7.2	2.2	0.9	-	36.3	-	-	-	50.3
84/85	1.0	0.8	27.2	-	33.0	9.1	-	-	16.3	-	-	1.0	88.4
85/86	22.5	-	13.4	30.1	-	15.7	-	-	5.7	1.4	-	-	88.4
86/87	40.7	18.0	14.2	0.8	0.9	7.9	14.8	-	13.8	3.9	-	1.2	116.2
87/88	1.3	1.2	63.2	21.6	10.1	100.8	12.9	-	18.2	2.0	-	-	231.3
88/89	-	10.1	23.2	-	-	10.8	4.0	11.9	-	8.2	0.5	8.1	76.8
89/90	16.7	69.2	52.5	35.9	9.1	-	-	17.7	42.1	-	-	0.8	244.0
90/91	3.7	2.8	0.5	51.0	-	33.5	25.9	39.9	1.8	-	1.0	2.2	162.3
91/92	3.8	8.4	7.6	15.8	-	12.4	8.9	0.8	6.4	0.5	-	-	64.6
92/93	-	-	26.8	8.8	9.1	1.8	8.0	-	-	-	-	4.8	59.3
93/94	1.0	2.4	72.3	5.5	72.8	1.5	1.0	1.0	-	-	-	7.3	164.8
94/95	31.8	101.4	4.1	1.0	2.1	1.0	25.7	8.6	4.1	3.0	2.3	2.5	187.6
95/96	3.5	30.5	-	24.5	39.0	29.5	47.1	-	-	51.3	15.9	0.5	241.8
96/97	-	0.2	-	22.2	10.0	-	19.2	48.3	0.9	-	2.2	6.6	109.6
97/98	8.3	9.8	-	-	4.2	18.3	-	-	3.3	16.1	-	-	60.0
98/99	1.2	-	1.0	11.0	21.1	-	1.0	-	-	-	0.3	7.7	43.3
99/00	2.5	10.7	7.7	6.6	4.3	-	-	-	43.8	8.2	-	2.0	85.8
00/01	3.1	23.7	3.8	5.7	-	-	-	-	3.5	-	-	1.2	41.0
01/02	-	18.8	0.2	-	-	-	5.0	26.2	4.7	-	-	4.0	58.9
02/03	12.0	1.6	30.0	8.2	-	5.2	0.8	-					
Average	8.1	16.6	17.3	10.7	12.7	11.2	8.8	13.1	9.8	3.7	1.0	2.9	116.9

Table A.3.1-(2).1 Rainfall Data (Monthly Basis in Gheris River Basin)- 1

Bassin-Versant: Rheris

Station: (Tirga) Amouguer

MOIS / Année-Hydr	SEP	OCT	NOV	DEC	JANV	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	TOTAL
80/81	12.3	6.4	10.2	34.0	6.1	45.6	0.2	T	-	15.3	4.6	2.5	137.2
81/82	19.8	3.1	-	-	9.8	3.9	1.2	45.7	103.0	24.0	5.5	10.1	226.1
82/83	2.9	1.2	0.8	-	T	0.7	8.1	21.4	22.1	T	2.3	-	59.5
83/84	2.5	18.7	6.4	1.8	6.5	-	3.8	0.4	0.4	6.2	-	-	46.7
84/85	21.2	-	15.8	9.9	12.5	18.6	3.5	21.6	20.0	-	9.8	2.8	135.7
85/86	31.1	17.0	41.6	19.5	-	3.3	0.4	-	5.9	18.4	1.6	2.7	141.5
86/87	7.3	44.8	0.9	-	4.5	10.0	3.0	-	14.3	14.1	0.9	-	99.8
87/88	19.5	51.9	16.2	19.0	13.6	14.3	3.0	4.4	21.2	1.0	-	5.7	169.8
88/89	7.0	107.9	40.6	-	5.2	87.0	9.0	9.7	21.5	38.9	4.6	53.3	384.7
89/90	9.2	44.6	43.0	79.4	6.0	-	29.4	39.7	33.3	2.0	6.4	10.5	303.5
90/91	67.8	1.0	10.7	21.2	-	4.8	23.0	26.9	19.9	47.3	31.1	37.6	291.3
91/92	15.3	3.6	-	13.0	-	26.9	37.3	3.2	36.0	10.6	0.6	2.0	148.5
92/93	9.9	-	5.4	14.5	5.6	7.9	3.6	1.3	3.6	1.3	-	19.5	72.6
93/94	12.5	7.5	180.8	5.9	6.1	4.2	4.9	2.8	-	15.5	-		240.2
94/95	45.5	33.3	-	-	-	-	40.4	85.1	3.7	1.5		18.2	227.7
95/96	18.0	73.8	-	7.2	64.2	55.2	54.8	6.2	3.4	41.9	44.4	-	369.1
96/97	2.7	7.9	-	18.2	10.2	8.5	27.3	52.0	27.0	-	-	16.3	170.1
97/98	60.3	10.6	-	-	11.6	25.3	25.1	2.1	7.2	17.2	-	16.0	175.4
98/99	55.7	-	-	2.0	26.1	-	7.5	-	-	-	-	18.6	109.9
99/00	-	100.0	-	-	-	-	3.2	3.7	9.6	-	-	5.3	121.8
00/01	1.1	51.1	-	1.5	-	-	-	-	23.7	-	-	15.8	93.2
01/02	10.4	33.4	-	-	-	39.2	25.8	8.2	18.0	-	-	15.5	150.5
02/03	24.8	-	5.0	-	-	4.1	28.0						
Average	19.9	26.9	16.4	10.7	8.5	15.6	14.9	15.9	17.9	12.2	5.3	12.0	176.1

Bassint-Verssant : Rheris

Station: Ait Bouijjane

MOIS / Année-Hydr	SEP	OCT	NOV	DEC	JAN	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	ANNEE
66/67						50.0	-	13.5	5.0	2.0	-	-	
67/68	22.7	4.0	81.3	-	6.2	14.3	3.4	28.2	3.6	2.2	13.0	1.3	180.2
68/69	8.6		3.2	16.9	14.6	47.0	-	2.0	1.6	0.3	11.5	18.6	124.3
69/70	4.7	8.6	45.4	0.9	17.7	-	22.7	0.1	-	-	-	0.6	100.7
70/71	0.8	46.9	17.0	9.7	-	5.4	4.4	3.4	6.9	-	-	5.2	99.7
71/72	27.0	13.9	8.2	14.8	7.4	14.8	5.3	41.0	1.2	0.2	-	-	133.8
72/73	1.3	16.2	76.9	9.9	8.7	3.2	5.5	7.8	0.3	4.7	-	0.8	135.3
73/74	-	0.4	52.3	20.3	-	-	9.2	31.4	0.9	3.0	8.8	1.1	127.4
74/75	14.7	-	24.2	7.0	-	-	-	74.4	21.3	4.4	4.2	-	150.2
75/76	5.5	-	2.2	10.2	7.7	12.9	19.7	17.1	59.5	-	2.5	-	137.3
76/77	30.9	6.5	-	3.8	24.0	0.7	-	23.3	13.4	-	-	-	102.6
77/78	23.1	4.8	-	44.5	47.3	-	-	-	0.3	-	-	16.0	136.0
78/79	-	15.7	0.5	-	74.8	3.6	-	0.3	-	0.8	-	10.2	105.9
79/80	6.6	145.1	5.3	-	23.8	31.5	34.9	7.2	0.2	0.4	-	-	255.0
80/81	8.2	-	19.9	26.2	2.8	32.4	-	0.9	8.2	5.4	-	1.5	105.5
81/82	3.5	-	-	-	3.7	0.6	1.2	48.2	59.8	5.1	0.6	1.7	124.4
82/83	0.2	-	1.6	-	-	-	1.8	6.8	25.3	0.7	0.5	2.0	38.9
83/84	8.9	5.0	9.2	3.3	1.3	0.2	0.7	1.3	19.7	0.3	-	4.4	54.3
84/85	16.9	-	25.9	6.0	16.2	17.3	0.8	33.3	19.2	-	-	0.5	136.1
85/86	4.7	3.1	15.6	13.6	0.9	2.1	-	0.7	8.0	6.0	0.7	7.5	62.9
86/87	1.5	48.4	3.6	-	2.8	5.9	24.8	1.0	9.4	5.1	0.1	3.1	105.7
87/88	25.8	4.9	12.3	19.0	23.0	54.4	11.7	1.9	4.2	-	-	1.6	158.8
88/89	3.4	29.4	63.9	-	1.6	66.8	2.6	0.3	1.0	47.3	1.8	30.0	248.1
89/90	7.9	34.2	50.7	100.0	12.7	-	22.9	2.0	9.8	-	2.1	9.4	251.7
90/91	39.7	-	2.7	14.3	1.5	8.0	16.5	14.3	5.1	8.5	6.2	20.4	137.2
91/92	10.3	11.1	-	34.8	-	42.2	19.9	0.3	10.4	7.4	0.8	12.0	149.2
92/93	2.2	4.7	3.5	18.9	3.8	17.9	8.2	-	4.9	-	1.5	1.4	67.0
93/94	2.3	101.0	59.5	3.3	22.3	1.2	3.6	8.3	-	-	9.8	2.9	214.2
94/95	4.7	53.3	-	-	-	-	13.2	42.9	0.4	-	1.5	2.0	118.0
95/96	10.7	81.4	-	9.0	16.0	32.2	53.2	3.0	0.3	53.7	22.0	1.2	282.7
96/97	1.5	2.7	-	9.0	10.9	1.5	12.0	24.1	4.0	-	0.2	20.3	86.2
97/98	13.4	6.0	1.0	-	17.1	67.9	28.3	8.0	-	6.7	T	3.8	152.2
98/99	4.2	T	-	0.2	20.6	0.1	16.7	-	2.0	4.8	T	38.5	87.1
99/00	0.9	51.9	0.1	3.4	0.4	-	0.1	2.3	11.1	0.4	T	11.1	81.7
00/01	-	36.1	1.6	9.5	-	-	1.9	1.0	14.0	0.3	0.3	0.3	65.0
01/02	3.2	7.3	2.1	8.4	0.3	21.1	15.6	21.2	22.2	T	1.5	1.4	104.3
02/03	4.2	0.1	3.8	7.8	0.2	0.8	50.8	1.8	3.3				
Average	9.0	21.8	16.5	11.8	10.8	15.0	11.1	12.8	9.6	4.8	2.7	6.4	132.0

Bassint-Verssant : Rheris

Station: Tadigoust

MOIS / Année-Hydr	SEP	OCT	NOV	DEC	JAN	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	TOTAL
62/63		11.6	30.1	19.0	25.5	9.6	3.0	24.4	78.4	9.7	2.2	4.8	218.3
63/64	8.0	-	T	3.8	30.4	6.0	T	0.8	3.4	0.8	2.4	2.5	58.1
64/65	27.6	-	0.9	11.5	46.3	157.6	4.4	39.0	3.1	1.2	T	12.4	304.0
65/66	20.2	160.1	76.7	0.5	-		29.1	-	15.1	4.6		0.5	306.8
66/67		T	28.6		3.2	30.1	-	11.9					73.8
67/68	28.4	61.8	117.1		3.5	4.0	7.8	29.8	12.0	8.4	0.4	0.2	273.4
68/69	9.2	0.4	5.2	21.6	15.4	22.1	T	7.5	4.1	T	1.6	29.7	116.8
69/70	9.3	7.3	32.6	5.4	20.9	-	13.2	-	8.3	-	-	4.6	101.6
70/71	3.2	26.3	19.2	8.1	-	7.3	4.0	29.2	9.3	0.2	1.1	8.1	116.0
71/72	15.8	37.8	16.5	17.0	2.2	23.3	6.6	66.7	T	3.8	T	T	189.7
72/73	13.0	9.9	112.3	10.8	1.6	1.4	5.7	5.9	-	14.5	0.5	3.9	179.5
73/74	0.4	T	65.9	18.4	-	-	14.0	20.8	3.7	6.1	0.2	1.4	130.9
74/75	28.8	T	16.2	5.0	-	T	-	82.8	51.3	3.6	T	0.3	188.0
75/76	T	1.8	0.2	29.1	26.0	12.9	25.5	35.9	31.8	12.9	1.0	3.3	180.4
76/77	41.6	0.5	-	6.0	39.1	4.0	0.2	17.9	5.1	-	-	0.8	115.2
77/78	18.3	8.6	-	19.4	29.2	-	-	8.3	2.8	-	T	18.1	104.7
78/79	0.5	24.2	1.2	T	59.8	4.1	-	-	1.2	5.0	-	T	96.0
79/80	25.3	109.5	1.5	T	17.5	69.9	48.1	24.9	0.6	0.5	-	3.3	301.1
80/81	2.7	2.4	11.8	28.7	1.0	24.2	2.0	0.8	-	3.0	-	1.2	77.8
81/82	1.0	-	-	-	17.3	5.4	0.9	37.4	35.2	15.0	T	3.0	115.2
82/83	0.7	0.7	1.0	0.2	T	T	0.6	7.0	23.9	0.8	T	61.1	96.0
83/84	9.2	6.3	1.5	T	0.2	0.3	0.7	0.1	16.0	0.3	-	T	34.6
84/85	2.3	0.2	21.1	6.5	13.9	24.0	0.3	9.5	37.5	T	3.3	-	118.6
85/86	16.0	9.3	41.1	31.5	0.1	4.7	0.9	0.1	4.1	7.8	-	1.5	117.1
86/87	3.7	46.3	1.8	-	1.5	0.8	24.2	-	4.9	5.9	-	2.0	91.1
87/88	25.4	7.2	20.3	37.7	7.8	40.7	7.8	0.2	16.1	1.0	T	-	164.2
88/89	29.2	19.6	31.4	-	0.8	46.8	1.8	2.2	0.9	22.1	0.6	14.9	170.3
89/90	16.4	21.4	67.6	93.8	15.4	-	32.6	8.2	39.9	0.5	0.8	6.7	303.3
90/91	19.2	-	2.1	30.4	-	14.4	8.2	19.2	0.2	17.0	2.8	5.3	118.8
91/92	15.9	7.2	-	61.9	-	29.3	7.6	-	13.4	5.9	-	4.9	146.1
92/93	0.2	T	15.6	26.3	8.7	4.9	4.5	0.4	1.5	-	-	1.1	63.2
93/94	0.4	19.0	105.0	5.7	9.4	-	5.9	13.5	-	-	1.4	T	160.3
94/95	3.2	61.6	3.0	-	-	T	14.3	41.3	3.2	-		8.9	135.5
95/96	12.4	52.9	-	8.9	24.9	27.4	36.4	T	1.9	27.8	17.6	0.3	210.5
96/97	T	1.4	-	12.0	17.2	3.1	27.3	12.4	1.3	-	T	20.3	95.0
97/98	26.1	0.8	-	0.1	18.2	72.6	21.1	1.1	1.7	4.1	T	6.5	152.3
98/99	0.3	T	T	1.2	14.2	0.4	3.8	-	0.4	2.3	-	0.5	23.1
99/00	6.4	41.6	-	1.9	-	-	T	4.7	15.4	T	-	5.2	75.2
00/01	T	2.6	0.7	T	-	T	-	T	1.7	-	-	-	5.0
01/02	6.9	10.6	T		5.8	T	28.5	24.4	39.1	23.9	T	T	1.2	140.4
02/03	9.2	-	T		3.5	-	2.4	15.8					
Average	12.7	21.4	22.9	15.2	12.1	19.0	10.6	15.9	12.5	5.3	1.3	6.8	141.7

Bassin-Versant: Rheris

Station: Akrouz

MOIS / Année-Hydr	SEP	OCT	NOV	DEC	JAN	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	ANNEE
96/97				7.0	5.4	-	5.2	26.6	-	-	-	20.3	
97/98	60.8	14.4	-	-	15.0	45.9	6.7	1.7	-	-	-	8.6	153.1
98/99	9.4	-	2.8	6.1	15.8	3.0	7.1	-	2.0	-	-	8.5	54.7
99/00	2.4	33.6	1.3	-	-	-	-	-	71.1	-	-	1.0	109.4
00/01	-	8.5	-	1.3	-	-	1.5	-	4.5	-	-	-	15.8
01/02	-	12.4	-	-	-	5.6	16.0	45.5	32.9	-	-	5.3	117.7
02/03	8.5	-	-	0.7	-	5.0	10.7						
Average	13.5	11.5	0.7	2.2	5.2	8.5	6.7	12.3	18.4	-	-	7.3	90.1

Table A.3.1-(2).2 Rainfall Data (Monthly Basis in Gheris River Basin)-2

Bassin-Versant: Rheris

Station: Merroutcha

MOIS / Année-Hydr	SEP	OCT	NOV	DEC	JAN	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	ANNEE
77/78				8.3	3.4	T	-	3.2	2.0	-	-	40.5	
78/79	0.3	7.0	-	0.5	62.4	T	2.4	T	0.1	4.7	-	T	77.4
79/80	25.3	78.9	2.9	-	17.7	28.5	33.0	21.5	0.8	-	-	1.7	210.3
80/81	15.3	3.2	14.7	22.9	-	9.7	-	T	2.3	14.4	0.3	1.7	84.5
81/82	2.2	T	T	-	28.9	1.9	T	58.0	42.5	0.8	T	T	134.3
82/83	0.9	0.7	5.3	-	1.9	T	T	4.0	23.1	T		0.3	36.2
83/84	T	1.9	T	-	T	-	1.8	T	11.5	1.5	-	-	16.7
84/85	3.3	-	12.6	-	15.8	15.7	0.9	12.0	9.7	-	-	2.0	72.0
85/86	14.1	15.5	8.9	45.8	4.3	3.7	1.3	-	3.3	0.4	-	-	97.3
86/87	3.7	52.2	T	-	0.3	T	21.7	-	10.4	10.9	-	-	99.2
87/88	18.7	7.7	13.1	10.1	4.0	34.1	8.3	1.1	2.5	T	-	T	99.6
88/89	0.3	15.3	45.4	-	-	21.2	3.2	4.5	-	6.8	2.8	29.0	128.5
89/90	13.6	70.5	41.7	52.3	1.6	-	8.5	10.8	24.0	-	0.4	0.3	223.7
90/91	4.8	-	8.0	29.8	-	12.0	11.2	16.0	3.0	10.7	0.2	8.4	104.1
91/92	8.3	4.0	-	9.5	-	17.4	3.9	7.5	10.9	1.9	T	0.1	63.5
92/93	T	1.0	5.8	24.7	5.9	11.5	5.2	-	-	-	-	2.8	56.9
93/94	T	8.2	49.0	3.1	69.0	-	-	10.0	-	-	T	2.2	141.5
94/95	T	48.2	-	-	-	-	29.7	28.5	-	12.2		8.3	126.9
95/96	4.0	49.2	-	3.2	16.6	45.3	12.2		1.4	43.9	17.9	-	193.7
96/97	4.3	13.3	-	8.8	2.2	-	12.0	29.7	-	-	T		70.3
97/98	21.2	-	-	-	10.6	43.3	6.7	-	T	T	-	-	81.8
98/99	2.2	-	-	7.4	18.4	2.4	9.7	-	1.8	T	-	7.4	49.3
99/00	7.5	50.2	-	-	-	-	-	-	43.5	1.4	4.9	2.2	109.7
00/01	-	9.0	2.5	T	-	-	0.2	0.3	5.5	-	-	-	17.5
01/02	2.7	10.5	T	0.8	-	12.3	18.1	28.0	24.8	-	-	0.8	98.0
02/03	13.7	-	-	-	-	2.5	14.0						
Average	7.9	18.6	10.0	9.1	10.5	11.9	8.5	11.2	9.3	5.2	1.4	5.1	99.7

Bassin-Versant : Gheris

Station: L'Hmida

MOIS / Année-Hydr	SEP	OCT	NOV	DEC	JAN	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	ANNEE
77/78	10.2	1.7	1.2	2.5	36.8	-	-	-	-	-	-	-	52.4
78/79	T	-	-	2.5	91.9	-	-	-	-	2.9	-	-	97.3
79/80	3.6	89.1	-	-	11.7	4.9	12.7	20.6	2.4	-	-	0.6	145.6
80/81	2.7	0.2	8.6	29.6	0.5	9.9	-	5.0	0.3	3.7	0.2	0.3	61.0
81/82	2.0	-	3.4	-	24.7	5.3	-	55.0	18.6	T	-	-	109.0
82/83	-	-	16.6	2.2	-	1.0	-	-	18.0	-	1.5	5.0	44.3
83/84	8.0	1.4	-	-	1.3	-	-	-	5.0	-	-	-	15.7
84/85	0.5	2.2	21.0	-	20.0	19.4		3.5	12.4	-	-	-	79.0
85/86	25.3	3.6	2.3	17.8	14.0	6.1	1.9	-		5.5	-	-	76.5
86/87	13.6	13.4	-	-	0.3	-	12.8	-	15.4	3.5	-	-	59.0
87/88	9.2	2.7	13.2	5.0	9.2	26.0	-	-	3.1	-	-	-	68.4
88/89	0.4	6.4	8.2	-	-	10.0	-	3.9	-	13.5	-	18.0	60.4
89/90	17.9	37.9	37.7	23.5	0.4	-	1.2	40.0	25.7	-	-	-	184.3
90/91	6.0	-	-	11.1	-	9.5	5.2	12.9	2.0	4.5	-	3.0	54.2
91/92	3.5	-	-	4.9	-	8.6	-	-	5.1	-	-	-	22.1
92/93	-	-	-	24.9	8.4	12.7		-	-	-	-	-	46.0
93/94	-	4.2	28.0	-	56.2	2.6	-	-	-	-	-	-	91.0
94/95		8.8	5.7	-	-	26.5	25.3		-	-		T	66.3
95/96	-	32.8	-	8.8	15.0	30.6	4.3						
96/97													
97/98													
98/99													
99/00													
00/01													
01/02													
02/03													
Average	6.1	10.8	7.7	7.0	15.3	9.1	3.7	8.3	6.4	2.0	0.1	1.6	74.0

Bassin-Versant: Gheris et Ziz

Station: Taouz

MOIS / Année-Hydr	SEP	OCT	NOV	DEC	JANV	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	ANNEE
70/71		-	7.0	16.0	-	2.5	7.0	25.0	-	-	5.0	-	62.5
71/72	2.0	-	-	-	-	-	-	22.0	-	-	-	-	24.0
72/73	-	8.0	18.0	28.9	1.1	20.5	2.3	7.5	-	6.7	-	-	93.0
73/74	-	-	13.1	-	-	-	32.5	1.1	-	-	-	-	46.7
74/75	12.7	-	16.3	2.1	-	0.3	-	79.2	7.7	-	0.3	-	118.6
75/76	1.5	-	3.1	19.2	8.1	3.0	3.9	18.7	15.2	5.5	-	-	78.2
76/77	13.0	-	11.5	5.3	2.1	-	-	6.9	1.3	-	-	-	40.1
77/78	2.7	10.1	-	3.0	5.9	1.2	-	-	-	-	-	-	22.9
78/79	-	1.0	-	2.0	46.1	0.4	-	-	-	-	-	0.7	50.2
79/80	2.3	53.8	1.4	-	3.3	2.7	14.7	10.0	-	-	-	-	88.2
80/81	1.8	-	15.4	11.5	-	3.5	-	-	0.8	1.0	-	-	34.0
81/82	1.1	-	5.5	-	8.3	8.8	1.1	8.7	9.2	-	T	2.4	45.1
82/83	T	T	6.6	-	-	T	T	1.5	0.9	-	T	1.5	10.5
83/84	0.6	-	-	-	-	-	0.2	0.3	-	-	-	-	1.1
84/85	-	-	22.0	-	7.0	5.4			3.5	-	-	-	37.9
85/86	12.5	1.4	-	19.0	-	1.8	-	-	-	-	-	-	34.7
86/87	2.5	7.3	-	-	-	-	1.8	-	-	-	-	-	11.6
87/88	0.1	0.3	9.8	5.3	2.5	12.4	5.7	-	-	-	-	-	36.1
88/89	16.0	0.4	16.4	-	-	3.2	-	2.6	-	-	-	0.4	39.0
89/90	1.2	13.1	7.0	31.3	T	-	T	7.8	0.3	T	T	-	60.7
90/91	T	T	-	11.9	-	9.0	5.0	3.0	T	T	T	2.5	31.4
91/92	T	2.1	0.5	2.4	-	T	T	0.9	T	-	0.4	T	6.3
92/93	T	1.7	1.5	22.2	0.3	9.3	T	-	-	-	-	T	35.0
93/94	-	17.0	35.4	3.7	17.5	7.0	-	-	T	-	-	-	80.6
94/95	T	61.0	0.2	-	-	9.0	10.0	8.0	-	-		T	88.2
95/96	1,m	7.0	-	3.0	1.3	22.4	16.0	2.0	1.3	26.0	2.0	-	81.0
96/97	-	-	-	0.8	15.0	-	2.0	10.0	T	-	-	11.0	38.8
97/98	5.0	5.0	-	-	3.0	23.0	-	-	-	T	T	6.3	42.3
98/99	-	-	-	20.0	7.0	0.3	0.5	-	-	-	-	2.8	30.6
99/00	-	1.0	-	-	-	-	T	-	27.0	T	-	1.0	29.0
00/01	-	2.0	-	T	-	-	-	-	T		-	-	T	2.0
01/02	-	10.4	-	-	-	-	6.0	4.5	4.0	-	-	T	24.9
02/03	0.4	-	4.0	-	-	10.0	-						
Average	2.9	6.5	5.9	6.5	4.0	5.0	4.0	7.1	2.6	1.4	0.3	1.1	44.5

Table A.3.1-(3).1 Rainfall Data (Monthly Basis in Ziz River Basin)- 1

Bassin-Versant: Ziz

Station: Amouguer+Mzizel

MOIS Année-Hydr	SEP	OCT	NOV	DEC	JAN	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	ANNEE
52/53							87.6	-	8.7	5.8	4.3	5.3	
53/54	23.4	25.5	31.1	78.0	6.7	8.0	11.1	61.0	2.9	15.0	-	-	262.7
54/55	-	9.1	34.3	25.2	14.7	8.9	-	50.3	38.0	22.0	-	28.4	230.9
55/56	2.4	21.6	17.7	89.7	53.7	37.5	43.0					-	265.6
56/57	10.0	30.0	2.0	-	-	-	5.0	21.5	25.9	17.0	-	6.3	117.7
57/58	7.2	36.0	-	84.0	11.0	1.0	-	5.0	34.0	18.0	-	-	196.2
58/59	7.0	21.0	108.6	10.7	-	-	50.5	-	34.0	2.0	5.6	5.0	244.4
59/60	63.3	11.7	-	60.0	-	26.0	26.0	14.0	3.0	69.5	25.6	1.0	300.1
60/61	-	-	16.2	12.2	-	18.0	10.7	6.0	22.6	32.0	-	-	117.7
61/62	19.7	9.5	30.3	7.7	-	-	24.2	7.8	3.0	4.8	-	5.0	112.0
62/63	28.6	13.7	5.3	9.8	13.3	10.5	-	55.3	119.4	5.5	19.3	2.0	282.7
63/64	12.5	1.5	1.0	17.6	14.1	1.6	9.1	15.3	1.5	-	9.0	-	83.2
64/65	48.0	-	-	15.0	42.0		16.0	-	15.0	-	-	-	
65/66													
66/67													
67/68													
68/69													
69/70													
70/71	3.0	15.0	15.0	3.5	1.0	7.3	6.0	35.7	9.2	1.5	5.5	5.5	108.2
71/72	23.3	48.5	30.5	1.0	2.0	2.0	16.7	62.2	22.1	14.5	-	0.4	223.2
72/73	13.0	24.6	22.0	9.0	-	1.3	-	40.0	-	35.0	-	16.2	161.1
73/74	5.5	0.6	39.9	11.7	-	4.1	4.8	25.4	11.4	10.3	-	-	113.7
74/75	78.0	-	15.1	1.6	-	6.3	1.8	114.8	51.0	11.9	-	-	280.5
75/76	1.5	-	-	4.6	14.3	6.3	16.8	76.7	97.1	25.7	-	7.2	250.2
76/77	53.1	10.2	-	4.0	41.6	-	1.5	7.6	21.2	-	-	1.0	140.2
77/78	36.0	10.7	-	29.3	12.9	3.7	1.7	8.6	14.5	0.2	-	24.0	141.6
78/79	6.5	12.7	7.8	-	29.6	35.1	-	-	7.2	12.5	-	-	111.4
79/80	26.3	68.6	-	-	14.7	71.7	28.6	19.3	2.5	-	-	18.9	250.6
80/81	10.3	5.2	14.7	8.5	12.2	39.8	2.3	3.1	1.3	1.9	7.1	4.9	111.3
81/82	27.2	2.9	1.3	-	21.5	6.2	-	43.5	119.0	27.1	-	26.1	274.8
82/83	17.4	4.0	4.8	0.7	-	0.1	6.0	26.2	30.3	-	6.2	-	95.7
83/84	6.5	20.7	11.5	-	9.2	0.4	11.7	6.8	0.7	1.5	-	-	69.0
84/85	26.7	-	14.0	5.4	31.6	26.0	2.6	23.8	11.6	-	1.6	-	143.3
85/86	28.5	22.7	47.8	28.0	-	2.6	2.6	-	5.2	19.7	-	2.2	159.3
86/87	3.0	55.2	-	-	4.4	18.8	16.8	-	9.1	10.7	2.8	7.6	128.4
87/88	16.6	29.4	12.0	13.8	5.9	25.2	4.4	-	17.6	1.9	-	1.7	128.5
88/89	2.7	61.8	13.2	-	4.5	50.3	12.5	6.4	25.3	28.7	2.3	21.5	229.2
89/90	7.2	18.4	52.9	37.0	10.6	-	32.4	20.1	22.8	-	-	36.2	237.6
90/91	46.1	12.3	6.4	22.5	-	6.1	28.2	48.0	25.1	44.1	29.5	22.2	290.5
91/92	21.2	3.9	-	14.1	-	24.7	20.5	1.0	21.8	13.5	1.0	1.5	123.2
92/93	8.1	-	20.2	16.9	6.0	8.0	6.4	3.9	0.7	2.5	-	1.0	73.7
93/94	15.9	10.0	71.6	5.5	9.0	7.0	28.3	11.8	-	3.5	-	2.4	165.0
94/95	23.4	34.2	8.2	-	-	1.1	7.2	70.9	7.0	6.5	-	31.1	189.6
95/96	18.2	64.3	-	5.0	20.1	30.1	57.9	18.5	8.6	51.1	44.0	4.1	321.9
96/97	14.7	7.2	-	17.2	34.0	-	30.9	16.1	18.0	-	2.0	10.0	150.1
97/98	78.2	4.6	1.0	1.8	13.2	26.4	13.7	3.5	21.3	5.5	-	6.6	175.8
98/99	13.2	-	-	8.5	20.4	4.2	28.1	-	-		1.9	11.1	87.4
99/00	26.6	61.9	1.5	4.0	0.9		0.9	5.4	59.9	1.7	-	2.9	165.7
00/01	1.3	35.9	-	11.0	-	-	7.5	-	7.2	-	-	2.9	65.8
01/02	15.3	47.7	3.2	9.3	-	18.1	20.5	33.4	19.4	-	-	18.4	185.3
02/03	40.2	-	11.4	1.2	5.4	4.3	22.5	T	3.5				88.5
Average	20.8	19.4	14.9	15.2	10.7	12.8	15.8	22.0	21.8	12.2	3.8	7.6	173.9

Bassin-Versant: Ziz

Station: Foum Zaabel

MOIS Année-Hydr	SEP	OCT	NOV	DEC	JAN	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	ANNEE
69/70									11.6	5.5	-	2.6	
70/71	7.5	16.7	13.3	9.3	4.6	22.2	6.4	95.9	25.7	-	0.2	2.6	204.4
71/72	12.5	23.2	18.9	42.0	8.7	29.7	18.6	37.5	19.2	-	-	-	210.3
72/73	16.4	4.8	168.4	7.1	1.1	1.2	7.5	33.3	0.4	27.6	-	3.7	271.5
73/74	0.4	0.7	63.8	8.0	-	-	35.1	79.9	5.8	2.5	3.8	0.7	200.7
74/75	47.5	0.2	17.5	2.7	0.1	0.1	0.7	140.0	36.6	5.3	-	3.5	254.2
75/76	0.4	0.8	10.1	30.0	22.4	25.1	40.2	61.8	66.8	4.2	2.5	27.0	291.3
76/77	58.6	4.7	-	20.4	43.6	-	1.8	19.0	23.6	0.3	-	3.5	175.5
77/78	41.8	18.5	11.4	19.4	14.7	3.7	-	14.8	5.2	-	2.5	16.4	148.4
78/79	0.6	19.3	-	0.3	6.5	6.8	2.8	-	27.0	2.1	-	0.3	65.7
79/80	49.8	101.7	0.4	-	27.5	52.1	43.2	47.5	0.1	-	-	1.7	324.0
80/81	11.1	2.0	7.0	22.8	11.5	17.2	8.1	10.9	-	11.3	2.0	2.6	106.5
81/82	9.0	-	6.0	-	0.2	11.2	0.1	30.8	45.8	4.4	0.4	8.1	116.0
82/83	2.0	7.9	4.4	0.7		9.5	4.8	22.0	35.4	0.3	3.3	31.8	
83/84	1.3	13.7	2.8	0.2	10.0	1.2	13.6	1.2	22.2	2.2	-	-	68.4
84/85	17.3	1.0	36.8	1.8	13.7	31.5	3.0	5.0	35.3	2.2	-	1.2	148.8
85/86	17.7	11.9	29.2	48.5	1.2	10.8	3.6	3.2	1.2	1.4	-	-	128.7
86/87	11.2	83.1	-	0.4	1.2	-	8.3	-	12.1	4.9	-	0.3	121.5
87/88	18.1	5.1	30.1	62.7	12.5	31.1	3.3	-	20.5	2.6	-	1.4	187.4
88/89	4.6	22.1	37.5	-	7.0	47.2	10.6	8.0	6.2	17.0	5.3	40.4	205.9
89/90	6.0	52.6	75.5	68.4	7.3	-	28.7	18.2	33.1	2.4	3.0	6.1	301.3
90/91	35.9	17.9	1.5	37.3	-	27.7	28.0	37.5	10.4	46.2	5.5	7.5	255.4
91/92	36.1	16.6	-	49.4	-	22.0	5.8	0.5	30.5	-	-	-	160.9
92/93	1.8	-	15.5	24.6	14.3	8.8	6.8	9.1	5.9	0.7	-	5.8	93.3
93/94	1.7	33.3	75.2	8.9	22.5	7.8	1.4	34.2	-	6.2	-	5.8	197.0
94/95	16.5	53.2	2.0	1.6	-	-	12.6	43.5	1.7	4.0	-	6.8	141.9
95/96	8.0	111.0	-	23.6	26.1	46.6	48.7	1.0	1.4	100.7	37.3	1.0	405.4
96/97	2.8	3.0	-	21.9	31.2	0.6	13.7	35.4	3.2	-	2.2	11.7	125.7
97/98	18.4	-	-	2.2	25.8	27.5	4.3	-	6.2	6.8	1.2	8.8	101.2
98/99	16.1	-	-	11.0	17.8	4.0	12.6	-	-	1.2	6.8	3.2	72.7
99/00	52.0	75.2	21.3	-	-	-	1.7	4.3	15.1	-	-	0.5	170.1
00/01	4.1	41.6	4.7	-	1.0	-	-	4.4	7.3	-	-	16.8	79.9
01/02	21.5	38.8	5.5	1.8	-	2.0	27.8	31.0	9.9	-	-	10.0	148.3
02/03	23.2	3.3	16.4	-	T	7.2	12.9	1.4	5.2				
Average	17.3	23.8	20.5	16.0	10.7	13.8	12.6	25.2	15.6	7.9	2.3	7.0	176.8

Table A.3.1-(3).2 Rainfall Data (Monthly Basis in Ziz River Basin)-2

Bassin-Versant: Ziz

Station: B.H.Eddakhil

MOIS / Année-Hydr	SEP	OCT	NOV	DEC	JAN	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	ANNEE
75/76	-	0.5	12.5	23.8	30.1	20.4	10.6	56.5	23.5	1.2	2.1	12.2	193.4
76/77	15.7	0.7	-	15.8	20.0	0.5	-	11.1	16.7	-	-	4.2	84.7
77/78	29.7	16.2	1.5	5.2	38.5	-	-	18.0	2.3	-	-	6.8	118.2
78/79	0.6	4.0	-	-	89.8	2.0	3.0	-	3.1	0.3	-	0.5	103.3
79/80	14.7	90.6	-	-	15.6	59.4	40.9	22.5	-	-	-	-	243.7
80/81	3.2	0.7	17.1	33.4	2.5	11.6	-	3.7	-	3.3	1.3	-	76.8
81/82	14.3	-	5.0	-	41.6	9.4	-	46.9	34.5	9.1	-	3.3	164.1
82/83	-	1.4	0.3	-	-	-	-	5.2	28.7	-	-	1.3	36.9
83/84	3.0	0.6	3.2	-	0.3	3.3	1.2	1.6	21.4	1.3	-	-	35.9
84/85	9.4	0.7	25.9	2.7	23.1	29.9	2.3	4.7	19.0	-	1.2	-	118.9
85/86	19.2	5.6	22.3	40.5	5.4	4.0	0.3	-	2.3	2.2	-	0.1	101.9
86/87	2.9	72.9	-	-	0.5	-	11.0	-	7.9	3.4	-	-	98.6
87/88	53.3	0.9	37.8	29.7	11.9	39.7	3.8	-	13.6	-	-	-	190.7
88/89	1.7	10.2	40.3	-	5.7	41.7	3.2	16.8	0.6	19.4	0.3	13.9	153.8
89/90	1.1	45.2	43.9	85.9	10.1	-	21.0	16.5	21.6	-	-	6.0	251.3
90/91	11.4	1.1	0.9	31.5	0.8	19.5	9.6	12.5	-	20.4	0.9	0.2	108.8
91/92	6.8	6.1	-	49.4	-	19.1	2.3	-	18.2	3.8	1.8	0.2	107.7
92/93	-	-	19.2	23.6	5.8	33.4	6.3	-	-	-	-	1.6	89.9
93/94	-	17.5	100.1	12.3	13.6	1.8	-	11.5	-	-	-	0.2	157.0
94/95	1.6	52.5	10.5	-	-	-	11.0	18.3	-	-	-	0.3	94.2
95/96	1.8	51.6	-	11.9	14.4	41.4	54.9	0.2	1.1	30.0	35.7	1.0	244.0
96/97	-	-	-	15.1	26.3	-	3.2	20.7	-	-	-	5.6	70.9
97/98	18.0	2.6	-	-	13.3	51.7	2.2	1.3	-	1.8	-	3.5	94.4
98/99	11.3	-	-	1.0	12.7	1.0	11.5	-	-	5.0	-	2.8	45.3
99/00	2.4	72.7	6.1	-	-	-	-	1.0	14.4	-	-	-	96.6
00/01	-	6.3	2.0	1.7	-	-	-	3.8	3.0	-	-	6.4	23.2
01/02	-	19.6	2.5	4.1	2.0	3.0	4.0	34.3	-	-	-	1.8	71.3
02/03	9.0	-	11.2	-	-	7.1	6.5	T	2.3				
Average	8.3	17.2	12.9	13.8	13.7	14.3	7.5	11.4	8.4	3.7	1.6	2.7	117.6

Bassin-Versant: Ziz

Station: Foum Tillicht

MOIS / Année-Hydr	SEP	OCT	NOV	DEC	JAN	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	ANNEE
74/75						5.8	2.8		171.8		4.9	3.2	
75/76	9.8	3.8	20.9	9.4	14.6	6.9	23.2				1.9		90.5
76/77		0.3	0.1	12.3	40.6	3.8	0.5	30.2	25.0	3.8	-	1.3	117.9
77/78	60.9	19.5	5.2	9.4	15.5	1.3	0.2	22.6	8.0	-	-	26.7	169.3
78/79	1.4	26.2	1.1	0.1	39.4	17.1	1.7	-	26.2	9.0	-	5.6	127.8
79/80	79.7	88.7	0.1	-	19.2	33.5	34.6	34.8	0.1	-	0.5	14.3	305.5
80/81	30.7	4.5	6.8	20.6	19.6	41.5	3.7	10.1	0.8	8.1	0.7	5.7	152.8
81/82	31.8	0.5	1.2	-	20.3	5.2	0.2	47.6	60.1	6.9	1.4	1.9	177.1
82/83	19.2	2.6	6.0	4.3	1.2	1.0	12.0	27.0	29.3	2.6	2.0	1.4	108.6
83/84	2.9	20.2	4.8	0.1	6.4	1.8	23.7	3.4	19.6	0.8	-	0.5	84.2
84/85	14.5	0.2	19.8	1.7	19.2	21.7	8.7	14.1	19.2	11.6	3.8	1.6	136.1
85/86	21.6	22.8	29.4	22.4	1.5	4.4	8.0	3.9	23.4	8.1	-	0.2	145.7
86/87	4.3	44.4	1.9	-	1.0	10.6	3.4	1.7	9.2	9.0	1.2	3.9	90.6
87/88	35.2	20.3	20.5	10.2	9.2	23.1	13.7	1.3	23.5	2.9	-	3.7	163.6
88/89	8.3	48.2	15.6	-	6.0	46.9	13.2	7.3	17.2	29.5	8.7	27.9	228.8
89/90	8.7	38.9	66.0	45.3	4.4	-	32.3	20.7	76.0	-	5.4	17.4	315.1
90/91	43.4	5.3	7.1	36.3	1.7	7.2	25.2	60.7	24.5	48.4	13.3	10.9	284.0
91/92	28.6	4.8	1.6	28.6	-	13.1	12.5	5.5	50.3	20.7	2.8	6.4	174.9
92/93	6.4	-	15.2	10.5	15.5	4.2	6.7	9.3	8.5	2.4	-	2.0	80.7
93/94	2.7	2.4	48.5	2.6	6.7	15.9	18.9	11.9	1.0	8.0	-	0.8	119.4
94/95	25.7	55.5	2.3	1.8	-	0.4	10.6	77.7	3.4	18.8	2.0	21.6	219.8
95/96	14.4	109.7	-	5.8	30.4	48.2	51.9	28.5	2.7	90.5	88.1	1.9	472.1
96/97	8.2	9.2	-	14.7	54.5	-	62.8	38.9	20.8	-	0.2	26.1	235.4
97/98	40.7	3.9	0.3	1.5	10.5	21.2	9.2	5.8	29.4	15.9	1.2	12.5	152.1
98/99	3.5	-	1.2	6.1	17.2	10.6	24.3	T	4.6	1.2	1.8	31.3	101.8
99/00	14.7	79.5	3.9	5.1	1.1	-	2.9	3.4	31.9	7.0	T	T	149.5
00/01	11.8	41.8	0.7	9.1	3.2	-	2.4	5.0	21.2	-	4.4	8.2	107.8
01/02	9.4	38.9	5.6	9.2	-	23.8	34.0	39.0	16.5	-	4.2	8.1	188.7
02/03	21.0	-	9.1	0.5	2.4	6.5	11.0	4.2	5.5				60.2
Average	20.7	24.7	10.5	9.6	12.9	13.0	15.7	19.8	26.1	11.7	5.5	9.4	170.0

