EXECUTIVE SUMMARY

FOOD SECURITY IN ARAB COUNTRIES

CHALLENGES AND PROSPECTS

2014 ANNUAL REPORT OF THE ARAB FORUM FOR ENVIRONMENT & DEVELOPMENT (AFED)

In their quest to enhance food self-sufficiency, Arab countries face serious challenges emanating from a backdrop of constraining factors, including aridity, limited cultivable land, scarce water resources and serious implications of climate change. Weak policies, insufficient investment in science and technology and agricultural development have contributed to the impoverished state of agricultural resources and to their inefficient use and low productivity. Population growth, rising demand for food, degradation of natural resources, and conversion of farmland to urban uses pose further challenges to the enhancement of the food security goal in the Arab region. The food deficit is underscored by a self-sufficiency ratio of about 46 percent in cereals, 37 percent in sugar, and 54 percent in fats and oil.

Food and water are inextricably linked. The Arab region faces the dilemma of water scarcity, reflected in the fact that the annual renewable water resources per capita are less than 850 m^3, compared to a world average of about 6000 m^3. This regional average masks the widely varying levels among countries, of which 13 are classified in the severely water scarce category, at less than 500 m^3 per capita. The situation is so alarming in six of these countries, with availability of renewable water less than 100 m^3 per capita, that this report has created a special "exceptionally scarce" category for them.

Water scarcity in the Arab region is accentuated by the utilization of about 85 per cent of total water withdrawals for the agriculture sector, which is characterized by low irrigation efficiency and crop productivity. Immense pressure has been exerted on the scarce water resources, including non-renewable groundwater, as reflected in the high rates of water withdrawals for agriculture, averaging about 630 percent of total renewable water resources in Gulf Cooperation Council (GCC) countries, reaching about 2,460 percent in Kuwait. 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 extract more than 20 percent of these resources. Based on this definition 19 Arab countries could be defined as water-stressed, because their current abstraction rates from their renewable water resources for agriculture greatly overshoot the defined limits.

Improving the state of food security in Arab countries through domestic production, under limited cultivable land, highly stressed and dwindling water resources, coupled with an impoverished bio-capacity of agricultural resources, is a challenging task. Nevertheless, considerable prospects do exist for enhancing the food self-sufficiency ratio through adoption of the right polices and improved agricultural technologies, and setting up an integrated food value chain capable of

ensuring food security built on the pillars of availability, accessibility, utilization and stability of food.

Improving the self-sufficiency aspect of food security requires an all-inclusive regionally integrated approach, recognizing the interdependence of the food-water-energy nexus, and a new paradigm of agricultural sustainability, based on economic, social, and environmental considerations. Within this framework, a number of options can be identified to enhance the food self-sufficiency ratio, particularly through the efficient utilization of available agricultural resources, in addition to livestock and fisheries resources. These options include the following:

Improving Irrigation Efficiency: Producing more agricultural outputs with less water is an option of significant importance for enhancing food security in water-scarce countries. It depends on the right type of canals used to deliver water to the field, more efficient irrigation methods, such as sprinkler and drip irrigation, raised broad-bed planting and the level of farmer organization and discipline.

Average irrigation efficiency in 19 Arab countries is below 46 percent. It is estimated that raising this figure to 70 percent would save about 50 billion m^3 of water annually. With an irrigation requirement of 1,500 m^3 of water per ton of cereals, this would be enough to produce over 30 million tons, equivalent to 45 percent of cereal imports with a value of about US$11.25 billion at 2011 import prices.

Boosting Crop Productivity: Crop productivity in the Arab region is generally low, particularly that of staple cereals, averaging about 1,133 kg/ha in five major cereal producers (Algeria, Iraq, Morocco, Sudan, and Syria), compared to a world average of about 3,619 kg/ha. Ongoing research by the International Center for Agricultural Research in the Dry Areas (ICARDA) has shown considerable increases in wheat yield at demonstration fields versus farmers' fields in both irrigated and rain-fed systems in countries such as Egypt, Morocco, Sudan, Syria, and Tunisia. For example, raised-bed planting in Egypt resulted in a 30 percent increase in grain yield, 25 percent saving in irrigation water, and 72 percent in water use efficiency.

It is critically important to improve crop productivity in rain-fed areas, which constitute over 75 percent of the cultivated area in the Arab region. FAO and ICARDA refer to various forms of rain-water harvesting including in situ water conservation, flood irrigation, and storage for supplementary irrigation. Work in some developing countries has shown that yields can be increased two to three times through rain-water harvesting, compared with conventional dry farming. Increasing average rain-fed cereal yield from its current level of about 800 kg/ha to two to three times would add between 15 to 30 million tons of cereal to current annual production of about 51 million tons in the Arab region.

