

*Feasibility Study on Water Resources Development in
Rural Area in
the Kingdom of Morocco
Final Report
Volume III Supporting Report (1)
Basic Study*

***Supporting Report VI Existing Water
Resources Development***

**FEASIBILITY STUDY
ON
WATER RESOURCES DEVELOPMENT
IN
RURAL AREA
IN
THE KINGDOM OF MOROCCO**

FINAL REPORT

**VOLUME III
SUPPORTING REPORT (1)
BASIC STUDY**

**SUPPORTING REPORT VI
EXISTING WATER RESOURCES
DEVELOPMENT PLANS**

Table of Contents

	<u>Page</u>
VI1 General.....	VI-1
VI2 Northern Morocco Basins	VI-3
VI3 Sebou River Basin	VI-4
VI4 Bou Regreg River and Casablanca Coastal Basins	VI-5
VI5 Oum Er Rbia River Basin	VI-6
VI6 Tensift River and Essaouira Coastal Basins	VI-6
VI7 Souss-Massa River Basins	VI-7
VI8 Guir, Ziz, Rheriss and Draa River Basins.....	VI-8
VI9 Moulouya River Basin.....	VI-8

List of Tables

Table VI1.1	Existing Large Dams (1/2).....	VIT-1
Table VI1.1	Existing Large Dams (2/2).....	VIT-2
Table VI1.2	Proposed Large Dams (1/2)	VIT-3
Table VI1.2	Proposed Large Dams (2/2)	VIT-4

List of Figures

Figure VI1.1	Water Resources Development in Northern Basin.....	VIF-1
Figure VI1.2	Water Resources Development in Sebou Basin.....	VIF-2
Figure VI1.3	Water Resources Development in Bou Regreg and Costal Atlantic of Casablanca	VIF-3
Figure VI1.4	Water Resources Development in Oum Er-Rbia Basin	VIF-4
Figure VI1.5	Water Resources Development in Tensift Basin	VIF-5
Figure VI1.6	Water Resources Development in Sous Massa Basin	VIF-6
Figure VI1.7	Water Resources Development in Guir, Ziz, Rheriss Basin	VIF-7
Figure VI1.8	Water Resources Development in Moulouya Basin.....	VIF-8

SUPPORTING REPORT VI

EXISTING WATER RESOURCES DEVELOPMENT PLANS

VII General

Master plans for basin-wide water resources development were prepared after 1980s, while sector basis plans were prepared before then. The water resources development master plan is prepared by the Ministry of Equipment incorporating policies and plans of the government agencies relevant to water resources development such as Ministry of Equipment (dam), Ministry of Agriculture (irrigation), Ministry of Energy (hydro-power), Ministry of Commerce and Industry (industrial water), Ministry of Health, Ministry of Environment, Ministry of Interior, ONEP (municipal water), etc., on the following process:

- Evaluation of existing conditions of water resources.
- Study on water resources.
- Site investigation.
- Study on water demand: Municipal (potable and industrial) water, irrigation water, hydropower generation, etc.
- Water balance study.
- Development scenario.
- Comparison of alternative schemes and selection of an optimum scheme.

The master plan is put into practice after approval of the CSES presented by His Majesty the King. The master plan has already prepared for all basins, and some of them have already been approved by the CSES.

General layout of the water resources development facilities is shown in Figures VII.1 through VII.8.

Dams in Morocco are primarily classified into small and large dams. The dams which are more than 30 m in height and annual inflow exceeds 1 million m³ are generally classified as the large dam. Medium-scale dams are those of the large dams, which are constructed directly by the Ministry of Equipment because of immediate need for implementation and other reasons. The dams to be constructed directly by the Ministry would be generally of medium scale.

The existing large dams including medium-scale dams are listed in Table VI1.1 and the proposed dams in Table VI1.2. A total of 89 dams are listed as existing large dam. The total storage capacity amounts to 14,160 million m³. According to the available data for the existing dams, annual regulated volume is on average about 53% of the storage capacity. If this ratio is assumed, the total regulated volume of the existing dams amounts to about 7,500 million m³/year. Furthermore, 107 large dams with total capacity of 15,572 million m³ are proposed for future water resources development.

For the implementation, the country is administratively divided into nine (9) hydraulic regions as follows:

- (1) Regional Hydraulic Directions of Loukkos: Tetouan
- (2) Regional Hydraulic Directions of Moulouya-Neckor: Oujda
- (3) Regional Hydraulic Directions of Sebou: Fes
- (4) Regional Hydraulic Directions of Bou Regreg and La Chaouia: Benslimane
- (5) Basin Hydraulic Agency of Oum Er Rbia: Beni Mellal
- (6) Regional Hydraulic Directions of Tensift: Marrakech
- (7) Regional Hydraulic Directions of Souss Massa and Draa: Agadir
- (8) Regional Hydraulic Directions of Guir-Rheris-Ziz: Er Rachidia
- (9) Regional Hydraulic Directions of Sahara: Laayoune

An agency will be established for each of the region. The agency is to be managed on a self-paying basis. At present, the first agency has been established in the Oum Er Rbia River Basin.

