The alliance Water-Energy-Food Security In North Africa:

Morocco as an exemple

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Sustainable Development Goals

Reflection on the alliance Water-Energy-Food Security:

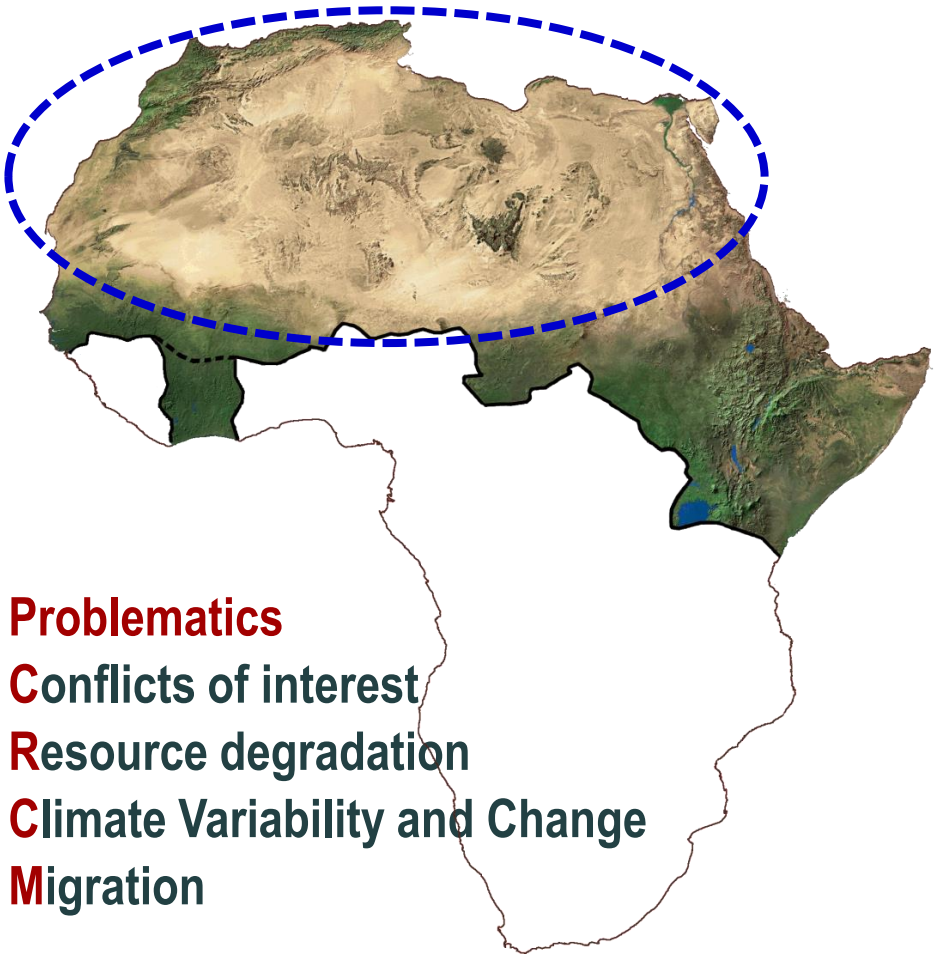
- What is the alliance «Water-Energy-Food Security»?
- Why only these 3 elements?
- How EO will respond to these goals and what is the role of the different actors to promote this alliance?

Importance of Earth Observations for Africa

- **world's second largest continent** (30.2 m km2) including islands
- **second most populous continent** (about 15% of the world's population)
- has a vast land area with difficult terrain *(deserts, rainforest, inland water bodies, complex and inhomogeneous topography, the Great Rift Valley*

Satellite observations are critical to support environment and natural resources management for protection of life and property and sustainable socio-economic development of Africa.

