



# Natural Resources Management in Southern Tunisia: Sustainable Exploitation and Degradation issues of the oasis Agro-Systems

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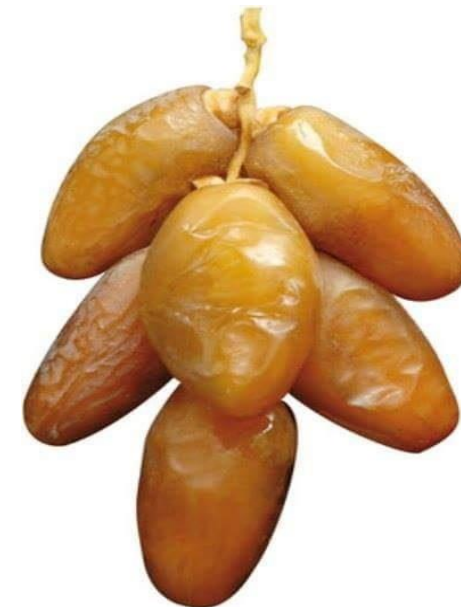
# Tunisian oasis agro systems



Les superficies productives des dattes  
57.2 Hectare  
86 %

**Production des dattes**  
(2020)  
**335000 Tons**

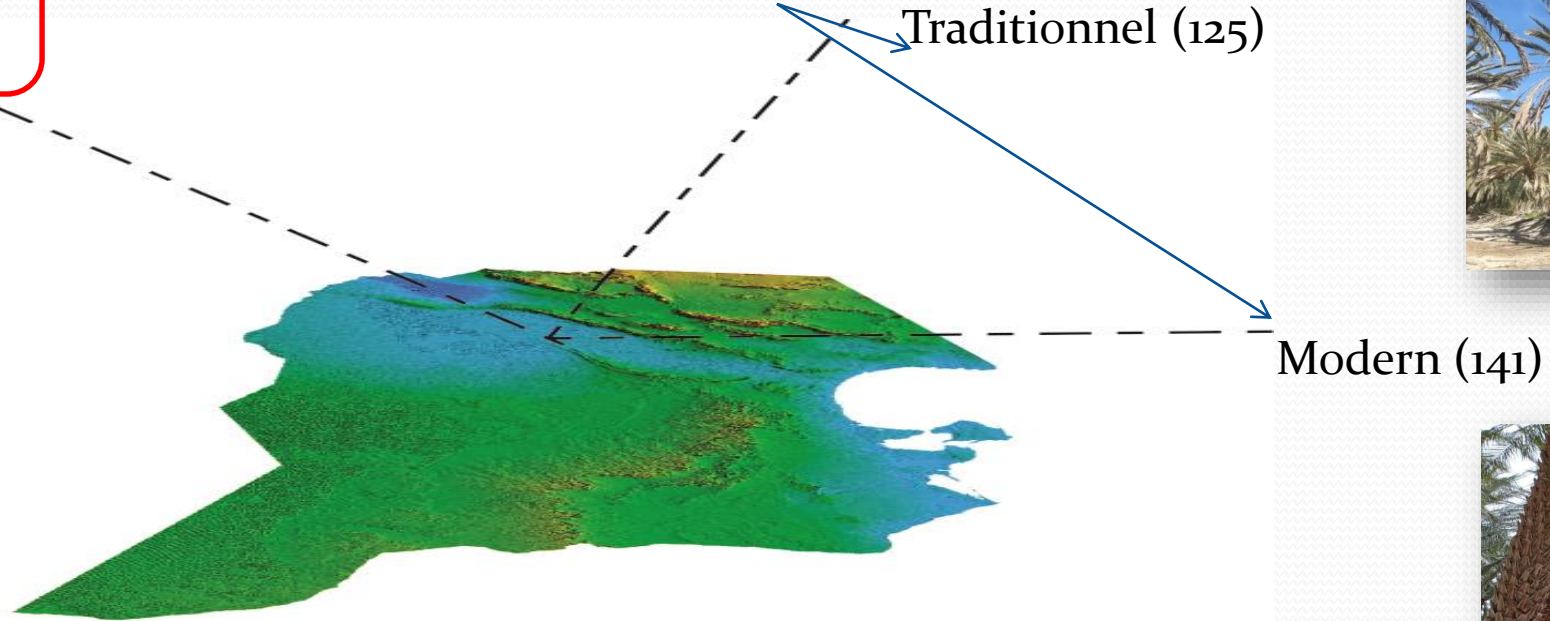
Deglet Nour 60%





