Climate Change and Water Scarcity: Strategies for Sustainable Agricultural Water Use in the Arab Region

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Arab Organization for Agricultural Development (AOAD) - Background

The establishment of AOAD:

On 11/03/1970, the Council of the Arab League approved the establishment of The Arab Organization for Agricultural Development (AOAD). AOAD began its work in 1972 from its headquarters in Khartoum, the capital of the Republic of Sudan. Membership of the organization was completed in 1980 with the accession of all Arab member states of the League of Arab States (LAS).

AOAD is the League of Arab States (LAS) 's technical arm for agricultural development and food security. It has four regional offices, each of which includes a number of countries, namely:

The regional office in the **Maghreb** region hosted by the Republic of Algeria

The regional office in the **middle** Arab region hosted by the Arab Republic of Egypt

The regional office in the **Arabian Peninsula** region hosted by the State of Kuwait

The regional office in the Arab **Mashreq** region hosted by the Hashemite Kingdom of Jordan

Introduction

- **Climate Impact:** Increased temperatures, shifting rainfall patterns, frequent and intense meteorological phenomena.
- **Water Scarcity:** Exacerbation of water scarcity due to climatic changes in a region with high population growth and economic development.
- **Water Security:** The region is warming faster than the global average, threatening water security for over 360 million people.
- **Urgent Action:** Need for immediate action to mitigate impacts and preserve water resources for future generations.

The reality of agricultural performance in the Arab region

Characteristics

1- Agricultural productivity is lower than the global average.

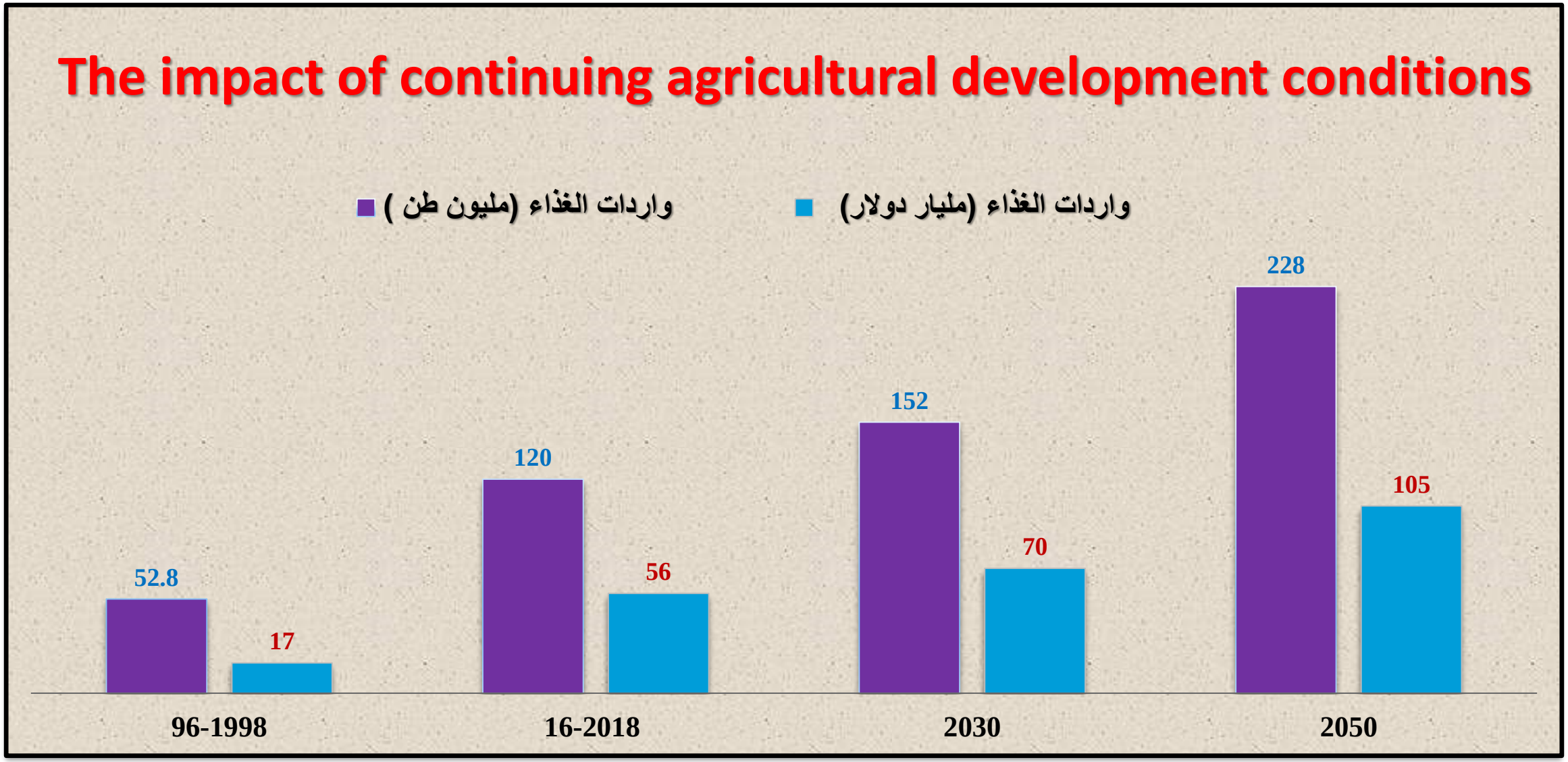
1. 2- Water scarcity and inefficient use.