All the planning procedures and institutions mentioned above are based on the Act 10-95.

Major water resources development facilities and plans related to the proposed 25-dams are outlined here dividing the country into the following group of basins:

- Northern Morocco Basins;
- Sebou River Basin;

- Bou Regreg River and Casablanca Coastal Basins;
- Oum Er Rbia River Basin;
- Tensift River and Essaouira Coastal Basins;
- Souss-Massa River Basins;
- Guir, Ziz, Rheris and Draa River Basins; and
- Moulouya River Basin.

VI2 Northern Morocco Basins

The Basins, located in the Northern part of Morocco, consist of the Tangerois and Loukkos river basins emptying into the Atlantic Ocean, and small river basins along the coast of the Mediterranean Sea (Figure VI1.1). The Basins cover a total area of 20,600 km².

The Basins fall under the Mediterranean climate zone with relatively high humidity in the west and dry in the east. Annual rainfall amounts to around 700 mm/yr and the rainfall pattern is rather stable. The rainfall is more in the Tangerois and Lukkoss river basins and Mediterranean coastal region amounting to 800 mm/yr, while rainfall is low ranging from 350 to 400 mm/yr in the eastern part of the Basins. The rainy season takes place from September to April next year, and the dry season the rest of the year. Changes of surface flow are large throughout a year, since water-retaining capacity of the soil is low.

The Neckor River, located in the eastern part of the Basins, is one of the numerous rivers in the Basins. A plain area extends at the mouth of the Neckor River and Al Hoceima city is located on the hill at the western edge of the plain.

Al Kattabi dam was constructed in 1981 on the Neckor River. The dam is playing important roles in irrigation, flood and sediment control of the plain, and municipal water supply to Al Hoceima city.

The Al Kattabi reservoir has suffered from severe sedimentation after the construction and about thirty (30) percent of total capacity has already silted up. The Neckor dam (No.1) was proposed for the compensation of Al Kattabi dam.

From the west, the Rhis River joins to the Neckor plain. The Rhis river basin, having almost same basin size with the Neckor, receives more rainfall but yields less sediment. In the middle reaches of the Rhis River, Joumoua dam is serving mainly for water supply to Targuist town. At the lower end of the river near the Neckor plain, Ifassiyene dam is proposed for irrigation and municipal water supply.

VI3 Sebou River Basin

The Sebou River Basin covers a total area of about 40,000 km² and has abundance of water resources, collecting river flows from the Rif and Moyen Atlas Mountains (Figure VI1.2). The Mediterranean type of climate prevails in the Basin with relatively high rainfall amounting to 750 mm/yr. River flow is relatively stable throughout a year receiving snowmelt runoff.

Seven (7) dams out of the 25 dams under study are located on the main Sebou River and its major tributaries such as the Ouergha and Beht rivers as follows:

- (1) Ouergha river: Tizimellal dam (No.2), Tazarane dam (No.6), Aoulai dam (No.19) and Sidi El Mokhfi dam (No.21).
- (2) Beht river: Adarouch dam (No.14).
- (3) Main Sebou river: Sidi Abbou dam (No.20) and Azghar dam (No.17).

Al Wahda dam was constructed in 1996 on the Ouergha River with major functions of hydropower generation, irrigation and municipal water supply. In order to alleviate reservoir sedimentation of the Al Wahda dam, fifteen dams including Tizimellal (No.2) and Tazarane (No.6) dams are proposed. Aoulai (No.19) and Sidi El Mokhfi dams may function to some extent for alleviation of the sedimentation as well, though they are not included in the fifteen dams. Primary function of these dams, however, should be for local irrigation and water supply, since the sediment alleviation function of these dams may be limited due to the following reasons:

- Except for Sidi El Mokhfi dam, basin areas of the proposed dams are by far small comparing with that of Al Wahda dam and located far away from Al Wahda dam. Effects of these dams may be small.
- Bouhouda dam exists in the downstream reaches of Tizimellal dam (No.2). Tafrant and Bob Ouender dams are proposed in the downstream reaches of Tazarane (No.6) and Aoulai (No.19) dams, respectively. Effects of these upstream dams are not direct and would be absorbed by the downstream dams.

El Kansera dam constructed in 1935 on the Beht River for hydro-power generation, irrigation and municipal water supply is also suffering from sedimentation problem. Sixty (60) percent of the total reservoir capacity has already been silted up. In the upstream Ouljet Soltane dam is proposed to compensate El Kansera reservoir. Further in the upstream Adarouch dam (No.14) is also proposed partly for the same purpose. These proposed dams also have their own functions such as local irrigation.

Sidi Abbou dam (No. 20) proposed on the Lebene River, a tributary of the main Sebou River, aims to local irrigation in the riverine areas downstream. The dam is also expected for avoiding salinity influence of geological origin near Tissa town.

