المنتدى العربي للبيئة والتنمية
ARAB FORUM FOR ENVIRONMENT AND DEVELOPMENT

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ARAB ENVIRONMENT·7
FOOD SECURITY
CHALLENGES AND PROSPECTS

THE STATE OF FOOD SECURITY & AGRICULTURAL RESOURCES

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I. Introduction

- The 2007-2008 food crisis and its consequences reignited Arab countries' further commitment to food security, with greater emphasis on food self-sufficiency, away from the vulnerabilities of external sources.
- As the largest importers of cereals which constitute their main food staples, Arab countries give top priority to self-sufficiency in these commodities.
- It is imperative to address the following questions:
  - What is the state of agricultural resources (land and water) in Arab countries, and what is their potential for cereal production?
  - What are the options available for enhancing the cereal food self-sufficiency aspect in Arab countries, in addition to other alternatives for ensuring the supply dimension of food security?

II. State of Food Security

A. Food Production and Self Sufficiency

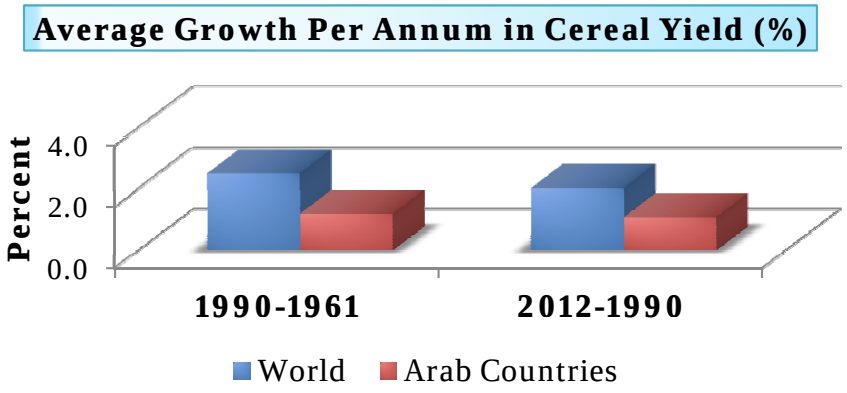
☼ Average cereal food self-sufficiency ratio in Arab countries dropped from about 50 percent in 2005 to about 46 percent in 2011 as shown below.

FOOD SELF-SUFFICIENCY IN ARAB COUNTRIES (%)		
Food Commodity	2005	2011
Cereals	**49.74**	**45.55**
Sugar	38.47	36.85
Fats & Oils	28.12	54.35
Meat	80.80	76.19
Fruits & Vegetables	98.49	106.19
Fish	103.09	98.19
Other Commodities	77.78	82.50
Average	70.48	71.69

Source: Compiled by the author based on data in Arab Organization for Agricultural Development (AOAD) Statistical Yearbooks.

II. State of Food Security

- FAO considers that cereals "are still by far the world's most important sources of food, both for direct human consumption and indirectly, as inputs to livestock production. What happens in the cereal sector is therefore critical to world food supplies."
- Cereal production in the world was driven by increase in cereal yield, unlike in Arab countries where expansion in the area played a major role in cereal production.
- Expansion of cereal area between 1961 and 2012: about 40 percent in Arab countries versus 8.5 percent in the world, with average cereal yield in Arab countries lagging behind at about 1,979 kg/ha compared to 3,619 kg/ha in the world in 2012, and slower average growth in cereal yield in Arab countries.



