Chapter 5. Focus and perspectives

Building on the CropWatch analyses presented in chapters 1 through 4, this chapter includes an updated production outlook for 2016 (section 5.1). Subsequent sections include a focus on agriculture in the Middle East (5.2) and an update on El Niño (5.3).

5.1 CropWatch food production estimates

Methodological introduction

Table 5.1 presents the latest revision of the periodic estimate by the CropWatch team of global maize, rice, wheat, and soybean production. For the current reporting period, virtually all 2016 crops have been harvested in the temperate northern hemisphere, while in many tropical areas in both hemispheres rice and maize crops are growing (to be harvested in early 2017) or are close to harvest. In the southern hemisphere the summer season/monsoon season is ongoing.

Importantly, the presented estimates are based on a combination of remote-sensing models (for the major commodities at the national level) and statistical trend-based projections (for minor producers[3] with an output between 100 thousand and one million tons at the national scale). Between 87% (wheat) and 92% (soybean) of the production is modelled, with modelled outputs indicated in red in the table. In addition, for the 31 countries (the "major producers," which are also the focus of chapters 3 and 4), the quantitative estimates in this chapter are calibrated against national agricultural statistics (as opposed to FAOSTAT). This means that (i) for the largest countries sub-national statistics are used and that (ii) 2015 information is included in the calibration. Calibration is also crop-specific; it is based on different crop masks, and for each crop, both yield variation and cultivated area variation are taken into account when deriving the production estimates. CropWatch production estimates differ from other global estimates by the use of geophysical data in addition to statistical and other reference information, such as detailed crop distribution maps.

Production estimates by countries

As shown in table 5.1, CropWatch puts the total output of crops produced in 2016 at 2,460.531 million ton of major grains and 315.663 million tons of soybeans. The major grains are made up almost exactly by 40% maize (994,940 thousand ton, 1.2% above last year's output), 30% rice (as paddy, 736,025 thousand tons, down -0.8% from the previous year) and 30% wheat (729,566 thousand ton, up 1.2 % over 2015).

Minor producers. As often happens, the bulk of minor producers—where food is grown more for local consumption by people and animals than for industrial uses and export—generally perform better than the major producers, among others because most of them have not reached the environmental and economic constraints that prevent the expansion of land and the increase of yields. For instance, maize production for these producers is up 2.8%, rice increases 1.4%, wheat by 1.6%, and soybeans by 7.0%, illustrating the overall popularity of soybean that is second only to the appeal for maize.

[3] The major producers represent at least 80% or production and 80% of exports. Minor producers include the 151 countries from Afghanistan and Angola to Zambia and Zimbabwe.

Major cereal producers. Among the three major cereal producers, the output of China reached 519,484 thousand tons, the United States 435,267 thousand tons, and India, significantly less, 261,531 million tons. Although India remains a relatively minor producer of maize (18,649 thousand tons), it still out-produces the 4th and 5th cereal producers in terms of total cereal output (Brazil: 89,033 thousand tons; and Indonesia: 87,620 thousand tons).

Neither China nor India performed well in 2016 due to the poor environmental conditions, especially in India. While maize stagnates in China, both rice and wheat production drop 1% compared to last year, and for the first time in more than a decade the production of soybean in China is up, resulting from agricultural policy changes. In India, only rice is up by 1%, soybean is on par with 2015, maize is down 1%, and wheat as much as 6%, one of the largest decreases of all the countries monitored by CropWatch. In the United States, on the other hand, while wheat remains stable, the output of all other major commodities increases significantly, with soybean up 3% and both maize and rice growing at least 5%.

Maize. Four countries have to be singled out for their poor performance of maize production compared with 2015, namely South Africa (down 32% due to the devastating El Niño triggered drought), Brazil (-12%), Pakistan (-7%), and Egypt (-4%). With the exception of South-Africa (+1%), the same countries also suffered a setback of their rice production (-7%, -3% and -4%, respectively). Among the countries for which specific CropWatch estimates are available[4], the best performance of maize occurred in Kazakhstan (+5%), Romania (+7%), Uzbekistan (+7%), Iran (+8%), Ukraine (+9%), and Ethiopia (+10%), with those increases usually directly ascribable to more favorable than average weather or—in the case of Ethiopia—more favorable than the very bad 2015 season.