Azghar dam (No.17) located on the Zloul River, a tributary of the main Sebou, is planned mainly to supply irrigation water to downstream basin and municipal water to Ribat-el Kheir town.

In the downstream reaches of the Azghar dam (No.17), Allal Al Fassi dam was constructed in 1990 for hydropower generation, irrigation and municipal water supply. The water taken from the main Sebou River for hydro-power generation is discharged into Idriss 1^{er} dam on the Inaouene River of the same Sebou river system. The water transferred from the main Sebou River contributes much for securing water resources of the Idriss 1^{er} dam and now shares majority of storage water of the dam.

The existing and proposed dams in the upper and middle reaches of the Sebou River also serve for replenishing ground water zone (nappe) to supply stable irrigation water in the extensive plain land near Kenitra city.

VI4 Bou Regreg River and Casablanca Coastal Basins

The Basins, covering a total area of 20,000 km², consist of the Bou Regreg river basin and small river basins along the Atlantic coast near Casablanca (Figure VII.3). The Mediterranean climate influenced by the ocean prevails in the Basins with annual rainfall of about 500 mm/yr.

Four (4) dams out of the 25 dams are proposed in the different river systems of the Basins. Ain Kwachiya dam (No.4), proposed on the Kellata River of the Iqem river system, aims at water supply for local irrigation and flood control of Sidi Yahya town. The proposed service area suffers from salinity problems of geological origin, and the dam is expected to alleviate the problems.

N'Fifikh dam (No.5) proposed on the N'Fifikh River has functions for irrigation water supply to the riverine farmlands and alleviation of salinity problems as well. Sidi Omar dam (No.15) is proposed on the Tabahart River, a tributary of the Bou Regreg River, mainly aiming at irrigation water supply to the river farmlands.

Boukarkour dam (No.18) is proposed on the Zamrine River of the Mellah River system. Major functions of this dam are local irrigation and municipal water supply securing stable flow to the existing Mellah dam located in the lower reaches. The Mellah dam was constructed in 1931 for water supply to Casablanca city and irrigation originally, and since 1970s solely for irrigation.

The Mellah dam also serves well for flood control. Even during severe flood in 1996, serious damages were not brought about in Mohammedia city and riverine areas downstream of the dam.

VI5 Oum Er Rbia River Basin

The Oum Er Rbia River, originating at the Moyen Atlas Mountains, has a total basin area of 35,000 km² (Figure VI1.4). The Basin falls under the Mediterranean climate zone and receives annual rainfall of 515 mm/yr. The Basin has abundance of water with relatively stable flow throughout a year associated with snowmelt runoff. The Oum Er Rbia River Basin as well as the Sebou River Basin is the most advanced regions in Morocco in the water resources development.

Major tributaries of the Oum Er Rbia River are the El Abid River and Tessout River. Two dams out of 25-dams are proposed in the Basin, N'Ouantz dam (No.22) in the upstream reaches of the El Abid River and Ait Baddou dam (No.3) on the Lakh River, a tributary of the Tessout River.

The N'Ouantz dam (No.22) aims to supply water for irrigation and livestock. In the lower reaches of the El Abid River, Bin El Ouidane dam was constructed in 1953 for hydro-power generation and irrigation purposes. Between these two dams, Bou Inougoudane dam is also proposed mainly for hydro-power generation.

Hassan 1^{er} dam, the highest dam in Morocco, was constructed on the Tessout River in 1986 for irrigation, hydro-power and municipal water supply. Sidi Driss dam constructed in the downstream in 1984 serves as regulation dam of the Hassan 1^{er} dam. Rocade canal was constructed from the Sidi Driss dam toward Boir Hamine dam on the N'Fiss River of the Tensift River system. The Rocade canal (more than 100 km long) transfer water from the Tessout River into the Tensift river basin for supplying municipal water of Marrakech city and irrigation water in the surrounding areas amounting to 60,000 ha. The Sidi Driss dam and the Rocade canal have been suffering from severe sedimentation and prompt measures are awaited.

Ait Baddou dam (No.3) on the Tessout River was proposed as a measure for the sediment problems of the Rocade canal and Sidi Driss dam.

VI6 Tensift River and Essaouira Coastal Basins

The Basins consist of the Tensift River basin and small river basins along Atlantic coast from El Jadida to Essaouira, covering a total area of 37,500 km² (Figure VI1.5). The Climate is dry but influenced by the ocean. The annual rainfall amounts to 330 mm/yr with irregular rainfall pattern.

River flow is little or none for most of the year except for the severe flush flood due to heavy rainfall that occurs once in a long while.

The Tensift River joins numerous left tributaries that originate at the Haut Atlas Mountains. Several dams are proposed on the left tributaries among which Amezmiz dam (No.7), Boulaouane dam (No.8) and Taskourt dam (No.9) are included. These dams aim to primarily supply local irrigation water to the downstream basins, and secondarily replenish extensive ground water zone (nappe) extending from Marrakech city to Essaouira city.

