



WATERSHED MANAGEMENT, FOR INTEGRATED RURAL DEVELOPMENT

Adopting a holistic vision that goes beyond the issue of erosion control (physical parameters) in favor of sustainable development durable

Improving the standard of living of the population (Job opportunities and income generating activities)

1
4 main pillars

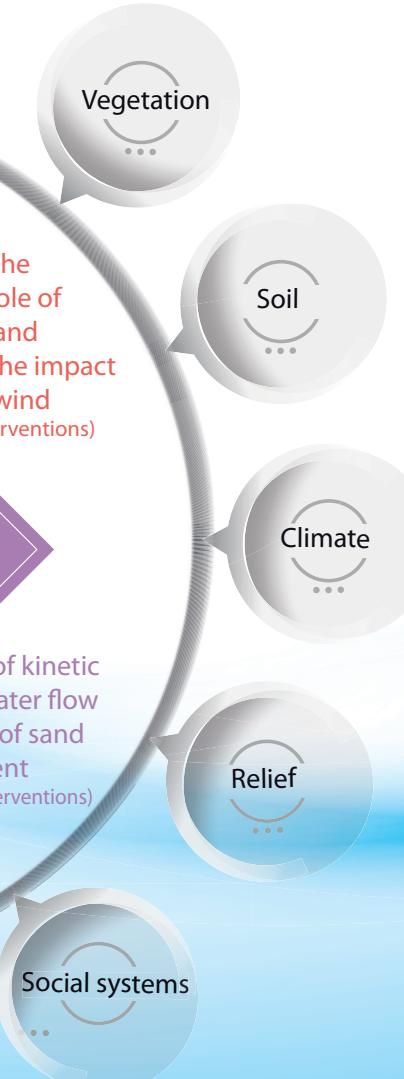
3

Improve soil resistance (by adapting soil use practices)

Enhancing the protective role of vegetation and mitigating the impact of rain and wind (biological interventions)