Rice. The early 2016 rice crops did poorly in a number of Asian countries because of the prevailing El Niño drought in Southeast Asia that was reported on in detail in the February and May 2016 CropWatch bulletins. The list includes Cambodia (rice production down 10%), Myanmar (-8%), Bangladesh and Vietnam (both -6%), Pakistan (-3%), and the already mentioned China (-1%) where the size of the country and the diversity of agro-ecological conditions provides some protection against extreme weather. Albeit for different reasons, European rice producers (Ukraine, Romania) also underperformed (both at -4%). For the same reasons as those mentioned for maize, Ethiopian rice grew 5%, and so did rice production of the United States (+6%), Iran (+9%), and Uzbekistan (+10%), which is part of a group of countries in Central Asia that benefited from unusually favorable rain for the second consecutive year.

Wheat. To some extent the global situation for wheat is always different from that affecting other crops because it is usually grown as a winter crop and because of the very large number of countries where the crop is produced. The most spectacular decrease in wheat production occurred in Turkey (-17%), followed by some major producers and exporters such as India (-6%), Argentina (-4%), and France and the United Kingdom (both at -3%). Large increases are those of Australia (+25%), Kazakhstan (+14%), and Iran (+15%), a country that did well for most crops after a long run of mediocre cropping seasons.

Soybean. In a sharp contrast with the large number of producers and major exporters of wheat, the situation for soybean is pretty much the opposite in that it is a summer crop and the bulk of production occurs in just a handful of countries. Egypt, Iran, Canada, and one of the largest producers (Argentina) all underwent a drop of 1%, while Brazil increased production by 2% and both Russia and the United States by 3%.

[4] As opposed to FAOSTAT based projections.

Table 5.1. Summary of 2016 production estimates by major country and variation (%, compared with 2015) of maize, rice, wheat, and soybean

	Maize		Rice		Wheat		Soybean	
	2016	Δ%	2016	Δ%	2016	Δ%	2016	Δ%
Argentina	**25710**	**1**	**1695**	**0**	**11630**	**−4**	**51080**	**−1**
Australia	470	3	1507	14	**31600**	**25**	99	7
Bangladesh	**2375**	**6**	**47722**	**−6**	**1317**	**0**		
Brazil	**70433**	**−12**	**11055**	**−7**	**7545**	**8**	**91774**	**2**
Cambodia	779	−0	**8588**	**−10**			166	4
Canada	**11701**	**−1**			**33290**	**9**	**5386**	**−1**
China	**200361**	**0**	**200532**	**−1**	**118591**	**−1**	**13287**	**2**
Egypt	**5701**	**−4**	**6293**	**−4**	**10207**	**3**	28	−1
Ethiopia	**7157**	**10**	134	5	**4743**	**12**	100	14
France	**14703**	**−1**	78	−8	**37984**	**−3**	208	9
Germany	**4602**	**0**			**28106**	**3**		
India	**18649**	**−1**	**156783**	**1**	**86099**	**−6**	**12176**	**0**
Indonesia	**18316**	**2**	**69304**	**3**			884	0
Iran	**2692**	**8**	**2763**	**9**	**16073**	**15**	174	−1
Kazakhstan	689	5	411	4	**18199**	**14**	271	10
Mexico	**23780**	**0**	177	−4	**3550**	**−2**	399	10
Myanmar	**1746**	**2**	**25541**	**−8**	187	1	127	−11
Nigeria	**10770**	**4**	**4588**	**1**	115	3	662	4
Pakistan	**4528**	**−7**	**9142**	**−3**	**24638**	**−1**		
Philippines	**7565**	**0**	**20106**	**3**				
Poland	**3681**	**0**			**10704**	**3**		
Romania	**11491**	**7**	47	−4	**7675**	**7**	208	8
Russia	**12337**	**3**	**1017**	**0**	**57506**	**6**	**2099**	**3**
South Africa	**9018**	**−32**	3	1	**1704**	**0**	1105	9
Thailand	**5080**	**1**	**39661**	**1**	1	4	231	3
Turkey	**5920**	**0**	937	2	**18981**	**−17**	218	12
Ukraine	**30774**	**9**	107	−4	**24059**	**3**	**3799**	**2**
United Kingdom					**14337**	**−3**		
United States	**367862**	**5**	**10528**	**6**	**56877**	**0**	**110024**	**3**
Uzbekistan	425	7	437	10	**6391**	**−5**		
Vietnam	**5234**	**1**	**42550**	**−6**				
Major producers	884549	1.0	661706	−1.0	632109	1.1	294505	1.8
Minor producers	110391	2.8	74319	1.4	97457	1.6	21158	7.0
All countries	994940	1.2	736025	−0.8	729566	1.2	315663	2.1