Bassin-Versant ZIZ

Station: Radier Erfoud

MOIS / Année-Hydr	SEP	OCT	NOV	DEC	JANV	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	ANNEE
83/84	5.0	0.5	-	-	2.9	-	-	-	1.1	1.2	-	-	10.7
84/85	2.0	0.3	27.4	-	17.1	25.1		0.9	13.9	-	-	-	86.7
85/86	51.5	1.2	3.0	31.4	12.6	5.8	0.2	-	1.2		-	2.0	108.9
86/87	11.2	11.9	T	-	1.2	-	7.1	-	15.6	4.3	-	-	51.3
87/88	3.6	-	13.6	3.2	8.5	27.0	3.0	-	2.9	1.0	-	-	62.8
88/89	0.5	3.8	24.7	-	6.8	4.5	3.1	5.2	-	6.6	-	14.2	69.4
89/90	9.9	30.3	18.3	32.5	0.9	-	1.3	7.6	6.6	T	5.7	T	113.1
90/91	9.2	1.0	-	7.6	-	12.9	3.5	8.0	T	9.5	-	2.2	53.9
91/92	0.6	3.8	-	3.1	-	3.8	T	T	2.5	-	T	-	13.8
92/93	-	-	4.8	11.9	5.5	7.6	1.9	T	T	-	-	T	31.7
93/94	3.5	4.1	8.3	0.3	27.8	0.6	0.7	T	-	T	-	T	45.3
94/95	0.5	36.9	1.5	-	-	-	12.9	11.9	-	T	T	T	63.7
95/96	0.3	14.9	0.2	7.6	3.6	17.0	13.3	1.7	0.6	14.2	14.0	-	87.4
96/97	-	0.6	-	3.5	8.3	-	6.9	14.6	0.3	-	T	2.1	36.3
97/98	4.1	-	-	-	2.1	18.6	T	0.6	-	-	T	1.0	36.3
98/99	4.1	-	-	-	2.1	18.6	T	-	0.8	T	T	1.4	27.0
99/00	0.7	3.6	0.3	0.6	-	-	-	1.7	22.3	T	-	T	29.2
00/01	T	4.0	0.5	3.9	-	-	-	1.0	2.1	-	-	0.2	11.7
01/02	T	10.5	T	1.4	-	T	13.1	7.2	4.8	-	-	1.2	38.2
02/03	6.3	T	7.0	T	-	7.1	1.2						
Average	6.3	6.7	6.1	5.6	5.0	7.8	4.3	3.8	4.4	2.8	1.4	1.7	51.4

Bassin-Versant ZIZ ORMVA du TAFILALET

Station: SEMVA D'ERRACHIDIA

MOIS / Année-Agricol	SEP	OCT	NOV	DEC	JANV	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	ANNEE
82/83	-	1.1	3.6	-	0.3	-	-	3.7	31.8	-	-	3.4	43.9
83/84	2.2	1.6	-	-	-	1.7	1.0	-	21.1	1.0	-	-	28.6
84/85	6.3	-	19.6	-	15.4	25.0	0.8	-	18.5	-	-	-	85.6
85/86	17.0	6.9	23.0	34.3	2.1	3.0	1.6	-	5.4	1.8	-	0.3	95.4
86/87	4.4	25.3	0.1	-	17.0	-	17.0	-	6.4	9.7	2.0	-	81.9
87/88	7.9	1.1	27.1	17.1	10.0	35.5	5.5	-	11.2	2.1	-	-	117.5
88/89	1.9	32.2	36.3	-	3.5	29.6	3.0	6.7	-	21.0	1.0	9.5	144.7
89/90	4.2	53.9	31.7	52.3	4.9	1.2	27.7	15.7	28.3	-	-	5.7	225.6
90/91	10.6	0.8	1.5	21.5	-	25.2	14.8	23.3	1.3	13.7	0.8	2.1	115.6
91/92	11.3	11.0	-	31.8	-	17.4	2.4	5.2	26.4	3.3	-	1.4	110.2
92/93	-	-	20.8	22.6	6.9	37.6	8.5	0.8	-	-	-	0.6	97.8
93/94	0.4	11.9	83.7	6.9	28.1	1.4	0.9	12.4	0.2	-	1.0	1.8	148.7
94/95	3.9	54.4	10.2	-	-	-	21.0	31.6	-	0.3	3.3	2.0	126.7
95/96	2.7	75.4	-	4.0	24.3	57.3	36.7	6.1	2.0	36.9	29.1	-	274.5
96/97	0.5	2.3	-	31.8	28.6	-	4.8	18.4	1.0	-	1.3	9.1	97.8
97/98	20.7	9.0	-	-	11.1	47.9	2.9	1.1	2.5	24.3	-	3.5	123.0
98/99	5.2	1.9	2.5	1.8	15.3	5.0	5.1	-	3.2	0.8	-	8.0	48.8
99/00	2.9	62.2	3.9	0.3	-	-	0.6	2.8	14.9	0.6	-	1.0	89.2
00/01	-	13.1	5.0	2.8	-	-	-	6.0	3.1	-	-	6.7	36.7
01/02	2.3	36.6	2.5	4.6	2.3	8.2	9.4	30.0	2.0	-	-	9.0	106.9
02/03	15.8	0.2	13.6	-	-	7.7	5.5	0.6	0.3	-	-	-	43.7
Average	5.7	19.1	13.6	11.0	8.1	14.5	8.1	7.8	8.6	5.5	1.8	3.1	106.8

Table A.3.1-(4) Rainfall Data (Monthly Basis in Maider River Basin)

Bassin - versant : Regg

Station: Alnif

MOIS / Année-Hydr	SEP	OCT	NOV	DEC	JAN	FEV	MARS	AVR	MAI	JUIN	JUILLET	AOUT	ANNEE
75/76			-	T	18.4	5.0	2.0		19.6	0.1	0.5	T	
76/77	47.5	0.6	1.5	18.9	14.6	0.3	T	10.5	2.4	-	-	-	96.3
77/78	9.9	6.0	3.6	10.3	52.4	8.3	-	T	-	-	T	6.8	97.3
78/79	2.5	4.1	T	1.6	80.3	2.8	T	T	2.1	T	T	T	93.4
79/80	20.5	86.8	4.6	-	11.6	50.1	24.6	4.9	T	T	T	2.0	205.1
80/81	3.6	T	10.7	36.1	1.0	9.7	T	T	T	3.0	1.0	0.9	66.0
81/82	4.2	T	T	-	16.1	3.9	T	33.8	27.9	T	T	1.0	86.6
82/83	13.3	1.1	1.8	-	T	3.2	T	0.6	13.4	-	-	T	33.4
83/84	T	11.7	0.7	T	3.5	-	0.5	T	9.8	3.7	-	T	29.6
84/85	T	-	17.3	-	5.4	13.8		28.1	12.1	T	T	T	76.7
85/86	4.0	5.4	3.2	17.0	3.9	1.8	T	T	2.3	T	1.1	0.4	39.1
86/87	7.2	37.3	-	-	-	T	30.4	T	6.3	T	T	-	81.2
87/88	9.6	5.0	6.8	10.3	4.2	13.5	4.2	3.5	-	T	-	0.1	57.2
88/89	0.8	10.6	66.0	-	-	35.1	T	13.4	T	16.5	1.3	6.3	150.0
89/90	3.8	34.0	30.6	48.4	T	-	3.4	15.7	8.6	T	17.0	T	151.2
90/91	18.9	1.7	-	29.5	-	13.1	T	11.5	1.8	8.0	0.6	6.4	85.5
91/92	-	3.0	-	13.2	-	5.7	8.4	2.6	107.0	0.4	1.2	1.3	142.8
92/93	1.7	2.1	1.4	23.2	1.0	30.8	4.2	-	0.4	-	-	0.2	65.6
93/94	-	10.0	24.6	2.6	29.3	-	0.1	1.0	-	1.6	T	0.1	69.3
94/95	0.6	80.6	-	-	-	T	14.1	20.9	T	1.8	T	6.8	124.8
95/96	0.5	37.1	-	11.3	9.5	33.3	13.9	-	0.1	57.3	16.9	0.1	180.0
96/97	-	2.0	-	4.1	4.2	2.2	6.6	35.9	-	-	T	22.2	77.2
97/98	14.2	-	-	-	13.8	47.9	7.8	-	2.9	1.6	1.3	2.6	92.1
98/99	0.3	0.3	0.2	15.8	7.3	2.6	2.6	-	5.0	T	T	37.7	71.8
99/00	T	34.4	-	-	-	-	-	0.2	35.3	0.3	-	2.9	73.1
00/01	-	7.1	T	3.4	-	T	T	-	1.0	0.1	T	1.3	12.9
01/02	0.3	10.7	0.7	2.5	0.5	0.9	25.8	28.4	10.2	T	2.3	3.1	85.4
02/03	8.9	0.7	0.7	1.9	T	5.0	13.3	T					
Average	7.2	15.7	7.0	9.6	11.1	11.6	9.0	10.6	11.7	5.6	2.7	4.9	90.1

Bassin-Verssant: Tarhbalt

Station: Tazarine

MOIS / Année-Hydr	SEP	OCT	NOV	DEC	JANV	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	ANNEE
96/97							5.9	20.2	1.5	-	-	30.7	
97/98	23.0	-	-	-	10.2	53.4	14.1	-	-	1.0	-	3.7	105.4
98/99	-	-	-	8.0	20.5	1.0	13.5	-	-	-	5.5	20.6	69.1
99/00	-	38.5	-	1.5	-	-	0.5	1.0	32.0	2.0	-	6.5	82.0
00/01	-	17.0	3.5	1.5	-	-	-	-	2.0			5.0	29.0
01/02	1.0	3.5	-	6.0	-	2.0	28.5	40.0	30.0	2.0	1.0	3.0	117.0
02/03	4.0	1.0	0.5	5.5	-	1.0	23.0						
Average	4.7	10.0	0.7	3.8	5.1	9.6	12.2	10.2	10.9	1.0	1.3	11.6	80.5

Table A.3.2-(1) Temperature (Monthly Basis in Guir River Basin)

Station: **Anoual** **B.V.** **Guir**
N°de poste: **91081**

Tº MOYENNE

MOIS / ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83	22.5	18.5	12.8	7.4	6.3	8.3	12.5	14.4	18.6	21.6	21.5	22.9
83/84	17.9			8.4	14.1	13.9	13.3	14.9	16.6	20.2	20.9	18.4
84/85	19.0	14.9	12.6	11.1	10.6	12.7	14.0	16.4	18.0	20.3	22.7	20.9
85/86	20.5	18.8	13.3	7.6	7.1	7.7	13.0	13.7	18.0	22.0	26.2	25.7
86/87	20.4	15.8	13.5	7.8	6.4	9.5	15.0	19.1	22.3	24.3	23.7	23.8
87/88	17.4	16.5	14.4	12.7	12.4	14.2	15.7	19.8	20.6	18.9	27.5	22.7
88/89	19.3	16.3	12.7	7.6	6.7	6.8	11.2			24.9	29.6	23.4
89/90	21.6	19.3	11.8	9.1	6.0	8.2	13.3	15.6	20.8	24.2	25.2	24.7
90/91	21.3	18.9	13.5	8.1	5.6	6.5	11.7	15.0	17.4	24.0	28.0	28.0
91/92	23.4	15.7	11.5	8.4	6.1	8.6	10.3	14.2	19.1	20.7	26.8	27.0
92/93	22.8	16.8	10.7	8.1	6.1	7.3	11.2	14.5	19.0	25.8		24.8
93/94	21.5	16.9	10.7	9.5	8.9	11.2	12.7	15.3	21.6	25.7	28.6	26.3
94/95	22.1	16.5	13.9	10.3	8.6	12.2	12.6	13.4	22.7	23.7	33.1	26.6
95/96	22.4	17.1	13.5	10.0	9.2	9.5	12.3	16.0	19.3	22.8	27.2	27.4
96/97	22.2	16.5	12.9	9.2	9.9	13.4	14.6	15.2	20.5	24.4		26.6
97/98	22.6	18.2	13.3	9.1	9.0	9.9	13.6	17.3	18.2	25.2	30.3	29.2
98/99	26.1	16.4	12.7	7.4	7.5	7.5	11.7	17.5	22.2	28.4	29.4	28.7
99/00	24.1	18.5	10.2	7.9		10.4	12.9	15.3	18.9	29.0	29.0	
00/01		15.3	12.6	10.1	8.9	8.9	15.4	12.5				
01/02												
02/03												

Tº MINIMALE

MOIS / ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83				0.4	0.4	0.3	2.4	3.2	8.0	11.0	10.0	10.4
83/84	8.4	7.4	6.4	1.9	6.2	4.0	6.0	7.0	6.0	9.0	11.0	8.0
84/85	8.0	6.0	5.0	3.0	3.0	2.0	4.0	6.0	6.4	10.0	10.0	9.4
85/86	7.0	7.0	5.4	0.4	0.3	0.5	4.4	6.0	6.0	12.0	15.0	12.0
86/87	11.0	6.0	4.0	0.4	0.2	1.2	7.0	10.0	14.0	15.0	14.0	14.0
87/88	10.0	9.4	7.0	4.2	5.2	4.0	5.0	12.0	12.0	10.0	14.0	12.0
88/89	11.0	8.4	4.0	0.2	0.4	1.0	2.0	``		17.0	17.0	14.0
89/90	11.0	8.4	3.0	1.4	0.4	1.4	4.4	6.4	11.0	14.0	14.0	15.0
90/91	12.0	9.0	1.9	1.2	0.3	0.2	1.2	4.8	6.4	9.2	16.0	17.0
91/92	6.2	4.0	0.2	-		0.1	2.0	2.6	6.0	8.2	16.6	16.0
92/93	10.2	4.0	1.0	0.2	0.1	-	0.2	3.4	5.6	16.2		9.0
93/94	7.0	4.0	2.0	0.1	0.4	0.3	0.3	4.0	2.4	13.0	17.0	13.4
94/95	8.4	8.4	6.0	0.2	0.5	0.4	2.0	3.0	11.0	9.4	15.4	16.0
95/96	11.0	8.6	1.0	0.2	1.8	0.1	3.0	4.0	12.7	10.4	9.0	14.6
96/97	7.0	8.0	2.2	2.0	2.0	3.0	8.1	3.0	10.0	9.4	15.0	15.0
97/98	9.4	5.2	0.2	0.1	-	0.1	0.1	5.2	5.0	12.0	15.0	16.0
98/99	3.2	3.0	-	-	-	-	1.0	5.4	5.0	14.8	17.2	18.0
99/00	11.6	8.4	0.1	-		0.1	1.0	0.6	7.0		14.0	14.0
00/01		2.0	0.1	0.1	0.1	0.1	3.0	-				
01/02												
02/03												

Tº MAXIMALE

MOIS / ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83				15.0	14.0	18.0	24.0	28.0	31.0	33.0	35.0	36.0
83/84	29.4	26.0		21.0	22.0	24.0	22.0	24.0	27.0	32.0	33.0	29.0
84/85	30.0	26.0	23.0	19.0	19.0	26.0	25.4	27.0	28.4	30.0	36.0	34.0
85/86	34.0	30.0	21.0	18.0	17.0	16.0	22.0	22.0	30.0	35.0	38.0	39.0
86/87	31.0	26.0	24.0	18.0	13.0	17.0	25.0	29.0	30.0	34.0	34.0	34.0
87/88	28.0	24.0	23.0	22.0	20.0	25.0	26.0	29.0	29.0	28.0	38.0	35.0
88/89	29.0	24.0	23.0	17.0	14.0	14.0	21.0	26.0	27.0	33.4	39.0	35.0
89/90	31.0	28.0	22.0	18.0	14.0	17.0	22.4	25.0	33.0	35.0	37.0	36.4
90/91	33.0	30.0	26.0	20.4	16.0	15.0	23.2	27.0	32.0	35.4	38.4	39.0
91/92	35.4	27.2	25.2	19.0	14.4	21.2	21.4	26.0	30.4	35.4	37.8	37.4
92/93	35.4	31.0	22.0	21.6	15.2	20.0	25.0	29.0	32.0	36.4		37.4
93/94	35.2	28.0	21.4	17.6	19.6	22.6	25.0	25.0	38.4	39.4	39.0	38.4
94/95	35.6	27.4	24.4	19.2	19.0	25.0	26.0	25.0	35.0	36.0	39.8	39.2
95/96	33.8	29.4	26.0	21.0	20.0	20.0	27.6	28.0	26.0	37.0	39.0	39.0
96/97	32.6	30.6	22.4	19.6	18.0	23.0	21.1	30.0	30.2	38.0	38.5	40.0
97/98	36.4	30.0	23.0	23.0	22.2	21.4	26.0	29.4	31.2	37.4	40.0	38.4
98/99	38.4	30.4	28.0	20.2	19.0	20.4	24.2	29.4	36.4	40.0	40.0	39.4
99/00	36.2	31.4	27.4	23.0		22.4	25.0	31.0	33.4		40.0	39.0
00/01		29.2	25.2	20.6	20.4	20.4	28.4	30.4	34.4	38.0	40.0	42.0
01/02	36.0	30.0	24.2	19.0	23.0	20.0	27.0	29.0	32.4	37.0	38.0	38.0
02/03	38.0											

Station: **Kadoussa** **B.V.** **Guir**
N°de poste: **94704**

Tº MOYENNE

MOIS / ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83	25.4	19.2	13.6	10.2	8.6	11.7	16.4	17.8	21.6	27.1	29.9	
83/84	26.0	19.6	15.1	9.3	7.3	10.8	12.1	20.3	18.8	28.0	30.5	
84/85	27.8	18.4	12.7	8.7	8.0	12.5	13.3	17.8	20.2	28.5	31.2	26.8
85/86	25.5	19.7	14.6	8.8	9.0	11.9	13.2	15.8	24.0	25.3	30.6	29.8
86/87	25.9	19.9	8.1	8.5	9.5	11.7	15.8	20.7	22.0	27.1	29.0	30.4
87/88	26.5	19.8	12.7	10.3	9.5	10.7	14.4	18.9	21.3	25.0	30.7	30.7
88/89	24.8	18.4	13.5	7.1	5.5	9.2	14.4	17.2	21.4	25.3	30.5	29.3
89/90	25.9	20.2	14.0	11.2	8.0	13.2	15.5	16.2	21.8	28.5	31.3	30.7
90/91	26.1	21.2	15.1	10.3	8.7	10.2	13.7	17.9	20.1	27.0	31.2	30.7
91/92	26.2	18.5	13.6	9.5	6.5	10.5	13.2	18.2	22.7	25.2	29.9	30.3
92/93		18.7	13.1	11.3	7.4	9.6	13.1	18.7	21.5	26.8	31.6	28.8
93/94	25.9	19.4	12.7	11.0	10.4	12.5	15.5	18.8	25.3	29.9	31.8	30.7
94/95	26.1	19.3	14.4	10.8	10.3	13.7	14.3	16.4	25.9	26.8	30.4	30.0
95/96	24.4	18.8	15.6	10.9	12.7	11.2	14.4	18.6	22.2	25.5	30.3	32.2
96/97	25.3	19.7	14.3	11.0	11.3	13.9	15.8	17.6	23.6	27.3	30.1	29.5
97/98	24.9	21.4	16.1	11.5	10.1	10.4	14.6	18.6	20.0	27.8	32.5	30.9
98/99	26.7	18.8	15.0	8.8	8.4	9.0	13.2	21.2	24.9	23.2	32.4	31.5
99/00	25.9	20.5	12.1	8.7	5.6	11.6	14.9	17.9	21.8	28.1	32.2	30.5
00/01	25.5	17.8	13.7	10.4	10.1	10.8	17.1	19.5	22.0	30.0	32.5	
01/02	26.1	21.0	12.9	10.0	9.4	12.1						29.3
02/03	25.0	21.9										

Tº MINIMALE

MOIS / ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83				-	-3.7	-1.7	1.3	4.0	9.0	17.0	19.0	19.6
83/84	15.0	8.0	4.6	-2.0	-6.9	-1.7	0.8	9.6	7.9	15.6	19.8	20.4
84/85	14.9	6.0	1.9	-3.7	-4.3	1.0	2.3	6.5	9.3	17.2	20.0	16.3
85/86	15.4	9.6	3.0	-2.0	-2.7	0.6	3.0	5.2	7.6	14.7	21.3	18.0
86/87	14.6		2.0	-3.9	-3.2	-1.3	5.4	4.7	13.0	16.0	19.4	16.1
87/88	12.4	8.4	1.2	-2.4	0.2	2.0	2.0	6.3	6.9	15.7	18.0	20.4
88/89	14.0	6.6	0.4	-4.0	-4.2	-1.0	3.0	3.2	11.7	8.7	20.8	20.3
89/90	15.4	10.0	4.5	2.8	0.6	3.0	5.8	7.2	8.7	16.3	20.0	9.7
90/91	12.4	10.0	2.4	2.9	-1.8	0.4	4.0	6.2	8.7	11.7	20.4	21.0
91/92	13.6	9.4	1.4	-1.4		1.0	3.0	7.8	10.0	14.7	17.3	22.3
92/93	16.4	7.6	1.5	0.6	-1.2	0.3	1.2	7.6	11.2	14.8	16.2	18.0
93/94	14.8	8.3	3.4	0.7	0.5	0.7	6.4	5.2	12.4	17.3	20.0	20.2
94/95	10.6	10.0	2.9	0.8	-4.0	1.5	2.6	4.8	13.0	14.2	18.2	9.6
95/96	9.6	7.2	2.6	-1.5	1.4	-2.0	1.8	6.8	11.3	11.7	13.8	21.5
96/97	12.4	7.3	1.3	0.4	0.8	2.3	6.2	6.2	11.0	14.7	17.6	14.0
97/98	10.2	8.5	4.5	0.8	2.8	2.0	1.6	6.8	9.0	16.0	20.4	21.2
98/99	15.6	4.0	1.8	0.2	0.2	0.2	1.8	9.2	10.4	16.6	20.4	20.0
99/00	17.0	11.4	-2.0	-3.4	-8.2	-1.8	2.4	5.6	0.6	17.6	21.4	30.5
00/01	13.2	6.2	2.0	-2.0	-2.6	-0.2	2.0	8.4	8.2	17.4	22.6	7.4
01/02	15.4	10.0	1.4	1.6	-3.8	1.2		12.2	9.0			15.6
02/03	15.2	10.0										

Tº MAXIMALE

MOIS / ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83				23.0	24.0	26.0	27.8	29.0	32.0	36.9	40.6 (	48.6
83/84	37.0	31.0	29.0	23.7	20.0	24.8	28.4	31.4	31.0	39.4	39.4	37.8
84/85	38.8	33.2	24.7	19.8	20.4	25.0	26.4	30.2	33.7	39.4	40.4	39.4
85/86	36.5	29.2	28.4	19.9	21.6	25.0	24.0	26.4	35.0	38.0	39.7	38.8
86/87	37.0	28.2	23.4	24.3	21.0	28.0	29.0	33.4	35.4	38.0	39.4	39.2
87/88	37.4	29.4	23.7	23.0	23.6	23.6	27.4	33.8	34.8	35.8	41.0	39.0
88/89	37.0	29.6	24.0	21.2	16.0	24.6	27.4	30.0	33.7	38.4	41.0	38.6
89/90	37.0	31.8	25.9	21.8	20.4	26.4	26.4	28.9	34.9	40.0	41.0	40.7
90/91	37.4	33.6	26.4	22.6	19.6	21.6	25.8	29.3	35.4	38.6	43.6	43.6
91/92	36.8	30.0	27.4	20.6	16.0	21.7	26.8	32.0	35.2	38.4	39.4	39.6
92/93	37.8	33.0	24.6	23.4	19.8	21.8	28.7	32.6	33.6	39.8	42.6	37.8
93/94	37.8	32.0	24.2	21.8	23.8	24.7	26.8	29.6	41.6	41.6	41.2	39.6
94/95	37.8	29.2	26.5	22.4	24.0	26.8	26.2	28.7	38.3	37.8	40.2	39.4
95/96	37.4	32.8	28.5	23.4	24.0	26.2	30.4	31.2	34.8	39.0	40.0	41.2
96/97	38.4	33.0	27.4	23.8	23.0	26.5	26.8	32.7	33.0	38.6	46.0	41.6
97/98	38.8	33.4	29.8	23.0	23.4	23.4	28.2	30.6	33.6	39.6	42.6	41.8
98/99	39.6	33.2	28.4	23.4	21.8	22.2	25.4	31.6	37.8	41.0	42.0	41.4
99/00	37.4	31.4	29.5	24.0	18.4	24.0	27.6	32.2	35.4	38.8	41.0	42.0
00/01	37.2	30.4	25.0	24.2	22.4	22.2	32.0	30.4	35.8	41.0	42.2	40.2
01/02	37.6	33.4	26.8	20.8	22.0	24.2		29.2	35.0			39.4
02/03	36.0	31.0										

Station: **Bouanane** **B.V.** **Guir**
N°de poste: **92048**

Tº MOYENNE

Tº MINIMALE

MOIS / ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83				-0.4	-0.3	0.1	6.3	7.2	12.3	20.2	20.4	22.1
83/84	17.9	12.4	9.1	1.4	-2.1	3.2	5.5	10.8	6.3	16.8	16.2	23.2
84/85	17.3	9.9	6.4	-1.2	-2.1	3.9	3.1	9.2	9.4	18.0	22.2	23.2
85/86	14.2	12.4	6.5	1.2	1.8	1.8	4.6	6.8	10.9	18.4	22.0	20.2
86/87	14.8	11.7	6.1	-1.6	-0.3	3.9	6.1	9.8	16.2	20.3	21.9	19.0
87/88	14.1	10.6	5.2	2.5	2.3	3.4	3.6	10.0	8.7	16.0	22.7	25.7
88/89	16.9	11.9	4.3	1.1	-1.5	2.3	6.4	5.6	13.3	16.7	24.2	21.2
89/90	18.0	10.8	6.7	2.3	0.6	5.5	6.1	6.2	12.4	17.3	23.1	22.5
90/91	19.2	12.4	2.7	1.9	0.7	1.2	4.0	6.8	9.8	12.1	19.4	22.2
91/92	16.4	9.6	-	1.8		2.4	1.0	5.0	5.4	14.2	16.2	23.0
92/93	17.4	9.2	4.6	1.8	-0.6	3.0	1.2	4.6	6.9	16.8	23.1	19.2
93/94	13.1	12.0	5.2	2.6	1.2	0.4	1.2	4.4	6.8	21.0	23.0	17.8
94/95	14.0	13.9	6.7	0.8	-1.6	2.6	2.0	7.0	15.0	17.8	22.6	22.6
95/96	14.0	11.0	4.0	2.0	-2.2	0.4	3.5	6.2	9.6	14.2	17.3	20.2
96/97	14.9	11.0	2.8	1.4	2.6	4.2	9.8	6.9	13.5	14.2	19.9	13.2
97/98	13.6	10.4	4.4	1.2	1.4	4.0	3.8	9.0	6.7	17.4	25.2	20.0
98/99	10.2	2.0	1.2	-5.6	-1.4	-5.4	4.2	11.0	11.8	19.4	19.7	21.2
99/00	19.6	14.6	1.4	-0.3	-2.0	4.6	7.6	7.0	13.6	17.8	24.3	23.2
00/01	17.0	8.6	4.1	2.4	2.2	3.4	5.8	10.2	8.0	18.6	25.4	20.0
01/02	18.1	13.4	0.6	2.6	1.0	4.6	5.4	9.0	7.7	17.0	21.4	19.0
02/03	17.1											

Tº MAXIMALE

MOIS / ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83				21.2	24.4	26.1	26.6	30.4	34.0	38.4	41.7	41.5
83/84	39.0	31.8	28.2	24.4	26.1	23.6	30.2	33.8	33.2	41.0	40.7	40.0
84/85	38.8	34.6	25.2	21.2	19.4	27.0	28.0	32.0	35.0	41.6	41.8	41.8
85/86	37.6	30.8	29.4	21.3	21.4	26.0	25.3	28.7	37.0	40.4	42.1	40.6
86/87	39.5	29.5	24.8	22.2	21.6	29.0	30.2	36.3	34.4	40.6	42.2	41.8
87/88	38.8	32.0	25.2	23.6	24.0	21.5	29.0	35.2	36.6	38.3	42.4	41.8
88/89	38.8	31.2	27.2	21.9	16.8	26.2	28.0	30.8	35.0	40.2	41.2	40.6
89/90	39.5	33.2	25.2	23.0	19.8	25.6	27.6	29.4	36.0	40.8	41.4	40.2
90/91	39.4	33.6	27.0	20.5	19.0	21.0	25.4	29.4	36.0	38.8	41.5	42.6
91/92	38.2	30.6	27.8	21.0	16.6	24.1	25.6	31.2	34.4	39.0	40.5	40.6
92/93	38.6	33.9	24.2	23.4	18.8	22.6	27.4	33.0	37.6	41.5	42.5	40.8
93/94	38.6	32.0	24.0	21.4	23.6	25.6	28.2	28.6	41.4	42.1	42.2	41.4
94/95	39.6	30.0	26.1	23.8	24.2	27.0	27.4	29.7	38.7	39.2	42.1	41.7
95/96	38.7	31.6	28.7	21.5	24.0	24.6	30.8	32.2	35.6	41.1	42.6	42.2
96/97	36.3	33.2	26.4	21.7	21.1	26.4	23.3	33.6	35.1	40.6	42.8	43.0
97/98	39.8	33.0	28.2	22.4	24.6	26.0	29.3	32.6	35.1	41.6	44.0	42.6
98/99	40.8	35.2	29.4	21.8	21.9	23.4	27.4	33.2	39.4	43.1	42.4	42.8
99/00	38.3	33.8	28.8	25.4	19.6	25.0	27.6	34.2	35.6	41.5	43.3	41.8
00/01	38.4	32.7	27.9	24.9	22.2	23.0	33.0	30.4	36.4	42.5	43.2	42.2
01/02	38.8	35.2	27.4	21.4	23.6	25.2	30.4	31.4	37.0	41.2	42.7	42.0
02/03	39.7											

Table A.3.2-(2) Temperature (Monthly Basis in Gheris River Basin)

Station: Tirgha **B.V.** Rheris
N°de poste: 97441

T° MOYENNE

MOIS / ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83	21.3	16.4	9.1	7.3	5.2	8.0	13.4	15.0	19.0	23.4	26.1	26.3
83/84	21.5	16.3	12.7	7.8	5.8	8.3	9.5	16.9	15.6	23.4		
84/85	21.8	20.2	10.5	7.3	5.8	10.2	11.0	14.0	16.7	23.6	26.4	25.9
85/86	21.3	16.9	11.6	7.3	7.6	9.0	10.6	13.3	19.9	21.6	24.8	26.0
86/87	22.0	14.9	10.1	6.5	7.6	9.4	11.0	17.1	19.3	23.3	24.9	25.8
87/88	22.2	15.7	10.7	8.0	7.3	9.1	12.0	15.4	18.1	21.6	28.2	26.6
88/89	21.3	15.3	10.9	5.3	3.3	6.5	11.1	13.0	17.4	21.0	25.1	23.6
89/90	21.0	18.4	12.4	6.7	5.1	9.9	12.3	12.5	18.0	23.5	25.7	24.6
90/91	21.9	16.8	12.2	7.1	5.7	6.8	10.8	13.7	16.1	21.9	25.7	25.2
91/92	21.8	14.6	10.5	7.4	4.2	7.4	9.3	13.7	17.1		25.1	24.7
92/93	20.9	15.1	11.0	7.7	4.9	6.6	10.3					
93/94												
94/95												
95/96								.		23.7		
96/97		16.9	13.7	8.3	6.3	9.8	12.6	11.6	17.3	22.7		21.5
97/98	17.8	16.6	14.3	9.5	11.0	10.1	13.2	16.5	18.2	12.5	27.1	23.7
98/99	21.9	17.4	12.5	7.4	11.4	7.7	12.0	17.6	22.1	27.4	29.7	27.5
99/00	24.1	17.9	11.0	7.6	5.2	11.6				26.8	30.0	29.2
00/01	24.5	16.5	13.1	9.9	8.9	11.8	15.0	17.2	19.0		34.6	20.4
01/02	24.0	21.3	18.5	11.9	10.8	13.4	14.3	12.5	17.8	26.7	26.0	21.7
02/03	17.2	15.1										

T° MINIMALE

MOIS / ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83				-8.0	-8.8	-5.8	1.6	0.8	8.6	12.0	14.2	14.0
83/84	8.0	5.2	0.8	-5.8	-6.4	-5.0	-2.4	4.0	5.6	10.3	14.4	13.6
84/85	9.6	3.0	-0.4	-6.8	-8.2	-4.0	-	1.6	5.8	12.2	13.0	13.6
85/86	11.0	5.4	-0.2	-5.6	-4.4	-5.4	-3.3	3.2	5.8	10.8	12.0	15.0
86/87	9.0	5.6	-3.8	-6.4	-7.6	-4.4	-	4.0	9.0	10.2	11.8	10.6
87/88	11.0	4.2	-3.0	-3.4	-3.4	-1.8	0.8	3.0	6.4	11.0	15.0	14.4
88/89	9.4	4.2	-2.6	-7.2	-8.0	-4.2	-1.2	0.2	7.3	8.8	14.6	13.0
89/90	7.4	9.4	2.0	-1.6	-4.6	-2.0	2.4	2.0	5.7	11.6	14.6	11.4
90/91	11.3	4.0	-1.4	-5.0	-6.4	-7.2	-0.8	1.6	3.6	7.6	14.4	13.7
91/92	10.6	4.6	-5.4	-5.2		-4.6	-0.6	0.6	5.6	9.0	14.2	13.8
92/93	9.6	0.8	-1.0	-1.2	-5.4	-0.3	-0.8					
93/94						I						
94/95				-	-	0.2	0.4	1.4	4.8	7.0	10.6	8.2
95/96	9.2	4.2	1.8	2.0	0.2	1.4	2.3	7.6	7.4	6.6	13.8	16.0
96/97	9.8	6.8	2.4	-0.8	0.8	1.4	3.2	2.8	5.4	10.2	14.4	9.2
97/98	7.8	7.2	3.6	-0.2	1.2	2.8	3.0	6.2	9.4	11.4	14.6	11.2
98/99	7.3	6.4	2.8	-0.8	-0.4	-2.6	4.0	6.8	9.6	17.2	19.6	16.6
99/00	15.4	9.8	0.8	-4.0	-4.2	26.0	5.0	6.0	10.4	14.0	19.4	17.4
00/01	9.0	5.4	0.8	-0.4	-0.4	2.2	4.0	6.6	7.2	17.4	25.5	14.6
01/02	12.2	9.4	3.8	-1.2	-0.8	0.8	1.0	1.8	1.0	11.4	13.2	7.2
02/03	5.0	4.2										

T° MAXIMALE

MOIS / ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83				22.6	20.0	22.6	24.0	26.8	24.0	26.8	33.4	37.0
83/84	34.0	28.6	26.4	21.4	23.2	22.6	26.4	28.2	26.4	28.2	36.4	35.0
84/85	32.2	32.0	21.5	19.2	18.8	24.5	25.0	27.6	25.0	27.6	35.4	35.6
85/86	32.6	28.3	27.5	20.3	19.0	24.5	22.0	24.0	22.0	24.0	35.0	34.6
86/87	33.4	25.4	21.8	23.0	19.0	22.8	26.8	30.2	26.8	30.2	34.8	36.2
87/88	34.6	25.4	23.0	20.8	20.2	21.2	26.0	30.4	26.0	30.4	32.4	36.0
88/89	34.6	26.6	23.2	19.6	14.8	20.6	23.4	25.2	23.4	25.2	34.0	33.6
89/90	33.8	28.0	21.8	20.0	18.2	24.2	25.0	25.0	25.0	25.0	35.4	35.4
90/91	33.3	29.0	25.0	20.2	17.2	18.4	23.4	26.0	23.4	26.0	32.2	36.4
91/92	32.3	27.4	25.0	18.0	14.6	19.6	20.4	26.2	20.4	26.2	33.0	34.4
92/93	33.0	26.2	21.8	22.6	14.2	19.0	25.0	28.0	25.0	28.0	36.2	
93/94												
94/95												
95/96												
96/97		28.4	22.8	19.2	19.4	21.2	22.6	23.6	22.6	23.6	37.2	36.0
97/98	30.2	26.2	25.2	21.2	22.0	19.4	25.8	27.4	25.8	27.4	33.6	38.0
98/99	36.8	30.8	26.4	18.4	19.0	20.0	22.0	17.6	22.0	17.6	37.6	38.8
99/00	34.2	28.4	25.0	20.6	15.4	21.2					37.4	40.4
00/01	38.4	27.6	25.6	22.8	19.0	23.6	26.6	27.4	35.2	38.6	42.4	37.0
01/02	36.0	34.0	31.5	28.0	25.6	25.8	30.0	25.3	37.6	38.8	38.3	38.8
02/03	30.4	26.0	j									

Station: Tadighoust **B.V.** Rheris
N°de poste: 97320

T° MOYENNE

MOIS / ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83	26.2	20.0	14.4	10.3	8.4	11.8	17.3	18.2	21.6			
83/84	26.3	20.4	16.5	11.1	8.6	11.1	12.9	20.7	19.3	28.2		
84/85	26.7	18.1	12.8	8.2	7.6	12.5	14.2	18.4	20.4	28.7	30.0	29.9
85/86	24.5	18.6	15.1	9.5	10.1	12.8	13.2	16.9	24.2	25.9	30.9	30.3
86/87	26.2	18.3	13.5	9.1	10.9	12.9	16.0	20.2	23.2	26.9	29.3	31.2
87/88	27.1	19.9	13.6	12.5			19.1	20.3	22.9	26.2	31.9	31.4
88/89	26.1	19.2	13.5	7.7	6.5	10.0	15.3	17.6	22.3	26.5	31.4	29.9
89/90	26.2	20.2	14.1	11.2	6.0	13.4	15.5	16.3	22.5	28.9	31.4	29.5
90/91		22.2	15.4	9.7	9.5	9.9	13.8	17.5	21.0	26.7	30.9	30.2
91/92	25.7	17.3	13.0	9.3	6.3	10.2	12.8	17.8	22.0	24.8	27.3	30.5
92/93	30.5	19.5	13.1	9.2	6.6	9.8	13.5	19.0	22.7	29.7	32.7	30.2
93/94	24.4	18.4	11.4	10.4	9.2	11.4	14.8	18.8	24.9	29.6	31.4	28.9
94/95	25.5	18.5	14.7	10.6	9.8	13.2	13.4	15.6	26.4	27.3	30.3	
95/96			10.8	10.3	10.1	10.2	13.7	18.9		24.0	30.2	30.7
96/97	24.1	19.7	12.8	9.4	8.2	12.6	14.8	17.3		27.8	31.2	28.6
97/98	24.3	19.8	14.7	10.3	9.8	10.6	14.8	18.3		28.9	33.0	30.6
98/99	26.4	19.6	14.7	7.5	7.4	8.7	13.4	19.3	25.0	29.6	32.7	32.1
99/00	26.4	19.6	12.0	10.4	7.0	14.5	18.7	19.1	23.0	29.8	33.5	29.1
00/01	27.5	25.5	13.8	10.2	10.5	11.2	18.5	21.2	24.0	31.5	34.6	32.4
01/02	28.5								20.0	30.0	35.8	28.3
02/03	25.3											

T° MINIMALE

MOIS / ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83				-2.0	-2.9	-0.2	0.4	4.3	7.6			
83/84	16.5	11.0	7.4	-	-2.6	-1.2	3.0	8.4	7.2	12.7	20.7	20.4
84/85	17.4	3.9	2.0	-4.9	-3.0	0.1	2.8	8.0	7.4	18.8	21.8	11.8
85/86	7.7	7.4	4.0	-0.7	-0.2	0.2	3.4	7.6	11.3	14.2	22.3	19.8
86/87	14.5	9.0	4.4	-3.2	-0.4	2.2	5.2	5.2	10.4	15.2		17.2
87/88	13.6	8.0	1.3	3.8	0.5	-2.2	3.6	8.8	7.6	16.6	17.6	16.8
88/89	16.4	8.4	1.5	-2.2	-7.6	0.6	3.3	2.4	8.4	16.0	21.2	16.3
89/90	15.9	8.7	4.7	3.0	1.2	2.0	6.6	5.4	11.4	16.8	18.0	18.8
90/91	15.8	10.8	3.3	-0.6	-2.1	-2.0	4.4	5.8	9.8	12.0	17.4	18.8
91/92	14.4	6.4	0.2	0.4		-0.4	2.8	6.8	9.6	12.8	20.6	19.6
92/93	15.6	9.2	1.8	0.2	-	-2.2	1.6	8.0	11.6	20.0	22.4	18.6
93/94	11.6	8.4	2.8	1.6	-2.4	1.0	5.8	9.0	13.6	16.6	18.4	14.6
94/95	12.6	10.6	4.4	-	0.6	1.8	3.6	4.0	13.6	15.6	19.8	16.4
95/96	11.8	8.8	2.8	0.2	-3.6	1.0	4.6	7.8	11.8	11.8	14.8	19.8
96/97	10.8	9.8	-	-0.2	1.4	2.6	5.4	8.6		16.4	18.8	14.8
97/98	11.8	6.8	3.0	1.0	-2.0	3.6	2.4	10.0	11.0	17.8	22.6	17.8
98/99	12.6	7.6	1.8	-3.0	0.6	-3.4	2.0	8.2	9.0	18.6	22.8	21.6
99/00	15.8	9.4	1.6	1.6	-2.8	2.4	3.8	7.8	12.8	18.4	24.6	16.0
00/01	15.8	6.8	1.8	-	-2.0	1.6	4.8	9.2	9.6	20.2	25.5	25.0
01/02	13.2								3.0	17.6	21.8	16.8
02/03	13.4											