2

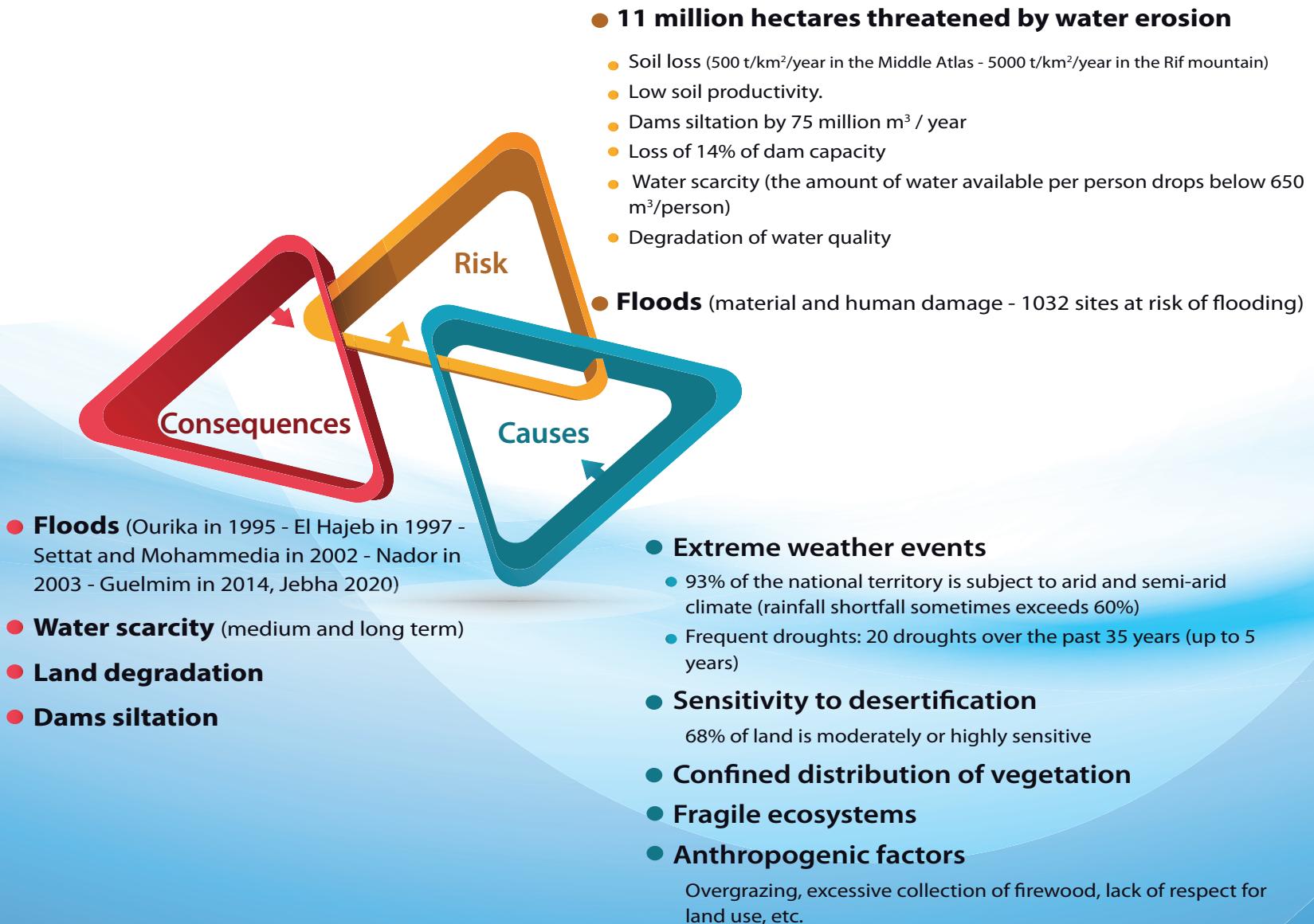
Regulation of kinetic energy of water flow and control of sand encroachment (mechanical interventions)



The interaction of these factors among themselves makes ecosystems, in the high watershed, a multivariate equation and difficult to manage.



