

Tableau 7.1.3 Débit Mensuel à Timkit

Year	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apl	May	Jun	Jul	Aug	Mean	Total Mm ³
1961 / 62	0.087	0.058	0.767	0.059	0.050	0.050	0.050	0.127	0.204	0.050	0.050	0.050	0.133	4.19
1962 / 63	0.795	0.528	0.159	0.102	0.079	0.066	0.066	0.114	3.829	0.517	0.050	0.050	0.535	16.87
1963 / 64	0.282	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.063	0.050	0.050	0.070	2.21
1964 / 65	1.187	0.050	0.050	0.050	0.050	2.035	0.180	0.278	0.103	0.203	0.151	0.372	0.378	11.94
1965 / 66	0.607	4.641	17.575	4.932	1.095	0.700	0.970	0.956	0.772	0.706	0.411	0.304	2.799	88.28
1966 / 67	0.498	0.325	0.378	0.293	0.262	0.344	0.345	0.260	0.308	0.061	0.051	0.051	0.264	8.32
1967 / 68	0.159	0.498	2.932	0.495	0.422	0.454	0.443	0.643	0.333	0.305	0.261	0.223	0.594	18.73
1968 / 69	0.251	0.254	0.221	0.264	0.199	0.200	0.124	0.103	0.090	0.094	0.146	1.392	0.280	8.83
1969 / 70	0.365	0.113	0.223	0.059	0.075	0.064	0.063	0.066	0.248	0.170	0.065	0.069	0.132	4.15
1970 / 71	0.088	0.069	0.162	0.064	0.063	0.063	0.063	0.397	0.055	0.052	0.052	0.052	0.098	3.09
1971 / 72	0.071	0.234	0.086	0.050	0.050	0.050	0.050	0.832	0.068	0.071	0.067	0.067	0.141	4.44
1972 / 73	0.067	0.070	2.305	0.193	0.165	0.161	0.138	0.147	0.110	0.191	0.172	0.110	0.316	9.98
1973 / 74	0.110	0.110	0.290	0.136	0.094	0.073	0.068	0.130	0.085	0.089	0.094	0.076	0.113	3.56
1974 / 75	0.319	0.069	0.054	0.052	0.051	0.051	0.051	0.822	0.756	0.095	0.059	0.070	0.204	6.43
1975 / 76	0.073	0.076	0.090	0.137	0.111	0.072	0.065	0.101	0.500	0.262	0.206	0.081	0.149	4.69
1976 / 77	0.654	0.241	0.180	0.208	0.304	0.106	0.069	0.073	0.072	0.070	0.059	0.055	0.174	5.49
1977 / 78	0.167	0.095	0.059	0.364	0.066	0.051	0.051	0.051	0.052	0.052	0.052	0.051	0.093	2.93
1978 / 79	0.050	0.111	0.050	0.050	0.253	0.050	0.050	0.050	0.214	0.052	0.050	0.050	0.086	2.73
1979 / 80	0.346	1.878	0.051	0.050	0.094	0.380	1.025	0.632	0.251	0.163	0.172	0.132	0.433	13.65
1980 / 81	0.198	0.230	0.166	0.214	0.138	0.176	0.085	0.073	0.105	0.102	0.102	0.093	0.140	4.42
1981 / 82	0.059	0.059	0.093	0.092	0.086	0.050	0.050	0.082	0.343	0.196	0.050	0.050	0.101	3.18
1982 / 83	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.051	0.159	0.050	0.050	0.106	0.064	2.02
1983 / 84	0.089	0.091	0.052	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.057	1.79
1984 / 85	0.050	0.050	0.148	0.050	0.050	0.050	0.050	0.052	0.203	0.050	0.050	0.050	0.071	2.25
1985 / 86	0.381	0.408	1.558	0.744	0.050	0.050	0.050	0.050	0.050	0.478	0.050	0.329	0.349	11.02
1986 / 87	0.639	1.899	0.050	0.050	0.050	0.050	0.284	0.050	0.278	0.050	0.050	0.050	0.295	9.30
1987 / 88	0.249	0.577	0.524	0.615	0.050	0.050	0.050	0.050	0.124	0.050	0.050	0.050	0.204	6.45
1988 / 89	0.051	1.654	0.406	0.050	0.050	0.879	0.668	0.086	0.055	1.020	0.277	0.837	0.501	15.80
1989 / 90	0.405	0.540	3.503	4.577	1.519	1.188	0.772	0.608	2.687	0.582	0.534	0.584	1.462	46.12
1990 / 91	1.221	0.354	0.234	0.426	0.530	0.554	0.250	0.202	0.267	2.662	0.721	0.761	0.679	21.40
1991 / 92	0.515	0.222	0.121	0.384	0.149	0.162	0.125	0.066	0.064	0.176	0.053	0.050	0.174	5.47
1992 / 93	0.660	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.050	0.100	3.16
1993 / 94	0.096	0.138	6.335	0.157	0.428	0.480	0.479	0.562	0.550	0.464	0.410	0.183	0.849	26.77
1994 / 95	0.183	1.093	0.257	0.176	0.138	0.157	0.262	2.017	0.178	0.215	0.131	0.127	0.410	12.94
1995 / 96	0.124	5.633	0.745	0.138	0.130	0.337	0.520	0.204	0.195	0.188	0.181	0.174	0.722	22.75
1996 / 97	0.167	0.161	0.155	0.150	0.145	0.140	0.134	0.126	0.119	0.112	0.106	0.518	0.170	5.36
Mean	0.314	0.630	1.115	0.433	0.200	0.264	0.218	0.284	0.377	0.271	0.143	0.205	0.371	11.71
(%)	7.0	14.4	24.7	9.9	4.6	5.5	5.0	6.3	8.6	6.0	3.3	4.7	100.0	

Note: 1) Inflows to Timkit dam were estimated based on flow records at Tadghoust station by basin area ratio.
 2) The above inflows include subsurface flow assumed uniformly at 0.050 throuot a year.

Tableau 7.1.4 Débit Mensuel à Azghar

(unit: m³/s)

