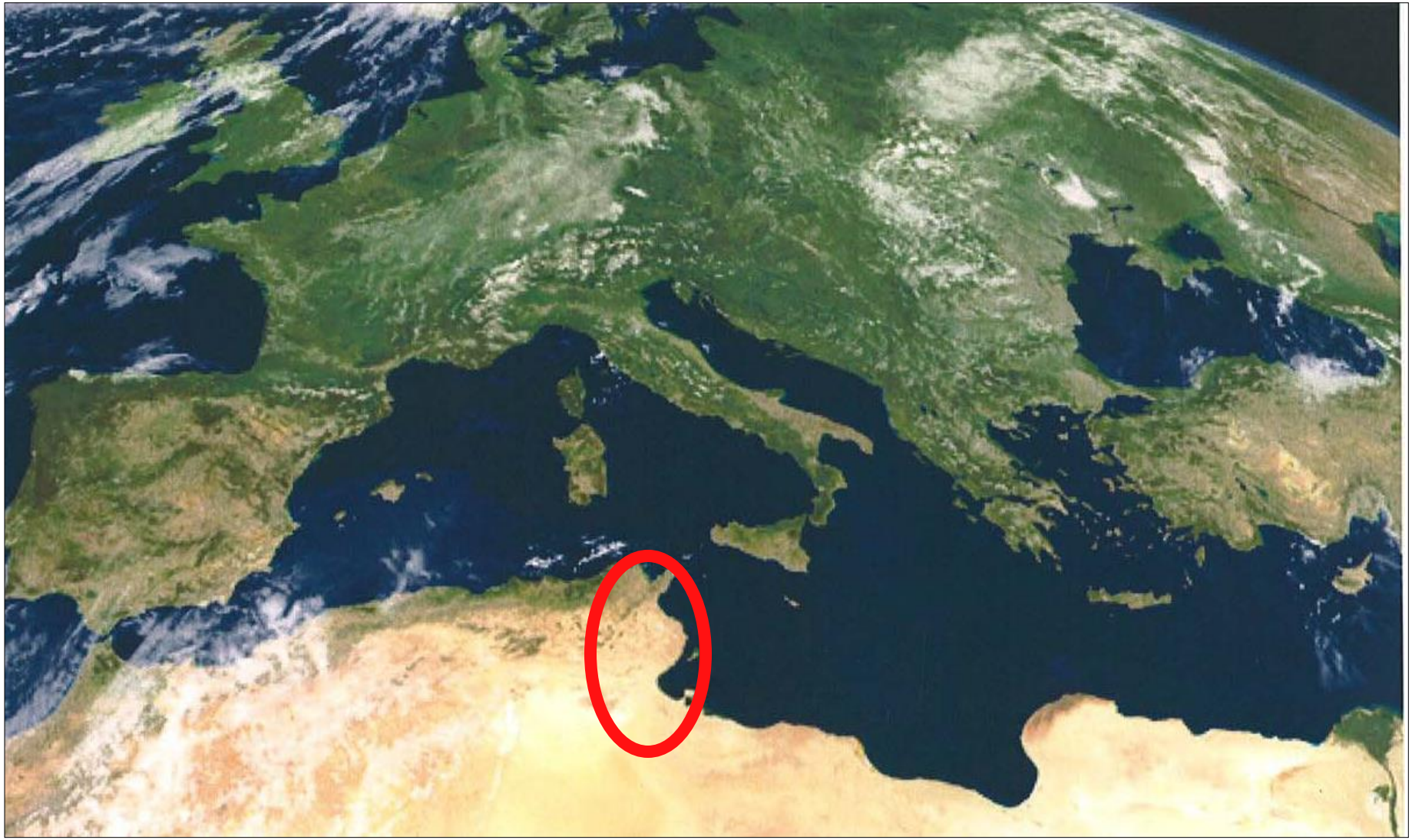
REPUBLIC OF TUNISIA
Ministry of Agriculture
General Directorate of Water Resources

