


WATER RESOURCES IN MOROCCO: AN OVERVIEW

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Aware of the strategic issues related to water sector, Morocco has implemented a strategy based on the development of water resources. However, due to its natural specificities, Morocco faces a strong increase in water needs and water resources quality degradation due to the negative impacts of human activities.

The adopted strategy has focused on the increase of water supply in order to satisfy different users demand.

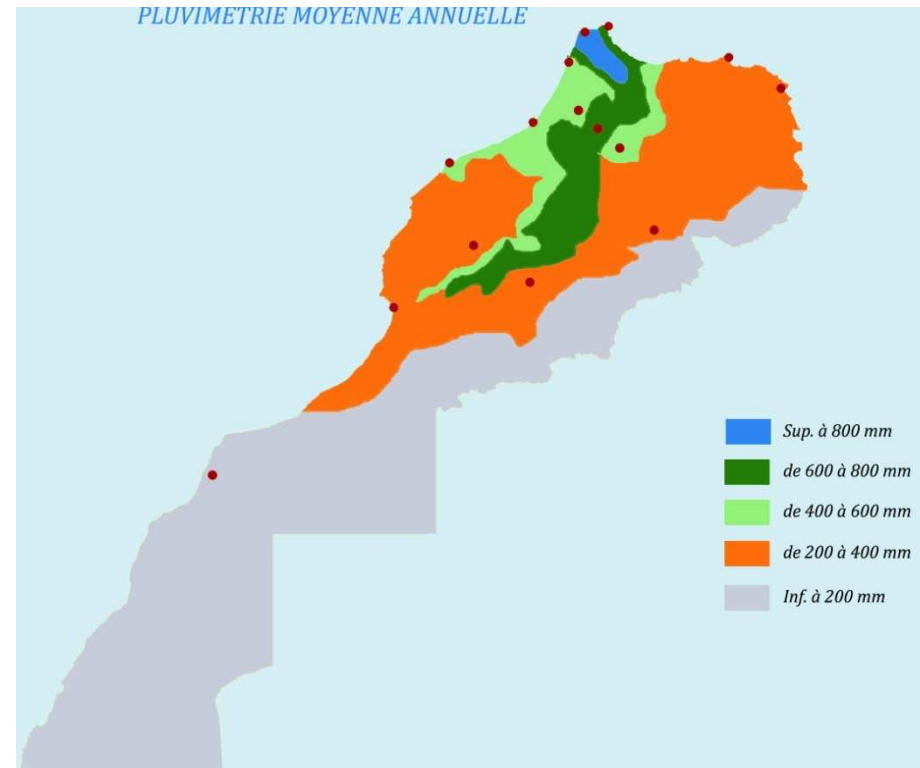
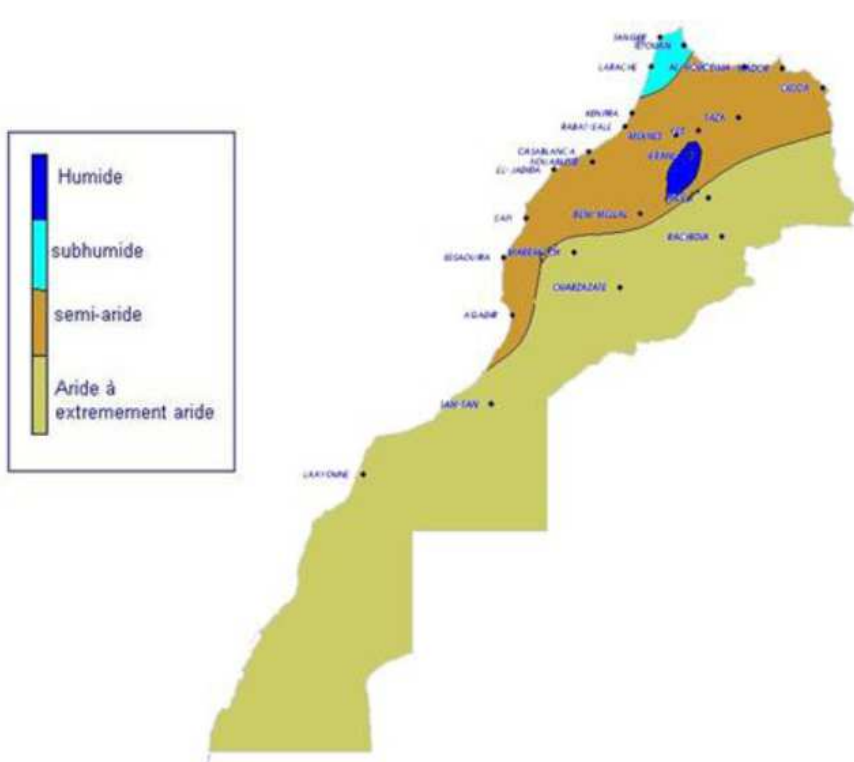
However, in face of this continuous and rapid water demand which is mainly linked to population growth, emerging pollution problems and accentuated impacts of drought periods, the efforts have to be deployed on water resources management rather than their development.

