



Supporting Morocco's Water Scarcity and Drought Management and Mitigation Plan

**DESA and other UN Partners (ECA, FAO,
WMO, UNISDR, UNEP, UNCCD, UNDP)**





Outline

1

Morocco Water Scarcity and Drought Challenges

2

Existing Water Scarcity and Drought Programs and Gaps

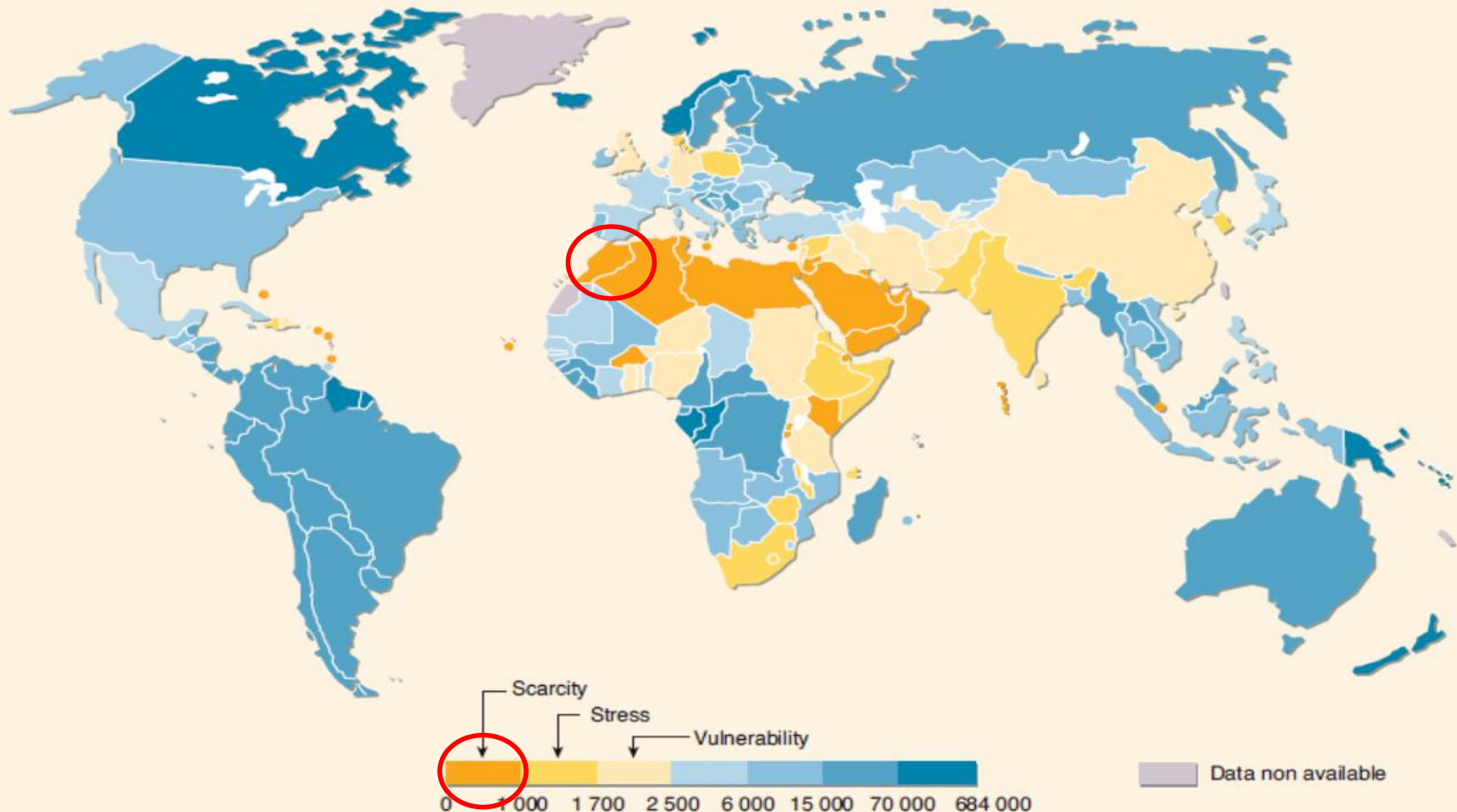
3

The Capacity Building Project on Water Scarcity and Drought Preparedness and Mitigation Plan-A Case for Morocco



Morocco is considered as a freshwater scarcity country

Freshwater availability (m³ per person per year, 2007)