T° MAXIMALE

MOIS / ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83				22.5	23.4	24.6	27.0	29.2	33.0	36.5	40.2	39.9
83/84	37.4	30.2	28.9	23.2	25.8	23.8	29.1	31.4	31.4	39.6	38.9	39.3
84/85	39.5	33.4	23.6	19.2	18.1	26.6	26.8	30.4	32.6	39.0	39.6	40.0
85/86	35.2	30.4	28.5	20.2	20.6	24.6	24.6	26.9	34.8	38.5	39.9	38.2
86/87	36.8	28.7	23.6	22.2	22.2	27.3	30.0	33.7	34.7	38.9		40.0
87/88	37.8	28.6	24.0	21.8				34.0	35.2	36.2	41.0	41.4
88/89	37.0	29.3	23.6	20.4	15.7	24.8	26.3	30.8	32.7	38.3	40.6	39.6
89/90	38.2	31.3	23.5	20.3	18.9	26.4	27.4	28.5	34.5	39.8	40.4	39.4
90/91	37.5	32.6	29.0	20.2	18.0	19.8	24.5	28.5	34.8	37.4	40.4	40.2
91/92	36.4	29.6	26.0	19.4	15.6	21.6	23.4	29.6	32.6	38.6	39.0	39.0
92/93	36.8	32.4	22.8	24.6	17.6	21.4	27.2	31.6	33.4	41.6	41.4	40.4
93/94	37.6	31.6	21.6	21.6	21.4	23.8	27.4	29.4	39.2	41.2	42.0	39.6
94/95	38.6	29.6	27.6	23.6	23.0	25.6	25.0	28.6	37.2	38.0	41.0	
95/96				20.6	23.2	24.2	28.8	30.6	34.4	40.0	40.2	40.2
96/97	35.6	31.6	25.4	21.4	19.4	23.8	25.2	31.0		37.8	40.2	40.2
97/98	37.2	31.4	27.4	21.6	24.0	21.2	28.4	29.4		39.4	42.6	39.8
98/99	39.4	33.4	27.6	20.6	20.2	21.4	25.0	32.2	37.6	41.0	42.4	41.6
99/00	37.4	31.4	28.8	26.0	23.8	24.2	26.4	31.6	35.4	39.8	42.2	40.0
00/01	36.0	30.6	24.4	22.4	22.2	22.8	32.4	36.4	35.6	42.6	42.4	42.2
01/02	36.4	32.0	25.8	20.6	23.8	23.8	29.4	29.8	36.8	41.8	49.8	39.8
02/03	37.2											

Station: Akrouz **B.V.** Rheris
N°de poste:

T° MOYENNE

MOIS / ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
97/98								21.7	22.9	22.0	32.4	31.6
98/99	28.7	22.0	18.0	10.9	10.4	14.8	5.6		24.0	30.8	33.9	32.8
99/00	27.8	21.6	13.3	12.2	8.8	14.2	17.3	20.0	23.7	30.2	34.4	32.2
00/01	27.4	19.5	16.4	13.2	13.0	13.6	19.5	21.6	24.4	31.6	33.7	32.9
01/02	28.1	23.7	15.5	12.9	12.1	12.6	16.7	18.4	24.2	29.9	30.8	

T° MINIMAL

MOIS / ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
97/98								12.0	9.4	16.2	12.6	20.4
98/99	17.4	10.6	5.4	1.6	1.8	14.2			10.6	19.6	23.4	21.4
99/00	12.3	10.2	0.4	0.2	0.1	3.4	6.2	6.6	12.6	18.6	23.0	21.2
00/01	15.4	7.0	5.2	2.4	1.0	3.6	5.8	9.2	11.2	18.6	18.3	20.8
01/02	15.8	14.2	3.8	0.4	1.4	4.0	4.0	4.6	6.8	18.6	20.0	20.0
02/03	27.0	12.4										

T° MAXIMAL

MOIS / ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
97/98	39.8	39.4	33.2	22.8	24.0	23.6	29.2	32.2	34.4	39.4	43.2	43.4
98/99	41.0	36.2	29.4	23.0	21.6	23.4	25.6	33.6	40.4	42.0	43.2	42.2
99/00	38.6	33.8	30.4	26.2	19.8	24.4	27.6	31.8	36.4	40.0	41.8	42.0
00/01	38.4	32.6	27.8	24.6	24.0	23.2	31.6	32.4	37.0	42.0	42.6	41.8
01/02	39.6	32.8	27.0	23.0	26.0	25.2	30.4	31.4	36.2	40.8	39.4	
02/03	28.8	33.6										

Table A.3.2-(3) Temperature (Monthly Basis in Ziz River Basin)

Station: SEMVA d'Errachidia B.V. Ziz
ORMVA du Tafilalet

T° MOYENNE

MOIS ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83	23.8	18.5	10.0	5.5	5.8	9.5	14.6	14.9	20.6	26.0	28.2	28.3
83/84	24.0	17.8	13.8	7.8	5.6	8.3	10.4	16.2	18.3	26.1	27.7	27.4
84/85	24.5	16.7	11.6	7.1	6.3	11.9	12.9	15.5	19.9	27.8	30.1	29.6
85/86	24.2	18.3	13.2	7.2	8.1	10.7	12.5	15.5	23.8	25.8	29.9	29.4
86/87	25.1	17.3	11.4	6.8	8.1	9.2	14.6	19.1	21.9	26.8	28.1	29.7
87/88	25.7	18.6	11.8	6.7	8.5	10.7	13.7	18.2	22.5	25.5	30.0	29.6
88/89	23.7	17.8	12.0	5.4	4.5	8.6	13.2	16.4	21.6	25.4	29.5	28.1
89/90	24.3	18.3	12.4	5.7	6.6	11.0	14.1	15.5	21.3	26.6	29.5	28.3
90/91	24.8	18.3	12.3	7.4	5.9	7.5	12.2	16.0	19.1	25.6	28.9	28.5
91/92	23.5	15.7	10.9	8.8	5.0	9.3	12.0	16.2	20.1	23.0	27.9	28.0
92/93	24.9	17.3	11.2	7.9	5.2	8.0	12.0	16.0	20.9	27.1	30.7	28.3
93/94	22.1	17.0	11.2	8.3	7.3	9.1	13.5	16.0	21.8	26.9	28.9	28.8
94/95	23.2	17.2	12.2	8.7	7.3	10.8	11.8	14.9	23.2	24.8	28.2	28.5
95/96	21.6	17.6	13.0	8.3	9.1	9.3	12.6	17.4	20.1	24.3	28.0	27.6
96/97	23.7	17.0	11.5	8.3	8.3	10.4	13.1	16.3	21.1	25.3	28.7	26.2
97/98	23.7	18.8	12.8	8.5	7.7	10.2	13.1	17.9	19.8	25.4	29.9	28.7
98/99	24.9	17.1	12.6	5.6	6.7	7.6	12.7	18.4	22.9	28.1	30.7	30.2
99/00	25.1	19.2	10.6	7.9	4.8	10.1	13.8	16.3	20.4	25.1	30.6	28.1
00/01	23.9	15.8	12.3	8.8	6.4	9.5	16.3	18.5	21.6	29.0	31.6	30.1
01/02	25.6	20.5	12.7	9.3	7.4	10.1	12.9	16.1	22.0	27.4	30.0	28.0
02/03	24.1	18.7	12.7	9.4	7.0	8.9	14.2	18.5	22.4			

T° MINIMALE

MOIS ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83	16.0	9.6	0.7	-3.8	-3.1	1.4	7.3	8.2	13.2	18.2	19.3	19.8
83/84	14.0	9.2	5.2	-2.2	-4.2	-1.3	1.3	11.3	9.6	17.1	18.3	17.4
84/85	15.9	7.4	3.6	-0.5	-0.8	3.9	5.9	6.2	12.3	19.8	22.0	21.5
85/86	16.7	10.8	5.9	-0.5	0.4	2.6	4.9	7.6	15.5	18.1	21.3	21.3
86/87	17.2	10.5	3.5	-1.7	-0.5	-0.8	5.8	9.7	13.7	18.2	19.2	21.5
87/88	18.0	10.8	5.0	-3.1	1.0	4.5	5.6	10.0	14.9	17.8	21.0	20.5
88/89	15.5	11.0	5.9	-3.3	-3.1	2.1	4.5	8.2	13.8	18.8	22.0	20.7
89/90	15.6	11.5	5.9	-4.4	0.6	1.6	6.5	8.5	14.0	17.7	21.6	20.2
90/91	17.1	9.1	3.4	-0.2	-3.3	-0.7	4.4	8.4	11.4	18.0	20.5	20.1
91/92	16.1	7.8	2.0	3.3	-2.4	2.4	4.9	7.8	12.4	15.3	19.4	19.4
92/93	14.4	8.8	2.7	0.8	-2.2	1.2	4.6	7.4	13.0	18.8	21.8	20.6
93/94	17.5	9.1	5.9	0.3	-0.2	0.8	6.9	7.8	13.3	18.6	21.0	20.9
94/95	13.1	10.3	4.2	-0.4	-2.4	1.8	4.0	9.0	15.7	17.3	19.9	20.8
95/96	14.3	11.7	4.7	1.6	2.5	2.6	5.4	10.1	12.3	17.7	20.2	18.7
96/97	12.9	7.7	1.8	0.2	1.4	1.7	4.5	9.5	13.5	15.8	19.7	18.6
97/98	16.3	10.7	3.7	-1.1	-1.2	3.8	4.4	9.3	12.4	16.4	20.8	20.5
98/99	16.4	8.3	3.0	-3.2	-1.9	-1.5	4.6	9.0	13.6	19.7	22.1	22.0
99/00	16.7	12.2	2.7	-0.6	-3.8	0.1	5.1	7.8	12.8	17.7	21.2	19.6
00/01	15.4	7.3	3.5	0.4	-1.7	-0.2	7.0	9.9	13.3	20.3	23.1	22.3
01/02	18.1	12.5	5.0	1.9	-1.5	0.4	3.9	8.5	13.8	18.4	21.4	19.4
02/03	15.7	10.0	3.7	0.4	-3.1	0.2	6.1	8.8	14.0			

T° MAXIMALE

MOIS ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83	31.6	27.4	19.2	14.8	14.7	17.7	21.9	21.7	27.9	33.8	37.2	36.8
83/84	34.1	26.4	22.4	17.7	15.4	17.9	19.4	21.1	27.0	35.1	37.0	37.5
84/85	33.0	25.9	19.6	14.6	13.4	20.0	20.0	24.9	27.5	35.8	38.2	37.7
85/86	31.8	25.7	20.5	14.8	15.9	18.9	20.1	23.3	32.2	33.5	38.5	37.5
86/87	33.0	24.2	19.3	15.2	16.7	19.3	23.3	28.5	30.1	35.3	37.1	38.0
87/88	33.4	26.4	18.6	16.5	16.1	17.0	21.8	26.5	30.1	33.2	39.1	38.7
88/89	31.9	24.7	18.1	14.1	12.1	15.1	21.9	24.5	29.3	32.1	37.0	35.4
89/90	33.0	25.1	19.0	15.7	12.5	20.3	21.7	22.5	28.5	35.6	37.5	36.4
90/91	32.5	27.6	21.2	15.0	15.0	15.7	20.0	23.6	26.9	33.2	37.4	36.9
91/92	32.5	23.6	19.9	14.2	12.5	16.1	19.0	24.6	27.8	30.7	36.5	36.5
92/93	32.3	25.8	19.7	15.0	12.6	14.7	19.5	24.7	28.8	35.4	39.7	36.1
93/94	31.1	24.9	16.4	16.3	14.9	17.4	20.0	24.2	30.3	35.3	36.8	36.8
94/95	32.0	24.2	20.2	17.7	17.1	19.7	19.5	20.9	30.7	32.3	36.5	36.3
95/96	30.4	23.5	21.4	15.1	15.8	16.1	19.9	24.7	27.9	30.9	35.8	36.4
96/97	31.1	26.2	21.2	16.4	15.2	19.1	21.7	23.2	28.7	34.8	37.7	33.8
97/98	31.1	26.8	22.0	18.2	16.7	16.6	21.8	26.5	27.2	34.5	39.1	36.9
98/99	33.4	25.8	22.2	14.5	15.4	16.7	20.9	27.8	32.2	36.5	39.4	38.3
99/00	33.6	26.2	18.5	16.5	13.4	20.2	22.5	24.9	28.0	32.5	39.9	36.6
00/01	32.4	24.3	21.1	17.3	14.6	19.2	25.6	27.2	29.9	37.7	40.1	37.9
01/02	33.2	28.5	20.3	16.6	16.3	19.8	21.8	23.7	30.2	36.4	38.6	36.6
02/03	32.5	27.4	21.8	18.5	17.2	17.6	22.3	28.1	30.8			

Station: R.Erfoud B.V. Ziz
N°de po: 93600

T° MOYENNE

MOIS ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83	28.6	20.8	13.7	9.0	9.6	12.5	20.5	21.8	25.0	31.1	-	-
83/84	-	-	-	-	-	-	-	22.5	21.2	30.7	-	-
84/85	28.4	20.6	15.0	11.1	9.2	14.3	16.0	20.2	22.8	30.4	33.4	-
85/86	-	-	-	10.5	10.8	14.4	15.8	18.7	27.3	28.7	33.6	32.9
86/87	27.3	21.1	14.9	9.2	9.2	16.0		22.9	25.0	29.5	32.4	34.2
87/88	28.5	21.8	14.9	-	12.2	13.0	16.7	22.1	25.0	28.6	34.9	33.8
88/89	-	-	14.3	9.6	7.3	11.0	15.1	15.4	22.5	25.9	34.5	29.2
89/90	26.0	21.3	13.1	10.8	-	-	-	-	-	32.1	33.6	9.0
90/91	29.5	22.9	16.4	10.6	9.2	10.8	15.3	19.3	22.6	28.9	33.6	9.0
91/92	28.6	19.5	14.5	10.3	8.0	11.8	14.4	19.7	23.8	23.7	30.9	32.6
92/93	28.0	21.0	14.5	10.5	8.4	11.0	15.4	19.9	23.7	30.2	33.9	33.2
93/94	-	-	-	-	-	-	-	-	-	-	-	-
94/95	-	-	15.4	11.4	9.3	14.0	15.4	18.1	18.1	28.8	32.8	32.8
95/96	27.0	21.3	-	-	-	-	16.5	21.2	24.2	28.5	32.3	32.7
96/97	27.1	21.8	15.4	12.0	11.4	15.0	16.7	19.8	25.2	29.5	33.3	31.0
97/98	27.7	22.7	16.9	12.1	11.4	15.0	16.7	19.8	25.2	29.5	33.3	31.0
98/99	29.4	21.5	16.8	9.9	10.0	11.0	16.0	11.4	27.0	26.4	-	-
99/00	-	-	-	-	-	13.0	17.3	20.4	24.1	30.9	33.8	32.9
00/01	20.0	19.6	15.9	11.9	10.8	12.7	19.6	22.2	24.9	32.5	35.1	33.6
01/02	29.4	24.2	15.3	12.3	10.6	13.7	16.7	19.4	25.8	31.5	33.7	32.4
02/03	28.3	22.6										

T° MINIMALE

MOIS ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83	-	-	-	-4.2	-3.6	-2.8	8.0	8.7	14.0	20.7	-	-
83/84	-	-	-	-	-	-	-	11.0	8.5	16.5	-	20.0
84/85	16.5	8.0	5.5	-1.5	-4.5	1.5	5.5	10.0	9.5	17.0	22.5	20.5
85/86	14.5	12.2	6.5	0.1	1.0	1.0	3.2	7.8	12.0	17.0	23.0	23.5
86/87	16.0	11.4	3.6	2.5	-	-	6.0	6.6	15.2	17.0	21.6	19.7
87/88	14.0	9.3	1.6	-	2.2	1.2	5.2	6.9	13.5	17.6	20.6	25.9
88/89	-	-	4.7	-2.1	-2.2	1.7	2.0	3.3	5.0	14.2	26.3	16.3
89/90	-	9.2	1.0	-1.2	-	4.8	7.4	7.0	13.4	19.0	23.0	22.4
90/91	19.6	12.6	3.8	-1.2	-0.8	-0.4	4.4	8.8	9.4	14.6	22.4	22.4
91/92	14.4	9.2	3.2	-	-	2.6	2.4	6.8	10.4	16.2	21.2	22.6
92/93	16.4	9.6	2.6	2.0	-1.8	1.2	1.8	8.4	10.4	20.4	21.0	22.0
93/94	14.4	10.6	5.2	0.8	0.4	2.6	7.6	9.0	13.8	21.0	23.4	24.6
94/95	15.4	12.4	4.6	-4.0	-8.0	2.0	2.0	7.6	16.2	17.6	21.2	22.0
95/96	14.6	12.4	-	-	-	-	5.6	9.4	12.4	16.6	15.2	21.0
96/97	15.2	10.6	2.6	0.6	2.8	4.4	6.0	8.4	15.0	18.2	22.2	17.0
97/98	14.8	11.2	5.2	1.6	2.0	4.8	4.8	12.4	9.4	18.4	23.8	23.2
98/99	17.4	9.8	2.8	-8.0	-	-2.0	4.8	11.4	8.6	20.8	24.2	22.2
99/00	17.2	14.2	-1.0	-4.0	-8.4	1.2	5.6	7.4	13.0	20.0	23.2	22.0
00/01	16.0	8.2	3.8	0.4	-	2.2	2.4	11.0	10.2	19.8	21.0	22.2
01/02	18.6	13.8	2.4	2.6	0.4	2.8	5.0	8.6	9.0	19.6	22.6	20.4
02/03	17.8	11.6										

T° MAXIMALE

MOIS ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83	-	-	-	22.1	25.8	25.4	31.4	32.2	36.6	40.4	-	-
83/84	-	-	-	-	-	-	-	34.6	33.8	42.3	-	41.5
84/85	40.0	33.6	25.3	21.4	20.0	29.3	29.2	33.3	37.2	41.4	43.4	-
85/86	-	-	-	23.0	21.4	20.0	29.3	29.2	38.8	40.0	43.5	41.4
86/87	40.2	30.9	26.5	21.4	22.1	27.0	31.7	37.0	37.9	40.6	43.1	43.1
87/88	40.1	32.6	30.2	24.6	26.0	23.5	31.0	34.6	37.0	38.1	44.4	42.6
88/89	40.1	32.4	25.3	21.2	17.0	26.1	27.1	31.6	35.3	38.3	41.8	41.4
89/90		34.0	24.7	20.9	-	-	-	-	-	41.8	42.6	40.8
90/91	40.4	35.0	27.6	20.8	19.2	20.2	25.4	27.6	37.2	38.3	41.9	42.0
91/92	38.4	31.2	28.4	20.3	17.9	23.2	27.0	31.3	35.2	39.6	41.0	40.0
92/93	39.6	35.0	25.0	22.3	17.3	22.0	28.0	32.8	36.6	42.0	42.3	41.0
93/94	-	-	-	-	-	-	-	-	-	-	-	-
94/95	-	-	27.2	22.6	22.4	26.2	27.6	30.3	38.6	39.8	42.3	42.4
95/96	39.6	32.0	29.4	22.4	24.2	25.4	30.3	33.0	35.3	42.2	43.2	42.0
96/97	37.4	34.0	27.2	23.2	21.0	25.6	27.4	33.6	34.6	40.6	43.6	42.3
97/98	40.0	33.2	29.8	22.2	24.0	23.3	28.4	32.4	34.3	40.3	44.2	43.2
98/99	41.0	35.2	29.2	22.0	21.3	23.4	27.8	34.2	39.8	44.0	-	-
99/00	-	-	-	-	-	24.4	28.2	34.8	36.8	40.8	43.0	41.3
00/01	39.2	32.4	27.2	22.2	21.6	23.6	33.7	31.8	37.2	42.8	44.2	42.4
01/02	40.4	34.4	27.8	21.6	23.8	26.2	31.8	32.2	37.6	42.0	43.8	42.2
02/03	38.0	34.4										

Station: Taouz B.V. Ziz
N°de po: 97936

T° MOYENNE

MOIS ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83	27.9	21.2	14.3	9.0	7.7	11.8		21.5	25.6	30.3		34.9
83/84	28.6	22.0	18.4	11.1	9.1	12.4	15.7	23.6	32.3	31.4	32.0	32.7
84/85	29.9	20.6	15.4	10.4	9.7	15.3	16.3	21.5	23.3	31.1	33.8	
85/86				9.9	10.1	14.4	15.7	19.4	26.8	28.6	34.4	33.6
86/87	28.7	21.0	14.4	8.7	10.8	13.6	17.9	24.4	26.3	31.4	34.6	35.5
87/88	29.2	22.4	14.4	12.7	11.3	13.4	17.4	22.3	24.8	29.5	34.3	35.4
88/89	27.1	20.6	15.2	7.7	7.1	11.8	16.5	20.3	26.3	29.6	33.9	33.4
89/90	29.7	23.1	15.8	12.5	9.3	16.7	22.2	22.8	28.7	35.8	37.8	37.1
90/91	33.7	27.1	20.2	12.3	10.6	14.4	19.2	23.9	27.8	34.1	36.2	35.5
91/92	31.4	20.4	14.3	10.2	8.3	12.0	14.7	21.7	25.5	28.1	34.1	34.7
92/93	30.1	23.9	15.9	11.4	9.3	12.1	22.1	21.6	26.1	33.4	36.1	35.0
93/94	27.3	21.8	14.9	11.5	10.3	13.5	16.8	20.8	27.6	32.5	33.9	34.5
94/95	29.7	21.8	15.9	11.4	9.7	14.0	15.4	19.0	28.7	30.6	34.2	34.8
95/96	28.1	21.3	18.1	12.3	13.6	12.5	17.3	20.3	24.5	29.2	33.9	33.9
96/97	27.9	21.0	14.0	11.6	11.2	13.1	16.0	20.0	25.8	30.6	35.2	32.1
97/98	28.8	23.3	16.9	12.4	11.5	13.4	17.6	23.2	24.4	31.4	36.6	34.3
98/99	30.0	21.8	16.9	9.5	10.2	11.2	16.9	23.4	28.8	21.9	35.6	35.4
99/00	31.0	24.2	14.8	10.0	8.1	13.5	19.4	23.6	27.1	32.8	36.1	34.8
00/01	29.8	20.5	16.8	12.9	12.5	13.4	21.6	23.8	26.6	34.6	31.9	35.5
01/02	31.6	25.7	16.7	13.2	11.1	14.9	18.8	21.7	27.7	33.4		34.7
02/03												

T° MINIMALE

MOIS ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83				-5.4	-5.6	-5.0	3.2	4.6	8.8	16.4	22.2	21.9
83/84	14.8	10.0	5.4	-2.2	-4.4	-0.2	1.4	10.2	11.0	16.8	17.0	13.5
84/85	18.0	6.4	3.6	-1.6	-5.4	-	4.0	6.2	8.4	18.4	19.6	18.8
85/86	16.6	8.6	3.0	-6.6	-2.2	-0.6	4.0	5.4	12.0	15.6	22.0	19.3
86/87	16.0	8.0	2.0	-3.0	-4.4	-3.0	3.4	6.4	10.0	18.4	21.1	21.8
87/88	12.0	7.2	1.0	-3.8	-1.2	2.2	4.2	8.6	10.2	18.6	21.9	23.4
88/89	14.2	7.0	-	1.8	-4.6	-1.4	1.5	6.0	13.6	14.6	22.0	23.2
89/90	17.0	10.8	4.1	-1.4	-0.5	5.0	10.0	12.8	16.4	25.0	26.4	25.7
90/91	21.9	13.8	6.3	-1.4	0.3	1.6	8.0	9.8	15.6	12.5	23.0	21.2
91/92	15.0	7.0	1.2	1.5		0.5	2.4	5.7	13.0	17.2	21.3	24.0
92/93	18.0	12.0	3.0	2.0	-3.4	2.0	5.0	8.8	13.0	21.7	25.0	23.3
93/94	13.0	9.8	6.2	-1.2	0.2	0.6	8.6	9.8	13.0	19.6	20.0	22.8
94/95	16.0	12.5	4.2	1.6	-3.0	-	2.4	7.6	15.8	19.0	23.0	23.6
95/96	15.0	10.8	4.0	-2.0	4.6	2.6	3.0	8.0	12.4	16.0	18.2	22.6
96/97	15.4	6.0	2.0	1.8	2.0	1.0	3.2	8.0	15.0	19.4	22.0	17.0
97/98	16.0	12.2	3.2	-1.8	1.2	4.2	5.0	12.8	10.8	21.0	24.0	20.4
98/99	16.0	9.0	2.0	-1.3	-	-2.0	5.2	9.2	10.2	19.6	25.0	21.0
99/00	19.8	15.0	3.2	-4.2	-6.0	1.0	5.8	12.0	14.6	19.0	22.6	21.4
00/01	15.0	6.8	5.0	0.2	0.2	22.0	7.0	11.0	13.2	21.0	25.0	23.0
01/02	17.2	12.0	4.0	2.0	2.0	3.0	5.0	7.0	10.0	21.8	20.4	22.8
02/03	20.4	11.4										

T° MAXIMALE

MOIS ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83				23.4	25.8	29.0	30.6	34.6	37.0	40.8	45.2	44.3
83/84	41.0	34.0	28.0	25.4	27.0	25.8	32.4	36.8	37.4	43.4	42.5	42.4
84/85	42.0	36.0	27.0	22.0	22.0	28.8	30.6	35.0	36.6	43.4	43.4	
85/86				22.0	23.2	28.0	28.4	32.6	40.0	43.0	44.1	43.0
86/87	41.2	32.4	27.4	23.4	25.0	29.0	33.0	38.6	39.2	43.0	45.0	44.5
87/88	41.0	35.0	29.0	24.8	27.6	25.0	32.0	38.4	39.2	41.6	44.9	43.9
88/89	40.6	33.8	29.6	21.0	17.4	28.4	29.0	33.4	37.4	42.7	43.6	42.2
89/90	41.8	37.7	26.4	25.0	22.0	29.7	30.8	34.2	41.0	44.2	48.0	46.2
90/91	45.8	40.0	32.8	25.4	22.5	26.0	29.8	34.6	42.0	44.8	46.2	46.0
91/92	43.0	34.4	30.0	22.6	18.2	26.0	28.5	35.2	37.8	43.6	43.9	43.8
92/93	42.0	38.0	28.0	25.5	19.0	24.0	33.0	35.8	39.8	45.0	45.2	43.0
93/94	40.7	34.0	23.8	22.0	22.2	28.0	29.6	31.4	43.2	44.0	44.4	43.8
94/95	40.6	32.0	27.8	23.6	24.0	27.0	27.2	32.4	40.0	41.4	45.2	44.2
95/96	41.2	32.4	31.0	25.0	25.0	26.0	32.8	34.2	36.8	42.0	44.4	44.0
96/97	39.2	35.0	26.0	22.4	20.4	25.0	27.8	33.0	35.0	41.2	45.0	44.0
97/98	41.4	34.2	29.6	22.4	25.0	25.0	30.0	34.0	35.6	42.0	46.2	42.8
98/99	42.4	36.2	30.6	20.6	22.0	24.2	28.2	35.8	28.8	44.2	46.4	45.0
99/00	41.0	35.8	32.0	25.0	20.2	25.0	31.4	37.4	41.0	42.6	45.0	44.4
00/01	41.2	34.0	30.0	26.4	24.8	24.2	25.8	35.0	38.4	44.4	45.8	45.2
01/02	43.0	27.0	29.0	23.2	25.0	28.8	34.0	34.4	39.0	43.2	46.4	44.6
02/03	42.0	35.6										

Table A.3.2-(4) Temperature (Monthly Basis in Maider River Basin)

Station: **Alnif** **B.V.** **Maider**
N°de poste: **90975**

T° MOYENNE

MOIS / ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83	28.1	22.0	14.2	11.0	8.8	13.1	19.1	20.3	24.3	30.1	32.2	32.7
83/84	28.0	22.2	17.8	12.4	9.5	12.9	15.2	22.7	21.7	30.1	-	-
84/85	-	-	-	-	-	-	18.2	19.8	23.2	30.5	33.3	33.0
85/86	27.7	21.5	16.6	10.9	11.5	14.4	15.9	19.3	26.7	28.6	33.2	32.6
86/87	28.5	20.7	15.4	10.1	11.7	14.3	18.3	23.6	25.7	30.5	32.1	32.4
87/88	28.5	21.8	15.4	12.9	11.9	13.7	17.4	21.7	24.9	28.2	34.1	33.4
88/89	27.5	20.9	15.5	9.4	8.1	11.9	17.1	19.5	25.1	28.7	33.4	31.8
89/90	28.0	22.5	16.0	13.2	9.6	14.8	18.2	19.0	25.1	30.7	33.7	32.7
90/91	28.2	23.0	16.1	10.7	9.6	11.4	15.6	19.6	23.2	26.9	-	-
91/92	-	18.3	14.9	11.3	8.1	12.3	15.2	20.0	24.2	26.8	32.1	31.5
92/93	27.9	21.1	14.9	11.2	8.8	11.6	16.3	20.8	24.1	30.4	34.0	32.6
93/94	27.2	21.2	14.0	11.9	10.9	13.9	16.9	20.6	27.0	31.3	-	-
94/95	-	-	-	-	-	-	-	-	-	-	-	-
95/96	-	-	-	-	-	-	-	-	24.2	28.3	32.9	32.6
96/97	27.7	22.0	15.6	12.5	11.9	15.0	16.9	20.3	25.6	29.5	32.9	31.0
97/98	27.9	22.9	17.3	13.1	12.1	14.1	17.7	22.8	23.7	30.0	35.3	33.8
98/99	29.5	21.9	16.9	10.2	10.8	11.3	16.2	22.7	27.3	23.2	35.0	33.7
99/00	29.5	23.3	14.7	11.1	8.2	14.3	18.1	20.7	24.7	30.7	34.5	32.8
00/01	28.3	20.2	16.4	12.8	12.4	13.2	20.1	23.0	25.5	32.6	34.8	33.4
01/02	29.5	24.2	15.7	13.4	11.5	14.6	17.1	20.1	26.6	31.0	33.4	32.7
02/03	28.8	28.0										

Station: **Tazarine** **B.V.** **Maider**
N°de poste:

T° MOYENNE

MOIS / ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
96/97							17.4	20.4	25.6	29.3	32.2	30.0
97/98	27.0	22.8	17.7	13.7	13.2	13.7	17.6	22.5	25.1	30.4	35.6	34.0
98/99	29.4	22.2	18.3	10.7	11.0	11.7	15.6	23.2	28.0	32.2	35.4	31.8
99/00	29.8	23.2	17.1	11.5	8.5	15.3	18.1	21.1	24.8	31.7	35.2	33.9
00/01	28.2	20.2	17.3	13.5	13.9	14.4	20.4	23.7	26.4			33.9
01/02	30.3	33.1	16.3	13.7	11.2	13.7	16.7	20.3				

T° MINIMALE

MOIS / ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83				-1.4	-2.8	-1.2	5.0	6.0	11.0	20.0	20.6	19.0
83/84	17.3	11.4	7.0	-0.2	-1.6	1.2	4.3	10.7	11.2	16.5	21.0	21.2
84/85	17.4	8.2	5.4	-2.6	-3.7	3.6	7.4	9.2	10.7	19.3	22.8	22.2
85/86	17.6	11.5	4.8	-	0.2	1.2	5.7	7.3	13.6	17.3	21.1	22.0
86/87	17.4	11.0	4.5	-3.2	-2.4	1.4	9.0	8.4	15.3	20.0	20.3	12.2
87/88	14.1	9.0	3.4	0.2	0.7	-	7.2	7.8	13.0	17.2	20.3	23.0
88/89	16.8	8.7	3.4	0.6	-1.2	1.6	4.2	5.6	16.3	15.2	24.2	21.8
89/90	11.4	10.2	6.4	3.2	0.1	4.2	6.8	9.2	14.1	20.8	24.4	20.8
90/91	18.7	11.0	3.0	-1.0	0.2	-0.6	4.8	5.6	10.2			
91/92		7.0	3.6	1.0		3.5	5.0	7.5	11.2	16.4	22.3	21.5
92/93	15.5	9.5	2.2	1.0	-2.3	-	4.0	9.7	10.0	19.4	22.0	21.5
93/94	13.8	9.9	4.0	0.5	1.2	3.4	7.6	9.4	15.0	21.5	21.4	25.0
94/95	14.5	13.5	5.5	0.7	-2.0	1.8	3.0	7.8	17.5	16.5	21.0	22.9
95/96	15.8	11.4	3.8	0.2	2.9	2.7	4.5	11.0	13.5	16.7	18.5	21.0
96/97	16.4	9.5	3.8	0.2	2.5	3.0	6.3	9.3	16.3	18.5	21.5	16.7
97/98	15.5	12.0	5.5	1.5	2.4	5.5	7.0	12.5	10.0	18.5	23.2	21.5
98/99	16.3	10.3	2.5	0.3	0.5	-2.0	4.8	10.8	9.6	20.0	23.0	12.0
99/00	19.0	14.2	0.9	-3.8	-3.7	2.7	5.5	9.8	13.5	20.5	21.2	22.0
00/01	15.5	8.0	4.5	0.4	1.0	2.0	3.3	11.7	13.5	22.4	21.2	21.0
01/02	17.7	13.0	1.0	3.0	0.4	3.5	4.5	9.0	9.0	21.1	23.0	21.8
02/03	17.8	11.6										

T° MINIMAL

MOIS / ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
96/97							8.0	9.5	15.2	17.5	20.0	16.0
97/98	14.5	13.5	6.5	3.5	3.0	5.0	6.0	13.5	12.0	19.2	26.4	23.4
98/99	19.4	11.0	5.0	1.0	2.2	-1.2	7.0	12.4	14.4	20.3	24.8	21.0
99/00	18.5	14.6	20.4	-6.0	-5.0	3.4	8.0	8.1	14.2	20.4	23.0	20.0
00/01	13.6	9.0	6.2	3.2	4.0	4.6	9.0	14.0	13.6			21.4
01/02	18.6	14.4	3.2	4.0	-	3.0	3.4	10.2	8.7	21.2	23.0	22.0
02/03	15.0	12.4										

T° MAXIMALE

MOIS / ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
82/83				24.0	24.7	26.9	28.4	32.0	35.1	39.4	42.7	42.2
83/84	39.8	32.5	29.4 .	26.6	27.8	24.0	30.8	33.8	34.3	41.7	41.0	41.6
84/85							29.3	32.6	34.7	42.1	41.0	40.7
85/86	37.6	31.6	30.5	22.9	24.0	26.4	27.2	30.2	37.2	41.0	41.8	42.0
86/87	39.5	30.5	26.6	23.7	23.8	28.2	31.4	36.2	38.1	39.6	42.0	41.4
87/88	40.4	32.6	25.7	23.8	26.0	24.5	30.4	36.8	37.9	39.2	43.0	40.0
88/89	39.4	32.0	26.4	21.8	17.2	28.3	26.8	31.2	35.4	40.6	41.8	41.5
89/90	39.4	36.1	26.5	24.2	20.6	27.1	29.8	31.5	36.7	41.3	42.0	42.2
90/91	41.0	35.2	28.0	24.7	20.2	24.0	25.8	31.2	36.8	38.6	43.0	41.1
91/92	38.2	31.6	28.6	21.0	18.0	24.8	27.8	31.8	35.0	39.6	41.8	41.3
92/93	38.7	35.8	26.8	24.0	19.3	23.3	29.9	32.6	36.7	42.4	42.0	41.3
93/94	39.5	32.8	24.8	23.3	24.3	26.8	28.3	31.3	41.0	41.0		
94/95												
95/96									35.8	41.5	42.6	42.0
96/97	38.5	35.2	27.5	23.0	23.2	25.9	26.8	33.0	34.9	39.8	43.3	43.1
97/98	39.5	34.1	30.1	23.3	24.5	25.1	30.0	33.5	35.5	40.3	44.2	42.7
98/99	41.4	36.0	30.3	22.2	23.0	24.3	27.4	35.5	39.7	43.3	43.4	44.0
99/00	39.2	34.8	31.3	25.7	19.9	25.0	29.0	34.6	37.7	40.5	43.2	42.0
00/01	38.6	33.3	29.3	24.5	24.8	24.5	33.0	33.8	38.3	43.6	43.9	42.7
01/02	40.7	34.5	27.8	23.0	25.3	27.0	31.0	31.9	38.5	41.5	43.7	43.1
02/03	39.8	33.8										

T° MAXIMAL

MOIS / ANNEE	Sept.	Oct.	Nov	Dec.	Janv.	Fevr	Mars	Avr.	Mai.	Juin	Juil	Aout
96/97							26.7	33.7	34.0	29.3	42.5	42.5
97/98	39.0	34.0	29.5	23.5	24.0	25.5	28.5	33.4	34.6	40.6	43.8	43.0
98/99	40.8	35.8	30.4	22.4	24.2	27.6	35.6	40.6	42.6	42.8	43.2	43.4
99/00	39.5	33.6	32.0	25.6	19.0	26.4	29.4	35.0	37.6	41.0	43.6	42.0
00/01	39.0	32.5	29.0	24.0	24.2	25.6	33.8	33.6	38.0			42.8
01/02	41.2	34.0	28.0	24.0	24.2	27.0	31.0	32.0	37.3	41.5	43.6	43.4
02/03	39.5	33.6										

Table A.3.3-(1) Evaporation (Monthly Basis in Guir River Basin)

Station: **Anoual**
Bassin-versant Bouanane

Evaporation Mensuelle (bac)

MOIS / ANNEE	SEP	OCT	NOV	DEC	JAN	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT
82/83	327.3	299.1	194.2	136.1	116.7	145.8	201.7	259.2	302.5	329.5	393.8	423.7
83/84	342.6	287.7	208.3	181.2	238.3	248.4	272.4	298.8	349.6	386.8	432.3	473.5
84/85	399.0	369.7	306.2	279.9	237.2	243.3	185.6	232.2		390.0	464.0	454.0
85/86	403.3	308.8	260.3	229.4	189.3	179.7	236.5	269.2	319.6	336.9	388.6	444.4
86/87	447.5	257.0	270.5	208.3	252.9	261.5	329.5	358.7	418.5	438.2	493.2	479.2
87/88	321.4	313.6	295.6	254.5	250.5	272.0	335.5	376.7	439.1	461.9	409.1	468.0
88/89	384.3	361.4	291.6	240.8	203.2	202.1	298.5	262.0	319.6		518.4	450.4
89/90	343.7	316.2	258.2	229.5	236.1	209.6	237.1		413.4	404.3	486.1	478.4
90/91	472.4	445.0	360.4	286.5	290.6	180.6	145.2	198.3	233.3	303.3	341.4	342.6
91/92	228.3	165.1	221.8	68.6	87.0	117.3	134.7	223.7	281.3	309.6	376.1	352.4
92/93	290.4	216.8	137.1	93.3	82.8	94.2	134.0	209.8	290.0	341.4	385.7	532.7
93/94	199.1	174.7	195.6	86.3	84.4	107.8	133.3	219.2	391.5	334.3	359.0	318.8
94/95	240.6	144.0	76.8	74.3	77.3	101.8	145.0	205.4	266.6	307.0	351.4	304.8
95/96	238.6	117.3	200.9	95.8	193.9	140.0	167.9	187.6	224.0	239.8	292.3	317.5
96/97	222.8	168.8	123.1	86.3	84.3	118.2	170.3	174.6	272.5	327.3	418.0	268.5
97/98	192.6	175.2	142.0	107.6	99.9	94.5	152.4	229.3	257.2	313.4	368.4	322.8
98/99	281.6	184.0	167.0	84.7	89.2	106.9	115.3	242.0	299.2	331.2	384.7	359.1
99/00	271.9	265.2	184.5	79.4		143.4	167.3	308.2	339.7	380.8	410.6	406.2
00/01		246.2	156.4	140.4	En panne	238.9	321.5	318.2	328.3	370.2	444.9	431.0
01/02	340.0	241.8	224.6	178.4	196.4	152.3	209.8	253.9	325.0	386.5	445.7	417.1
02/03	352.7	329.5	205.7	126.3	88.6	160.3	173.0	221.5				
Average	315.0	256.5	213.4	155.6	163.1	167.6	203.2	252.4	319.5	352.2	408.2	402.3

Station **Bouanane**
Bassin-Versant.Bouanane

Evaporation Mensuelle (bac)

MOIS / ANNEE	SEP	OCT	NOV	DEC	JAN	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT
82/83	391.4	280.6	171.8	135.4	137.6	174.8	287.7	350.5	428.3	498.1	568.7	561.2
83/84	416.0	276.7	191.9	118.7	128.6	165.8	233.3	363.5	342.2	474.5	566.4	506.6
84/85	407.3	274.8	166.4	128.6		173.0	255.1	351.9	382.6	486.1	523.1	488.2
85/86	346.3	231.6	151.0	112.4	126.1	149.1	234.7	331.4	381.3	436.5	510.6	484.5
86/87	369.3	213.1	158.1	102.9	127.4	162.5	251.7	337.2	373.3	466.0	502.3	
87/88	339.4	261.3	139.5	102.2	119.3	156.9	222.4	338.1	426.8	476.4	495.4	489.3
88/89	348.8	233.2	148.9	114.3	100.4	120.0	244.0	308.7	402.9	415.5	481.5	450.9
89/90	368.0	243.0	127.9	102.1	101.5	126.3	210.9	295.7	334.8	458.3	486.5	467.2
90/91	372.0	293.2	184.0	114.7	110.4	133.5	233.8	277.9	353.3	416.6	501.6	466.3
91/92	395.5	237.6	156.0	95.9	101.5	124.2	215.1	311.8	351.7	425.1	485.6	447.7
92/93	353.4	280.2	157.0	96.3	102.3	119.7	189.9	314.4	409.7	482.0	506.0	490.9
93/94	367.5	265.2	173.2	118.1	156.2	147.8	213.8	318.7	415.0	459.5	484.0	453.5
94/95	286.7	207.4	137.0	108.1	125.6	165.1	199.9	245.5	430.4	430.1	488.0	475.7
95/96	378.6	209.1		109.2	126.7	177.8	220.4	317.2	364.6	400.4	456.2	500.3
96/97	349.9	245.0	158.5	106.6	101.9	139.7	241.4	246.1	372.7	459.5	535.4	13.6
97/98	342.9	249.8	170.7	115.5	114.8	108.8	216.1	323.2	372.2	419.8	509.3	470.7
98/99	365.7	241.8	167.0	115.6	106.5	139.8	218.9	319.7	423.6	479.5	542.4	464.7
99/00	382.4	291.8		104.1	208.6	195.9	235.8	344.8	341.8	403.7	546.0	440.3
00/01	348.9	196.5	134.6	109.0	130.3	153.2	174.4	327.2	384.2	497.6	548.9	466.7
01/02	377.0	246.1	156.4	104.9	111.5	159.1	241.9	303.0				
02/03												
Average	365.3	248.9	158.3	110.7	123.0	149.6	227.1	316.3	383.8	451.9	512.5	452.1