Lalla Takerkoust dam was constructed in 1935 on the N'Fiss river in the lower reaches of the proposed Amezmiz dam (No.7). This dam has functions for hydropower generation and irrigation, and serving as well for municipal water supply to Marrakech city in case of abnormal drought. In the downstream of the Lalla Takerkoust dam, exists the Boir Hamine dam which is the terminal point of the Rocate canal.

VI7 Souss-Massa River Basins

The Basins consist of the Souss, Massa, Tamri and other small river basins with an area of 35,400 km² in total (Figure VI1.6). Climate is dry and unstable with annual rainfall of about 240 mm/yr. The river flow is little or none for most of the year and severe flush flood occurs once in a long while after heavy few days' rainfall.

The Basins extend symmetrically on both sides of the Souss River, bordered by Haut Atlas Mountains on the right and Anti Atlas Mountains on the left. Three proposed dams out of the 25 dams are located on the right tributaries of the Souss River. They are Igui N'Ouaqa dam (No.23) on the Aguerd River, Sidi Abdellah dam (No. 25) on the L'Ouaar River, and Amont Abdelmoumen dam (No.24) on the Issen River.

The extensive ground water zone (nappe) of the Souss River, extending from existing Aoulouz dam to Agadir city, is recently suffering from rapid drawdown of groundwater table at the rate of 1.6 m/yr on an average. In order to cope with the problems, the Government has been taking so far various measures. Igui N'Ouaqa (No.23) and Sidi Abdellah (No.25) dams are proposed for this purpose. These dams jointly aim at replenishment of ground water in the Sebt Guerdane area near Taroudant city.

On the Issen River where Amont Abdelmoumen dam (No.24) is proposed, Abdelmoumen dam was constructed in 1981 for hydropower generation, irrigation and municipal water supply. The Abdelmoumen dam, however, cannot store water as planned originally due to some technical defect.

The Amont Abdelmoumen dam (No.24) was proposed for this compensation. Dkhila dam was also constructed in the downstream for regulation of discharge from the Abdelmoumen dam.

VI8 Guir, Ziz, Rheriss and Draa River Basins

The Basins, located on the southeastern side of the Moyen Atlas Mountains, have a total area of 164,190 km² covering the Guir, Ziz, Rheris and Draa river basins in the territory of Morocco (Figure VI1.7). The climate is dry but changes depending on the elevation. The rainfall, which concentrates in several days of a year, is as low as 170 mm/yr on an average. In the mountainous basins, the annual rainfall amounts to around 200 mm/yr in the Guir river basin on the north, increasing toward south to around 400 mm/yr in the Draa River. The river flow is little or none throughout a year except for some period of rainfall and reaches collecting snowmelt runoff.

The Guir River and the Ziz River after joining the Rheris River flow into desert in the south. Tiouzaguine dam (No.12) and Kheng Grou dam (No.13) are located on the Guir River system. Tadighoust dam (No.11) is on the main Rheris River and Timkit dam (No.10) on the Iffer River of the Rheris river system. Each of these dams aims to stabilize water supply to oases in the downstream reaches.

Hassan Addakhil dam on the Ziz River was constructed in 1971 to supply municipal water for Er Rachidia city and irrigation water for about 30,000 ha in Tafilalt area. In order to foster the irrigation water supply in the Tafilalt area, a trans-basin canal is under construction near Erfoud town to transfer 50 m³/s of water of the Rheris River to the Ziz River.

The Draa River collects numerous river water from southern slope of the Anti Atlas Mountains and finally empty into Atlantic Ocean near Tan Tan town. On the Draa River near Ouarzazat city, Mansour Eddahbi dam was constructed in 1992 for hydropower generation and irrigation purposes. In the upstream of the dam, Tiouine dam (No.16) is proposed for local irrigation and flood control.

VI9 Moulouya River Basin

The Basin has an area of 57,500 km² located on the east of the Moyen Atlas and Rif Mountains (Figure VI1.8). The climate is dry for the oceanic air from the west is blocked out by the mountain ranges, though northeastern part of the Basin has a nature of the Mediterranean climate. Basin rainfall is around 250 mm/yr. The rainfall, however, exceeds 400 mm/yr on the slope of Mediterranean side and Atlas Mountains. In the middle reaches of the Moulouya River, rainfall is around 200 mm/yr like in Guir, Ziz, Rheris and Draa River Basins.

Natures of river flow and amount in the Basin are of irregular. Generally river flow is relatively much in January/February and April/May with maximum in May. On the contrary, the Basin suffers from severe drought in August and September.

Several dams were constructed in the Basin; namely, Mechara Homadi dam constructed in 1955 for hydropower generation, irrigation and municipal water supply; Mohamed V dam constructed in 1967 for hydro-power generation, irrigation and municipal water supply; and Enjil dam constructed in 1995 for irrigation and municipal water supply.