North Africa: a harsh climatic context

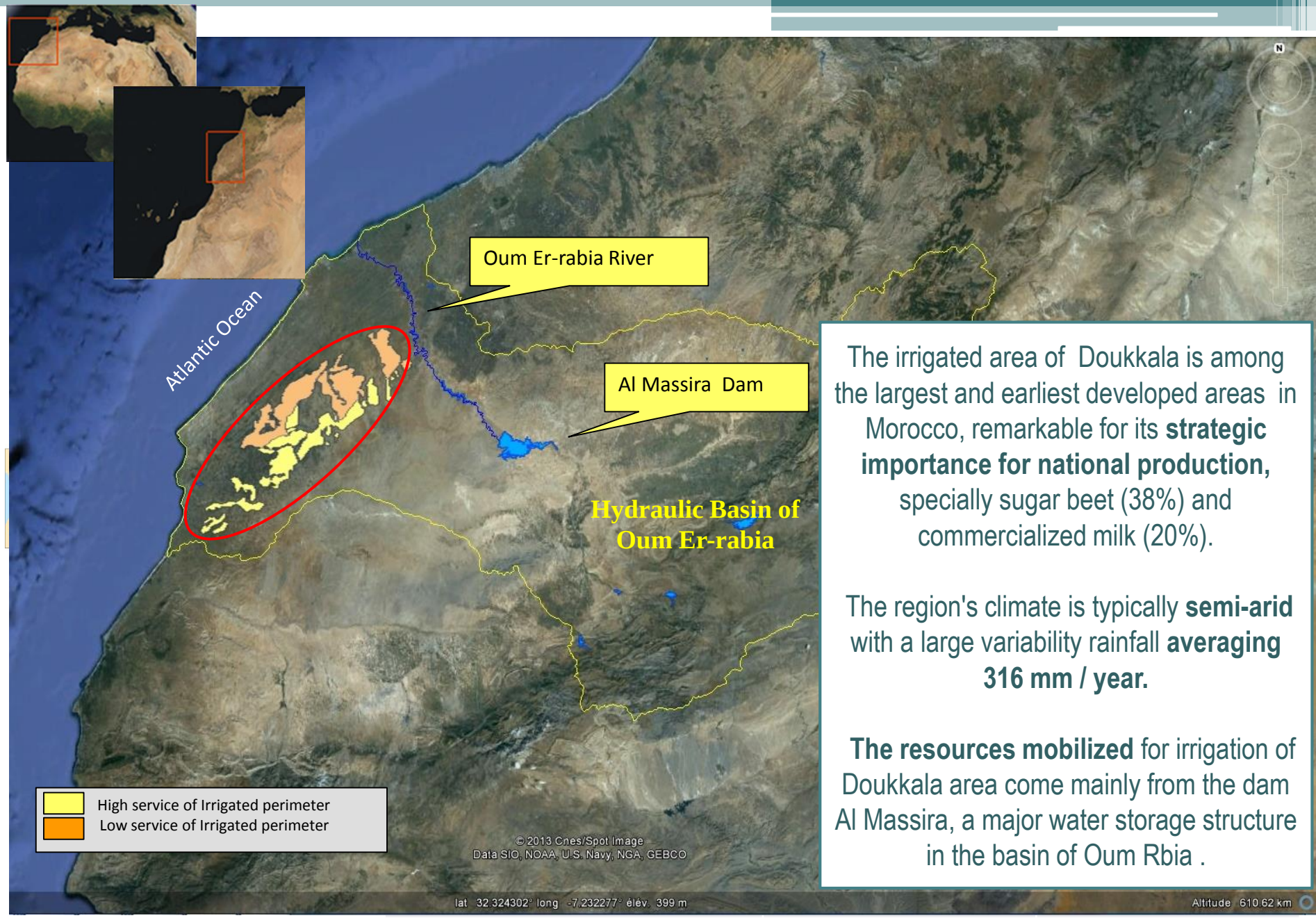


Problematics
Conflicts of interest
Resource degradation
Climate Variability and Change
Migration

- 6 countries: Algeria, Egypt, Libya, Mauritania, Morocco and Tunisia.
- The area is approximately 7 049 591 km^2 mostly covered by the Sahara desert (75%)
- The population is around 190 million of inhabitants.
- extreme climatic conditions (arid and semi-arid),

- The natural water resources in Morocco are among the lowest in world
- potential is estimated at 21 billion m^3 per year, equivalent to 730 m^3 / capita / year.
- More than half of these resources are concentrated in the north over an area covering 7% of the national territory.

Alliance Water-Food Security



The irrigated area of Doukkala is among the largest and earliest developed areas in Morocco, remarkable for its **strategic importance for national production,** specially sugar beet (38%) and commercialized milk (20%).