Station **KADDOUSSA**
Bassin-Verssnt Guir

Evaporation Mensuelle (bac)

MOIS / ANNEE	SEP	OCT	NOV	DEC	JAN	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT
82/83	230.5	181.7	121.8	86.2	91.3	98.5	151.2	157.3	217.4	227.0	317.2	326.8
83/84	233.7	122.8	117.1	98.8	85.4	120.5	129.2	210.2	209.2	321.7	389.8	341.9
84/85	278.8	182.0	112.6	86.4	74.7	111.1	152.7	205.8	208.7	328.7	325.7	329.1
85/86	245.0	145.3	88.7	70.2	52.9							
86/87												
87/88												
88/89												
89/90												
90/91												
91/92			101.3	121.8	111.0	124.3	182.7	268.7	376.6	417.7	499.5	485.6
92/93	424.4	365.9	296.3	139.0	119.9	107.2	153.8	226.1	336.1	332.6	844.1	864.8
93/94	517.4	383.6	145.6	105.9	116.2	147.4	286.1	320.1	480.1	626.5	540.0	502.7
94/95	445.1	303.1	200.1	147.3	159.3	192.6	224.7	255.4	333.6	209.0	411.3	339.7
95/96	232.1	160.9	186.6	100.8	102.0	140.9	155.3	305.2	409.0	367.9	427.8	495.4
96/97	476.9	373.6	223.9	164.4	135.4	158.2	251.6	184.0	284.0	378.3	505.0	396.7
97/98	304.8	245.2	214.1	198.5	140.8	130.3	241.2	432.3	330.1	429.8	580.2	558.8
98/99	424.1	242.1	171.2	95.2	104.9	117.9	225.5	318.0	395.7	501.5	573.3	556.1
99/00	444.8	294.2	188.6	139.4	108.3	142.2	262.0	344.2	352.8	515.1	563.0	450.6
00/01	398.3	252.6	165.3	142.8	164.1	160.7	245.5	286.0	423.3	574.8	671.5	727.0
01/02	367.6	232.2	152.2	115.2	143.4	169.3	201.2	282.8	375.2	576.5	665.6	526.9
02/03	365.2	254.9	149.1	173.7	145.2	192.0	249.5					
Average	359.3	249.3	164.7	124.1	115.9	140.9	207.5	271.2	338.0	414.8	522.4	493.0

Table A.3.3-(2,3) Evaporation (Monthly Basis in Ziz & Gheris River Basin)

Station **TIRGAOU (AMOUGUER Taghia)**
Bassin-Versant RHERIS

Evaporation Mrnsuelle (piche)

MOIS / ANNEE	SEP	OCT	NOV	DEC	JAN	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT
82/83	138.6	142.6	78.7	105.7	100.5	103.2	124.5	150.5	204.5	228.7	285.5	270.7
83/84	198.8	121.7	92.6	94.4	89.8	112.2	127.0	202.4	209.5	278.3	317.3	315.7
84/85	206.2	168.9	108.1	77.0	87.9	123.0	136.1	199.4	201.5	388.6	298.1	298.9
85/86	185.4	142.2	112.0	106.8	146.0	141.1	161.6	186.3	234.0	256.2	308.9	318.2
86/87	218.4	102.5	118.2	90.2	153.1	138.2	227.1	329.3	356.2	389.2	483.8	493.3
87/88	309.7	206.1	163.0	134.7	144.4	161.8	269.8	165.4	403.4	476.5	574.3	505.0
88/89	364.0	200.8	132.4	145.5		96.7	300.8	355.8	357.6	460.2	477.3	332.2
89/90	413.9	232.6	176.3	133.5	145.1	207.8	259.3	316.4	411.7	571.0	503.7	436.6
90/91	321.0	348.3	207.0	188.4	186.6	223.8	283.5	271.2	313.4	351.4	569.8	502.8
91/92	371.2	245.5	221.0	125.5	128.3	148.8	186.2	287.2	301.6	344.9	379.5	438.3
92/93	341.5	296.0	162.2	126.7	114.8	93.6	178.0	243.6	279.4	322.3	451.8	405.3
93/94	283.4	214.1	92.5	99.3	81.6	131.5	184.5	223.7	367.1	403.9	485.5	495.2
94/95	275.1	147.3	95.8	108.4	124.4	144.4	149.7	130.9	208.0	261.6	344.1	222.1
95/96	159.5	149.3	103.7	83.1	68.7	72.6	267.0	130.2	267.0	130.2	254.7	314.0
96/97	209.0	192.5	140.0	107.8	82.1	114.4	152.0	106.2	186.2	286.5	251.8	202.4
97/98	121.7	143.4	135.7	135.7	165.8	74.6	149.4	189.8	282.4	301.2	400.8	242.1
98/99	182.7	122.5	59.9	120.6	141.2	137.9	168.7	229.5	479.2	376.1	412.0	360.0
99/00	222.7	143.7	206.5	125.2	101.5	158.7	200.2	212.5	257.7	326.2	388.0	362.5
00/01	291.4	144.1	161.5	133.6	144.8	153.5	198.3	193.8	178.5	236.4	253.0	212.1
01/02	179.3	167.3	131.1	114.7	127.4	140.0	133.2	129.5	153.3	197.8	199.5	176.2
02/03	134.2	138.1	121.2	110.5	93.6	81.2	100.8					
Average	244.2	179.5	134.3	117.5	121.4	131.4	188.5	212.7	282.6	329.4	382.0	345.2

Station **TADIGHOUSTE**
Bassin-Versant RHERIS

Evaporetion Mensuelle(bac)

MOIS / ANNEE	SEP	OCT	NOV	DEC	JAN	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT
82/83	295.2	230.2	134.0	99.1	103.6	119.7	202.8	215.2	290.0	357.0	439.1	391.1
83/84	296.8	186.1	139.3	110.1	100.2	137.4	192.0	284.0	305.8	368.3	410.8	445.3
84/85	917.6	209.9					192.3	277.9	297.4	382.5		
85/86				64.4	107.9	143.9	192.2	261.1	64.8			
86/87												
87/88												
88/89							72.1	255.1	320.3	345.4	416.1	361.3
89/90	313.7	175.6	99.3	138.4	76.8	110.2	124.2	220.0	262.4	399.8	389.5	371.9
90/91	251.8	199.8	121.6	74.9	83.0	104.5	181.8	210.1	288.3	336.4	395.1	358.7
91/92	283.0	177.7	119.7	55.4	64.7	101.7	162.9	254.8	289.5	366.2	422.2	324.7
92/93	244.6	174.1	81.6	45.5	45.5	90.7	145.9	295.9	399.5	432.6	515.8	458.0
93/94	295.9	201.9	95.7	38.8	44.8	98.4	198.1	253.7	342.3	413.7	570.4	368.2
94/95	289.8	125.9		59.4	108.8	140.1	172.2	189.1	388.2	484.3	551.4	359.9
95/96	279.6	122.4	123.3	33.8	613.0	126.1	189.7	331.5	421.7	115.7	355.1	374.9
96/97	302.5	229.8	105.6	90.0	95.8	165.5	244.7	214.3	362.3	441.0	425.0	291.9
97/98	231.7	212.6	165.2	96.2	89.8	186.0	167.3	256.8	372.0	475.5	565.0	420.0
98/99	292.2	103.1	124.7	42.4	40.1	192.8	226.4	306.8	316.0	365.0	452.1	345.9
99/00	248.5	141.3	104.7	135.1	73.5	155.0	232.4	en panne	en panne	en panne	en panne	en panne
00/01		179.3	110.8	97.1	138.5	120.8	308.8	275.8	260.8	459.7	612.9	452.0
01/02	251.0	170.8	189.0	154.8	182.2	190.0	241.0	248.0	431.1	576.7		392.5
02/03		168.3	170.4	110.1	141.6	143.6	206.0					
Average	319.6	177.0	125.7	85.0	124.1	136.8	192.3	255.9	318.4	395.0	465.7	381.1

Station. **Akrouz**
Bassin-Versant Rheris

Evaporation Mensuelle

MOIS / ANNEE	SEP	OCT	NOV	DEC	JON	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT
97/98	324.1	259.3	256.5	206.6	182.6	131.9	291.0	350.3	403.6	447.5	229.2	512.0
98/99	368.9	250.9	224.6	147.3	157.0	192.8	270.5	306.6	612.7	404.2	401.6	463.0
99/00	413.6	262.3	180.2	180.1	177.2	232.0	324.4	386.9	447.2	556.1	696.0	585.1
00/01	376.5	228.5	200.7	125.5	192.0	191.3	353.7	385.7	394.1	386.5	571.5	339.1
01/02	334.9	330.0	205.1	153.0	180.6	218.0	313.7	301.5	382.7	505.8	415.0	510.5
02/03	380.3	271.3	229.6	163.2	214.0	108.4	270.8					
Average	366.4	267.1	216.1	162.6	183.9	179.1	304.0	346.2	448.1	460.0	462.7	481.9

Station. **SEMVA D'ERRACHIDIA**
Bassin-Versant Rheris **ORMVA du TAFILALET**

EVAPORATION MENSUELLE- BAC - CLASSE A (1982-2003)

Années	Janvier	Février	Mars	Avril	Mai	Juin	Juillet	Aout	Septembre	Octobre	Novembre	Décembre
1982				193.9	249.3	337.6	391.1	337.2	253.0	169.0	98.1	65.4
1983	32.4	73.0	126.2	175.9	200.0	257.1	322.1	273.7	227.1	144.9	93.7	73.8
1984	72.7	105.0	148.1	223.9	236.4	360.3	369.5	355.0	278.2	151.8	87.7	52.0
1985	56.0	114.7	169.2	244.9	268.5	361.9	401.5	371.7	258.9	169.9	96.9	64.5
1986	76.9	106.0	161.4	213.1	250.3	330.7	363.7	342.1	338.3	234.2	116.8	76.5
1987	78.2	110.6	177.3	227.3	272.8	326.0	386.3	351.3	273.5	265.1	75.3	61.9
1988	75.4	85.5	157.5	218.0	287.5	363.3	377.1	344.3	231.0	137.2	75.7	56.8
1989	56.7	71.7	152.2	217.5	300.8	299.2	333.7	286.3	240.5	122.4	74.1	47.1
1990	56.4	86.0	128.0	191.2	242.4	319.3	330.5	295.4	192.8	158.1	81.8	49.4
1991	61.1	84.7	157.2	177.9	238.0	288.2	315.0	275.0	208.5	126.5	84.3	30.8
1992	47.4	78.9	159.3	208.8	231.7	268.4	306.6	271.3	221.8	157.3	73.4	50.5
1993	47.4	74.4	175.7	193.4	259.4	341.8	354.9	329.3	230.6	153.7	80.8	61.7
1994	57.4	93.8	154.0	202.5	281.2	277.8	299.8	284.6	201.8	105.8	72.6	50.7
1995	68.8	105.4	134.5	149.4	233.6	281.7	323.5	304.2	193.4	107.2	86.8	33.4
1996	58.9	81.1	107.0	171.4	203.2	187.3	248.1	262.8	183.7	115.8	72.2	43.8
1997	52.1	78.2	136.4	145.5	211.4	257.8	289.5	238.4	171.1	134.7	77.7	54.4
1998	53.7	57.1	121.0	176.4	229.0	264.9	305.6	252.8	183.7	131.4	74.2	41.5
1999	44.3	97.0	136.0	210.0	266.7	326.5	344.3	300.2	235.0	226.8	76.0	50.8
2000	57.0	87.7	136.3	190.5	219.9	264.4	364.4	261.6	218.7	228.8	73.3	55.9
2001	80.0	103.5	196.8	199.0	246.8	347.6	362.9	304.6	228.2	144.9	84.7	47.8
2002	52.7	86.7	149.1	179.8	236.1	297.1	320.2	268.8	211.7	133.1	77.6	54.6
2003	58.2	79.9	139.0	192.5	249.9							
Average	59.2	88.6	148.7	195.6	246.1	302.8	338.6	300.5	227.7	158.0	82.6	53.5

Station **TAOUZ**
Bassin-Versant ZIZ

Evaporation Mensuelle(piche)

MOIS / ANNEE	SEP	OCT	NOV	DEC	JAN	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT
82/83	233.8	178.9	117.6	117.1	175.9	517.0		415.1	651.6	838.1	285.2	869.7
83/84	675.8	415.3	315.6	216.9	213.4	307.2	482.8	502.1	716.4	818.6	785.4	824.5
84/85	740.5	480.0	298.2	191.7	226.5	325.3	400.7	631.8	598.9	613.2	718.3	770.0
85/86	471.1	420.4	313.2	237.1	253.7	341.4	439.3	601.6	745.3	645.0	807.6	724.0
86/87	449.9	283.1	254.7	167.8	291.4	318.5	397.2	654.7	672.5	740.3	858.3	732.2
87/88	495.7	420.4	260.4	244.6	82.2	72.4	178.3	319.1	476.4	613.9	535.8	643.7
88/89	503.4	385.6	187.7	130.7	147.2	216.2	364.1	513.9	545.8	608.8	578.5	579.7
89/90	391.9	329.1	218.6	144.5	115.1	161.0	312.2	440.8	493.4	609.1	495.7	600.7
90/91	318.3	427.0	214.5	130.2	185.0	259.1	397.4	301.7	496.0	475.9	573.3	381.9
91/92	352.6	309.1	239.3	148.6	211.0	243.0	331.2	468.7	469.3	566.8	683.4	716.3
92/93	587.0	453.0	241.1	165.7	163.6	194.3	342.5	473.3	600.9	708.0	713.8	736.3
93/94	673.4	382.9	206.6	148.8	189.2	314.7	476.5	554.7	768.9	656.2	635.9	535.3
94/95	613.7	310.7	264.3	173.9	203.9	237.3	388.8	410.7	503.0	593.2	618.8	527.3
95/96	476.5	304.7	280.4	197.0	271.2	234.4	353.6	459.6	596.7	505.4	657.5	713.0
96/97	502.3	367.3	270.5	238.2	213.8	232.0	341.1	364.6	555.0	510.0	648.1	556.8
97/98	411.2	403.0	304.0	248.4	202.4	173.1	306.9	446.8	557.5	656.8	722.2	647.8
98/99	566.3	347.9	296.8	186.1	168.5	224.9	311.2	512.9	559.9	658.4	685.8	616.2
99/00	441.2	409.1	276.8	211.3	202.1	262.9	459.0	532.6	548.0	674.0	736.2	663.3
00/01	654.0	470.0	313.0	261.6	253.0	310.0	533.4	554.5	659.8	703.0	796.6	696.0
01/02	606.0	444.0	293.8	282.0	227.1	364.0	528.0	535.0	656.0	722.0	773.6	799.9
02/03	532.1	515.6	348.0	271.0	220.0	287.0	511.7					
Average	509.4	383.7	262.6	195.9	200.8	266.5	392.8	484.7	593.6	645.8	665.5	666.7

Table A.3.3-(4) Evaporation (Monthly Basis in Maider River Basin)

Station **ALNIF**

Basssin-Versant RHERIS

Evaporation Mensuelle (bac)

MOIS / ANNEE	SEP	OCT	NOV	DEC	JAN	FEV	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT
82/83	389.9	245.2	128.7	100.7	86.7	146.4	289.1	350.3	399.7	610.0	721.5	514.0
83/84	371.0	184.2	140.4	121.2	89.1	149.9	212.7	329.6	374.7	534.5	507.1	510.8
84/85	411.3	230.9	143.7	83.4	103.1	191.1	229.5	323.5	306.4	505.3	519.3	965.1
85/86	286.1	197.0	137.2	90.9	102.3	160.4	219.9	329.0	412.7	447.1	503.8	457.7
86/87	354.5	174.5	149.9	81.5	133.2	163.5	246.4	387.1	378.7	481.9	530.3	485.0
87/88	320.0	263.5	122.6	86.2	114.0	109.4	217.8	283.0	333.7	474.7	467.6	440.2
88/89	284.1	194.3	130.0	74.5	72.5	77.6	187.3	238.4	322.7	344.2	468.6	379.5
89/90	359.6	230.2	124.3	78.8	84.9	123.2	180.4	238.3	286.0	479.9	437.6	354.4
90/91	322.5	264.3	125.3	77.8	92.1	125.1	218.7	218.2	333.4	397.1	470.6	502.1
91/92	355.8	267.3	143.9	72.0	103.1	145.7	210.9	319.6	375.5	441.9	537.6	567.6
92/93	429.7	354.2	199.8	133.3	126.4	150.6	250.4	336.2	420.6	708.9	606.2	513.3
93/94	359.2	276.4	121.9	96.1	97.7	106.3	231.5	303.6	498.1	443.9	499.3	468.5
94/95	440.4	200.5	134.1	94.9	113.8	153.8	213.1	242.7	418.6	453.0	550.5	467.3
95/96	368.2	193.2	165.3	85.8	147.7	118.5	157.1	343.1	427.9	368.2	469.2	502.6
96/97	366.1	216.1	151.5	109.2	93.1	127.9	219.8	244.5	428.1	447.6	632.3	406.8
97/98	328.4	240.1	184.8	117.7	90.7	83.0	207.1	322.2	378.7	454.2	554.8	476.9
98/99	357.0	218.5	165.7	84.3	73.8	111.3	197.0	345.2	455.3	490.1	455.4	480.2
99/00	456.5	217.8	145.4	102.3	135.9	149.8	240.2	387.5	332.0	500.7	580.0	458.1
00/01	382.2	476.4	153.8	113.0	247.3	142.5	358.2	324.3	380.9	519.6	614.8	454.5
01/02	404.3	299.2	156.3	111.6	106.7	156.1	256.0	263.8	444.0	489.6	543.6	526.9
02/03	429.9	197.7	145.5	155.0	206.0	124.9	196.9					
Average	370.3	244.8	146.2	98.6	115.2	134.1	225.7	306.5	385.4	479.6	533.5	496.6

Station **TAZARINE**

Bassin-Versant , SAGHIO

Evaporation Mensuelle (piche)

MOIS / ANNEE	SEP	OCT	NOV	DEC	JAN	FEV	MARS	AVR	MAI	JUIN	JUILLET	AOUT
82/83												
83/84												
84/85												
85/86												
86/87												
87/88												
88/89												
89/90												
90/91												
91/92												
92/93												
93/94												
94/95												
95/96												
96/97							177.8	246.2	532.9	626.8	693.8	532.9
97/98	395.8	320.0	291.8	266.6	209.3	159.5	301.0	415.7	490.0	552.4	726.3	663.7
98/99	558.2	372.5	298.4	213.4	208.2	262.4	363.7	342.3	422.1	372.5	499.6	577.1
99/00	346.0	173.1	134.2	123.7								
00/01												
01/02												
02/03												
Average	433.3	288.5	241.5	201.2	208.8	211.0	280.8	334.7	481.7	517.2	639.9	591.2

Table A.3.4-(1) River Discharge (Monthly Basis in Guir River Basin)

Station: Tit N'aissa

N° 1RE 39/330

Année	Septembre	Octobre	Novembre	Décembre	Janvier	Fevrier	Mars	Avril	Mai	Juin	Juillet	Août	Annuel
76/77	----	----	----	----	----	----	----	----	0.428	0.164	0.149	0.120	0.215
77/78	0.174	0.533	0.163	0.123	0.154	0.118	0.102	0.102	0.076	0.053	0.023	0.026	0.137
78/79	0.029	0.120	0.031	0.032	6.950	0.573	0.204	0.076	0.249	0.130	0.222	0.262	0.740
79/80	1.140	12.000	0.874	0.393	1.030	0.210	2.250	0.977	0.283	0.270	0.190	0.181	1.650
80/81	0.339	0.172	0.177	0.201	0.152	0.300	0.113	0.074	0.063	0.033	0.016	0.019	0.138
81/82	0.023	0.029	0.033	0.069	2.270	0.039	0.033	0.694	0.399	0.229	0.019	0.020	0.321
82/83	0.020	0.086	0.026	0.029	0.027	0.030	0.029	0.025	0.313	0.019	0.011	0.087	0.059
83/84	0.024	0.128	0.011	0.012	0.013	0.012	0.053	0.104	0.108	0.015	0.008	0.005	0.041
84/85	0.003	0.045	0.661	0.015	0.016	0.048	0.043	0.030	0.053	0.001	3.800	0.001	0.393
85/86	1.210	0.156	0.220	1.320	0.032	0.015	0.012	0.013	0.019	0.463	0.400	0.026	0.324
86/87	4.320	7.090	1.850	1.860	1.760	1.760	1.740	1.700	2.070	1.930	1.730	1.690	2.458
87/88	1.970	1.990	2.310	0.079	0.084	0.335	0.056	0.024	0.125	0.023	0.021	0.020	0.586
88/89	0.309	2.750	0.071	0.014	0.015	0.015	0.018	0.189	0.013	0.625	0.070	0.023	0.343
89/90	0.171	0.472	4.070	1.670	0.119	0.046	0.044	0.701	0.700	0.283	0.727	0.102	0.759
90/91	0.325	0.238	0.249	0.235	0.192	0.332	0.198	0.297	0.224	0.617	0.024	0.250	0.265
91/92	0.237	0.501	0.139	0.149	0.149	0.111	0.108	0.116	0.342	0.241	0.083	0.094	0.189
92/93	0.083	0.094	0.831	0.155	0.152	0.110	0.080	0.043	0.073	0.035	0.021	0.023	0.142
93/94	0.118	0.120	4.060	0.348	0.183	0.430	0.555	0.302	0.206	0.196	0.169	0.215	0.575
94/95	0.391	0.881	0.622	0.163	0.155	0.114	0.146	0.652	0.066	0.039	0.056	0.021	0.276
95/96	0.108	0.502	0.023	0.078	0.068	0.850	3.440	0.620	0.316	1.380	0.541	0.163	0.674
96/97	0.173	0.235	0.172	0.278	0.446	0.091	0.113	0.144	0.101	0.097	0.080	0.158	0.174
97/98	2.630	0.046	0.051	0.067	0.048	0.126	0.043	0.041	0.158	0.124	0.034	0.040	0.284
98/99	0.103	0.076	0.082	0.078	0.074	0.054	0.049	0.040	0.037	0.032	0.030	0.454	0.092
99/00	0.157	0.446	0.748	0.050	0.048	0.071	0.058	0.036	0.606	0.036	0.025	0.035	0.193
											Debit moyen annuel:		0.460

Station: Bni Yatti

N° 1RE 49/37

Année	Septembre	Octobre	Novembre	Décembre	Janvier	Fevrier	Mars	Avril	Mai	Juin	Juillet	Août	Annuel
70/71	----	0.117	----	0.166	0.274	----	0.152	----	0.183	----	. 060	0.049	0.157
71/72	----	1.990	----	0.424	0.309	----	0.312	----	0.114	----	0.039	-	0.455
72/73	----	8.490	----	0.746	0.316	----	0.087	----	0.250	----	0.075	0.035	1.428
73/74	----	0.007	----	0.230	0.164	----	0.083	12.800	0.361	0.132	0.096	0.070	1.549
74/75	0.325	0.725	2.290	0.374	0.252	0.186	0.159	97.000	44.500	1.940	0.185	0.141	12.340
75/76	1.410	0.320	0.703	0.927	0.425	0.729	0.779	2.480	8.930	1.260	3.160	0.139	1.772
76/77	13.500	0.457	0.290	4.910	12.100	0.337	0.150	3.140	2.650	0.221	0.078	0.083	3.160
77/78	2.450	14.700	3.620	0.306	1.200	1.250	0.774	0.073	0.057	0.082	0.064	0.047	2.052
78/79	0.042	0.048	0.058	0.102	36.500	0.199	0.141	0.096	0.399	0.124	0.107	0.065	3.157
79/80	11.100	89.500	1.500	0.693	0.432	0.316	1.730	1.430	0.307	0.219	0.098	0.060	8.949
80/81	0.717	0.282	0.445	0.360	0.360	1.980	0.223	0.230	0.207	0.272	0.041	0.032	0.429
81/82	0.040	0.099	0.091	0.106	6.440	0.148	0.133	4.270	3.990	4.130	0.074	2.660	1.848
82/83	0.420	13.200	6.330	1.670	1.620	1.610	1.400	1.370	4.760	1.700	1.130	1.130	3.028
83/84	1.740	1.410	1.760	1.700	1.700	1.590	1.630	1.330	5.460	3.690	0.027	0.017	1.838
84/85	0.044	0.185	5.690	0.147	0.217	0.121	0.109	0.106	0.511	0.040	0.019	0.011	0.600
85/86	9.740	1.360	3.670	15.400	0.192	0.152	0.098	0.053	0.161	0.206	0.114	0.049	2.600
86/87	2.060	7.540	1.060	0.129	0.149	0.133	0.146	0.104	0.211	0.123	0.080	0.062	0.983
87/88	0.114	0.320	3.060	0.161	0.108	1.660	1.290	0.468	0.165	0.103	0.063	0.031	0.629
88/89	0.125	2.760	0.384	0.247	0.244	0.243	0.242	0.241	0.301	2.840	0.210	0.355	0.683
89/90	0.269	3.270	41.100	1.600	0.775	0.313	0.189	0.145	0.588	0.263	0.124	0.138	4.065
90/91	0.348	0.234	0.117	0.204	0.275	0.045	0.319	0.249	0.186	0.151	0.100	1.140	0.281
91/92	0.130	5.530	0.165	0.249	0.250	0.246	0.225	0.214	9.050	3.250	0.485	2.570	1.864
92/93	3.000	4.990	----	----	----	----	----	----	----	----	----	----	
93/94	----	----	----	----	----	----	----	----	----	----	----	----	
94/95	----	----	----	----	----	----	----	----	----	----	----	----	
95/96	----	----	----	----	----	----	----	----	----	----	----	----	
96/97	----	----	----	----	----	----	----	----	----	----	----	----	
											Debit moyen annuel:		2.448

Station: Tazouguert

N° 1RE 48/628

Année	Septembre	Octobre	Novembre	Décembre	Janvier	Fevrier	Mars	Avril	Mai	Juin	Juillet	Août	Annuel
70/71	----	0.040	----	0.085	0.023	----	0.065	----	0.802	----	0.030	0.015	0.151
71/72	----	-	----	0.102	0.050	----	0.033	----	0.135	----	0.030	0.002	0.050
72/73	----	5.110	----	1.170	0.467	----	0.145	----	0.553	----	0.172	0.311	1.133
73/74	0.066	0.046	2.000	0.186	0.155	0.151	0.123	6.160	0.108	0.070	0.053	0.013	0.761
74/75	3.110	1.480	0.456	0.131	0.116	0.110	0.097	23.700	10.800	0.727	0.347	0.147	3.435
75/76	0.445	0.133	0.986	1.060	1.230	0.478	0.358	2.170	7.580	1.640	1.040	0.220	1.445
76/77	3.690	0.824	0.614	1.660	1.890	0.221	0.094	0.796	0.998	0.026	0.046	0.053	0.909
77/78	0.209	1.670	0.179	0.018	0.098	0.212	0.164	0.159	0.086	0.030	0.021	0.008	0.238
78/79	0.002	0.128	-	0.007	15.400	0.152	0.070	0.083	1.860	0.075	0.001	0.005	1.482
79/80	4.790	17.000	3.110	0.373	0.339	0.726	2.520	1.460	0.279	0.117	0.075	0.036	2.569
80/81	0.188	0.033	0.041	0.059	0.070	0.191	0.050	0.075	0.072	0.033	0.028	0.019	0.072
81/82	0.017	0.010	0.008	0.026	1.070	0.054	0.056	0.827	0.914	0.902	0.024	0.023	0.328
82/83	0.027	0.006	0.141	0.024	0.024	0.014	0.010	0.016	2.010	0.003	0.002	0.001	0.190
83/84	0.103	0.002	0.002	0.005	0.010	0.010	0.089	0.053	0.288	0.012	0.007	0.002	0.049
84/85	0.006	0.008	2.200	0.009	0.017	0.016	0.016	0.019	0.743	0.022	0.013	-	0.256
85/86	5.910	0.425	0.208	4.530	0.275	0.050	0.043	0.036	0.036	0.272	0.047	0.036	0.989
86/87	0.183	9.310	0.027	0.028	0.027	0.043	0.190	0.025	0.679	0.446	0.050	0.045	0.921
87/88	0.096	0.452	2.690	0.209	0.037	0.927	0.097	0.023	0.642	0.035	0.028	0.028	0.439
88/89	0.038	3.600	0.295	0.016	0.016	0.017	0.016	1.200	0.018	2.590	0.021	0.026	0.654
89/90	0.278	5.800	13.900	5.720	0.168	0.091	0.084	5.880	5.030	0.043	0.041	0.036	3.089
90/91	0.088	0.038	0.035	0.983	0.383	0.747	0.348	0.565	0.386	0.509	0.121	0.113	0.360
91/92	0.120	0.244	0.122	0.173	0.147	0.140	0.128	0.128	0.391	0.196	0.117	0.129	0.170
92/93	0.110	0.087	1.370	0.146	0.215	0.163	0.185	0.180	0.180	0.186	0.156	0.138	0.260
93/94	0.194	0.188	72.200	16.100	0.296	0.150	0.302	0.192	0.128	0.107	0.093	0.034	7.499
94/95	0.629	8.840	2.490	2.480	2.480	2.480	2.440	7.440	4.480	0.913	0.202	0.644	2.960
95/96	7.600	0.634	0.208	0.109	1.070	0.434	1.530	1.850	0.969	0.501	0.200	0.199	1.275
96/97	0.283	0.982	0.186	0.278	0.446	0.244	0.775	2.870	0.283	4.020	0.291	1.050	0.976
97/98	0.291	0.434	0.430	0.424	0.424	0.926	0.313	0.324	1.080	0.874	0.264	0.273	0.505
98/99	2.950	0.207	0.193	0.217	0.266	0.246	0.227	0.209	0.199	0.186	0.172	0.778	0.488
99/00	0.247	3.820	3.700	0.717	0.794	0.794	1.000	0.873	7.740	0.271	0.275	0.264	1.708
00/01	0.264	6.930	0.539	0.500	0.571	0.649	0.616	0.581	0.434	0.483	0.469	0.413	1.037
												Debit moyen annuel:	1.174

Table A.3.4-(2).1 River Discharge (Monthly Basis in Ziz River Basin)-1

Station: F. Tillicht

N° 1RE 38/1508

Année	Septembre	Octobre	Novembre	Décembre	Janvier	Fevrier	Mars	Avril	Mai	Juin	Juillet	Août	Annuel
74/75	----	----	----	0.797	0.736	0.867	1.270	9.720	9.510	4.090	2.210	1.550	3.417
75/76	1.260	1.260	1.050	1.070	1.050	1.190	1.590	6.190	22.300	10.600	4.600	2.490	4.554
76/77	12.100	2.790	1.870	1.490	2.140	2.350	2.730	3.250	1.790	2.380	0.960	0.731	2.882
77/78	1.140	1.040	0.916	1.070	1.640	1.870	1.630	2.090	2.040	1.130	0.681	0.684	1.328
78/79	0.442	0.945	0.779	0.772	1.230	1.510	2.610	2.970	2.820	1.470	1.140	0.986	1.473
79/80	3.370	5.960	1.500	1.260	1.140	1.280	2.240	3.400	1.760	1.220	1.030	0.829	2.082
80/81	2.550	1.200	0.533	0.513	0.505	0.580	0.689	0.732	0.527	0.500	0.425	0.400	0.763
81/82	0.616	0.390	0.406	0.388	0.410	0.401	0.482	0.923	3.350	2.260	0.481	0.490	0.883
82/83	1.720	1.120	0.692	0.703	0.790	0.717	1.180	2.390	1.700	0.357	0.153	0.373	0.991
83/84	1.320	1.300	0.227	0.066	0.037	0.038	0.703	0.791	0.479	0.368	0.181	0.107	0.468
84/85	0.642	0.164	0.756	0.377	0.590	1.140	1.110	1.460	1.610	1.570	0.342	0.307	0.839
85/86	2.520	0.988	4.140	2.250	2.110	2.560	3.200	3.250	2.360	2.590	2.380	2.170	2.543
86/87	0.358	2.690	1.090	1.070	1.050	1.690	2.200	1.270	1.730	2.260	0.660	0.399	1.372
87/88	1.630	1.800	4.230	2.120	1.790	2.730	3.140	2.980	2.460	1.730	1.080	0.721	2.201
88/89	0.880	13.600	3.550	1.190	0.385	2.430	2.970	6.630	11.800	8.680	6.570	3.470	5.180
89/90	2.190	3.010	13.000	1.660	0.016	0.022	0.023	0.951	6.660	2.870	2.060	1.880	2.862
90/91	5.670	3.640	1.100	1.180	1.100	1.010	1.340	8.530	6.090	4.590	4.890	2.620	3.480
91/92	3.690	1.130	1.070	1.270	1.340	1.380	1.930	2.250	3.150	1.450	1.280	1.210	1.763
92/93	1.760	2.180	1.940	0.634	0.631	0.650	1.190	1.360	0.901	0.661	0.406	0.357	1.056
93/94	0.464	0.570	4.040	0.057	0.050	0.063	0.188	0.716	0.572	0.259	0.064	0.060	0.592
94/95	1.880	2.170	0.372	0.220	0.168	0.129	0.477	4.660	1.780	0.572	0.188	1.020	1.136
95/96	3.110	10.100	1.180	1.080	1.170	2.490	4.150	3.230	1.750	6.950	4.130	1.140	3.373
96/97	1.480	1.820	1.910	2.330	2.260	1.820	2.440	4.270	2.800	1.040	0.853	1.180	2.017
97/98	2.910	3.980	4.010	4.140	3.810	5.370	4.200	3.250	4.150	22.700	6.480	0.649	5.471
98/99	2.030	1.580	1.780	2.220	2.590	2.980	3.210	4.220	2.620	1.600	1.330	2.000	2.347
99/00	1.260	7.950	5.620	5.420	4.540	4.010	3.570	3.150	2.800	1.060	0.909	0.864	3.429
00/01	1.220	1.920	0.730	0.710	0.879	0.865	0.832	0.747	0.739	0.616	0.511	1.350	0.927
											Debit moyen annuel:		2.201

Station: F. Zaabel

N° 1RE 48/867

Année	Septembre	Octobre	Novembre	Décembre	Janvier	Fevrier	Mars	Avril	Mai	Juin	Juillet	Août	Annuel
70/71	0.430	0.574	1.200	1.040	1.090	2.000	1.760	10.400	5.500	2.360	1.380	0.344	2.340
71/72	0.809	1.790	6.310	3.380	2.920	6.180	7.000	16.300	11.600	10.300	3.430	0.762	5.898
72/73	2.060	3.120	12.800	8.840	4.420	3.770	4.120	4.120	2.620	10.000	1.600	2.200	4.973
73/74	0.703	0.563	3.800	2.460	1.460	1.040	3.200	5.920	5.210	1.520	0.761	0.623	2.272
74/75	5.240	1.030	1.410	1.050	0.961	0.910	0.942	29.400	16.400	6.390	2.130	0.895	5.563
75/76	0.805	0.845	1.080	1.690	1.450	1.200	2.900	9.410	40.000	18.200	6.580	2.760	7.243
76/77	14.700	3.820	2.960	2.710	5.600	6.260	4.570	4.980	2.600	2.260	0.753	0.613	4.319
77/78	1.890	1.300	1.250	3.110	2.670	2.080	1.120	1.590	1.640	0.582	0.432	0.574	1.520
78/79	0.235	1.100	0.355	0.330	4.210	5.230	8.850	4.450	4.570	1.560	0.342	0.064	2.608
79/80	7.140	26.300	4.760	3.550	3.530	3.580	6.740	6.600	1.620	1.010	0.748	0.712	5.524
80/81	1.880	1.100	0.785	1.220	0.881	1.730	1.050	0.818	0.322	0.206	0.174	0.232	0.867
81/82	0.373	0.177	0.189	0.205	0.235	0.245	0.217	1.570	5.860	3.600	0.264	0.304	1.103
82/83	0.166	1.610	0.197	0.220	0.228	0.303	0.226	0.276	3.050	0.318	0.262	1.610	0.706
83/84	1.270	1.650	1.470	0.949	0.925	0.905	1.180	0.767	0.710	0.738	0.675	0.534	0.981
84/85	0.771	0.608	1.820	0.150	0.148	0.144	0.204	0.187	0.600	1.660	0.188	0.176	0.555
85/86	3.050	0.511	4.040	2.400	0.507	0.409	0.467	0.525	0.340	0.506	0.271	0.230	1.105
86/87	0.479	7.770	0.466	0.525	0.523	0.919	1.060	0.320	0.641	1.600	1.180	0.305	1.316
87/88	1.930	26.200	37.900	1.670	0.841	3.900	2.800	0.762	0.895	0.310	0.212	0.105	6.460
88/89	0.152	43.100	6.960	2.870	1.640	11.700	8.000	5.860	8.050	26.300	8.630	2.270	10.461
89/90	2.790	46.600	43.600	29.400	15.000	6.900	4.450	8.000	23.900	6.030	4.350	5.030	16.338
90/91	12.200	9.420	4.490	5.280	4.230	3.850	4.990	10.500	5.750	8.340	4.620	10.300	6.998
91/92	5.880	1.760	1.210	2.480	1.830	1.140	1.570	1.830	5.520	3.640	1.730	0.506	2.425
92/93	1.030	0.306	1.410	0.893	0.939	0.876	2.330	1.920	0.574	0.367	0.357	0.183	0.932
93/94	12.900	2.680	33.000	4.690	2.540	7.890	12.400	7.750	2.390	1.240	0.345	0.220	7.337
94/95	0.812	6.800	1.970	1.010	1.000	1.000	1.740	34.300	1.950	3.230	-	2.650	4.705
95/96	3.560	24.200	1.220	1.170	1.940	8.100	13.600	10.800	6.030	26.200	21.500	----	10.756
96/97	----	6.320	5.830	7.240	11.700	----	----	----	----	----	----	----	
												Debit moyen annuel:	4.435

Station: M' zizel

N° 1RE 38/1585

Année	Septembre	Octobre	Novembre	Décembre	Janvier	Fevrier	Mars	Avril	Mai	Juin	Juillet	Août	Annuel
84/85	----	----	----	----	----	----	----	----	----	----	----	----	
85/86	0.512	0.373	1.660	1.360	2.030	3.190	3.420	2.790	1.070	1.110	0.596	0.980	1.591
86/87	1.320	3.030	1.870	2.810	3.350	5.820	5.160	3.250	1.810	2.250	2.650	2.570	2.991
87/88	2.850	4.780	1.220	0.717	0.722	2.460	1.240	0.165	0.120	----	----	----	1.586
88/89	----	----	----	0.616	0.503	5.090	7.610	7.780	4.060	1.160	1.710	1.080	3.290
89/90	1.310	0.924	3.300	0.589	0.113	0.105	0.088	0.253	2.400	0.992	0.520	----	0.963
90/91	1.070	0.322	0.112	0.136	0.116	0.122	0.320	1.740	0.944	0.953	0.726	0.950	0.626
91/92	0.758	0.093	0.073	0.085	0.071	0.066	0.088	0.156	0.265	0.197	0.271	0.018	0.178
92/93	0.291	0.024	0.058	0.067	0.066	0.068	0.306	0.111	0.059	0.030	0.014	0.080	0.098
93/94	0.413	0.093	10.200	4.730	3.380	9.260	11.400	9.060	6.300	3.860	1.810	1.670	5.181
94/95	1.870	3.200	2.780	2.830	2.500	2.040	2.250	3.880	0.941	1.020	0.097	0.955	2.030
95/96	1.130	3.160	0.121	0.315	1.270	3.210	7.280	7.990	2.330	6.260	4.610	1.180	3.238
96/97	1.350	0.530	0.473	1.220	2.090	2.720	1.720	3.910	----	----	----	----	1.752
97/98	----	----	----	----	----	----	----	----	----	----	----	----	
											Debit moyen annuel:		1.960