Constructions of some other dams are proposed further in the Basin, though none of the 25 dams under the present study is located.

Rural Area in

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Tables

Table VII.1 Existing Large Dams (1/2)

N°	Dams	Rivers	Type	Start of service	Height of dam (m)	Regulated Volume (Mm ³)	Present capacity (Mm ³)	Fonction	Surface area (ha)	Hydro-el. capacity	
										Instalated (MW)	Operating (GWH)
	OUM ER RBIA BASIN	BASIN TOTAL					4648.41			590	1292
1	SIDI SAID MACHOU	Oum Er Rbia	B	1929	29	280.00	2.00	E,AEPI	27970	15.2	55
2	KASBA TADLA	Oum Er Rbia	B	1931	12		0.10	E,I		7	17
3	IMFOUT	Oum Er Rbia	B	1944	50		27.00	E,I,AEPI		31	140
4	DAOURAT	Oum Er Rbia	B	1950	40		9.50	E		17	80
5	BINE EL OUIDANE	El Abid	V	1953	133		945.00	1384.00	E,I	113500	229
6	AIT OUARDA	El Abid	V	1953	43		4.00	E,I,BC			350
7	SAFI	Asmine ou sahim	T.E	1965	18		2.00	AEPI			
8	MOULAY YOUSSEF	Tessaout	T.E	1969	100	240.00	175.00	E,I	31520	24	60
9	AL MASSIRE	Oum Er Rbia	C	1979	82	1525.00	2760.00	E,I,AEPI	126000	197	221
10	TIMI N'OUTINAE	Tessaout	V	1981	45		5.50	BC			
11	SIDI DRISS	Lakhdar	B	1984	42		7.00	BC		3	17**
12	KWACEM AVAL	Chguigua	T.Z	1985	12		3.00	I,AC			
13	SI EL MIARI	Takhzrit	T.Z	1986	21		1.10	I	300		
14	BENI SMIR	Oued Zem	E	1986	16		0.94	AEPI			
15	HASSAN 1er	Lakhdar	T.E	1986	145	346.00	262.50	I,E,AEPI	35400	67	132
16	AIN TOURTOUTE	Behaligarane	T.Z	1987	21		0.85	I,AC	200		
17	MOULLAH	Mouillah	T.H	1987	16		0.46	I	60		
18	TOUILTEST	Toulttest	MAC	1989	17		1.00	I,AC	85		
19	ITZER	Tiflitoucht	MAC	1989	30		0.66	I	55		
20	OUED ARICHA	Aricha	T.H	1990	30		1.80	I			
	SEBOU BASIN	BASIN TOTAL					5613.22			544	728
21	EL KANSERA	Beht	C	1935	68	208.00	266.00	E,I,AEPI	28750	14	33
22	IDRISS 1er	Inaouene	C	1973	72	973.00	1186.00	E,I	72300	40	66
23	TIZGUIT AVAL	Tizguit	MAC	1986	18		0.12	EC			
24	AMAN SEYERNINE	Dfali	MAC	1987	16		0.33	I,EC			
25	RAS BEL FIRANE	Bel Firane	MAC	1990	17		0.30	I,AC,AEP	20		
26	ALLAL AL FASSI	Sebou	T.E	1990	61	335.00	81.50	E,I,AEPI	24600	240	239
27	GARDE DU SEBOU	Sebou	B	1991	18	144.00	40.00	I	11500		
28	BLAD EL GAÂDA	Boufekrane	T.Z	1991	30		2.90	PEP			
29	TIZGUIT AMONT	Tizguit	MAC	1991	15		0.30	PL			
30	LORF RL GHORAB	Jorf El Ghorab	T.Z	1992	29		0.90	AEP,PE,AC			
31	ESSAF	Essaf	T.Z	1992	29		1.00	I,AEP,AC,PE			
32	MAHRAZ	El Mahraz	T.Z	1992	17		0.62	EC,PEP			
33	AGGAY	Aggay	T.Z	1995	40		1.25	EC			
34	SAHLA	Sahla	BCR	1994	55	32.00	62.00	I,AEPI,PE	4810		
35	AL WAHDA	Ouergha	T.E	1996	88	1740.00	3800.00	E,I,PE,T	100000	250	390
36	SIDI CHAHED	Mikkes	T.H	1996	51	80.00	170.00	AEPI,I	1000		
	NORTH-WEST BASIN	BASIN TOTAL					1246.26			47	110
37	ALI THELAT	Lao	B	1935	36		30.00	E,I	1690	10.5	50
38	NAKHLA	Nakhla	T.E	1961	46	11.00	5.70	AEPI			
39	AJRAS	Ajras	T.E	1969	18	2.00	3.00	I	695		
40	IBN BATOUTA	M'harhar	T.E	1977	30	26.00	38.50	I,AEPI			
41	OUED EL MAKHAZINE	Loukkos	T.E	1979	67	539.00	773.00	E,I,AEPI	40500	36	60
42	Med B.A.EL KHATTABI	Neckor	T.B	1981	40	31.40	33.60	I,AEPI	5720		
43	GARDE DU LOUKKOS	Loukkos	B	1981	9		4.00	I			
44	TLET BOUBKER	Irhane	T.H	1986	30		2.75	I	250		
45	BOUKHALEF I	Msaber	T.H	1989	20		1.10	I	300		
46	SMIR	Smir	T.Z	1991	45	17.00	43.00	AEPI			
47	SABOUN	Saboun	T.H	1991	15		1.10	I	250		
48	SGHIR	Sghir	T.H	1991	15		2.30	I	530		
49	JOUMOUA	Joumoua	BCR	1992	57	2.50	6.50	AEPI			
50	9 AVRIL 1947	Hachef	T.H	1995	52	78.00	300.00	AEPI			
51	ARABET	Arabet	T.Z	1995	17.5		1.71	AEPI			
	BOU REGREG BASIN	BASIN TOTAL					500.53			0	0
52	MELLAH	Mellah	B	1931	33	3.00	8.80	I,AEPI	400		
53	ZEMRANE	Zemrane	B	1950	20		0.60	I,AEPI	60		
54	SIDI Med BEN ABDELLAH	Bouregreg	T.E	1974	99	245.00	486.00	AEPI			
55	AIT LAMBRABTIYA	Khanaza	T.Z	1985	19		0.20	I,AC	15		
56	ARID	Arid	T.Z	1985	20		0.70	AEP	6		
57	ROUIDAT AMONT	Rouidat	BCR	1987	24		2.92	I	300		
58	AÏN KOREIMA	Akrech	BCR	1987	26		1.31	I	200		