3- Low adoption of modern agricultural technologies and management systems.

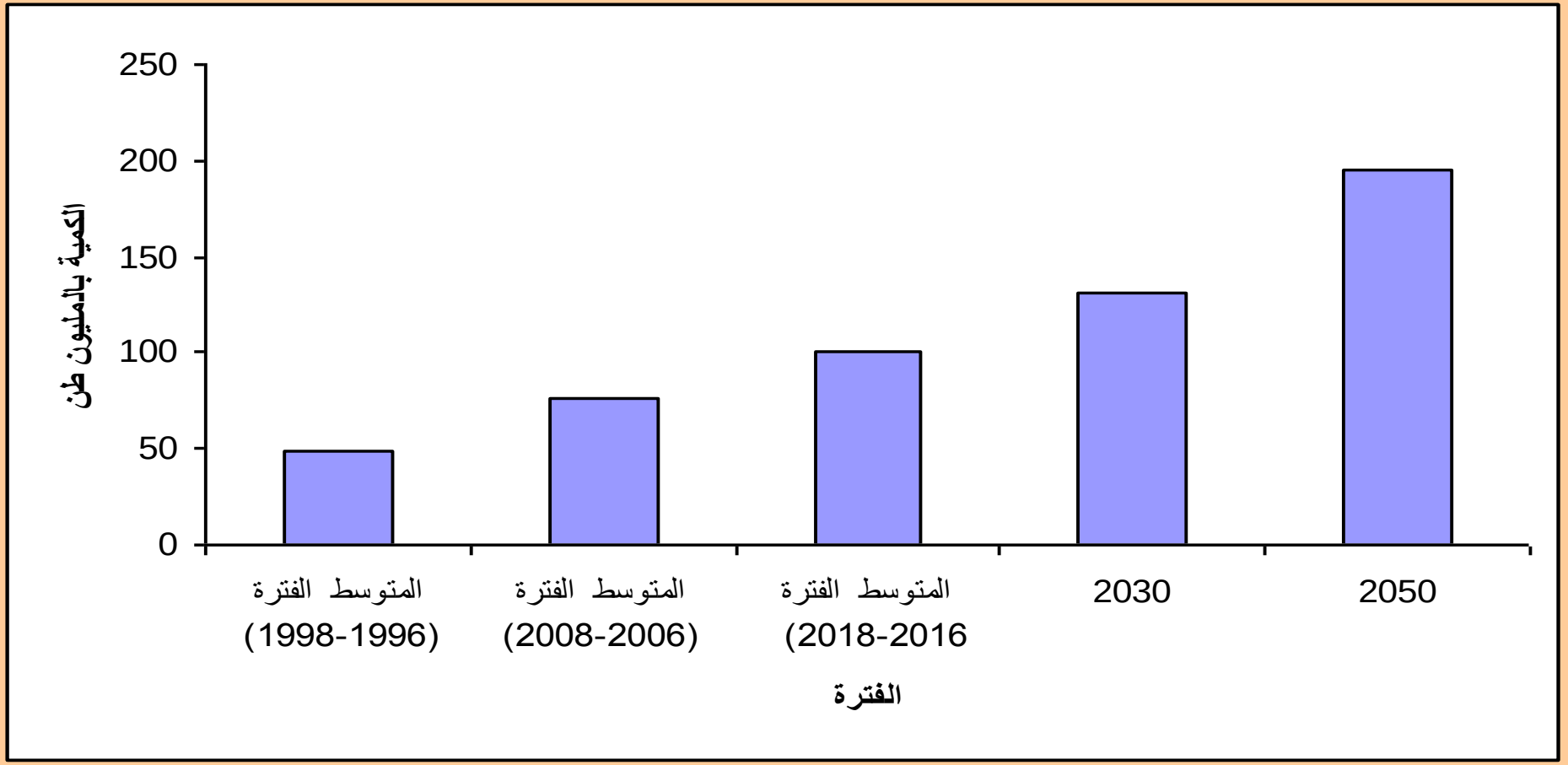
4- Lack of risk prediction capabilities due to inadequate information, which affects timely decision-making.