REGIONAL CONTEXT

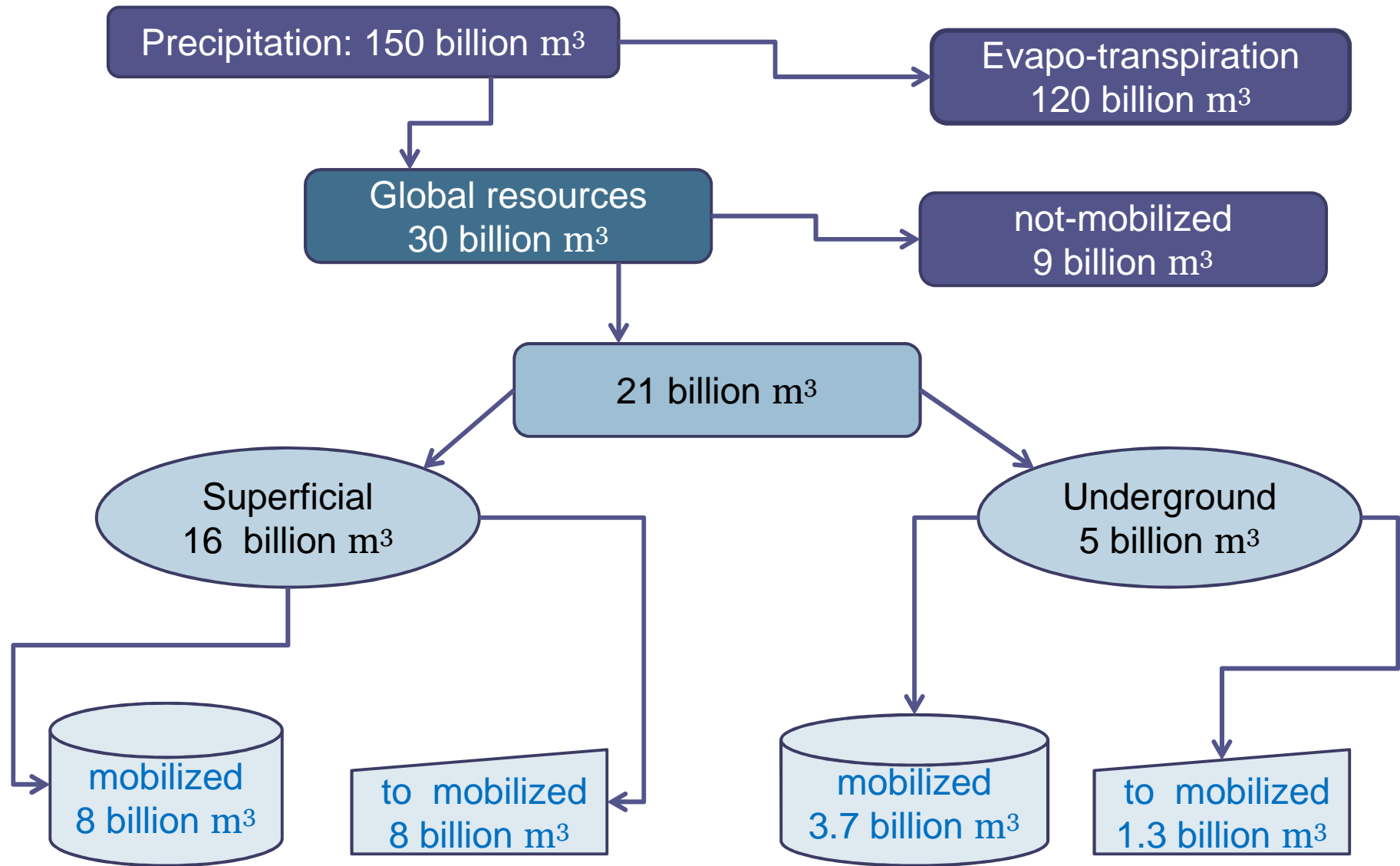


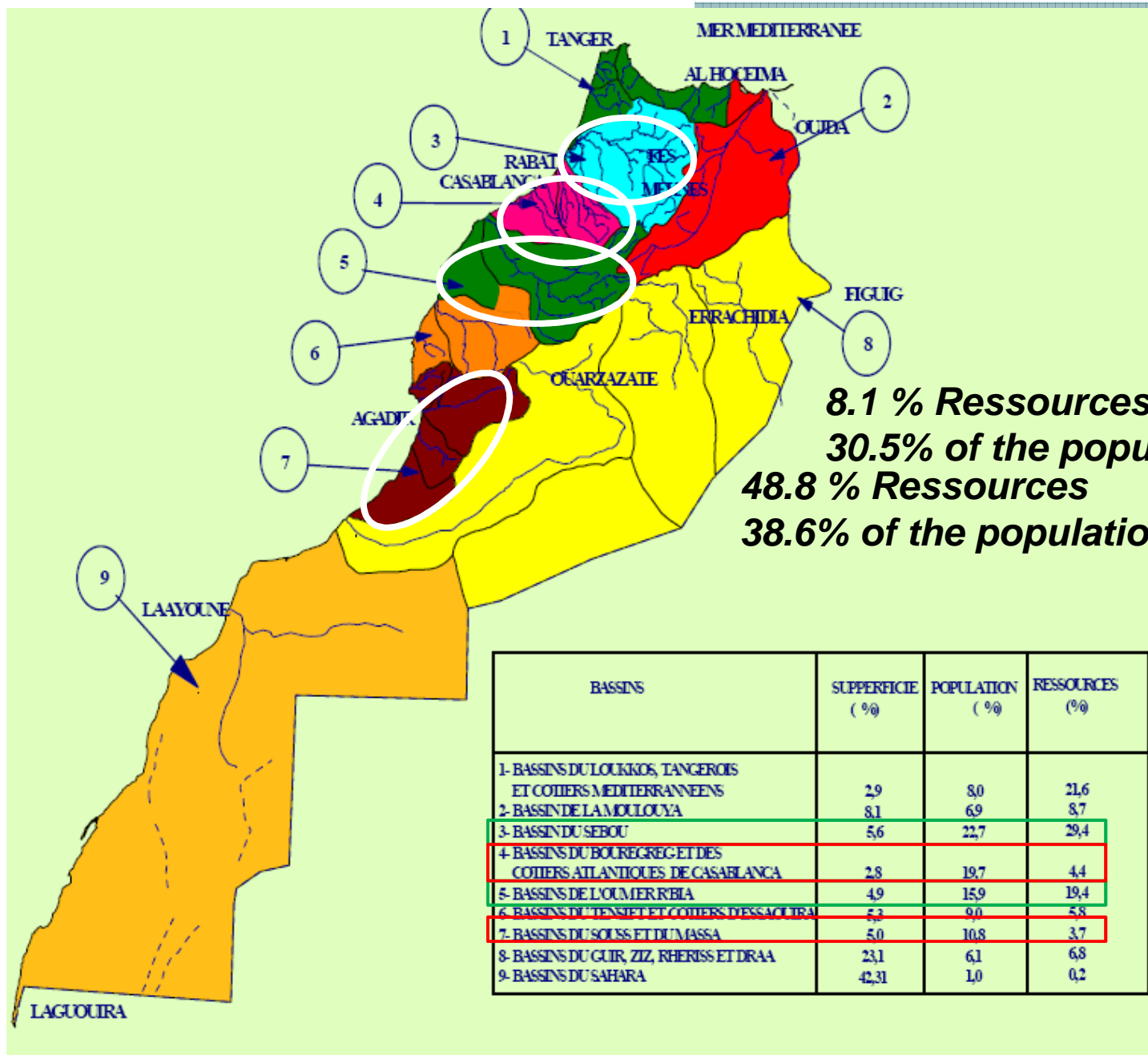
- The natural water resources in Morocco are among the lowest in world
- Due to its geographical position, Morocco is characterized by a climate with strongly contrasting rainfall dominated by a highly irregular in space and time.
- potential is estimated at 22 billion m³ per year, equivalent to 730 m³ / capita / year.
- More than half of these resources are concentrated in the north over an area covering 7% of the national territory.