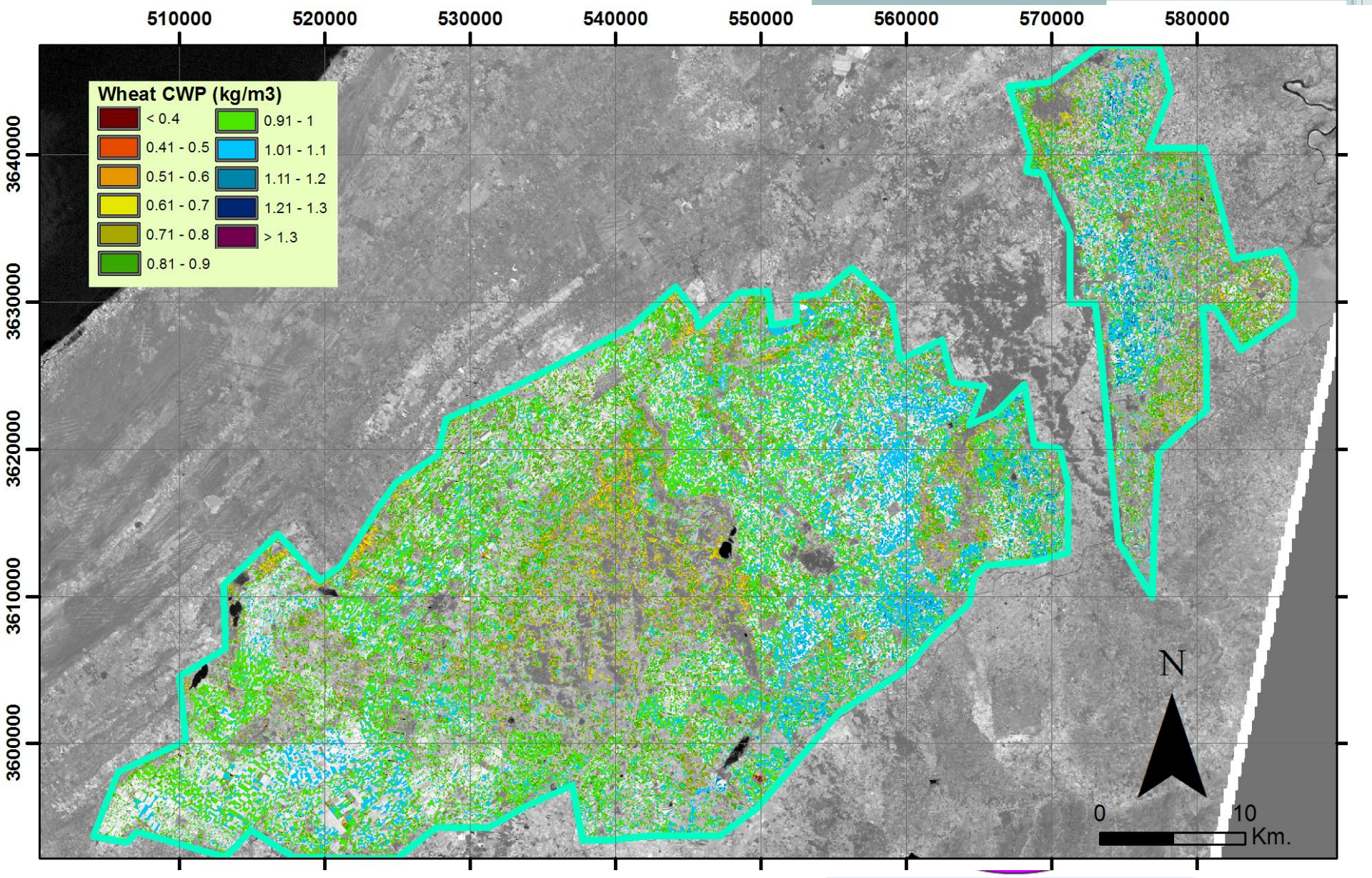
The region's climate is typically **semi-arid** with a large variability rainfall **averaging 316 mm / year.**

The resources mobilized for irrigation of Doukkala area come mainly from the dam Al Massira, a major water storage structure in the basin of Oum Rbia .

Aims of the project

MOSES aims at putting in place and demonstrate at the real scale of application an **information platform** devoted to planning of irrigation water resources, to support water procurement & management agencies (e.g. reclamation consortia, irrigation districts, etc.). Its main goals are:

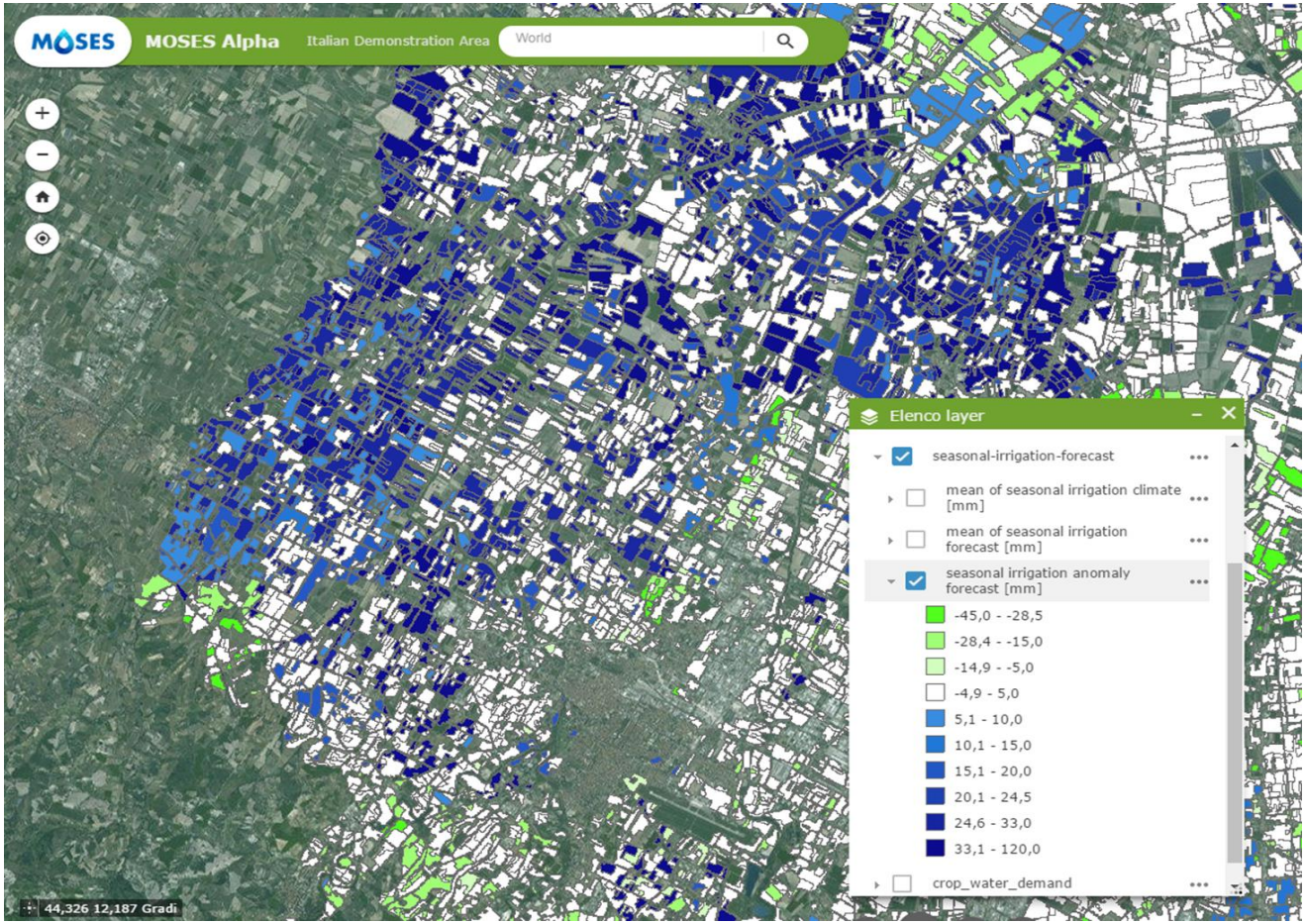
- saving water
- improving services to farmers
- reducing monetary and energy costs


510000
520000
530000
540000
550000
560000
570000
580000
3640000
3630000
3620000
3610000
3600000
Wheat CWP (kg/m3)
< 0.4
0.41 - 0.5
0.51 - 0.6
0.61 - 0.7
0.71 - 0.8
0.81 - 0.9
0.91 - 1
1.01 - 1.1
1.11 - 1.2
1.21 - 1.3
> 1.3
N
0
10
Km.