Improving crop yield in irrigated and rain-fed areas has a considerable potential for enhancing food self-sufficiency in the Arab region, through promoting agricultural research, technology transfer and investment in rain-fed agriculture. Application of best agricultural practices is crucial, including optimization of the use of fertilizers, pesticides and other inputs, coupled with good management of the available agricultural resources. However, the impact of climate change in the Arab region is expected to be manifested in drastic decline in crop productivity, and needs to be addressed through the adoption of effective adaptation and mitigation measures.

Improving Water Productivity: In addition to increasing irrigation efficiency, water productivity can be increased in either economic or physical terms, through the allocation of water to higher value crops or by achieving 'more crop per drop' of water, respectively. The choice of which of these options to pursue depends on whether crop value or quantity is more relevant to a country within the broader political, economic, social, and environmental context.

Water productivity can be enhanced by a combination of factors, including improved agricultural practices, such as modern irrigation methods, improved drainage, conservation agriculture or no-till farming, utilization of the available improved seed, optimizing fertilizer use, innovative crop protection techniques, and effective extension services. Such farming practices as water harvesting, supplemental and deficit irrigation, water conservation, and organic agriculture are not only conducive to raising water productivity, but they are also very important for enhancing agricultural sustainability. In addition, water productivity can be further improved by shifting consumption habits towards less water-intensive. crops of similar nutritional value.

Use of Treated Wastewater: Wastewater remains largely untapped for agricultural use in Arab countries. Only about 48 percent of municipal wastewater of about 14,310 million m^3 annually is treated, with the remaining amount discharged without treatment. The amount used for agricultural irrigation does not exceed 9 percent of the treated wastewater in countries such as Egypt, Jordan, Morocco and Tunisia, while countries use about 37 percent of treated wastewater for agriculture.

The fact that a higher percentage of treated wastewater is used for agriculture in GCC countries than in other Arab countries is prompted by the severe scarcity of freshwater resources, and the enormous pressure impacted on them through withdrawal for agriculture use, in addition to adopting improved treatment standards to ensure safe use of treated wastewater. Nevertheless, with different suitable treatment levels, wastewater can be reused as a source of non-potable water for a multitude of agricultural, industrial, and household activities, releasing pressure on freshwater resources and the environment.

Where food production is heavily dependent on rain-fed agriculture and freshwater resources are declining rapidly, the alternative of water reuse for irrigation in Arab countries should be encouraged and supported. According to FAO, by converting from rain-fed to irrigated agriculture, it is possible not only to increase yields of most crops by 100 to 400 percent, but can also allow for the growth of alternative crops with higher income and value.

Reducing Post-harvest Losses (PHL): The main causes of these losses are attributed to improper methods used in the harvesting, processing, transportation, and storage of the crops, as well as inefficient import supply chain logistics. It is estimated that the annual losses of grains in Arab countries amounted to about 6.6 million tons in 2012. In addition, loss in imported wheat in some Arab countries translates to about 3.3 million tons due to inefficient import logistics. The combined value of grain PHL and wheat import losses amount to about US$3.7 billion at 2011 import prices, which represents 40 percent of the wheat produced in all Arab countries in value terms. This is equivalent to about four months worth of wheat imports.

A reduction in cereal losses along the food supply chain cannot be overemphasized,

because such losses represent a waste in food supply and other natural resources, including land, water, energy, fertilizers, pesticides and labor. This is intensified by environmental damage, including excessive greenhouse emissions from agricultural activities along the food chain.

Regional Cooperation: Cooperation among Arab countries based on comparative advantage in agricultural and financial resources is a key option for enhancing food security at the regional level. To be effective it requires an approach based on the harmonization of national agricultural strategies and policies; more investment in science and technology and agricultural development; regulations, measures and incentives conducive to the efficient use of resources; and the conservation of the productive bio-capacity of land and water resources which constitute the cornerstone for food production at the national, sub-regional, and regional levels.

Development of Livestock and Fisheries: Arab countries have considerable livestock and fisheries resources. They are almost self-sufficient in fish, but about 25 percent of meat demand is being met through imports. This percentage is expected to increase in the future driven by population, wealth and urban growth.

The productivity of the livestock sector in the Arab region is hampered by the scarcity of natural resources, in particular degradation of rangelands and insufficient sources of feed and water. Lack of support for infrastructure and services and arbitrary policies has affected the livestock sector negatively. Producing feed locally has resulted in the deterioration of non-renewable water resources, and the degradation of rangelands and feed resources, leading to loss of biodiversity, soil erosion, and consequently livestock productivity. In the face of high aridity and vast areas of marginal land, pastoralists and rain-fed livestock production systems remain the most resilient, thus policies supporting their movement and access to grazing lands are needed. More so, well integrated crop and livestock production systems at various levels provide opportunities to increase overall production, diversity, and economic sustainability of both sectors.