Table A.3.4-(2).2 River Discharge (Monthly Basis in Ziz River Basin)-2

Station: B.H.Addakhil

Année	Septembre	Octobre	Novembre	Décembre	Janvier	Fevrier	Mars	Avril	Mai	Juin	Juillet	Août	Annuel
70/71	2.400	2.700	4.400	3.700	4.100	8.000	6.900	29.400	16.200	5.100	1.800	0.500	7.100
71/72	0.900	3.900	15.000	12.300	6.500	15.900	18.600	37.900	24.100	21.700	6.800	1.200	13.733
72/73	4.100	9.200	39.700	19.800	11.400	19.800	12.100	28.900	9.100	4.500	24.200	6.900	15.808
73/74	1.901	2.022	12.863	5.949	5.875	5.678	7.113	19.928	10.183	2.584	2.574	1.219	6.491
74/75	10.705	1.067	0.337	4.972	1.558	3.738	2.197	79.248	45.297	16.911	7.811	3.436	14.773
75/76	2.300	1.720	2.400	10.281	3.775	3.939	13.827	34.379	97.042	43.973	18.894	9.178	20.142
76/77	40.282	10.042	10.142	10.070	15.563	19.895	17.740	25.705	6.167	----	27.977	9.611	17.563
77/78	4.007	----	29.958	----	----	5.494	----	5.742	5.033	2.304	1.778	2.213	7.066
78/79	0.441	4.683	1.283	1.003	16.216	9.004	23.023	5.474	13.297	4.543	----	1.584	7.323
79/80	----	73.356	6.774	4.708	7.588	11.011	21.298	25.741	5.778	1.886	1.794	1.550	14.680
80/81	5.111	3.322	1.611	3.584	2.403	4.797	2.862	0.740	1.703	0.596	0.827	0.389	2.329
81/82	----	0.827	0.421	0.466	1.422	0.481	0.268	3.240	13.966	9.546	0.055	0.562	2.841
82/83	1.421	2.692	0.255	0.206	0.269	0.315	0.118	0.155	6.853	0.478	0.695	2.513	1.331
83/84	1.874	2.730	0.959	0.185	0.143	0.140	0.984	0.066	0.186	0.119	0.173	0.128	0.641
84/85	0.092	0.051	4.573	----	0.008	0.110	0.030	0.079	4.557	1.807	0.491	0.078	1.080
85/86	6.132	0.372	8.725	6.395	0.450	0.230	----	2.782	0.426	0.875	0.182	0.109	2.425
86/87	0.306	26.865	----	0.452	----	2.888	2.882	0.390	1.596	2.593	0.414	0.228	3.861
87/88	6.107	9.764	16.821	6.338	----	11.276	6.257	----	2.438	0.370	0.250	0.176	5.980
88/89	0.084	45.530	14.129	8.982	3.045	20.169	20.997	20.433	12.647	19.222	9.266	10.389	15.408
89/90	2.775	26.175	107.129	64.248	21.685	12.585	9.477	18.187	53.954	9.012	4.641	9.377	28.270
90/91	25.408	17.861	9.969	8.931	3.004	4.862	5.628	23.964	10.119	19.397	11.647	10.444	12.603
91/92	12.591	3.280	1.200	8.123	1.552	3.980	2.178	5.782	14.208	4.355	3.488	1.370	5.176
92/93	2.492	0.572	2.952	1.878	1.159	1.305	5.400	2.648	1.031	0.956	0.030	0.482	1.742
93/94	2.167	1.177	72.752	12.011	6.325	18.892	33.871	20.962	5.709	3.286	1.092	1.348	14.966
94/95	3.019	14.416	2.154	1.170	0.411	27.921	4.204	50.437	4.540	6.912	1.466	4.902	10.129
95/96	3.273	66.091	1.992	6.478	8.602	28.217	43.836	16.209	7.543	3.569	44.281	2.668	19.397
96/97	5.813	6.688	5.954	8.224	14.500	6.784	9.133	25.520	11.020	1.936	2.422	6.914	8.742
97/98	24.424	5.127	1.421	4.048	2.735	8.736	2.490	2.418	3.506	4.000	1.047	3.368	5.277
98/99	12.339	-	-	0.150	0.523	0.298	0.989	0.714	0.244	-	1.983	5.237	1.873
99/00	4.515	40.232	2.859	1.112	1.327	0.758	-	-	10.590	0.607	-	-	5.167
00/01	1.122	16.145	-	-	-	-	-	0.205	-	0.030	0.138	2.030	1.639
01/02	2.047	38.097	-	0.832	-	0.632	0.645	36.950	5.980	0.422	0.763	1.838	7.351
02/03	7.862	2.199	1.803	0.047	0.259	0.464	0.608	0.310	0.400	----	----	----	
											Debit moyen annuel:		8.841

Station: Radier Erfoud

N° 1RE 57/2029

Année	Septembre	Octobre	Novembre	Décembre	Janvier	Fevrier	Mars	Avril	Mai	Juin	Juillet	Août	Annuel
70/71	0.246	0.144	0.137	1.550	0.741	0.332	0.193	12.300	0.335	0.142	0.442	0.119	1.390
71/72	0.140	0.107	0.249	1.360	80.000	0.513	1.670	2.590	4.380	0.083	1.820	0.023	7.745
72/73	0.017	3.440	18.300	2.480	1.510	4.130	1.550	7.920	0.267	0.205	0.125	0.187	3.344
73/74	0.141	0.282	6.050	1.130	1.340	4.870	0.578	5.420	0.257	0.847	1.460	0.134	1.876
74/75	0.661	3.140	2.680	0.980	0.903	3.340	0.945	22.100	1.750	0.700	0.770	0.188	3.180
75/76	0.197	0.178	0.228	7.370	2.650	0.777	7.230	7.360	1.140	5.030	1.920	0.202	2.857
76/77	1.020	0.289	7.240	11.600	1.960	10.300	6.560	15.000	0.340	0.235	4.010	0.180	4.895
77/78	0.190	0.467	11.400	0.844	1.550	11.100	6.590	4.300	0.231	0.183	0.219	0.115	3.099
78/79	0.103	0.111	0.121	0.308	14.600	1.390	0.258	5.670	0.190	0.181	2.690	0.108	2.144
79/80	1.210	14.100	1.370	0.865	6.080	2.170	4.250	7.730	0.369	0.250	5.330	0.243	3.664
80/81	0.102	0.332	5.470	1.890	0.913	0.877	0.222	0.622	0.602	0.081	1.030	0.152	1.024
81/82	0.100	0.099	0.055	0.167	2.050	0.469	0.171	2.110	0.853	0.208	1.890	0.138	0.693
82/83	0.138	0.138	0.477	0.140	0.138	0.139	0.138	0.106	1.660	0.082	0.078	0.073	0.276
83/84	0.069	0.077	0.154	0.141	0.119	0.096	0.058	0.112	0.665	0.032	0.030	0.040	0.133
84/85	0.053	0.049	2.050	0.072	0.941	1.270	0.631	0.795	0.819	0.100	0.038	0.036	0.571
85/86	7.240	0.081	0.079	8.730	0.100	0.049	0.012	5.520	0.160	0.051	0.062	0.295	1.865
86/87	0.253	0.181	0.114	0.091	0.107	1.290	5.430	0.219	0.083	0.089	0.094	0.090	0.670
87/88	0.084	0.211	23.400	5.880	26.800	27.400	0.173	2.710	0.098	0.098	0.098	0.098	7.254
88/89	0.115	0.148	0.102	4.100	0.101	3.630	3.820	5.700	0.194	0.756	2.700	0.558	1.827
89/90	0.157	15.300	13.200	2.740	0.783	13.500	8.230	12.300	3.230	0.451	5.920	0.462	6.356
90/91	0.256	0.383	8.720	1.530	6.930	3.750	4.920	4.740	0.219	0.219	4.810	0.505	3.082
91/92	0.277	0.249	7.080	2.310	4.520	4.050	3.920	5.730	0.923	0.320	0.320	0.313	2.501
92/93	0.348	0.320	0.561	0.541	1.460	8.540	0.973	0.619	0.588	5.290	0.314	0.270	1.652
93/94	0.270	0.270	8.470	4.160	7.210	5.060	11.700	12.100	3.010	1.830	1.640	1.560	4.773
94/95	1.560	9.370	1.240	0.248	0.475	9.200	3.240	3.050	0.605	0.420	0.342	0.312	2.505
95/96	0.339	3.420	2.010	7.870	0.906	4.670	8.960	3.350	0.185	1.690	0.341	0.450	2.849
96/97	0.400	0.369	10.600	1.780	3.940	6.540	7.140	0.730	0.379	0.337	----	----	3.222
97/98	0.656	1.110	10.600	7.990	1.150	5.050	12.700	3.670	0.448	0.300	0.359	0.500	3.711
98/99	0.462	0.328	0.244	0.427	1.090	0.975	0.783	0.636	0.559	2.470	5.660	1.420	1.255
99/00	1.120	2.680	14.000	1.650	1.640	1.290	1.230	1.110	17.800	0.988	0.384	0.299	3.683
00/01	0.290	0.714	0.322	0.419	0.431	0.431	0.414	0.287	0.322	0.233	0.096	0.098	0.338
											Debit moyen annuel:		2.724

Table A.3.4-(3) River Discharge (Monthly Basis in Gheris River Basin)

Station: Ait Bouijane
N° 1RE 55/355

Année	Septembre	Octobre	Novembre	Décembre	Janvier	Fevrier	Mars	Avril	Mai	Juin	Juillet	Août	Annuel
75/76	----	0.274	0.437	0.517	0.419	0.508	0.425	0.260	0.511	0.235	0.318	0.263	0.379
76/77	0.686	0.569	0.497	0.441	0.501	0.480	0.421	0.374	0.400	0.312	0.356	0.405	0.454
77/78	0.934	0.314	0.358	0.748	1.360	0.834	0.693	0.478	0.549	0.437	0.408	0.401	0.626
78/79	0.351	0.608	0.572	0.365	0.509	0.397	0.651	0.896	0.426	0.317	0.342	0.392	0.486
79/80	0.572	3.940	1.140	1.090	1.020	1.150	1.800	2.420	2.460	1.880	1.030	0.836	1.612
80/81	0.826	0.411	0.911	1.180	1.060	0.954	0.930	0.703	0.593	0.554	0.517	0.427	0.756
81/82	0.422	0.436	0.404	0.453	0.452	0.444	0.438	0.425	0.385	0.206	0.210	0.165	0.370
82/83	0.237	0.271	0.487	0.512	0.729	0.918	0.521	0.518	0.423	0.182	0.237	0.346	0.448
83/84	0.240	0.180	0.429	0.237	0.340	0.154	0.206	0.239	0.319	0.221	0.135	0.061	0.230
84/85	0.145	0.103	0.425	0.379	0.387	----	0.302	0.478	1.230	0.724	1.010	0.937	0.556
85/86	0.886	0.332	0.503	0.223	0.128	0.104	0.174	0.198	0.223	0.400	0.217	0.181	0.297
86/87	0.122	2.160	0.280	0.216	0.146	0.113	0.274	0.184	0.174	0.230	0.111	0.047	0.338
87/88	0.512	0.243	0.513	0.148	0.193	0.196	0.670	0.417	0.430	0.347	0.217	0.217	0.342
88/89	0.200	0.456	1.500	0.733	0.713	1.160	1.500	1.470	1.550	3.730	0.525	3.600	1.428
89/90	1.490	1.710	4.890	2.990	2.390	2.120	1.860	1.790	1.780	1.730	1.730	1.830	2.193
90/91	2.050	1.140	1.160	1.190	1.250	1.210	1.110	1.020	0.972	1.020	1.090	1.180	1.199
91/92	0.979	1.040	1.060	0.843	0.572	0.426	0.780	0.807	0.954	1.220	0.657	0.465	0.817
92/93	0.389	0.478	0.680	0.401	0.506	0.442	0.544	0.495	0.569	0.382	0.513	0.538	0.495
93/94	0.837	0.234	2.760	1.070	1.020	1.050	1.480	1.570	1.360	1.340	1.230	1.260	1.268
94/95	1.210	4.760	0.826	0.852	1.030	0.922	1.550	1.810	1.120	0.824	0.815	1.170	1.407
95/96	0.764	1.120	1.010	0.423	0.497	0.894	0.902	0.625	0.697	0.805	1.280	1.770	0.899
96/97	0.816	0.692	0.868	0.810	0.685	0.655	0.714	0.788	0.790	0.834	0.899	0.933	0.790
97/98	2.140	0.201	0.536	0.762	1.170	2.900	3.040	1.190	1.090	0.980	0.229	0.429	1.222
98/99	0.330	0.261	0.207	0.822	0.800	0.838	1.080	0.780	0.858	0.674	0.618	1.100	0.697
99/00	0.372	2.430	1.360	1.630	1.930	2.120	2.550	1.890	2.350	1.490	1.450	1.910	1.790
00/01	1.640	3.200	0.979	1.610	1.490	1.560	1.450	1.360	1.470	0.495	1.080	1.210	1.462
											Debit moyen annuel:		0.868

Station: Tadighoust
N° 1RE 47/426

Année	Septembre	Octobre	Novembre	Décembre	Janvier	Fevrier	Mars	Avril	Mai	Juin	Juillet	Août	Annuel
70/71	0.155	0.079	0.460	0.055	0.530	0.053	0.053	1.420	0.021	0.010	0.010	0.009	0.238
71/72	0.086	0.754	0.148	-	-	-	-	3.210	0.075	86.000	0.071	0.371	7.560
72/73	0.071	0.083	9.240	0.587	0.471	0.457	0.350	0.398	0.245	0.579	0.498	0.246	1.102
73/74	0.245	0.245	0.984	0.353	0.180	0.093	0.074	0.329	0.144	0.161	0.182	0.106	0.258
74/75	1.100	0.078	0.015	0.008	0.004	0.002	0.004	3.170	2.900	0.186	0.037	0.081	0.632
75/76	0.096	0.105	0.166	0.356	0.252	0.090	0.063	0.210	1.360	0.358	0.638	0.128	0.319
76/77	2.480	0.784	0.534	0.646	1.040	0.231	0.079	0.094	0.089	0.080	0.036	0.022	0.510
77/78	0.479	0.186	0.036	1.290	0.064	0.004	0.004	0.003	0.007	0.007	0.008	0.003	0.174
78/79	-	0.251	-	-	0.832	-	-	-	0.671	0.006	-	-	0.147
79/80	1.210	7.490	0.002	-	0.180	1.610	3.830	2.320	0.791	0.452	0.516	0.320	1.560
80/81	0.606	0.736	0.477	0.672	0.361	0.516	0.145	0.093	0.227	0.215	0.215	0.177	0.370
81/82	0.036	0.035	0.177	0.171	0.146	-	-	0.129	1.200	0.597	-	-	0.208
82/83	-	-	-	-	-	-	-	0.003	0.447	-	-	0.230	0.057
83/84	0.158	0.167	0.010	-	-	-	-	-	-	-	-	-	0.028
84/85	-	-	0.401	-	-	-	-	0.009	0.627	-	0.002	-	0.087
85/86	1.360	1.470	6.180	2.850	-	-	-	-	-	1.760	-	1.150	1.231
86/87	2.420	7.580	-	-	-	-	0.958	-	0.935	-	-	-	0.991
87/88	0.814	2.160	1.940	2.320	-	0.001	-	-	0.302	0.001	-	-	0.628
88/89	0.006	6.570	1.460	-	-	3.400	2.530	0.149	0.019	3.980	0.931	3.230	1.856
89/90	1.450	2.010	14.200	18.600	6.020	4.670	2.960	2.290	10.800	2.180	1.990	2.190	5.780
90/91	4.800	1.250	0.755	1.540	1.970	2.070	0.822	0.623	0.891	10.700	2.750	2.910	2.590
91/92	1.910	0.704	0.293	1.370	0.404	0.461	0.294	0.064	0.058	0.517	0.010	-	0.507
92/93	2.500	-	-	-	-	-	-	-	-	-	-	-	0.208
93/94	0.187	0.363	25.800	0.437	1.550	1.760	1.760	2.100	2.050	1.700	1.480	0.546	3.311
94/95	0.547	4.280	0.847	0.517	0.363	0.437	0.870	8.060	0.524	0.675	0.332	0.315	1.481
95/96	0.395	22.900	2.850	0.361	0.330	1.190	1.890	0.627	0.595	0.564	0.535	0.507	2.729
96/97	0.480	0.455	0.432	0.409	0.388	0.368	0.343	0.311	0.281	0.255	0.230	1.920	0.489
97/98	24.000												
											Debit moyen annuel:		1.298

Station: Merroutcha
N° 1RE 56/1548

Année	Septembre	Octobre	Novembre	Décembre	Janvier	Fevrier	Mars	Avril	Mai	Juin	Juillet	Août	Annuel
78/79	----	----	----	-	-	-	-	-	-	-	-	-	-
79/80	-	12.540	----	----	----	----	----	----	----	----	----	----	
80/81													
81/82													
82/83													
83/84													
84/85													
85/86	----	----	0.747	3.740	0.108	-	-	-	-	-	-	-	0.460
86/87	0.165	13.500	-	-	-	-	1.140	-	0.041	0.058	-	-	1.242
87/88	1.190	0.220	0.455	0.534	-	0.248	0.131	-	-	-	-	-	0.232
88/89	-	1.040	3.080	0.073	-	7.170	-	-	-	4.690	-	1.100	1.429
89/90	0.380	0.346	60.300	0.001	-	-	0.095	0.399	0.934	-	-	-	5.205
90/91	----	0.737	0.312	-	0.865	0.018	-	0.410	1.100	0.328	1.100	-	0.443
91/92	0.697	0.031	-	0.724	-	-	-	0.016	0.102	0.253	0.056	-	0.157
92/93	-	-	0.036	0.090	0.050	0.413	-	-	-	-	-	0.021	0.051
93/94	0.344	-	14.300	-	-	-	-	-	-	-	-	-	1.220
94/95	-	10.900	0.556	-	-	-	2.780	1.560	-	0.332	-	0.086	1.351
95/96	-	----	-	-	-	1.980	0.204	-	-	2.890	2.670	-	0.704
96/97	-	0.015	-	-	0.053	-	0.009	0.168	-	-	-	0.794	0.087
97/98	1.250	0.020	-	-	-	1.190	0.322	-	-	0.033	-	-	0.235
98/99	0.258	0.004	-	-	-	-	0.013	-	-	-	-	0.510	0.065
99/00	0.017	0.637	-	-	-	-	-	-	1.720	-	-	-	0.198
00/01	-	1.100	-	-	-	-	-	-	-	-	-	0.162	0.105
											Debit moyen annuel:		0.824

Station: L'hmida
N° 1RE 57/384

Année	Septembre	Octobre	Novembre	Décembre	Janvier	Fevrier	Mars	Avril	Mai	Juin	Juillet	Août	Annuel
76/77	17.200	2.600	0.040	0.329	3.670	0.006	0.011	0.912	0.003	-	-	-	2.064
77/78	1.340	0.093	0.022	5.620	0.496	0.002	0.001	-	-	-	-	-	0.631
78/79	-	2.970	0.011	0.011	14.000	0.023	0.017	0.013	0.966	0.014	-	-	1.502
79/80	2.560	46.400	0.055	0.042	0.086	0.023	1.290	0.375	0.004	-	-	-	4.236
80/81	0.002	0.002	0.001	0.026	-	0.001	-	-	-	-	-	-	0.003
81/82	-	-	-	-	0.939	0.065	0.065	2.820	0.765	0.874	-	-	0.461
82/83	-	-	0.002	-	-	-	-	-	2.580	0.012	-	0.064	0.222
83/84	0.015	-	-	0.012	0.033	0.031	0.012	-	0.027	-	-	-	0.011
84/85	-	0.047	0.539	-	0.014	-	-	-	2.340	-	-	-	0.245
85/86	1.080	0.182	0.698	1.910	0.029	0.027	0.027	0.009	0.006	-	-	-	0.331
86/87	0.121	5.990	-	-	-	-	0.235	-	0.001	0.002	-	-	0.529
87/88	0.512	0.425	1.050	0.588	-	0.010	-	-	-	-	-	-	0.215
88/89	-	1.210	0.482	0.002	-	2.600	-	0.003	-	3.260	-	0.991	0.712
89/90	0.095	8.010	35.400	8.000	5.630	0.141	0.036	1.280	2.950	-	-	-	5.129
90/91	0.856	0.001	-	0.213	0.001	0.242	0.020	0.049	-	1.400	-	0.275	0.255
91/92	0.444	-	-	3.300	-	-	-	-	-	-	-	-	0.312
92/93	-	-	-	-	-	-	-	-	-	-	-	-	
93/94	-	-	1.560	-	8.330	-	-	-	-	-	-	-	0.824
94/95	-	1.940	-	-	-	-	0.011	9.580	-	-	-	-	0.961
95/96	-	4.740	-	-	----	----	----	----	----	----	----	----	1.185
96/97	-	-	-	0.060	0.751	-	-	3.120	-	-	-	1.950	0.490
97/98	4.230	0.024	-	-	-	2.100	0.566	-	-	-	-	-	0.577
98/99	0.991	-	-	-	-	-	-	-	-	-	-	-	0.083
99/00	-	1.940	-	-	-	-	-	-	3.900	-	-	-	0.487
00/01	-	1.370	-	-	-	-	-	-	-	-	-	-	0.114
											Debit moyen annuel:		0.899

Table A.3.5 Location and Depth of DRH Observation Wells

B.V.	Region	n°IRE	X	Y	Z	P.T.
Guir	Gourrama	547 /39	618.250	198.650	1425.96	12.90
		553 /39	642.900	183.150	1178.26	13.15
		596 /39	633.150	190.450	1281.42	17.00
	Kaddoussa	992 /48	652.060	175.000	1114.00	13.10
	Boudenib	941 /48	676.950	152.222	928.00	6.37
		952 /48	670.990	150.380	947.70	6.32
		49 /49	685.410	152.898	906.30	18.45
Gheris	Tinejdad	1357 /56	535.880	103.973	990.63	18.32
		1358 /56	546.946	106.897	955.20	14.67
		1360 /56	540.721	104.100	976.78	10.77
		1361 /56	552.198	106.182	934.49	12.97
		1363 /56	542.678	112.432	986.41	4.00
		1368 /56	556.662	116.274	944.83	7.77
		1373 /56	564.797	108.149	898.49	8.68
		1445 /56	529.452	99.848	1019.89	20.08
		1476 /56	534.730	102.517	997.41	24.07
		1485 /56	535.118	107.394	996.45	8.40
		1510 /56	546.857	113.254	975.48	7.00
	Goulmima	663 /47	544.377	121.260	1008.74	18.60
		670 /47	540.561	123.016	1031.32	22.30
		678 /47	540.910	121.852	1024.71	22.15
		682 /47	540.773	136.082	1107.26	29.10
		691 /47	547.017	120.172	995.86	24.50
		755 /47	533.789	130.932	1088.84	13.05
		764 /47	576.050	138.700	1046.67	20.60
Ziz	Rich	498 /39	594.060	186.200	1283.92	7.70
		587 /39	600.350	187.350	1297.79	12.05
		597 /39	586.450	184.100	1312.12	18.95
		1195 /48	596.950	178.600	1226.66	4.97
	Errachidia	29 /48	588.300	154.250	1058.53	27.50
		98 /48	594.300	148.800	1019.28	23.95
		581 /48	607.000	136.850	953.70	15.65
		1204 /48	598.950	143.150	993.04	32.90
		1210 /48	620.350	140.000	981.55	14.75
		1511 /48	596.411	145.325	1010.00	196.00
Tafilalet	Tizimi, Erfoud	457 /57	605.701	92.300	789.95	19.24
		1307 /57	612.246	97.999	810.23	6.34
		3904 /57	617.650	92.450	800.00	60.35
		3907 /57	621.800	89.300	795.00	29.32
		4034 /57	618.150	104.250	851.57	119.43
		4035 /57	614.950	102.800	828.42	40.55
		4093 /57	614.610	117.870	881.00	12.14
		4096 /57	613.410	111.830	864.00	10.61
	Jorf, Hannabou	1028 /57	589.124	103.909	837.71	21.45
		1029 /57	599.479	95.665	796.69	7.74
		1048 /57	601.737	91.938	789.80	12.07
		3628 /57	592.892	102.170	824.47	13.03
		3630 /57	594.578	100.710	819.29	11.34
	Siffa, Rissani	525 /57	609.154	86.400	778.37	17.48
		1038 /57	605.758	84.873	775.12	18.22
		2379 /57	613.514	76.328	750.79	13.01
		3107 /57	607.566	77.731	760.00	17.27
		3254 /57	603.292	77.363	758.18	16.45
		3640 /57	609.212	69.844	756.24	20.97
		3659 /57	611.953	72.537	745.39	17.62
		3666 /57	606.450	69.736	718.19	22.85
		3669 /57	604.835	68.523	743.51	18.05
		3887 /57	611.057	70.882	745.98	19.53
Maider	Regg	178 /65				
		181 /65				
		192 /65				
	Tarhbalt	185 /65				

Table A.3.6-(1).1 Groundwater Data (Measured Monthly in Guir River Basin)-1

REGION: GOURRAMA (Tagrist): n°IRE = 547/39

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1980	8.29	8.33		7.97	8.04	8.28	8.36	8.96		8.90	8.67	8.63
1981	8.73	9.11	8.79	9.10	9.62	9.80	10.05	10.33	10.50	10.62	10.70	10.75
1982	10.44	10.15	10.28	10.19								
1983	10.74		10.32	10.77	10.47			10.95	11.15		11.31	
1984	11.40	11.32	11.35	11.28	11.30	11.36	11.46	11.60	11.61	11.76	11.60	11.55
1985	11.55	11.51	11.64	11.63	11.40	11.48	11.68	11.88	12.07	12.03	11.86	11.83
1986	11.56	N.M	11.50	11.46	11.54	11.60	11.75		12.27	12.09	11.81	
1987		11.70		11.80	11.78	11.93	11.69	11.60	12.30	11.62	11.28	11.22
1988	11.20	10.70	10.59	10.75	10.87	11.52	11.60	11.80	11.90	11.81	11.59	11.23
1989	10.87	10.66	10.74	9.40	9.55	5.84	9.96	11.10	11.00	10.56	10.34	
1990			8.28	8.20	8.03	8.36	8.56	8.69	8.49	8.40		
1991	8.93		8.88	8.83	8.51	8.39	8.67	8.34	8.37		8.61	8.60
1992	8.78	8.78	8.71	8.85	8.73	8.89				9.73	10.20	10.12
1993	9.83	3.61	9.54	9.69	9.75	10.03			10.86	11.06	8.90	8.36
1994	7.88		7.62		7.90	8.13		9.00		8.75	8.45	8.45
1995			8.40				8.40					
1996		8.10										
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION: GOURRAMA (Toulal): n°IRE = 596 / 39

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1980	15.40	16.48		15.93	16.11	8.83	16.46	16.55		16.22	16.28	16.45
1981	16.34	16.75	16.40	16.28	16.37	15.48	16.55	16.60	16.50	16.55	16.48	16.58
1982	16.04	16.10	16.43	16.45	16.50	16.65					16.67	16.90
1983	16.75	16.70	16.65	16.69	16.61				17.01		16.81	
1984	16.88	16.78	16.83	16.90	16.94	16.94	SEC	SEC	SEC	16.55	16.45	16.40
1985	16.50	16.45	16.60	16.70	16.60	16.70	17.28	17.15	17.22	16.75	16.87	16.80
1986	16.62	16.64	16.74	16.77	16.90	17.01	17.12		17.23	16.70	16.63	
1987		16.71		16.77	16.70	17.11	17.05	17.40	17.51	17.32	16.90	16.78
1988	16.68	16.77	16.60	16.73	16.71	17.30	17.30	17.40	17.40	16.92	16.73	16.49
1989	16.76	16.72	16.72	16.71	16.90	17.01	17.19	17.15	17.11	17.04	17.07	
1990			15.76	15.71	15.86	15.45	15.75	16.03	15.91	16.04		
1991	15.89		15.82	15.63	15.88	15.59	16.15	16.23	16.41		16.14	16.03
1992	15.99	16.16	16.14	16.20	16.08	16.13				16.55	16.26	16.38
1993	16.38	16.28	16.33	16.33	16.04	16.06			16.61	16.69	15.70	15.76
1994	14.35		15.24		15.83	16.10		16.70		15.70	15.78	15.88
1995			15.96				16.11					
1996												
1997												
1998												
1999												
2000										16.83		
2001	16.62											
2002												
2003	16.05											

REGION: GOURRAMA (Irara): n°IRE = 553/ 39

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1980	8.60	9.14		7.75	8.06	11.22	9.55	10.47		10.17	9.79	8.84
1981	9.47	9.90	9.75	10.01	10.29	11.18	11.29	11.29	11.27		1.19	11.19
1982	9.49	9.75	10.29	10.24	10.04	10.29					11.59	11.22
1983	11.37	10.60	10.42	10.41	10.08			14.14	12.41		12.56	
1984	12.43	12.46	12.49	11.31	12.23	12.29	12.39	12.49	12.54	12.54	12.31	12.31
1985	11.09	10.40	9.90	9.74	9.65	9.85	9.87	10.75	11.45	9.15	9.45	9.85
1986	8.63	8.61	8.85	9.12	9.25	9.55	10.45		11.25	9.02	9.00	
1987		10.12		10.53	10.20	10.24	10.25	13.15	13.15	13.15	10.13	9.27
1988	9.19	9.30	9.13	9.26	9.30	10.25	12.05	12.45	12.65	10.15	10.04	9.71
1989	9.94	9.71	10.01	10.52	10.44	10.61	11.35	12.56	12.78	12.57	11.80	
1990			9.30	9.69	7.59	7.50	8.15	9.50	9.45	9.53	9.68	
1991	9.53		9.44	9.33	8.82	9.02	9.82	10.10	10.39		10.29	10.62
1992	10.32	10.41	10.36	10.47	10.36	9.79				13.08	9.70	9.72
1993	9.30	9.18	9.25	9.47	10.47	12.25			12.96	13.15	8.05	7.85
1994	8.25		9.18		9.71	10.05		10.75		12.98	8.73	9.27
1995			9.15				9.88					
1996		7.57										
1997												
1998												
1999												
2000										11.03		
2001	11.00											
2002												
2003	13.28											

REGION: BARRAGE (kaddoussa): n°IRE = 992/ 48

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1976										10.60	10.19	10.19
1977	10.39	10.11	10.20	10.25	10.25	10.34	11.01	10.80	10.76	10.56	9.85	9.76
1978	9.58	9.65	9.66	9.65	9.60	9.64	11.30	10.95	11.09	11.53	11.26	
1979											10.31	9.62
1980	9.67	9.61	9.58	9.54	9.66	9.71	10.12		12.99	11.71	10.78	9.97
1981	9.78		10.14	9.63	9.62	9.66			12.11	12.55	12.74	12.87
1982	12.01			11.37	11.32	10.05	10.71					11.18
1983	10.01	11.16		11.21	11.44	11.40	11.49					
1984					10.80	10.74	11.29			10.75	10.76	10.81
1985	10.72	10.75	10.72	10.75	10.73	10.76	10.81	10.81	10.77	10.54	10.54	10.50
1986	10.53	10.55	10.56	10.57	10.72		10.78	10.88	10.89	10.88	10.90	
1987	10.94	10.97	10.96	10.97	10.98	10.92	11.26	12.05	12.28	12.29	12.17	11.00
1988	10.99	10.83	10.62	10.70	10.74	11.27	11.18	11.33	11.50	10.90	10.76	F
1989	10.73	10.80	10.83	10.73	11.02	11.11	11.01	11.58	11.50	11.60	10.55	
1990			10.69	10.60	10.38	10.36	10.50	10.67	10.93	11.20		
1991	11.11		10.87	10.78	10.52	10.70	10.93	11.18	11.01	10.96	10.83	11.49
1992	11.55	11.80	11.90	12.00	12.03	11.96				12.07	11.86	11.84
1993	11.90	11.87	11.84	11.89	11.80	11.40			12.21	12.35		10.86
1994	10.75		10.92		11.34					12.38	12.21	12.19
1995			11.20				10.92					
1996												
1997												
1998												
1999												
2000												
2001												
2002												
2003												

Table A.3.6-(1).2 Groundwater Data (Measured Monthly in Guir River Basin)-2

REGION: BOUDNIB (Ksar Ouled Ali): n°IRE = 941 / 48

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1973	3.85	3.80	3.86	3.71	3.94	3.93	4.13	4.11	4.25	4.20	4.11	4.05
1974	4.06	4.08	4.10	4.05	4.25	4.20	4.10	4.05	4.25	4.19	4.04	4.84
1975												
1976												3.95
1977	3.49	3.86		3.91	4.05	4.17	5.05	4.25	4.20	4.05	3.93	3.95
1978	3.84	3.91	4.09	4.02	4.17	5.01	4.48	4.51	4.27	4.20	4.17	
1979	3.80	3.85									3.93	3.89
1980	3.59	3.87		3.60	3.73	3.87	3.98	4.24		3.97	3.93	3.89
1981	3.86	4.31	3.90	3.99	4.05	4.12	4.35	4.25	4.23	4.21	4.07	4.25
1982	3.69	3.65	3.96	4.00	4.01	4.95					4.15	4.15
1983	4.21	4.05	4.07	4.09	4.01			4.29	4.26		4.30	
1984	4.29	3.99	3.95	3.98	4.11	4.19	4.33	4.37	4.40	4.33	4.20	3.90
1985	3.94	4.01	3.95	4.03	3.84	4.00	4.35	4.43	4.56	4.08	4.01	3.97
1986	3.83	3.76	3.28	3.94	4.05	4.08	4.21		4.25	3.78	3.86	
1987		3.86	3.92	3.93	3.84	3.73	3.85	4.38	4.54	4.35	3.87	3.78
1988	3.65	3.75	3.67	3.57	3.55	4.55	4.23	4.33	4.36	4.00	3.86	3.81
1989	3.77	3.76	3.80	3.75	4.00	4.04	4.21	4.27	4.42	4.27	3.68	
1990	2.85	2.93	2.89	3.06	2.65	3.02	3.38	3.81	3.55	3.45	3.41	
1991	3.09		2.53	2.48	3.39	3.44	3.73	3.70	3.82	3.75	3.81	3.66
1992	3.37	3.50	3.42	3.59	3.53	3.51				4.18	3.79	3.73
1993	3.70	3.63	3.55	3.63	3.70	4.01			4.15	4.05	2.90	2.42
1994	2.95		2.75		3.15	3.21		3.85		3.55	3.05	3.10
1995			3.35				3.40					
1996		AD	4.04	4.93	2.93	2.96	2.88	3.56				
1997						3.66	3.85	3.85	3.66	3.87	3.78	
1998												
1999										4.68	4.52	
2000	4.26							4.70				
2001	4.91											
2002												
2003	4.28											

REGION: BOUDNIB (Ksar sahli): n°IRE = 49 / 49

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1973	13.78	13.60	13.47	13.47	13.42	13.42	13.62	13.64	13.69	13.94	13.81	13.74
1974	13.69	13.60	13.59	14.74	13.74	13.97	14.34	14.11	14.24	14.08	14.09	14.11
1975												
1976												16.52
1977	16.47	13.68		13.70	13.81	13.86	13.95	14.01	13.64	13.79	14.09	13.99
1978	13.64	13.78	13.91	13.85	13.96	14.90	14.24	14.41	14.26	14.46	14.19	
1979	13.61	14.47									13.89	13.82
1980	13.78	13.64		13.62	13.62	13.88	13.64	14.32		14.23	14.24	14.12
1981	14.01	14.50	13.99	13.89	14.04	14.16	14.24	14.39	14.50	14.51	14.44	14.41
1982	14.13	14.09	14.20	14.22	14.12	14.04					10.01	14.39
1983	14.52	14.32	14.32	14.31	13.42			SEC	SEC		SEC	
1984	SEC	SEC	SEC	SEC	17.99	18.04	18.14	18.09	F	18.06	16.89	16.84
1985	16.84	16.76	16.39	16.39	16.18	15.32	15.36	15.45	15.58	14.68	14.59	
1986												
1987												
1988												
1989												
1990	14.44				14.36	14.49	14.93	15.88	16.29	16.27		
1991	16.16		16.05	16.01	14.33	14.19	14.24	14.44	14.43		14.43	14.81
1992	14.72	14.59	14.48	14.58	14.63	14.58			14.66	14.68	14.28	4.26
1993	14.72	14.59	14.48	14.57	14.63	14.58			14.66	14.68	14.28	14.26
1994	14.11		14.87		14.16	19.26		16.70		14.56	14.46	14.43
1995			14.82				14.56					
1996		A.D										
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION: BOUDNIB (Ksar Touz): n°IRE = 952 / 48

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1973	3.93	3.83	3.82	3.90	4.10	4.06	4.54	4.55	4.61	4.62	4.48	4.26
1974	4.21	4.11	4.11	4.01	4.61	4.66	5.53	4.86	4.72	4.55	4.00	3.20
1975												
1976												3.49
1977	3.27	2.14		3.16	3.33	3.57		4.15	4.18	4.18	3.98	3.91
1978	3.80	3.50	3.65	3.85	4.28	5.17	4.88	4.91	4.93	4.96	4.73	
1979	4.61	4.41										3.84
1980	3.65	4.69		3.57	3.64		4.16	4.62		4.49	4.39	4.21
1981	4.08	4.48	3.93	4.13	5.31	4.62	4.83	5.08	5.18	5.21	5.29	5.18
1982	4.86	4.53	4.75	4.87	5.04	5.21					5.48	5.41
1983	5.34	5.06	5.09	5.41	5.38			6.10	6.58		6.10	
1984	5.79	5.51	5.43	5.51	5.67	6.11	6.91	7.13	6.81	6.79	6.17	5.96
1985	6.09	6.25	5.45	4.91	4.85	5.00	5.45	5.79	6.11	5.77	5.61	5.42
1986	5.19	5.13	5.04	4.96	5.09	5.25	5.65	5.96	5.84	5.84	5.66	
1987		5.38	5.44	5.37	5.30	5.23	5.32	5.90	6.50	6.45	6.10	5.99
1988	5.85	5.92	5.61	5.40	5.40	6.05	6.19		F	6.40	6.19	5.85
1989	5.72	5.53	5.48	5.37	4.65	4.84	4.96	6.49	6.44	6.67	6.39	
1990	5.60	5.02	4.94	5.02	4.48	4.32	4.51	4.79	5.07	5.05		
1991	4.93		4.28	4.23	4.23	4.31	4.72	4.87	4.24	4.20	4.32	4.42
1992	4.57	4.37	4.32	4.43	4.68	4.71				4.77	4.99	5.03
1993	5.25	5.16	5.04	5.00	4.93	5.56			6.36	6.37	5.95	4.86
1994	4.80		4.12		4.43	9.98		5.16		4.85	4.84	4.64
1995			4.06				4.04					
1996		A.D										
1997												
1998												
1999												
2000												
2001												
2002												
2003	7.48											

Table A.3.6-(2g).1 Groundwater Data (Measured Monthly around Gheris River)-1

REGION: GOULMIMA (Zinba taziat): n°IRE = 682 / 47

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1973								17.64	17.97	17.67	17.87	16.37
1974	17.27	17.30	17.87	18.07	18.09	18.27	18.47	18.67	18.64	17.92	18.27	18.02
1975		18.42	18.62	18.77	17.27	17.27	18.02	18.25	18.52	18.15	18.	
1976	17.05	17.54	17.65	17.77	17.02		17.33		17.95	17.51	17.37	17.38
1977	16.94	17.57	17.90	17.97		18.41	18.37	18.70	18.52	18.57	18.65	18.59
1978	17.86	18.29	18.64	18.61		19.53	17.89	18.94	18.96	19.12	18.69	
1979	18.77	18.67									18.37	18.51
1980		18.60	16.85	16.40	16.55	16.62	17.01	17.55	17.60		17.54	17.08
1981	17.15	16.84	17.45	17.80	18.15	18.25	18.50	18.65	18.81	18.75		18.85
1982	18.85	18.55	18.56	18.95	18.70	15.63		18.90				19.01
1983	18.98	19.03	18.96	19.08	19.20			19.07			18.97	
1984	19.10	19.1	19.13	19.19	19.17	19.30	19.87		19.62	19.33	19.25	19.17
1985	19.14	19.33	19.33	19.47	19.08	19.25	19.76	19.77	19.77	19.65	19.65	
1986	19.31	19.40										
1987				19.75	19.80	19.90	19.92	19.90	19.79	19.89	119.55	19.40
1988	19.88	19.83	19.83	19.81	19.75	19.89	20.00	20.05	19.97	19.60	19.35	19.52
1989	19.83	19.55	18.80	19.21	19.21	19.03	18.93	18.96	19.05	18.90		
1990				16.33	15.98	16.20	16.24	16.35	16.69	16.55		
1991	16.55		17.16	17.31	17.37		17.46	17.50	18.60	17.86	17.75	
1992	17.69	17.68	17.95	18.25		18.59				18.93	17.75	
1993	18.50		19.03	19.31	19.28	19.42			19.43		17.59	16.97
1994					17.28						16.32	16.71
1995			16.8									
1996		16.4										
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION : GOULMIMA (Boutanfit): n°IRE = 663/47

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1973								18.5	18.4	18.5	18.2	18.1
1974	18.1	18.4	18.3	18.5	18.7	18.9	18.9	18.8	18.7	18.7	18.7	18.6
1975		18.8	18.7	18.7	17.8	18.4	18.6	18.7	18.7	18.8	18.8	18.6
1976	18.6	18.7	18.6	18.7	18.4	18.4	18.5		18.7	18.5	18.5	18.6
1977	18.5	18.5	18.6	18.6		18.7	18.7	18.8	18.7	18.7	18.7	18.7
1978	18.7	18.6	18.7	18.8	18.9	19.4	19.0	18.9	19.2	19.0	18.9	
1979	19.0	17.8									18.5	18.4
1980		18.6	17.9	17.3	17.6	18.1	18.4	18.5	18.5		18.5	18.2
1981	18.0	18.2	18.4	18.3	18.4	17.6	18.6	18.6	18.7	18.6		18.7
1982	18.7	18.4	18.4	18.2	18.5	18.6						18.9
1983	18.8	18.9	18.8	18.9	18.7			19.0	18.8		18.9	
1984	18.9		19.0	19.1	19.1	19.2	20.3		19.2	19.8	19.1	19.1
1985	19.0	19.0	19.0	19.1	18.9	19.2	19.1	19.5	19.5	19.1	19.2	
1986	18.7	18.9										
1987				19.0	19.0	19.1	19.2	19.3	19.0	19.0	18.9	18.7
1988	18.9	18.9	18.7	18.9	18.9	19.0	18.1	19.5	19.5	19.2	18.7	18.9
1989	18.9	18.9	18.4	18.7	18.7	18.8	18.9	18.8	18.7	18.4		
1990				16.4	16.1	16.0	16.4	17.0	16.9	16.6		
1991	16.5		17.0	17.3	17.6		17.8	17.9	18.6	17.9	18.0	17.9
1992	17.9	17.8	17.8	17.9		18.1				18.2	18.2	
1993	18.1		18.1	18.3	18.3	18.8			18.5		17.8	17.5
1994					18.3						17.4	18.0
1995			18.2									
1996		17.4										
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION: GOULMIMA (Ialtafraout): n°IRE = 755 / 47