Water Resources in Tunisia

NASA, 28-31, May 2013

H. CHAIEB

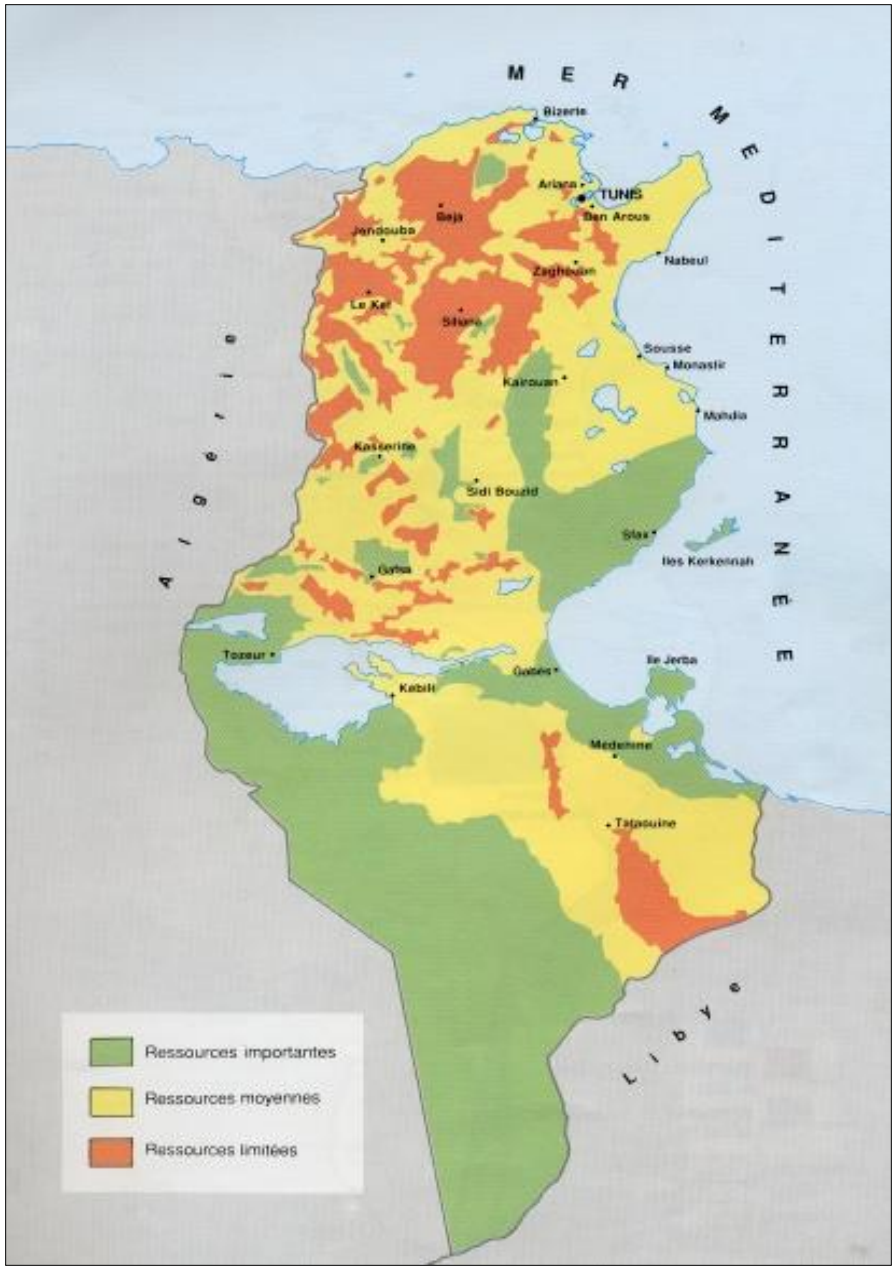
Situation



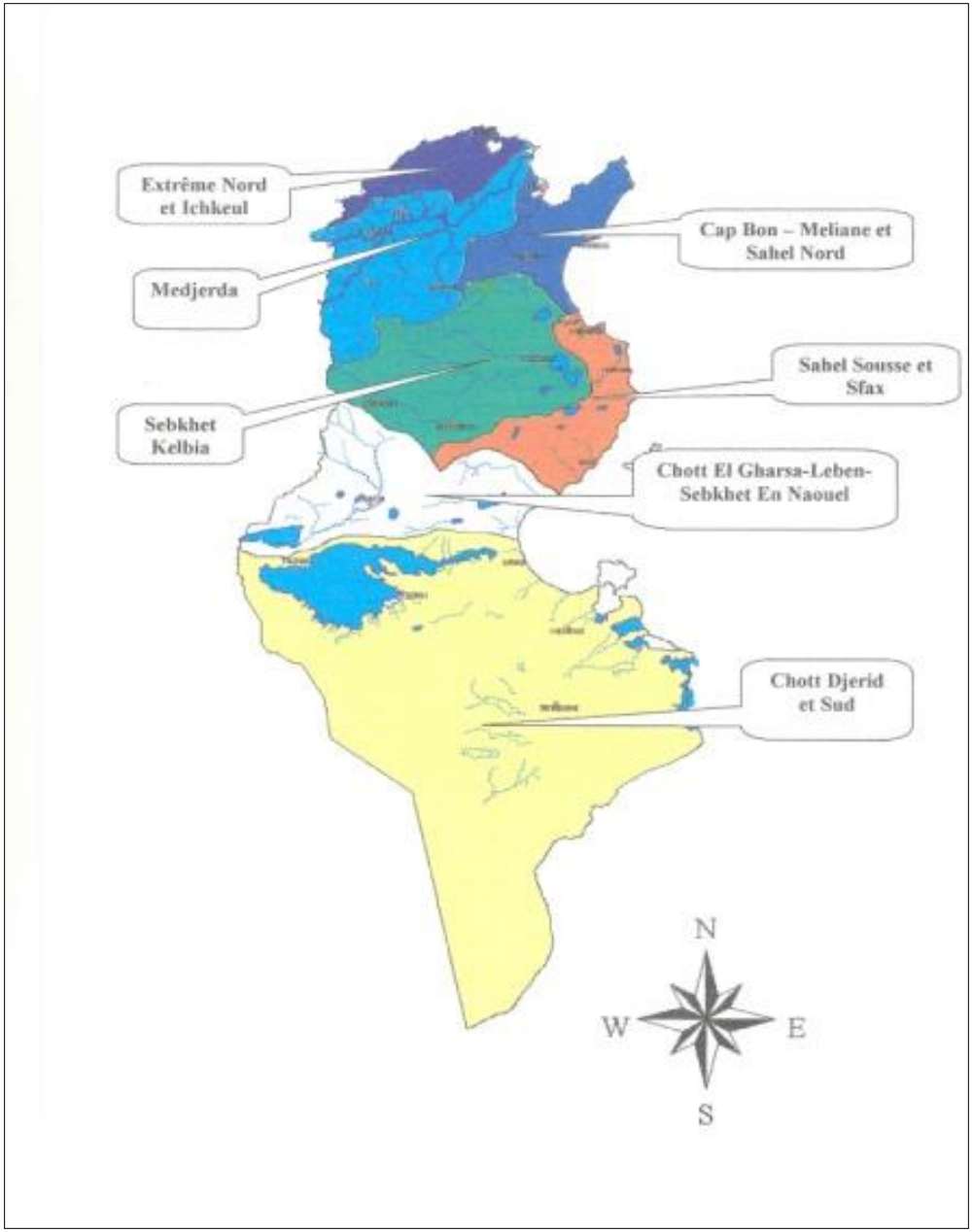
General Informations

Characteristics	Unit	Value
Total area	Km^2	164420
Population	Hab	$10,7\ 10^6$
Average density	Hab/km^2	65
Maximum altitude	M	1544
Average Altitude	M	744
Principal lake area (Ichkeul)	Km^2	87
Average Rainfall	MM	230
Temperature of December	Celsius	12°C
Temperature of July	Celsius	30°C