The fisheries sector in Arab countries has a great potential not only to meet domestic demand, but also to be exported. In 2013, fish exports amounted to 912,460 tons, with a value of about US$3 billion. However, there is potential to further growing these exports; unlocking the potential of the fisheries sector requires addressing the various problems and bottlenecks facing its development. Most importantly, there is a need for investing in the fishing industry and, among other things, enacting laws and legislation with respect to fishing in natural grounds and in fish farming activities, to ensure the sustainability of the sector and its contribution to a country's welfare. Shared governance of fisheries stocks in Arab countries is also crucial, since cross maritime borders are impacted by the health of entire watersheds.

Fish is not a less important source of protein intake than meat. Consuming fish should be encouraged to reduce excessive consumption of meat for economic and health reasons, as well as considering the impact of livestock production on the scarce water resources and the environment. In general, an awareness campaign is needed to encourage consumers to adapt their food consumption habits towards healthier patterns, and more conducive to the sustainability of agricultural resources.

Other Options: Despite reservations about the virtual water concept as a policy

tool for addressing challenges related to the water-food nexus, it remains useful in the context of a country's specific water situation, and the overall role of agriculture in economic and social development.

The virtual water concept can be an important tool for cooperation on food security between regions based on their geographical proximity, and comparative advantage in agricultural resources. This could for instance mean expanded cooperation between Arab and African countries, where limited land and water scarcity in Arab countries can be compensated by the comparative advantage of African countries in natural and agricultural resources.

THE WAY FORWARD

While embarking on a path towards enhancing food security through promoting domestic food production, Arab countries need to adopt policies and take actions, with due consideration to the following recommendations:

a. Strengthen regional cooperation among Arab countries, based on comparative advantage in agricultural and investable capital resources, coupled with coordination and harmonization of agricultural development strategies and programs.

b. Take the necessary actions to reverse the deteriorating state of agricultural resources and maintain their bio-capacity to regenerate their services and contribution to food security.

c. Consider implementation of the available options for enhancing the self-sufficiency aspect of food security, including, among others, boosting crop and water productivity, improving water-use efficiency, reducing post-harvest and other losses, and promoting the use of treated wastewater for irrigation.

d. Allocate more investment in agricultural scientific research and development programs, supported by adequate financial resources, as well as human and institutional capacity development geared towards research for more productive and environmentally protective inputs and agricultural practices, with the aim of boosting the productivity of rain-fed and irrigated agriculture.

e. Undertake the required investments to develop the livestock and fisheries sectors, in a sustainable manner, with a view to increase production to meet local demand and promote the potential for exports.

f. Implement an awareness campaign to change consumption patterns, especially through more dependence on commodities with similar nutritional value, but which are less water-intensive.

g. Adopt an integrated approach to food security, incorporating all food value-chain components, comprising harvesting, transporting, storing, and marketing, to make food available, accessible, and utilizable with good quality at the right time and place.

h. Develop responses to cope with the threat of climate change on food security in the region through adaptation strategies, based on relevant and reliable climate forecasting models, with the adoption of improved agricultural practices and water management, conservation agriculture, diversification of crops, and selection of crops and cultivars best suited to the predicted conditions, among other adaptation and mitigation measures.