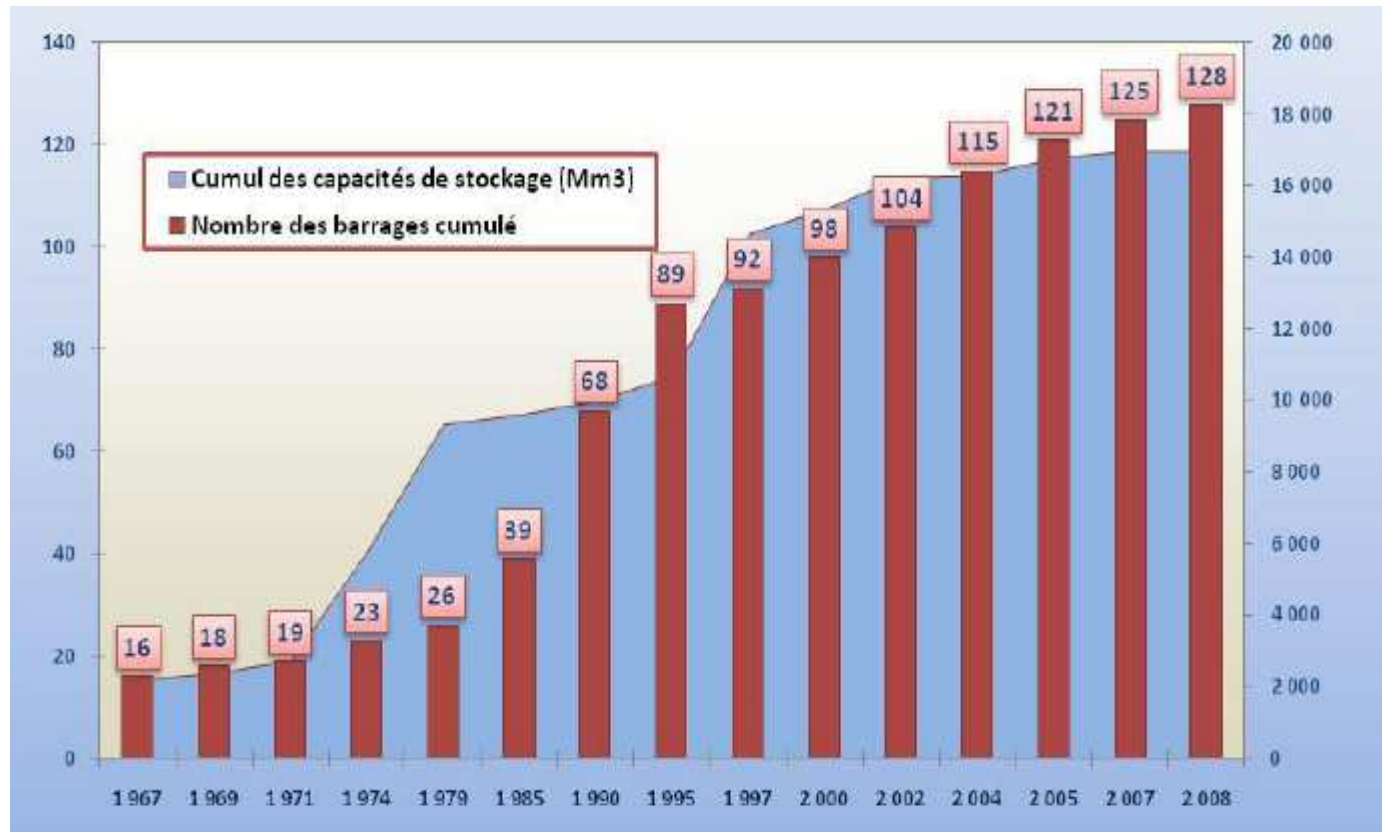
In addition, water supplies are very irregular in time they can vary in a ratio of 1 to 9 according to the years¹. They are also variables in space per capita flows can vary with a ratio of 1 to 8 between the basins



POTENTIAL AND STATE OF WATER RESOURCES



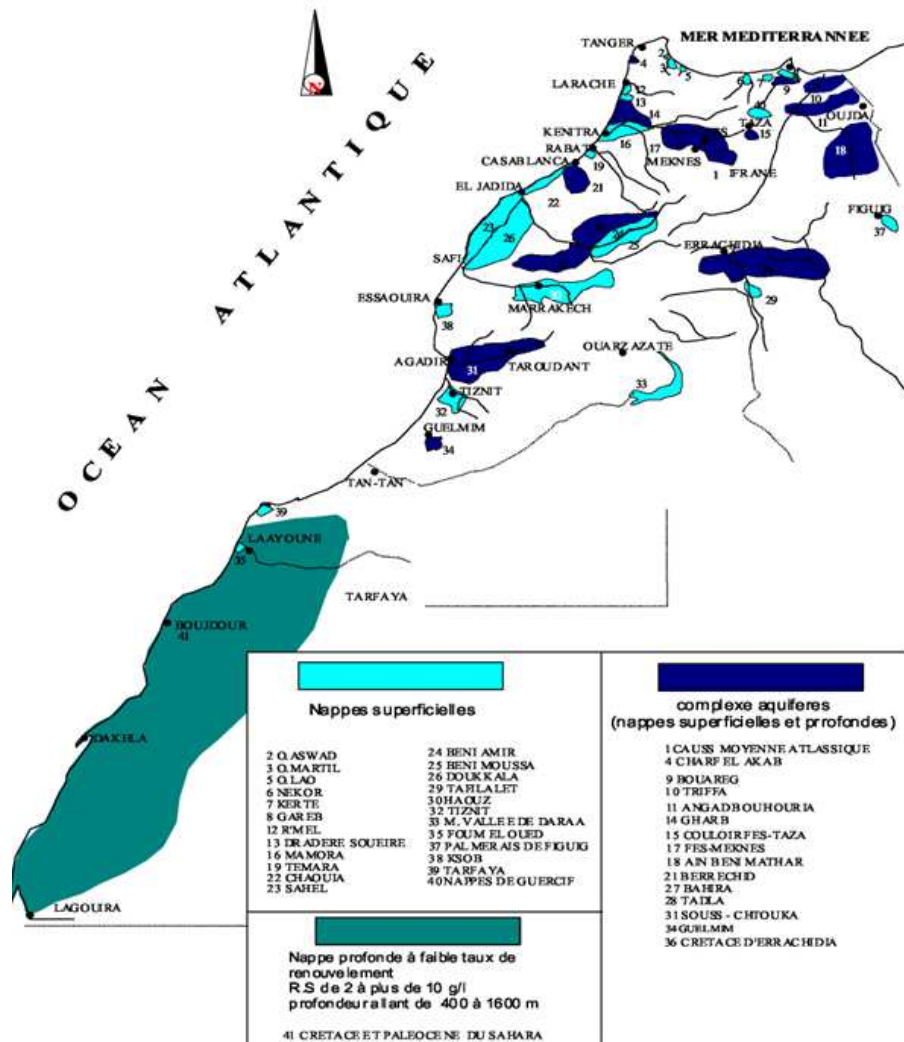




an efficient model of water management, own country and exemplified internationally.