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1980		11.78	11.55	11.67	11.62	11.66	11.69	11.71	11.71		11.85	11.85
1981	11.69	11.85	11.85	11.59	11.75	11.80	11.90	11.85	11.75	11.70	11.90	11.80
1982	11.60	11.60	11.61	11.80	11.65	11.76		12.07				11.97
1983	11.93	11.88	11.90	11.88	11.93			11.89	11.06		11.97	
1984	11.99	12.59	11.93	12.00	11.95	12.10	12.03		11.96	12.00	12.05	12.00
1985	11.95	11.93	11.67	11.98	11.94	12.05	12.08	12.12	12.12	11.96	12.15	
1986	11.97	12.02										
1987				9.85	11.95	11.90	12.14	12.05	11.86	11.87	11.80	11.75
1988	11.83	11.76	11.82	11.69	11.75	11.83	11.85	12.00	11.86	11.80	11.75	11.80
1989	11.86	11.73	11.63	11.63	11.49	11.55	11.67	11.38	11.53	1.40		
1990				11.40	11.30	11.35	11.45	11.88	11.80	11.75		
1991	11.54		11.84	11.90	12.01		11.93	11.99	11.95	11.96	11.95	11.84
1992	11.97	11.88	11.91	11.95		E				12.11	12.10	
1993	11.33		11.78	11.99	12.17	12.32			12.33		10.93	10.88
1994					12.11						12.15	12.11
1995			12.05									
1996		11.61										
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION: GOULMIMA (Ait Yahya): n°IRE = 670 / 47

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1973								19.9	20.05	20.08	20.06	19.84
1974	19.66	19.67	19.63	19.78	19.79	19.81	19.80	19.9	19.90	19.9	19.92	19.80
1975		20.10	19.99	20.00	19.95	20.01	19.75	19.6	19.50	20.17	19.80	19.78
1976	19.81	20.01	19.90	19.98	19.84	19.61	19.48		19.62	19.34	19.58	19.45
1977	20.00	19.44	19.40	19.85		19.60	19.65	19.9	19.82	19.94		19.75
1978		20.06	19.40	20.00	20.05	20.36	19.51	19.5			19.62	
1979	19.75	19.50									20.07	
1980		19.54	18.74	18.70	15.85	18.89	19.10	19.1			19.19	18.85
1981	18.64	19.19	19.54	19.19	19.44	19.09	18.84	19.4	18.79	19.14	19.14	19.94
1982	19.04	19.19	19.21	19.44		19.58		19.7				
1983	19.64	19.74		20.02	20.28			20.1	19.96		19.84	
1984	19.85	19.79	19.83	19.83	19.96	19.94	19.64		19.42	19.16	19.36	19.83
1985	19.92	19.88	19.92	20.15	20.06	19.94	F	20.0	19.95		19.85	
1986	20.38											
1987				F	20.69	20.57		21.1	20.58	20.60	20.75	20.95
1988	20.95	21.05	21.09	21.20	20.55	21.60	21.67	21.7	21.46	21.58	21.56	
1989	21.69	21.98	F	21.60	21.59	21.65	21.59	21.5	21.20	21.50		
1990				19.20	18.95	18.75	18.65	18.8	18.92	18.95		
1991	21.35		19.25	19.35	19.50		19.63	19.6	20.31	19.53	19.48	19.40
1992	19.78	19.67	19.75	19.88		19.93				20.40	20.29	
1993	20.18		20.44	20.64	F	F			20.69		19.89	19.56
1994					20.87						20.75	20.52
1995			20.52									
1996		20.75										
1997												
1998												
1999												
2000												
2001												
2002												
2003												

Table A.3.6-(2g).2 Groundwater Data (Measured Monthly around Gheris River)-2

REGION: GOULMIMA (Tiaâouanine): n°IRE = 678 / 47

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1973								18.90	18.93	18.96	18.90	18.90
1974	18.95	18.90	18.93	19.18	19.25	19.25	19.30	19.42	19.40	19.39	19.59	19.40
1975		19.40	19.60	19.38	19.23	19.40	19.23	19.63	19.41	20.05	19.48	19.80
1976	19.44	19.73	19.49	19.44	19.30	19.25	19.20		19.32	19.10	19.01	19.44
1977	19.52	19.18	18.98	19.37		19.18	19.28	19.38	19.30	19.65	19.55	19.54
1978	19.25	19.49	19.66	18.95	19.55	19.60	19.75	19.84	19.67	19.98	18.87	
1979	19.92	19.85									20.54	19.80
1980		19.85	19.40	18.91	18.12	18.19	18.26	18.40	18.57		18.75	18.60
1981	18.60	18.45	18.36	18.40	18.60	18.70	18.80	18.95	18.91	19.15	19.15	19.10
1982		19.10	19.12	19.45	19.47	19.46		19.54				19.77
1983	19.85	19.90	20.00	19.93	19.95			20.15	20.05		20.11	
1984	20.23	20.25	20.31	20.24	20.13	20.27	20.23		20.23	20.30	20.33	20.30
1985	20.33	20.39	20.50	20.48	20.50	20.67	20.57	20.68	20.68	20.70	20.80	
1986	20.77	20.86										
1987				SEC	SEC	SEC		SEC	SEC	SEC		
1988		SEC					SEC	21.77	21.76	21.62	21.50	21.45
1989	21.45	21.40	21.20	21.20	21.26	21.34	21.19	21.20	21.12	20.90		
1990				18.09	17.82	17.20	17.87	17.44	17.46	17.45		
1991	17.73		17.95	18.10	18.28		18.51	18.50	19.30	18.64	18.68	18.75
1992	18.7	18.79	18.68	18.75		19.08				19.30	19.42	
1993	19.50		19.56	19.69	19.91	20.07			20.37		22.22	20.12
1994					20.23						20.29	20.19
1995			20.05									
1996		19.50										
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION: GOULMIMA (Toughza): n°IRE = 691 / 47

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1980		16.75	16.75	16.50	17.03	12.57	20.43	21.30	21.52		22.13	20.24
1981	18.73	20.44	21.91	21.03	21.38	21.62	21.88	22.28	22.78	22.89		23.13
1982	22.83	23.23	23.28	23.38	21.76	21.64		23.64				23.59
1983	23.50	23.70	23.62	23.93	23.36			24.36	23.92		23.93	
1984	23.16		23.81	23.92	23.96	24.88	24.20		23.33	24.21	23.62	24.05
1985	23.61	23.76	23.68	24.08	23.68	23.93	24.73	24.75	24.75	23.52	23.27	
1986	23.58	23.74										
1987				23.63	23.53	23.56	24.26	23.83	23.38	23.51	23.41	23.40
1988	23.54	23.48	23.50	23.49	23.48	23.18	23.71	24.04	23.98	23.56	23.48	23.71
1989	23.78	23.50	23.59	23.50	22.61	22.99	23.72	22.53	23.38	21.83		
1990				15.08	14.98	15.20	16.11	17.18	17.08	16.80		
1991	16.58		17.88	18.18	18.55		18.91	19.68	20.13	19.48	19.28	19.25
1992	18.70	19.08	20.13	20.21		21.52				22.79	22.78	
1993	22.13		22.58	22.70	22.95	23.13			23.27		17.76	16.88
1994					23.48						17.62	20.69
1995			21.21									
1996		18.20										
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION: Goulmima (sur la route vers Goulmima): n°IRE = 764/47

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1980		20.00	20.01	20.70	20.02	21.20	20.38	21.10	20.23		20.75	20.30
1981	20.27	20.35	20.66	20.46	20.50	21.80	21.30	20.85	20.58	20.70	20.60	20.70
1982		19.50	19.54	21.75	20.74	21.52		21.40				20.75
1983	20.80	20.83	21.15	21.19	21.30			20.98	20.98		20.90	
1984	20.88	20.87	20.90	21.23	21.09	21.14	21.37		21.14	21.00	20.05	21.04
1985	21.05	21.04	20.78	20.95	21.18	21.60	21.70	21.28	21.28	21.09	21.10	
1986	20.94	20.92										
1987				20.80	20.74	20.70	20.75	21.50	20.80	20.80	20.65	20.45
1988	20.44	20.40	20.42	20.46	20.50	20.62	20.60	21.17	20.70	20.65	20.58	20.65
1989	20.65	20.55	20.65	20.66	20.65	20.96	20.77	20.76	20.74	20.70		
1990				20.80	19.75	20.55	19.93	20.05	20.00	20.00		
1991	20.10		20.20	20.52	20.39		20.61	20.75	20.40	20.38	20.42	20.40
1992	20.36	20.42	20.40	20.43	20.46					20.56	20.54	
1993	20.54		20.53	20.59	20.72	20.83			20.96		20.49	20.30
1994					20.43						20.32	20.42
1995			20.58									
1996		19.90										
1997												
1998												
1999												
2000												
2001												
2002												
2003												

Table A.3.6-(2tf).1 Groundwater Data (Measured Monthly around Todrha-Ferkla River)-1

REGION: TINEJDAD (Tinejdad): n°IRE = 1357/56

MOIS / ANNEES	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	5ep	Oct	Nov	Dec
1973								9.97	10.23	10.29	10.22	9.89
1974	10.10	10.23	10.46	10.79	10.84	10.42	11.80	11.62	11.17	11.19	11.64	11.77
1975		11.89	11.82	11.84	9.19	9.52	10.32	11.52	11.55	11.72	11.99	12.05
1976	12.19	12.52	12.39	12.29	12.37	11.67	12.12		10.61	10.31	11.66	12.11
1977	12.14	13.26	12.72	13.17		13.07	12.27	13.44	13.34	13.42	13.49	13.33
1978	13.91	13.27	13.51	13.61	13.82	14.73	14.10	13.99	13.94	14.22	13.89	
1979	13.97	11.73									10.91	11.07
1980		13.52	11.70	12.13	12.32	12.72	12.83	13.25	13.34		13.83	13.50
1981	13.37	14.57	13.40	13.55	12.85	14.10	14.25	14.20	14.35	14.50		14.49
1982	14.50	14.35	14.40		14.36	13.41		14.00				14.43
1983	14.40	14.37	14.66	15.09	15.18			14.58	14.89		15.08	
1984	15.05	15.15	15.29	15.15	16.03	16.43	16.44		16.31	16.38	16.12	15.45
1985	15.02	15.35	14.46	16.00	14.20	14.19	14.59	14.76	14.76	15.00	15.13	
1986	14.82	14.90										
1987				14.30	14.15	14.90	15.41	15.83	14.70	14.46	14.30	14.20
1988	14.24	14.62	15.32	15.10	15.15	14.66	16.31	16.26	16.28	15.00	14.23	14.10
1989	14.06	13.90	14.07	13.44	13.80	13.53	13.18	13.30	13.35	13.30		
1990				12.06	11.85	12.30	12.63	12.81	13.00	13.07		
1991	13.40		13.13	13.94	14.10	14.10	14.28	14.36	14.90	14.16	14.30	14.30
1992	14.25	14.44	14.48	14.84		15.65				16.00	15.93	
1993	15.60		16.72	16.30	16.36						13.18	13.03
1994					14.45						16.06	13.06
1995			14.15									
1996		12.92										
1997												
1998												
1999												
2000										15.24		
2001												
2002												
2003												

REGION: TINEJDAD (Izlif): n°IRE = 1360/56

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1973								8.00	7.48	7.66	7.66	6.81
1974	7.52	7.88	8.12	8.22	8.24	8.54	9.08	9.01	8.36	7.99	8.08	8.23
1975		8.70	8.85	8.87	3.11	3.10	3.06	3.45	3.92	4.31	4.41	4.61
1976	4.70	5.01	5.54	6.20	6.41	6.42	6.84		7.33	5.41	4.58	4.66
1977	4.66	5.00	5.57	6.41		6.67	7.71	7.71	8.06	8.76	8.81	8.47
1978	8.95	9.35	9.11	8.52	8.64	9.87	9.86	9.71	9.68	9.86	7.93	
1979	7.93	7.76									3.23	3.43
1980		10.02	3.90	4.11	4.33	4.77	5.12	6.15	6.18		6.52	6.67
1981	6.41	6.50	6.89	7.10	7.43	7.65	7.95	8.25	8.80	8.35	8.35	8.55
1982	8.33	8.15	8.22	8.50	4.57	5.70		7.45				8.15
1983	8.53	9.13	8.63	8.70	8.28			8.90	8.58		9.20	
1984	8.88	9.45	9.51	9.41	9.37	10.29	9.49		10.43	10.43	9.64	10.13
1985	9.55	10.11	9.85	10.21	10.00	10.10		10.25	10.25	7.71	6.92	
1986	6.08	6.56										
1987				7.30	7.65		8.17	8.34	7.95	7.87	7.82	7.66
1988	7.74	8.14	8.03	8.12	8.14	8.30		8.86		8.34	7.77	7.60
1989	7.82	7.43	7.42	7.57	7.92	7.58	7.60	7.72	7.85	7.74		
1990				4.28	4.37	4.67	5.01	5.36	6.00	5.87		
1991	6.14		6.52	6.67	7.01		7.24	7.52	7.75	7.36	7.32	7.33
1992	7.30	7.28	7.35	7.78		7.80				7.62	7.84	
1993	7.82		7.42	7.47	7.68	7.85			8.09		6.37	5.93
1994					7.78		8.21				6.57	6.84
1995			6.84							8.25		
1996		5.15	5.37	6.60		9.65			6.70		6.80	7.80
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION: TINEJDAD (Igli): n°IRE = 1358/56

MOIS / ANNEES	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1973								5.22	5.22	5.24	5.07	4.94
1974	4.92	4.94	5.01	5.07	5.12	5.40	5.44	5.52	5.22	5.34	5.07	5.02
1975		5.02	5.02	5.26	4.77	4.94	5.22	5.32	5.37		5.21	5.10
1976	5.11	5.10	5.16	5.32	5.32		5.77		5.49		5.21	5.20
1977	5.19	5.31	5.39	5.40		5.59		5.62			5.76	5.50
1978	5.59	5.86	5.68		4.87			6.14				
1979		4.32									4.47	5.98
1980		6.07	5.99		6.18	6.41	6.45	6.58	6.55		6.19	6.08
1981	5.96	6.01	5.50	6.21		6.57	6.83	7.03	6.76	6.63	6.58	
1982	6.58	6.02	6.39		6.89	7.00		7.53				7.28
1983	7.23	7.41	7.60	8.01	7.98			8.41	8.70		8.50	
1984	8.47	8.66	8.81	9.09	9.02		9.80		10.33	9.87	9.94	10.04
1985	9.78	10.26	10.40	10.64	10.73	12.05	11.35	11.37	11.37	11.95	11.92	
1986	10.72	11.27										
1987				12.05	13.20	12.70	13.17	13.65	13.14		12.50	
1988	12.64	12.85	13.11	13.05	13.01	13.35	14.60		14.51	14.38	13.45	13.65
1989	13.67	13.49	13.52	14.70	14.60	12.41	13.50	12.85	14.55	11.95		
1990				9.59	9.25	9.36	9.77	9.70	8.95	8.69		
1991	8.15		7.75	8.05	8.10	8.10	8.55	8.39	8.78	7.98	7.95	7.93
1992	7.66	7.55	7.93	7.98		8.80				8.88	9.27	
1993												
1994			-									
1995												
1996												
1997												
1998												
1999												
2000										16.10		
2001												
2002												
2003												

REGION: TINEJDAD (Mellaab): n°IRE = 1361/56

MOIS / ANNEES	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	5ep	Oct	Nov	Dec
1973								10.81	10.58	10.95	10.03	8.80
1974	8.71	8.70	8.84	8.86	9.06	9.15	9.86	10.13	10.08	9.73	9.58	9.23
1975		9.36	8.96	8.98	7.68	7.93	8.45	8.88	9.21	9.28	9.38	8.68
1976	8.10	8.24	8.15	8.46	8.56		8.60		9.58	9.32	9.13	8.98
1977	8.83	8.40	8.80	8.80		9.48	9.81	10.83	10.43	10.45	10.71	10.63
1978	10.28	9.62	10.54	10.57	10.90	11.89	11.73	11.55	11.38	11.36	11.20	
1979	11.30	10.83									9.80	9.74
1980		9.82	9.72	9.15	9.15	10.37	9.76	10.37	10.57		10.99	11.04
1981	11.20	11.20	11.07	10.99	11.20	10.45	11.45	11.60	11.65	11.70	11.50	11.95
1982	11.80	11.60	11.63	11.80	11.48	10.32		10.92				11.63
1983	11.85	11.82	11.91	11.97	11.84			11.85	12.47		12.29	
1984	12.62	12.72	12.73	12.81	12.86	13.25	13.09		13.19	12.93	12.71	12.45
1985	12.30	12.11	12.03	12.00	11.90	11.60	11.38	11.37	11.37	11.30	11.15	
1986	10.78	10.79										
1987				11.05	11.15	11.40	12.25	12.65	12.56	12.33	12.00	11.51
1988	11.65	11.75	11.70	11.75	11.80	11.85	12.47	12.10	12.07	11.90	11.67	11.50
1989	11.53	11.60	11.30	11.30	11.43	11.41	11.05	10.85	10.80	10.80		
1990				10.52	10.41	10.35	10.46	10.49	10.59	10.55		
1991	10.75		10.95	10.85	11.00		10.77	10.75	10.93	10.79	10.30	10.25
1992	10.43	10.44	10.49		10.59					10.65	10.79	10.82
1993		10.75	10.85	11.18	11.29			11.32		11.07	10.55	
1994					10.69						10.37	10.30
1995			10.39									
1996		9.87										
1997												
1998												
1999												
2000										13.57		
2001												
2002												
2003												

Table A.3.6-(2tf).2 Groundwater Data (Measured Monthly around Todrha-Ferkla River)-2

REGION: TINEJDAD : n°IRE = 1363/56

MOIS / ANNEES	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	5ep	Oct	Nov	Dec
1973								8.60	3.69	3.43	3.43	3.47
1974	3.36	3.28	3.10	3.10	3.24	3.30	3.46	3.60	3.59	3.62	3.70	3.48
1975		3.23	3.09	3.10	3.02	3.23	4.35	3.42	3.50	2.95	3.49	3.44
1976	3.32	3.22	3.17	3.26	3.20	3.37	3.74		3.49	2.80	3.58	3.59
1977	2.73	3.28	3.31	2.95		3.67	3.80	3.80	3.70	3.80	3.75	3.10
1978	3.59	3.54	3.56	3.80	3.64	3.67	3.82	3.90	3.92	3.88	3.15	
1979	3.00	3.00									3.40	3.23
1980		3.27	3.15	3.30	3.39	3.42	3.65	3.61	3.74		4.01	3.67
1981	3.65	3.55	3.75	3.35	3.67	3.58	3.85	3.85	3.90	4.00	3.95	3.80
1982		3.36	3.37	3.58	3.51	3.43		3.90				3.91
1983	3.75	3.63	3.63	3.72	3.77			3.90	4.15		4.23	
1984	3.88	3.74	3.63	3.68	3.77	3.95	3.98		4.34	4.40	4.18	3.98
1985	3.90	3.66	3.57	3.59	3.55	3.80	3.90	4.05	4.05	4.20	4.25	
1986	3.58	3.56										
1987				3.70	3.85	4.05	4.10	4.30	4.45	4.72	4.15	3.92
1988	3.70	3.65	3.66	3.60	3.85	3.75	3.89	4.04	4.09	4.09	4.00	4.03
1989	3.95	3.81	3.75	3.65	3.75	3.90	4.02	4.09	4.17	4.28		
1990				3.51	3.50	3.65	3.73	3.83	3.85	3.87		
1991	3.75											
1992												
1993											3.63	3.51
1994												
1995												
1996		3.90										
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION: TINEJDAD (C.Touroug): n°IRE = 1373/56

MOIS / ANNEES	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	5ep	Oct	Nov	Dec
1973								11.08	11.13	11.13	11.13	11.08
1974	11.03	11.05										
1975					6.08	6.18	6.43	6.15	6.66	6.63	6.63	6.45
1976	6.57	6.57	6.58	6.66	6.38	6.60	6.64		6.65	6.47	6.58	6.61
1977	6.60		6.40	6.67					6.60			
1978												
1979											6.56	6.67
1980		6.83	6.83	6.46	6.21	6.61	6.74	6.87	6.97		6.93	9.89
1981	6.55	6.93		6.86	4.08	6.99	7.03		7.13	7.18	7.18	7.03
1982		6.58	6.56	7.03	6.80	6.64		6.78				7.15
1983	7.03	7.03	7.15	7.21	6.96			7.16	7.26		7.40	
1984	7.34	7.38	7.33	7.50	7.45	7.60	7.53			7.73		7.71
1985	7.77	7.79	7.71	7.79	7.85	7.65				8.05	7.88	
1986	7.64	7.69										
1987				8.05	8.05	8.09	8.43	8.75	8.30	8.13	8.00	8.15
1988	8.15	8.20	7.98	7.99	8.07		8.33		8.39	8.07		8.35
1989	8.31	8.35	8.30	8.22	8.31	8.26	8.04	7.86	7.56	7.51		
1990				7.20	7.15	7.20	7.26	7.29	7.25	7.15		
1991	6.86		6.95	6.95	7.16		6.99	7.11	7.64	6.91	6.96	6.95
1992	6.95	6.95	6.95	7.15		7.15				7.25	7.17	
1993	7.13		7.10	7.14	7.25	7.46			7.61		7.45	7.10
1994					7.35		7.59				7.23	7.29
1995			7.61									
1996		7.00										
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION: TINEJDAD (Kanfar): n°IRE = 1368/56

MOIS / ANNEES	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	5ep	Oct	Nov	Dec
1973								4.82	4.86	5.97	5.05	5.05
1974	4.98	4.92	5.02	5.02	5.19	5.21	5.40	6.20	6.20	6.10	5.00	4.95
1975		5.09	5.10	5.92	4.90	4.90	6.00	6.63	6.35	6.25	5.18	4.94
1976	4.99	4.97	4.94	5.05	4.95	5.94	6.41		6.00	4.98	5.53	5.10
1977	4.88	5.30	5.99	4.96		6.10	6.51	6.51	5.72	5.64	5.54	5.04
1978	4.94	4.94	4.94	4.94	5.55	6.96	6.54	6.57	6.57	6.45	5.60	
1979	5.72	4.95									4.93	4.90
1980		4.94	4.76	5.04	4.90	5.24	5.98	6.70	6.42		4.90	4.89
1981	4.97	4.95	4.97	4.85	4.99	5.86	6.04	6.50	6.40	6.40	6.25	5.50
1982	5.00	4.75	4.76	5.48	4.65	4.94		6.50				5.64
1983	5.14	4.92	5.48	6.72	5.05			6.83	6.53		5.14	
1984	5.78	5.87	6.04	6.72	6.23	7.12	7.13		6.21	5.96	5.74	6.76
1985	4.84	5.58	5.14	6.00	5.03	6.68	6.72	6.54	6.54	6.40	6.22	
1986	4.90	5.15										
1987				5.90	6.60	6.83	6.97	7.25	6.22	5.87	5.82	5.77
1988	5.74	5.74	5.47	5.90	5.90	6.30	7.05	6.81	6.76	6.25	6.00	5.85
1989	5.80	5.75	5.40	5.75	6.00	6.41	6.72	6.56	6.30	6.32		
1990				4.81		5.30	6.32	6.44	6.00	5.80		
1991	4.75		4.73	4.85	4.98		5.96	5.90	6.50	5.42	5.41	5.40
1992	4.75	4.80	4.80	5.10		5.40				5.59	5.41	
1993	4.84		4.90	5.27	5.60	6.12			6.05		4.80	4.63
1994					6.02		6.46				4.95	5.27
1995			5.45									
1996		4.82										
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION: TINEJDAD (E.Khourbai): n°IRE = 1445/56

MOIS / ANNEES	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1976	10.05	10.19	10.20	10.41	10.45	10.37	10.54		10.47	8.45	10.27	10.25
1977	10.10	10.29	10.64	10.55		10.75	11.29	11.15	11.07	11.10	10.97	11.49
1978	10.74	11.04	11.35	11.64	12.07	12.71	12.61	12.82	13.34			
1979	13.55										13.88	13.27
1980		11.79	11.02	10.91	10.72	10.79	10.72	10.67	10.55		10.34	10.00
1981	9.95	12.00	10.07	12.14	10.41	10.43	10.47	10.57	10.47	10.32	10.17	10.12
1982	9.82	9.82	9.87	10.22	19.67	9.81		10.01				9.95
1983	9.71	9.81	10.01	10.35	10.43			10.70	11.20		11.21	
1984	11.46	11.86	12.24	13.02	14.04	14.62	15.02		15.03	17.05	17.57	17.67
1985	17.33	17.27	17.74	18.15	17.60	17.86	17.90	18.05	18.05	18.85	18.50	
1986	18.20											
1987				17.66	18.25	18.40	18.55	18.92	17.60	17.80	17.54	18.00
1988	18.15	18.45	18.60	18.80	18.85	19.22	19.54	19.18	19.13	18.36	16.56	17.84
1989	17.93	15.28	16.65	17.77	18.90	16.39	17.00	16.50	17.25	17.60		
1990				14.00	13.46	12.90	12.69	12.52	12.00	11.81		
1991	11.14		11.04	11.30	11.54		11.66	11.76	12.43	11.42	11.20	11.00
1992	10.66	10.30	10.51	11.13		10.92				11.15	11.10	
1993	10.60		11.08	11.21	11.77	12.22			13.00		12.80	17.70
1994			18.75								16.23	17.17
1995												
1996												
1997												
1998												
1999												
2000												
2001												
2002												
2003												

Table A.3.6-(2tf).3 Groundwater Data (Measured Monthly around Todrha-Ferkla River)-3

REGION: TINEJDAD (K.Ghardmi): n°IRE = 1476/56

MOIS / ANNEES	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1976	9.32	8.67	9.82	9.82	9.75	10.21	10.26		10.22		9.75	9.73
1977	10.22	10.18	11.58	11.55		11.80	11.60	11.27	11.75	11.75	11.66	11.67
1978	11.70	11.35	11.47	12.09	12.40	12.45	12.90		12.86	12.70	12.47	
1979	12.35	11.90									12.26	12.08
1980		11.86	11.79	12.24	12.41	12.82	12.96	13.24	13.47		12.96	12.72
1981	12.44	12.43	12.54	12.82	13.23	13.34	13.54	13.59	13.54	13.44	13.39	13.54
1982	13.44	12.84	12.80	13.84	13.39	13.45		13.87				13.74
1983	13.39	13.48	13.94	14.41	14.55			14.37	14.38			
1984	13.64	13.67	13.94	14.41	14.55	14.76	14.91		13.98	14.96	14.89	13.82
1985	14.43	14.88	15.03		16.06	16.10	16.20			17.00	16.55	
1986	15.51	16.86										
1987				20.45	21.40	22.94	22.92	22.91	22.84	22.92	22.78	22.86
1988		22.92	23.01	23.04	22.06	22.86	23.06			24.01	23.66	23.66
1989	19.31	21.78	20.76	21.26	24.11	21.12	23.44	24.01	22.26	20.31		
1990				16.26	16.21	17.06	17.33	17.19	17.07	16.74		
1991			16.26	16.44	16.81		17.14	17.06	16.71	16.41	16.16	15.68
1992	15.66	15.26	15.51	16.46		16.49				16.82	16.61	
1993	15.72		16.15	16.37	17.16	17.46			18.67		16.76	15.97
1994											17.97	18.22
1995			19.25									
1996												
1997												
1998												
1999												
2000										19.33		
2001												
2002												
2003												

REGION: TINEJDAD : n°IRE = 1510/56

MOIS / ANNEES	1	2	3	4	5	6	7	8	9	10	11	12
1976	5.89	5.87	5.85	5.24	5.30	6.04	6.14		6.17	6.35	6.32	6.33
1977	5.95	5.97	6.02	6.16		6.35	6.33	6.37	6.30	6.25		
1978												
1979		6.40									5.70	5.75
1980		5.70	5.47	5.45	5.59	5.61	5.93	6.15	6.13		6.33	6.19
1981	5.90	5.95	5.85	5.85	6.10	6.00	6.60	6.94	7.00	7.00	7.00	7.05
1982		6.52	6.55	6.70	6.63	6.54		6.80				7.02
1983	6.60	6.50	6.46	6.62	6.66			6.80	7.08		7.09	
1984	6.94	6.83	6.85	6.87	6.38	7.19	7.17			7.21	7.17	7.08
1985	6.90	6.76	6.73	6.83	6.80	6.93	7.06	7.10		7.15	7.25	
1986	6.63	6.60										
1987				6.90		7.00					7.05	
1988	6.96	6.65	6.45	6.53		6.80	6.92	7.11	7.10	7.04		6.90
1989	6.64	6.35	6.34	6.42	6.43	6.78	6.84	6.86	6.90	6.78		
1990	5.60			5.95	6.02	6.11	6.60	6.76		6.80		
1991			6.25	6.50	6.78		7.35	7.30				
1992												
1993			6.85	6.91	6.91							
1994						6.82					7.19	7.20
1995												
1996												
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION: TINEJDAD (K.Ksiba): n°IRE = 1485/56

MOIS / ANNEES	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1976	4.62	4.84	4.89	4.89	4.79	5.50	4.75		4.80	4.69	4.43	4.45
1977	4.35	4.42	4.46	4.50		4.60	4.64	5.07	5.00	4.97	4.80	3.85
1978	3.90	3.92	4.00	4.45	5.20	5.25			5.50	4.80	5.27	
1979	5.27	4.70									4.35	4.34
1980		4.55	4.50	4.57	4.66	4.90	5.00	5.00	5.03		5.20	4.70
1981	4.78	5.09	5.38	5.75	5.48	6.10	5.95		6.00	6.30		5.55
1982		5.05	5.08	5.68	5.30	5.49		5.95				6.17
1983	5.83	6.17	6.48	6.57	6.81				6.62		5.72	
1984	5.67	6.03	6.27	6.80	6.50	6.82	6.43		6.83	6.56	5.85	5.80
1985	6.59	5.75	6.03	6.35	5.81	7.25	7.11	7.13	7.13	7.09	6.60	
1986	5.95	6.70										
1987				7.30	7.95	8.22	8.17	8.20	7.20	6.93	6.20	5.89
1988	5.55	5.70	6.34	7.10	7.20	6.35	7.06	7.30	7.76	7.62	5.70	5.67
1989	5.81	5.65	5.75	6.10	6.32	6.29	8.02	8.00	7.42	6.60		
1990				5.54	5.64	5.76	6.55	7.12	5.78	5.65		
1991	5.50		5.50	5.54	5.83		6.03	6.02	7.03		5.90	5.74
1992	5.50	5.56	5.60	5.63		5.71				5.77	6.00	
1993	5.89		6.42	6.53	6.83	7.18			8.21		5.79	5.68
1994					6.70		8.07				5.88	
1995			5.87									
1996		5.83										
1997												
1998												
1999												
2000												
2001												
2002												
2003												

Table A.3.6-(3).1 Groundwater Data (Measured Monthly in Ziz River Basin)-1

REGION:RICH (Ait Hikou): n°IRE = 498 / 39

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1980	6.96	6.85		7.13	7.25	6.83	7.52	7.42		7.00	6.90	7.48
1981	6.60	7.48	6.74	7.18	7.24	6.79	7.00			7.25	7.22	7.29
1982	6.44	6.33	7.02	6.05	6.60	7.34					7.00	7.95
1983	7.26	7.15	7.22	6.58	7.46							
1984					7.35	SEC					E	
1985		SEC	7.00	6.95	SEC		SEC			E		
1986	E				E							
1987								E				
1988												
1989	E			7.38	7.35	7.43	7.45	SEC			6.65	
1990			5.45	5.50	7.20	7.03	7.12	7.15	6.85	6.98		
1991	6.94		6.90	7.12	7.20	7.05	SEC					
1992	SEC				7.15	7.18						
1993	SEC					T.E			SEC			
1994			E		B	B				B		
1995												
1996												
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION:RICH (Ait Tikart): n°IRE = 597 / 39

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1980	16.07	16.06		14.76	14.18	14.26	14.47	14.85		15.23	15.42	15.38
1981	15.61	16.12	15.66	15.72	15.91	15.95	16.01	16.23	16.30	16.40	16.55	16.50
1982	16.30	16.70	16.80	16.60	15.87	15.28					16.80	16.72
1983	16.50	16.67	16.57	16.48	16.28			17.17	17.26		17.83	
1984	17.02	16.98	16.93	16.70	16.82	17.32	17.40	18.60	18.62	18.60	17.85	17.80
1985	17.30	16.85	16.98	16.88	16.74	16.83	17.13	17.33	17.90	17.64	17.56	17.50
1986	17.14	17.06	16.58	15.81	15.96	15.88	16.00		16.13	16.02	16.10	
1987		15.99	15.90	15.95	15.18	15.70	15.95	18.46	18.80	18.52	17.66	17.21
1988	17.13	17.02	16.91	16.80	16.68	17.67	17.54	18.94	18.02	17.50	17.40	17.25
1989	17.14	16.98	16.86	16.65	16.95	16.92	16.98	17.25	17.34	17.39	17.06	
1990			14.07	13.95	14.19	14.30	14.43	15.57	14.47	14.56	14.62	
1991	14.49	14.53	14.62	14.53	15.10	15.13	15.31	15.34	15.47	15.11	15.48	15.51
1992	15.50	15.88	15.73	15.79	15.49	15.56				16.24	16.83	16.99
1993	16.93	16.83	16.63	16.42	16.21	16.80			18.10			
1994	16.54		16.87		16.44	16.65		17.35		17.44	17.04	16.96
1995	M	M	17.26	NM	NM	NM	16.35	NM	NM	NM	NM	NM
1996	16.11	14.50	15.10		15.42							
1997												
1998												
1999												
2000												
2001										17.80		
2002												17.97
2003												

REGION:RICH (Tazmamart): n°IRE = 587 / 39

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1980	7.41	8.46		7.17	6.37	7.49	8.09	7.54		8.38	8.67	8.44
1981	8.40	9.26	9.59	9.83	10.10	10.39	10.78	10.68	11.19	10.78	10.83	10.03
1982	10.33	10.53	10.73	10.03	8.61	8.11					10.25	10.43
1983	10.43	10.72	10.83	10.87	10.00			11.13	11.16		10.86	
1984	10.88	10.99	11.21	10.63	10.92	10.13	10.92	11.13	11.27	11.28	10.14	10.13
1985	10.18	10.15	10.04	10.09	9.97	9.69	10.53	10.77	10.86	9.71	9.35	9.25
1986	8.75	8.60	8.57	8.51	8.79	9.22	9.31		9.49	9.19	9.09	
1987		9.92	9.59	9.64	9.59	9.89	10.22	11.09	11.11	10.31	9.03	839.00
1988	7.86	6.82	6.64	7.04	7.10	8.59	9.35	10.24	10.27	10.35	10.29	10.25
1989	10.71	10.38	10.34	10.89	10.93	10.17	10.53	10.73	10.62	9.90	9.05	
1990			7.87	7.83	7.62	7.85	8.14	8.39	6.95	7.88		
1991	7.67		8.49	8.40	8.92	7.94	8.69	9.06	9.36		9.18	9.23
1992	9.33	9.77	9.77	10.34	9.09	9.50				9.75	10.71	10.56
1993	10.49	10.41	10.35	10.81	10.97	11.10			10.85			
1994	9.00		8.50		10.35	10.47		10.92		10.75	9.23	9.19
1995			8.45				9.15					
1996		7.91		7.90								
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION:RICHE (Ait Salah): n°IRE = 1195/ 48

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1980	2.15	2.12		1.51	1.98	2.22	2.45	2.70		2.49	2.45	2.35
1981	2.27	2.29	2.27	2.35	1.80	2.72	2.88	3.03	3.01	3.12	3.13	3.08
1982	2.58	2.66	2.96	2.98	2.70	2.94					3.36	3.33
1983	3.23	3.14	3.04	3.16	2.78			3.71	3.58		3.20	
1984	3.36	3.29	3.36	3.58	3.68	4.08	4.18	4.28	4.28	4.27	3.95	3.94
1985	3.98	4.03	4.27	4.19	4.57	3.59	4.11	4.28	4.49	3.92	3.36	3.23
1986	2.79	2.77	2.74	2.84	2.97	2.97	3.07		3.27	3.04	2.97	
1987		2.92	2.85	3.43	3.44	3.77	3.89	4.07	4.26	4.13	3.86	2.98
1988	2.85	2.80	2.65	2.71	2.59	3.02	3.40	3.82	3.80	3.59	3.41	3.36
1989	3.21	2.82	2.70	2.64	2.92	2.99	2.90	3.13	3.17	3.09	3.01	
1990			2.16	2.52	2.12	2.56	2.60	2.58	2.50	2.82	2.70	
1991	2.34		2.30	2.47	2.67	2.50	3.18	3.22	2.85		2.88	2.66
1992	2.62	2.65	2.59	2.85	2.72	2.65				3.75	3.70	3.36
1993	3.25	3.12	3.09	3.14	3.49	3.82			4.73	4.17	2.77	3.05
1994	2.69		2.59		3.20	3.55		3.94		3.25	3.02	3.00
1995			3.14				3.50					
1996		1.97	2.07	2.33		2.04	2.57	2.67			2.91	
1997		2.66	2.67	2.25	2.68	3.25	3.55	3.18	3.21	3.39	3.20	
1998												
1999										4.30	3.74	
2000	3.16									5.44	3.24	
2001	5.32					5.60						
2002												
2003												

Table A.3.6-(3).2 Groundwater Data (Measured Monthly in Ziz River Basin)-2

REGION:ERRACHIDIA (Tazouka): n°IRE = 29 / 48

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1980		16.96	18.86	16.00	16.55	16.65	15.66	16.00	16.86		16.71	18.05
1981	18.80	19.67	18.88	18.44	17.92	18.73	19.90	20.70	21.70	23.10	23.30	
1982		25.20	25.22	52.85	25.20	25.05		21.20				25.24
1983	26.05	26.68	26.75	SEC	SEC							
1984	SEC			SEC	SEC	SEC					SEC	SEC
1985	SEC	SEC	SEC	SEC		SEC	SEC	SEC			SEC	SEC
1986	SEC	SEC		25.03								
1987				SEC	SEC	SEC	SEC	SEC	SEC			SEC
1988		25.91	24.92	21.85	22.65	SEC			SEC	SEC	SEC	
1989				20.06	19.98	12.90	21.17	21.87	22.05	23.20	23.20	
1990	26.70			16.87	16.76	16.70	16.23	15.60	15.55	15.79		
1991	15.57		16.11	15.93	15.76		15.34	19.96			17.13	16.91
1992	17.36	16.60	16.86		17.09	17.66	17.66			20.64	21.04	21.04
1993	20.93	19.77	20.36	20.30	20.70	21.36			SEC	SEC		
1994	SEC		19.90		18.53	19.91		20.70		23.56	24.73	24.53
1995			21.10				22.10					
1996	21.54											
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION:ERRACHIDIA (Ksar El Kenz): n°IRE = 581/ 48

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1980		14.75	14.75	14.71	15.36	14.70		14.73	14.80		14.65	14.72
1981	14.82	14.84	14.80	14.75	14.80	14.75	14.65	14.77	14.20	14.75	14.85	14.90
1982	14.88			14.80								
1983	14.89	14.63	14.60		SEC				14.88			
1984	14.97	15.19	15.46	F	14.92	14.85	14.87		14.89	14.84	14.80	14.90
1985	14.87	14.42	14.90	14.90	14.95	14.93	15.00	14.96	14.96	15.00	14.97	14.86
1986	14.95	14.96		14.74								
1987				14.56	14.90	15.08	15.05		15.34	15.40	15.25	15.41
1988	14.75	14.95	15.25	15.05	14.44	16.28	15.28	15.27	15.23	15.40	15.25	15.41
1989	15.33		14.73	15.08	15.15	15.57	15.13	15.11	15.20	14.53		
1990	15.30			14.35		15.16	15.06	15.10	15.18	15.23		
1991	15.13		15.24	15.18	15.06	15.02	15.04	15.05	15.06		15.09	15.22
1992	14.63	15.13	15.23		15.28	15.09	15.09			15.18	15.32	
1993	15.27	14.68	14.65	15.05	15.10	14.61			14.95	15.26	15.27	
1994	15.30		14.97		15.05	15.20		15.17		14.79	15.36	15.35
1995			15.28				15.22					
1996		15.15										
1997												
1998												
1999												
2000												
2001												
2002												15.55
2003			15.47									

REGION:ERRACHIDIA (Ouled Lhaj): n°IRE = 98 / 48

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1980		10.40	10.40	10.12	10.16	10.13	9.77	9.88	9.87		9.78	10.10
1981	10.49	10.50	10.63	10.55	10.55	10.70	10.94	11.10	11.35	11.78	11.95	12.20
1982	12.50	12.66	13.30		13.86	13.95						14.56
1983		15.05		15.56	15.74			16.16			16.48	
1984	16.96	17.22	17.41	17.61	17.58	18.02	18.02		18.34	18.75	18.65	18.76
1985	18.78	19.06	19.28	19.62	F	19.62	19.70	19.68	19.68	19.70	19.80	19.40
1986	19.52	19.66		18.32								
1987				19.56	20.04	19.44	19.84	19.99	20.32	F	20.20	19.96
1988	19.46	18.78	18.57	17.32	18.37	18.73	18.83	F	F	F	F	F
1989	17.78	F	17.01	15.20	15.25	15.05	14.52	14.49	14.32	14.43	14.43	
1990	13.80			11.40	11.16	11.13	10.47	10.50	10.35	10.42		
1991	10.14		10.01	9.83	9.85		10.03	10.05	10.14	10.20	10.15	10.06
1992	10.11	8.99	9.30		9.21	9.62				10.23	11.33	
1993	11.53	11.36	10.70	11.28	11.31	11.49			12.75	13.50	13.81	
1994	14.10		12.37		11.25	11.48		11.97		12.30	12.67	12.57
1995			11.78				11.85					
1996		11.96										
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION: ERRACHIDIA (Medionna): n°IRE = 1204/ 48