ACTUAL RENEWABLE WATER RESOURCES, ARABLE LAND AREAS AND RANGELAND AREAS PER CAPITA IN THE ARAB COUNTRIES

Country	Country Area (ha)	Population	Arable Land area (ha)	Percentage Arable Land (%)	Arable Land/capita (ha)	Rangeland Area (ha)	Percentage Rangeland (%)	Rangelands/ capita (ha)	RWR/capita (cubic meter)
GCC									
Bahrain	80,000	1,317,827	8,800	11	0.01	36,371	45	0.03	83.36
Kuwait	1,780,000	3,250,496	160,200	9	0.05	1,581,291	89	0.49	6.92
Oman	30,950,000	3,314,001	1,857,000	6	0.56	12,964,448	42	3.91	482.1
Qatar	1,160,000	2,050,514	69,600	6	0.03	989,457	85	0.48	29.91
Saudi Arabia	214,970,000	28,287,855	174,125,700	81	6.16	157,900,003	73	5.58	83.61
United Arab Emirates	8,360,000	9,205,651	418,000	5	0.05	6,652,101	80	0.72	18.5
Yemen	52,800,000	23,852,409	23,232,000	44	0.97	37,381,458	71	1.57	82.13
Levant									
Iraq	43,430,000	32,578,209	8,251,700	19	0.25	35,948,750	83	1.1	2666
Jordan	8,880,000	6,318,000	976,800	11	0.15	5,871,649	66	0.93	145.1
Lebanon	1,020,000	4,424,888	632,400	62	0.14	31,620,000	31*	7.15	1049
Syria	18,360,000	22,399,254	13,770,000	75	0.61	13,594,471	74	0.61	795.5
Palestine	600,000	4,046,901	258,000	43	0.06	158,692	26	0.04	196
Nile Valley									
Egypt	99,550,000	80,721,874	3,982,000	4	0.05	8,751,808	9	0.11	682.5
Sudan**	237,600,000	37,195,349	109,296,000	46	2.94	66,069,830	28	1.78	1411
North Africa									
Algeria	238,170,000	38,481,705	40,488,900	17	1.05	44,553,283	19	1.16	319.8
Libya	175,950,000	6,154,623	15,835,500	9	2.57	27,182,552	15	4.42	108.2
Mauritania	103,070,000	3,796,141	40,197,300	39	10.59	54,167,647	53	14.27	3147
Morocco	44,630,000	32,521,143	29,902,100	67	0.92	21,677,682	49	0.67	889.6
Tunisia	15,540,000	10,777,500	10,101,000	65	0.94	10,135,549	65	0.94	429.2
African Horn									
Comoros	190,000	717,503	157,700	83	0.22	-	0	0	1552
Djibouti	2,320,000	859,652	1,693,600	73	1.97	1,952,779	84	2.27	325
Somalia	62,730,000	10,195,134	43,911,000	70	4.31	34,683,330	55	3.4	1500

Renewable Water Resources

+1500 CM per Capita/Yr	Adequate
1000 – 1499 CM per Capita/Yr	Stressed
500 – 999 CM per Capita/Yr	Scarce
100 – 499 CM per Capita/Yr	Severely scarce
0 – 99 CM per Capita/Yr	Exceptionally Scarce

Arable Land

+2.5 ha per Capita	Adequate
1.0 - 2.5 ha per Capita	Stressed
0.5 - 1.0 ha per Capita	Scarce
0.05 - 0.5 ha per Capita	Severely scarce
0 – 0.05 ha per Capita	Exceptionally Scarce

Rangelands

+2.5 ha per Capita	Adequate
1.0 - 2.5 ha per Capita	Stressed
0.5 - 1.0 ha per Capita	Scarce
0.05 - 0.5 ha per Capita	Severely scarce
0 – 0.05 ha per Capita	Exceptionally Scarce

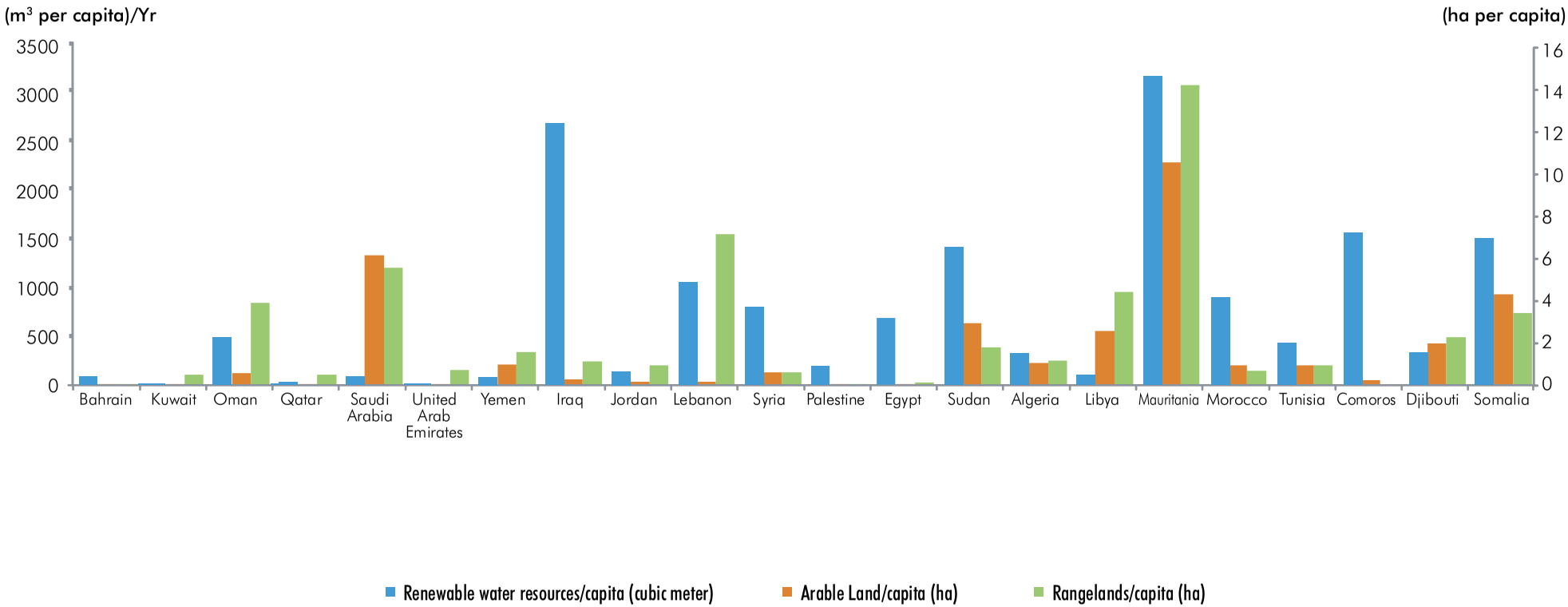
Note: Stressed, Scarce and Severely Scarce are based on FAO classification of renewable water availability per capita. Adequate and Exceptionally Scarce are two categories introduced by AFED for this table to reflect special extreme situations in the Arab countries.

