



## World Water Forum Dakar

Session 3C2 : “Develop experience sharing on water resources management to address chronic water scarcity and water-related disasters (including floods and droughts)”


# Moroccan water resources management to address chronic water scarcity and water-related disasters -floods and droughts-

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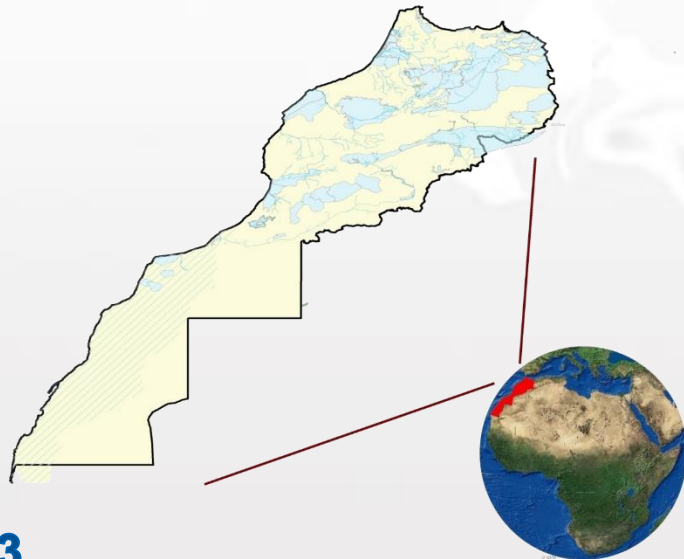
**23 Mars 2022**

# PLAN

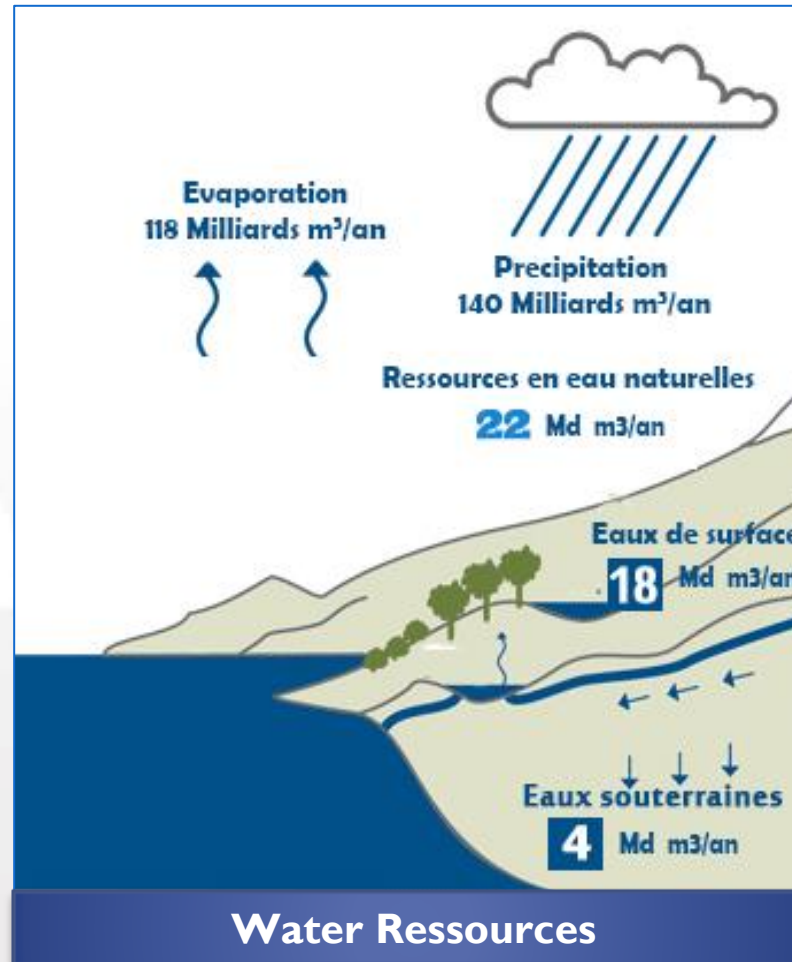
1. **General background**
  2. **Drought Characterization**
  3. **Drought management**
  4. **Flood Risk : Damages & causes**
  5. **Flood Risk Management**
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- A decorative background image showing a splash of water, rendered in a light, semi-transparent style, positioned in the lower right quadrant of the slide.