Global physical and economic water scarcity



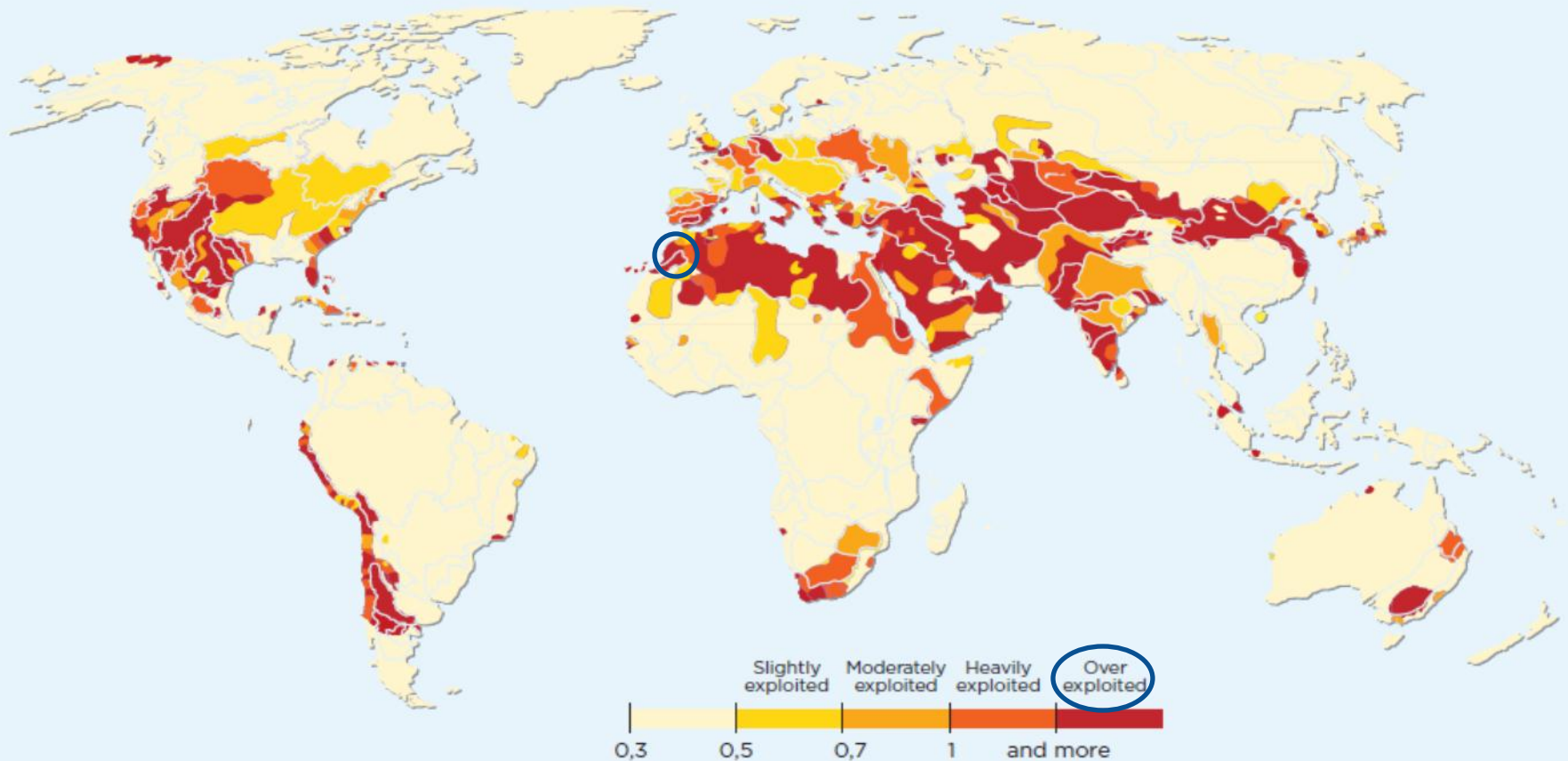
Definitions and Indicators

- Little or no water scarcity. Abundant water resources relative to use, with less than 25% of water from rivers withdrawn for human purposes.
- Physical water scarcity (water resources development is approaching or has exceeded sustainable limits). More than 75% of river flows are withdrawn for agriculture, industry, and domestic purposes (accounting for recycling of return flows). This definition—relating water availability to water demand—implies that dry areas are not necessarily water scarce.
- Approaching physical water scarcity. More than 60% of river flows are withdrawn. These basins will experience physical water scarcity in the near future.
- Economic water scarcity (human, institutional, and financial capital limit access to water even though water in nature is available locally to meet human demands). Water resources are abundant relative to water use, with less than 25% of water from rivers withdrawn for human purposes, but malnutrition exists.