Notes: "All countries" combines major and minor producers. Major producers are all the countries listed in the table; minor producers are the remaining countries. Boldfaced numbers in red are model-based estimates by CropWatch calibrated against data up to 2015; normal faced numbers are simple statistical projections based on FAOSTAT data up to 2014.

Production by importers and exporters

The variation in the global demand for maize, rice, wheat, and soybean can be assessed through variations in the domestic production of major importers[5] (table 5.2). The major importers have generally increased their domestic output, with the notable exceptions of rice (for the top three rice importers resulting from a 1% production drop in China) and wheat (for the top 10 importers with Turkey estimated to have lost 17% of production compared with 2015). Exporters did generally well with a marked increase in wheat availability among the major exporters (+8.0%), resulting from the excellent performance of Canada and Australia. The reduced rice availability for the top 10 exporters (-0.6%) results from the poor

[5] This discussion does not include countries where the 2016 production was estimated based on trend, which are the "minor producers.

performance of several countries, including Pakistan (-3%), Vietnam (-6%), Brazil (-7%), Cambodia (-10%), and Italy (-1%). On the contrary, the production of rice has increased in Australia (+14%) and the United States (+6%).

Table 5.2. Change (Δ%) in 2016 production compared with 2015 among the major exporting and importing countries

			Maize	Rice	Wheat	Soybeans
Exporters	Top 3	Share %	59	61	42	90
		Δ%	1.8	1.2	8.0	1.8
	Top 10	Share %	89	87	82	100
		Δ%	2.2	−0.7	5	2
Importers	Top 3	Share %	49	50	43	85
		Δ%	0	−0.6	3.7	2.8
	Top10	Share %	100	100	100	100
		Δ%	2	0.1	−1.3	2.7

Notes: Share % is the fraction of exports and imports that is contributed by the top 3 and the top 10 countries. The identification of major exporters and importers was obtained from the following sources: Wheat, maize and rice export data source (2015 data), http://www.worldstopexports.com/wheat-exports-country/; Soybean exports combine meal and seeds, http://legroupindustries.com/top-10-exporters-of-soybeans-and-soybean-meals-by-country/ (2013 data); maize imports (2016 estimates), http://www.indexmundi.com/agriculture/?commodity=corn&graph=imports; rice importer (2015), http://www.worldatlas.com/articles/the-largest-rice-importers-in-the-world.html; wheat imports, http://www.indexmundi.com/agriculture/?commodity=wheat&graph=imports; and soybean imports, (2011) www.earth-policy.org/datacenter/xls/book_fpep_ch9_3.xlsx.

The most noteworthy variations among maize exporters include mainly the large drop of production in Brazil (-12%, see table 5.1). On the positive side, the United States (+5%), Ukraine (+9%), and Russia (+3%) deserve mention, as well as the fact that Ukraine exports about three times more maize than Russia. Among wheat exporters, China's neighbor and wheat supplier Kazakhstan (+14%) did as well as the already mentioned Canada (+9%) and Australia (+25%), while France (-3%) and Argentina (-4%), respectively 4th and 9th exporters, did poorly. Among soybean exporters, only Argentina (3rd exporter) needs to be mentioned with a 1% production drop due to water logging resulting from excess precipitation.

Importer countries that are likely to buy more include Egypt (with a 4% production drop in maize) as well as Japan where the long-term drop in soybean production continued in 2015 (-2%). Reduced imports due to favorable domestic production include Iran for maize (+8%) and rice (+9%), rice in the Philippines (+3%) and in Iraq (+9%), and wheat in Brazil (+8%) and especially Egypt—globally the major wheat importer in the world (+3%).