This policy helped to develop important Hydraulic infrastructure : 128 large dams with a capacity of 18 billion cubic meter





The groundwater resources represent nearly a third, 10 billion m³, and are spread over a thirty major aquifer systems.

Only half of this potential is considered mobilized, because almost 3 billion m³ are the base flow of rivers and 2 billion m³ flows to the sea



Source : DRPE

The review of the overall quality of the river basin's water shows that almost 50% of the resources shows fairly good to excellent quality

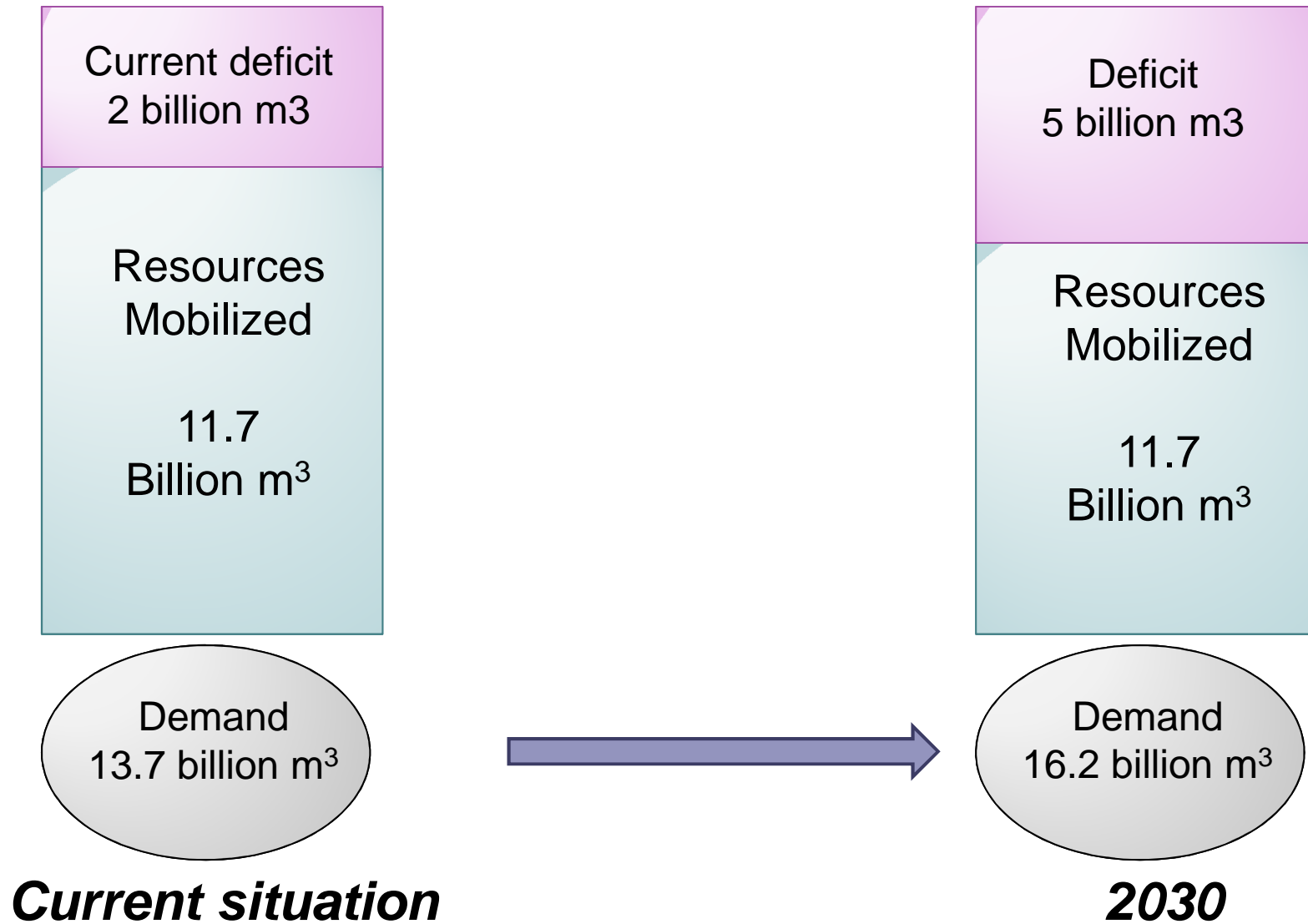


Source : DRPE

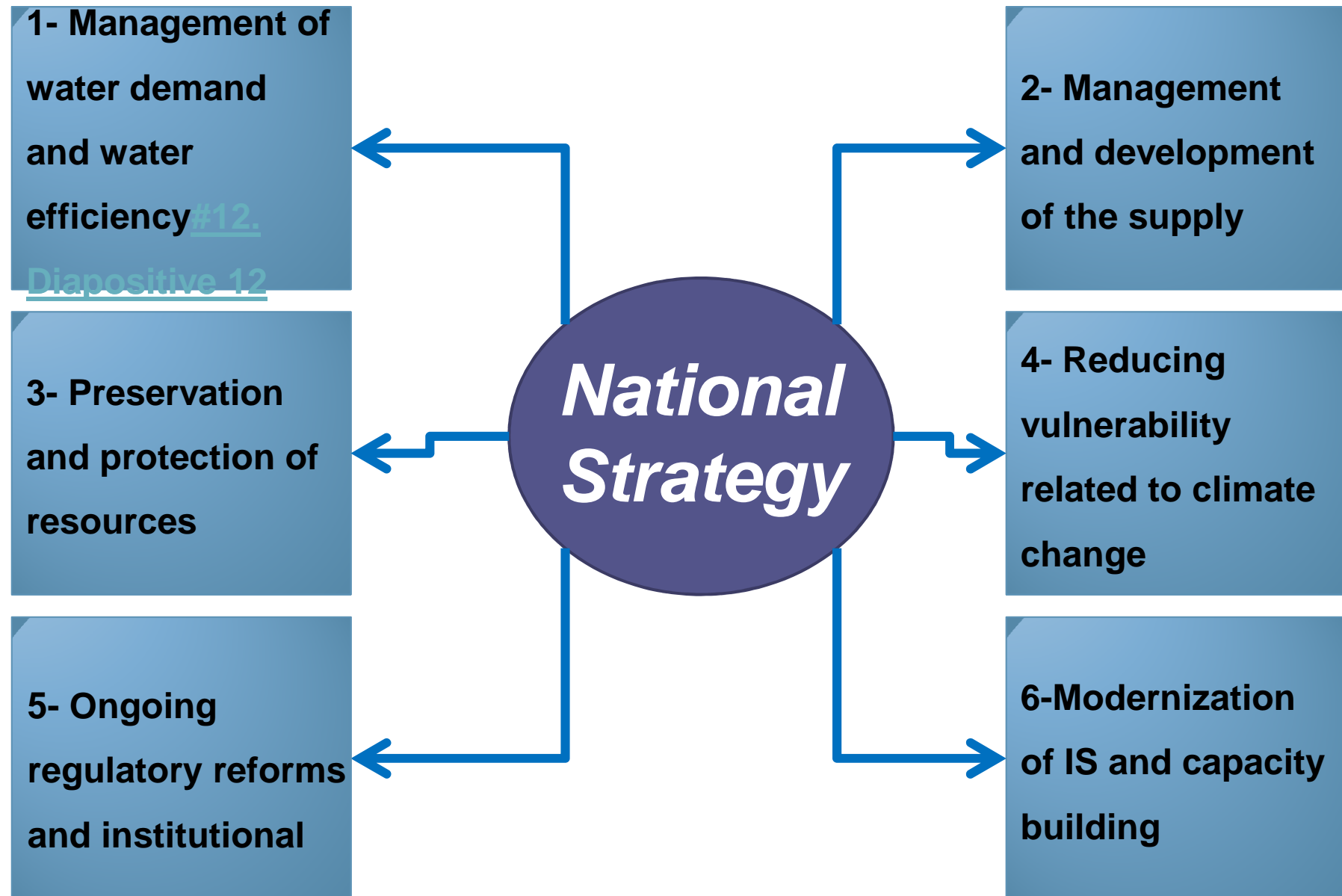


National Water Strategy

WATER BALANCE

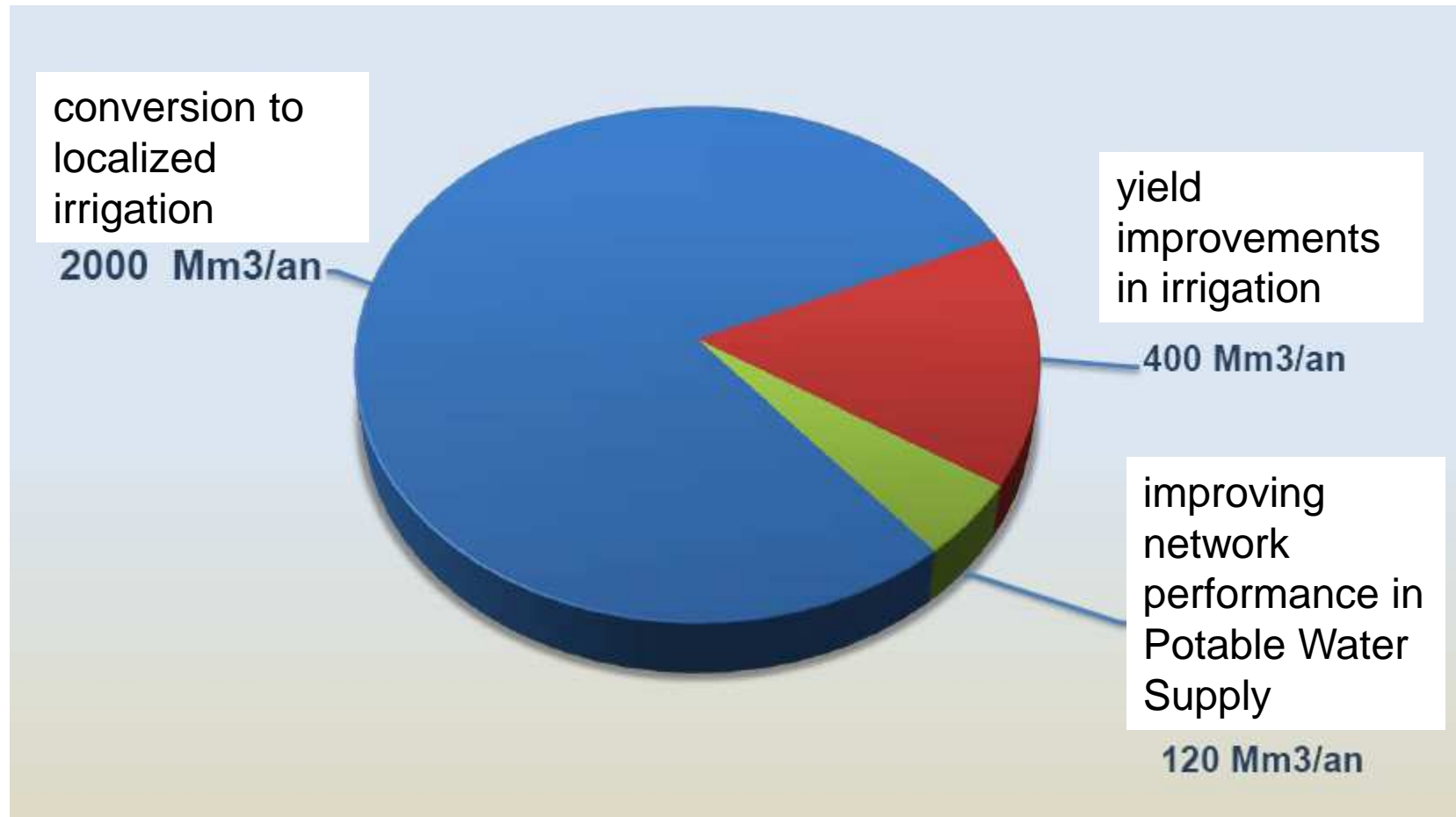


MAJOR STRATEGY



1- Management of water demand and water efficiency