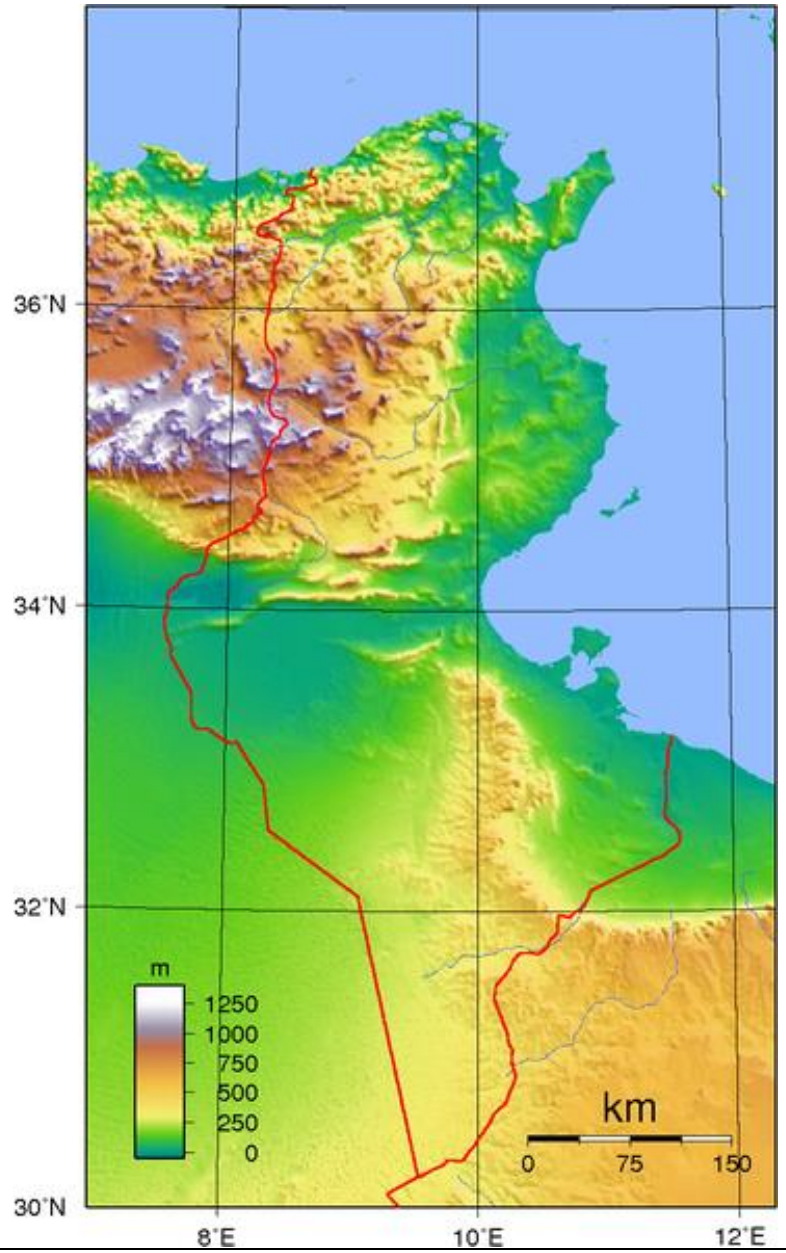
Groundwater aquifers



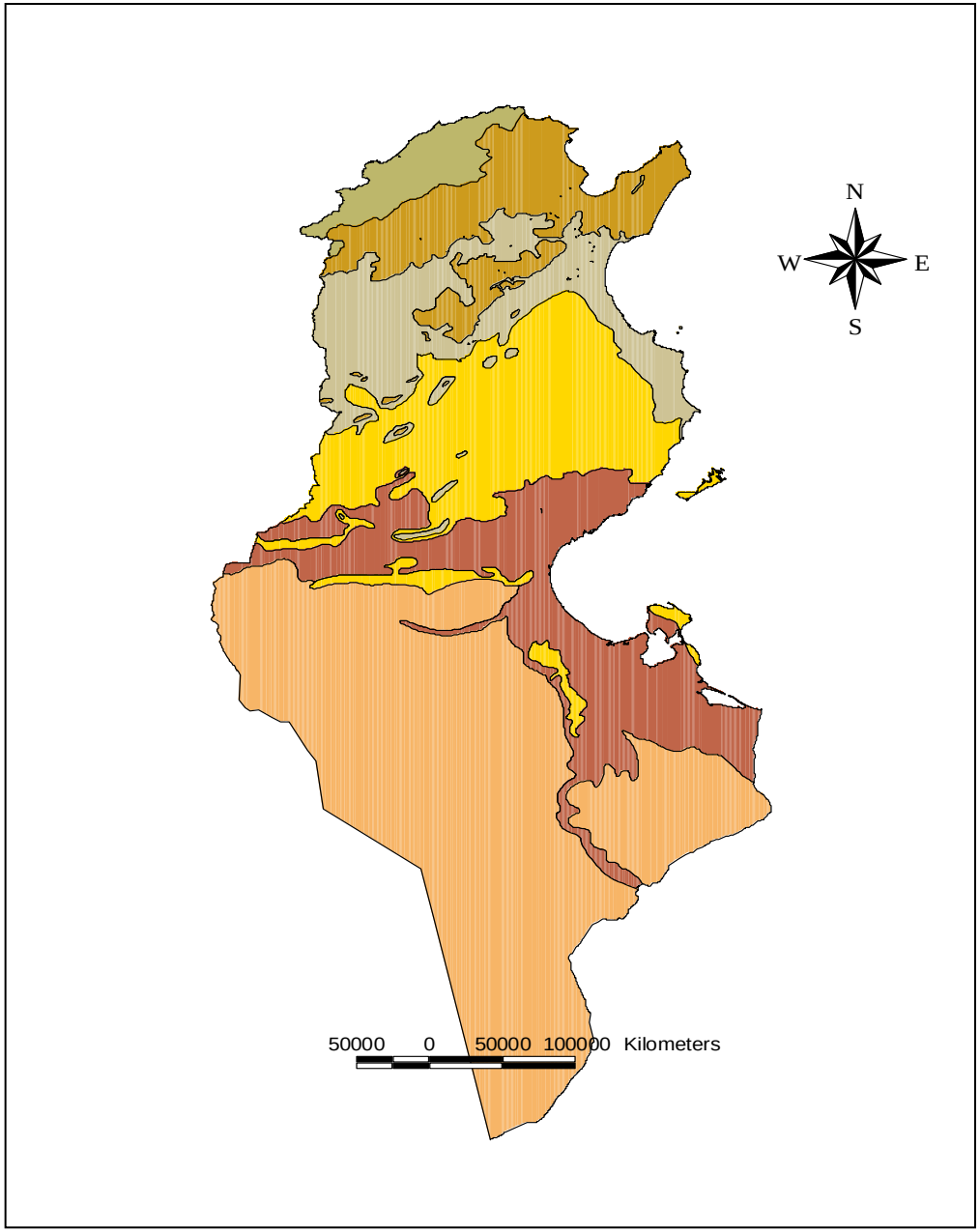
Catchments


Extrême Nord et Ichkeul
Cap Bon – Meliane et Sahel Nord
Medjerda
Sahel Sousse et Sfax
Sebkhet Kelbia
Chott El Gharsa-Leben-Sebkhet En Naouel
Chott Djerid et Sud
N
W
E
S