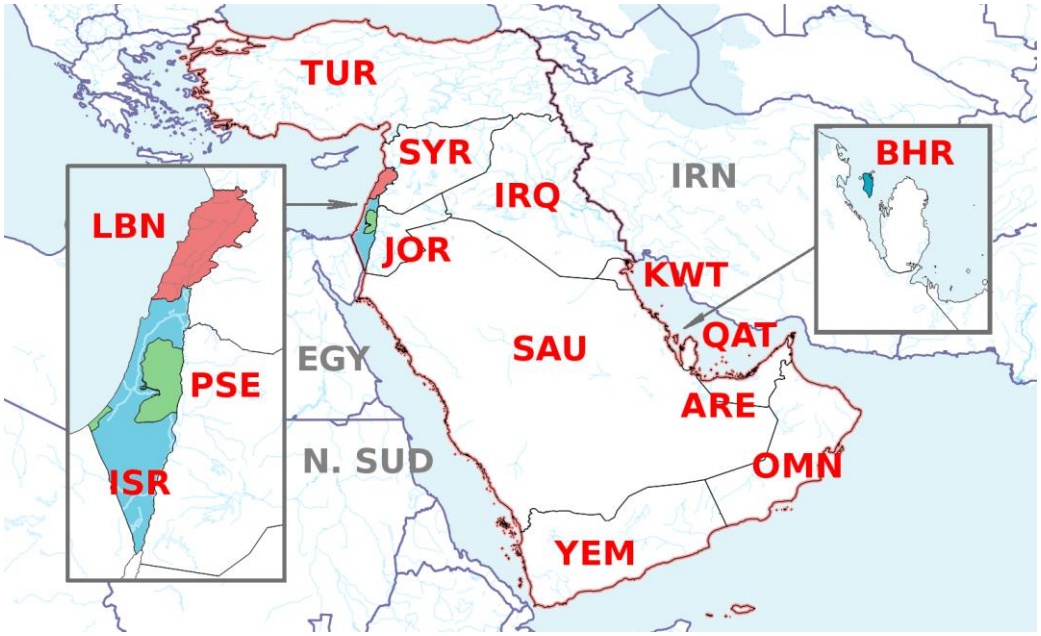
5.2 Focus: Middle East

Overview

The countries covered in this focus section on the "Middle East" are part of the Arabian Peninsula and western Asia (figure 5.1). They include Turkey (TUR), Israel (ISR), and twelve Arabic countries from Bahrain (BHR) to Iraq (IRQ), Jordan (JOR), Kuwait (KWT), Lebanon (LBN), Oman (OMN), the State of Palestine (PSE,[6] also referred to as *West Bank and Gaza* by the World Bank and *Occupied Palestinian Territory* by FAO), Qatar (QAT), Saudi Arabia (SAU), Syria (SYR), the United Arab Emirates (ARE), and Yemen (YEM). As shown in table 5.3, their areas cover about four orders of magnitude from 770 km² in Bahrain to 2.1 million km² for Saudi Arabia.

[6] The State of Palestine has Permanent Observer status at the UN; it was recognized by about 70% of countries worldwide, including China but excluding essentially Western Europe and North America.

Figure 5.1. Middle Eastern countries



Note: ARE: United Arab Emirates; BHR: Bahrain; EGY: Egypt; IRQ: Iraq; ISR: Israel; JOR: Jordan; KWT: Kuwait; LBN: Lebanon; N. SUD: North Sudan; OMN: Oman; PSE: the State of Palestine; QAT: Qatar; SAU: Saudi Arabia; SYR: Syria; TUR: Turkey; YEM: Yemen.
Source: Authors.

Half the countries in the region are oil producers, including major ones such as Saudi Arabia, Iraq, the United Arab Emirates, and Kuwait. The share of oil as a percentage of GDP reaches values between 15% and 20% for Bahrain, the Emirates, and Qatar; between 30% and 40% for Oman, Saudi Arabia, and Iraq; and as high as 53% for Kuwait (World Bank 2011). All countries are actively diversifying out of oil but face severe constraints in terms of environment and food security, not to mention crippling political unrest and wars that have been affecting much of the region for decades.