## Private Oases

## Public Oases

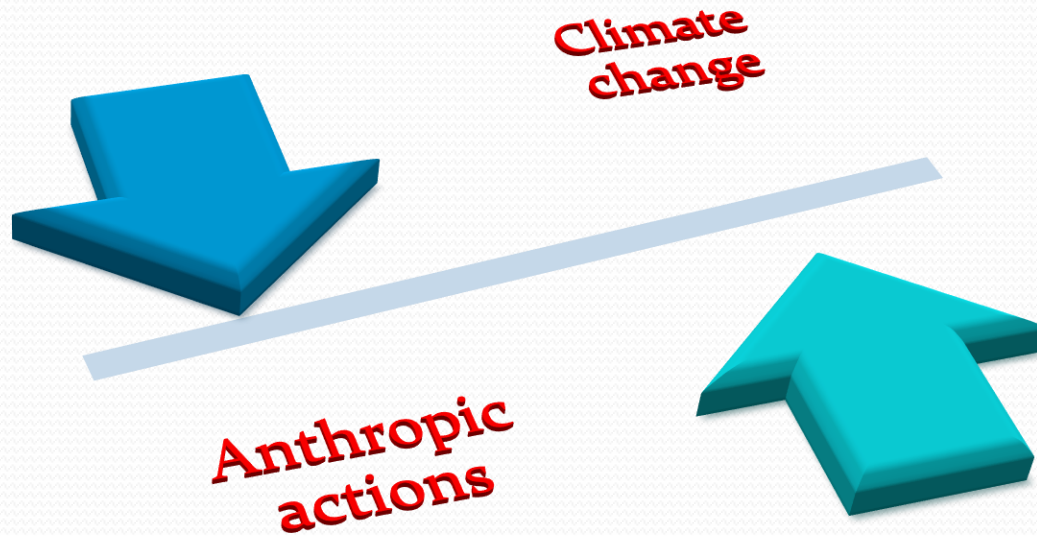


- *Intercalary Continental (CI)* : (50-70 °C) and salinity (2 to 6 g/L).
  - depths (1,000 and 2,000 m)
- *Terminal Complex (CT)* ( cold waters): Depths (40 to 500 m) salinity (2 to 8 g/L)
  - *Jeffara* aquifer : saline (2.6-3.5 g/L) is found in the coastal oases of *Gabes*.
- the shallow These aquifers have salinity between 3 g/L and 18 g/L.