Notes:
- Renewable Water Resources: AFED Report 2014, based on chapter 1, table 6.
- Arable land: Adapted from World Bank - World Development Indicators - 2014, the data refer to year 2011.
- Rangeland: ICARDA Benchmarks of WANA project. Similarity analysis report, Amman, Jordan 2013.

* The World Bank. November 2003. Republic Of Lebanon. Policy Note on Irrigation Sector Sustainability. Report No. 28766 – LE. Page (14).
**Data reflect situation before the separation of South Sudan.

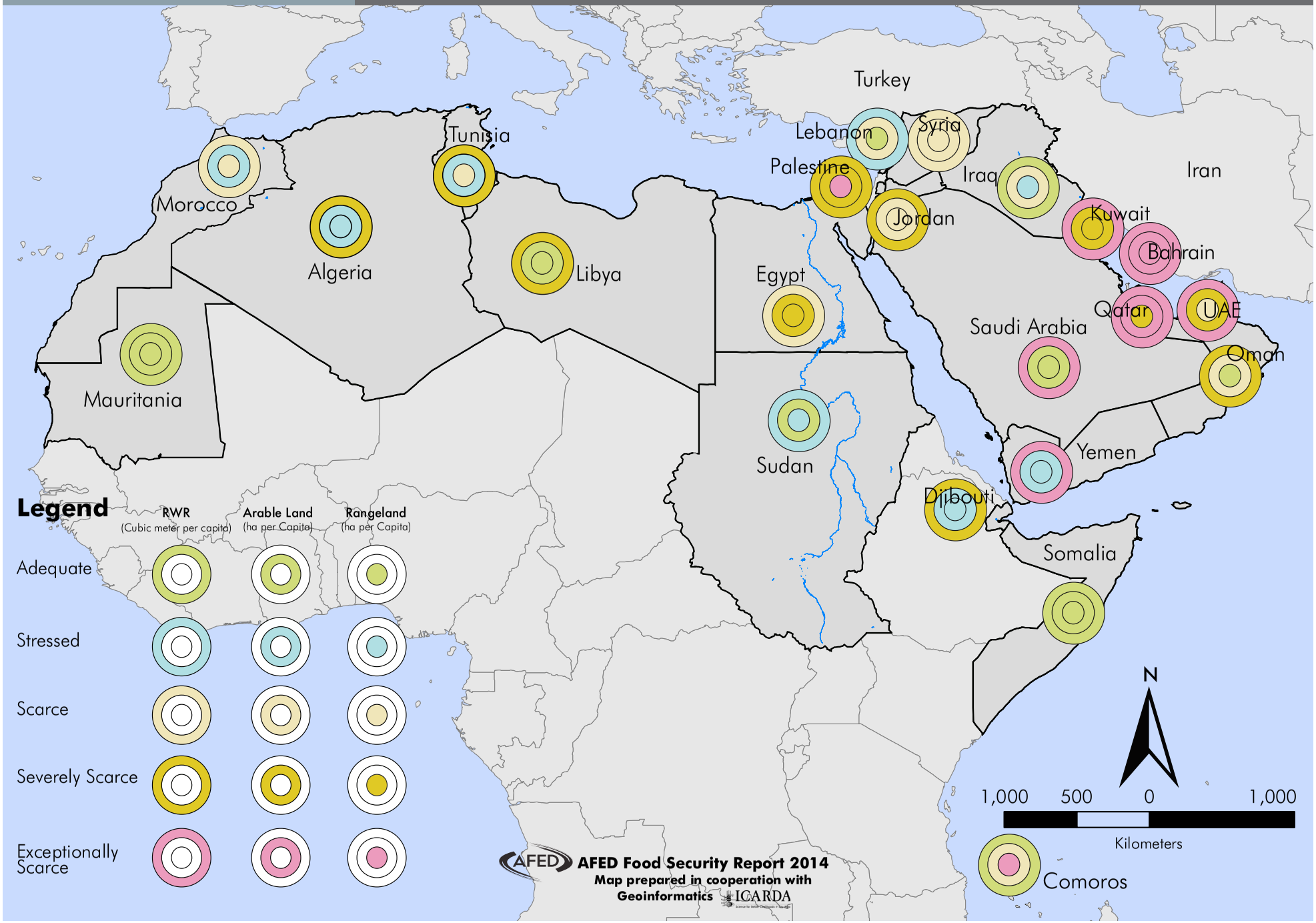
The table has been prepared in cooperation with Geoinformatics - ICARDA