Year	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apl	May	Jun	Jul	Aug	Mean	Total Mm ³
1955 / 56	0.120	0.358	0.464	2.814	1.731	5.983	9.470	11.662	7.066	3.303	1.679	0.913	3.778	119.14
1956 / 57	0.543	0.728	0.596	0.767	1.481	0.728	2.207	4.016	3.593	1.084	0.437	0.371	1.383	43.60
1957 / 58	0.054	0.675	1.996	2.431	4.887	4.927	2.497	2.999	2.194	1.084	0.332	0.054	1.992	62.83
1958 / 59	0.002	0.002	0.266	3.276	3.171	2.128	4.108	2.458	2.048	1.256	0.503	0.134	1.615	50.93
1959 / 60	0.054	0.107	0.239	6.710	10.539	6.683	6.683	4.214	2.445	3.065	1.137	0.543	3.527	111.23
1960 / 61	0.279	0.477	0.728	4.676	5.508	5.363	3.646	3.739	1.533	1.150	0.385	0.068	2.280	71.89
1961 / 62	0.041	0.147	1.164	0.873	0.715	0.583	5.653	4.755	1.863	1.164	0.385	0.094	1.457	45.94
1962 / 63	0.000	0.279	2.643	2.141	7.211	10.618	5.468	3.197	8.572	5.231	1.771	1.282	3.994	125.96
1963 / 64	0.900	0.767	0.662	3.937	1.784	1.692	2.841	6.868	2.088	1.230	0.701	0.490	1.995	62.90
1964 / 65	0.517	0.358	0.913	0.966	4.082	4.346	5.891	5.812	2.471	1.626	1.111	0.688	2.384	75.19
1965 / 66	0.754	0.741	0.649	0.490	0.662	0.517	0.649	0.754	0.437	0.094	0.000	0.000	0.478	15.06
1966 / 67	0.028	3.831	1.124	0.371	0.015	0.147	0.371	1.071	0.992	0.596	0.000	0.000	0.717	22.61
1967 / 68	0.000	0.239	0.398	0.952	1.441	3.844	8.479	6.129	4.544	1.996	0.913	0.503	2.445	77.11
1968 / 69	0.252	0.107	1.467	3.831	5.561	8.268	6.525	5.706	3.646	2.629	1.322	0.649	3.299	104.03
1969 / 70	0.517	0.583	1.190	2.167	10.209	3.290	3.290	3.210	1.652	1.005	0.411	0.213	2.312	72.92
1970 / 71	0.213	0.173	0.094	0.186	2.471	2.893	4.069	8.109	7.951	4.346	1.943	1.124	2.793	88.07
1971 / 72	0.794	0.662	1.599	1.547	2.682	5.218	8.875	6.591	4.808	2.722	1.375	0.728	3.118	98.34
1972 / 73	0.767	1.309	0.807	0.860	1.520	3.580	5.746	5.534	2.907	1.441	0.662	0.490	2.123	66.96
1973 / 74	0.120	0.186	0.186	0.371	0.543	1.137	3.739	6.406	5.085	2.180	1.111	0.503	1.798	56.71
1974 / 75	0.385	0.437	0.252	0.081	0.028	1.111	3.092	6.142	4.306	2.326	0.926	0.503	1.630	51.39
1975 / 76	0.239	0.173	0.200	0.385	0.266	2.048	2.775	5.191	7.832	2.577	1.362	0.569	1.966	62.01
1976 / 77	0.464	0.913	1.124	2.709	6.393	7.476	4.650	3.514	1.771	1.071	0.490	0.173	2.533	79.88
1977 / 78	0.292	0.530	0.345	1.018	1.190	3.739	2.973	3.739	2.497	1.269	0.530	0.279	1.517	47.83
1978 / 79	0.015	0.002	0.000	0.200	0.754	5.600	5.772	3.752	1.903	1.045	0.451	0.094	1.604	50.59
1979 / 80	1.560	1.877	2.788	1.626	1.243	1.335	3.039	2.009	2.312	0.662	0.134	0.000	1.548	48.82
1980 / 81	0.000	0.266	0.860	0.451	0.609	1.045	1.481	2.563	1.877	0.715	0.200	0.002	0.835	26.33
1981 / 82	0.000	0.266	0.000	0.000	0.292	0.952	1.599	3.224	2.352	0.926	0.226	0.000	0.816	25.74
1982 / 83	0.000	1.863	0.952	1.481	1.269	1.296	1.494	1.230	0.437	0.015	0.000	0.000	0.836	26.36
1983 / 84	0.000	0.000	0.292	0.490	0.279	0.000	0.622	1.401	1.969	0.913	0.000	0.027	0.502	15.83
1984 / 85	0.030	0.033	0.892	0.385	1.231	0.586	0.728	0.377	1.654	0.223	0.054	0.025	0.519	16.37
1985 / 86	0.024	0.056	0.225	0.301	2.099	7.610	6.828	2.959	0.504	1.440	0.073	0.034	1.806	56.97
1986 / 87	0.070	0.213	0.460	0.147	1.477	8.271	1.199	0.313	0.147	0.105	0.157	0.065	1.002	31.58
1987 / 88	1.234	1.482	1.265	0.383	2.427	2.144	3.745	0.476	0.868	0.163	0.050	0.032	1.186	37.39
1988 / 89	0.028	0.032	0.165	0.128	0.044	0.479	1.315	4.845	0.573	0.291	0.050	0.100	0.665	20.98
1989 / 90	0.588	1.141	1.115	4.407	3.379	0.463	0.186	1.550	0.339	0.038	0.274	0.089	1.140	35.94
1990 / 91	0.400	0.044	0.556	2.390	0.280	2.343	10.318	3.355	0.718	0.253	0.207	0.131	1.751	55.23
1991 / 92	0.555	0.256	0.210	0.167	0.198	0.278	0.902	3.400	0.452	1.191	0.212	0.163	0.661	20.85
1992 / 93	0.069	0.162	0.136	0.523	0.140	0.175	1.365	1.187	1.604	0.099	0.029	0.018	0.462	14.58
1993 / 94	0.012	0.099	2.199	0.404	1.603	5.365	1.880	0.428	0.201	0.053	0.015	0.008	0.990	31.23
1994 / 95	0.171	0.119	0.217	0.047	0.047	0.042	1.600	0.855	0.178	0.101	0.025	0.026	0.287	9.06
1995 / 96	0.045	0.063	0.100	1.704	10.861	5.608	6.249	5.197	2.761	0.863	0.220	0.045	2.800	88.32
1996 / 97	1.051	0.726	0.228	7.695	10.455	1.825	0.797	1.967	0.738	0.217	0.064	0.034	2.166	68.32
1997 / 98	0.769	1.370	2.194	2.728	1.609	3.030	0.557	0.518	0.530	0.225	0.162	0.222	1.147	36.17
1998 / 99	0.242	0.231	0.226	0.258	1.240	0.754	0.993	0.189	0.257	0.120	0.036	0.023	0.380	11.97
Average (%)	0.323	0.547	0.777	1.579	2.628	3.080	3.554	3.491	2.379	1.230	0.503	0.262	1.687	53.21
	1.6	2.8	3.8	7.9	13.2	14.0	17.9	17.0	12.0	6.0	2.5	1.3	100.0	

Note: 1) Sep-1955-Aug-1984: Estimated based on correlation between Ain Timedrine and Dar Hamra stations and basin area ratio.
 2) Sep-1984-Apr-1999: Estimated from Dar Hamra records by basin area ratio.
 3) May-Aug-1999: Estimated based on average runoff pattern at Dar Hamra from 1984/85 to 1997/98.

Tableau 7.1.5 Débit de Crue Propable

Descriptions	Return period (year)						
	2	10	20	50	100	1000	10000
No.5 N'FIFIKH							
Basin area (km ²)	:	323					
Time of concentration (hr)	:	7.5					
Base length of hydrograph (hr)	:	18					
Probable discharge (m ³ /s)		45.8	140	250	380	490	820
Specific discharge (m ³ /s/km ²)		0.14	0.43	0.77	1.18	1.52	2.54
Ratio to Q10yr		0.33	1.00	1.79	2.71	3.50	5.86
Runoff volume (Mm ³)		1.48	4.54	8.10	12.31	15.88	26.57
No.9 TASKOURT							
Basin area (km ²)	:	419					
Time of concentration (hr)	:	5					
Base length of hydrograph (hr)	:	15					
Probable discharge (m ³ /s)		89.2	400	600	800	900	1700
Specific discharge (m ³ /s/km ²)		0.21	0.95	1.43	1.91	2.15	4.06
Ratio to Q10yr		0.22	1.00	1.50	2.00	2.25	4.25
Runoff volume (Mm ³)		2.41	10.80	16.20	21.60	24.30	45.90
No.10 TIMKIT							
Basin area (km ²)	:	572					
Time of concentration (hr)	:	3					
Base length of hydrograph (hr)	:	9					
Probable discharge (m ³ /s)		84.0	300	500	750	1000	2000
Specific discharge (m ³ /s/km ²)		0.15	0.52	0.87	1.31	1.75	3.50
Ratio to Q10yr		0.28	1.00	1.67	2.50	3.33	6.67
Runoff volume (Mm ³)		1.36	4.86	8.10	12.15	16.20	32.40
No.17 AZGHAR							
Basin area (km ²)	:	263					
Time of concentration (hr)	:	5					
Base length of hydrograph (hr)	:	15					
Probable discharge (m ³ /s)		88.5	200	250	300	400	500
Specific discharge (m ³ /s/km ²)		0.34	0.76	0.95	1.14	1.52	1.90
Ratio to Q10yr		0.44	1.00	1.25	1.50	2.00	2.50
Runoff volume (Mm ³)		2.39	5.40	6.75	8.10	10.80	13.50