Agro system oasis sustainability



Sustainability of Natural resources



**OBJECTIF**

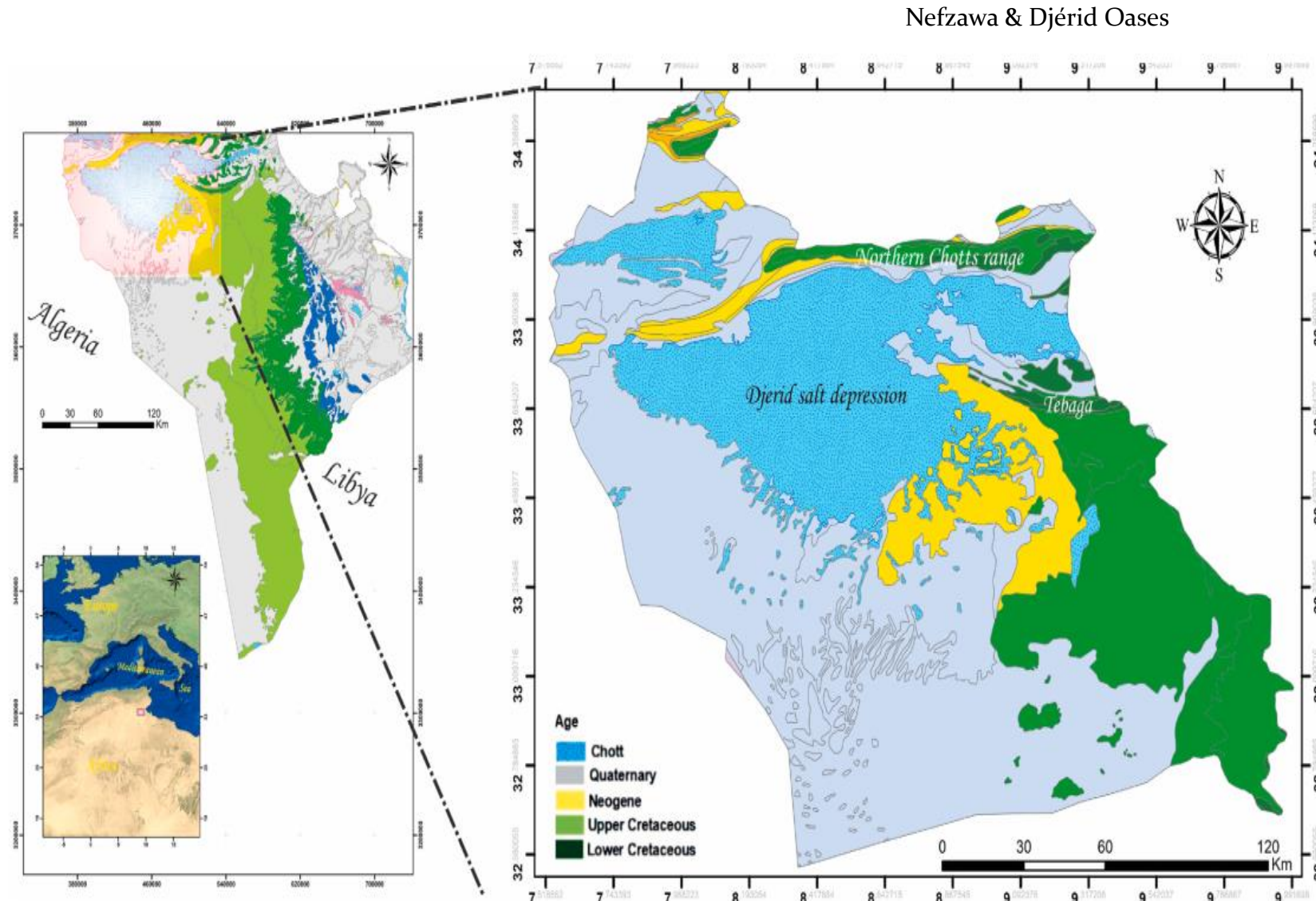
Assesment of the sustainability of different natural resources in the oasis lands,

The principal agro-system in southwestern Tunisia.

# Methodology

This study has involved three major phases:

- Literature review and data collection
- Samples analysis and laboratory work
- Data treatment and interpretation



Localization of the study area (Besser et al. 2021)



# Results

## Phase I:

### Issues challenging the sustainability of Oasien Agriculture: Irrigation Water resources availability and exploitation