RENEWABLE WATER RESOURCES, ARABLE LAND AREA AND RANGELAND AREA PER CAPITA IN THE ARAB COUNTRIES



2014 AFED ANNUAL REPORT
FOOD SECURITY IN ARAB COUNTRIES

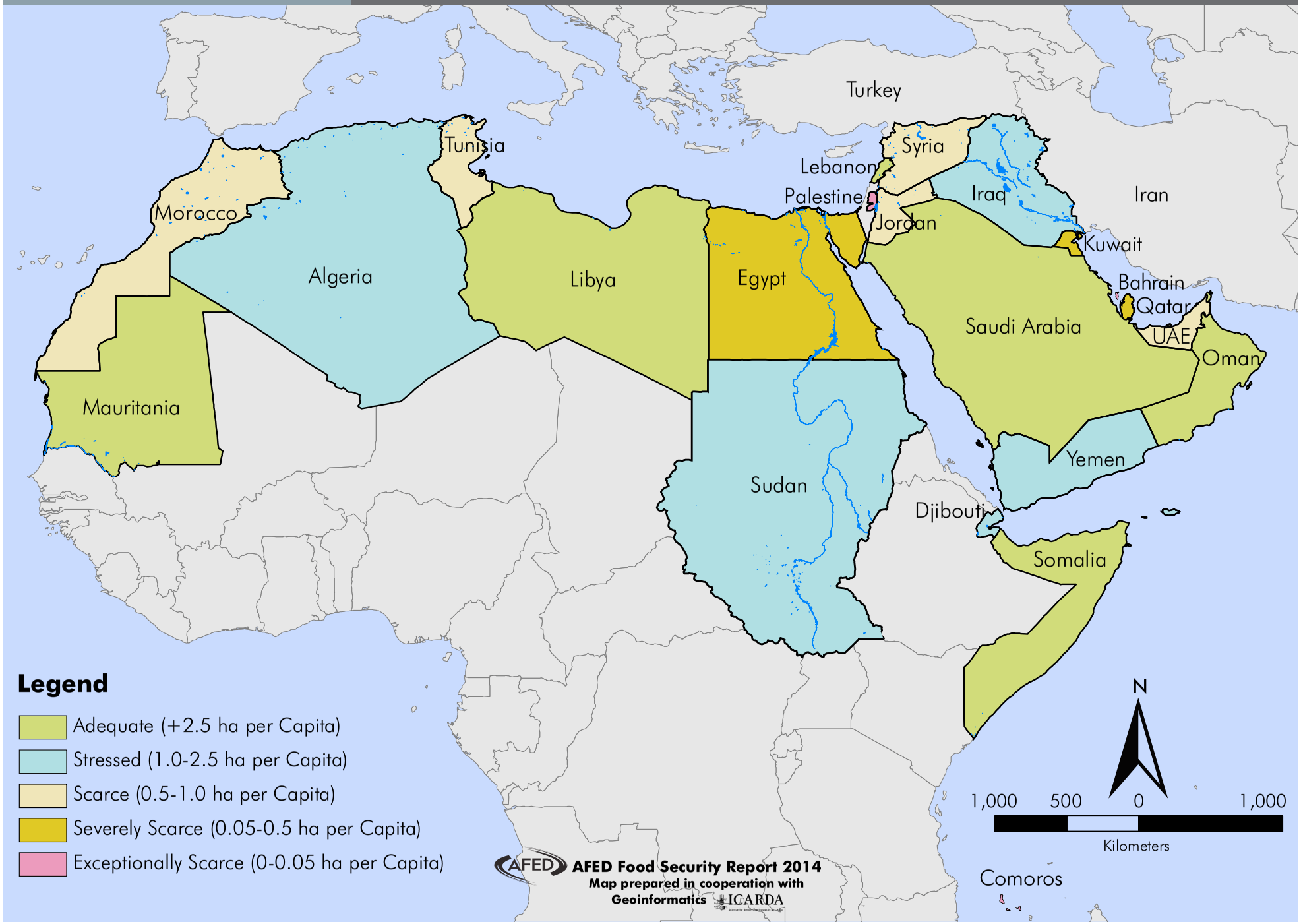
RENEWABLE WATER RESOURCES, ARABLE LAND AREA AND RANGELAND AREA PER CAPITA IN THE ARAB COUNTRIES



Divisions between countries shown in these maps are for graphic presentation purposes and may not precisely reflect internationally recognized boundaries.