Water resources are over exploited in Morocco

Global Water Stress Indicator (WSI) in major basins

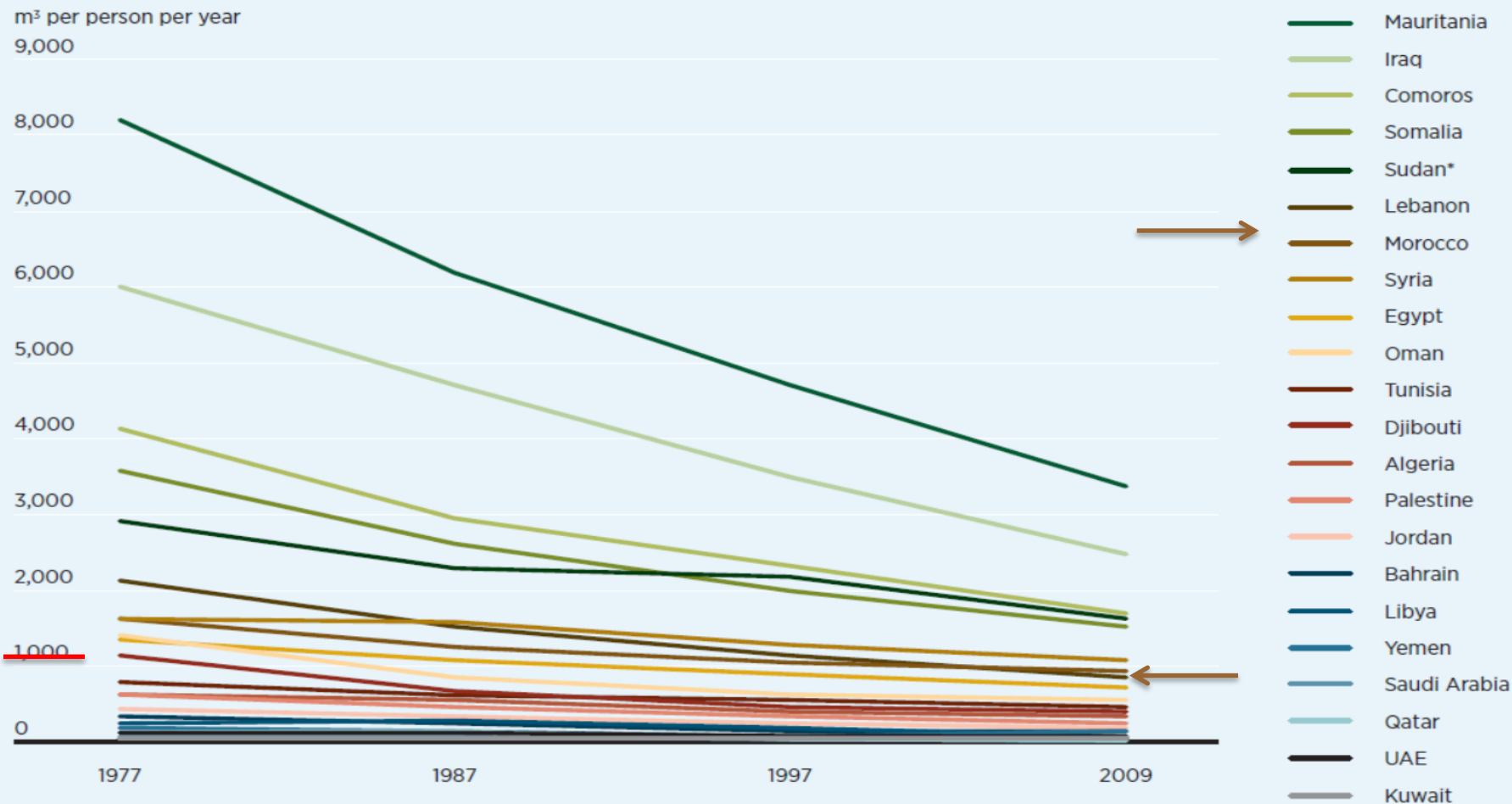


Source: UNEP/GRID-Arendal (2008) (<http://maps.grida.no/go/graphic/water-scarcity-index>, P. Rekacewicz [cartographer], with sources Smakhtin, Revenga and Döll [2004]).



By 2025, about 35 percent of the population will be below the absolute scarcity threshold of 500 m³/person/year

Renewable water resources in the Arab region per capita



Note: *Area covering South Sudan and Sudan.
 Source: Based on FAO AQUASTAT data (2011).



Morocco Drought Statistics

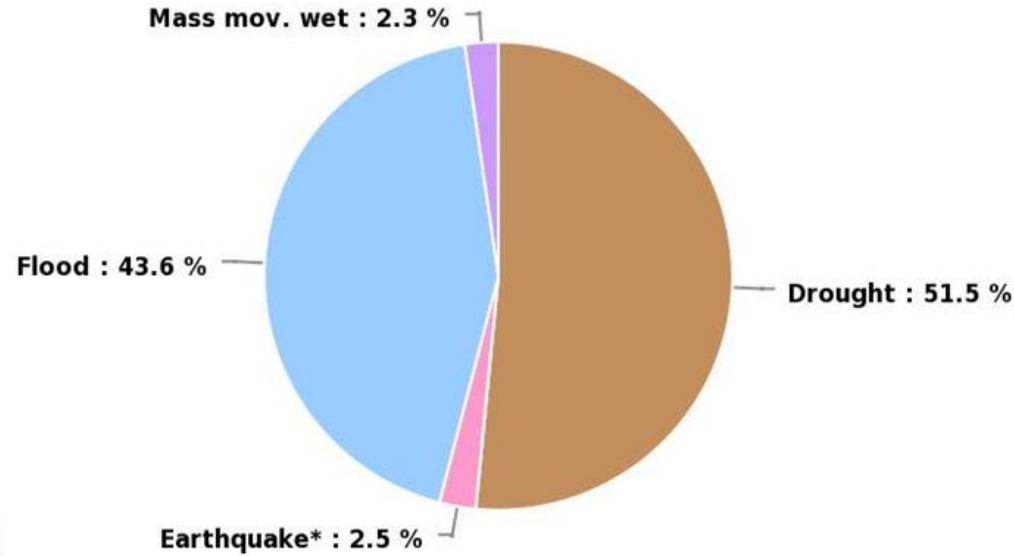
Morocco is highly susceptible to long periods (one to six years) of drought.

In the last 30 years, on average, drought occurs in Morocco every 3 years, creating a volatility in agricultural production that is the main constraint on expansion in the sector.

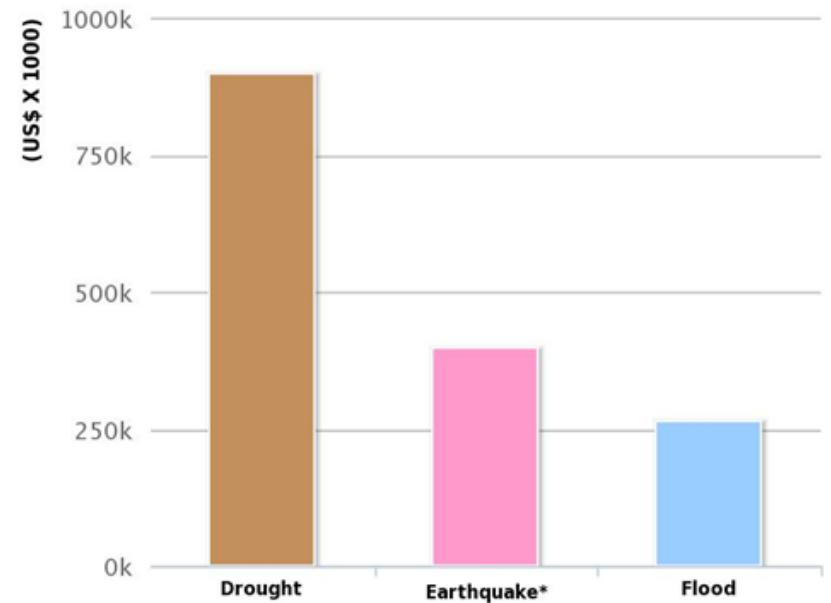
Morocco historical drought statistics, 1000-1984		
Drought Length	Number of occurrences	Time interval, years
1 to 6 years	89	11.0
2 to 6 years	35	28.5
3 to 6 years	9	113.7
4 to 6 years	6	182.0
5 to 6 years	4	303.3
6 years	3	455.0
Recent droughts at the national level		
1 year	1986-87	2
2 year	1991-93	4
2 year	1994-1995	1
4 year	1999-2003	4