- The released water quantity

- The distribution of water for irrigation is variable and irregular

- The leaching issues

- Old school irrigation methods

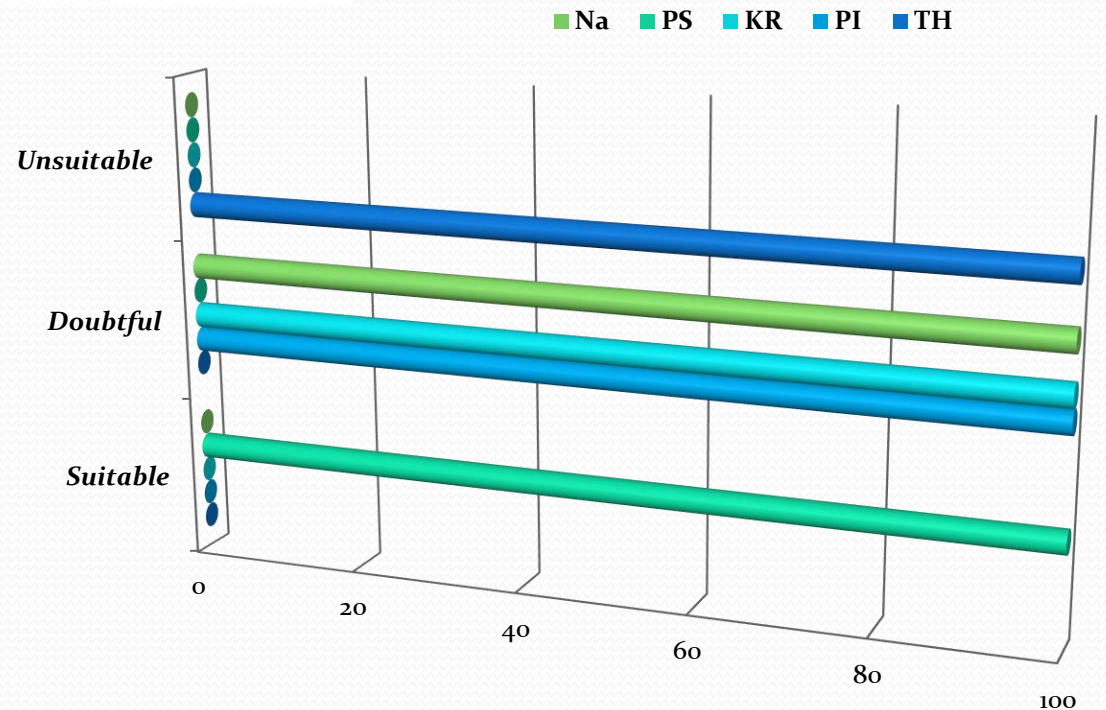
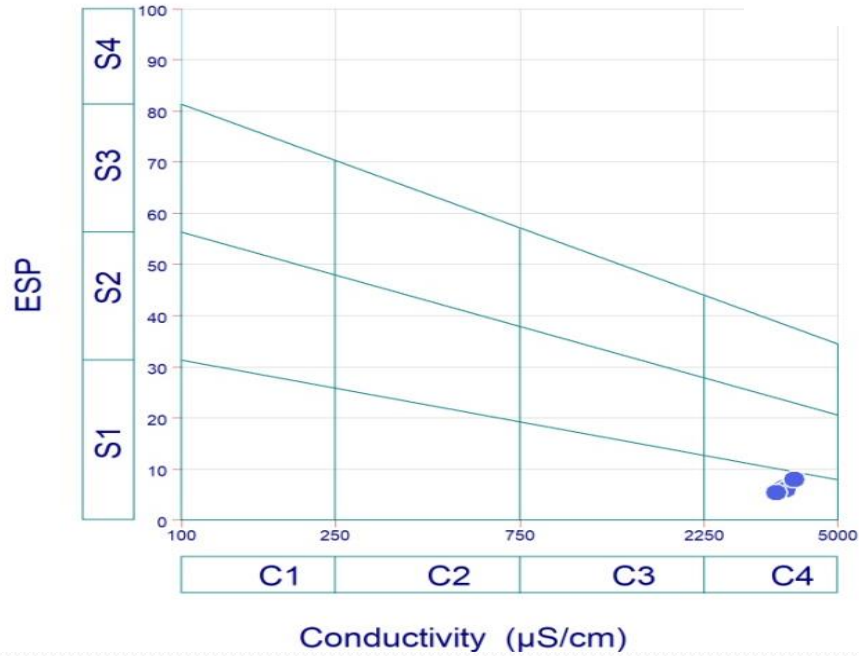
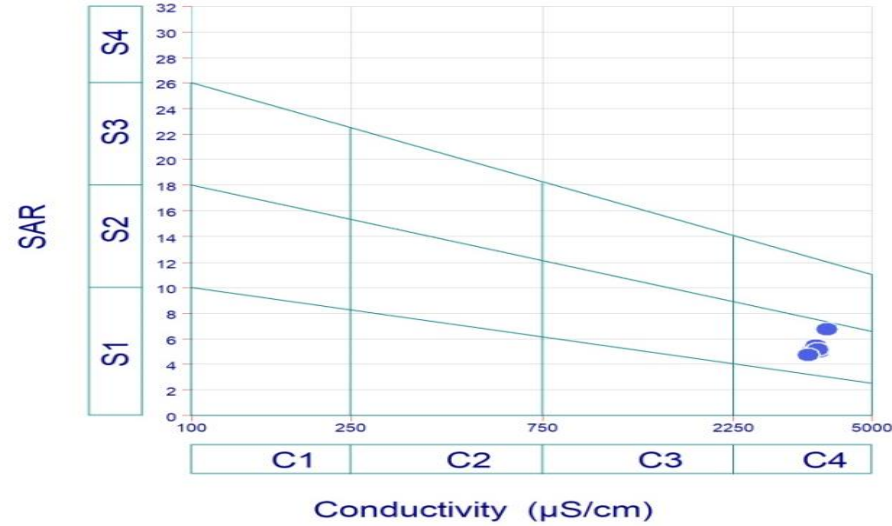
- Uncontrolled use of energy