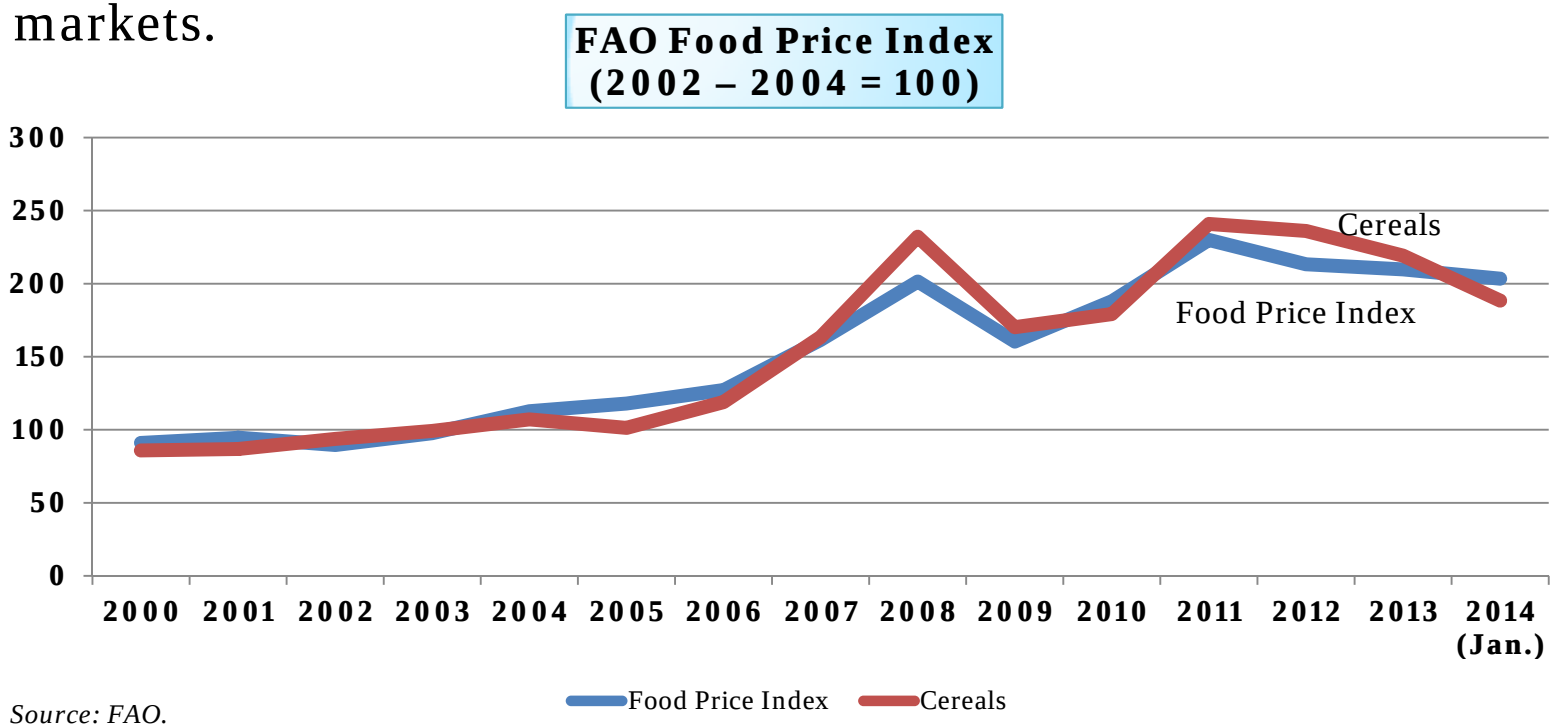
II. State of Food Security

- 88 percent of cereal production (51 million tons) in 2012 was contributed by six countries (Algeria, Egypt, Iraq, Morocco, Sudan, Syria).
- Wide variations in cereal productivity, ranging between 472 kg/ha in Sudan and 7,269 kg/ha in Egypt in 2012.
- **Productivity is key to food security.** The Green Revolution of the 1960s, saved the plight of millions of people in Asia from starvation, but its sustainability has been severely challenged because of its externalities, including soil deterioration, groundwater depletion, and contamination.
- **A new agricultural paradigm is needed** based on agricultural inputs and practices conducive to maintaining the bio-capacity of agricultural resources and their long-term sustainability.

II. State of Food Security

B. Food Imports

☼ The heavy impact of the 2007-2008 food crisis on Arab countries is demonstrated by a food import bill that more than doubled between 2005 and 2011 in line with the sharp rise of food prices in world markets.

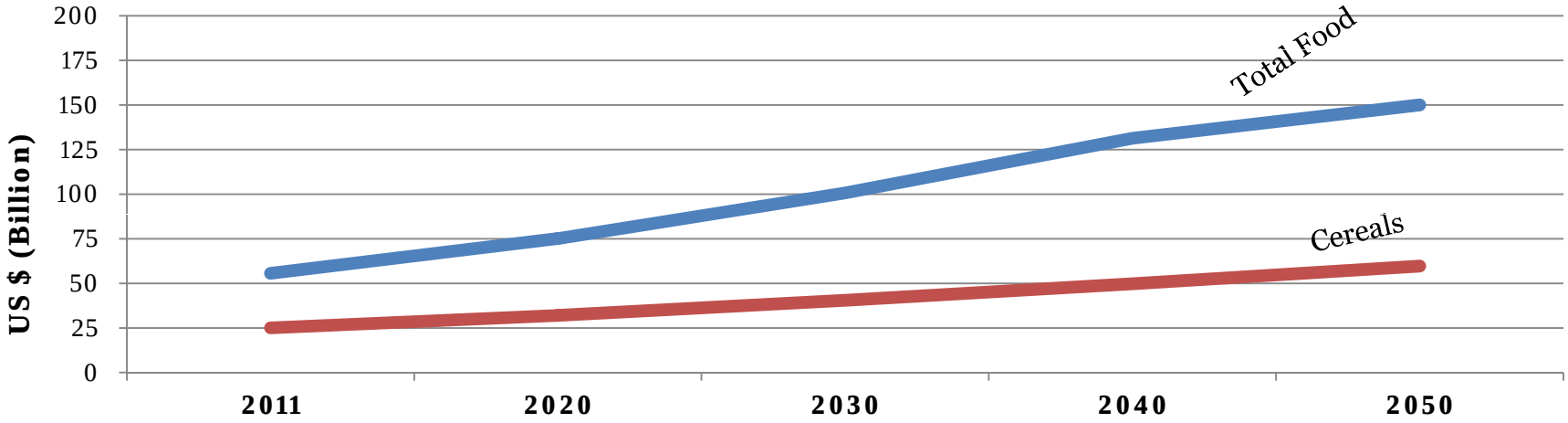


Source: FAO.

II. State of Food Security

- Cost of food imports by Arab countries jumped from about $25 billion, including $10.2 billion for cereals in 2005 to about $56 billion, including $25 billion for cereals in 2011.
- If this trend of food imports were to continue taking into consideration the expected population growth, **the Arab food import bill is likely to shoot up from about $56 billion in 2011 to about $150 billion in 2050.**

Projected Cost of Food Imports in Arab Countries



Source: Author's estimates.