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1980		21.69	21.62	20.42	21.11	21.56	20.75	21.65	21.85		20.80	20.97
1981	21.81	22.23	22.50	22.28	22.19	22.25	2.25	22.25				
1982						26.61		25.75				27.40
1983	SEC	28.08	28.31	29.13	28.66			29.23	29.31		29.49	
1984	29.61			SEC		SEC	31.31		31.25	31.04	31.35	E.E
1985	T.E	31.62	31.56	31.58	31.63	T.E		32.08	32.08	31.67	31.68	30.98
1986	31.19	31.58		30.33								
1987				32.21	32.14	32.45	32.42	32.22	32.51	32.51	32.03	31.84
1988	31.21	30.64	30.88	29.86	31.23	30.98	30.94	31.49	32.30	32.08	31.68	31.63
1989	30.95	30.65	29.24	28.20	28.28	28.00	27.78	27.91	27.97	27.79		
1990	27.42			22.83	22.95	24.20	24.18	24.20	23.99	24.02		
1991	24.50		23.88	23.86	21.02	21.08	20.95	21.25	21.53	21.70	22.23	21.69
1992	21.47	20.44	21.14		20.95	21.44				23.50	23.15	
1993	23.23	21.58	22.05	22.98	23.31	22.27			25.06	26.16	26.55	
1994	26.65		23.37		22.16	23.41		24.45		24.73	25.52	25.67
1995			23.61				24.63					
1996		24.73										
1997												
1998												
1999												
2000												
2001												
2002												24.17
2003												

Table A.3.6-(3).3 Groundwater Data (Measured Monthly in Ziz River Basin)-3

REGION: ERRACHIDIA (Ait Khlifa): n°IRE = 1210/ 48

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1980		11.62	11.62	12.16	12.19	13.54	12.37	13.24	11.82		11.62	11.77
1981	11.46	11.47	11.47	11.31	12.17	12.17	11.47	11.47	11.44	11.39	11.47	11.47
1982	11.47	11.22	11.16									
1983	11.71	11.52	11.90	11.47	11.62			12.00	11.51		11.69	
1984	11.44	11.41	11.52	11.70	11.44	18.77	11.44		11.39	11.57	11.44	11.43
1985	11.42	11.47	11.80	11.47	11.46	12.15	11.47	11.87	11.87	11.46	11.64	11.80
1986	11.45	11.43		11.45								
1987				11.40	11.40	11.54	11.41	11.54	11.39	11.43	11.39	11.43
1988	11.54	11.45	11.40	11.95	12.05	12.43	12.65	12.42	11.39	11.31	11.28	11.45
1989	11.41	12.35	12.33	11.42	11.58	12.35	11.40	11.86	12.01	11.88		
1990				11.88	11.60	11.60	11.38	11.42	11.35	11.44		
1991	11.39		11.37	11.41	11.70	11.41	11.50	11.54	11.61	11.39	11.42	
1992	11.38	11.34	11.38		12.25	11.42				11.47	11.53	
1993	11.49	11.34	11.40	11.38	11.35	12.15			11.83	11.60	11.30	
1994	11.15		11.30		11.32	11.57		11.12		11.47	11.33	11.32
1995			11.25				11.32					
1996		11.35										
1997												
1998												
1999												
2000												
2001												
2002												16.20
2003												

REGION: ERRACHIDIA (Beni Mhala): n°IRE = 1511/ 48

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1984							12.00		12.14	12.22	12.28	12.36
1985	12.36	12.45	12.48	14.38	14.90	15.42	16.30	17.05	17.05	17.76	17.92	13.77
1986	13.93	14.15		12.45								
1987					13.42	13.55	13.72	13.73	13.81	13.80	14.60	14.95
1988	13.61	14.00	14.91	13.05	14.76	15.28	15.16	17.53	19.00	19.33	18.98	16.98
1989	14.29	15.62	12.36	12.00	12.35	11.75	11.96	12.15	11.95	12.38		
1990	12.30			11.10	10.18	10.12	9.37	9.28	9.26	9.48		
1991	9.13		8.96	8.56	8.78	8.91	8.93	8.90	8.90	8.89	8.86	8.80
1992	8.72	8.72	8.75		8.68	8.88				9.14	9.29	
1993	9.24	9.08	9.43	9.28	9.22	8.82			10.53	10.93	11.17	
1994	11.35		9.70		9.65	9.45				10.18	10.55	10.39
1995			9.45				9.80					
1996		9.02										
1997												
1998												
1999												
2000												
2001												
2002												
2003												

Table A.3.6-(2,3).1 Groundwater Data (Measured Monthly in Tafilalet Plain: Tizimi)-1

REGION: TAFILALET (Erfoud): n°IRE = 4034 / 57

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1988											6.31	6.40
1989	6.42	6.43	6.45	6.60	6.66	6.53	6.53	6.52	6.52	6.46		
1990				6.58	6.60	6.65	6.70	6.66	6.68	6.68	6.70	6.75
1991			6.75	6.78	6.81	6.80	6.69	6.81	6.81	6.80	6.86	6.90
1992	6.89	6.91	6.90	6.90		6.95		6.95		6.95	6.99	6.95
1993	6.92		6.95	7.01	7.00			7.02	7.01			
1994				7.07	7.52			7.13	6.69	6.90	6.95	
1995												
1996												
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION: TAFILALET (Rteb Douira): n°IRE = 4093 / 57

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1987	11.65	10.77		11.08	11.70	12.14			SEC		11.98	11.62
1988	11.08	10.64	10.47	10.37	10.43	11.17	11.70				SEC	11.40
1989	10.89	10.76	10.15	9.70	10.37	10.70	10.37	10.40	11.30	11.13		11.23
1990	9.98			9.25	10.07	10.23	10.17	10.47	10.55	10.38		
1991			9.29	9.76	9.77	10.35	9.85	10.53	10.45	9.67	8.27	9.12
1992	9.02	9.06	8.67	8.72		9.10		9.72		10.28	9.55	8.92
1993	8.95		8.47	9.03	9.86			11.29	11.44			
1994					9.23				10.94	10.54	10.00	9.75
1995							10.61					
1996			9.57									
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION : TAFILALET (Erfoud): n°IRE = 4035/57

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1988											7.55	7.61
1989	7.72	7.32	7.71	7.86	7.85	7.66	7.65	7.87	5.87	5.82		
1990				7.57	7.55	7.58	7.61	7.63	7.65	7.66	7.48	7.55
1991			7.26	7.57	7.55	7.62	7.54	7.56	7.66	7.66	7.23	7.64
1992	7.30	7.67	7.24	7.65		7.71		7.73		7.75	7.71	7.66
1993	7.64		7.71	7.77	7.77			7.73	7.72			
1994					7.38	7.83			7.55	6.18	6.86	6.92
1995							7.40					
1996			7.67									
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION: TAFILALET (Rteb Douira): n°IRE = 4096 / 57

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1987	8.10	8.11		F	8.18	8.15	8.14	8.16	8.11	8.11	7.94	7.89
1988	8.11	8.10	8.08	8.09	8.11	8.11	8.12	8.11	8.12	8.12	8.12	8.11
1989	8.11	8.26	8.12	8.20	8.23	8.20	8.06	8.04	8.07	8.06		7.91
1990	7.74			8.33	7.59	7.62	7.56	7.80	7.92	8.05		
1991			7.76	7.72	7.69	7.68	7.61	7.64	7.66	7.74	7.84	7.84
1992	7.79	7.78	7.80	7.74		7.72		7.90		8.07	8.06	8.07
1993	8.07		7.83	7.86	7.96			8.08	8.08			
1994					7.48	7.56			8.01	7.87	7.89	8.01
1995							7.89					
1996			7.71									
1997												
1998												
1999												
2000												
2001												
2002												
2003												

Table A.3.6-(2,3).2 Groundwater Data (Measured Monthly in Tafilalet Plain: Fezna - Hannabou)-2

REGION: FEZNA (Mosqué Fezna): n°IRE = 1028/57

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1974	15.74	15.49	15.00	15.50	15.80	15.85	17.00	17.20	17.10	16.10	16.31	16.40
1975		15.70	16.21	16.05	14.18	13.55		14.78	15.00	15.35	15.42	15.32
1976	14.98	14.89	14.93	16.30	16.35	16.47	16.00	16.06	16.00	16.08	14.98	14.87
1977	15.93	14.98	14.99	15.06	15.14	15.98	16.20	16.57		16.79	16.17	16.06
1978	15.37	15.43	16.87	17.53		19.57	19.74	19.80	19.90	19.77	19.82	19.88
1979	18.85	18.84	18.88								14.79	13.74
1980	14.15	14.20	14.08	13.42								
1981	14.23				14.35	14.47	14.53	14.61		17.68	17.75	17.88
1982	18.04	18.11	19.70	19.71	21.02	21.05						
1983		20.28	20.33	20.81	19.85					17.48		17.55
1984	16.45	17.77	17.86	18.02	18.25	18.45		18.65	18.65	18.89	18.45	17.90
1985	18.20	18.92	17.65	18.66	17.80	17.85	17.72	18.75	18.75	18.42	15.00	16.23
1986	17.67	15.95	20.25	20.85	20.86	17.90	18.28		18.55	22.23	14.91	
1987	15.05	15.74		19.43	19.75	18.06	18.67	19.13	19.08	19.80	20.71	15.63
1988	16.67	16.43	18.40	20.57	21.35	21.08	21.23	21.09	21.34	21.35	21.05	20.14
1989	20.69	20.29	20.82	21.20	21.321	20.56	21.25	21.25	18.32	18.92	16.25	
1990	13.53			12.50	11.82	11.65	11.70	12.83	12.40	11.40	12.12	12.06
1991			12.98	12.60	13.21	12.32	12.75	14.11	13.66		13.68	13.64
1992	13.58	14.84	15.31	15.94	16.69	17.80		17.81		17.37	17.33	17.68
1993	16.70		17.21	17.43	17.68	18.46		18.92	18.55	18.69		
1994					17.10			18.72	18.11	16.23	14.91	14.85
1995							14.63					
1996		20.112		12.55		13.65	12.84	12.89			14.58	
1997		14.43	15.61	15.27	15.62	16.61	18.79	17.20	15.70	15.71	13.58	
1998												
1999										19.42		
2000	18.73										20.39	
2001						21.14						20.70
2002												
2003												

REGION: JORF: n°IRE = 3630 / 57

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1979											10.15	9.96
1980	9.56	9.71	9.66	10.26		10.36	10.47	10.59	10.73	10.85	10.66	10.54
1981	10.66			10.86	10.97	11.06	11.11		11.14	11.15	11.16	
1982	11.88	11.06	10.95	10.96	11.00	11.03						
1983		10.75	10.75	11.21	11.04							
1984								P.S				
1985		11.80	12.20	12.46	11.38	12.50	12.75	P.V	12.70	12.40	12.40	12.43
1986	11.65	11.77	12.20	12.44	12.58	12.59	12.85		13.04	12.40	12.65	
1987		12.30		13.01	12.97	13.41	13.20	13.32	13.42	13.36	Fermé	13.05
1988	12.95	13.24	13.20	13.57	13.47	13.63	13.72	13.81	14.00	13.96	13.72	13.62
1989	13.48	13.32	13.84	14.13	14.16	13.94	14.07	14.10	14.03	13.55	12.95	
1990	12.25			10.87	F	9.96	10.00	9.51	9.35	F		
1991			7.87	7.79	7.72	7.74	7.78	7.87	7.92	7.90	7.59	7.48
1992	7.24	7.16	7.24	7.35		7.85		8.44		8.63	8.70	8.62
1993	8.56		F	8.93	9.19			10.23	10.42			
1994					10.01				10.86	9.88	9.95	9.91
1995							9.80					
1996			7.48									
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION: FORAGE Vers Environs du Jorf: n°IRE = 3628 / 57

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1979											11.71	11.23
1980	11.26	11.33	11.21	9.65		9.77	9.80	9.85	9.94	9.99	9.69	9.57
1981	9.81			9.95	10.03	10.09	10.21		10.28	10.36	10.45	
1982	13.49	12.58	12.48	12.45	12.56	12.65						
1983		12.41	12.54	12.59	12.53							
1984	12.61	12.94	12.86	12.96	12.24	13.28		13.68	13.68	13.54	13.29	13.36
1985	13.31	13.61	13.67	14.19	13.50	14.44	16.09	P.V	16.14	13.54	12.78	12.76
1986	12.00	12.48	13.52	13.35	13.54	14.45	16.41		16.39	13.23	10.09	
1987		13.61		14.58	18.23	14.29	14.44	14.55	14.44	14.53	14.32	14.26
1988	13.92	14.34	14.41	14.83	14.81	14.99	15.22	15.39	15.36	15.11	14.91	14.59
1989	14.51	14.30	15.04	15.51	15.46	15.69	16.23	16.19	15.76	15.19	14.79	
1990	13.91			12.38	11.41	11.13	11.09	10.69	10.46	10.08		
1991			9.06	8.91	8.88	7.74	7.85	8.84	8.61		8.71	8.69
1992	8.81	8.98	9.27	9.57		10.10		10.69		10.72	10.84	10.68
1993	10.51		11.09	11.57	11.09	M.V		13.07	13.15			
1994					13.26				13.70	11.47	12.09	12.31
1995							13.01					
1996			11.24									
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION: BOUIA HANNABOU: n°IRE = 1029/57

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1979											6.26	6.13
1980	6.16	6.28	6.22	6.36		6.48	6.56	6.61	6.68	6.77	6.60	6.56
1981	6.82			6.91	6.95	6.98	7.02		7.05	7.06	7.08	7.09
1982		6.14	6.31	6.26	6.86	6.88			6.66			
1983		6.33	6.37	6.52	6.57					6.72		6.96
1984	6.41	6.41	6.41	6.57	6.63	6.67		6.81	6.81	6.74	6.56	6.54
1985	6.45	6.51	6.41	6.49	6.48	6.59	6.59	V.P	6.64	6.50	6.44	6.31
1986	6.19	5.24	6.47	6.49	6.50	6.54	6.59		6.67	6.49	6.49	
1987		6.34		6.54	6.58	6.63	6.69	6.78	6.77	6.69	6.51	
1988	7.04	6.94	6.99	7.16	7.26	7.30	7.41		7.41	7.31	7.23	7.09
1989	6.98	6.93	7.09	7.36	7.44	7.40	7.37	7.37	7.42	7.32		
1990	6.94			7.20	7.19	7.22	7.28	7.94	7.22	7.11		
1991	P.V		6.83	6.88	6.91	4.91	6.89	7.00	6.97		6.76	6.71
1992	6.91	6.60	6.58	6.66		6.74		6.81		6.74	6.64	6.62
1993	6.46		6.45	6.58	6.62			6.77	6.74			
1994					6.69	6.75			6.85	6.81	6.86	6.82
1995							6.96					
1996			6.67									
1997												
1998												
1999												
2000												
2001												
2002												
2003												

Table A.3.6-(2,3).3 Groundwater Data (Measured Monthly in Tafilalet Plain: Hannabou - Siffa)-3

REGION: BOUHANNABOU (Mosqué Hananabou): n°IRE = 1048/57

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1979											10.73	10.62
1980	10.60	10.64	10.46	10.49		10.60	10.69	10.84	10.98	11.06	10.65	10.44
1981	10.65			10.97	11.05	11.14	11.16		11.02	11.03	11.05	11.07
1982		10.92	10.85	10.83	11.15	11.16			10.95			
1983		10.74	10.87	10.89	10.84					11.17		11.10
1984	11.02	11.08	11.02	11.06	11.05	11.17		11.20	11.20	11.24	11.19	11.17
1985	11.12	10.97	10.81	10.82				V.P				
1986										11.42	11.58	
1987		11.48		11.49	11.55	11.63	11.62	11.64	11.69	11.59	11.69	11.71
1988	11.64	11.60	11.56	11.60	11.64	11.70	11.74	11.74	11.55	11.78	11.65	11.68
1989	11.67	11.65	11.63	11.59	11.81	11.69	11.74	11.75	11.77	11.81	11.72	
1990	11.59			11.65	11.63	11.69	11.72	11.77	11.82	11.84		
1991			11.61	11.57	11.58	11.57	11.57	11.67	11.69		11.75	11.59
1992	11.45	11.41	11.32	11.03		11.45		11.41		11.44	11.38	11.38
1993	11.18		11.04	11.09	11.17			11.30	11.33			
1994					9.19	11.23			11.39	11.35	11.32	11.29
1995						11.36						
1996			11.24									
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION: Sifa Ouled Zouhra (Mosqué Sifa): n°IRE = 1038/57

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1979											11.95	12.10
1980	12.14	12.22	11.19	10.48		10.52	10.63	12.34	12.45	12.49	12.11	12.47
1981	12.72			13.32	13.39	13.42	13.48		13.51	13.50	13.56	13.57
1982		13.52	13.48	13.42	13.72	13.82			15.04			
1983		15.11	15.84	15.97	15.76					16.49		16.92
1984	16.66	16.74	16.92	17.07	17.31	17.33	17.60	17.68	17.68	17.77	17.73	17.37
1985	17.52	17.82	17.52	17.98		17.99	18.05	P.V	18.14	17.22	15.02	17.99
1986	17.03	17.06	17.46	17.04	17.16	17.61	17.88		18.17	17.31	17.42	
1987	17.30	16.94		17.50	17.61	17.90	18.11	18.18	18.22	18.18	17.39	17.32
1988	17.21	16.85	16.31	16.25	16.26	16.95	17.27	17.54	17.64	17.24	17.10	16.99
1989	16.90	16.52	16.42	16.08	16.24	16.09	16.17	16.16	16.71	16.03	10.44	
1990	14.07			12.79	12.51	12.97	13.11	13.33	13.54	13.71		
1991	13.04		12.70	12.06	12.35	13.00	12.74	13.30	13.63	13.65	13.29	12.85
1992	12.47	12.15	12.06	11.91		12.83		13.80		13.90	13.86	13.84
1993	13.73		13.35	13/86	14.04	14.12		14.88	15.02			
1994					12.46				14.46	11.88	12.13	12.32
1995												
1996			12.56									
1997												
1998												
1999												
2000											16.46	
2001	16.66											17.07
2002												
2003												

REGION: Sifa Ouled Zouhra (Mosqué ouled zohra): n°IRE = 525/57

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1979											9.83	9.86
1980	9.90	9.79	8.87	8.45		8.53	9.55	9.78	9.89	9.96	9.69	9.55
1981	9.80			10.88	10.97	11.03	11.09		11.11	11.15	11.22	11.25
1982		11.67	11.70	11.55	11.68	10.88			10.00			
1983		9.93	10.08	10.63	10.69							
1984		14.36	14.17	14.80	14.84	14.90	15.56	15.74	15.74	15.93	15.78	15.76
1985	15.83	15.79	15.47		16.25	16.25	16.15	17.40	17.40	17.35	17.35	17.35
1986	17.35	17.35	17.35	17.35	17.35	17.35			17.22	17.15	17.32	
1987	17.37	17.35		17.40	17.10	16.96	17.39	17.00	15.66	15.30	15.07	15.14
1988	15.37	15.22	15.00	15.00	15.68	15.07	15.27	15.25	14.82	14.54	14.44	14.33
1989	14.38	14.28	14.24	13.90	13.92	13.89	13.69	13.68	13.20	R.I	12.43	
1990	11.66			10.45	10.03	9.95	9.36	9.93	10.09	10.32	10.41	10.26
1991			9.29	8.69	8.72	8.81	8.61	8.66	8.81	9.00	9.25	9.20
1992	8.86	8.59	8.50	8.30		8.43		8.87		9.43	9.60	9.93
1993	10.03		9.80	9.75	9.8	9.97		10.14	10.35	10.59		
1994					9.47			9.87	10.08	9.88	9.85	9.86
1995							9.90					
1996			10.10									
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION: RISSANI (Mosqué Ouled Saidane): n°IRE = 3254/57

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1979											14.14	14.25
1980	14.29	14.40	14.15	13.77		13.89	13.82	14.03	14.33	14.40	13.89	13.92
1981	14.70			14.90	15.05	15.12	15.16		15.18	15.19	15.20	15.21
1982	15.21	15.20	15.16	15.10	15.14	15.16		15.50				
1983		15.47	15.53	15.80	15.54					15.79		15.84
1984	15.82	16.00	16.02	15.92	15.97	16.01	16.10	16.10	16.10	16.03	16.99	16.05
1985	15.96	16.00	15.67	15.75		15.65	15.63	V.P	15.73	15.73	15.58	15.58
1986	15.34	15.46	15.75	15.48	15.60	15.63	15.85		15.88	15.74	15.46	
1987	15.55	15.35		15.75	15.78	15.89	16.32	16.08	16.05	15.82	15.74	15.67
1988	15.60	15.51	15.52	15.55	15.66	15.76	15.83	16.22	16.04	15.80	15.79	15.70
1989	15.74	15.81	15.49	15.40	15.87	15.53	15.44	15.43	15.55	15.38	14.90	
1990	13.98			13.90	13.53	13.73	13.78	13.89	14.13	14.07		
1991	13.89		13.84	13.68	13.78	14.11	13.89	14.30	14.32	14.31	14.34	14.32
1992	14.09	14.05	13.99	14.02		14.36		14.66		14.84	14.83	14.83
1993	14.91		14.68	14.95	15.02			15.46	15.30			
1994					14.23	14.52			14.79	14.25	14.16	14.09
1995												
1996			13.78									
1997												14.75
1998												
1999												
2000												
2001												16.58

Table A.3.6-(2,3).4 Groundwater Data (Measured Monthly in Tafilalet Plain: Erfoud, Rissani)-4

REGION : TIZIMI (Maâdid 3éme virage en allant vers errachidia): n°IRE = 1307 / 57 F1

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1956	1.60	1.45	1.70	1.40	1.80	1.45	2.05	2.20	2.45	1.70	1.80	2.40
1957	2.35	2.65	2.95	3.60	1.80	2.70	2.65		4.60	4.10	3.10	2.80
1958	3.25	1.40	1.60	2.95	3.60	3.40	4.40			5.50	4.70	3.45
1959	2.50	2.50	1.50	1.60	2.45	2.10	2.90		3.85	3.15	2.80	3.45
1960	3.05	3.00	1.60	2.90	3.70	2.55	3.45	4.05	4.70		5.10	4.70
1961	4.50	4.35	4.55	2.85	4.00	3.20	4.55					
1962					5.30	4.85						
1963						1.95	2.30	2.40	4.01	4.23	4.80	4.40
1964	3.40	3.24	4.49	4.45	5.08							
1965		4.48	2.57	1.90	1.56	1.55	2.10	2.60	3.60	2.70	8.80	2.55
1966	1.95	1.50	1.50	1.55	1.55	1.70	2.25	3.55	3.61	2.57	1.50	1.65
1967	1.72		1.43	2.05	1.63	2.07	3.60		3.03	1.97	1.35	2.72
1968	1.35	1.35	1.17	1.18	1.30	1.25	2.20	3.13	3.43	3.45	3.25	2.57
1969	2.35	1.75	1.55	1.55	2.23	2.09	2.30	2.55	3.69	3.45	3.25	2.57
1970	1.86		1.92	2.62	3.78	3.70				3.87		
1971												
1972												
1973								6.24	6.39	6.40	6.18	5.92
1974	5.30	4.95	5.05	4.75	4.89	4.00	5.60	5.56		5.30	5.21	6.03
1975			4.54	4.48	3.99	4.59	5.01	4.98	5.89	5.94	6.00	5.39
1976	5.30	4.76	3.54	2.94	2.92	4.48	4.34	4.42	4.32	5.29		
1977	4.44	3.21	3.17	3.22	3.16	3.22	4.26	5.00	5.36	5.54	4.30	4.22
1978	3.56			2.96	3.99	4.94	5.26					
1979	5.20										4.57	4.52
1980	4.05	4.10	4.04		1.72	1.85	1.92					
1981												
1982												
1983												
1984												
1985												
1986												
1987												
1988												
1989												
1990												
1991												
1992												
1993												
1994												
1995												
1996												
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION: RISSANI (Centre): n°IRE = 3107/57

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1988												15.89
1989	15.89	16.09	15.84	15.65	15.87	15.85	15.70	15.72	15.77	15.78	15.56	
1990	15.65			15.07	14.97	14.87	14.85	14.67	14.77	14.88		
1991	14.83		14.62	14.22	14.21	14.39	14.39	14.34	14.52	14.65	14.76	14.86
1992	14.69	14.49	14.54	14.23		14.48		14.87		15.13	15.18	15.39
1993	15.33		15.15	15.36	15.45	15.53		15.61	15.69			
1994					14.96	15.00			15.43	14.83	14.93	15.05
1995												
1996			15.47									
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION: RISSANI (Ksirt Asserghine): n°IRE = 2379/057

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1979											10.59	10.48
1980	10.50	10.55	10.41	9.61		9.70	9.72	7.81	9.98	10.10	9.78	9.90
1981	10.20			10.58	10.68	10.73	10.80		10.88	10.91	10.98	11.00
1982	11.00	10.86	10.90	10.98	11.08	11.13		11.96				
1983		11.88	12.27	12.33	11.83					19.30		12.35
1984					M.M							
1985	A.D							V.P	A	A	A	A
1986	A.D										12.91	
1987	12.96	12.93		12.87	12.91	12.91	12.93	12.92	12.91	12.91	12.91	12.91
1988	12.92	12.86	12.93	12.94	12.79	12.93	12.93	12.95	12.91	RI	12.91	12.85
1989	12.93	12.91	12.91	12.81	12.89	12.93	12.70	12.66	12.86	RI	RI	
1990	RI			10.10	10.18	10.22	10.26	10.10	10.07	10.00	L	
1991			10.25	9.97	9.96	10.21	10.16	10.14	10.37	10.42	10.47	10.44
1992	10.61	10.7	10.68	10.81		10.9		11.60		11.02	10.99	11.58
1993	11.54		11.47	12.08	12.72			11.12	11.19			
1994					10.56	12.28			11.73	R.C	9.94	9.82
1995							10.09					
1996			10.48									
1997												
1998												
1999												
2000												
2001												
2002												
2003												

Table A.3.6-(2,3).5 Groundwater Data (Measured Monthly in Tafilalet Plain: Erfoud - Rissani)-5

REGION: TIZIMI (Mosqué Lhssassna): n°IRE = 457/57

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1979											12.77	12.21
1980	12.86	13.31	13.27	12.65	12.65	12.79	13.31	13.36	13.46	13.53	12.96	12.91
1981	13.00			13.18	13.21	13.24	13.27		13.14	13.16	13.20	13.21
1982		13.24	13.23	13.18	12.87	22.89			13.48			
1983		13.50	13.62	13.64	65.71					14.05		10.34
1984	14.08	14.11	14.20	14.41	14.21	14.21		14.21	14.21	14.26	14.31	14.31
1985	14.31	14.31	14.00	14.00	14.70	SEC	15.00	V.P	15.37	15.25	11.87	14.80
1986	14.57	14.58	14/82	14.82	15.40	15.40	15.40		15.40	15.40	15.40	
1987	15.38	15.40		15.40	15.40	15.40	15.40	15.40	16.20	17.70	19.95	19.40
1988	19.35	19.40	19.39	19.30	19.41	19.44	19.30	19.28	19.15	19.15	19.12	19.04
1989	19.15	16.88	15.99	15.34	15.07	18.55	16.69	16.70	18.19	17.84	15.77	
1990	14.44		15.77	13.45	13.25	13.25	13.30	13.13	13.09	13.09	V	
1991			12.56	12.54	12.49	12.46	12.42	12.45	12.45	12.46	12.43	12.38
1992	12.25	12.14	12.01	11.93		11.94	PAS.V	12.9		12.07	12.12	12.30
1993	12.20		12.25	12.26	12.32	12.38		12.50	12.49			
1994					12.49				12.55	12.60	12.59	12.57
1995							12.71					
1996			12.72									
1997												
1998												12.15
1999												
2000												
2001												
2002												
2003												

REGION: ERFOUD: n°IRE = 3907 / 57

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1979											4.47	5.07
1980	5.11	5.14	5.12	5.82		5.58	5.95	5.87	5.99	6.14	5.85	5.88
1981	6.20			6.56	6.64	6.74	6.88		8.00	8.12	8.21	8.35
1982		7.93	8.05	8.02	8.06	8.09						
1983		8.01	8.05	8.50	8.52							
1984												
1985												
1986												
1987	8.74	8.94		8.32	8.62	8.97	9.00	9.30	9.49	9.65	9.70	9.95
1988	9.98											
1989												
1990												
1991												
1992												
1993												
1994												
1995												
1996												
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION: ERFOUD: n°IRE = 3904 / 57

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1979											1.87	2.25
1980	2.29	2.30	2.28	2.97		2.99	3.11	3.05	3.21	3.30	2.85	2.90
1981	3.04			3.34	3.45	3.53	3.62		3.95	4.10	4.18	4.33
1982		4.45	4.60	4.62	4.63	4.63						
1983		4.57	5.12									
1984												
1985												
1986												
1987												
1988												
1989												
1990												
1991												
1992												
1993												
1994												
1995												
1996												
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION: GAOUZ: n°IRE = 3669/57

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1985				15.90		15.91			15.90	16.06	16.04	16.14
1986	16.10	16.70	16.63		16.40	16.30	16.33		16.61	16.75	16.72	
1987	16.80	16.77		16.87	16.95	16.81	16.90	16.95	16.96	17.02	F	
1988	17.59	17.31	17.34		17.30	17.03	17.19	17.69	17.26		17.66	
1989	18.58		18.35	17.95	17.99	17.47	17.94	17.93	17.20			
1990								15.30	15.14	15.23		
1991	14.80		14.59	14.58	14.51	14.48	14.43	14.36	14.41	14.39	14.41	14.31
1992	14.17	14.05	14.00	14.70		14.23		14.23		14.32	14.33	14.64
1993	14.61		14.76	14.85	14.88	14.02		15.13	15.26			
1994					14.97	15.00			15.26	15.20	14.79	15.28
1995							15.09					
1996			16.77									
1997												
1998												
1999												
2000												
2001												
2002												
2003												

Table A.3.6-(2,3).6 Groundwater Data (Measured Monthly in Tafilalet Plain: Erfoud - Rissani)-6

REGION: RISSANI (Mosqué Zaouit Malykhaf): n°IRE = 3640/57

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1979											15.82	15.79
1980	15.83	15.91	15.83	15.87		16.03	15.94	16.25	16.40	16.49	15.83	16.03
1981	16.63			16.68	16.73	16.75	16.73		16.73	16.73	16.74	16.73
1982	16.75	16.73	16.63	16.59	16.61	16.63		16.75				
1983		16.44	16.53	16.70	18.17							
1984						17.90	17.96	18.00	18.00	17.92	17.92	17.75
1985	18.05	18.06	17.55	17.73	17.82	18.23	18.18	V.P	18.35	14.96	18.18	18.19
1986	18.79	17.98	18.20	18.10	19.03	19.00	19.05		19.03	18.68	18.98	
1987	19.08	18.75		19.08	19.07	21.41	21.45	20.98	21.43	21.11	20.97	21.13
1988	21.10	20.27	20.81	20.68	20.73	20.76	20.83	20.80	20.79	20..73	20.83	19.06
1989	18.78	18.63	18.52	18.56	18.13	18.27	18.43	18.43	18.23	RI	RI	
1990	RI			P.L.S	P.L.S				17.28	17.35		17.29
1991	17.26		17.10	16.72	16.89	17.10	17.21	17.30	17.35		17.38	17.38
1992	17.45	17.02	17.26	17.38	17.34	17.44		17.89		17.74	18.07	17.90
1993	17.95		17.09	17.98	18.05	18.07		18.19	18.18	18.48		
1994					18.27	18.18			18.11	18.09	18.21	18.23
1995							18.23					
1996			18.28									
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION: RISSANI (Mosqué ksar bouzmela): n°IRE = 3666/57

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1979											15.42	15.40
1980	15.50	15.58	15.55	15.60		15.71	15.65	15.71	16.38	16.00	15.58	15.78
1981	16.12			16.78	16.30	16.38	16.45		16.48	16.53	16.58	16.61
1982	16.61	16.60	16.58	16.56	16.59	16.67		16.66				
1983		16.58	16.64	19.10	18.87							
1984						19.59	19.68	19.68	19.68	20.03	19.01	19.08
1985	20.21	20.09	19.88	19.88		19.80	19.78	V.P	22.19		21.44	21.22
1986	A.	19.89	22.48	20.57	22.75	22.52	22.67		20.47	21.40	22.41	
1987	22.50	20.13		20.48	22.33	22.78	22.70	22.77	22.51	22.70	20.48	20.50
1988	20.64	19.85	20.14		19.98	21.42	22.53	22.75	22.72	22.76	22.61	
1989	20.76	20.65	P.I	20.10	20.63	22.29	22.38	22.37	22.37	RI	19.63	
1990				19.19	18.39	18.30	18.34	18.08	17.92	17.90		
1991	17.43		17.15	16.85	16.85	16.94	16.62	16.85	16.90	16.92	16.94	16.69
1992	16.73	16.45	P.B	16.29		16.54		16.86		17.08	17.09	17.30
1993	17.38		17.51	17.94	18.09	18.22		18.60				
1994					11.67	17.89			18.84	18.47	18.32	18.39
1995							18.95					
1996			17.63									
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION: RISSANI (Mosqué Abderahmane): n°IRE = 3659/57

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1979											11.29	11.28
1980	11.31	11.36	11.24	10.11		10.15	10.16	10.44	10.47	10.64	10.24	10.34
1981	10.55			11.35	11.55	11.61	11.65		11.85	11.91	11.95	12.05
1982	12.05	12.30	12.35	12.40	12.45	12.47		17.27				
1983		17.20	17.27	17.19	17.64					17.09		16.82
1984	16.65	16.42	16.45	16.16	17.20	17.24	SIE	17.35	17.35	17.35	17.35	17.35
1985	17.75	17.75	17.74	17.52	17.52	17.53	17.52	V.P	17.51	17.54	17.57	17.40
1986	17.34	17.52	17.52	17.52	17.52	17.42	17.52		17.52	17.50	17.52	
1987	17.44	17.47		17.44	17.49	17.42	17.52	17.32	17.23	17.26	16.21	17.21
1988	17.17	17.19	17.17	17.17	13.11	17.09		17.45	17.53	17.51	17.47	17.45
1989	17.39	17.49	17.52	17.47	17.46	17.46	17.44	17.42	17.37	17.30	17.31	
1990	16.60			17.67	17.24	17.06	17.12	13.32	12.93	13.07		
1991	11.82		11.15	10.67	10.72	10.91	10.39	10.84	11.01	10.85	10.85	10.42
1992	10.37	10.11	10.05	9.81		10.41		11.25		11.73	11.75	11.74
1993	11.83		11.22	11.82	12.62	12.74		13,31	13.44			
1994					11.25	12.35			13.47	12.13	11.84	11.77
1995							12.90					
1996			11.78									
1997												
1998												
1999												
2000												
2001												
2002												
2003												

REGION: RISSANI (Mosqué Zaouit EI Matti): n°IRE = 3887/ 57

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1979											15.09	15.07
1980	15.10	15.15	14.97	14.57		14.61	14.63	15.24	15.11	15.18	14.61	14.83
1981	14.98			15.38	15.58	15.64	15.68		15.71	15.73	15.76	15.78
1982		15.76	15.68	15.57	16.10	15.79			16.45			
1983		16.30	16.54	16.97	16.58					17.16		17.19
1984	17.18	17.32	17.38	17.48	17.38	17.42	17.48	17.53	17.53	17.87	17.59	17.67
1985	17.71	17.72	17.87	18.03	18.23	18.24	18.33	V.P	18.55	17.53	18.20	18.13
1986	18.16	18.22	18.54	17.96	18.41	18.68	18.88		19.04	18.42	18.51	
1987	18.93	18.15		18.75	19.01	19.08	19.18	19.08	19.11	19.34	19.34	19.37
1988	19.22	18.58	18.74	18.48	18.82	19.14	19.38	19.41	19.46	19.32	19.38	19.07
1989	19.00	19.40	19.00	19.00	19.00	19.31	19.31	19.34	19.21	RI	18.71	
1990	18.76			18.65	18.55	18.59	18.58	18.21	18.11	17.94		
1991	17.51		17.19	17.10	17.07	17.11	16.98	16.95	16.85	16.65	16.06	16.39
1992	16.26	16.22	16.17	16.06		16.20		16.30		16.28	16.33	16.27
1993	16.11	16.24	16.31	16.45	16.67		16.91	16.73				
1994					16.61	16.65			16.79	16.65	16.78	16.53
1995							16.65					
1996			16.63									
1997												
1998												
1999												
2000												
2001												
2002												
2003												

Table A.3.6-(4) Groundwater Data (Measured Monthly in Maider River Basin: Daya Maider)

REGION: DAYA Maider: n°IRE = 178 / 65

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1968	8.23	8.17	8.16	8.18	8.18	8.17	8.20	8.19	8.21	8.22		8.22
1969	8.19	8.19	8.21	8.21	8.23	8.23	8.39	8.31	8.25	8.24	8.23	8.24
1970	8.18	8.20	8.22	8.16	8.23	8.19	8.23	8.26	8.26	8.26	8.25	8.26
1971	8.23	8.24		8.22	8.23	8.26	8.30	8.28	8.28	8.27	8.29	8.26
1972	8.24	8.23	8.23	8.19	8.29	8.30	8.34	8.34	8.33	8.28	8.32	8.29
1973	8.24	8.28	8.28	8.27	8.30	8.28	8.43	8.64	8.61	8.41	8.35	8.28
1974	8.33	8.35	8.28	8.26	8.39	8.31	8.39	8.45		8.45	8.34	8.34
1975	8.34	8.33			8.30		8.35	8.30	8.31	8.37	8.32	8.28
1976	8.26	8.19	8.20	8.23	8.29	8.29	8.32	8.32	8.34	8.33	8.32	8.32
1977	8.31	8.27	8.32	8.29	8.30	8.32	8.31	8.30	7.73	8.31	8.33	8.32
1978	8.31	8.29	8.31	8.33	8.33	8.33		8.38	8.37	8.36	8.35	8.34
1979	8.33	8.40	8.32								8.63	8.34
1980	8.34	8.34	8.34	8.34		8.43	8.36	8.35	8.29	8.31	8.32	8.33
1981	8.31	8.28	8.27	8.28	8.30	8.30	8.31		8.31	8.33	8.31	8.33
1982		8.29	8.29	8.27	8.33	8.35		8.38				8.35
1983		8.38	8.39	8.36	8.38							8.37
1984	8.39	8.40	8.42	8.44								
1985												
1986												
1987												
1988												
1989												
1990												
1991												

REGION: DAYA Maider: n°IRE = 185 / 65

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1968	5.02	5.01	5.01	5.03	5.01	5.05	5.07	5.08	5.09	5.09		5.11
1969	5.10	5.12	5.10	5.15	5.20		5.14	4.90	4.98	5.23	5.26	5.25
1970	5.28	5.26	5.28	5.31	5.33	5.33	5.37	5.42	5.41	5.44	5.44	5.46
1971	5.47	5.49		5.50								
1972	5.72	5.74	5.76	5.78	5.80	5.86	5.90	5.90	5.92	5.96	5.91	5.94
1973	5.94	5.96	5.97	6.01	6.05	6.07	6.10		6.10	6.10	6.10	6.09
1974	6.10	6.12	6.14	6.15	6.17	6.21	6.28	6.25		6.29	6.30	6.28
1975	6.30	6.31			6.40		6.51	6.43	6.45	6.48	6.46	6.44
1976	6.46	6.49	6.50	6.52	6.56	6.54	6.58	6.47	6.51	6.54	6.59	6.60
1977	6.61	6.56	6.64	6.62	6.66	6.61	6.68	6.71	6.79	6.74	6.74	6.75
1978	6.77	6.80	6.81	6.80	6.80	6.81		6.93	6.93	6.94	6.95	6.96
1979	6.97	6.99	6.92								7.01	6.98
1980	6.95	6.92	6.87	6.81		6.70	6.70	6.70	6.58	6.59	6.52	6.44
1981	6.62	3.82	6.66	6.55	6.32	6.26	6.23		6.25	6.26	6.19	6.16
1982		6.15	6.11	6.10	6.08	6.05		6.09				6.06
1983		6.06	6.06	6.07								6.13
1984	6.15	6.14	6.20	6.18	6.16	6.14	6.19	6.22	6.26	6.27	6.28	6.30
1985	6.31	6.32	6.34	6.34	6.39	6.39	9.39	6.42	6.43	6.45	6.49	6.51
1986	6.47	6.50	6.50	6.53	6.59	6.61	6.64		6.68	6.63	6.68	6.73
1987	6.75	6.71	6.77	6.80	6.78	6.80	6.84	6.87	6.90	6.89	6.89	6.94
1988	6.93	6.90	6.95	7.00	7.00	7.00	7.04	7.03	7.05	7.08	7.10	
1989	7.10	7.12	7.16	7.15	7.18	7.18	7.20	6.81	7.23	7.23		
1990				7.30	7.33	7.30	7.34	7.35	7.35	7.33	7.33	7.21
1991	7.26	7.30	7.31	7.20	7.29	7.30	7.30	7.32	7.30		7.34	3.35

REGION : DAYA Maider: n°IRE = 181 / 65

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1968	3.87	3.90	3.95	4.00	4.05	4.11	4.14	4.67	4.78	4.33		4.35
1969	4.43	4.45	4.45	4.48	4.54		4.68	4.75	4.72	4.72	4.77	4.29
1970	4.82	4.85	4.88	4.92	4.95	4.98	4.99	5.04	5.09	5.15	5.17	5.18
1971	5.20	5.22		5.23	5.28	5.30	5.32	5.35	5.39	5.38	5.38	5.21
1972	5.20	5.22	5.37	5.32	5.37	5.42	5.40	5.47	5.52	5.51	5.52	5.48
1973	5.33	5.40	5.45	5.47	5.52	5.55	5.57	5.60	5.62	5.63	5.65	5.61
1974	5.62	5.66	5.69	5.68	5.70	5.72	5.76	5.78		5.79	5.80	5.80
1975	5.69	5.69			5.82		5.89	5.85	5.87	5.93	5.93	5.92
1976	5.89	5.93	5.95	5.97	6.00	5.99	5.92	6.05	6.06	6.08	6.08	6.06
1977	6.07	6.09	6.08	6.07	6.10	6.11	6.12		6.15	6.15	6.16	6.16
1978	6.15	6.19	6.25	6.25	6.22	6.24		6.28	6.30	6.29	6.31	6.32
1979	6.32	6.28	6.31								4.89	4.71
1980	4.55	4.49	3.82	3.36		3.24	3.42	3.45	3.59	3.55	3.68	3.65
1981	3.73	6.65	3.83	3.88	3.95	3.93	3.89		4.10	4.15	4.18	4.20
1982		4.23	4.30	4.30	4.33	4.35		4.43				4.61
1983		4.68	4.72	4.78	4.79							5.21
1984	5.02	5.04	5.06	5.13	5.10	5.12	5.19	5.25	5.27	5.30	5.29	5.31
1985	5.35	5.37	5.37	5.38	5.23	5.26	5.29	5.27	5.29	5.25	5.25	5.24
1986	5.23	5.19	5.17	5.21	5.26	5.32	5.34		5.42	5.36	5.25	5.24
1987	5.27	5.30	5.35	5.35	5.38	5.34	5.39	5.43	5.45	5.43	5.43	5.46
1988	5.43	5.34	5.21	5.26	5.34	5.36	5.41	5.40	5.44	5.47	5.44	5.46
1989	5.43	5.44	5.46	5.41	5.47	5.45	5.42	5.41	5.45	5.41		
1990				4.80	4.65	4.69	4.69	4.72	4.69	4.74	4.77	5.15
1991	4.93	4.78	4.76	4.82	4.87	4.87	4.88	4.95	4.98		5.02	5.03