# General background

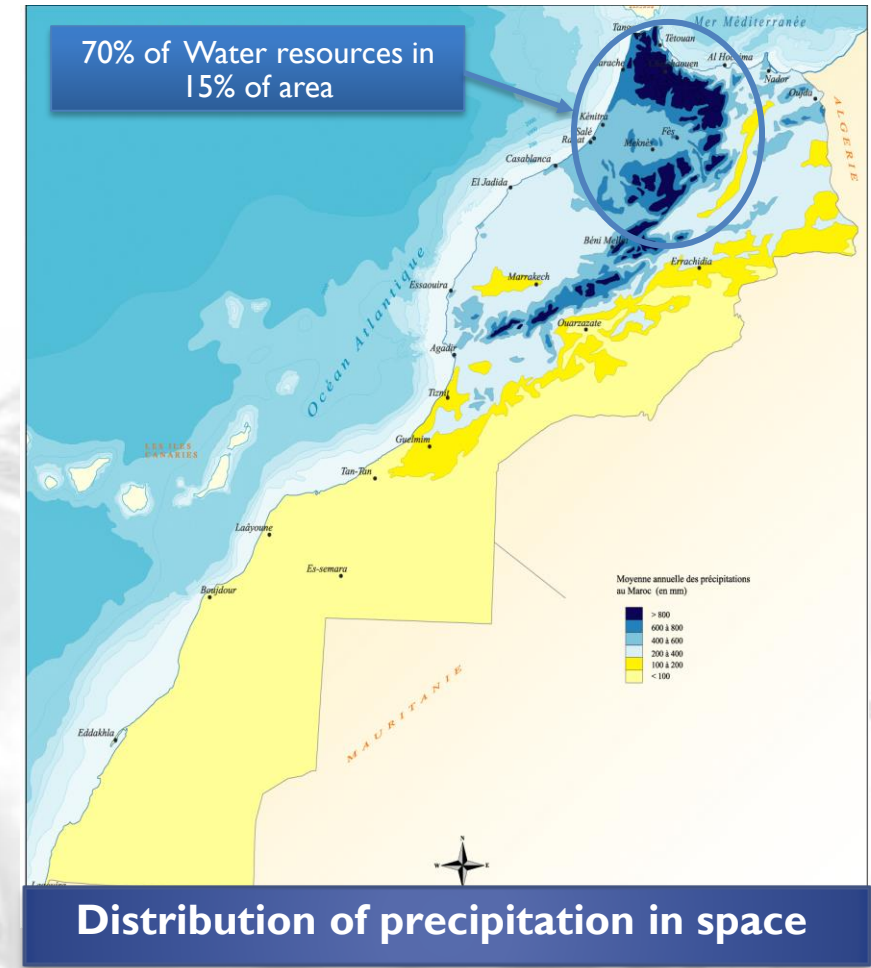
- **Population :** 34 million (60% urban) : 2014 inventory
- **Total area :** 710.850 Km<sup>2</sup> (50% desert)
- **Forest :** 9,5 million hectares (12% of global)
- **Agricultural land :** 9 million hectares
  - 84% rainfed
  - 16% irrigated
- **Economy based on Agriculture, Mining & Industry**
- **Agriculture:**
  - GDP agr : 15% - 20% of global GDP
  - Employment : 40% of total; 80% of rural
- **Diversification began:** Emerging sectors: Services, Tourism, Industry, Major Infrastructure