WATER EROSION, Risks, CAUSES AND CONSEQUENCES

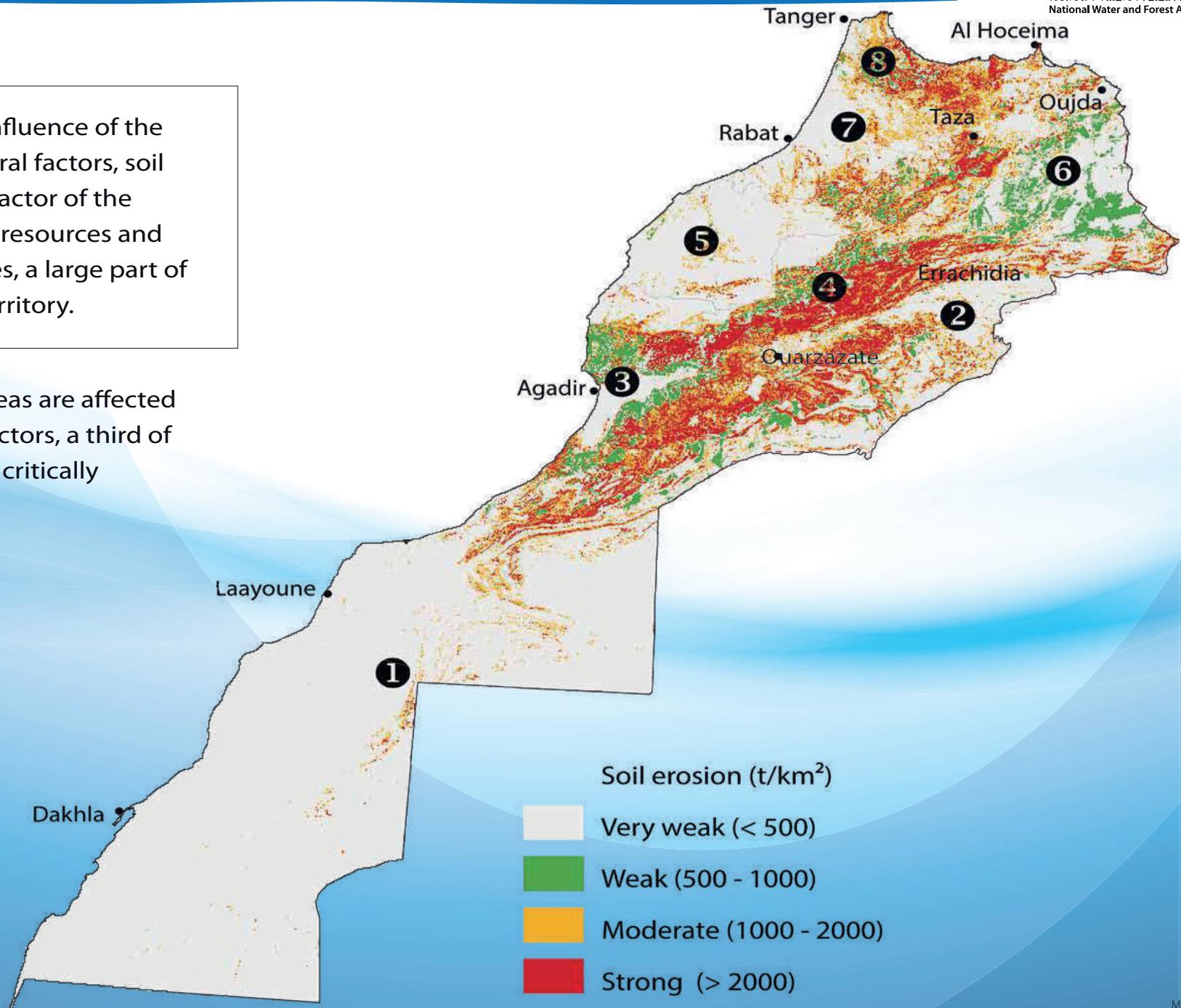




LAND EROSION (WATER EROSION)

Under the combined influence of the human factor and natural factors, soil erosion is the main factor of the degradation of natural resources and affects, to varying degrees, a large part of the national territory.

75% of mountainous areas are affected directly from erosion factors, a third of which is affected critically