> *Economics of 2.5 billion m³/year*



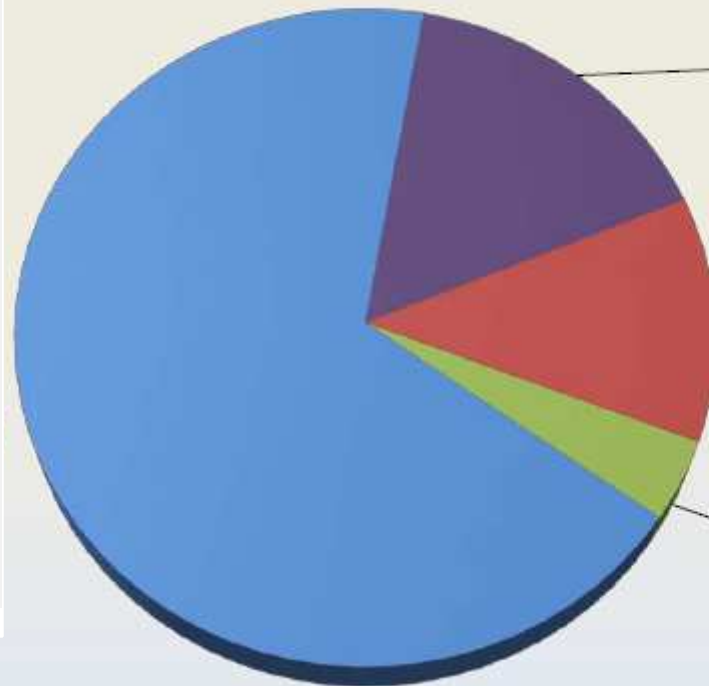
2- Management and development of the supply

> *Mobilization of 2.5 billion m³/year*

water surface

Mobilization of 1.7 billion m³

- 60 major dams
- 1000 small dams
- North-South transfer: 800 M m³



Desalination of sea water

400 Millions m³

Reuse of treated wastewater

300 millions m³

Capture rainwater

3- Preservation and protection of resources

The groundwater resources: strategic reserves

- Reduction in levies and building control
- Artificial recharge groundwater

Protection of the quality of water

- Implementation of sanitation programs and wastewater treatment
- Prevention and fight against Industrial Pollution
- Implementation of the national plan of household and similar waste.