Tableau 7.1.6 Valeurs Conceptuelles du Volume de Sédimentation dans le Réservoir

River system	Candidate dam	BA (km ²)	Ds (m ³ /km ² /yr)	Vs (Mm ³ /yr)
1. MOROCCO NORTH BASINS				
Neckor R.	No.01: Neckor	710	3,333	3.800
2. SEBOU R. BASIN				
Sebou R.				
- Ouerrha R.				
- Aoudour R.	No.06: Tazarane	30	(3,800)	0.114
- Aoulai R.	No.19: Aoulai	490	863	0.430
- Ametzet R.	No.21: Sidi El Mokhfi	378	(101)	0.038
- Mengou R.	No.02: Tizimellal	170	(2,876)	0.489
- Lebene R.	No.20: Sidi Abbou	363	(2,755)	1.000
- Zloul R.	No.17: Azghar	263	(490)	0.130
- Beht R.(Tigriga R.)	No.14: Adarouch	630	(317)	0.200
3. BOUREGREG R. AND CASABLANCA COASTAL BASINS				
Bou Regreg R.(Tabahart R.)	No.15: Sidi Omar	350	649	0.230
Iqem R.(Khellata R.)	No.04: Ain Kwachiya	162	(105)	0.017
Nefifikh R.	No.05: Lower N'fifikh	606	(100)	0.061
	No.05: Upper N'fifikh	323	(93)	0.030
Mellah R.(Zamrine R.)	No.18: Boukarkour	1,120	(100)	0.112
4. OUM ER RBIA R. BASIN				
Oum Er Rbia R.				
- El Abid R.	No.22: N'ouantz	204	(392)	0.080
- Tessaout R.(Lakhdar R.)	No.03: Ait Baddou	194	1,200	0.250
5. TENSIFT R. AND ESSAOUIRA COASTAL BASINS				
Tensift R.				
- N'fiss R.	No.07: Amezmiz	80	280	0.025
- Assif el Ma R.	No.09: Taskourt	419	280	0.120
- El Rhira R.	No.08: Boulaouane	565	(283)	0.160
6. SOUSS, MASSA R. BASINS				
Souss R.				
- Issen R.	No.24: Amont Abdel.	938	(161)	0.151
- L'ouaar R.	No.25: Sidi Abdellah	233	430	0.103
- Aguerd R.	No.23: Igui N'ouaqa	161	460	0.075
7. GUIR, ZIZ, RHERIS AND DRAA R. BASINS				
Guir R.	No.12: Tiouzaguine	258	(543)	0.140
- Bouanane R.	No.13: Kheng Grou	4,900	333	1.500
Rheris R.	No.11: Tadighoust	2,239	(335)	0.750
- Ferklo R.	No.10: Timkit	572	(350)	0.200
Draa R.	No.16: Tiouine	1,540	700	1.000

(Notes)

BA: Basin area,

Ds: Specific annual reservoir sedimentation. Ds in () were calculated from Vs avd BA.

Vs: Annual reservoir sedimentation

Tableau 7.2.1 Situation Administrative des Zones Bénéficiaires

Project Site	Province	Cercle	Caidat	CR/CU	Douar
N'fifikh	Ben Slimane	Ben Slimane	Fdalate	Od Yahia Louta	Bni Karzaz Biad
			Ziaida	Mouline Ghaba Tlat Ziaida	Od Tarfaya Mssaada
		Bouznika	Bni Yakhlef	Mansouria	Bni Rached Bni Makraz
Taskourt	Chichaoua	Mejjat	Sidi Bou Othmane	Assif El Mal Mejjat Guemmassa Mzouda	127 douars
			Mejjat		
			Mzouda		
Timkit	Errachidia	Goulmima		Aghbalou Akerdas	Timkit Izoukalen Irbiben Taghya
				High Farkla	Ait Hamou Ait Bzem Ait Boutekhsiam Tamardout Ait Erah Ait Aissa Ait Bouhadou Sidi Yahya (Kmach) Ait Assem Numero Ait Bennacer Set El Kherbates Amlal Azyghmouchen Bour Taghya Ait Derouich Imelouane Ait Said Ihendar Toughach Ait M'hammed Zaouia Ait Maamar Lkdim Tallalt Tayrza Tighfart Ktaa Elouad Ait Ba Omar Jdida Ksiba Dar Amira Ait Ourgham Kettarat Laytama Isilf (Ksar) Ait My mamoun Ait Ba Maati Zizzogharine Gardmite Ait Maamar Jdide Tighdouine Tinjdad Centre
Azghar	Sefrou	Ribat Al Khair	Ribat Al Khair	Ighzrane	Bni Lchaa Taghza Nass Daoud Nass Said Tichou Tamallalt
				Od M'koudou	Mghila Zitouna
		Municipalite Tinejdad			
		Municipalite Ribat Al Khair			

Note: Since the command areas of the Projects have not been exactly fixed yet, the above mentioned administrative units to be integrated into the benefical areas are provisional.

**Tableau 7.2.2 Sommaire de l'Enquête par Interview sur
l'État Socioéconomique des zones Bénéficiaires (1/4)**

Item	N'fifikh		Taskourt		Timkit		Azghar		Total	
	nos.	distr.	nos.	distr.	nos.	distr.	nos.	distr.	nos.	distr.
0 Total Number of Respondents	63		75		77		44		259	
1 Family Structure										
1-1 Number of households live in a house										
One household	41	65%	62	84%	34	44%	23	52%	160	62%
More than one household	22	35%	12	16%	43	56%	21	48%	98	38%
1-2 Family size per house										
1 persons	1	2%	0	0%	0	0%	0	0%	1	0%
2 persons	1	2%	1	1%	1	1%	4	9%	7	3%
3 persons	2	3%	4	5%	0	0%	2	5%	8	3%
4 persons	1	2%	4	5%	0	0%	5	11%	10	4%
5 persons	9	14%	6	8%	6	8%	1	2%	22	9%
6 persons	5	8%	10	14%	6	8%	10	23%	31	12%
7 persons	9	14%	13	18%	6	8%	4	9%	32	12%
8 persons	16	25%	12	16%	7	9%	4	9%	39	15%
9 persons	6	10%	4	5%	6	8%	3	7%	19	7%
10 persons	1	2%	10	14%	8	10%	1	2%	20	8%
More than 10 persons	12	19%	10	14%	37	48%	10	23%	69	27%
Average family size	8.4 pers.		7.6 pers.		11.4 pers.		7.4 pers.			
1-3 Average composition of men and women										
Men	4.3	52%	4.2	55%	5.6	49%	3.8	52%	17.9	52%
Women	4.0	48%	3.4	45%	5.8	51%	3.5	48%	16.7	48%
2 Economic Activities										
2-1 Major economic activities										
Agriculture only	33	52%	28	37%	15	19%	19	43%	95	37%
Agriculture + Employee	4	6%	5	7%	9	12%	11	25%	29	11%
Agriculture + Commerce	7	11%	5	7%	5	6%	0	0%	17	7%
Agriculture + Small business	0	0%	4	5%	0	0%	0	0%	4	2%
Agriculture + Labor	0	0%	31	41%	36	47%	0	0%	67	26%
Agriculture + Other (incl. more than two kind of work)	19	30%	2	3%	9	12%	14	32%	44	17%
Non agricultural work only	0	0%	0	0%	3	4%	0	0%	3	1%
2-2 Annual family income (excluding remittance from migrant workers)										
10,000 DH or less	12	19%	18	24%	49	64%	15	34%	94	36%
10,001 - 20,000 DH	21	33%	26	35%	15	19%	17	39%	79	31%
20,001 - 40,000 DH	17	27%	22	29%	8	10%	10	23%	57	22%
40,001 - 60,000 DH	5	8%	8	11%	3	4%	1	2%	17	7%
60,001 - 80,000 DH	2	3%	1	1%	2	3%	1	2%	6	2%
80,001 - 100,000 DH	3	5%	0	0%	0	0%	0	0%	3	1%
More than 100,000 DH	3	5%	0	0%	0	0%	0	0%	3	1%
Average income	32,800 DH		20,800 DH		12,600 DH		16,500 DH			
2-3 Annual family income (including remittance from migrant workers)										
10,000 DH or less	1	2%	7	9%	14	18%	3	7%	25	10%
10,001 - 20,000 DH	19	30%	24	32%	28	36%	21	48%	92	36%
20,001 - 40,000 DH	23	37%	29	39%	20	26%	17	39%	89	34%
40,001 - 60,000 DH	6	10%	13	17%	4	5%	1	2%	24	9%
60,001 - 80,000 DH	6	10%	2	3%	5	6%	1	2%	14	5%
80,001 - 100,000 DH	2	3%	0	0%	3	4%	1	2%	6	2%
More than 100,000 DH	6	10%	0	0%	3	4%	0	0%	9	3%
Average income	47,900 DH		27,000 DH		32,400 DH		23,700 DH			