The drought impacts on Morocco



Percentages of population affected in Morocco



Estimated accumulated economic damages for Morocco



The drought impacts scale

Only 15 percent of the country's lands are irrigated, while the rest are rain-fed crops.

Morocco's 1.4 million hectares of irrigated crops consume, on average, 85% of available water resources (as low as 60 to 70% in a dry year), while 12% and 3% of resources are used for public water supply and industry, respectively.

Agricultural sector in Morocco accounts for

- 15 percent of the GDP
- 40 percent of all employment

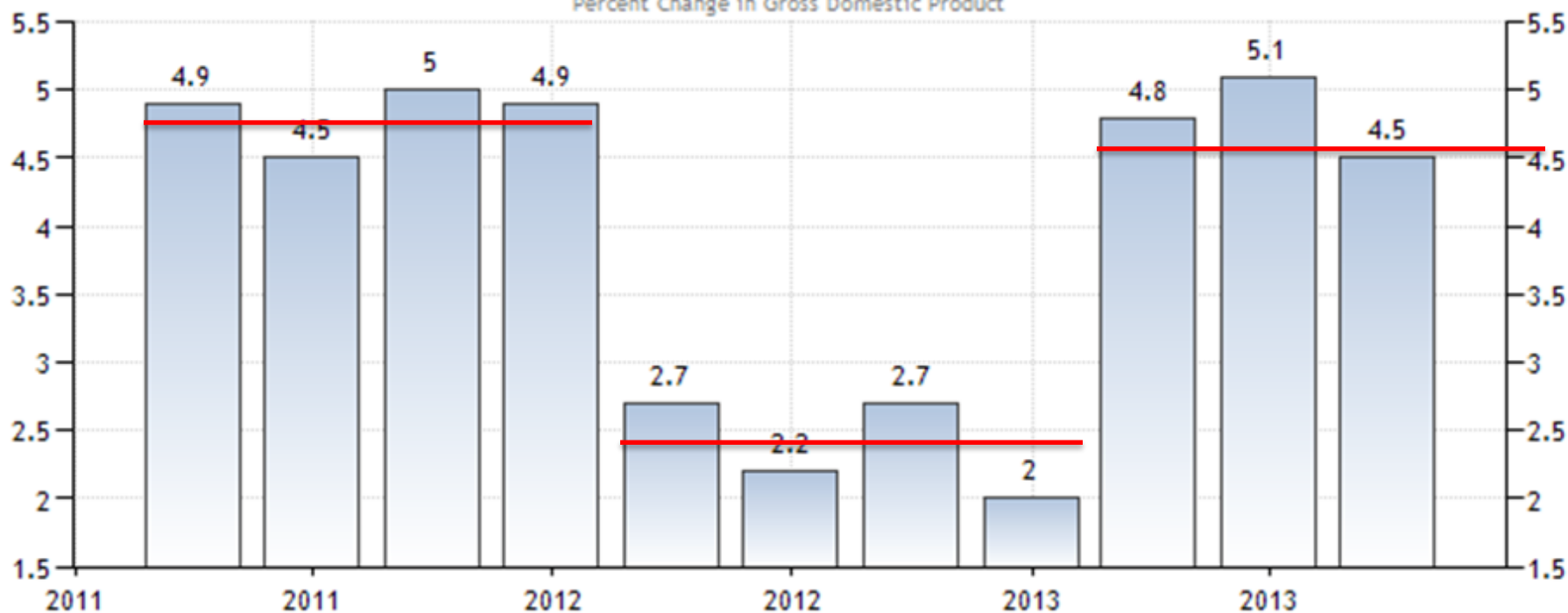
70% farmers have no more than 2.1 ha. of land and struggle with frequent drought, in the absence of any appropriate protection mechanisms.



Morocco's economy is vulnerable to drought

MOROCCO GDP GROWTH RATE

Percent Change in Gross Domestic Product





Morocco's economy is vulnerable to water scarcity

Country	Public expenditure on water as a share of GDP (%)***				Ground water depletion as % of GNP
	2001	2002	2003	2004	
Algeria	1.3	1.7	1.7	1.5	-
Egypt	-	3.6	3.3	2.4	1.3
Morocco	3.6	3.6	3.6	30.6	0
Saudi Arabia	-	1.7	-	-	-
Tunisia	1.7 ^a	-	-	-	1.2
Yemen	-	-	3.5	-	1.4
Jordan					2.1