2014 AFED ANNUAL REPORT
FOOD SECURITY IN ARAB COUNTRIES

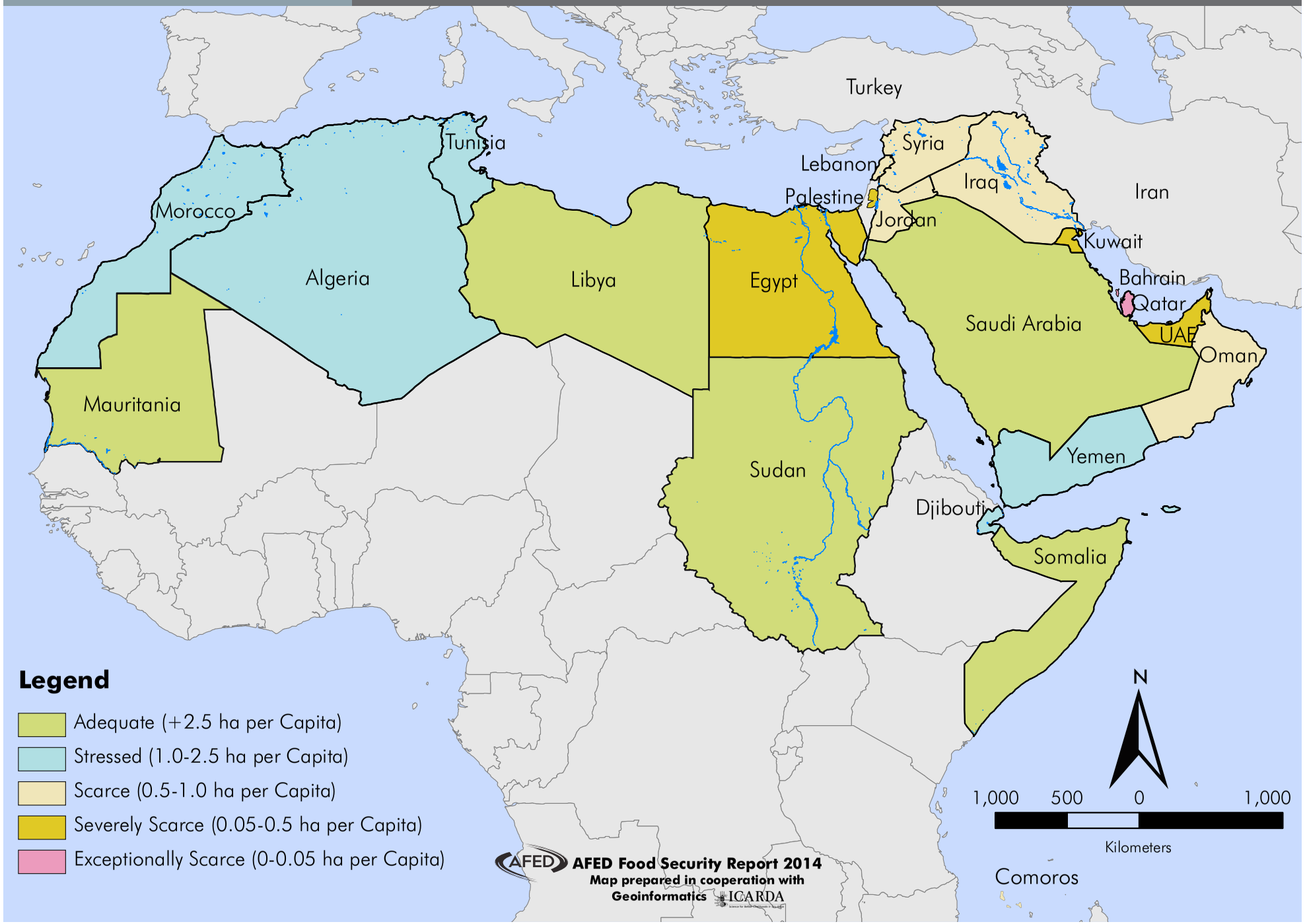
RANGELAND AREA PER CAPITA IN THE ARAB COUNTRIES (HECTARE PER CAPITA)



Divisions between countries shown in these maps are for graphic presentation purposes and may not precisely reflect internationally recognized boundaries.