MOSES Alpha version on the Italian Demonstration area:

Seasonal irrigation forecast (mm)

Emission of 1st June 2016



current consumption about 1,450 GWh >>>>> 6,150 GWh in 2030 (about 0.7 to 0.8 kWh/m³) :

- The use of energy-intensive solutions (desalination of seawater and the water transfer project)
- Exploitation of conventional resources with high energy consumption in order to satisfy water demand. This is the case of drinking water supplies for water to Some big cities.
- Development of sanitation and wastewater treatment activities.

sector	2010		2030	
	Water (Mm³)	Energy (GWh)	Water (Mm³)	Energy (GWh)
Drinking and industrial water	850	550	1 550	2 350
Irrigation	4 400	900	6 500	3 880
Cleaning				
Reuse of wastewater	-	300	300	200 l
Total	***5 250***	***1 450***	***9 000***	***6 145***

Evolution of energy consumption in the water sector

71,5%

320%

Renewable energies

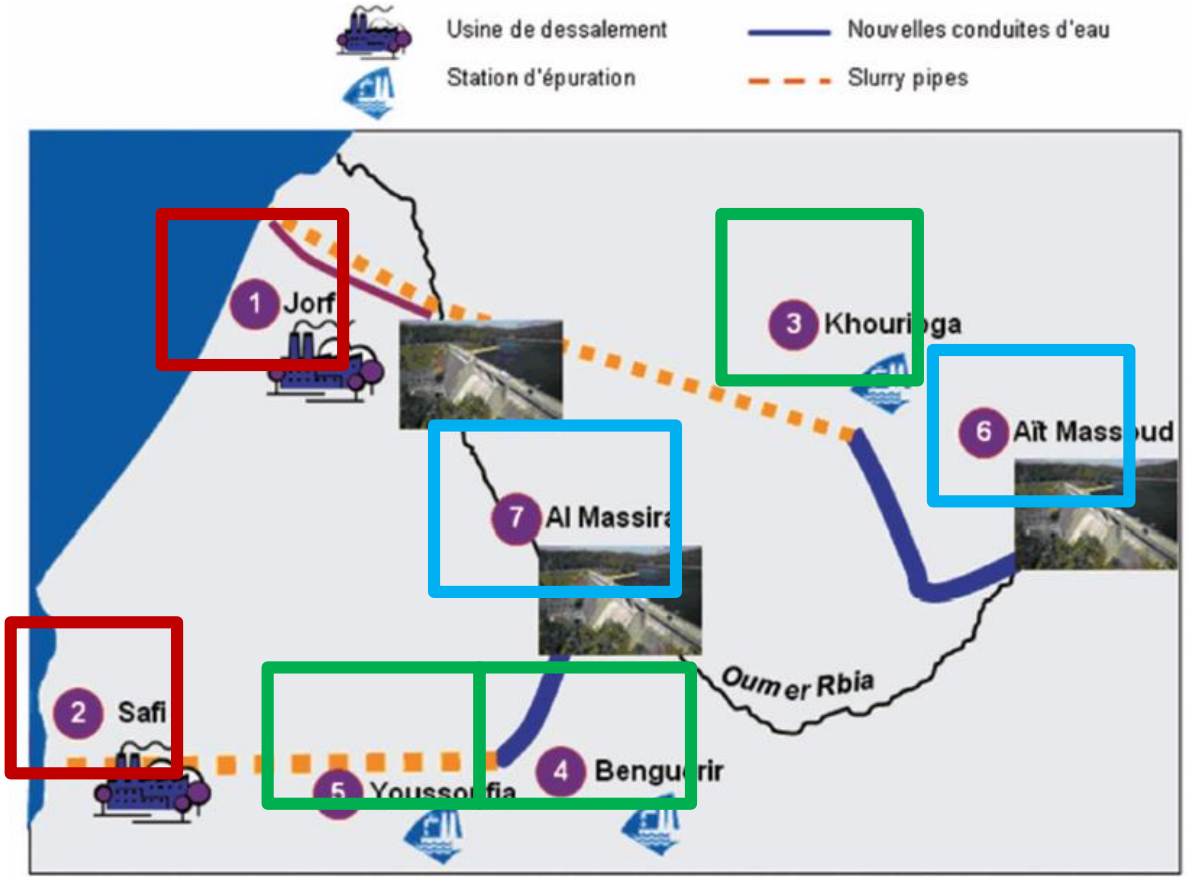
- By 2020-2030, all possible wind potential, estimated at 7 000 MW, could be exploited.
- By
- The hydroelectric capacity will be increased from 1,730 MW currently to 2,700 MW by the construction of new dams and pumping power stations.

Target:

52% Morocco's energy production will be renewable by 2030.

Development strategy without impact on water resources:

- Water withdrawals in rivers would remain constant in volume.
- The current withdrawals in the groundwater would be abandoned in run



Type of project

- Desalination of sea water
- Wastewater treatment at mining sites
- Water supply from dams
- Transport Slurry pipe

21 Billion dollars of investment

More than 60% of industrial water needs will eventually be met from unconventional waters

THANK YOU