REGION: DAYA Maider: n°IRE = 192 / 65

MOIS / ANNEES	JANVIER	FEVRIER	MARS	AVRIL	MAI	JUIN	JUILLET	AOUT	SEP	OCT	NOV	DEC
1968	6.85	6.77	6.80	6.75	6.77	6.72	6.75	6.75	6.80	6.73		6.77
1969	6.65	6.73	6.76	6.80	6.76		6.85	6.76	6.73	6.77	6.63	6.56
1970	6.56	6.59	6.63	6.33	6.34	6.75	6.76	6.80	6.75	6.78	6.75	6.74
1971	6.70	6.78		6.70	6.77	6.80	6.82	6.83	6.80	6.82	6.84	6.78
1972	6.73	6.80	6.80	6.73	6.74	6.82	6.84	6.84	6.87	6.82	6.82	6.84
1973	6.18	6.79	6.77	6.75	6.84	6.78	6.87	6.84	6.85	6.85	6.49	6.79
1974	6.57	6.60	6.56	6.80	6.80	6.81	6.85	6.86		6.85	6.80	6.65
1975	6.75	6.76			6.74		6.72	6.80	6.79	6.77	6.73	6.70
1976	6.71	6.71	6.75	6.76	6.67	6.76	6.73	6.76	6.75	6.73	6.73	6.71
1977	6.72	6.71	6.70	6.70	6.71	6.74	6.73	6.72	6.73	6.73	6.72	6.71
1978	6.69	6.10	6.11	6.70	6.73	6.73		6.77	6.77	6.73	6.72	6.11
1979	6.55	6.60	6.77								6.70	6.68
1980	6.68	6.69	6.69	6.67		6.69	6.69	6.69	6.65	6.61	6.63	6.59
1981	6.54	6.54	6.54	6.51	6.48	6.50	6.46		6.54	6.51	6.51	6.49
1982		6.50	6.49	6.47	6.47	6.47		6.51				
1983		6.51	6.49	6.59	6.51	6.54						6.59
1984	6.58	6.55	6.60	6.63	6.60	6.63	6.66	6.65	6.66	6.65	6.63	6.64
1985	6.60	6.62	6.64	6.66	6.62	6.66	6.67	6.68	6.68	6.66	6.68	6.64
1986	6.62	6.58	6.59	6.64	6.68	6.70	6.70		6.70	6.71	6.67	6.67
1987	6.65	6.65	6.62	6.65	6.70	6.67	6.66	6.65	6.67	6.66	6.65	6.66
1988	6.63	6.64	6.59	6.60	6.65	6.60	6.62	6.66	6.62	6.61	6.60	6.61
1989	6.63	6.62	6.64	6.63	6.64	6.60	6.63	6.65	6.65	6.66		
1990				6.57	6.57	6.37	6.44	6.37	6.38	6.50	6.51	6.50
1991	6.46	6.47	6.45	6.47	6.46	6.53	6.46	6.45	6.47		6.44	6.40

Table A.4.1 Location and Depth of Bore Holes in the Study Area

n°Sondage	Latitude	Longitude	Altitude (m)	P.T.(m)	Area Name
TS(B-1)	31°38'16"	004°56'33"	1,001.41	70	Tizougarhine
HS(B-2)	31°27'43"	004°25'49"	826.08	70	Hannabou
MS(B-3)	31°05'46"	004°00'18"	700.50	40	Merzouga
AS(B-4)	31°11'17"	005°13'29"	924.95	40	Ammar (Alnif)
BS(B-5)	32°19'15"	003°34'24"	1,191.53	30	AlmouChoura (BniTadjit)
MKS B-6	31°28'56"	004°28'41"	840.54	50	Mounkara
KSB B-7	31°34'07"	005°03'10"	1,012.29	50	AitBenOmar/Laksiba (Tinejdad)

Coordinnées des SEV (prospection geoélectrique) exécuté dans cette étude

n°Sondage	Latitude	Longitude	Altitude (m)	Area Name
TR0b	31°39'33"	004°58'00"	1,004.39	Tizougarhine
TR1a	31°38'15"	004°59'01"	1,006.48	
TR1b	31°38'16"	004°56'33"	1,001.41	
TR1c	31°38'16"	004°56'33"	995.26	
TR2a	31°37'09"	004°58'57"	1,009.02	
TR2b	31°37'40"	004°57'40"	1,005.01	
TR2c	31°37'10"	004°56'28"	1,000.03	
TR3a	31°36'05"	004°58'51"	994.56	
TR3b	31°36'02"	004°57'33"	989.57	
TR3c	31°36'14"	004°56'21"	988.10	
HR1z	31°27'43"	004°25'49"	826.08	Hannabou
HR1a	31°27'30"	004°24'00"	823.70	
HR1b	31°27'03"	004°29'51"	806.58	
HR1c	31°26'43"	004°19'41"	800.81	
HR2a	31°26'24"	004°23'39"	818.93	
HR2b	31°26'03"	004°21'33"	803.80	
HR2c	31°25'26"	004°19'07"	801.16	
HR3a	31°25'31"	004°23'18"	813.08	
HR3b	31°25'00"	004°21'09"	801.00	
HR3c	31024'44"	004°19'40"	801.51	
MR1a	31°07'12"	004°01'13"	708.40	Merzouga
MR1b	31°07'14"	004°00'09"	709.10	
MR1c	31°07'07"	003°59'45"	708.00	
MR2a	31°06'14"	004°01'15"	701.80	
MR2	31°05'46"	004°00'18"	700.50	
MR2c	31°06'13"	003°59'44"	708.50	
MR3a	31°05'06"	004°01'08"	697.60	
MR3b	31°05'07"	004°00'25"	701.50	
MR3c	31°04'45"	003°58'16"	725.00	
MR4b	31°04'20"	004°00'41"	701.40	
AS0b	31°11'17"	005°13'29"	924.95	Ammar (Alnif)
AR1a	31°11'04"	005°14'08"	934.61	
AR1c	31°11'09"	005°12'44"	917.52	
AR2a	31°09'53"	005°14'28"	957.09	
AR2b	31°10'10"	005°13'38"	932.10	
AR2c	31°10'04"	005°12'39"	907.12	
AR2d	31°10'04"	005°11'39"	911.95	
AR3a	31°08'54"	005°14'06"	949.50	
AR3b	31°08'56"	005°13'17"	928.21	
AR3c	31°08'51"	005°12'35"	892.83	
BR1a	32°19'54"	003°33'00"	1,180.06	AlmouChoura (BniTadjit)
BR1b	32°19'44"	003°31'50"	1,171.14	
BR1c	32°19'38"	003°30'33"	1,156.64	
BR2z	32°19'15"	003°34'24"	1,191.53	
BR2a	32°19'21"	003°33'05"	1,180.76	
BR2b	32°19'16"	003°31'54"	1,161.33	
BR2c	32°19'13"	003°30'40"	1,133.72	
BR3a	32°18'52"	003°33'07"	1,178.76	
BR3b	32°18'57"	003°31'51"	1,159.21	
BR3c	32°18'45"	003°30'45"	1,154.60	
MK1a	31°29'48"	004°27'29"	837.34	Mounkara
MK1b	31°29'43"	004°26'11"	833.46	
MK1c	31°29'36"	004°24'57"	826.46	
MK2a	31°29'15"	004°27'33"	836.07	
MK2b	31°29'11"	004°26'15"	832.10	
MK2c	31°29'06"	004°24'58"	826.56	
MK2d	31°28'58"	004°23'40"	818.07	
MK3a	31°28'43"	004°27'38"	835.01	
MK3b	31°28'37"	004°26'18"	830.51	
MKS B-6	31°28'56"	004°28'41"	840.54	
KSB1a	31°34'47"	005°03'12"	1,015.00	AitBenOmar/Laksiba (Tinejdad)
KSB2a	31°34'07"	005°03'28"	1,013.53	
KSB3a	31°33'38"	005°03'43"	1,014.29	
KSB1b	31°34'16"	005°02'15"	1,009.43	
KSB2b	31°33'46"	005°02'37"	1,008.10	
KSB3b	31°33'16"	005°03'00"	1,003.41	
KSB1c	31°33'55"	005°01'28"	996.61	
KSB2c	31°33'27"	005°01'46"	996.88	
KSB3c	31°32'58"	005°01'59"	998.70	
KSB B-7	31°34'07"	005°03'10"	1,012.29	

Table A.4.2-1 Results of Permiability Test In Situ at every Boreholes （Open End Method）-1

Tizougarhine（TS B-1）

GL.- 5m		GL.- 10m		GL.- 15m		GL.- 20m		GL.- 25m		GL.- 30m		GL.- 35m	
Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)
1	0.0065	1	0.0020	1	0.0010	1	0.0021	1	0.0015	1	0.0012	1	0.0022
2	0.0078	2	0.0000	2	0.0007	2	0.0000	2	0.0000	2	0.0014	2	0.0020
3	0.0045	3	0.0052	3	0.0000	3	0.0013	3	0.0005	3	0.0010	3	0.0020
4	0.0048	4	0.0032	4	0.0002	4	0.0007	4	0.0005	4	0.0008	4	0.0021
5	0.0016	5	0.0017	5	0.0004	5	0.0004	5	0.0008	5	0.0015	5	0.0015
6	0.0058	6	0.0000	6	0.0000	6	0.0000	6	0.0000	6	0.0016	6	0.0030
7	0.0065	7	0.0022	7	0.0000	7	0.0015	7	0.0010	7	0.0019	7	0.0021
8	0.0084	8	0.0000	8	0.0015	8	0.0011	8	0.0000	8	0.0013	8	0.0018
9	0.0039	9	0.0000	9	0.0000	9	0.0000	9	0.0000	9	0.0011	9	0.0018
10	0.0035	10	0.0000	10	0.0002	10	0.0000	10	0.0000	10	0.0014	10	0.0015
11	0.0029	11	0.0000	11	0.0001	11	0.0006	11	0.0013	11	0.0013	11	0.0020
12	0.0052	12	0.0041	12	0.0000	12	0.0000	12	0.0000	12	0.0007	12	0.0014
13	0.0048	13	0.0000	13	0.0002	13	0.0000	13	0.0004	13	0.0005	13	0.0019
14	0.0039	14	0.0000	14	0.0002	14	0.0019	14	0.0002	14	0.0008	14	0.0020
15	0.0027	15	0.0000	15	0.0000	15	0.0000	15	0.0000	15	0.0015	15	0.0023
16	0.0039	16	0.0032	16	0.0000	16	0.0010	16	0.0000	16	0.0012	16	0.0025
17	0.0035	17	0.0000	17	0.0001	17	0.0000	17	0.0000	17	0.0013	17	0.0027
18	0.0078	18	0.0000	18	0.0009	18	0.0003	18	0.0014	18	0.0012	18	0.0025
19	0.0039	19	0.0032	19	0.0000	19	0.0002	19	0.0000	19	0.0012	19	0.0022
20	0.0071	20	0.0000	20	0.0002	20	0.0000	20	0.0012	20	0.0012	20	0.0027

Merzouga（MS B-3）

GL.- 5m		GL.- 10m		GL.- 15m		GL.- 20m	
Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)
1	0.0000	1	0.0022	1	0.0016	1	0.0011
2	0.0000	2	0.0022	2	0.0016	2	0.0010
3	0.0000	3	0.0019	3	0.0016	3	0.0012
4	0.0000	4	0.0020	4	0.0014	4	0.0010
5	0.0000	5	0.0020	5	0.0014	5	0.0011
6	0.0000	6	0.0020	6	0.0015	6	0.0010
7	0.0000	7	0.0020	7	0.0015	7	0.0010
8	0.0000	8	0.0022	8	0.0015	8	0.0010
9	0.0000	9	0.0017	9	0.0015	9	0.0010
10	0.0000	10	0.0019	10	0.0016	10	0.0009
11	0.0000	11	0.0017	11	0.0016	11	0.0009
12	0.0000	12	0.0015	12	0.0015	12	0.0010
13	0.0000	13	0.0015	13	0.0014	13	0.0008
14	0.0000	14	0.0013	14	0.0014	14	0.0009
15	0.0000	15	0.0013	15	0.0014	15	0.0008
16	0.0000	16	0.0013	16	0.0011	16	0.0007
17	0.0000	17	0.0013	17	0.0011	17	0.0007
18	0.0000	18	0.0013	18	0.0011	18	0.0007
19	0.0000	19	0.0013	19	0.0011	19	0.0007
20	0.0000	20	0.0013	20	0.0011	20	0.0007

Hannabou（HS B-2）

GL.- 5m		GL.- 10m		GL.- 15m		GL.- 20m		GL.- 25m		GL.- 30m		GL.- 35m	
Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)
1	0.0033	1	0.0027	1	0.0023	1	0.0007	1	0.1323	1	0.0980	1	0.0767
2	0.0019	2	0.0024	2	0.0021	2	0.0007	2	0.0877	2	0.0647	2	0.0852
3	0.0013	3	0.0020	3	0.0021	3	0.0005	3	0.0762	3	0.0738	3	0.0817
4	0.0013	4	0.0017	4	0.0018	4	0.0005	4	0.1006	4	0.0811	4	0.0753
5	0.0016	5	0.0013	5	0.0018	5	0.0005	5	0.0337	5	0.0411	5	0.0700
6	0.0013	6	0.0010	6	0.0014	6	0.0003	6	0.0635	6	0.0514	6	0.0677
7	0.0013	7	0.0010	7	0.0014	7	0.0003	7	0.0719	7	0.0600	7	0.0595
8	0.0016	8	0.0010	8	0.0014	8	0.0003	8	0.0460	8	0.0450	8	0.0573
9	0.0006	9	0.0006	9	0.0009	9	0.0001	9	0.0582	9	0.0466	9	0.0556
10	0.0009	10	0.0006	10	0.0009	10	0.0001	10	0.0481	10	0.0438	10	0.0509
11	0.0013	11	0.0006	11	0.0009	11	0.0001	11	0.0520	11	0.0438	11	0.0488
12	0.0006	12	0.0006	12	0.0004	12	0.0000	12	0.0517	12	0.0468	12	0.0514
13	0.0006	13	0.0003	13	0.0004	13	0.0000	13	0.0611	13	0.0428	13	0.0379
14	0.0006	14	0.0003	14	0.0004	14	0.0000	14	0.0431	14	0.0402	14	0.0389
15	0.0006	15	0.0003	15	0.0004	15	0.0000	15	0.0409	15	0.0396	15	0.0367
16	0.0003	16	0.0003	16	0.0004	16	0.0000	16	0.0592	16	0.0439	16	0.0348
17	0.0003	17	0.0003	17	0.0004	17	0.0000	17	0.0418	17	0.0403	17	0.0343
18	0.0003	18	0.0003	18	0.0004	18	0.0000	18	0.0481	18	0.0399	18	0.0355
19	0.0003	19	0.0003	19	0.0004	19	0.0000	19	0.0481	19	0.0405	19	0.0355
20	0.0003	20	0.0003	20	0.0004	20	0.0000	20	0.0491	20	0.0708	20	0.0350

Ammar (Alnif)（AS B-4）

GL.- 5m		GL.- 10m		GL.- 15m		GL.- 20m	
Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)
1	0.4735	1	0.0020	1	0.0014	1	0.0010
2	0.4605	2	0.0022	2	0.0014	2	0.0010
3	0.4216	3	0.0020	3	0.0014	3	0.0012
4	0.4086	4	0.0022	4	0.0015	4	0.0010
5	0.4411	5	0.0024	5	0.0012	5	0.0011
6	0.4670	6	0.0020	6	0.0011	6	0.0010
7	0.4086	7	0.0019	7	0.0011	7	0.0010
8	0.4119	8	0.0019	8	0.0011	8	0.0010
9	0.3859	9	0.0017	9	0.0011	9	0.0010
10	0.3762	10	0.0017	10	0.0011	10	0.0009
11	0.3775	11	0.0017	11	0.0009	11	0.0010
12	0.3567	12	0.0015	12	0.0009	12	0.0009
13	0.3535	13	0.0015	13	0.0009	13	0.0010
14	0.3710	14	0.0013	14	0.0007	14	0.0008
15	0.3652	15	0.0013	15	0.0007	15	0.0008
16	0.3554	16	0.0010	16	0.0007	16	0.0008
17	0.3567	17	0.0010	17	0.0004	17	0.0008
18	0.3667	18	0.0010	18	0.0004	18	0.0008
19	0.3645	19	0.0010	19	0.0004	19	0.0008
20	0.3567	20	0.0010	20	0.0004	20	0.0008

Table A.4.2-2 Results of Permiability Test In Situ at every Boreholes （Open End Method）-2

AlmouChoura (BeniTadjit) (BS B-5)

GL.- 5m		GL.- 10m		GL.- 15m	
Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)
1	0.0057	1	0.0035	1	0.0025
2	0.0051	2	0.0053	2	0.0037
3	0.0051	3	0.0088	3	0.0018
4	0.0063	4	0.0106	4	0.0037
5	0.0082	5	0.0088	5	0.0050
6	0.0063	6	0.0071	6	0.0025
7	0.0076	7	0.0079	7	0.0063
8	0.0063	8	0.0053	8	0.0050
9	0.0082	9	0.0053	9	0.0055
10	0.0051	10	0.0053	10	0.0063
11	0.0063	11	0.0053	11	0.0056
12	0.0076	12	0.0088	12	0.0025
13	0.0044	13	0.0049	13	0.0065
14	0.0054	14	0.0079	14	0.0037
15	0.0095	15	0.0078	15	0.0040
16	0.0089	16	0.0088	16	0.0037
17	0.0044	17	0.0092	17	0.0063
18	0.0089	18	0.0053	18	0.0050
19	0.0070	19	0.0106	19	0.0037
20	0.0051	20	0.0053	20	0.0050

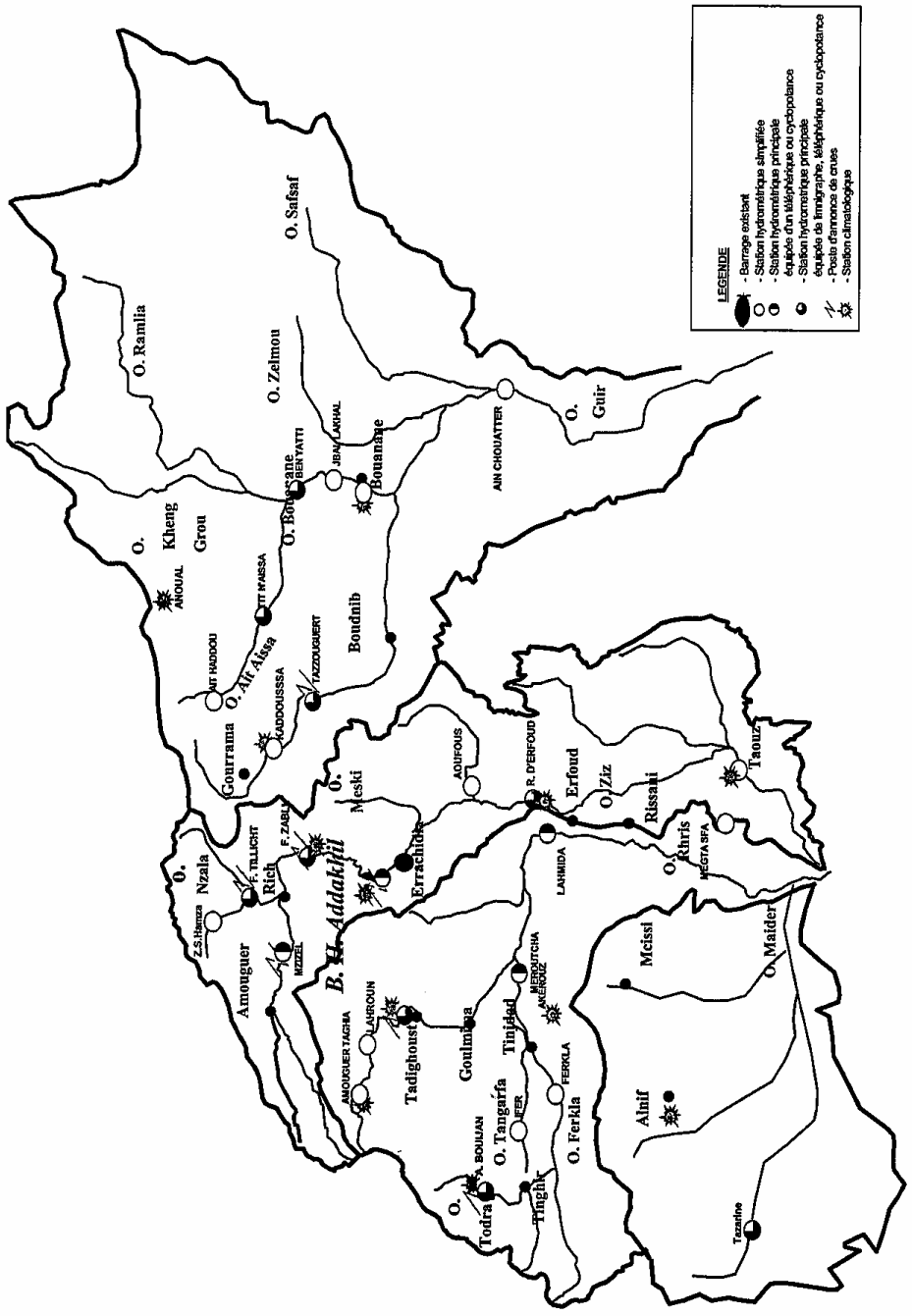
Mounkara (MKS B-6)

GL.- 5m		GL.- 10m		GL.- 15m		GL.- 20m		GL.- 25m	
Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)
1	0.0046	1	0.0034	1	0.0018	1	0.0010	1	0.1456
2	0.0052	2	0.0031	2	0.0014	2	0.0008	2	0.1326
3	0.0039	3	0.0020	3	0.0016	3	0.0008	3	0.1196
4	0.0033	4	0.0024	4	0.0011	4	0.0008	4	0.1254
5	0.0033	5	0.0020	5	0.0009	5	0.0007	5	0.1225
6	0.0033	6	0.0017	6	0.0009	6	0.0008	6	0.1189
7	0.0026	7	0.0010	7	0.0007	7	0.0008	7	0.1139
8	0.0033	8	0.0010	8	0.0007	8	0.0007	8	0.1132
9	0.0033	9	0.0013	9	0.0007	9	0.0007	9	0.1056
10	0.0026	10	0.0010	10	0.0004	10	0.0007	10	0.1031
11	0.0033	11	0.0006	11	0.0004	11	0.0005	11	0.1016
12	0.0033	12	0.0010	12	0.0004	12	0.0005	12	0.0980
13	0.0033	13	0.0006	13	0.0002	13	0.0003	13	0.1009
14	0.0026	14	0.0006	14	0.0002	14	0.0003	14	0.1002
15	0.0026	15	0.0006	15	0.0001	15	0.0003	15	0.1031
16	0.0019	16	0.0006	16	0.0001	16	0.0001	16	0.0980
17	0.0019	17	0.0006	17	0.0001	17	0.0001	17	0.0974
18	0.0019	18	0.0003	18	0.0001	18	0.0001	18	0.0983
19	0.0019	19	0.0003	19	0.0001	19	0.0001	19	0.0966
20	0.0019	20	0.0003	20	0.0001	20	0.0001	20	0.0973

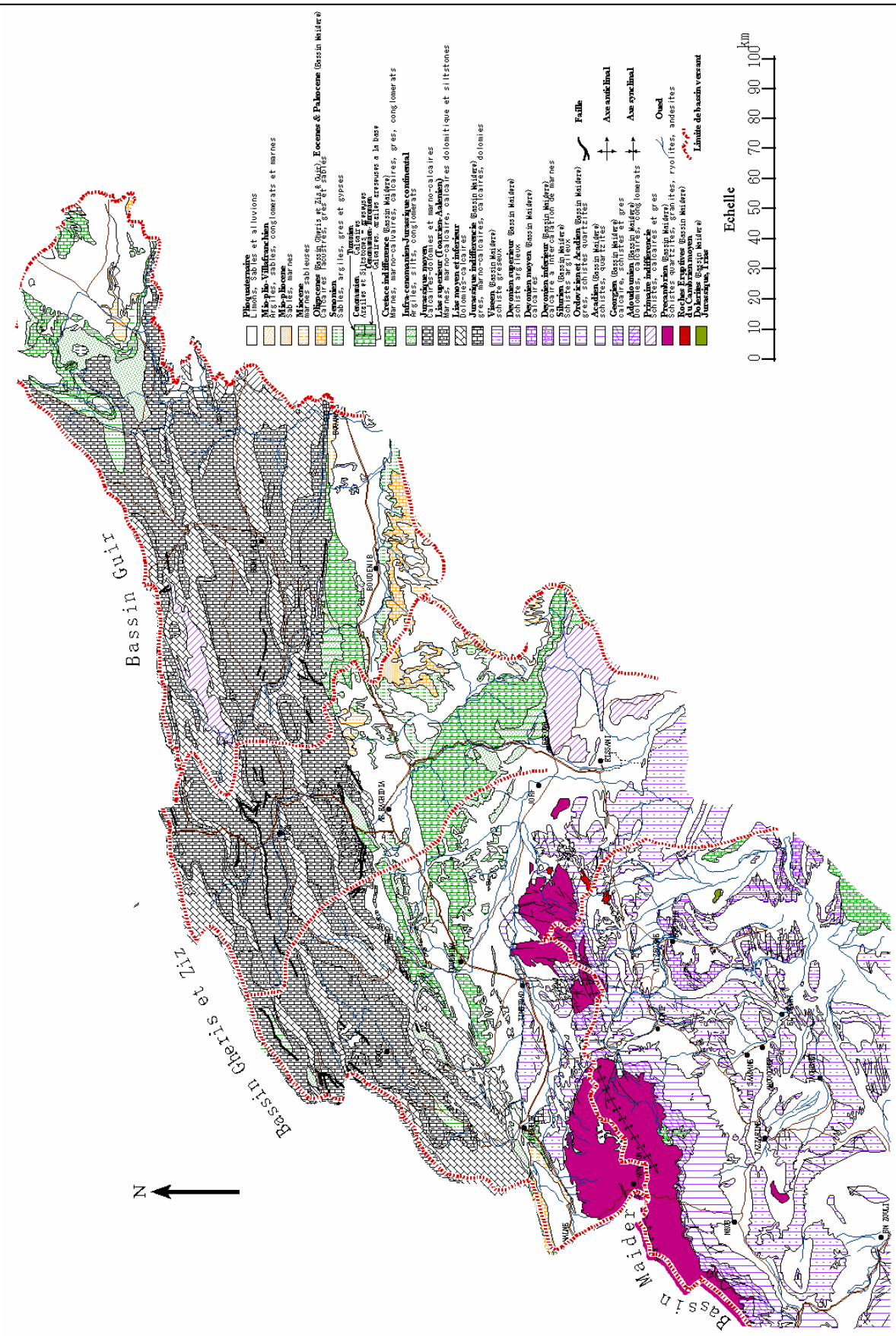
Ait Ben Omar / La'Ksiba (KSB B-7)

GL.- 5m		GL.- 10m		GL.- 15m		GL.- 20m		GL.- 26m	
Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)	Elap.Time (min)	Coef. of Permeability (cm/s)
1	0.0013	1	0.0045	1	0.0023	1	0.0034	1	0.0026
2	0.0014	2	0.0066	2	0.0028	2	0.0037	2	0.0016
3	0.0014	3	0.0083	3	0.0050	3	0.0033	3	0.0005
4	0.0013	4	0.0087	4	0.0056	4	0.0030	4	0.0011
5	0.0016	5	0.0062	5	0.0049	5	0.0032	5	0.0008
6	0.0011	6	0.0059	6	0.0046	6	0.0026	6	0.0012
7	0.0015	7	0.0062	7	0.0037	7	0.0039	7	0.0009
8	0.0013	8	0.0067	8	0.0046	8	0.0040	8	0.0011
9	0.0016	9	0.0076	9	0.0033	9	0.0041	9	0.0006
10	0.0017	10	0.0045	10	0.0035	10	0.0048	10	0.0006
11	0.0018	11	0.0073	11	0.0050	11	0.0028	11	0.0006
12	0.0012	12	0.0074	12	0.0042	12	0.0026	12	0.0006
13	0.0018	13	0.0034	13	0.0041	13	0.0034	13	0.0005
14	0.0011	14	0.0041	14	0.0052	14	0.0031	14	0.0005
15	0.0013	15	0.0053	15	0.0023	15	0.0037	15	0.0004
16	0.0013	16	0.0097	16	0.0030	16	0.0035	16	0.0003
17	0.0011	17	0.0064	17	0.0029	17	0.0017	17	0.0003
18	0.0010	18	0.0077	18	0.0055	18	0.0020	18	0.0002
19	0.0009	19	0.0081	19	0.0046	19	0.0039	19	0.0002
20	0.0015	20	0.0069	20	0.0049	20	0.0046	20	0.0001

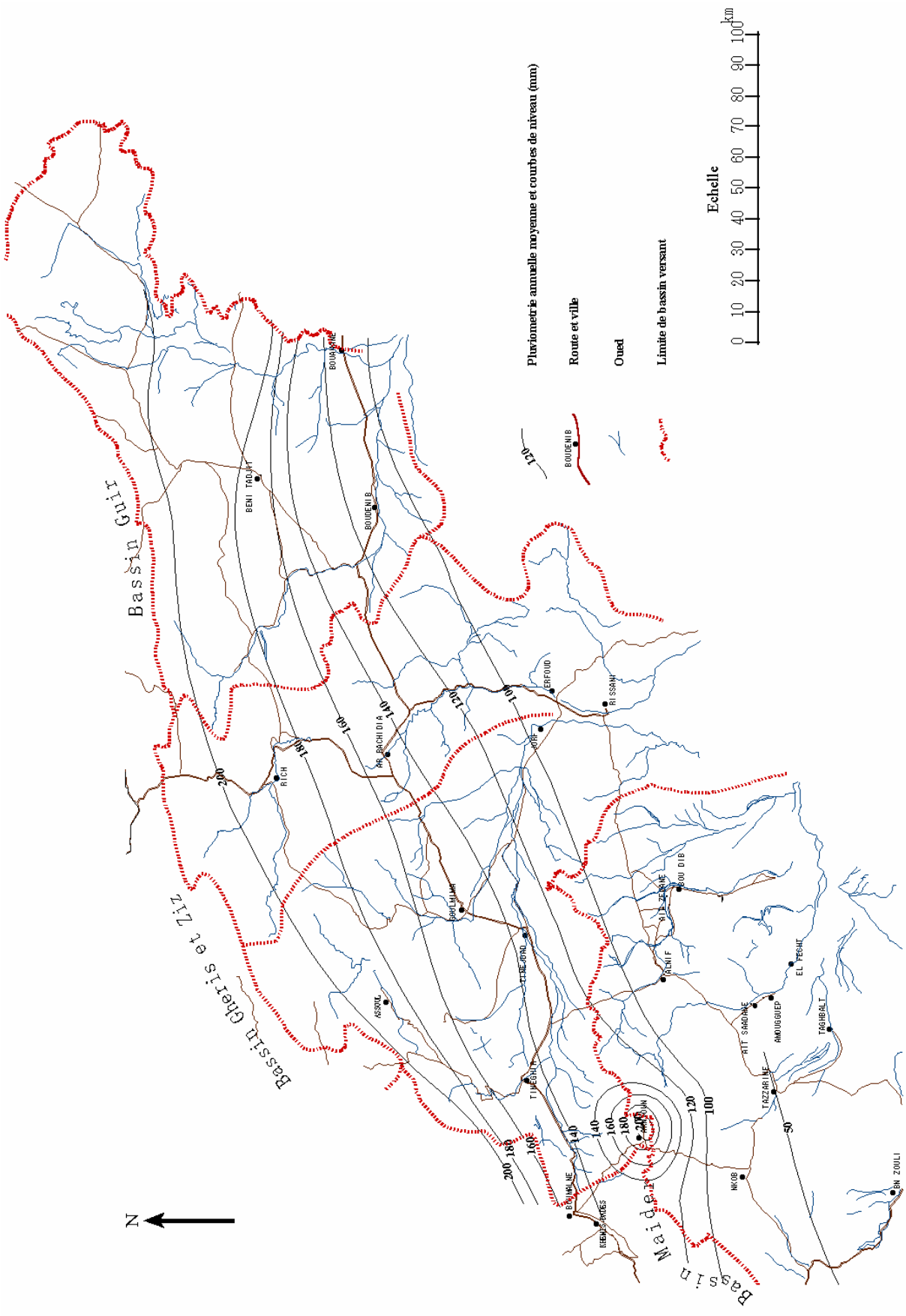
Figures



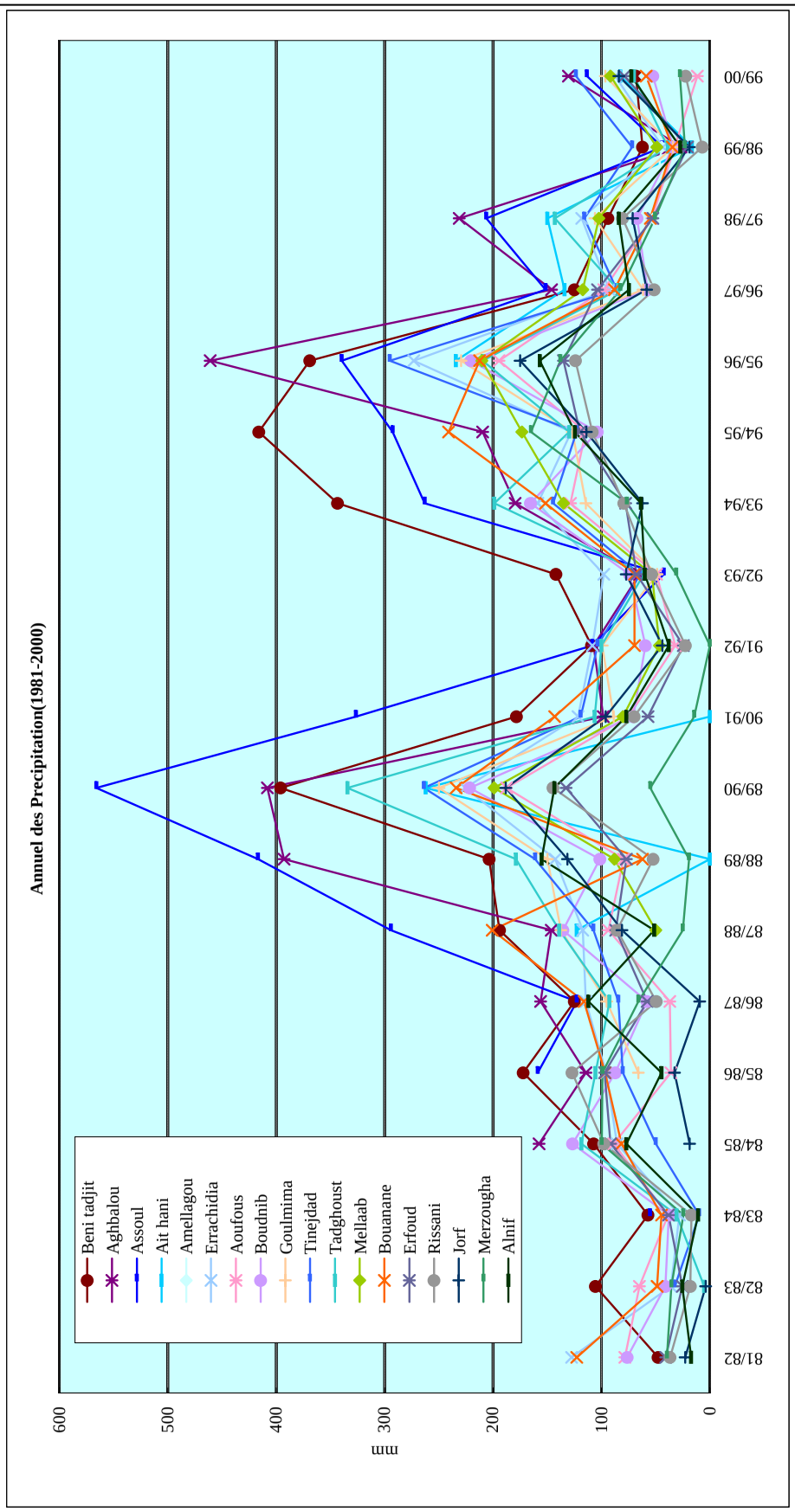
The Development Study on Rural Community Development Project in Semi-Arid Atlas Regions with Khettara Rehabilitation in the Kingdom of Marocco	Figure A.1.1 Meteor - and Hydrometrical Stations of DRH
Japan International Cooperation Agency	



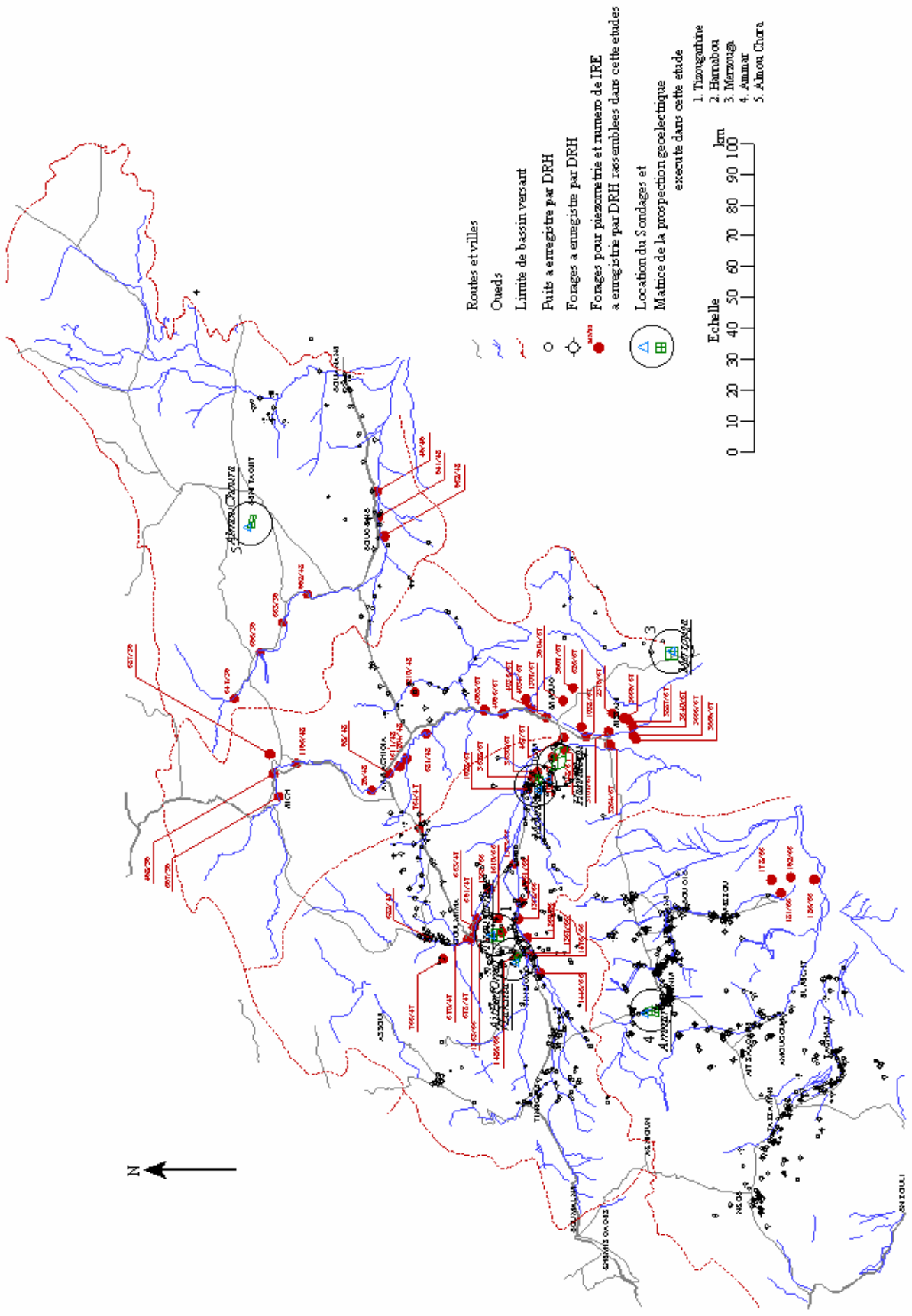
The Development Study on Rural Community Development Project in Semi-Arid Atlas Regions with Khettara Rehabilitation in the Kingdom of Marocco	Figure A.2.1 Geology of the Study Area
Japan International Cooperation Agency	



The Development Study on Rural Community Development Project in Semi-Arid Atlas Regions with Khettara Rehabilitation in the Kingdom of Marocco	Figure A.3.1 Contour Map of Annual Average Rainfall in the Study Area
Japan International Cooperation Agency	



The Development Study on Rural Community Development Project in Semi-Arid Atlas Regions with Khettara Rehabilitation in the Kingdom of Marocco	Figure A.3.2 A Secular Fluctuation of Annual Precipitation during 1981 – 2000 at CMV ORMVA/TF
Japan International Cooperation Agency	



The Development Study on Rural Community Development Project in Semi-Arid Atlas Regions with Khettara Rehabilitation in the Kingdom of Marocco	Figure A.3.3 Location of Wells (including Groundwater Observation Wells) in the Study Area and Drilling / Geoelectrical Prospecting Points carried out in this Study
Japan International Cooperation Agency	