1. 5- Unregulated exploitation of resources due to weak monitoring and management systems.

The impact of continuing agricultural development conditions



The evolution of the gap for the total food groups in million tons during the periods (1996-1998 /2006-2008 / 2016-2018/ 2030 /2050



Current State of Water Resources in the Arab Region:

- **Conventional** Water Resources
- **Non-conventional** Water Resources

Conventional Water Resources in the Arab Region:

- Conventional water resources refer to **natural water**, such as surface water and groundwater, that **can be accessed and used with minimal treatment**.
  - **Rainfall**: Maybe!!
  - **Surface Water**: Includes **23 major watersheds** with rivers and ephemeral streams (wadis).
  - **Groundwater**: A critical source of water, especially in arid areas

Non-conventional Water Resources in the Arab Region:

- **Definition**: Non-conventional water resources require treatment or special technology to be usable.
- **Types:**
  - **Agricultural drainage reuse**
  - **Treated Municipal & industrial wastewater reuse**
  - **Desalinated water**
  - **Brackish groundwater**
  - **Water, humidity, dew, and fog Harvesting**
  - **Cloud Seeding!**
  - **……. etc.**

Non-conventional Water Resources in the Arab Region (Cont.):

- **Advancements:**
  - Technological improvements have reduced the energy required for desalination by up to 80%
  - Integration of renewable energy with desalination systems to decrease costs
- **Challenges:**
  - Environmental impacts such as increased soil salinity and yield reductions
  - Social acceptance and awareness of the economic benefits of non-conventional water resources

Environmental Challenges and Opportunities

Environmental Challenges in the Arab Region

- **Climate Change and Its Impacts**

Rising Temperatures – Droughts – Extreme Events

- **Water Scarcity and Management**

Water Shortages - Deterioration (Quantity and Quality) of Water Resources

- **Land Degradation and Desertification**

Soil Erosion and Salinization - Impact on Agriculture

- **Pollution and Waste Management**

Solid Waste - Marine Pollution

Environmental Challenges in the Arab Region (Cont.)

- **Governance and Policy**

  Weak Environmental Institutions - Lack of Policy Impact
- **Social Perception and Public Opinion**

  Public Concern - Priority Issues
- **Regional Cooperation and Sustainable Development**

  Need for Regional Cooperation - Sustainable Development

Some Technological advancements in water management and agriculture to tackle the environmental challenges could be:

- **Climate-Resilient Crops**
- **Weather Forecasting**
- **Climate Modeling Technologies**
- **Advanced Irrigation Technologies**
- **Water Recycling and Reuse**
- **Smart Water Management Systems**
- **Soil Health Monitoring**

Some Technological advancements in water management and agriculture to tackle the environmental challenges could be (Cont.):

- Land Management
- Integrated Waste Management Systems (Circular Economy)
- Environmental Monitoring Technologies
- Digital Platforms for Policy Impact
- Educational and Outreach Programs
- Collaborative Technologies

Innovative Water Management Strategies:

- Precision Irrigation Systems
- Smart Irrigation
- Water Reclamation
- Rainwater Harvesting
- Integration of Water Management Strategies
- Seasonal Storage Solutions
- Efficiency in Resource Allocation
- Policy and Regulatory Support

Innovative Water Management Strategies (Cont.):

- Quantum Technologies
- Big Data Analytics
- Artificial Intelligence
- Internet of Things (IoT)
- Robotics
- Remote Sensing
- Community Involvement and Education

The Impact of Technology and Research:

- Enhances the precision and efficiency of water allocation and use.
- Drives the development of sustainable and adaptable water management strategies.
- Supports the Arab region's unique environmental and socio-economic contexts through tailored technological solutions.

Policy and Regulatory Framework

Introduction to Policy and Regulatory Frameworks

- **Need for Policy**: Escalating pressures from increasing demand and dwindling water supplies necessitate effective policy and regulatory frameworks.

- **Integration:** Policies must integrate water-saving practices and climate change mitigation strategies for sustainable water resource management.

Key Components of Effective Water Policies

- Sustainable Utilization
- Climate Change Integration
- Regulatory Revisions

Strategies for Policy Implementation

- Technological Advancements
- Progressive Governance Frameworks
- Robust Policy Structures

Supporting Actions for Sustainable Water Management

- **Research and Development**
- **Cooperative Ventures**
- **Public Awareness and Education**

Future Directions and Recommendations

Strategic Frameworks for Water Management

- Long-Term Objectives
- Integration with Climate Mitigation
- Measurable Targets

Stakeholder Involvement and International Collaboration

- Diverse Stakeholder Engagement
- Transboundary Water Resource Management
- Collaborative Initiatives

Enhancing Water Efficiency and Governance

- **Water Efficiency Goal**
- **Collective Decision-Making**
- **Participatory Approaches**

Thank You