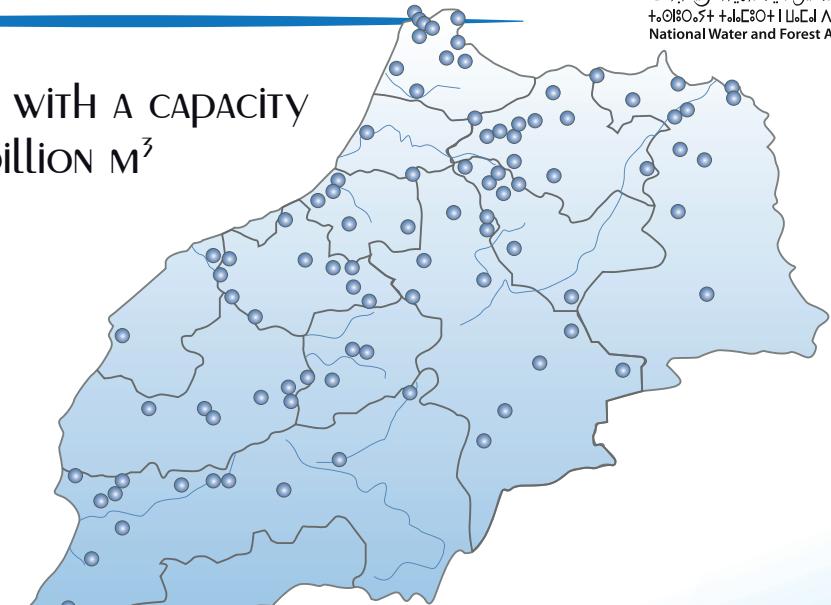




DAMS SILTATION, WHEN SEDIMENT REPLACES WATER



152 LARGE DAMS WITH A CAPACITY
of 20 billion m³



DAMS SILTATION: A THREAT TO WATER RESOURCES

- Loss of storage capacity
- Reduced water regulation capacity
- Reduced life span of dams
- Deteriorating water supply
- Damage to hydromechanical equipment
- Deteriorating water quality and biological function of dams



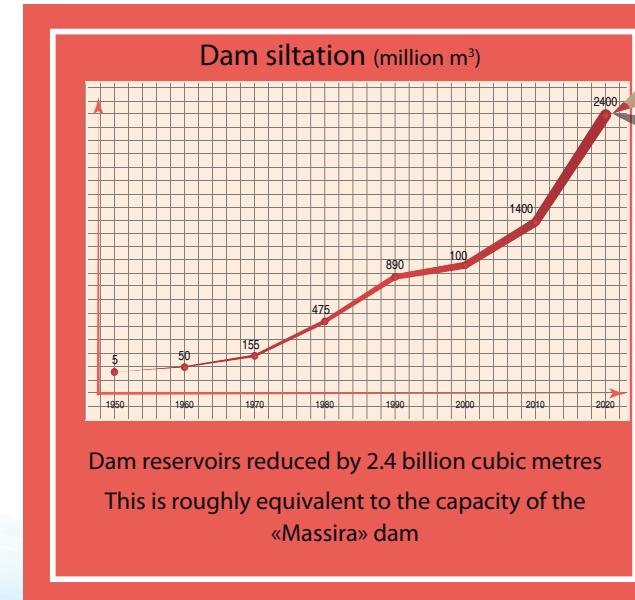
WATERSHED MANAGEMENT, FOR INTEGRATED RURAL DEVELOPMENT

Key numbers

Loss of 75 Million m³ of the dams carrying capacity annually (equivalent to Yacoub Al-Mansour Dam (Ourigane))

Loss of 14% of dam capacity (equivalent to irrigating about 240,000 hectares)

5 million hectares of watershed threatened by erosion



If the necessary measures are not taken:

- Total siltation of about 20 big dams by the year 2040
- Half of the dams lost 50% of their carrying capacity by the year 2050
- Most of the small dams will be filled by 2040