II. State of Food Security

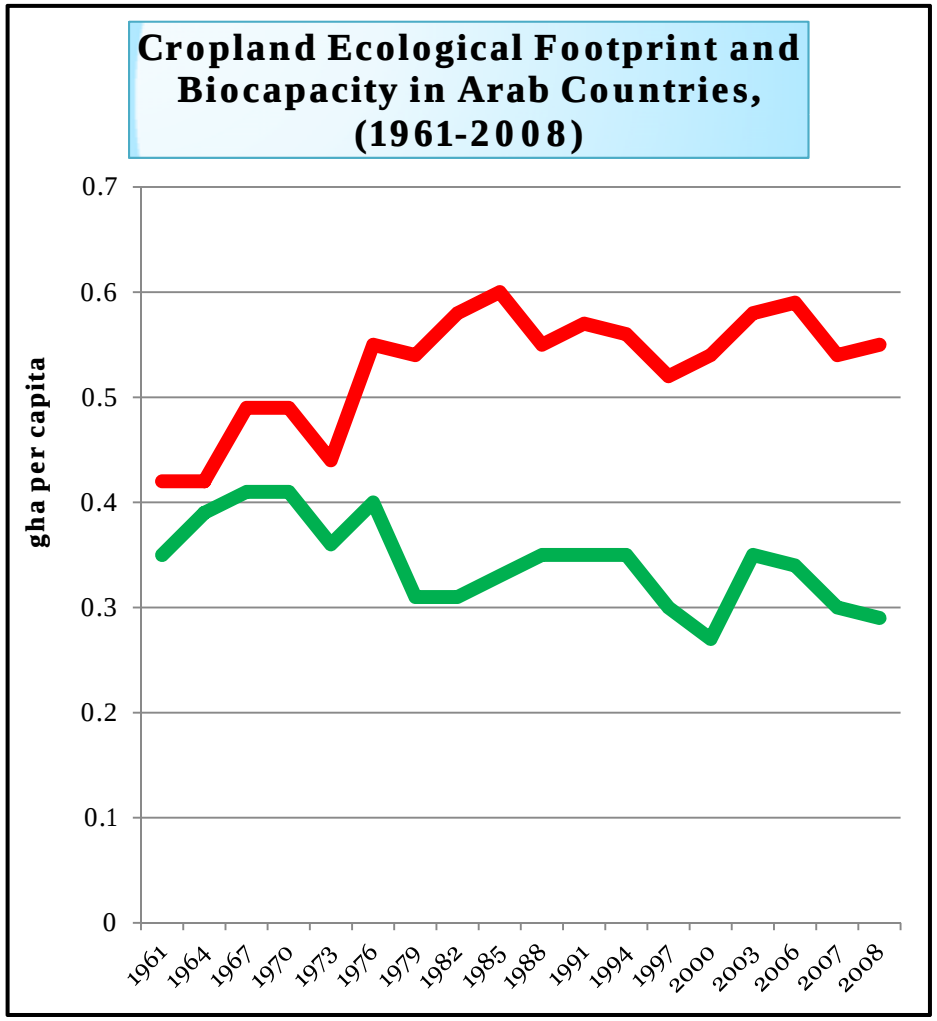
- The outlook for food imports is characterized by rising cost, price fluctuations, uncertainty about food supplies in world markets, impact of climate change, and policies of major food producers.
- Arab countries give top priority to the production of staple cereals which constituted in terms of quantity and value about 63 percent and 45 percent, respectively of total major food imports in 2011.
- The question is what are the prospects for enhancing self-sufficiency, at least, in cereals, and what options are available that can meet this goal?
- Addressing this question requires serious consideration of the state of agricultural resources, their potential, efficient use and sustainability.