Safeguard environmentally sensitive areas (watersheds, oases, and wetlands)

4- Reducing vulnerability related to climate change

Improved protection against flooding

- identify vulnerable sites (400 sites: National Plan for protection against Floods).
- Strengthen forecasting and warning.

Fight against the effects of drought

- Implementation of structural measures (diversification of sources of water supply, development of contingency plans)
- Development of financial mechanisms: insurance, funds of natural disasters.

5- Ongoing regulatory reforms and institutional

Review of the law 10-95 on water and its implementing regulations, in order to enrich and adapt them to new requirements for the development of water resources.

6-Modernization of IS and capacity building

Development of applied scientific research

Capacity building and training

Development of information systems



Conclusion

WATER IN MOROCCO

Many accomplishments and achievements

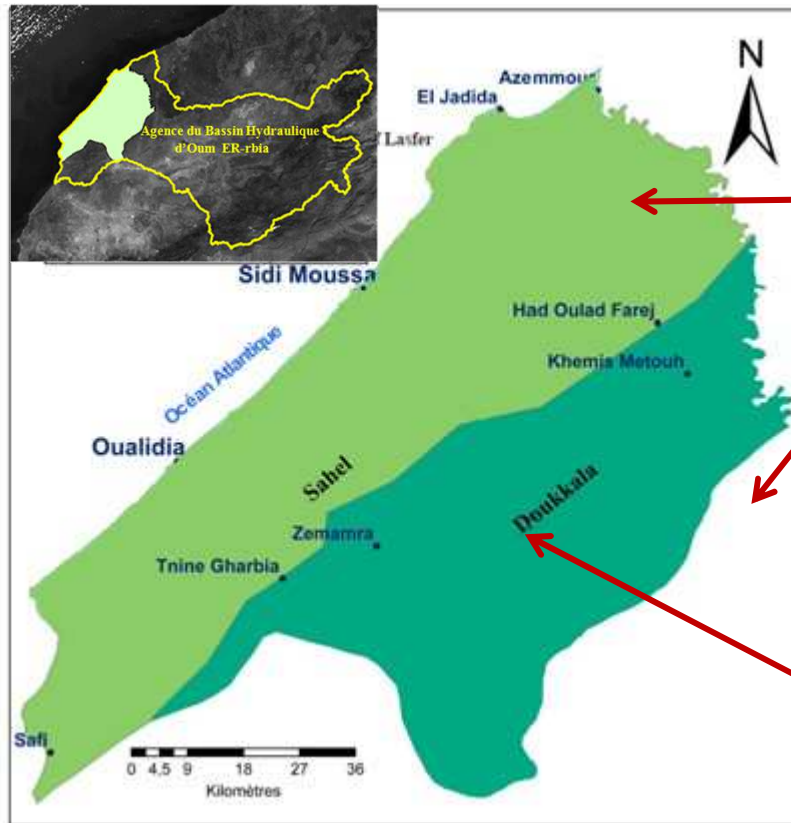
But also, more CONSTRAINTS AND CHALLENGES



DOUKKALA:

downstream portion of the hydraulic basin OR

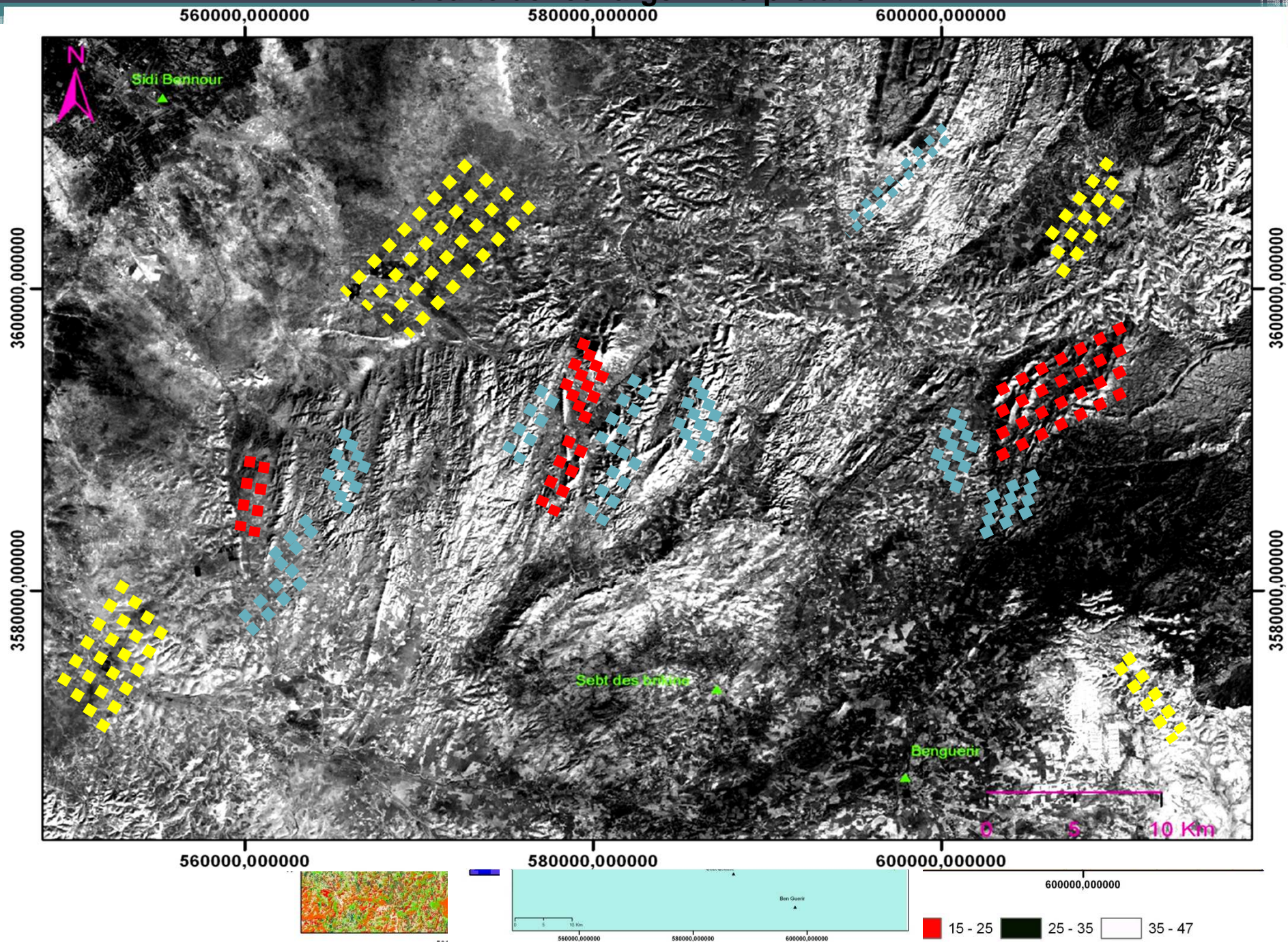
The research activities are conducted under the Tiger Project (www.tiger.esa.int)