^a- Average 1997-2001

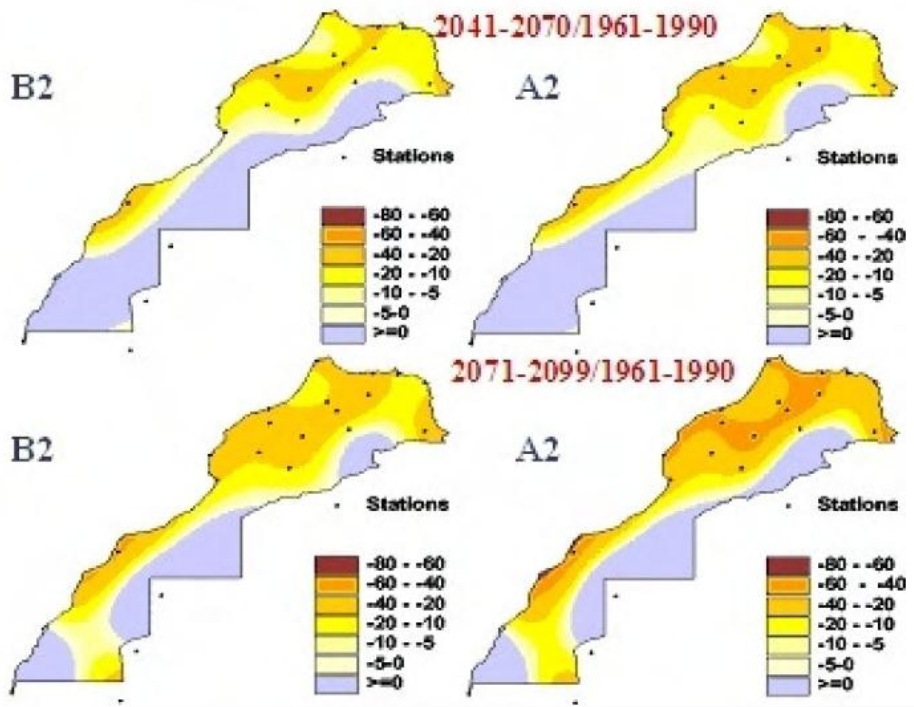
*** World Bank 2004b, 2005b, 2006g; AWC 2006.



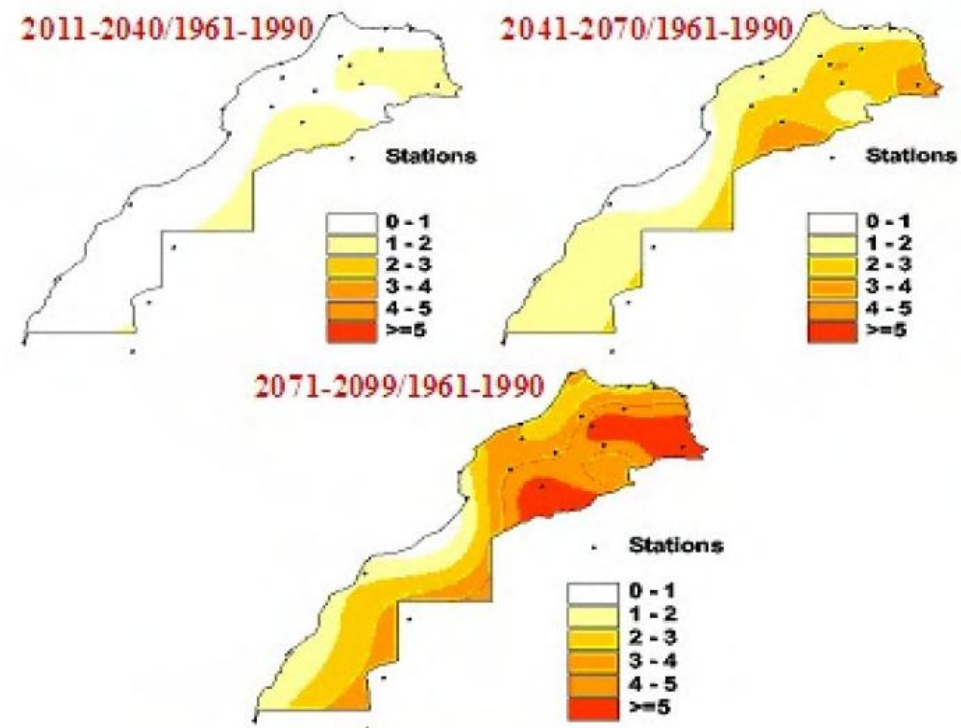
Sectoral water demands in some Arab countries for the years 2010 and 2025

Countries	Sectoral water demand projection									
	Domestic		Agriculture		Industry		Energy		Total	
	2010	2025	2010	2025	2010	2025	2010	2025	2010	2025
Algeria	0.83	0.80	1.90	1.90	0.2	0.3			2.93	3
Bahrain										
Egypt	5.00	6.00	75.00	95.00	10	14			90	115
Jordan	0.43	0.57	1.75	2.40	0.13	0.2			2.31	3.17
Lebanon	0.40	0.52	0.92	1.10	0.1	0.14			1.42	1.76
Libya	1.00	1.76	9.00	11.90	0.24	0.57			10.2	14.2
Morocco	2.80	3.70	1.10	1.40	6	8	10	12	19.9	25.1
Syria	2.10	3.00	17.60	25.20	0.3	0.37	0.1	0.1	20.1	28.7
Tunisia	0.42	0.53	3.37	4.23	0.16	0.26			3.95	5.02