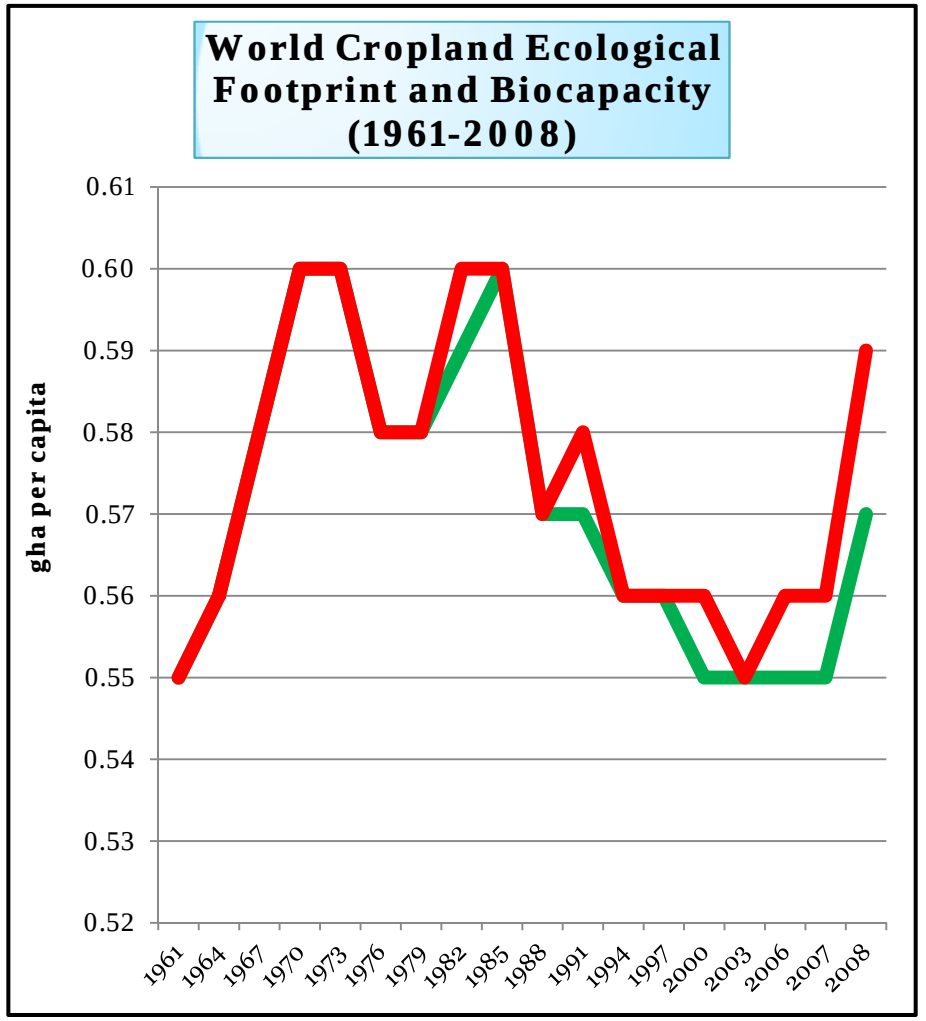
III. State of Agricultural Resources

A. State of Cropland

- In Arab countries, the bio-capacity of land and water resources to regenerate their services over time has been severely constrained by disregard to their health and to the protection of ecosystems.
- This is often reflected in such phenomena as soil erosion, land degradation, depleted aquifers, and water pollution, which altogether loaded land and water resources with a heavy footprint.
- The Global Footprint Network (GFN) survey which covered the period 1961 – 2008 shows that the gap between cropland bi-ocapacity (BC) and the Ecological Footprint (EF), representing consumption of cropland resources in Arab countries has been widening as measured by (gha) per capita, compared with maintaining a balance at the world level.

III. State of Agricultural Resources





Footprint Biocapacity

III. State of Agricultural Resources

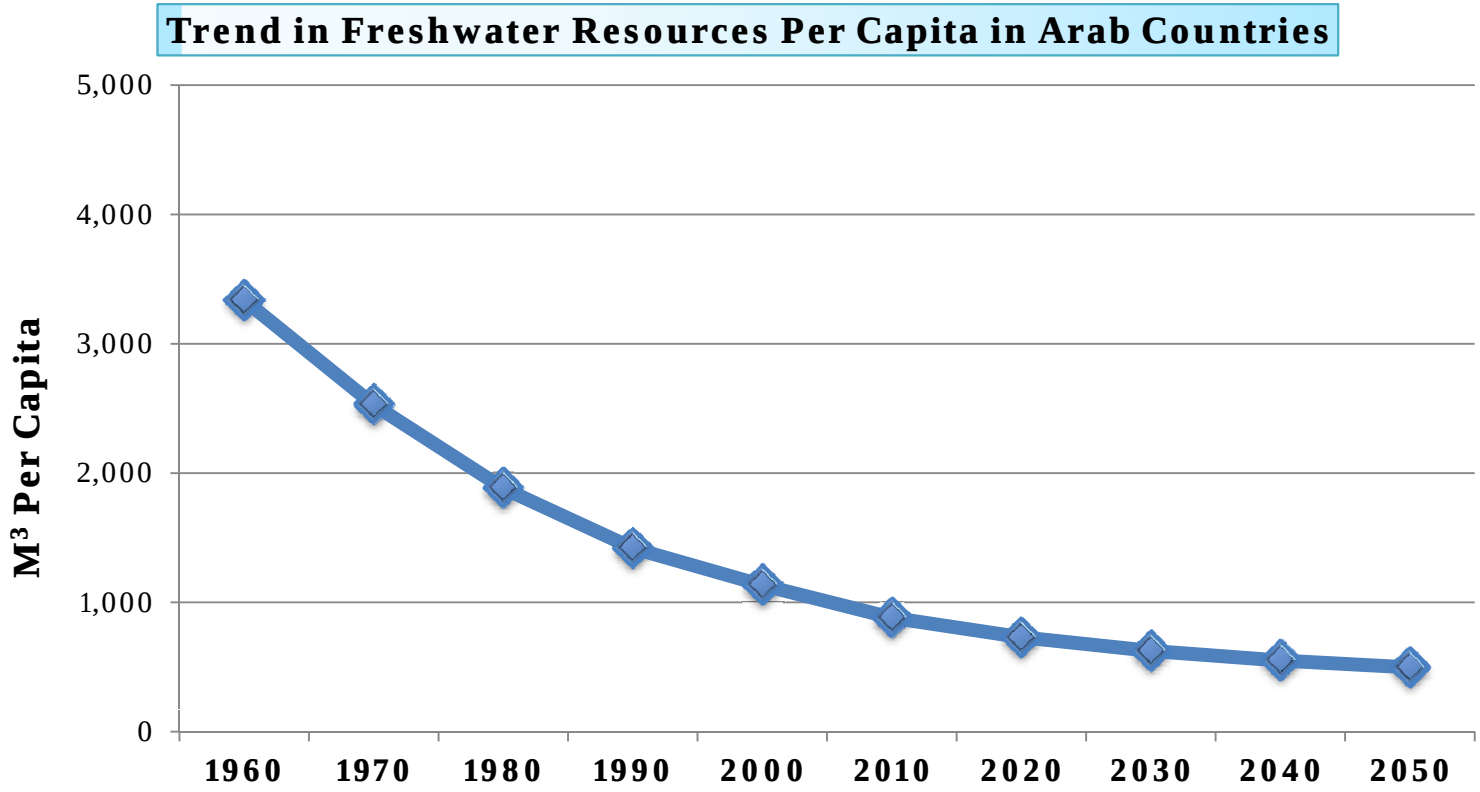
- Despite an increase in population by 250 per cent over the period 1961 – 2008, BC at the regional level was maintained at about 0.30 gha per capita.
- This pattern of stability in cropland BC in past years is not replicable in the future due to limited scope for land expansion, declining cropland area per capita, slower growth in crops yield, and dwindling water resources.