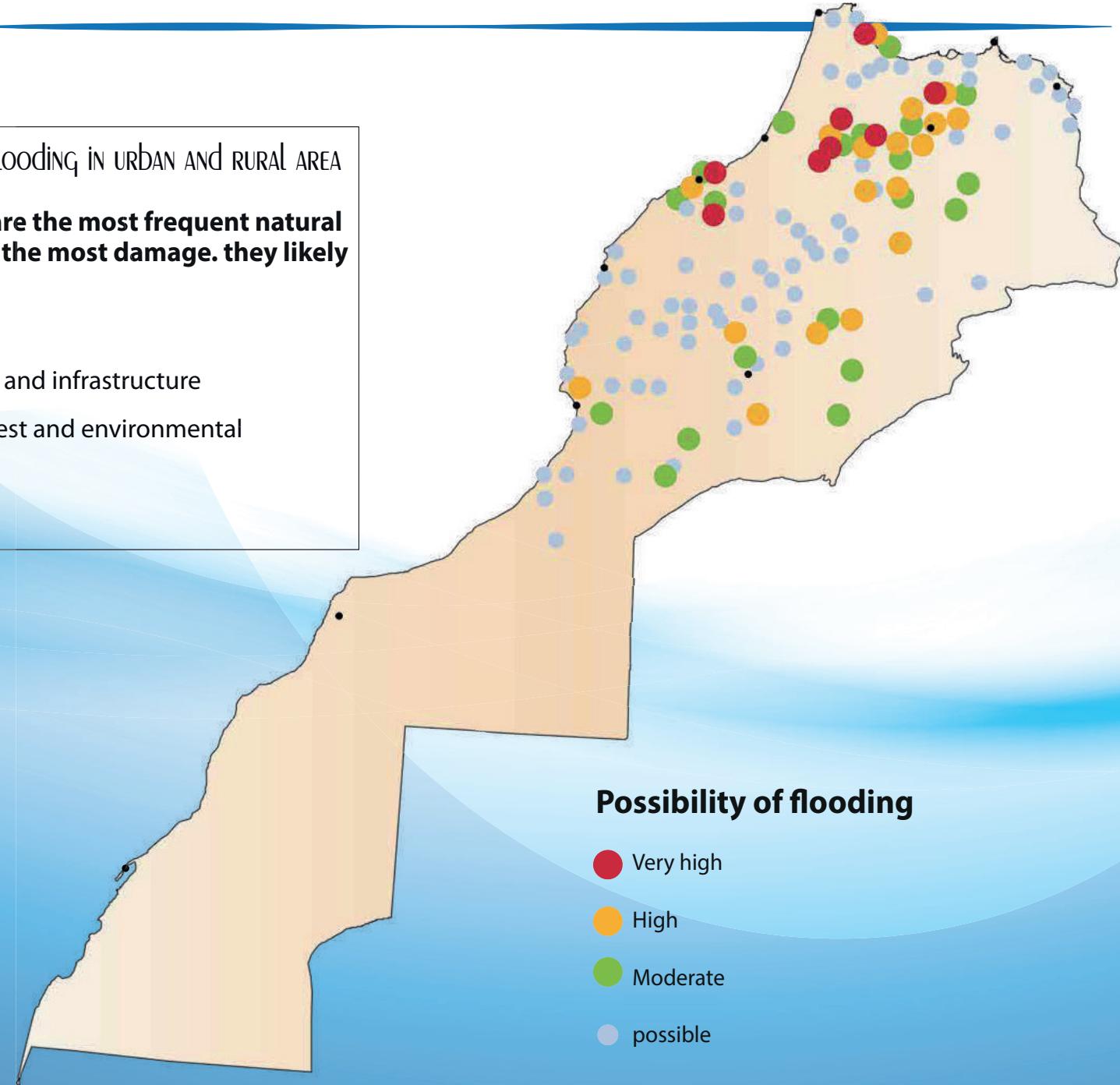


Floods, WHEN WATER BECOMES A DISASTER

1032 SITES AT RISK OF FLOODING IN URBAN AND RURAL AREA

In Morocco, floods are the most frequent natural disasters and cause the most damage. They likely cause:

- Loss of human life
- Damage to property and infrastructure
- Socio-economic unrest and environmental degradation





Floods, WHEN WATER BECOMES A DISASTER



According to the GIEC, increased frequency of intense rainfall events will lead to a heightened risk of flooding, river bank over flow and flash flooding.

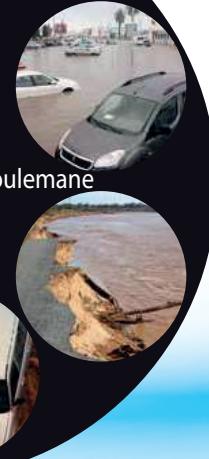
Intense rainfall and flooding may also result in soil erosion and water logging of crops, thus decreasing yields, with the potential to increase food insecurity; particularly for subsistence-scale farmers.