**Tableau 7.2.2 Sommaire de l'Enquête par Interview sur
l'État Socioéconomique des zones Bénéficiaires (2/4)**

Item	N'fifikh		Taskourt		Timkit		Azghar		Total	
	nos.	distr.	nos.	distr.	nos.	distr.	nos.	distr.	nos.	distr.
2-4 Number of migrant workers										
None	23	37%	27	36%	22	29%	7	16%	79	31%
One person	22	35%	33	44%	36	47%	12	27%	103	40%
Two persons	13	21%	10	13%	13	17%	20	45%	56	22%
Three persons or more	5	8%	5	7%	6	8%	5	11%	21	8%
2-5 Annual family expenditure										
10,000 DH or less	0	0%	17	23%	34	44%	10	23%	61	24%
10,001 - 20,000 DH	57	90%	38	51%	26	34%	19	43%	140	54%
20,001 - 40,000 DH	6	10%	18	24%	12	16%	14	32%	50	19%
More than 40,000 DH	0	0%	2	3%	5	6%	1	2%	8	3%
Average expenditure	15600 DH		17100 DH		16100 DH		16300 DH			
3 Agriculture										
3-1 Size of farmlands										
1.0 ha or less	11	17%	4	5%	43	56%	3	7%	61	24%
1.1 ha - 2.0 ha	11	17%	10	13%	12	16%	12	27%	45	17%
2.1 ha - 4.0 ha	10	16%	16	21%	6	8%	14	32%	46	18%
4.1 ha - 6.0 ha	5	8%	13	17%	10	13%	4	9%	32	12%
6.1 ha - 10 ha	12	19%	15	20%	1	1%	4	9%	32	12%
10.1 ha - 20 ha	8	13%	12	16%	4	5%	7	16%	31	12%
More than 20 ha	6	10%	5	7%	1	1%	0	0%	12	5%
Average size	4.7 ha		7.6 ha		2.6 ha		4.7 ha			
3-2 Condition of farmlands										
Not irrigated (ha)	403	86%	173	30%	97	49%	187	86%	860	59%
Irrigated (ha)	65	14%	399	70%	100	51%	31	14%	595	41%
3-3 Ownership status of farmlands										
Private ownership only	48	76%	30	40%	63	82%	39	89%	180	69%
Tenant only	0	0%	0	0%	0	0%	0	0%	0	0%
Collective ownership only	2	3%	0	0%	0	0%	0	0%	2	1%
Association only	0	0%	1	1%	0	0%	0	0%	1	0%
Private ownership + tenant	8	13%	4	5%	0	0%	3	7%	15	6%
Private + collective ownership	5	8%	16	21%	12	16%	2	5%	35	14%
Private + association ownership	0	0%	8	11%	2	3%	0	0%	10	4%
Other	0	0%	16	21%	0	0%	0	0%	16	6%
3-4 Agricultural land use (ha)										
Hard wheat	121	25%	54	9%	70	34%	73	32%	318	21%
Soft wheat	138	29%	142	23%	10	5%	4	2%	294	19%
Barley	50	10%	304	50%	40	20%	77	33%	471	31%
Maize	11	2%	22	4%	20	10%	0	0%	53	3%
Bersim	0	0%	29	5%	0	0%	0	0%	29	2%
Bean	34	7%	0	0%	3	1%	5	2%	42	3%
Lentille	0	0%	0	0%	0	0%	3	1%	3	0%
PC	33	7%	0	0%	0	0%	0	0%	33	2%
Alfalfa	10	2%	0	0%	15	7%	0	0%	25	2%
Vegetable	23	5%	37	6%	9	4%	0	0%	69	5%
Other	0	0%	25	4%	3	1%	0	0%	28	2%
Fallow	63	13%	0	0%	33	16%	69	30%	165	11%
3-5 Livestock farming										
Number of livestock (head)										
Cattle										
0	16	25%	15	20%	48	63%	37	84%	116	45%
1 - 5	35	56%	51	68%	26	34%	7	16%	119	46%
6 - 10	9	14%	8	11%	2	3%	0	0%	19	7%

**Tableau 7.2.2 Sommaire de l'Enquête par Interview sur
l'État Socioéconomique des zones Bénéficiaires (3/4)**

Item	N'fifikh		Taskourt		Timkit		Azghar		Total	
	nos.	distr.	nos.	distr.	nos.	distr.	nos.	distr.	nos.	distr.
more than 10	3	5%	1	1%	0	0%	0	0%	4	2%
Average	3.3 head		2.9 head		1.1 head		0.4 head			
Sheep										
0	31	49%	25	33%	14	19%	22	51%	92	36%
1 - 10	17	27%	12	16%	56	75%	12	28%	97	38%
11 - 20	5	8%	18	24%	5	7%	2	5%	30	12%
21 - 30	4	6%	13	17%	0	0%	4	9%	21	8%
more than 30	6	10%	7	9%	0	0%	3	7%	16	6%
Average	9.9 head		14.2 head		4.8 head		7.6 head			
Horse and donkey										
0	24	38%	34	45%	57	74%	36	82%	151	58%
1 - 5	39	62%	41	55%	20	26%	8	18%	108	42%
more than 5	0	0%	0	0%	0	0%	0	0%	0	0%
Average	0.8 head		0.9 head		0.3 head		0.3 head			
Goat										
0	63	100%	69	92%	65	84%	33	75%	230	89%
1 - 5	0	0%	5	7%	4	5%	5	11%	14	5%
more than 5	0	0%	1	1%	8	10%	6	14%	15	6%
Average	0 head		0.3 head		2.3 head		7.7 head			
4 Flood and Erosion Damage										
Reference year:	Year 1996		Year 1999		Year 1979		Nearly no flood			
4-1 Inundation depth (Houses)										
No inundation	59	94%	75	100%	55	71%	43	98%	232	90%
Less than 50 cm	1	2%	0	0%	7	9%	0	0%	8	3%
50 - 99 cm	1	2%	0	0%	7	9%	1	2%	9	3%
100 - 199 cm	1	2%	0	0%	4	5%	0	0%	5	2%
200 - 299 cm	0	0%	0	0%	4	5%	0	0%	4	2%
300 cm or more	1	2%	0	0%	0	0%	0	0%	1	0%
4-2 Inundation depth (Farmlands)										
No inundation	37	59%	57	76%	21	27%	41	93%	156	60%
Less than 50 cm	17	27%	0	0%	16	21%	1	2%	34	13%
50 - 99 cm	7	11%	0	0%	11	14%	2	5%	20	8%
100 cm or more	2	3%	18	24%	29	38%	0	0%	49	19%
4-3 Area of inundation (Farmlands)										
No inundation	37	60%	56	75%	45	58%	41	93%	179	69%
0.2 ha or less	4	6%	4	5%	22	29%	0	0%	30	12%
0.21 - 0.4 ha	3	5%	3	4%	1	1%	0	0%	7	3%
0.41 - 0.6 ha	6	10%	2	3%	3	4%	1	2%	12	5%
0.61 - 0.8 ha	3	5%	1	1%	1	1%	0	0%	5	2%
0.81 - 1 ha	7	11%	5	7%	3	4%	0	0%	15	6%
more 1 ha	2	3%	4	5%	2	3%	2	5%	10	4%
4-4 Agricultural damage by inundation (Nos. of farmers)										
Hard wheat	5	20%	2	6%	15	25%	2	67%	24	20%
Soft wheat	5	20%	0	0%	0	0%	0	0%	5	4%
Barley	0	0%	11	34%	11	18%	1	33%	23	19%
Maize	0	0%	3	9%	3	5%	0	0%	6	5%
Bean	7	28%	0	0%	1	2%	0	0%	8	7%
Bersim	0	0%	1	3%	0	0%	0	0%	1	1%
PC	4	16%	0	0%	0	0%	0	0%	4	3%
Alfalfa	0	0%	5	16%	11	18%	0	0%	16	13%
CM(Vegetable)	4	16%	2	6%	3	5%	0	0%	9	7%
Olive	0	0%	7	22%	0	0%	0	0%	7	6%