The total population in the region reaches 229 million, with people mostly distributed in Turkey (76 million), Iraq (34 million), Saudi Arabia (30 million), Yemen (26 million), and Syria (19 million). The least populated country is Bahrain with just 1.4 million inhabitants. Interestingly, the most populated countries are also the ones with the smallest urban populations in relative terms. Many countries have population growth rates that are well above the world average (currently close to 1% annually according to Census 2016), for instance in Jordan (3.06%), Qatar (4.72%), Kuwait (4.81%), Lebanon (5.99%), and Oman (8.45%). The lowest values for population growth rate in the region occur in Israel (1.66%), Turkey (1.69%), and Bahrain (1.76%), as well as in Syria (-2.27%) due to the war that has been ongoing for six years and the ensuing massive emigration. According to UNHCR (2016), the region has many internally displaced persons, mostly in Iraq and Syria, as well as close to 5 million refugees distributed between Egypt, Jordan, Turkey, and Lebanon. In addition, as a result of favorable economic conditions, many countries in the region have also been the target of emigration, with immigrants mainly from Asian countries such as Bangladesh and Indonesia. As a result of refugee and economic migrant movements, some Middle Eastern countries have large populations of non-nationals, with population shares as high as 31% (Saudi Arabia), 40% (Jordan), or even 70% (Kuwait), 74% (Qatar), and 84% (United Arab Emirates) (table 5.3).

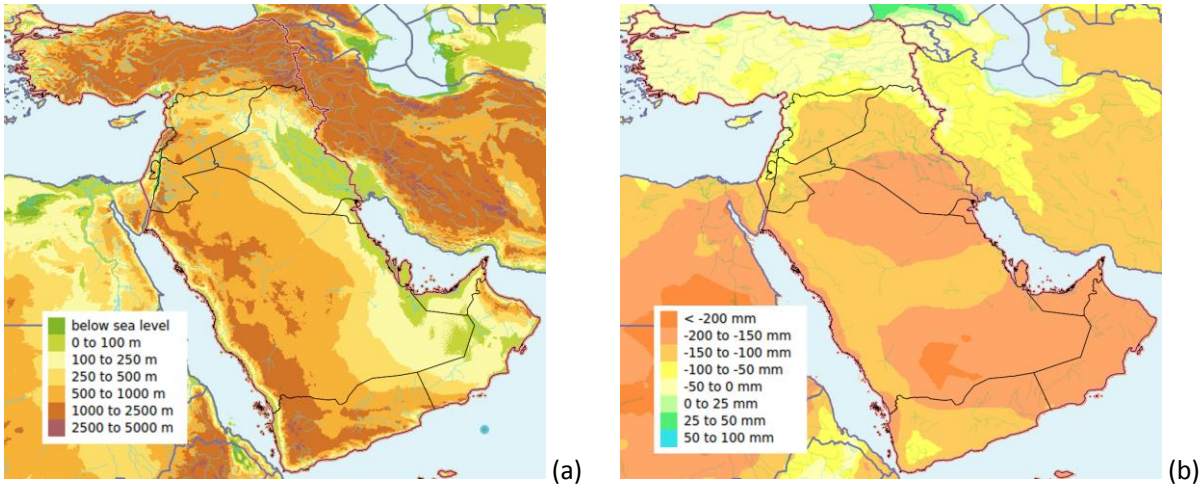
Even without considering difficult environmental conditions, the declining food production in the region, and persistently low crude oil prices, indices of poverty, political stability, and food security are particularly unfavorable in some countries in the region. For instance, Global Food Security Indices (GFSI) remain below 60 in Yemen (GFSI is 34), Syria (GFSI is 36), and Jordan (GFSI is 57) (table 5.3). Yemen in fact is the 11th most insecure food country in the world. Human Development Indices do not exceed 0.70 in

Yemen (0.50), Syria (0.59), and Iraq (0.65), countries where the Political Stability Indices of the World Bank are also very negative (Syria, -2.76; Yemen, -2.53; Iraq, -2.47; and Lebanon, -1.72).