To not forget

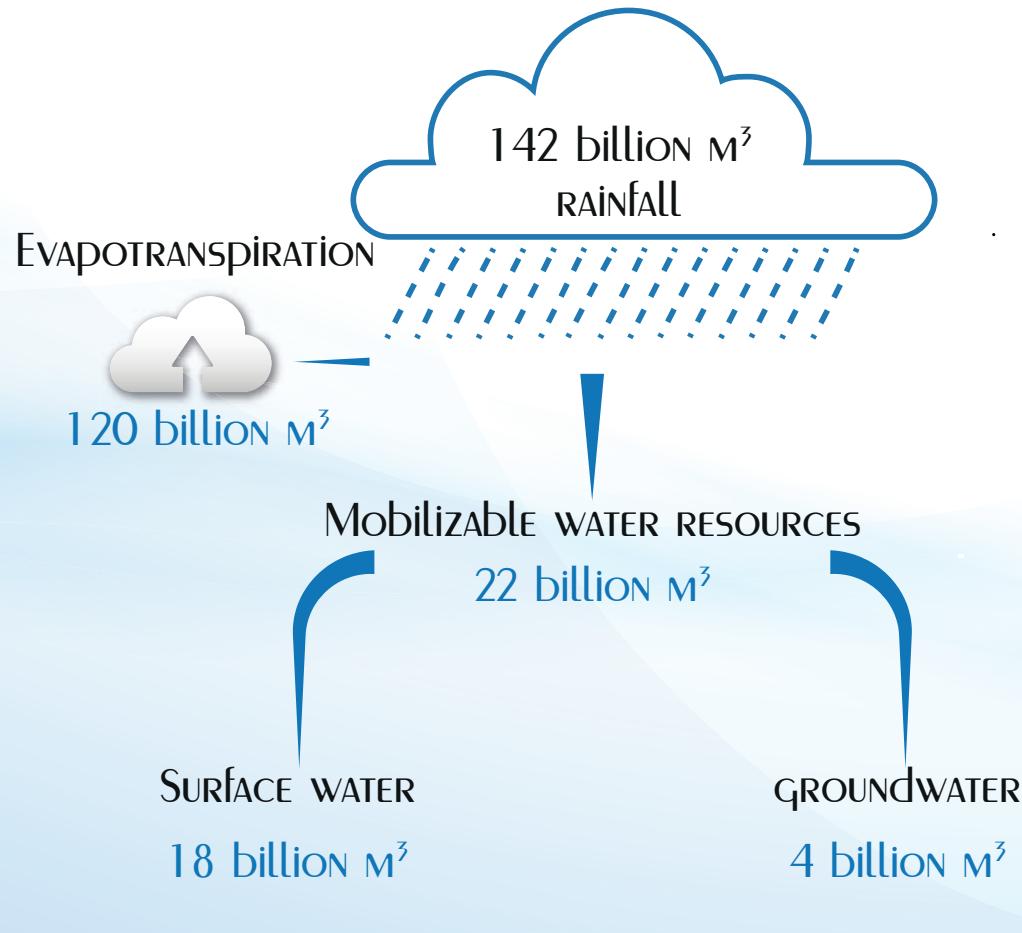
Floods that caused severe damage:

- 1995... Ourika Valley
- 1997... ElHajeb
- 2002... El Maleh River
- 2008... Tangier, Nador, Fnideq, Boulemane
- 2009... Beht River
- 2014.... Guelmim
- 2019 Taroudant
- 2020 Jebha





WATER RESOURCES, BETWEEN SCARCITY AND ABUNDANCE



Water Resources:

Unequally distributed spatially.
Subject to significant interannual variations and affected by climate change in the form of reduced rainfall

The current situation in Morocco makes it one of the thirty-three countries threatened by water scarcity by 2040.