IN THE SAHEL and BORDER:
apprehension of groundwater by
establishing thematic map to
guide exploration

PLAIN OF DOUKKALA: estimate the CWR
to contribute to the rational management of
water of irrigation.

La carte de recharge : interprétation.



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580000,000000

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Sebt des Arabes

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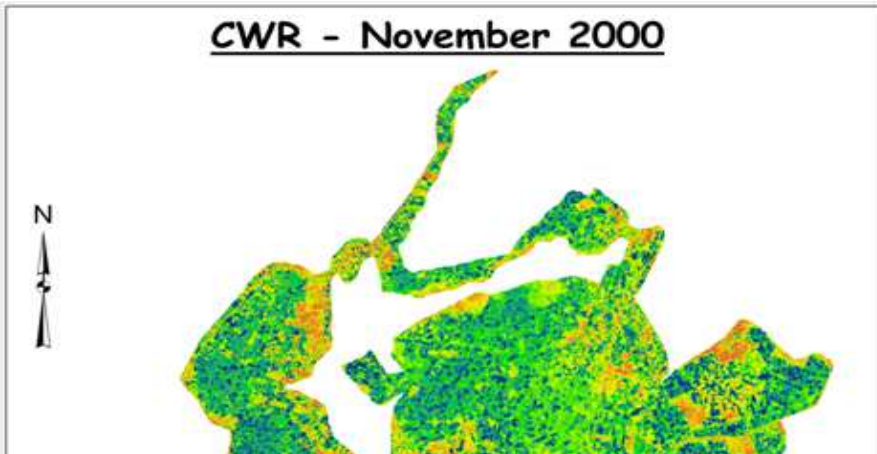
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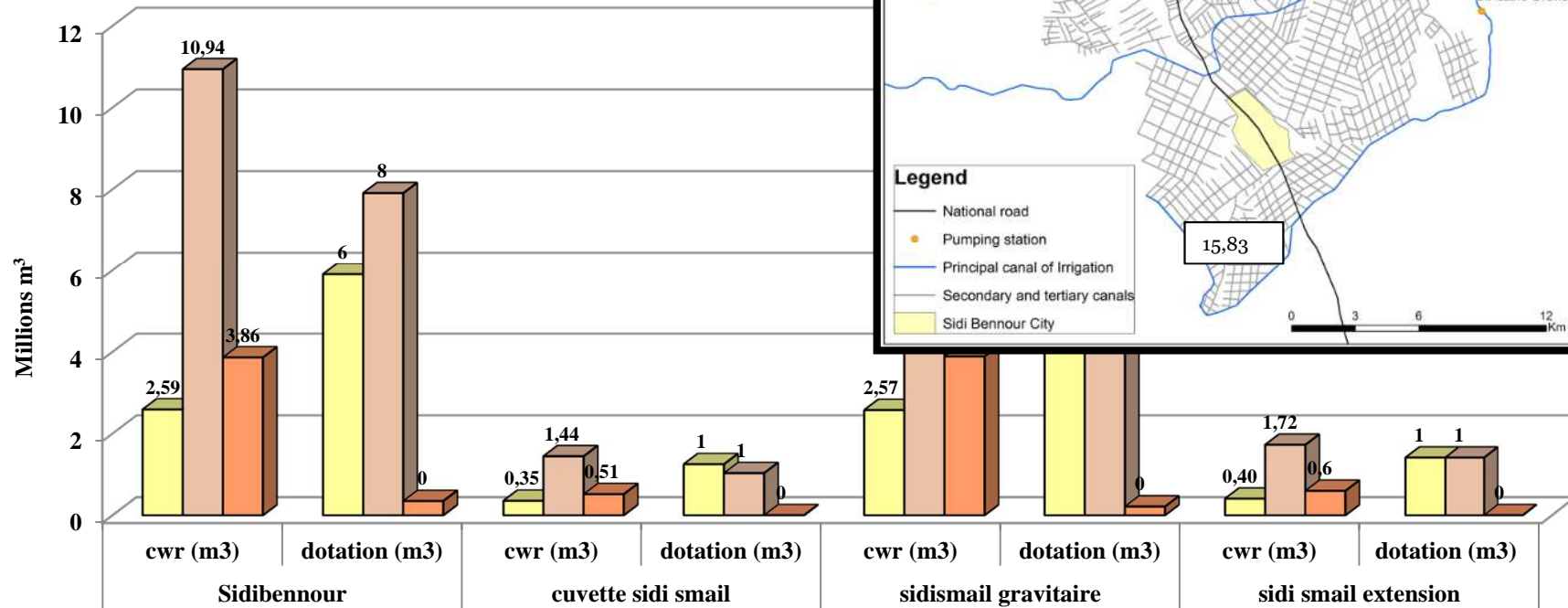
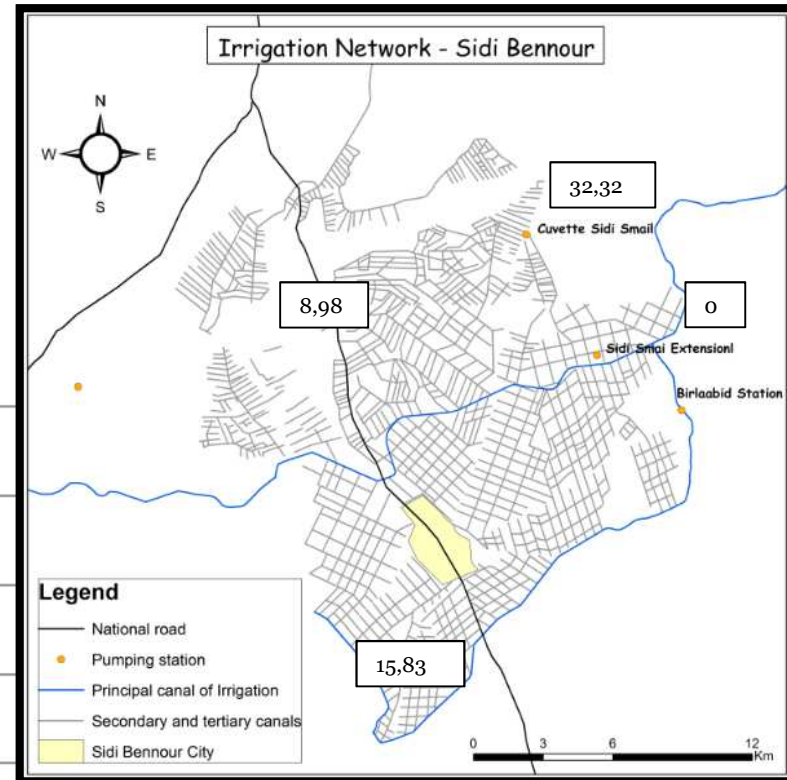
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CWR - November 2000