## Fragile hydro-climatic context



Water Ressources

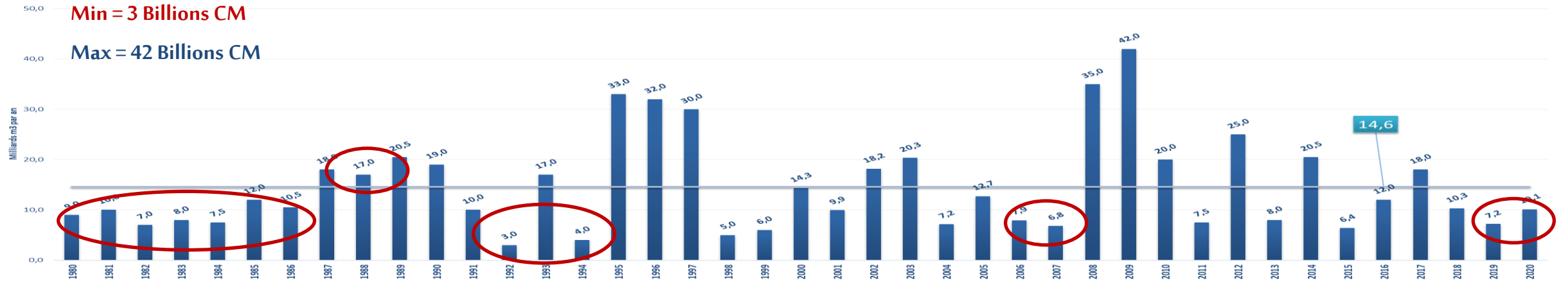


Distribution of precipitation in space

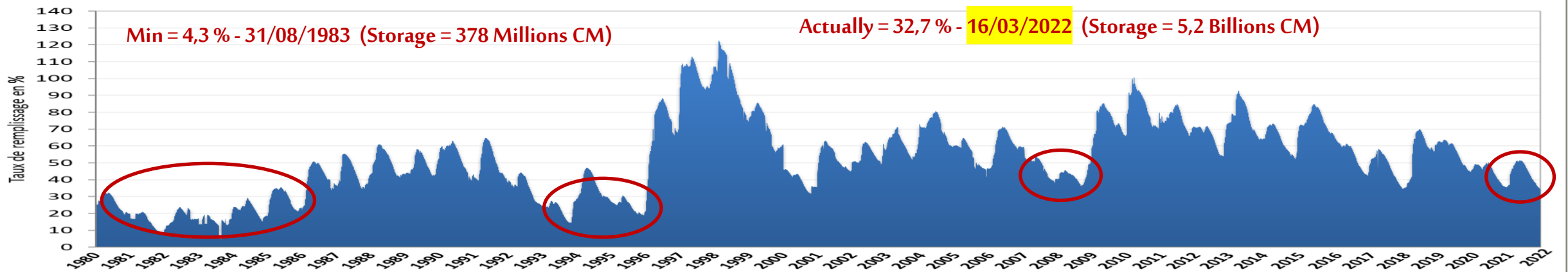
# Drought Characterization

Since the 80s several periods of drought : 1980-1985 / 1991-1995 / 1998-2000 / 2016 until today

Water inflow 1980-2021



Daily Dam storage 1980-2022



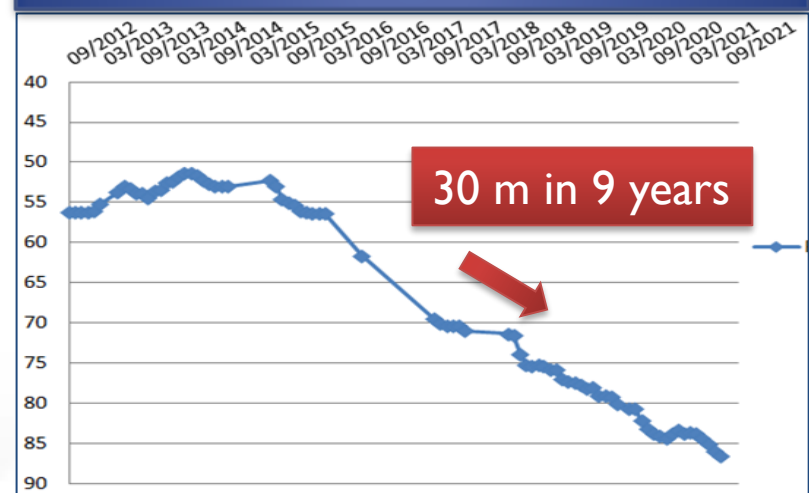
# Drought Characterization

Drought has become a structural component of Moroccan climate, agriculture and environment