# Results

Phase II:

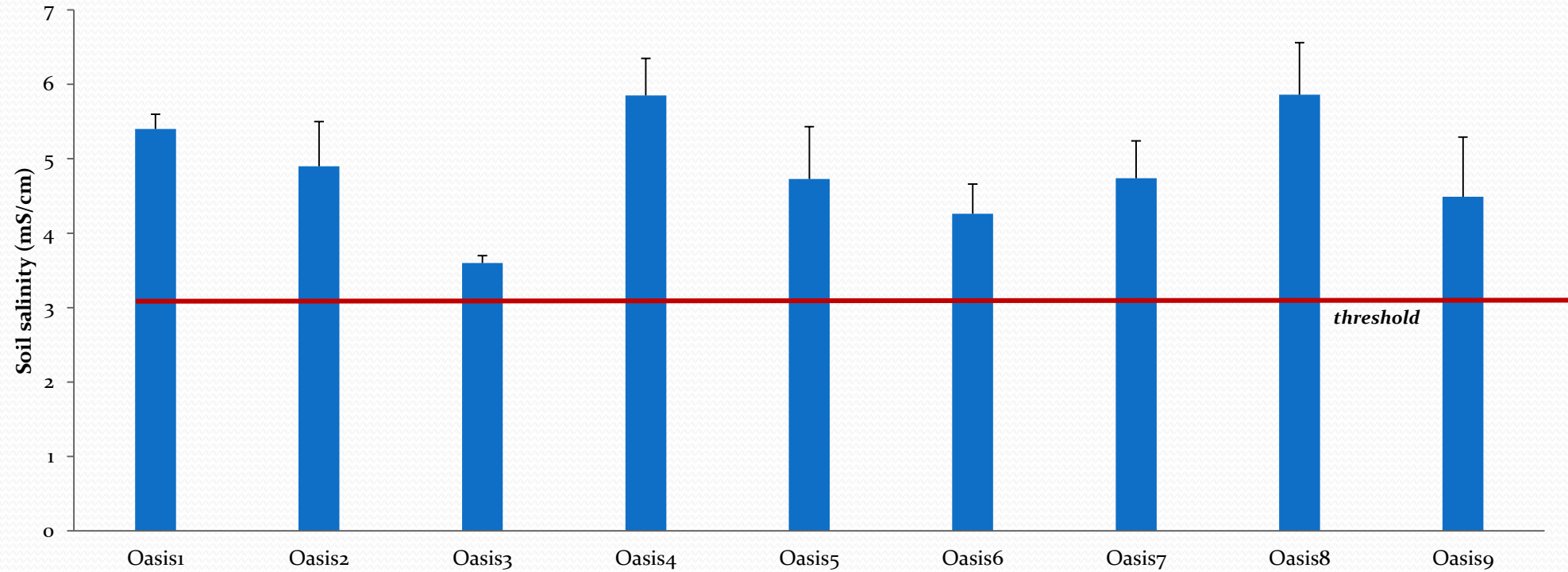
Irrigation water characteristics



# Results

## Phase II:

### Soil Salinity





**Ecological factors****Water resources**

	overexploitation	Water quality	Pollution	Surface water
<b>Oasis of Kebili</b>	6,73 % exploitation of shallow aquifer	TDS > 19 g/L	petroleum contamination	non perennial
	164,96 % exploitation of CT aquifer	> 4 g/L	Nitrate contamination	
	218,38 % exploitation of CI aquifer	> 5 g/L		
<b>Oasis of Tozeur</b>	85,65 % exploitation of shallow aquifer	> 8 g/L	Nitrate contamination	non perennial
	87,30 % exploitation of CT aquifer	> 4 g/L	Fluoride contamination	

**Ecological factors****Soil resources**

	Soil Salinization	Soil alkalization