Topography



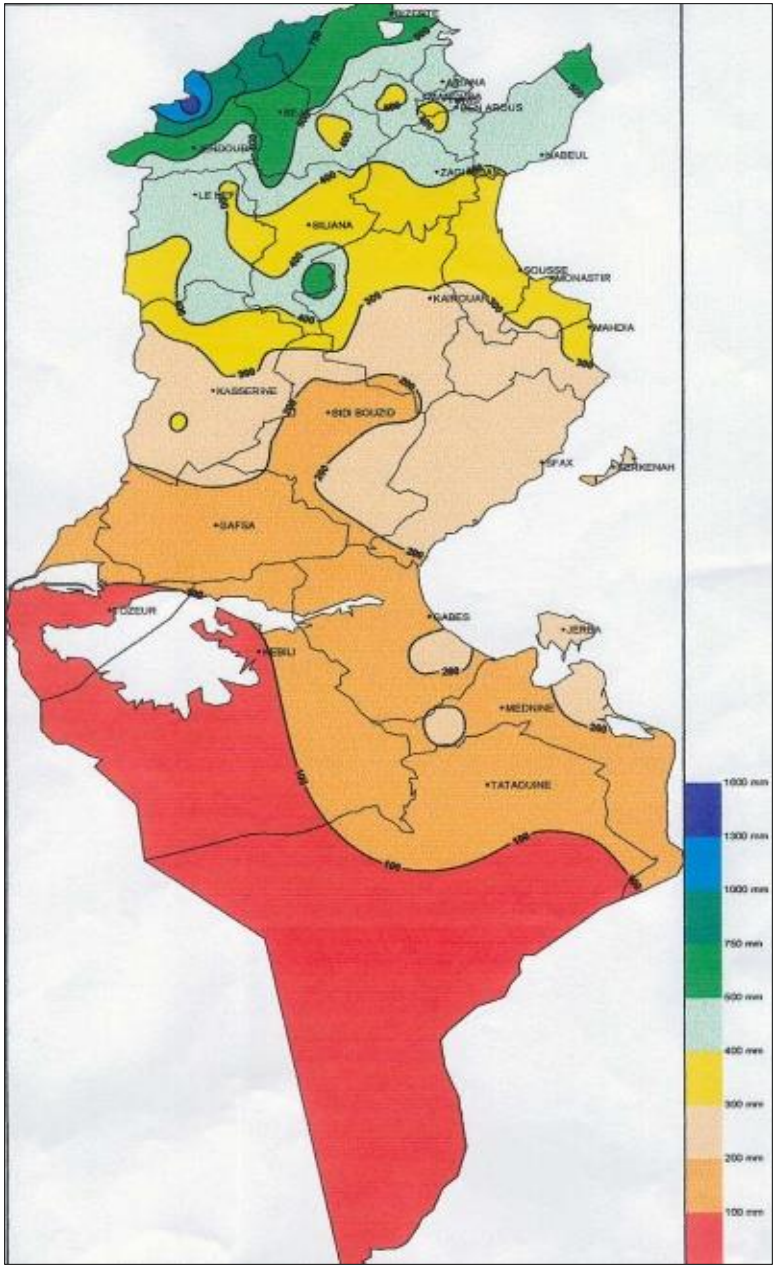
Climate



Bioclimatic layers

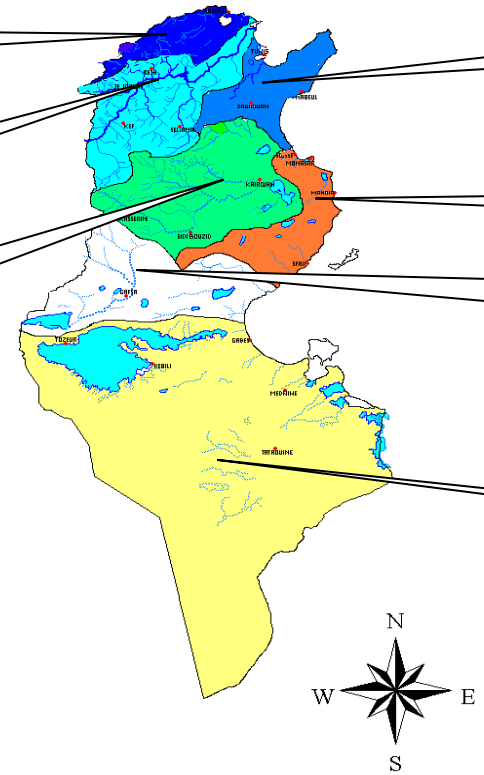
- Humid
- Sub-humid & semi arid
- Average & under Sub-humid
- Upper Arid
- Under Arid
- Désertic

Rainfall



BIZERTE
ARIANA
BEN AROUS
NABEUL
ZAGHOUAN
LE KEF
SILIANA
SOUSSE
MONASTIR
KAIROUAN
MAHDIA
KASSERINE
SIDI BOUZID
SFAX
KERKENAH
SAFSA
TOZEUR
GABES
JERBA
KEBILI
MEDNINE
TATAOUINE
1600 mm
1300 mm
1000 mm
750 mm
500 mm
400 mm
300 mm
200 mm
100 mm

Hydrographic catchments



Extreme North & Ichkeul : 960 Mm^3

Medjerda :1000 Mm^3

Sebkhet Kelbia :190 Mm^3

Cap Bon – Meliane & Sahel Nord :250 Mm^3

Coastel of Sousse & Sfax :60 Mm^3

Chott El Gharsa-Leben-Sebkhet Ennaouel :120 Mm^3

Chott Djerid & South :120 Mm^3

Surface water distribution (Total = 2700 Mm^3/year)

Water resources in Tunisia

- **Rainfall : From 1500 mm in the north to less than 50 mm in the south.**

  Average : 36 10^9 m^3/y (11-90 10^9 m^3)

- **Available conventional water resources : 4.875 10^9 m^3.**

  - Surface water resources : 2.7 10^9 m^3.

  - Underground water resources : 2.175 10^9 m^3.

  Non renewable : 0.615 10^9 m^3/y, Renewable : 1.56 10^9 m^3/y.

- **Ratio per capita : 480 m^3 (now) 350 m^3 (2030/12 millions capita)**

- **Available water resources : 4.275 10^9 m^3.**

- **Deduction : 2.07 10^9 m^3. (0.85 + 1.23)**

- **Boreholes : 140000.**

- **Deep wells and springs : 6255 (6167 + 88).**

- **Observation wells : 2159.**

- **Quality Network : 876.**

- **91 overexploitation aquifers :**
- **55** surface aquifers
- **36** deeper aquifers

Water supply (conventional water)

	Number	Potential (Mm^3/y)	Water supply (Mm^3/y)
Surface water		**2700**	**2500**
Dams	31	-	2170
Hill dams	226	-	195
Hill lakes	856	-	135
Groundwater		**2175**	**2175**
Surface aquifers	100000/**226**	745	745
Deeper aquifers	6255/**343**	1430	1430
Total	**-**	**4875**	**4675**

MOBILISATION

✓ **Surface Water :**

- Big dams (31) : **1985 Mm^3/an**
- Hill dams (226) : **272 Mm^3/an**
- Hill lakes (856) : **86 Mm^3/an**

✓ **and Ground water :**

- 215 Surface aquifers
- 314 Deep aquifers
- 91 Over exploitation aquifers
- 6255 Extraction deep wells and springs
- 308 Artesian aquifer
- 94 Springs
- 100 000 boreholes

Mobilized water resources : 90 %

Water demand and balance evolution

Water demand evolution

Sector	1996	2010	2020	2030
Agriculture	2115	2141	2083	2035
Potable water	290	381	438	491
Industry	104	136	164	203
Touristic	19	31	36	41
Total	2528	2689	2721	2770