## Drought Impacts

- Urban areas : Water supply restrictions (TANGER : 50% in 1995)
- Rural areas : Drying up of traditional supply sources
- Agriculture : decrease in Production, decrease in agricultural g.d.p...
- Environment : degradation of water quality
- Hydro-power energy: Drop in production

## Fes-Meknes groundwater aquifer Evolution



Ain Abayno Source

# Drought management

Improve knowledge of the water cycle



Assessment of drought characteristics and parameters (Meteorologic & hydrologic data)

Sustainable water planning



Mobilization of conventional and non-conventional water resources

Priorities definition

Drinking water, Irrigation, Hydropower

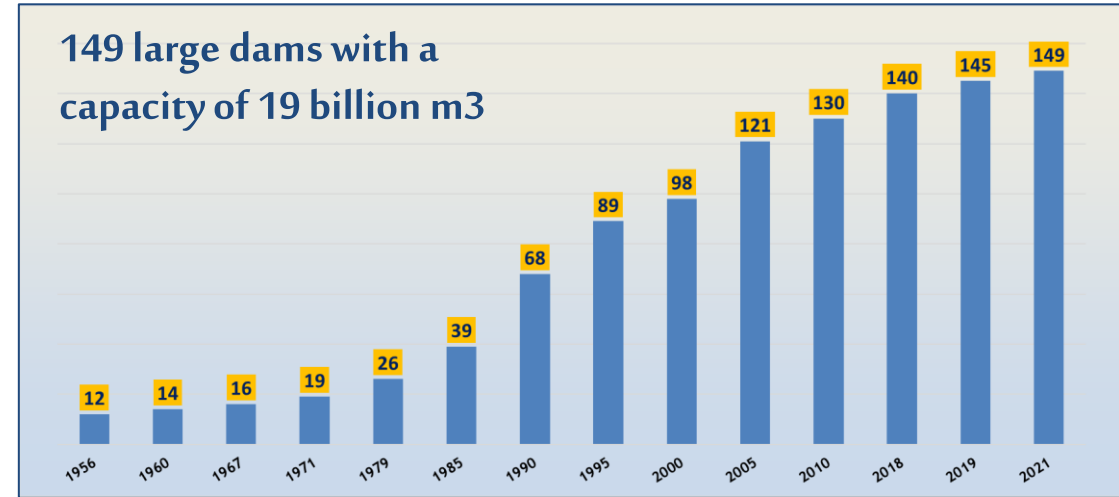
Institutional framework

Water Law 36-15 : National & provincial vigilance committees

Water demand management

Nonrevenue water reduction, rehabilitation and maintenance of irrigation canals

149 large dams with a capacity of 19 billion m3



Water transport boat



# Drought management

**The National Drinking Water supply and Irrigation Program 2020-2027 :**  
Strengthen the drinking water supply and irrigation, particularly in the most affected areas by the water shortage.



## PROGRAMME'S AXES



**Global Cost: 115.4 Billion of Dirhams**

# Flood Risk : Damages & causes

## Root Causes

- Uncontrolled urban development in flood-prone areas;
- Lack of maintenance of flood defense systems, watercourses, culverts and road gullies, particularly where this leads to channel blockage
- Poor asset management of waterways ;
- Insufficient knowledge of phenomena inappropriate behavior of the population and insufficient means of prevention



Flooding in Mohammadia



Flooding in Guelmim November 2014

Période	Zones Touchées	Dommages encourus
1965	Errachidia	<ul style="list-style-type: none"> <li>- More than 25,000 homeless people,</li> <li>- nearly 75,000 olive trees and more than 16,000 palm trees were destroyed.</li> </ul>
17-18 /08/1995	Vallée d'Ourika	<ul style="list-style-type: none"> <li>- More than 240 casualties</li> </ul>
28-29 /9/1997	EL Hajeb, Taza, Khenifra	<ul style="list-style-type: none"> <li>- 60 dead and 78 vehicles were swept away.</li> </ul>
25-26 /11/2002	Mohamedia, Settat, Berrachid	<ul style="list-style-type: none"> <li>- Flooding of the oil industrial area.</li> <li>- Indirect cause of the great SAMIR fire.</li> </ul>
2009/2010	Plaine du Gharb	<ul style="list-style-type: none"> <li>- 110.000 ha de terres inondées et infrastructures de communication (route+ chemin de fer)</li> </ul>
novembre 2014	Guelmim, Tiznit, Sidi Ifni	<ul style="list-style-type: none"> <li>- Important human and material damage</li> </ul>