<b>Oasis of Kebili</b>	observed in the most parts of the region Increasing risks in other localities	High risks in the oasis lands Severe restriction for the greenhouses
<b>Oasis of Tozeur</b>	Observed in El Hamma region Increasing risks in the most parts of the region	High risks in the cultivated lands

# Phase III:

# Discussion

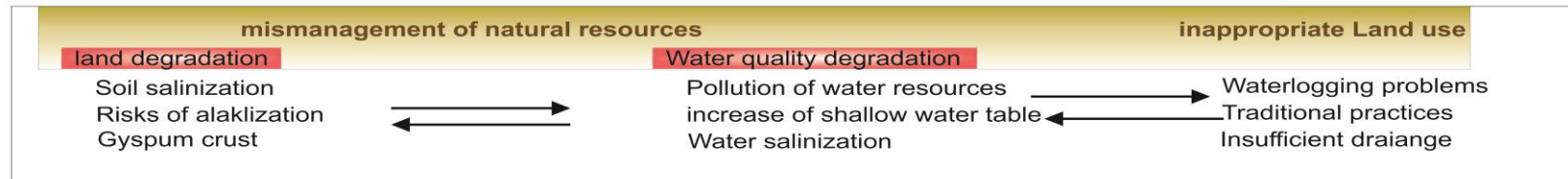
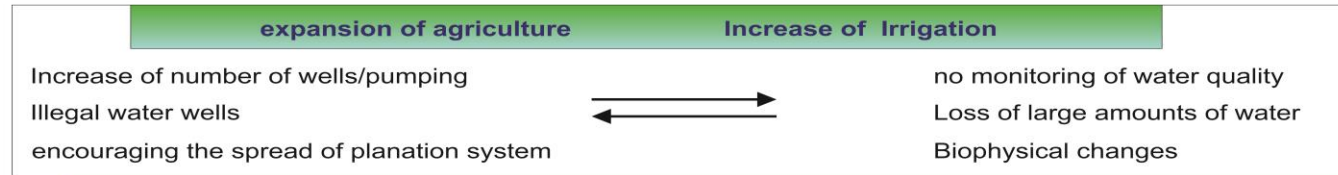
## Baseline conditions

- Low renewable groundwater water resources
- Harsh climate conditions
- Restricted fertile lands
- Infertile lands of Chotts depressions
- Infertile lands of the sandy dunes
- Limited off -farm employment
- Old school agricultural methods

## Pressure factors

Socio-economic pressure/ dependence → increase agricultural employment  
 Policy and environmental institutions → increase of incomes and benefits of date palm and greenhouses culture