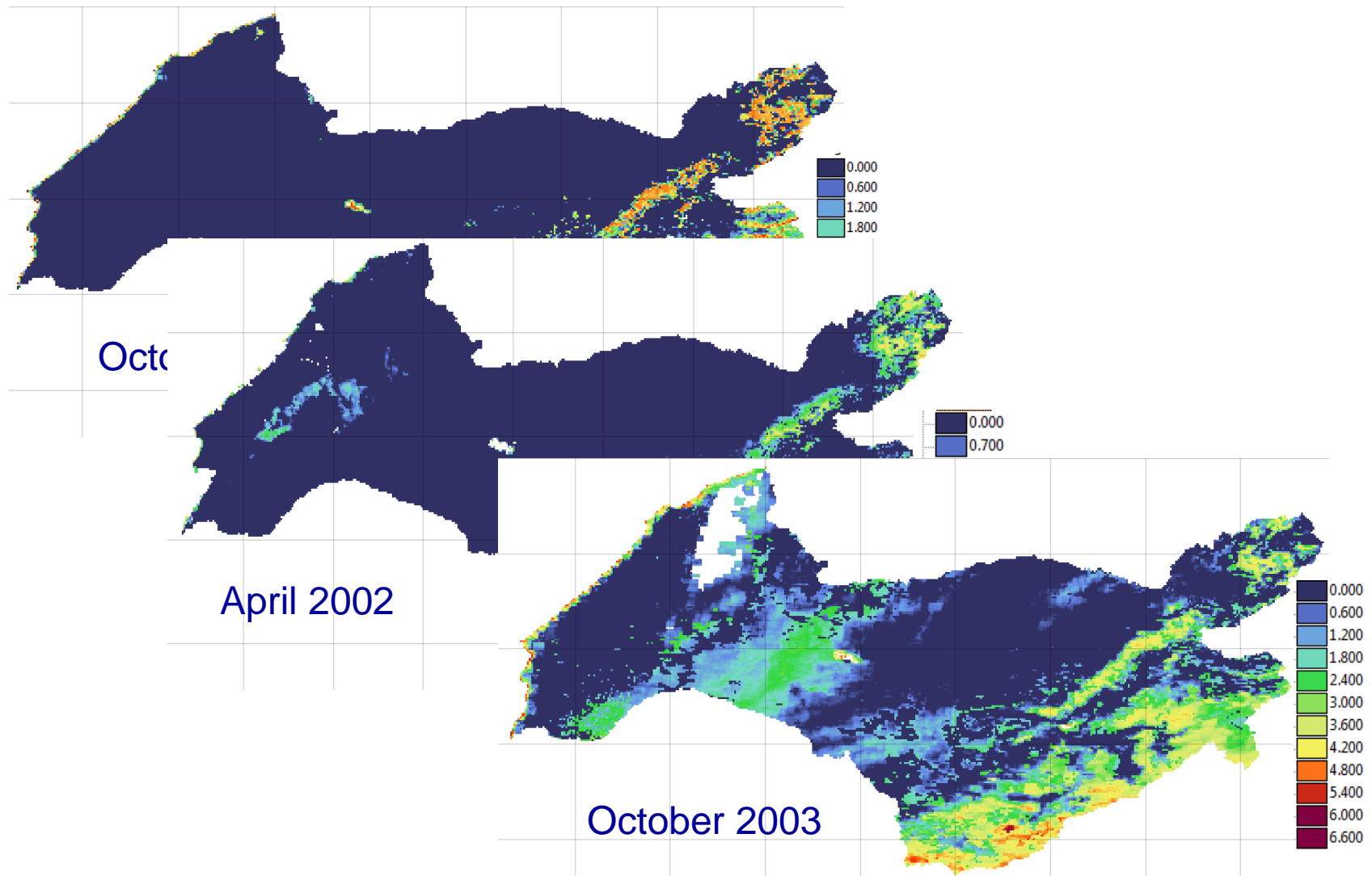


Irrigation efficiency= water allocation /Crop water requirement



■ nov-00 ■ mars-01 ■ juil-01

SEBS daily evapotranspiration for the Om Er Rabia basin_ PRELIMINARY RESULTS



Research structures and capacity Building



Réseau National des Sciences et Techniques de la Géo-Information (REGI).

Pôle de compétence en Sciences et Techniques de la Télédétection Spatiale.



Le Spatiale au service de la surveillance de l'environnement et la gestion durable



focal Point: Faculty of Sciences,
El Jadida

REGI

- Consortium of 8 University institutions, 13 accredited research structures
- 133 researcher and teacher-researchers
- 72 PhD
- 112 scientific articles
- 19 research projects

GENERAL THEME

Geo-Information Science for Monitoring of the Environment and Sustainable Management

SOUS-THEMATIQUES

- *Methodological development: processing, integration and modeling.*
- *Satellite data for ecosystem management and environmental applications.*
- *Hyperspectral remote sensing for the assessment and mapping of natural resources.*
- *Geographic Information Sciences (GISc) and land management.*



MARSE

Moroccan *Association* of Remote Sensing of the Environment

Non-profit association, created in 2011

A link with the socio-economic
Environment

Goal is to promote research in environment and sustainable development, through:

- ✓ Various communication means (scientific meetings)
- ✓ Support of young researchers
- ✓ Establishment of relations, coordination and exchange of experiences with other organizations (associations, industries, universities, ...).

MARSE: Branch National of AARSE

67 researchers

LOOKING FOR PARTNER



THANK YOU

