Water pumping in a southern moroccan oisis

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Frequent droughts

Groundwater levels have fallen

Traditional systems not reliable

Pumping stations

Objective

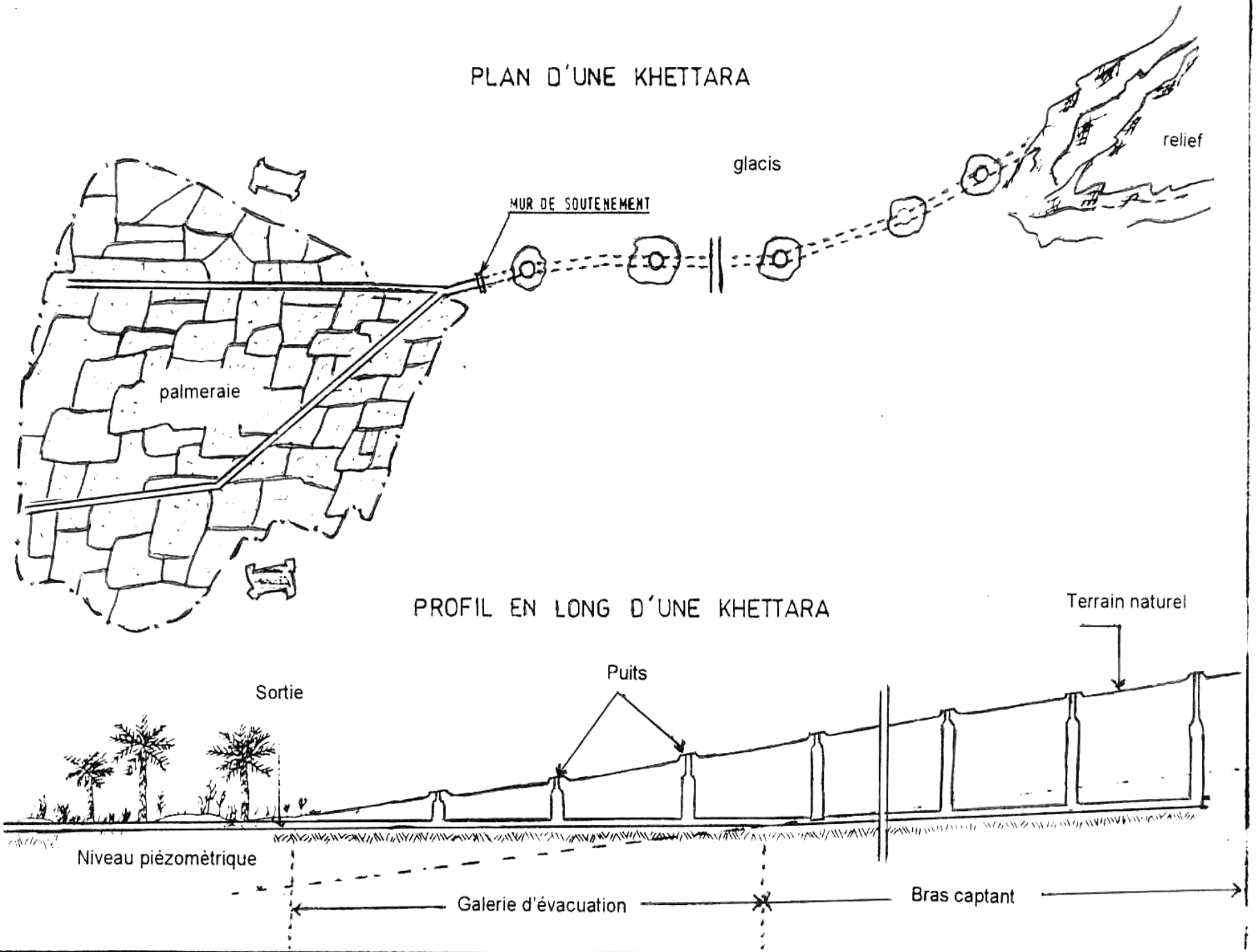
- Characterize pumping stations
  - technical aspects
  - economic & organizational
- Possible interventions to improve

Site

- Jorf area / Tafilalet district

  - semi-arid to arid (50-250mm)

  - plain zone : river floods, khettara and pumping


PLAN D'UNE KHETTARA
relief
glacis
MUR DE SOUTENEMENT
palmeraie
PROFIL EN LONG D'UNE KHETTARA
Terrain naturel
Puits
Sortie
Niveau piézomètrique
Galerie d'évacuation
Bras captant

Main crops

Crops	Average cultivated area	Average production [tons]
Cereals	40,000 ha	300,000
Vegetables	1,900 ha	37,000
Beans	1,600 ha	2,400
Henna	650 ha25	1,700
Alfalfa	9000 ha	580,000
Date palms	1.25 M. trs	27,000
Olive trees	1.0 M. trs	13,000
Apple trees	0.4 M. trs	6,000

ORMVA-Taf, 1997

Method

Survey

- Identification of land holdings
- Engine/motor : type, power, state
- Pump : type, flow rate, state
- Accessories : type, state
- Economic data, organizational aspects

Main results

1. Wells equiped between 1940 and 2001 with a major part after 1970
2. 3 kinds of stations
   - diesel engine - centrifugal pump : 71%
   - diesel engine - vertical axis pump : 19%
   - electric motor–vertical axis pump : 10%

Main results

3- 64% of the stations have concrete reservoir in wich 36% are cylindrical

4- 13 engine marks, 2 dominate with 69,5%

5- 92,5% of the stations use gasoil as energy

6- Frequent engine power : 8, 10, 12 & 27 hp

7- 9 pump marks, 2 represent 69,2%

8- 77,8% of the pumps are centrifucal

Main results

9- 33% of the stations equiped with second hand pumps

10- Few safety and protection devices

11- No measurment instruments

12- No preventive maintenance

11- Important potential of energy saving

Main results

Station	Energy	Annual cost MAD	annuel volume m^3	**Cost** MAD/ m^3	HMT m	Cost MAD/m^3/ mHMT
1	gasoil	45377	38016	1,19	35,2	**0,034**
2	gasoil	77845	114048	0,68	26,4	**0,026**
3	gasoil	34408	106920	0,32	28,6	**0,011**
4	electricity	66406	213840	0,31	28,6	**0,011**
5	gasoil	58439	83160	0,70	26,4	**0,027**
6	gasoil	47168	42768	1,10	35,2	**0,031**
7	gasoil	21599	38016	0,57	24,2	**0,024**
8	gasoil	21847	61776	0,35	24,2	**0,014**
9	gasoil	45972	47520	0,97	29,7	**0,033**
10	gasoil	26602	44550	0,60	31,9	**0,019**
11	gasoil	16324	44550	0,37	31,9	**0,012**
12	gasoil	26947	35640	0,76	35,2	**0,022**
13	gasoil + butane	9249	49896	0,19	25,3	**0,008**
14	gasoil	19941	47520	0,42	29,7	**0,014**
15	gasoil	34485	35640	0,97	33	**0,029**

Conclusion

1- Management of pumping stations is not yet mastered by the users,

2- Maintenance costs can be reduced,

3- A real potential of energy saving exists

Possible interventions

1- Improve policy and institutional support to advence energy and water use,

2- Enhance commercial management in rural power distribution,

3- Plan, design and implement energy and water efficiency programs.


Thank you