Water balance (Mm^3/y)

Year	1996	2010	2020	2030
Exploitable water resources	2767	3300	3106	3121
Global water demand	2528	2689	2721	2770

Measurements

-Technical / **Artificial recharge**: **55 aquifers**

-Legislative : **Saving and Forbidden area**

Artificial recharge objectives

- **Preserve groundwater aquifers and optimize surface water and groundwater managements,**

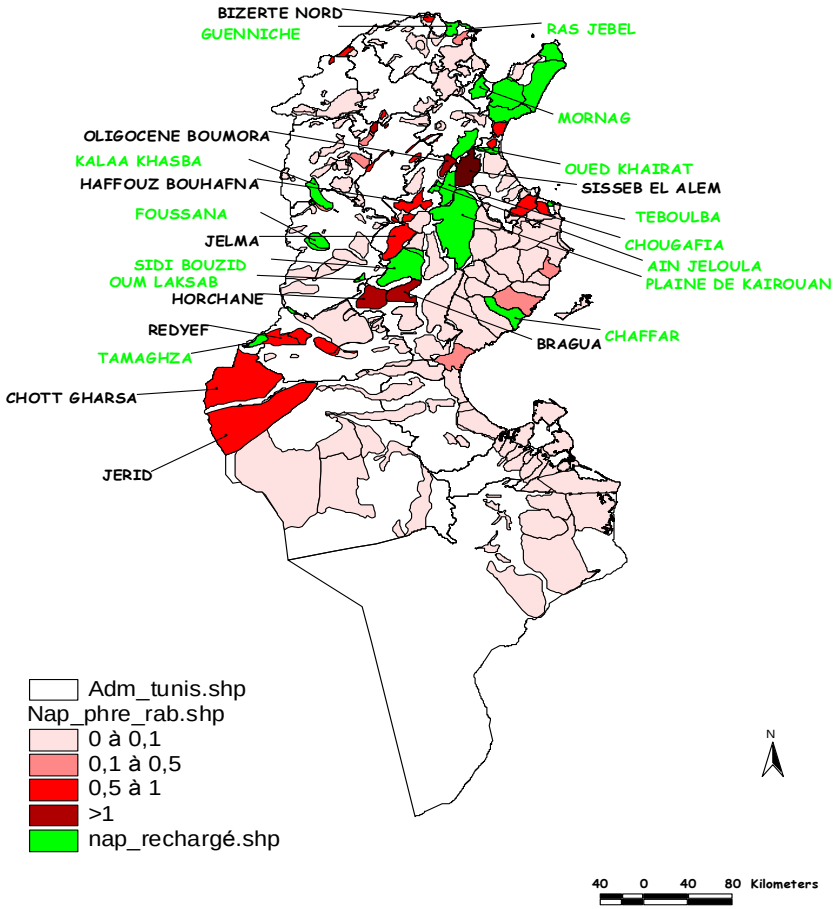
- **Restore the hydrodynamic equilibrium of ground-water aquifers that were intensively extracted and threatened with the deterioration risk both of quantity and quality waters,**