B. State of Water Resources

- The Arab region is the poorest in the world in water resources, in absolute and per capita terms, caused by arid climate and high population growth.
- Water per capita varies widely among Arab countries, ranging between 7 m^3 in Kuwait and 3,147 m^3 in Mauritania, with a regional average of 813 m^3 in 2011, compared to a world average of about 6,500 m^3.

III. State of Agricultural Resources

- Projected population growth will lead to greater pressure on water resources, with a drop in regional per capita average to about 497 m^3 in 2050, and rise in the number of countries facing absolute water scarcity from 13 to 15 countries.



III. State of Agricultural Resources

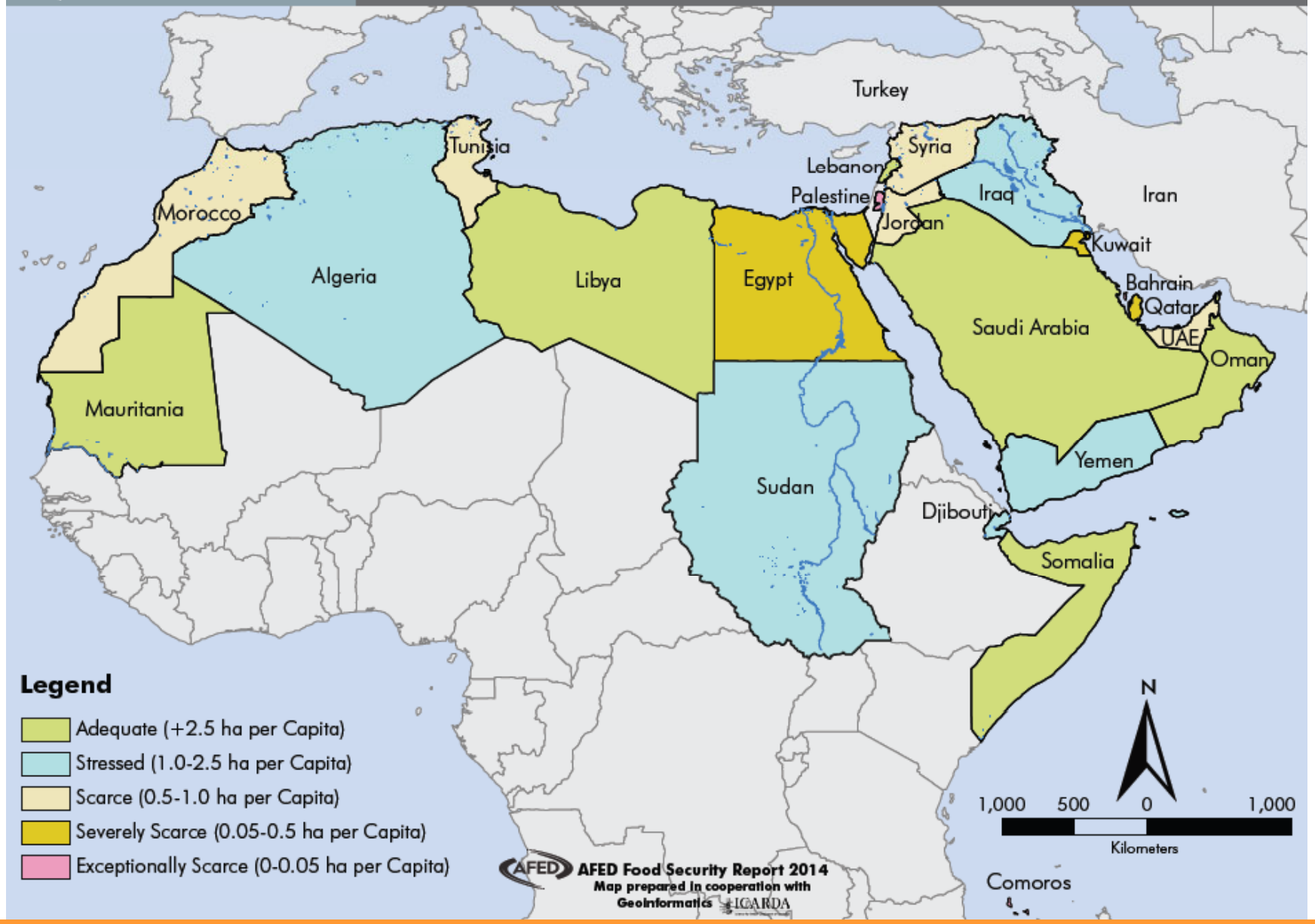
- The bulk of water withdrawals (85 percent) in Arab countries is used for irrigation with an average efficiency of 51 percent.
- Withdrawal of freshwater for agriculture in seven countries (Bahrain, Egypt, Kuwait, Libya, Saudi Arabia, United Arab Emirates, Yemen) ranges between 103 percent (Egypt) and 2,460 percent (Kuwait) of their annual renewable water resources.
- According to FAO, countries are in a critical condition if they use more than 40 percent of their renewable water resources for agriculture, and could be defined as water-stressed if they abstract more than 20 percent of these resources.
- With the exception of Comoros, Djibouti, and Lebanon, all other Arab countries are either in a critical condition or water-stressed.