# Flood Risk Management

## Shift from crisis management to risk prevention

### National Flood Protection Plan

Elaborated in 2003, updated in 2015

### structural measures

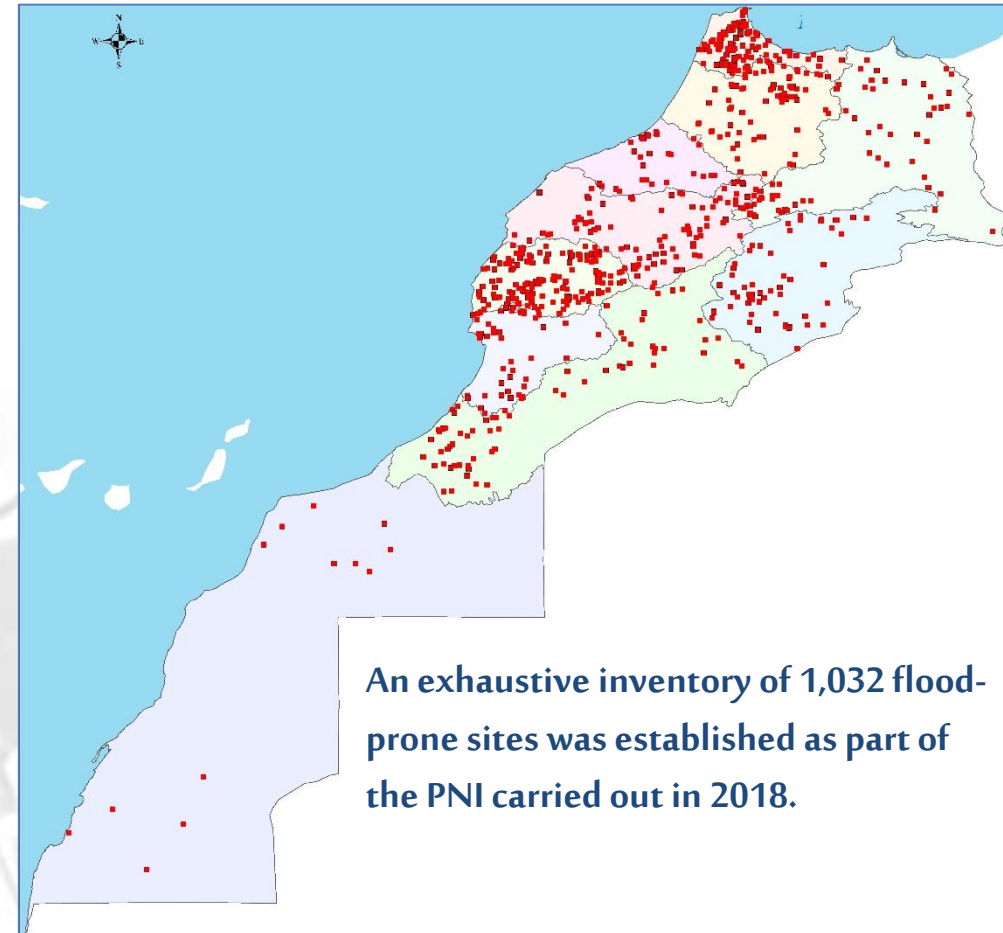
Consistently enforce the flood control and protection of people and property through the development of additional structures adapted to the damage potential and hazards.

### Preventive measures

- integration of flood risk into land use plans (urban planning..)
- improving knowledge in the field of meteorologic forecasting and urban hydrology (hydrometeorological forecasting models);
- development of flood warning and contingency plans;

### institutional and organizational measures

Water Law 36-15 : clarification of the roles and responsibilities of the various stakeholders and their coordination.



***Thank you for your attention***