**Tableau 7.2.2 Sommaire de l'Enquête par Interview sur
l'État Socioéconomique des zones Bénéficiaires (4/4)**

Item	N'fifikh		Taskourt		Timkit		Azghar		Total	
	nos.	distr.	nos.	distr.	nos.	distr.	nos.	distr.	nos.	distr.
Orange	0	0%	1	3%	0	0%	0	0%	1	1%
Dates	0	0%	0	0%	13	21%	0	0%	13	11%
Other	0	0%	0	0%	4	7%	0	0%	4	3%
Fallow field	0	0%	0	0%	0	0%	0	0%	0	0%
4-5 Erosion of farmlands										
No erosion	47	75%	58	77%	50	65%	40	91%	195	75%
1,000 m2 or less	6	10%	8	11%	26	34%	0	0%	40	15%
1,001 – 2,000 m2	8	13%	3	4%	0	0%	0	0%	11	4%
2,001 - 3,000 m2	2	3%	0	0%	0	0%	0	0%	2	1%
3,001 m2 or more	0	0%	6	8%	1	1%	4	9%	11	4%
4-6 Agricultural damage by erosion (Nos. of farmers)										
Hard wheat	3	19%	2	6%	4	10%	2	50%	11	12%
Soft wheat	1	6%	0	0%	0	0%	0	0%	1	1%
Barley	0	0%	11	34%	2	5%	2	50%	15	16%
Maize	0	0%	3	9%	3	8%	0	0%	6	7%
Bean	0	0%	0	0%	0	0%	0	0%	0	0%
Bersim	0	0%	1	3%	0	0%	0	0%	1	1%
PC	2	13%	0	0%	0	0%	0	0%	2	2%
Alfalfa	2	13%	5	16%	5	13%	0	0%	12	13%
CM (Vegetable)	2	13%	2	6%	1	3%	0	0%	5	5%
Olive	0	0%	7	22%	3	8%	0	0%	10	11%
Almond	0	0%	0	0%	4	10%	0	0%	4	4%
Orange	0	0%	1	3%	0	0%	0	0%	1	1%
Dates	0	0%	0	0%	13	33%	0	0%	13	14%
Other	0	0%	0	0%	4	10%	0	0%	4	4%
Fallow field	6	38%	0	0%	0	0%	0	0%	6	7%

Tableau 7.2.3 Caractéristiques Générales du Réseau D'Irrigation Existant de la Zone de Taskourt

	Length (km)	Dominant surface (ha)				Potential flow (l/s)
		Perennial	Seasonal	Flood	Total	
Taslimant	12.5	193.5	75	432	700.5	max 500
Targa	12.3	50	236	50	336	max 300
Tamatoust	13.5	68.5	1829	2580	4638.5	max 1000
Taourdast	18	160				max 120
Chouaihiya	11	31	287	80	398	max 300
Afroukh	12	22.5	462	106	590.5	max 300
Aseoul	12	63	993	2874	3930	max 500
Jdida	8					60 /800
Laaouar	5	-	110	304	414	800 to 1000
Ait Bella et						
Bourekba	7.2	-	-	412	412	800 to 1000
Tafchtalt	4	34	-	-	34	max 50
Tadraouit	9.5	97	431.5	120	648.5	max 500
Igouramane	11.2	187.5	87	-	274.5	max 100
Tazerdakht	17	-	320	1857.5	2177.5	max 1500
Ouled Aissa	6.5	-	252	310	562	max 1000
El Hararcha	5	-	40	866	906	max 800
Sbait	5.2	-	-	361	361	max 800
Total		907.0	5,122.5	10,352.5	16,383.0	
Oued Piemont, Oued Bou Zouga +Other sources		270.5	397	1703	2370.5	
Total		1,177.50	5,519.50	12,055.50	18,753.50	

Tableau 7.2.4 Caractéristiques Générales du Réseau Existant de la Zone de Timkit

River name (Oued)	Canal name (Seguia)	Canal length (m)	Command area (ha)	Water right (m³/s)
Ifegh		3600	200	0.035
Chaaba	Ait Ferah	2400	45	1.000
	Ait Labzem	2000	75	1.500
	Tairza	2000	55	1.500
Tanguera	Talalt	1400	40	1.500
	Tighert	2700	175	2.000
Todrha L.B	Asrir	2500	120	1.000
	Ait Hammou	2500	130	1.000
Todrha R.B	Ait Assem	5500	220	1.000
	Lahini	3700	250	1.000
Felka	Chitam	9100	690	1.000
		37400	2000	
Notes:	L.B; Left Bank R.B; Right Bank			

Tableau 7.2.5 Principale Activités Économiques et Revenus Familiaux dans la Zone d' Étude

Particulars	N'Fifikh (No.5) Household N=63 (%)	Taskourt (No.9) Household N=75 (%)	Timkit (No.10) Household N=77 (%)	Azghar (No.17) Household N=44 (%)				
	Economic Activities							
-Agricultural Activities Only	52.0	37.0	19.0	43.0				
-Agricultural and Other Side Jobs (Employment, Commerce/Small Business etc.)	48.0	63.0	77.0	57.0				
-Non Agricultural Activities Only	0.0	0.0	4.0	0.0				
Total	100.0	100.0	100.0	100.0				
Average Annual Family Income								
	N'Fifikh DH/Annum	Share (%)	Taskourt DH/Annum	Share (%)	Timkit DH/Annum	Share (%)	Azghar DH/Annum	Share (%)
-Agricultural Income Including Non Agricultural Activities	32,800	68.5	20,800	77.0	12,600	38.9	16,500	69.6
-Remittance from Migrant Workers	15,100	31.5	6,200	23.0	19,800	61.1	7,200	30.4
Total	47,900	100.0	27,000	100.0	32,400	100.0	23,700	100.0

Note: Agricultural activities/income include livestock production/income

Source: Household Interview Survey on Socioeconomic Conditions of Beneficiary Areas, 2000

Tableau 7.2.6 Programme de Electrification des Villages autour de Projet

Taskourt Dam				Azghar Dam			
Status	Year	Commune : Assif El Mal		Status	Year	Commune : Ighazrane	
		Village	Location			Village	Location
Electrified		Imin Ouassif	between dam and irrigation area	Electrified		Iffrah	north of Ribat El Kheir
		Sidi Bou Otmane				Sidi Bonaza	
PERG2	2000 - 2002	Dar Akimah	witin irrigation area	PERG2	2000 - 2002	Tsaout Ou Araar	
		Ait Abaid				Tichout Tamalalet	within irrigation area
		Ifrane				Nass Said Jbel	
		Jorf				Taghza Lamroui	
		Taloutint	within irrigation area			Ekarbousse	
		Ajmani				Ouled Nacer	near irrigation area
PERG3	2002 - 2004	Tigourar		PERG3	2002 - 2004	Tahiyante	north of Ribat E.K.
		Dar N'mes					(none)
		Taskourt	between dam and irrigation area			Batha	
PERG4	2004 - 2006	Anebdour	irrigation area	PERG4	2004 - 2006	Beni Souhane	upstream of reservoir
		Bonou				Od Mimoune	
PERG5	2006 - 2008	Tafroukht	within irrigation area	PERG5	2006 - 2008	Sidi Yahia	near irrigation area
		Imin Ighzer	between dam and irrigation area			Tirbitinr	(other location)
Electrified		Taddart	near irrigation area	PERG5	2006 - 2008	Taounte Ouazarar	
						Ansem	within irrigation area
PERG3	2002 - 2004	Adassil Centre	upstream of reservoir	PERG5	2006 - 2008	Ihanoune	
		Maidid				El Mesreh	upstream of reservoir
		Quaidat				Beni Abbad	
		Tignarine	upstream of reservoir			Matine	
		Azmou				Ahmmar	
		Tiderguine				Faj Azrar	
		Assais				Ain Mediouna 1	
		Kerni	within reservoir			Ain Mediouna 2	(other location)
		Tiliwa				Nasdaoud	
		Talborjt				Ait Mhamed	
		Imin Eikha				Igli	
		Talat Nemti					
		Zawvat Hemti					
		Ighermane					
Tikht							
Tighoula							
Tagadirt	near reservoir						
Agaolir							
Aoammer							
Zwalil							
Iberdatene							
PERG4	2004 - 2006	Tawtirt	upstream of reservoir				
		Ighzer	within reservoir				