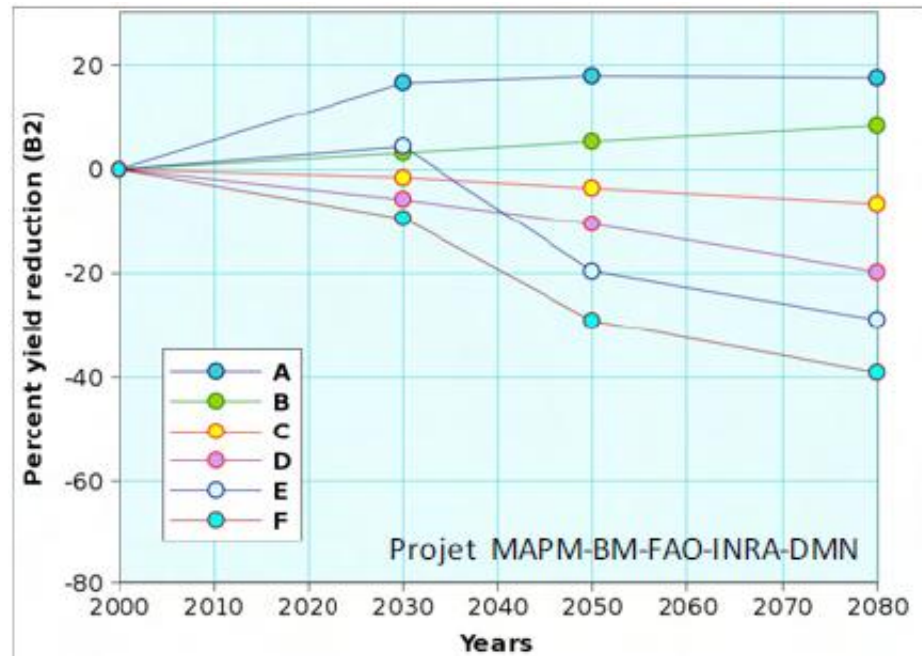
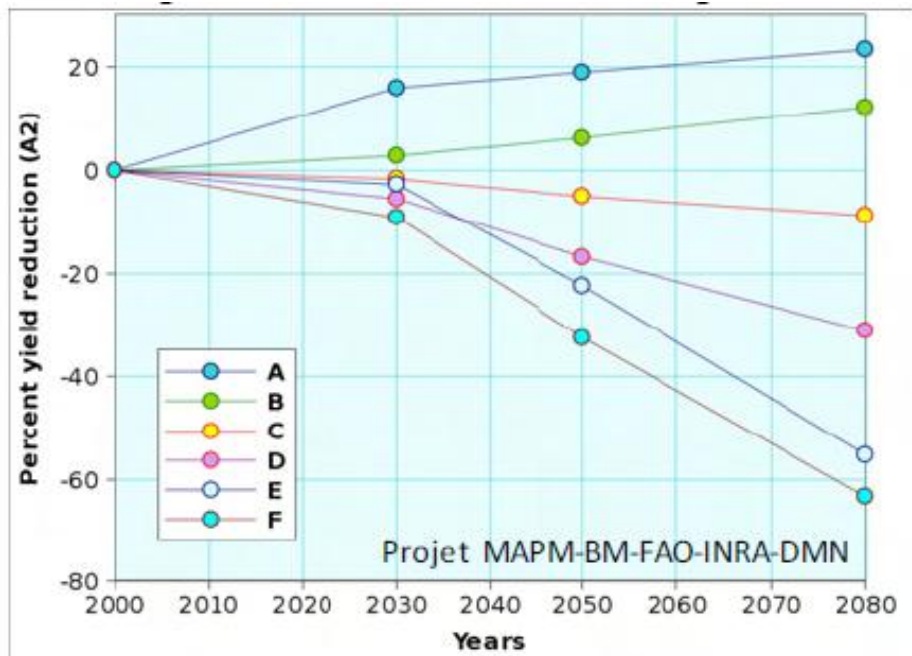
For Morocco the projected 2025 water demand increase is about 25% comparing with 2010