Table VII.1 Existing Large Dams (2/2)

N°	Dams	Rivers	Type	Start of service	Height of dam (m)	Regulated Volume (Mm ³)	Present capacity (Mm ³)	Fonction	Surface area (ha)	Hydro-el. capacity		
										Instalated (MW)	Operating (GWH)	
	MOULOUYA BASIN		BASIN TOTAL				441.66			36	140	
59	MECHRA HOMADI	Moulouya	B	1955	57	530.00	12.00	E,I,AEPI	65400	6.4	55	
60	MOHAMED V	Moulouya	B	1967	64		410.00	E,I,AEPI		30	85	
61	MSAKHSHKA	Msakhskha	T.H	1985	20		2.66	AC				
62	BOUKERDANE	Boukerdane	T.Z	1986	22		0.44	I,AC		50		
63	KHENG EL H'DA	Marbouha	T.Z	1986	15		3.80	AC				
64	BATMAT RMA	Ain Hamou	T.H	1987	20	3.70	0.76	I,AC	1175			
65	ENJIL	Taghoucht	BCR	1995	36		12.00	I,AEP				
	TENSIFT BASIN		BASIN TOTAL				71.30			12	15	
66	LALLA TAKERKOUST	N'Fis	B	1935	71	85.00	69.00	E,I	9800	12	15	
67	IMI LARBAA	Tighizrit	T.Z	1985	16		0.78	I	80			
68	AGAFAY	Arissa	MAC	1986	28		0.52	I,AC				
69	AZIB DOUIRANI	Douirani	T.Z	1987	15		0.60	EC,AEP				
70	IMIN LHAD	Zeddir	MAC	1987	23		0.40	I,AC	50			
	SOUSS-MASA BASIN		BASIN TOTAL				643.15			0	15	
71	YOUSSEF BEN TACHAFINE	Massa	T.E	1972	85	90.00	303.50	I,AEPI	18260			
72	ABDELMOUMEN	Issen	C	1981	94		216.00	E,I,AEPI	13000		30**	
73	SFA	Sfa	T.H	1985	16		0.60	EC				
74	SDKHILA	Issen	B	1986	32		0.70	BC				
75	ASSIF TAGUENZA	Taguenza	MAC	1986	24		0.35	I	60			
76	AOLOUZ	Souss	BCR	1991	79	312.00	110.00	ANS				
77	IMIN EL KHANG	Oued Berhil	BCR	1993	39		4.50	I,AN	1000			
	OTHER BASINS		BASIN TOTAL				995.40			10	20	
78	TAGHDOUT	Amara	V	1956	26	130.00	3.00	I	200			
79	HASSAN ADDAKHIL	Ziz	T.E	1971	85		347.00	I,PC	27900			
80	MANSOUR EDDAHBI	Drâa	V	1972	70		529.00	E,I	26000	10	20	
81	AKKROUZ	N'oukrouz	MAC	1986	24		0.64	I,AC,AN	30			
82	ACHBABOU	Gaïz	MAC	1986	20		1.00	I,AC,AN	50			
83	BOUTAARICHT	Boutaaricht	MAC+E	1986	18	14	0.70	I,AC	30			
84	HAMMOU OURZAG	H. Regaz	T.Z	1986	14		1.60	AC				
85	AKKA N'OUSSIKIS	N'oussikis	MAC	1986	42		1.00	I,AC	70			
86	DOUISS	Douiss	MAC	1992	21		0.95	I,AC	80			
87	IMAOUENE	Imaouene	MAC	1992	23		0.23	EC				
88	AGHERGHIS	Assif Netfella	MAC	1992	24	110.00	0.28	EC				
89	SAQUIA EL HAMRA	Saquia El Hamra	T.Z	1995	16			EC,RN				
GRAND TOTAL							14160			1239	2313	