**Tableau 8.1.1 Feuilles de Calcul pour les Besoins en Eau du Projet
Pour la Zone Amont de N'Fifikh**

Factors in estimating water requirement	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Total
	(In case dependable rainfall is 4 out of 5 years)												
1. Reference crop evapotranspiration, ETo: (1)	177.0	152.8	105.6	83.1	89.3	101.7	151.9	183.3	223.2	243.3	261.3	220.4	
2. Crop coefficient, kc: (2)	0.15	0.18	0.33	0.51	0.67	0.69	0.56	0.40	0.28	0.33	0.30	0.18	
3. Crop evapotranspiration, ETcrop (3): (1)-(2)	26.6	27.5	34.8	42.4	59.8	70.2	85.1	73.3	62.5	80.3	78.4	39.7	680.6
4. Dependable rainfall 4 out of 5 years or 80% probability: (4)	3.3	21.7	32.4	44.1	38.7	30.2	26.3	22.7	7.8	2.9	0.3	0.1	320.5
5. Cropped area: (5)	0.28	0.4	0.50	0.85	0.85	0.70	0.70	0.80	0.75	0.42	0.42	0.42	
6. Effective rainfall, (6): Pe=(4)-(5)-fraction	-	6.5	12.2	28.1	24.7	15.9	13.8	13.6	-	-	-	-	114.8
7. Net irrigation requirement, In: (7)=(3)-(6)	26.6	21.0	22.6	14.3	35.1	54.3	71.3	59.7	62.5	80.3	78.4	39.7	565.8
8. Project water requirement , V: (8)=(7)/0.52	51.2	40.4	43.5	27.5	67.5	104.4	137.1	114.8	120.2	154.4	150.8	76.3	1,088.1
	(In case dependable rainfall is 1 out of 5 years)												
9. Dependable rainfall 1 out of 5 years or 20% probability: (9)	6.1	40.0	60.0	81.5	71.6	55.9	48.7	42.0	14.5	5.3	0.5	0.3	426.4
10. Effective rainfall, Pe: (10)=(9)-fraction	-	12.0	22.5	54.3	45.6	29.3	25.6	25.2	-	-	-	-	214.5
11. Net irrigation requirement, In: (11)=(3)-(10)	26.6	5.5	12.3	-	14.2	40.9	59.5	48.1	62.5	80.3	78.4	39.7	478.0
12. Project water requirement, V: (12)/0.52	51.2	29.8	23.7	-	27.3	78.7	114.6	92.5	120.2	154.4	150.8	76.3	919.5

**Tableau 8.1.2 Feuilles de Calcul pour les Besoins en Eau du Projet
Pour la Zone de Taskourt**

Factors in estimating water requirement	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Total
	(In case dependable rainfall is 4 out of 5 years)												
1. Reference crop evapotranspiration, ETo: (1)	179.7	155.9	105.9	84.0	87.3	105.0	157.2	185.1	231.9	255.6	261.3	221.7	
2. Crop coefficient, kc: (2)	0.12	0.11	0.23	0.43	0.68	0.86	0.80	0.49	0.22	0.19	0.20	0.16	
3. Crop evapotranspiration, ETcrop (3): (1)·(2)	21.60	17.10	24.30	36.10	59.40	90.30	125.80	90.70	51.00	48.60	52.30	35.50	652.7
4. Dependable rainfall 4 out of 5 years or 80% probability: (4)	9.0	31.2	26.2	23.4	43.2	36.6	43.8	40.0	18.3	7.5	0.5	3.2	282.9
5. Cropped area: (5)	0.21	0.20	0.46	0.87	0.90	0.90	0.91	0.95	0.73	0.33	0.30	0.27	
6. Effective rainfall, Pe:(6)=(4)·(5)-fraction	-	4.7	9.0	15.3	29.2	24.7	29.9	28.5	10.0	-	-	-	151.3
7. Net irrigation requirement, In: (7)=(3)-(6)	21.6	12.4	15.3	20.8	30.2	65.6	95.9	62.2	41.0	48.6	52.3	35.5	501.4
8. Project water requirement , V: (8)=(7)/0.52	41.5	23.8	29.4	40.0	58.1	126.1	184.4	119.6	78.8	93.5	100.6	68.3	964.1
	(In case dependable rainfall is 1 out of 5 years)												
9. Dependable rainfall 1 out of 5 years or 20% probability: (9)	14.2	49.1	41.1	36.7	67.9	57.5	68.9	62.9	28.8	11.7	0.8	5.0	444.6
10. Effective rainfall, Pe: (10)=(9)·(5)-fraction	2.2	7.4	14.2	23.9	45.8	38.8	47.0	44.8	15.8	-	-	-	
11. Net irrigation requirement, In: (11)=(3)-(10)	19.4	9.7	10.1	12.2	13.6	51.5	78.8	45.9	35.2	48.6	52.3	35.5	412.8
12. Project water requirement, V: (11)/0.52	37.3	18.7	19.4	23.5	26.2	99.0	151.5	88.3	67.7	93.5	100.6	68.3	794.0

**Tableau 8.1.3 Feuilles de Calcul pour les Besoins en Eau du Projet
Pour la Zone de Ifegh à Timkit**

Factors in estimating water requirement	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Total
	(In case dependable rainfall is 4 out of 5 years)												
1. Reference crop evapotranspiration, ETo: (1)	178.8	152.4	100.4	28.5	80.7	98.0	150.0	179.4	225.1	250.2	264.1	220.4	
2. Crop coefficient, kc: (2)	0.19	0.27	0.39	0.51	0.71	0.84	0.75	0.47	0.24	0.19	0.16	0.16	
3. Crop evapotranspiration, ETcrop (3): (1)·(2)	34.0	41.1	39.2	40.0	57.3	82.3	112.5	84.3	54.0	47.5	42.3	35.3	669.8
4. Dependable rainfall 4 out of 5 years or 80% probability: (4)	4.2	10.7	8.9	7.7	6.1	9.8	5.5	6.2	5.1	4.2	1.5	1.8	71.7
5. Cropped area: (5)	0.35	0.39	0.66	0.94	0.90	0.90	0.93	0.91	0.65	0.33	0.27	0.28	
6. Effective rainfall, Pe:(6)=(4)·(5)·fraction	-	3.1	4.4	5.4	-	6.6	-	-	-	-	-	-	19.5
7. Net irrigation requirement, In: (7)=(3)-(6)	34.0	38.0	34.8	34.6	57.3	75.7	112.5	84.3	54.0	47.5	42.3	35.3	650.3
8. Project water requirement , V: (8)=(7)/0.58	58.6	65.5	60.0	59.7	98.8	130.5	194.0	145.3	93.1	81.9	72.9	60.9	1,121.2
	(In case dependable rainfall is 1 out of 5 years)												
9. Dependable rainfall 1 out of 5 years or 20% probability: (9)	9.7	24.1	20.5	17.7	14.0	22.4	12.8	14.3	11.8	9.7	3.4	4.1	164.5
10. Effective rainfall, Pe: (10)=(9)·(5)·fraction	-	7.2	10.1	12.7	9.5	15.1	8.9	9.8	-	-	-	-	73.3
11. Net irrigation requirement, In: (11)=(3)-(10)	34.0	33.9	29.1	27.3	47.8	67.2	103.6	74.5	54.0	47.5	42.3	35.3	596.5
12. Project water requirement, V: (11)/0.58	58.6	58.4	50.2	47.1	82.4	115.9	178.6	128.4	93.1	81.9	72.9	60.9	1,028.4

**Tableau 8.1.4 Feuilles de Calcul pour les Besoins en Eau du Projet
Pour la Zone de Tinejdad à Timkit**

Factors in estimating water requirement	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Total
	(In case dependable rainfall is 4 out of 5 years)												
1. Reference crop evapotranspiration, ETo: (1)	178.8	152.4	100.4	78.5	80.7	98.0	150.0	129.4	225.1	250.2	264.1	220.4	
2. Crop coefficient, kc: (2)	0.23	0.29	0.38	0.47	0.64	0.28	0.24	0.50	0.28	0.23	0.20	0.20	
3. Crop evapotranspiration, ETcrop (3): (1)·(2)	41.1	44.2	38.2	36.9	51.6	76.4	111.0	89.7	63.0	57.5	52.8	44.1	706.5
4. Dependable rainfall 4 out of 5 years or 80% probability: (4)	4.2	10.7	8.9	7.7	6.1	9.8	5.5	6.2	5.1	4.2	1.5	1.8	71.7
5. Cropped area: (5)	0.45	0.45	0.66	0.95	0.90	0.90	0.93	0.95	0.74	0.42	0.38	0.38	
6. Effective rainfall, Pe:(6)=(4)·(5)·fraction		3.6	4.4	5.5		6.6							20.1
7. Net irrigation requirement, In: (7)=(3)-(6)	41.1	40.6	33.8	31.4	51.6	69.8	111.0	89.7	63.0	57.5	52.8	44.1	686.4
8. Project water requirement , V: (8)=(7)/0.75	54.8	54.1	45.1	41.9	68.8	93.1	148.0	120.0	84.0	76.7	70.4	58.8	915.6