PRESSURE ON WATER RESOURCES AND USE IN AGRICULTURE

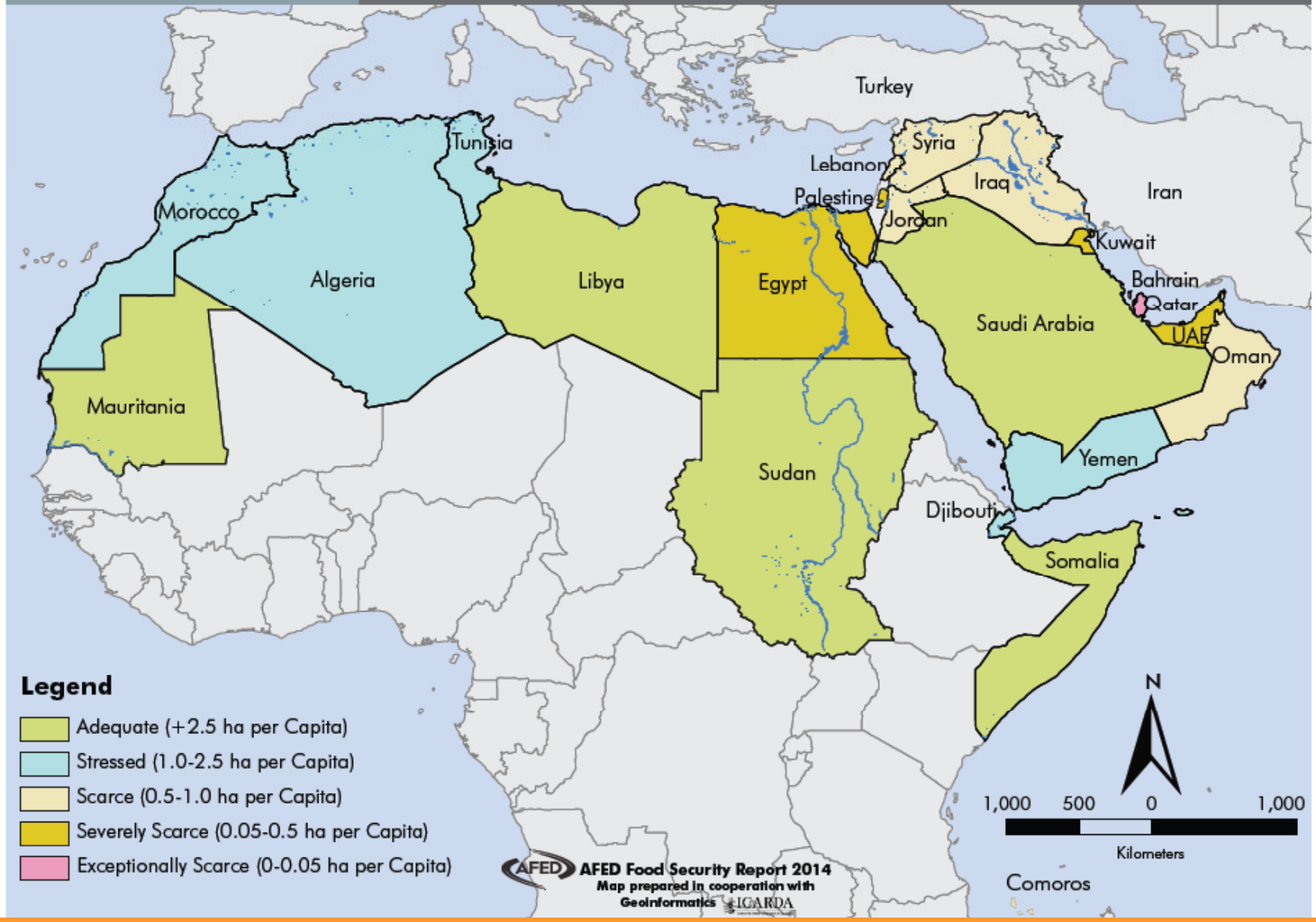
Country / Sub-region	Agriculture share of total water resources (%)
Bahrain	137.20
Kuwait	2,460.00
Oman	83.43
Qatar	451.70
Saudi Arabia	867.91
United Arab Emirates	2,208.00
GCC	**629.15**
Yemen	154.00
GCC & Yemen	**469.53**
Iraq	57.87
Jordan	65.23
Lebanon	17.32
Palestine	22.58
Syria	87.32
Levant	**60.44**

Country / Sub-region	Agriculture share of total water resources (%)
Egypt	103.00
Sudan	40.54
Nile Valley	**69.90**
Algeria	30.01
Libya	517.00
Mauritania	10.73
Morocco	37.97
Tunisia	47.12
North Africa	**37.74**
Comoros	0.39
Djibouti	1.00
Somalia	22.32
African Horn	**20.29**
Arab countries	**65.97**

