Irrigation Water management in Tunisian oases: a resilient ecosystem for Irrigation Management “Gafsa Oasis”

Dr. Dhaouadi Latifa CRRAO, Degueche, Tozeur,
Email: Latifa_hydro@yahoo.fr/ latifahydro@gmail.com
Tunisian Oases

Area oases: 53.9 miles Ha
60% Deglet Nour

Gafsa:
2197 Ha

Tozeur:
8444 Ha
4533 Moderns
3403 Traditionnels

Gabès:
6928 Ha

Kébili:
36000 Ha
25517 Moderns
5041 Traditionnels
Date Palm potential in Tunisia

• World rank in production quantity: 12.

• Export value: 1st World Rank.

• Production in 2016: 242 thousand tons.

• Export: 67 thousand tons (2017).

• Market value: 396 M.DT.
The main issues

- Awareness lack of the resource potential
- Insufficient infrastructure for the oasis valorization products
- Weakness of farming techniques
- Problèmes phytosanitaires
- Soil salinisation & hydromorphy
- Water Scarcity Quantity & Quality
Tunisian Oasis Water resources

Surface water 6%
Surface groundwater 15%
Deep groundwater 58%

+60% ≥ 1.5g/l

Importnat but Overexploitation

Tunisian Oasis Ecosystem Services Sustainability
Agricultural Water Economy Projects in the Southern Oases

Southern Water Master Plan (PDES) (1980-1991)

Improvement of Irrigation in the Southern Oases (APIOS)
Irrigation situation in Tunisian Oasis?

Irrigation system unsuitable for demand–management nexus

water stress & yield losses

Overexploitation & resources losses

Inefficient irrigation management

poor governance
Sustainability…………….Services

Irrigation Improvement

Irrigation Management

Water Productivity

Efficient Irrigation
Case Study: Gafsa Oasis (Tunisian South West)

- The Gafsa region is a pre-Saharan area
- Regular drought (rain = 160 mm; ETP = 1300 mm), Water resources (potential: 128.4 Mm3 exploited: 121 Mm3, agriculture: 70 Mm3),
- Irrigated public perimeters (PPI): 6226 ha, Private irrigated perimeters (PIP): 10274 ha,
- Irrigation Techniques: Pressurized (1/3), Surface bassin irrigation (2/3).
Typology of Gafsa oases

Traditionnel Oasis

*Trees*

*Date palm, the olive, the fig, the apricot, the pear, the grenadier, the apple, the vine, the plum*

*Herbaceaus*

*Animals*

Semi traditional oasis

Modern Oasis
Irrigation Water resources!!!!!!

Irrigation water was only natural sources:

- The big water or Maa El Kebir, The total flow was 160 l/s.
- The little water or Maa Elsségir ou El: other small naturel sources The total flow was 100 l/s.
Irrigation Water...Shortly before independence & until now

• Several Drillings to irrigate the Gafsa oases
  Salinity 1.5g/l to 3g/l

• Drillings were carried out to fill the water deficit in the oasis caused by the permanent depletion of natural sources (1999).

• Currently, the available flow of irrigation water resources is about 420 l/s.

(Dhaouadi, 2017) (Mkademi, 2014) (Ben Amor, 2010)
Irrigation management in Gafsa oasis

• The total flow (420l/s) has been defined to serve the entire oasis in a continuous way (365 days) at 20 hours a day

• Presence some wells (depth 30-50m)
Irrigation management in Gafsa oasis
Water Tower...Individual wells......Seguias.....Canalisation
Irrigation techniques in the Gafsa Oasis

- Basin
- Surface drip irrigation
- Subsurface irrigation
- Mini diffuser
- Bubbler

80% surface basin irrigation
Assessment of Basin Irrigation

Modern Oasis

Semi traditional Oasis

Traditional Oasis
Semi Traditional Oasis

![Graph showing volumic soil moisture over time for different depths. The graph indicates fluctuations in moisture levels with peaks and valleys between 0% and 25% for various dates.]
Modern Oases

Soil water deficit during the monitoring period
Semi Traditional oasis

Drinking water

Water soil retention

Water use productivity

Irrigation efficiency

Irrigation system management

Agricultural tools

Agricultural water
Modern oasis

Drinking water

Water soil retention

Water use productivity

Irrigation Efficiency

Agricultural water

Irrigation system management

traditional agricultural tools
Drinking water

Water soil retention

Water use productivity

Irrigation efficiency

Agricultural water

Irrigation system management

Agricultural tools

Tradional Oasis

Semi Tradional oasis

Modern Oasis
CONCLUSION

Irrigation Water resources management in oasis ecosystem

- Biodiversity in the oasis
- Oasien Stakeholders
- Governance
Thank You & Questions