**Tableau 8.1.5 Feuilles de Calcul pour les Besoins en Eau du Projet
Pour la Zone de Chitam à Timkit**

Factors in estimating water requirement	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Total
					(In case dependable rainfall is 4 out of 5 years)								
1. Reference crop evapotranspiration, ETo: (1)	178.8	152.4	100.4	78.5	80.7	98.0	150.0	129.4	225.1	250.2	264.1	220.40	
2. Crop coefficient, kc: (2)	0.11	0.11	0.23	0.45	0.72	0.91	0.86	0.52	0.21	0.15	0.12	0.11	
3. Crop evapotranspiration, ETcrop (3): (1)·(2)	19.7	16.8	23.1	35.3	58.1	89.2	129.0	93.3	47.3	37.5	31.7	24.2	605.2
4. Dependable rainfall 4 out of 5 years or 80% probability: (4)	4.2	10.7	8.9	7.7	6.1	9.8	5.5	6.2	5.1	4.2	1.5	1.8	
5. Cropped area: (5)	0.20	0.20	0.48	0.92	0.95	0.95	0.98	1.00	0.74	0.28	0.23	0.20	
6. Effective rainfall, Pe:(6)=(4)·(5)-fraction	-	1.6	3.2	5.3	-	7.0	-	-	-	-	-	-	17.1
7. Net irrigation requirement, In: (7)=(3)-(6)	19.7	15.2	19.9	30.0	58.1	82.2	129.0	93.3	47.3	37.5	31.7	24.2	588.1
8. Project water requirement , V: (8)=(7)/0.75	26.3	20.3	26.5	40.0	77.4	109.6	172.0	124.4	63.1	50.0	42.3	32.3	784.1

**Tableau 8.1.6 Feuilles de Calcul pour les Besoins en Eau du Projet
Pour la Zone de Azghar**

Factors in estimating water requirement	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Total
	(In case dependable rainfall is 4 out of 5 years)												
1. Reference crop evapotranspiration, ETo: (1)	173.7	140.7	93.9	69.8	73.5	86.5	133.9	157.2	195.9	233.1	261.0	223.2	
2. Crop coefficient, kc: (2)	0.10	0.09	0.25	0.46	0.67	0.86	0.92	77.00	0.39	0.14	0.13	0.12	
3. Crop evapotranspiration, ETcrop (3): (1)·(2)	17.4	12.7	23.5	32.1	49.2	73.6	123.2	121.0	76.4	32.6	33.9	26.8	622.4
4. Dependable rainfall 4 out of 5 years or 80% probability: (4)	22.5	27.2	50.3	49.2	51.4	56.4	51.3	48.7	36.4	12.5	3.9	4.0	413.8
5. Cropped area: (5)	0.20	0.22	0.49	0.95	1.00	0.96	0.95	0.95	0.99	0.70	0.26	0.23	
6. Effective rainfall, Pe:(6)=(4)·(5)·fraction	3.4	4.5	18.5	35.1	38.6	40.6	36.6	34.7	27.0	6.6	-	-	
7. Net irrigation requirement, In: (7)=(3)-(6)	14.0	8.2	5.0	-	10.6	33.0	86.6	86.3	49.4	26.0	33.9	26.8	379.8
8. Project water requirement , V: (8)=(7)/0.52	26.9	15.8	9.6	-	20.4	63.5	166.5	166.0	95.0	50.0	65.2	51.5	730.4
	(In case dependable rainfall is 1 out of 5 years)												
9. Dependable rainfall 1 out of 5 years or 20% probability: (9)	34.3	41.5	76.7	75.0	78.3	86	78.2	74.2	55.5	19.0	5.9	6.0	630.6
10. Effective rainfall, Pe: (10)=(9)·(5)·fraction	5.1	6.8	28.2	53.4	58.7	61.9	55.7	52.9	41.2	10.0	-	-	373.9
11. Net irrigation requirement, In: (11)=(3)-(10)	12.3	5.9	-	-	-	11.7	67.5	68.1	35.2	22.6	33.9	26.8	284.0
12. Project water requirement, V: (11)/0.52	23.7	11.3	-	-	-	22.5	129.8	131.0	67.7	43.5	65.2	51.5	546.2

Tableau 8.1.7 Sommaire de chaque zone de projet

Project		Existing (without dam)			Plan (with dam)			Crop Intensity (%)	Annual Regulated Water Volume by dam (MCM)
		Potential area ⁽¹⁾ (ha)	Crop Intensity (%)	Study area ⁽²⁾ (ha)	Gross area ⁽³⁾ (ha)	Net irrigation area ⁽⁴⁾ (ha)	Average irrigation area ⁽⁵⁾ (ha)		
No. 5 N'Fifikh	Up-stream	1.250	91	1.250	1.000	590	645	100	6.4
No. 9 Taskourt		8.000	96	6.000	4.500	2.500	2.713	100	24
No. 10 Timkit	Ifegh	300	96	300	240	240	240	105	2.7
	Tineidad	2.835	84	2.835	2.298	888	1.173	105	6.14
	Chitam	690	14	690	522	222	277	100	(including Chitam)
	Total	3.825		3.825	3.060	1.350	1.690		8.84
No. 17 Azghar		2.350	82	2.350	2.350	2.000	2.000	110	28
Total		15.425		13.425	10.910	6.440	7.048		67.24

- (1) Potential area: Soil survey has been conducted.
- (2) Study area has been delineated by both parties, MOA and the Study Team, at the stage of aerial photo-mapping.
- (3) Gross area is defined as the entire project area that covers not only irrigation area but also areas for infrastructures and buildings as well as areas for expected extension of irrigation.
- (4) Net irrigation area is defined as the area that is irrigated by the water requirement estimated based on the dependable rainfall of 80% probability.
- (5) Average irrigation area is defined as the area that is obtained by long term year simultaneous calculation for reservoir operation and irrigation

Tableau 8.3.1 Classification de Qualité de Nappe Souterraine et Eau Superficielle dans Chaque Zone d'Echantillonnage

Sampling Site*	Temp	pH	Cond	DO	Odor	Color	BOD	COD	PT	PO ₄	TN	NH ₄	NO ₃	SO ₄	Cl	Ca	Mg	F	Fe	Mn	Zn	TC	
N'fifikh	S 1	16	7.5	1447	8.57	0	5	1.51	13.44	0.113	0.027	0.18	0.03	1.88	266	255	148	81.4	0.55	0.308	0.058	<0.01	340
	S 2	16.5	7.55	2315	10.7	0	10	1.29	15.36	0.143	0.033	0.38	0.082	38.5	216	557	140	163.5	0.5	<0.1	<0.02	<0.01	770
	G 1	23	7.2	1695	-	0	<5	-	-	-	-	-	-	2.136	-	-	196	86.1	-	-	-	-	-
	G 2	22	7.35	2625	-	0	<5	-	-	-	-	-	-	1.55	-	-	138	156.8	-	-	-	-	-
	G 3	24	7.05	1465	-	0	<5	-	-	-	-	-	-	0.393	-	-	200	40.8	-	-	-	-	-
Taskourt	S 1	16.5	7.15	668	8.56	0	0	0.9	<7.5	0.105	0.036	0.21	0.04	6.25	147	20	104	34.3	0.8	<0.1	<0.02	<0.01	10
	S 2	22.5	8.15	734	13.15	0	0	1.2	11.52	0.105	0.018	0.3	0.069	3.37	197	29	96	40.7	0.42	<0.1	<0.02	<0.01	18
	G 1	21	7.45	710	-	0	<5	-	-	-	-	-	-	3.842	-	-	116	42.1	-	-	-	-	-
	G 2	19.5	7.45	1262	-	0	<5	-	-	-	-	-	-	5.75	-	-	140	83.8	-	-	-	-	-
	G 3	22.5	10.95	3111	-	1	10	-	-	-	-	-	-	55.8	-	-	325	7.4	-	-	-	-	-
Timkit	S 1	17	7.4	2158	9.95	0	0	0.9	7.68	0.095	0.034	0.25	0.057	20.77	409	425	172	89.2	0.55	<0.1	<0.02	<0.01	110
	G 1	21.5	7.2	1619	-	0	<5	-	-	-	-	-	-	21.72	-	-	165	74.2	-	-	-	-	-
	G 2	23.5	7.05	2026	-	0	<5	-	-	-	-	-	-	11.54	-	-	190	105.8	-	-	-	-	-
	G 3	22	7.15	2687	-	0	<5	-	-	-	-	-	-	0.067	-	-	232	143.2	-	-	-	-	-
Azghar	S 1	10	7.5	450	9.65	0	0	0.61	<7.5	0.122	0.024	0.34	0.07	22.8	24	24	80	18.4	0.45	<0.1	<0.02	<0.01	110
	S 2	11.5	7.65	450	9.25	0	0	0.81	<7.5	0.11	0.024	0.25	0.053	7	22	34	60	20.4	0.3	<0.1	<0.02	0.019	190
	S 3	13	7.45	443	9.33	0	0	0.89	<7.5	0.105	0.038	0.21	0.048	7.75	28	26	76	19.9	0.35	<0.1	<0.02	0.02	0
	S 4	14.5	7.7	440	9.1	0	0	0.89	<7.5	0.1	0.042	0.29	0.068	7	30	26	68	20.7	0.35	<0.1	<0.02	<0.01	40
	G 1	18.5	8.6	461	-	0	<5	-	-	-	-	-	-	6.113	-	-	44	48.4	-	-	-	-	-
	G 2	18.5	7.65	669	-	0	<5	-	-	-	-	-	-	0.986	-	-	116	40.1	-	-	-	-	-
	G 3	18.5	7.6	692	-	1	10	-	-	-	-	-	-	5.466	-	-	104	39.3	-	-	-	-	-