2014 AFED ANNUAL REPORT
FOOD SECURITY IN ARAB COUNTRIES

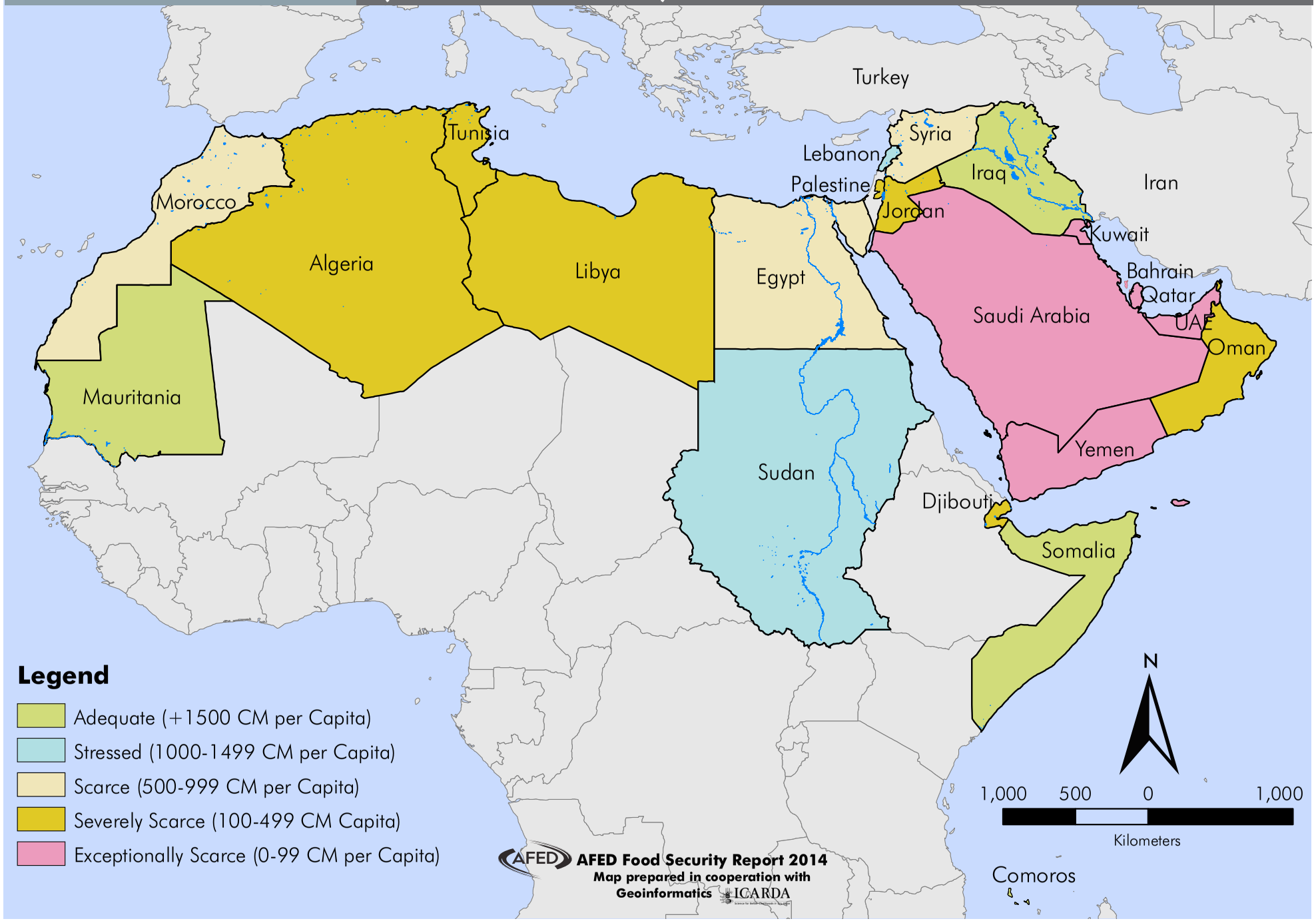
ARABLE LAND AREA PER CAPITA IN THE ARAB COUNTRIES (HECTARE PER CAPITA)



Divisions between countries shown in these maps are for graphic presentation purposes and may not precisely reflect internationally recognized boundaries.

2014 AFED ANNUAL REPORT
FOOD SECURITY IN ARAB COUNTRIES

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



Divisions between countries shown in these maps are for graphic presentation purposes and may not precisely reflect internationally recognized boundaries.
Source: AFED Report 2014, based on chapter 1, table 6.