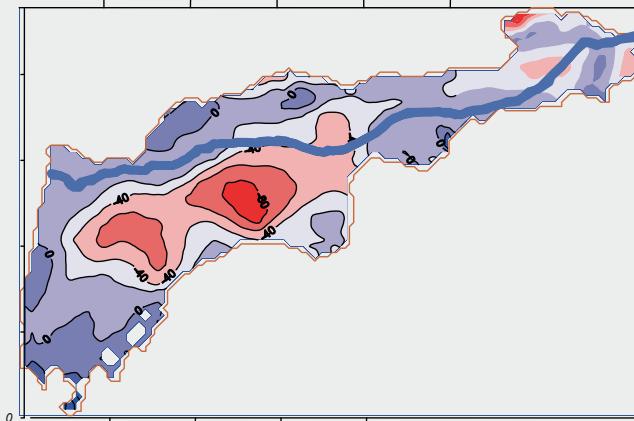
About 14 million people (35% of the population) will have access to an amount of water in the future of less than 500 m³ per year per capita.



WATER RESOURCES, BETWEEN SCARCITY AND ABUNDANCE

FOCUS ON THE GROUNDWATER AQUIFER

Decline in the piezometric level of the Souss groundwater aquifer (1970-2015)



Significant decrease in the level of the Saiss groundwater aquifer



>>> Increase in operational costs and increased investment needs for securing users of aquifers to cope with the decrease in flow rates



WATER RESOURCES, BETWEEN SCARCITY AND ABUNDANCE

Comparison of water resources with the infrastructure of 2020 - Demand expressed in 2050 per Basin, taking into account climate change (Mm³/year)

Hydraulic basin agency	Mobilizable water resources	Expressed water demand	Gap
Loukkos	709	1014	-305
Moulouya	1324	2442	-1118
Sebou	3406	4625	-1220
Bouregreg and Chaouia	540	1207	-668
Oum Rbia	2606	4389	-1783
Tensift	1381	2540	-1159
Souss Massa	909	1338	-428
Draa	704	803	-99
Guir-Ziz-Ghriss	1312	1506	-195
Sakia Hamra Oued Dahab	77	198	-122
Total	12967	20064	-7097

By 2050, due to climate change, the country will witness an increase in Demand, especially for irrigation water (approximately 10%) and a shortage of precipitation and groundwater (about 10 %)



MOROCCO FOREST STRATEGY 2020-2030

PROMOTING INTEGRATED WATERSHED MANAGEMENT TO SUPPORT WATER SECURITY

The National Watershed management Plan

In order to give a new dynamism to the field of combating erosion, The National Watershed management Plan adopted as a strategic intervention framework, advocates for a treatment program of 1.500.000 hectares (75.000 hectares per year) over a period of 20 years, at the level of 22 priority watersheds.

Biological and mechanical treatments conducted upstream in watersheds are considered the most effective means of protecting soil, residential areas, and infrastructure from erosion and flood risks :

Reforestation + water and soil conservation + gully control+ Streambank protection and floodplain erosion control.

Watershed management for

soil conservation, dam siltation prevention, and natural recharge of the groundwater table. Enhancing and maintaining watershed management within the framework of integrated rural development policy for mountainous areas,

The area treated against water erosion exceeds 1 million hectares, and gully treatment involves more than 3 million m³ of check dams.

Development of 33 watershed management plans covering an area of 8 million hectares.