Current status



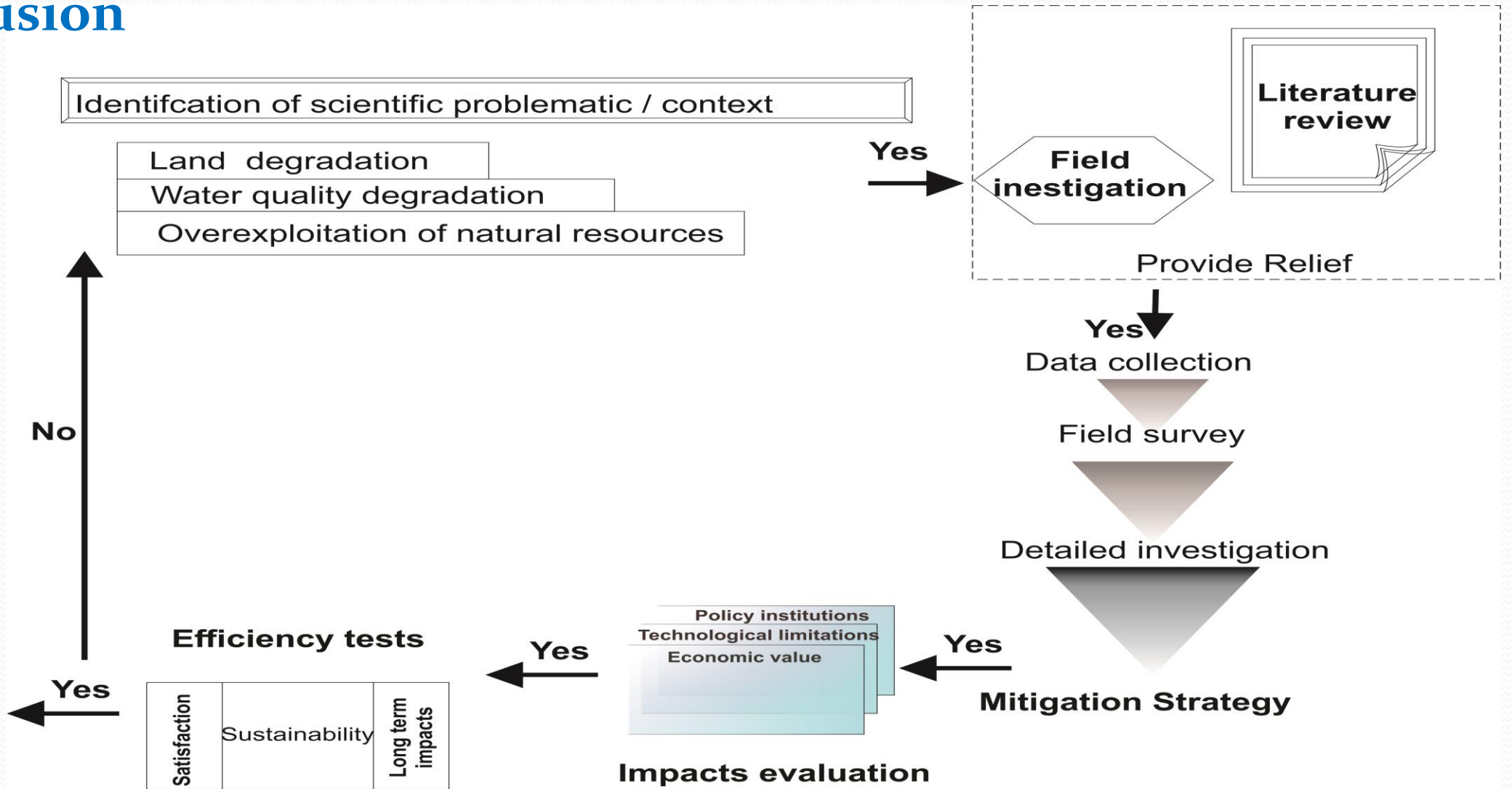
## Mitigation strategy

- Investment in resource replenishment
- Upadted irrigation technique

## Rehabilitation strategies

use of unconventional water resources

# Conclusion



Rehabilitation process





Thank You  
For Your Attention