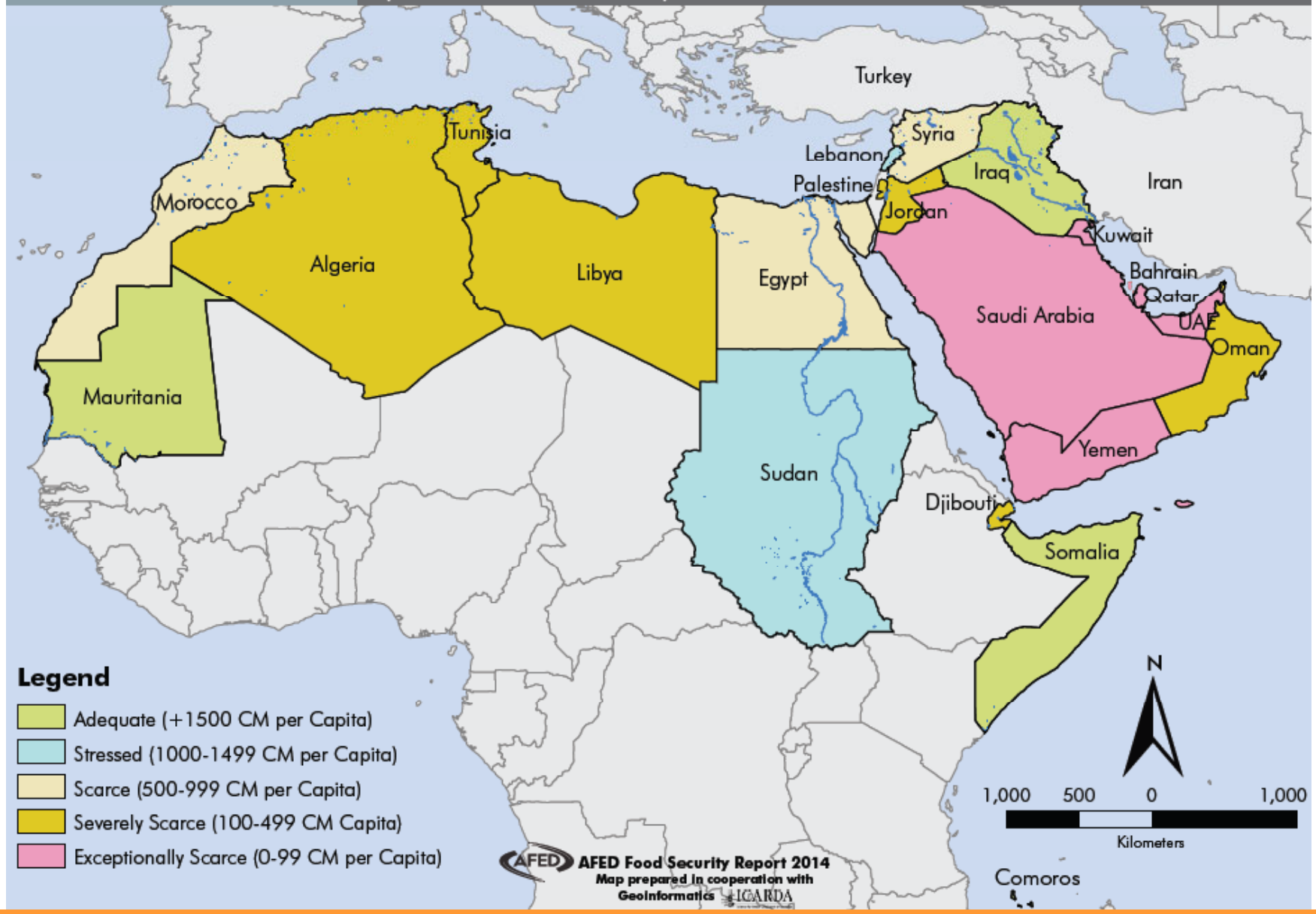
RANGELAND AREA PER CAPITA IN THE ARAB COUNTRIES (HECTARE PER CAPITA)



ARABLE LAND AREA PER CAPITA IN THE ARAB COUNTRIES (HECTARE PER CAPITA)



RENEWABLE WATER RESOURCES PER CAPITA IN THE ARAB COUNTRIES (CUBIC METER PER CAPITA)



IV. Prospects for Enhancing Food Self-Sufficiency

Improving Irrigation Efficiency

- Excluding Egypt, Algeria, and Tunisia, irrigation efficiency in all other Arab countries is about 46 percent.
- Raising irrigation efficiency to 70 percent in these countries would save about 50 billion M^3 of water, enough to produce over 30 million tons of cereals, equivalent to 45 percent of cereal imports with a value of about $ 11.25 billion at 2011 import prices.

Boosting Crop Productivity

- Excluding Egypt with high productivity (7,269 kg/ha), the average productivity of the other five major cereal producers (Algeria, Iraq, Morocco, Sudan, and Syria) is 1,133 kg/ha.
- If these five countries were able to boost cereal yield to world average, their current cereal production (21 million tons), increases by about 47 million tons.

IV. Prospects for Enhancing Food Self-Sufficiency

- ICARDA's research project for enhancing food security in Arab countries, supported by financing from four of the Arab national and regional development institutions shows encouraging results on wheat production in some Arab countries.
- These results demonstrate the importance of intensifying agricultural research and disseminating results at large scale to farmers for application with best farming practices.