Precipitation anomalies projection



Temperature anomalies projection

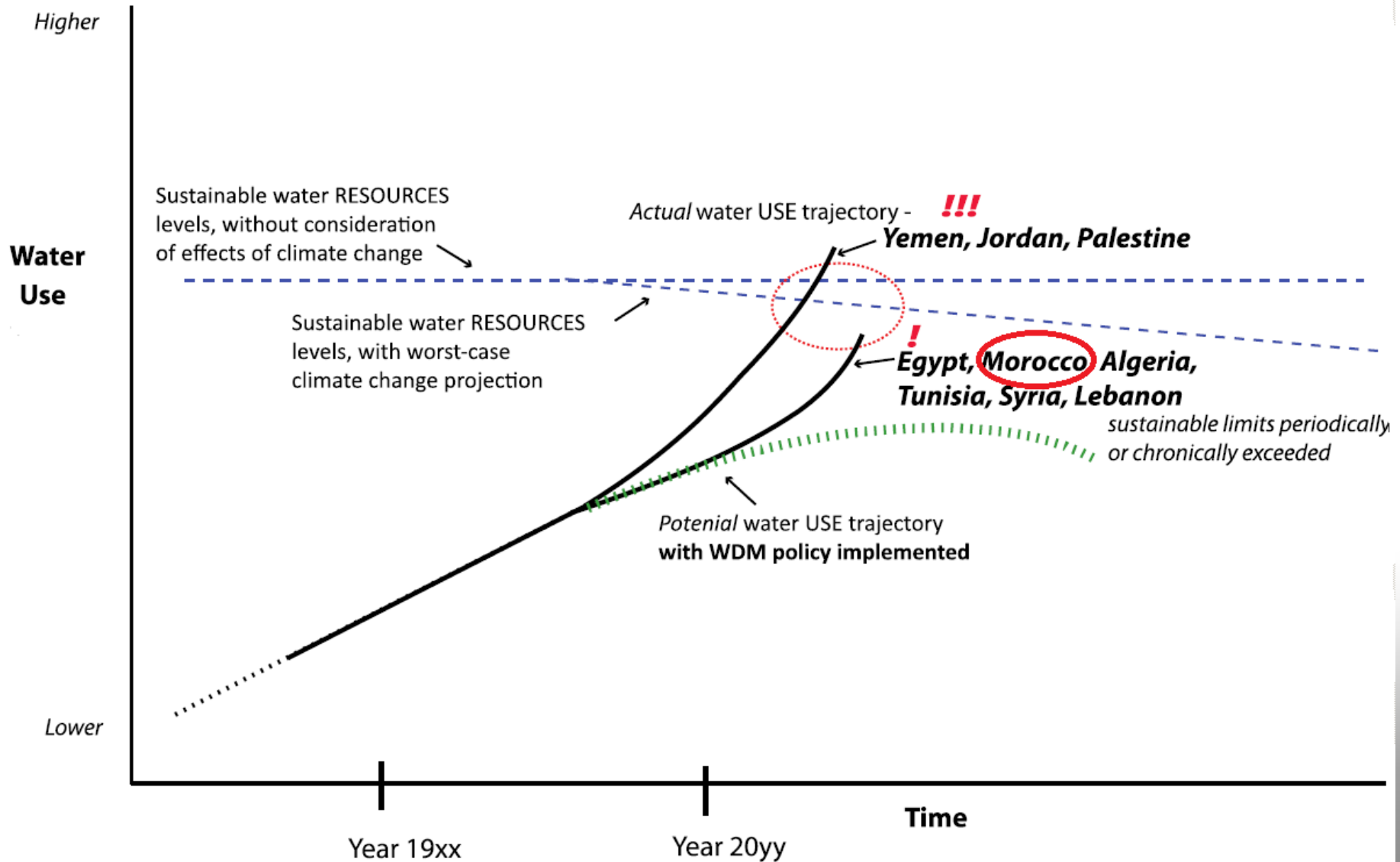


Projection of percent yield reduction, according to scenarios A2 and B2, by 2100

- A: irrigated maize and irrigated seasonal vegetables
- B: irrigated fruits and vegetables
- C: fodder crops and vegetables
- D: rainfed cereals and legumes
- E: rainfed wheat and barley
- F: Other rainfed crops.



Advantages of adopting Water and Drought Management Policy





Morocco's achievements on WS&D management

- In terms of WS&D management, Morocco is the most advanced country in the region.
- Established 1995 water law, which emphasis on integrated water resources management through better water use efficiency, resource allocation practices, and protection of water quality.
- Morocco provides a good example of drought monitoring and assessment by establishing of a National Drought Observatory (NDO) in 2001.
- Morocco is one of the Arab countries that adopted successfully the insurance approach in cereal production.
- A network for the development of drought early warning systems (SMAS) which was established between Morocco, Algeria and Tunisia and it is coordinated by OSS. The plan of action was launched and some activities have started



Morocco 's Efforts on WS&D Management

Table 1. Preparation to Drought and Water Scarcity Situations: Supply Side Management Measures

Countries /Actions	New storage facilities	Use of marginal resources (groundwater)	Aquifer recharge	Improved efficiency of water distribution networks	Relaxing environmental constraints	Water transfers	Desalination	Waste water reuse	Other
Turkey	Yes	Yes				Yes			
Morocco	Yes	Yes	Yes	Yes		Yes	Yes	Yes	
Tunisia	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Palestine	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	
Jordan	Yes	Yes	Yes		Yes	Yes	Yes	Yes	

Table 2. Demand Side Management Measures

Countries /Actions	Water metering	Mandatory rationing	Restriction on municipal use	Water markets (tariffs) & full cost recovery	Water saving campaigns for voluntary actions	Awareness campaign to minimize drought damages	Increase in the regulation capacity for irrigation purposes	Increase in the regulation capacity for urban supply
Turkey			Yes		Yes	Yes		
Morocco	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Tunisia	Yes	Yes	No	No	Yes	Yes	Yes	No
Palestine	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Jordan	Yes	Yes	Yes		Yes	Yes	Yes	Yes



MAIN ADVISORY AUTHORITIES

Main stakeholders in water sectors in Morocco

Superior Council for Water and Climate (SCWC)
National Council for Environment (NCE)
Council for Agricultural Development (GCAD)
Permanent Inter-Ministerial Council for Rural Development (PICRD)
National Drought Observatory (NDO)