Environmental conditions and agriculture

In spite of generally high elevations (figure 5.2a), the Middle East is one of the driest places on earth (figure 5.2b), with large deficits of rainfall when compared with the evaporative power of the atmosphere (as expressed by Potential Evapotranspiration, PET). Only very limited areas of Turkey and Lebanon have an annual excess of rainfall over PET. As a result, permanent rivers are rare and include mostly the Tigris and Euphrates rivers and the Jordan. The first two originate in eastern Turkey and flow mostly through central and eastern Iraq. The discharge is directly related to winter precipitation in the Mediterranean area, resulting in winter flow usually being 10 times larger than summer flow (UNU, 1995). The basin of the Jordan River touches Syria, Israel, and Palestine, as well as Lebanon and Jordan which derive about 70% of their freshwater resources from perennial rivers (ECOMENA, 2016). The flow peaks in winter and often dries completely in summer as a result of the natural variability combined with extensive use for irrigation (up to 90% of the flow). One of the consequences of this is the drying of the Dead Sea, which has been likened to the Aral Sea disaster. Oman, Saudi Arabia, Syria, the United Arab Emirates, and Yemen are dependent on surface water and seasonal rivers. Finally, the region is also rich in oases mostly fed by fossil and slowly renewable water in desert areas.

Figure 5.2. Elevation (a) and difference between average monthly rainfall and potential evapotranspiration (b)

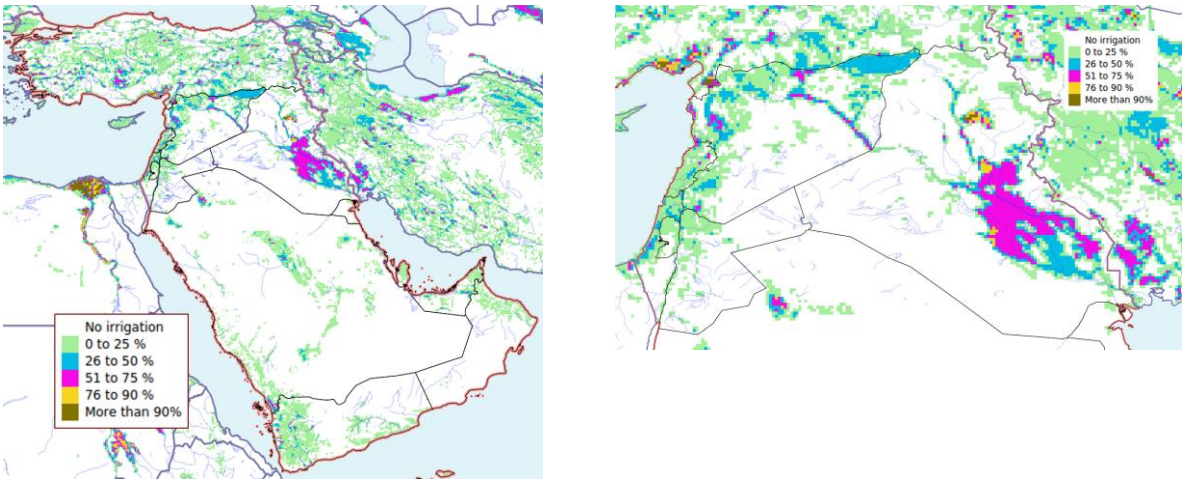


Source: Based on rainfall and on PET computed from New_locClim (Grieser et al, 2006).

Figures 5.3a and b show the extent of irrigation in the region. All surface waters as well as ground water are put to use, and desalination has become a major source of freshwater, albeit too expensive for irrigation use (ECOMENA, 2016).

As shown in table 5.3, agriculture makes up a large share of water use, as expressed by the percentage of total renewable water resources (TRWR). If some countries are still in a favorable situation (for example Lebanon, which uses 17% of its renewable water for agriculture and 24% for agriculture, domestic and industrial uses combined, or Turkey with uses of 16% and 20% respectively for those uses), many other countries are approaching the point when they need to tap in to non-renewable water resources (Jordan, 65% and 92%; Israel, 57% and 80%; Iraq 58% and 73%). Some of the main countries in terms of area have already started using their non-renewable resources, such as in particular Yemen (154% and 169%) and Saudi Arabia (867% and 942%; see Wergosum 2011 for a detailed analysis of the situation in Saudi Arabia). This situation is highly unsustainable and may potentially lead to more unrest in the region.