Improving Rain-fed Crop Productivity

- FAO points out that work in some developing countries including Sudan has shown that yields can be increased two to three times through rainwater harvesting compared with conventional dry farming.
- Improving yield on current rain-fed cereal area in the Arab region two to three times would increase cereal production by about 15 to 30 million tons.
- These rough estimates represent an order of magnitude, and are indicative of the considerable potential for enhancing cereal self-sufficiency through research and investment in rain-fed agriculture, application of best agricultural practices, and good management of available agricultural resources.

IV. Prospects for Enhancing Food Self-Sufficiency

Improving Water Productivity

- Maximizing water productivity entails complementing and reinforcing water with a composite of factors, such as adoption of efficient and modern irrigation schemes and improved inputs conducive to agricultural sustainability.
- Water harvesting, deficit irrigation, water conservation, and organic farming are not only conducive to raising water productivity, but they are significantly important for agricultural sustainability.
- The benefits or water use efficiency and water productivity can be far more than water savings per se. Other benefits include reduction of energy costs, lower cost of crops production, less greenhouse emissions, and more price competitive crops.

Reducing Post-Harvest Losses

- Losses can be attributed to improper methods of harvesting, processing, transportation, and storage, as well as to inefficient import supply logistics.
- Reduction of cereal losses along the food supply chain cannot be overemphasized. Losses represent not only waste of food, but also waste of natural resources, including land, water, energy, labor, agricultural inputs and damage to the environment.

IV. Prospects for Enhancing Food Self-Sufficiency

Use of Treated Wastewater

- The limited reuse of wastewater in general and for agriculture, in particular, can be attributed to economic, health, institutional and environmental issues.
- Countries which have made significant strides with use of treated wastewater, their fully-fledged local state regulations have been supported by guidelines and the setting of basic conditions of wastewater treatment and safe reuse.

Virtual Water

- Virtual water is an option for water-scarce countries to address food security concerns, and despite reservations it remains useful in the context of a country's water situation, and the overall role of agriculture in economic and social development.

Adapting to Climate Change

- It is reported that rain-fed crop yields in the Arab region are expected to decrease by an overall average of 20 percent in Arab countries, and by almost 40 percent in Algeria and Morocco.
- Arab countries need to implement mitigation and adaptation policies and measures based on validated country weather data and relevant prediction models.

IV. Prospects for Enhancing Food Self-Sufficiency

Regional Cooperation

- Regional cooperation in food security requires an approach based on:
  - Harmonization of agricultural strategies and policies.
  - Implementation of agricultural practices, regulations, measures and incentives conducive to the efficient use of resources, and facilitation of intra-regional agricultural trade through reduction of trade barriers, improved marketing information, and provision of infrastructure for communication and transport are of critical importance for accessibility to food.

Inter-Regional Cooperation

- The Arab region has limited land and scarce water resources, but Africa has an untapped agricultural potential. Geographical proximity and comparative advantage can be used to the benefit of both regions, including promoting food security.

V. Conclusion and Recommendations

- Notwithstanding the limited and impoverished state of agricultural resources, there remains considerable prospects for enhancing food self-sufficiency and the broader supply aspects of food security.
- A number of options has been identified. With no-size-fits-all approach, a set of recommendations for informed policy and decision-making in the quest to ensure food security are described hereunder as follows:
  - Adoption of policies and practices conducive to the efficient and sustainable utilization of land and water resources to ensure regenerating their ecological, economic, social, and environmental services.
  - Saving water by increasing irrigation efficiency through rehabilitation and timely maintenance of water transport systems, and the use of modern methods for farm irrigation.

- Boosting crop productivity, especially cereals, in irrigated and rain-fed systems is key to enhancing food self-sufficiency and call for providing adequate funding for agricultural research institutions and organizations to intensify their research for developing high-yielding, salt-resistant, and drought-tolerant crop varieties.
- Improving water productivity by producing more crop with less water requires knowledge-based farming practices, farmer discipline on farm water-saving methods and incentives, including appropriate pricing for irrigation water.
- Encouraging safe wastewater reuse through suitable treatment for irrigation, supported by a management approach and national guidelines to raise public awareness, establish confidence and new attitudes towards water reuse and its economic, social, and environmental benefits.
- Giving greater attention to the reduction of crop post-harvest losses throughout the food supply chain, as well as to losses due to inefficient import supply chain logistics. Adequate infrastructure, proper facilities and efficient logistics are needed to preserve the quantity and quality of food products.
- Reducing the impact of a changing climate on food supply calls for the need to implement mitigation and adaptation policies and measures based on validated weather data and relevant prediction models.

- Acquiring food through the 'virtual water' concept requires thorough evaluation of its political, economic, social, and environmental implications, especially its impact on domestic agriculture and its role in the development of the national economy.
- Strengthening Arab regional cooperation in food security requires harmonization and coordination of national agricultural strategies and policies, with special attention to the management of land and water resources and their efficient utilization.
- Enhancing food accessibility at regional level requires the facilitation of intra-regional trade in agricultural products through reduction or elimination of trade barriers, improved marketing information, and the provision of infrastructure for communication and transport.
- Promoting south-south cooperation in food security concerns, such as between the Arab and African countries is an option that merits high consideration due to the geographical proximity of the Arab and African regions, and their comparative advantages in agricultural resources and investable capital.
- Prioritizing available options based on economic, social and environmental considerations, and mobilizing public and private resources for their implementation.

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