- **Stop salt water intrusion (costal aquifers);**

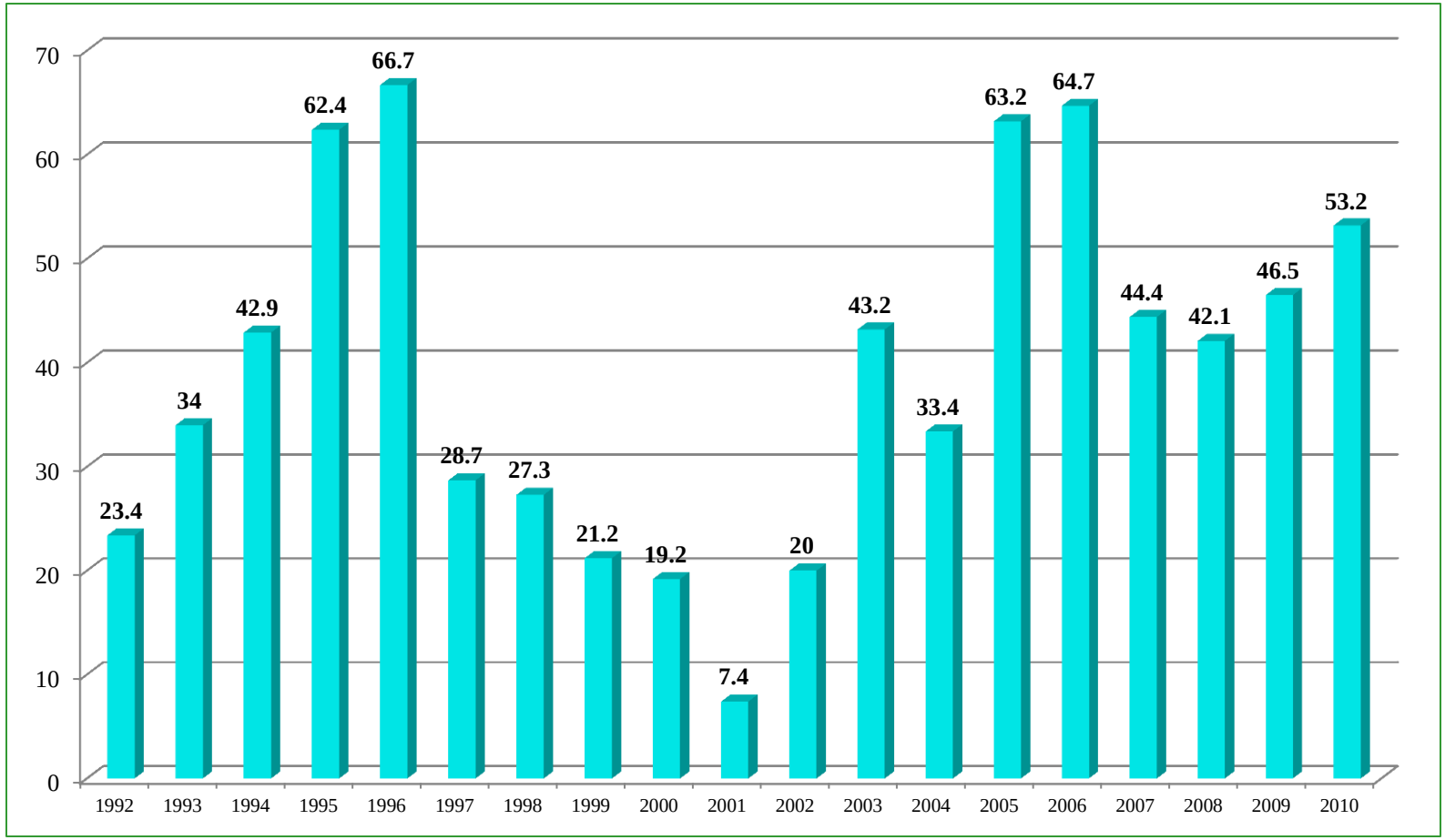
- **Improve groundwater quality,**

- **Store surface water in underground reservoirs especially during the wet periods .**

Overexploitation and artificial recharged aquifers



Recharge water volume evolution (1992-2010)



The total recharge volume : 744 10^6 m^3 (35 10^6 m^3/year)

Source of water

- **Surface water (Dams) : 99 % (34,8 millions m^3)**
- **Treated waste water : 1 % (0,2 millions m^3)**

Releasing water and Basin Recharge in wadi Al Khairat aquifer

Infiltration Basins and Quarries

Sidi Alaya-Bni Khalled

El Gobba 1-Bni Khalled

Bou Argoub-Grombalia

Sand quarry-Ras Jebel

El Gobba 2-Bni Khalled

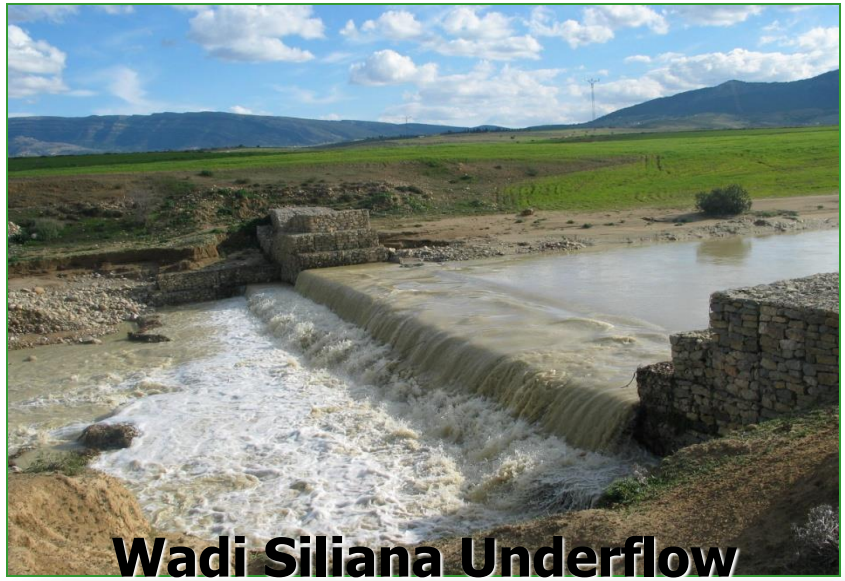
Recharge through Zeroud river bed

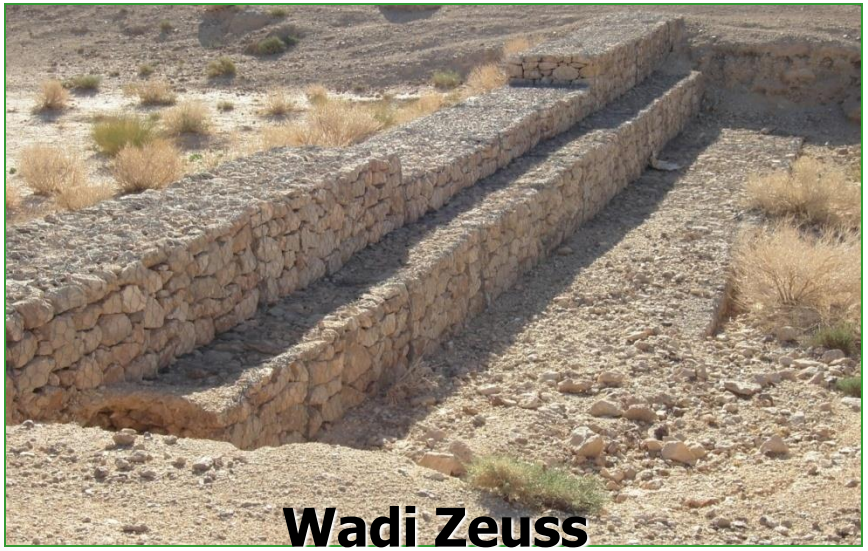
Sidi Salah site / Kairouan aquifer

Wadi el Fekka derivation/ irrigation : 'Mgoud'