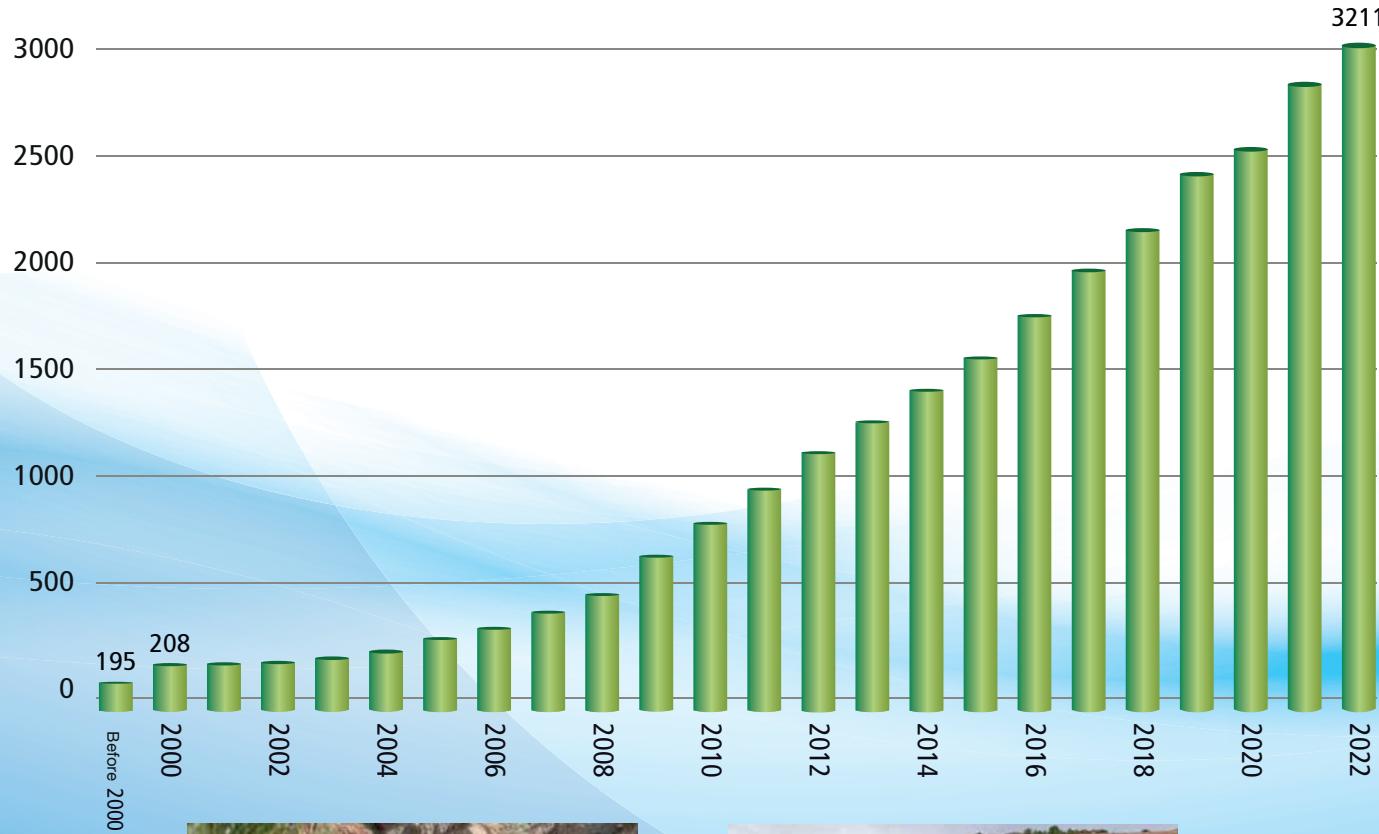
Results of watershed management works: reduction in the annual rate of dam siltation.



MOROCCO FOREST STRATEGY 2020-2030

PROMOTING INTEGRATED WATERSHED MANAGEMENT TO SUPPORT WATER SECURITY

Evolution of the cumulative volume of gully treatment (1000 m³) 1960-2022





MOROCCO FOREST STRATEGY 2020-2030

PROMOTING INTEGRATED WATERSHED MANAGEMENT TO SUPPORT WATER SECURITY

Evolution of the cumulative volume of soil conservation and reforestation (1000 ha) 1960-2022





MOROCCO FOREST STRATEGY 2020-2020

PROMOTING INTEGRATED WATERSHED MANAGEMENT TO SUPPORT WATER SECURITY

Funding mobilized for watershed management (million DH) 2000-2021