*) Location of sampling site is shown in Figures XVI 2.1.1 to 2.1.4 of Supporting Report XVI.

**Tableau 8.3.2 Caractéristique du Projet Préliminaire du
Système d'Approvisionnement en Eau de Petite Taille**

Item	Unit	N'Fifikh		Taskourt	
Village		Tlet Ziaida	Dar Akimakh	Tamatoust	Tiguemi
Commune		Ziaida	Assif El Mal	Mzouda	Oumrhar
Population	person				Mzouda
1994		824	575	549	539
2000		1120	760	(292)	552
2020		1300	900	700	700
Consumption					
Daily	m ³ /day	26	18	14	14
Annual	m ³ /year	9,490	6,570	5,110	5,110
Water Source		N'Fifikh River	Seguia	Seguia	Seguia
Reservoir Volume	m ³	26	Tadraouit	Tamatoust	Taourdast
Number of Stand			18	14	14
Pipes	nos	4	3	3	3
Project Cost	mil DH	1.80	1.20	0.90	0.90

**Tableau 8.4.1 Caractéristique du Projet Préliminaire
De la Mini-Centrale Hydro-Electrique**

Item	Unit	Taskourt		Azghar
		NWL 1020m	NWL 995m	
Specifications				
Installed capacity	kW	710	460	50
Maximum discharge	m ³ /s	1.5	1.5	1.0
Reservoir water level	m	1020	995	854
Turbine center level	m	950	950	847.5
Gross head	m	70.0	45.0	6.5
Maximum effective head	m	64.4	41.4	6.0
Generated energy	GWh	2.06	1.22	0.09
Powerhouse building				
Type		Open	Open	Open
Turbine				
Type		Cross-flow	Cross-flow	Cross-flow
Transmission line				
Line voltage	V	22,000	22,000	22,000
Wire length	km	1.0	1.0	2.5
Project Cost				
Powerhouse building	mil. DH	2.6	1.9	0.3
Generating equipment	mil. DH	11.0	8.3	1.8
Transmission line	mil. DH	0.1	0.1	0.4
Total	mil. DH	13.7	10.3	2.5
Unit Construction Cost per kWh	DH/kWh	4.9	6.2	19.3

Note : Unit construction cost per kWh is calculated by cost that covers actual work, overhead and profit of the contractor, and physical contingency only.

Tableau 8.5.1 Données de Base et Critères pour l' Etude du Bilan d'Eau

Item			N'Fifikh		Taskourt	Timkit	Azghar
			Upstream	Downstream			
Basic Data							
Discharge	Annual average	Mm ³ /year	13.32	11.4	44.65	11.71	53.21
	Period		39/40 to 96/97	39/40 to 96/97	35/36 to 96/97	61/62 to 96/97	55/56 to 98/99
Sedimentation	Annual average	Mm ³ /year	0.03	0.04	0.12	0.20	0.13
Precipitation	Annual average	mm/year	323.4	323.4	366.0	186.4	446.8
	Period		76/77 to 99/00	76/77 to 99/00	89/90 to 99/00	64/65 to 99/00	82/83 to 99/00
Evaporation	Annual average	mm/year	1,545	1,545	1,412	2,115	1,484
	Basis (referred station)		SMBA	SMBA	Lalla Takerkoust	Hassan Addakhil	Idris Premier
Elevation-Area/Volume Curve			1:5,000 map	1:5,000 map	1:5,000 map	1:5,000 map	1:5,000 map
Water Demand	Annual	m ³ /ha/year	8,247	5,712	9,641	11,212	7,304
Maintenance flow		Mm ³ /year	not considered	not considered	not considered	not considered	not considered
Calculation Criteria							
	Duration of simultaneous calculation		39/40 to 96/97	39/40 to 96/97	35/36 to 96/97	61/62 to 96/97	55/56 to 98/99
	Design period for sedimentation volume		50	50	50	20	50
Guarantee of Supply	<ul style="list-style-type: none"> - Frequency of deficit year (annual deficit more than 15%) is less than 20%. - Maximum annual deficit is less than 50%. 						
Operation method	<ul style="list-style-type: none"> 68% of water requirement is taken between M.O.W.L.-1 and M.O.W.L.-2. - 50% of water requirement is taken between M.O.W.L.-2 and M.W.L. - No water is taken below M.W.L. 						

Tableau 8.5.2 Résultats de l' Étude de Bilan d'Eau

Normal Water Level EL. m	Regulated Volume Mm³	Average Deficiency Rate %	Frequency of Deficit Year %	Maximum Annual Deficit %	Average Water Use Mm³	Average Evaporation Mm³	Average Spillout Mm³
N'Fifikh Dam (upstream)							
228	1.2	5.8	15.5	49.8	1.13	0.45	11.74
230	2.5	6.4	17.2	49.8	2.34	0.55	10.43
235	4.3	6.8	13.8	45.1	4.01	0.87	8.45
240	5.5	6.4	15.5	49.4	5.15	1.31	6.87
245	6.4	6.5	19.0	50.0	5.98	1.79	5.54
250	7.1	7.0	19.0	50.0	6.60	2.22	4.45
N'Fifikh Dam (downstream)							
13	2.0	2.6	3.4	48.2	1.95	1.06	8.41
15	2.7	7.6	20.7	48.5	2.50	1.21	7.70
20	4.0	8.3	20.7	49.4	3.67	1.64	6.09
25	4.6	7.0	19.0	49.4	4.28	2.14	4.96
30	5.1	6.6	19.0	50.0	4.76	2.56	4.00
35	5.4	6.0	20.7	50.0	5.07	2.90	3.39
Taskourt Dam							
976	8.0	7.3	14.5	40.7	7.41	0.57	36.66
986	19.0	7.2	19.4	47.0	17.63	0.76	26.24
991	22.0	7.2	14.5	50.1	20.42	0.90	23.29
995	24.0	6.7	14.5	46.2	22.40	1.02	21.18
1005	28.0	7.3	14.5	48.2	25.94	1.41	17.19
1020	34.0	6.6	21.0	50.0	31.76	2.02	10.95
1030	37.0	6.2	19.4	50.0	34.71	2.46	7.87
1040	38.5	6.2	19.4	50.0	36.13	2.86	6.42
Timkit Dam							
1245	2.7	8.5	19.4	50.0	2.47	1.60	7.60
1250	3.8	8.5	19.4	50.0	3.48	2.54	5.67
1255	4.0	8.3	19.4	50.0	3.67	3.68	4.34
1260	4.3	9.2	19.4	50.0	3.91	5.22	2.57
Azghar Dam							
850	9.0	8.6	20.0	45.0	8.23	0.81	44.19
852	12.5	6.4	20.5	45.1	11.70	0.91	40.65
854	14.6	5.6	18.2	41.7	13.79	1.02	38.48
860	23.0	7.3	13.6	49.4	21.33	1.40	30.70
865	28.0	7.5	15.9	42.6	25.90	1.81	25.85
870	32.5	7.9	18.2	50.0	29.92	2.29	21.48
875	36.0	8.0	20.5	50.0	33.11	2.82	17.90
880	39.0	9.0	20.5	50.0	35.50	3.33	15.17