Table VI1.2 Proposed Large Dams (1/2)

N°	Dams	Rivers	Type	Height of dam (m)	Total capacity (Mm3)	Regulated volume (Mm3/yr)	Fonction	Irrigated surface area (ha)
1	EL GHRASS	ZA	V	92	275	72	AEPI,I,EC	2750
2	CHAKOUKANE	Aousiwa	RMAB	62.5	50	45	I,RN	10,000
3	BOUHOUDA	Sra	BCR	55	55.5	37.8	I,PE	2800
4	BAB LOUTA	Bou Sbaa	BCR	54	36.9	8.3	AEPI,I,EC	
5	AIT MESSAOUD	Oum E Rbia	B	34	13.2		BC	
6	DCHAR EL OUED	Oum E Rbia	RMAB	101	740	473	AEPI,E,I	36,000
7	ASFALOU	Asfalou	V	112	317	50	I,AEPI,E	7,200
8	TIMKIT	AssiN'Tfer	BCR	36	14		I,RN	1,000
9	BOUKERKOUR	Zamrine	BCR	59.5	30.1	13.6	I,AEPI,AC	1,000
10	ADDAROUC	Tigrigra	BCR	51	48	16	I,AC,AEPI	1,800
11	AIT HAMMOU	Ougar	V	65	110	27.5	AEPI	
12	AMEZMIZ	Anougal	BCR	72.5	11	6	I,REG,T	600
13	NFIFIKH	N'Fifikh	BCR	44	52.5		I,AEPI	
14	SURELEVATION SMBA	Bouregre	E	111.5	1280		AEPI	
15	IGUI NOUAKA	Berhil	BCR	52.5	10.5	4	RN,I	370
16	TADIGHOUST	Rheris	Type	34	60		I	
17	KHENG GROU	Guigou	BCR	25	100		AEPI,RN,I	1055
18	AIT ZIAT	Zat	T.Z	85	286	87	AEPI,I	
19	SIDI ABDELLAH	Ouaar	E	65	10	8.2	RN,I	980
20	RAOUZ	Raouz	T	40	30	10	AEPI	
21	SIDI ABBOU	Lebene	B	35	71	62	I,E	3,400
22	TASKOURT	Al Mal	BCR	88	106		I,E	1,500
23	AIT SIGMINE	Rhzef	T.Z	80	110		I,E,AEPI	
24	TIYUGHZA	Tessaout	C	110	145		I,REG	
25	TAGHZIRT	Derna	B	150	235		I,E	9,700
26	SIDI SAID	Moulouya	V	123	400		AEPI,I,E	
27	AIN TIMEDRINE	Sebou	B	34	3		E	
28	NEKKOR	Neckor	T	59	15		PE	
29	MDEZ	Sebou	RMAB	97	581		E,AEPI,I	
30	MECHRAA AL HAJAR	Sebou	B	20	18.23		I,BD	
31	BOULAOUANE	Seksaoua	E	57.7	80		I	5,970
32	IMIZER	R'Dat	T.Z	77	150	50	AEPI,I	815
33	BOU INOUGOUDANE	El Abid	B	85	143		E	
34	TARGA OU MADI	Zobzit	V	133.5	250		AEPI,I	
35	TIOUZAGUINE	Guir	BCR	32	10		I	67
36	ZERRAR	Ksob	T.Z	66	70		AEPI,I	960
37	ASSAYAD	Assayad	RMAB	40	30		AEPI,I	2,000
38	WIRGANE	N'Fis	BCR	75	72	17	AEPI	
39	TALMEST	Tensif	BCR	43	250	66	I	8,250
40	KADDOUSSA	Guir	B	60	220		I,EC	
41	ANSEGMIR	Ansgmir	B	99	130	47	AEPI,I	
42	TIOUINE	Irriri	BCR	74	150		I	600
43	TAMRI	Tamri	T.Z	74	155	39	AEPI,E,I	
44	IMIZDELFANE	Oum Er Rbia	B	66	72		E	
45	TASKDERT	Oum Er Rbia	E	55	19		E	
46	MSALIT	Tata	RMAB	30	52		EC	
47	TALEMOUT	Oum Er Rbia	V	40	6.8		E	
48	OULAD MANSOUR	Tensift	T	20	38	7	I	
49	TILIWINE	Tabia	RMAB	25	9.7		I	
50	LEMDAD AVAL	Lemdad	T	57	10	3.2	I,RN	650
51	MECHRASFA	Oum Er Rbia	B	32.5	21.5		E	
52	AGOUBACH	Akka	RMAB	41	16		I	
53	MRIJA	Oum Er Rbia	B	29.5	19.5		E	
54	RHAFAI	Aoulai	C	70	290		I,E	
55	EMSA	Emsa	T.Z	79	82	27	AEPI	
56	TOULAL	Guir	BCR	25	10.4		I	150
57	OUAKLIM	Aj N'Targa	E	45	15.8		I	
58	IMI OUZLAGH	N'Tamsout	RMAB	37	10.8		I	
59	TILIDANINE	Moulouya	E	83	800		AEPI,PE,I	
60	ALLOUGOUM	Ouhliidi	RMAB	30	28		EC	
61	TAMRAGHT	Tamraght	T	74	50	18	AEPI	
62	AYACHA	Ayacha	E	35	90	48	AEPI	
63	AKNIOUN	Assa	B	25	7		I	
64	BOURRAMANE	Ghalb	BCR	45	13.5		I	
65	OULJET ES SOLTANE	Beht	T.Z	77	250		AEPI,E,I	
66	ASSAKA	Assaka	T	61	65		AEPI,I	
67	BABOUENDER	Ouergha	T.Z	70	390		EC,I,E	
68	TIDDAS	Bouregreg	C	120	600	157	AEPI	
69	TFER	Loukkos	BCR	71	1191		REG,E	