Spreading floodwaters

Stonework Water and soil conservation devices/ threshold / recharging works


Wadi Siliana Underflow


Wadi Zeuss

Wadi Siliana aquifer

Sfax aquifer

Injection well recharge

River bed of wadi Zeuss

Wadi Al Jir aquifer

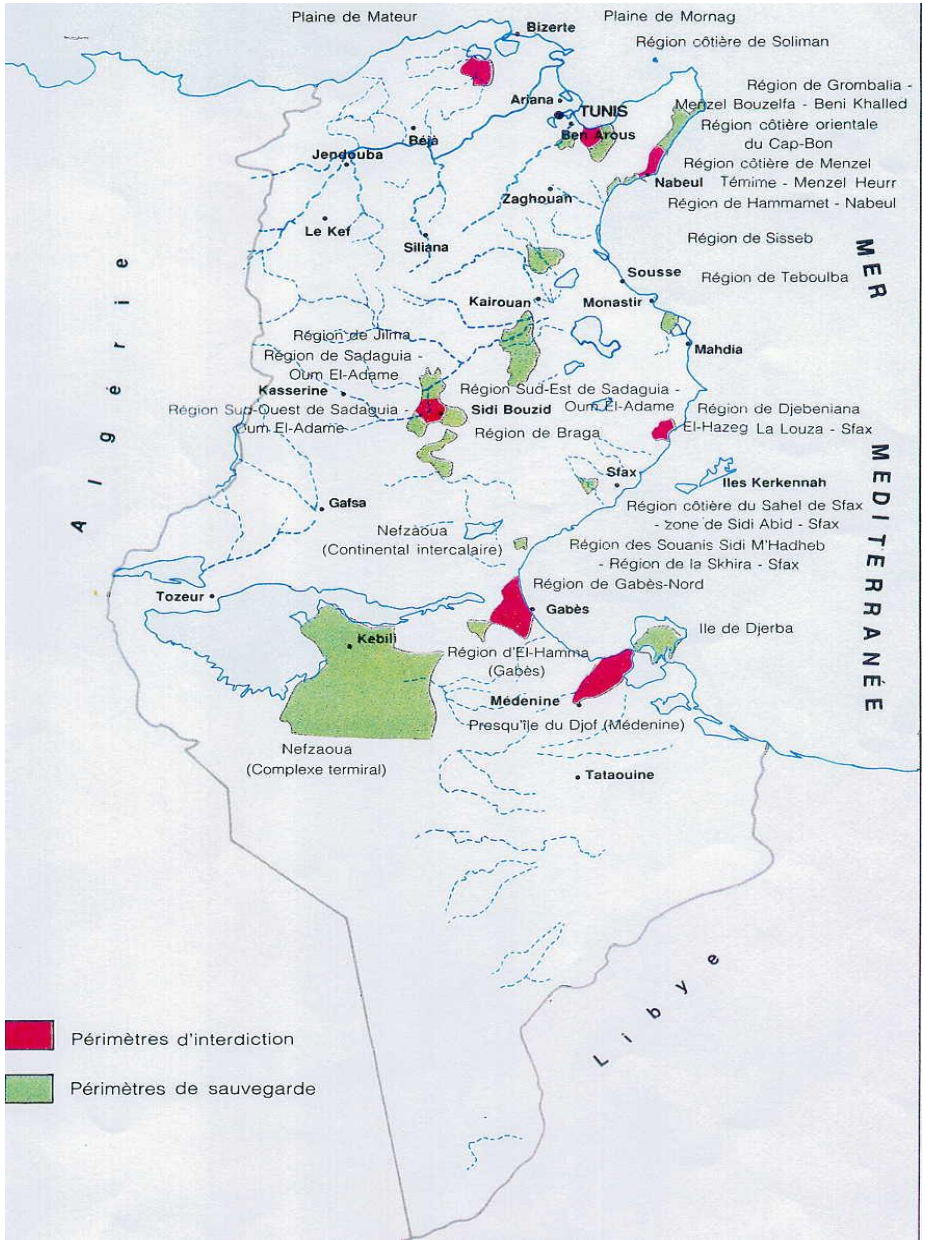
Wadi Al Khairat basins

Injection shallow wells in Ras Jebel aquifer

✓ **Forbidden & Save area: 32**

- Save : 23

- Forbidden: 9



Conclusion / Questions

Respond to : **Where, When, How and How much, related to :**

Situation, delimitation, Extension, Deep, thickness, Parameters, Quantity, Storage, Recharge, Flow, Fluctuation, Extraction, Quality, impact/effect, ...

Need : **Recognize, Prospect, Experiment, Measure, Monitor,**

Observe, Evaluate, Calculate, Model, Analyze, Map, forecast, etc ....

Techniques /cheap cost : **Remote sensing**

SINEAU / National Information System of Water

Piseau 2 / Launching : March, 08/2013

Develop and implement SINEAU and its sub-systems :

(i) Develop and install the portal of SINEAU,

(ii) Upgrade and implement the Water resource management System (SYGREAU),

(iii) upgrade and implement the soil information system (SISOL),

(iv) overhaul and install the water pollution control system and its Data base (COPEAU/SPORE),

et (v) Capacity building.

END
Thank you

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