EXECUTIVE ADMINISTRATION AUTHORITIES

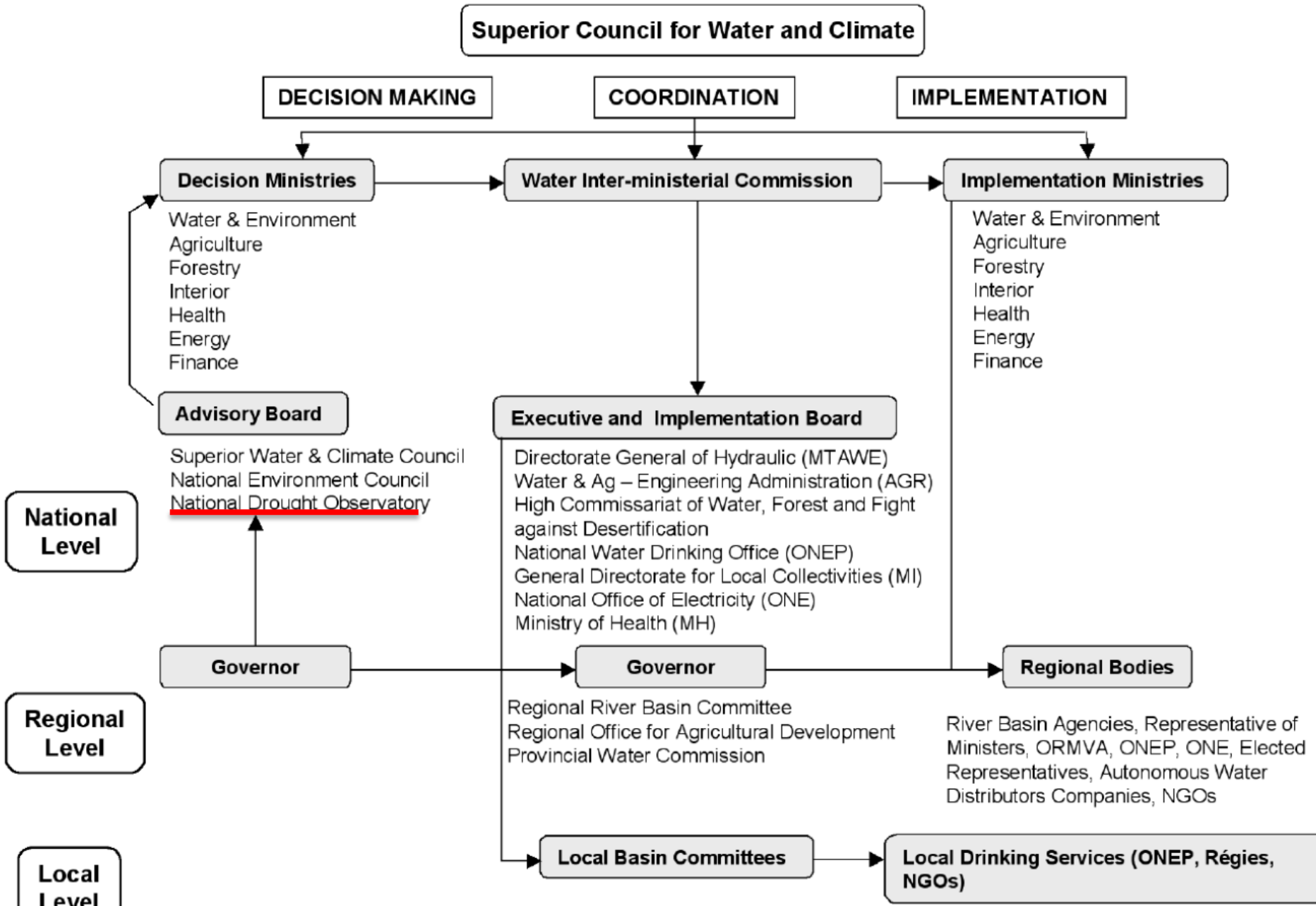
Ministry of Territorial Administration, Water & Environment (MTAWE)
• Secretariat of SCWC
• Directorate General of Hydraulics (DGH)
• National Meteorological Office
Ministry of Agriculture and Rural Development (MARD)
• Water & Ag – Engineering Administration (AGR)
High Commissariat of Water, Forest and Fight against Desertification
Ministry of Interior (MI)
• Directorate General of Local Collectivities
• Directorate of Régies & Conceded Services
Ministry of Finance (MF)
Ministry of Health (MH)
Ministry of Energy and Mines (MEM)
Ministry of General Affairs (Prices Directorate) (MGA)

PUBLIC OFFICES, AGENCIES & PRIVATE OPERATORS

River Basin Agencies (MTAWE)
Directorate General of Hydraulics (MTAWE)
National Water Drinking Office (ONEP - MTAWE)
Regional Office for Agricultural Development (ORMVA - MARD)
Autonomous companies and private operators (REGIES – MI)
National Office of Electricity (ONE – MEM)

WATER LOCAL

Water Provincial Commission
Local Collectivity Representatives
Water Users Associations (AUEA)



Water resources management structure in Morocco



Morocco drought management Gaps Identified

- Without an independent body or unit responsible on drought management
- Weak coordination between various ministries and organizations
- In each drought management related ministry, there is no unit specialized and responsible on drought issues, rather the responsibilities are scattered between various sections.
- Lack of standard drought management approaches
- Inadequate in sharing on drought information
- Weak on drought projection
- Lack of comprehensive early warning system
- Mitigation plans are mainly for emergency and not updated regularly



The Goals of this project are:

- To enhance Morocco's national preparedness for WS&D and
- To assist Morocco further developing and implementing the mitigation strategies and plans.

The objectives of the project are:

- Raise awareness of up-to-date WS&D management tools, methodologies, and BMPs, and enhance the national capacity.
- Reinforce drought monitoring and early warning systems in Morocco (Characterization of droughts: identification and proposal of monitoring indicators).
- Improve Morocco drought forecasting capacity (development of contingency plans).

UN-DESA will achieve the objectives through:

- Foster high-level political forums and technical workshops.
- Promote regional and international cooperation and partnership.
- Encourage the knowledge and best management practices sharing at all levels.
- Provide technical and capacity building training supports.



“Droughts are hard to avert, but their effects can be mitigated.[...] The price of preparedness is minimal compared to the cost of disaster relief. Let us therefore shift from managing crises to preparing for droughts and building resilience.”

**UN Secretary-General Ban Ki-moon's Message for
2013 World Day to Combat Desertification
17 June 2013**

Thank you!

Feel free to contact:

Sami Areikat,
Sustainable Development Officer

**Water, Energy and Capacity Development
Branch**

**Division for Sustainable Development
UN-DESA**

United Nations, Room S-2651

405 42nd Street

New York, NY 10017

Tel. 212-963-7844

Fax. 917-367-3391

E-mail: areikat@un.org

<http://sustainabledevelopment.un.org>