Table VII.2 Proposed Large Dams (2/2)

N°	Dams	Rivers	Type	Height of dam (m)	Total capacity (Mm3)	Regulated volume (Mm3/yr)	Fonction	Irrigated surface area (ha)
70	HERRISSEN	Larh	T.H	48	19		I	
71	IFASSIYENE	Rhiss	BCR	83	231		I,AEPI	
72	TOUAHAR	Inaouene	B	57	370	160	I,AEPI,E	
73	TIMALIZENE	Ourika	TH	53	20		I	
74	ALI THAILAT	Laou	BCR	28	240		REG,E,I	1,350
75	SIDI EL MOKHFI	Amzaz	BCR	65	26		I,AC	
76	BENI KHEMIS	Bouregreg	C	108	600	160	REG,AEPI	
77	TILOUGGUIT	Assif Ahansal	BCR	75	84		E	
78	FOUM LAHCEN	Assif N'Taloust	RMAB	25	40		I,AC	700
79	AIN KWACHIA	Kellata	BCR	30	11		I,AEPI	
80	LALLA LOUMA	Mda	TH	25	27		I,EC	
81	CHERRAT	Cherrat	BCR	29	7	3	I,AEPI	400
82	FOUM KHNEG	Guigou	B	36.5	40		AEPI	
83	KHANNOUSSA	El Mlha	BCR	41.5	22.7	6.8	AEPI	
84	SIDI BOUKNADEL	Serou	B	70	440	400	E,I,REG	
85	KHENG EL GHAR	El Ghar	BCR	35	17		I,AC	
86	TIZIMELLAL	Mengou	BCR	80	21	12.5	PE,I	
87	TAZARANE	Malha	BCR	63	9	7	PE,I	1,500
88	SIDI AMAR	Grou	BCR	47.5	63	28	REG SMBA	300
89	BENI MANSOUR	Laou	E	129	773	265	T	
90	DAR KHORFA	El Makhazine	E	53	413		T,I,E	
91	KHARROUB	Kharroub	E	45	127		AEPI,I	
92	SIDI OMAR	Tanoubart	BCR	40	7		I	1,400
93	AOULAI	Aoulai	BCR	60	40		I,PE	
94	AZGHAR	Zelloul	BCR	30	18		I	1,000
95	BOUDINAR	Anekrâne	TH	66	58		I,AC	800
96	EL LIAM	El Liam	E	58	57		AEPI	
97	MARTIL	Martil	T,Z	97	100		AEPI,I	
98	MECHRA SAF SAF	Moulouya	T,Z	60	462	222	AEPI,I	
99	AIT MZAL	Assif Izig	BCR	40	5		I,PC	500
100	IMIDER	Ghris	BCR	31	38		I	160
101	KCHACHDA	Kchachada	TZ	36	5.2		AEP	
102	CHACHA N'MELLAH	Srou	T	25	22		I,PE	350
103	IMIDER	Ghris	BCR	31	38		I	160
104	AIN ABDOUN	Tamda	BCR	65	10		I,PE	1,500
105	TAZERGUIOUT	Assif N'Igoudmane	BCR	26	13		I	500
106	ZRIZER	Islane	BCR	39	6		I,PE	900
107	TAHAMDOUNT	Ghris	BCR	25	9.7		I	
GRAND TOTAL					15572			111137