Figure 5.3. Percentage of land irrigated per pixel



(a) (b)

Note: Figure b presents a detail of figure 1.
Source: Based on GMIA data (FAO, 2016).

Table 5.3. Selected descriptors and reference data about the Middle Eastern countries

Variable (and source)	ARE	BHR	IRQ	ISR	JOR	KWT	LBN	OMN	PSE	QAT	SAU	SYR	TUR	YEM
Land area (LAT, 1000 km²) (9)	84	0.77	430	22	89	18	10	310	6	12	2100	180	770	528
Agric. Land (LAA, % of LAT) (8)	5	11	21	24	12	9	64	5	44	6	81	76	50	45
Arable land (LAR, % of LAT) (8)	0	2	12	13	3	1	13	0	8	1	1	25	27	2
Population (POPT, million) (8)	9	1	34	8	7	4	5	4	4	2	30	19	76	26
Growth rate/year of POPT,% (7)	1.89	1.76	3.31	1.66	3.06	4.81	5.99	8.45	2.75	4.72	2.32	-2.27	1.69	2.57
Urban pop. (% of POPT) (6)	79	88	69	90	74	98	83	69	68	93	77	49	60	23
Immigrants in % of POPT (4)	84	55	0.3	27	40	70	n.a.	31	6	74	31	6	6	1
Global Food Security Index (1)	72	70	n.a.	79	57	74	n.a.	74	n.a.	78	71	36	64	34
Human Development Index (2)	0.85	0.82	0.65	0.89	0.75	0.82	0.77	0.79	0.68	0.85	0.84	0.59	0.76	0.50
Political Stability Index (3)	0.81	-0.94	-2.47	-0.99	-0.56	0.14	-1.72	0.66	n.a.	1.00	-0.24	-2.76	-1.06	-2.53
GDP/capita, 1000 $/year (11)	64	43	15	43	11	75	15	40	5	139	51	n.a.	19	4
Agric. contribution, % GDP (10)	n.a.	0	n.a.	n.a.	4	0	6	1	5	0	2	n.a.	9	n.a.
% change LAR/20 years (12)	11	−22	−19	−15	−9	124	−31	15	−54	10	−14	−3	−15	−21
Wheat+rice import (kg/cap.) (6)	52	288	114	145	229	138	157	114	151	78	151	108	72	138
Cereal imports % available (13)	13	98	100	50	92	96	97	87	95	95	99	91	45	82
Wheat, % of cereal imports (6)	77	46	49	75	50	40	37	52	55	56	40	16	37	78
Rice, % of cereal imports (6)	5	32	40	24	4	7	22	5	24	12	34	10	9	10
All water uses in % of TRWR (5)	1867	206	73	80	92	2075	24	85	49	374	943	84	20	169
Agric. water use in % TRWR (5)	2208	137	58	57	65	2460	17	83	23	452	867	87	16	154

Notes: LAT: Land area; LAA: Agricultural land; LAR: Arable land; POPT: Population; TRWR: Total Renewable Water Resources; for country abbreviations, see note figure 5.1.
Sources: (1) Global food security index, varies from 0 (bad) to 100 (good), 2016 data, Economist 2016; (2) Human development index, 2014 values (0.35 to 0.95), http://hdr.undp.org/en/composite/HDI; (3) Political stability index, 2014 values, varies from -2.76 (Low) to 1.54 (high), http://www.theglobaleconomy.com/rankings/wb_political_stability/; (4) World Bank data for 2015 http://www.un.org/en/development/desa/population/migration/data/estimates2/estimates15.shtml; (5) TRWR, Total renewable water resources, http://www.fao.org/nr/water/aquastat/main/index.stm, most recent data available. In some countries, the percentage of agricultural water withdrawal exceeds total water withdrawal. This is because the first one refers to freshwater (withdrawal by source) and the second includes both freshwater and non-conventional water (withdrawal by sector). Non-conventional water includes desalinated sea or brackish water, direct use of (treated) waste-water and direct use of agricultural drainage water; (6) Based on 2009-13 FAOSTAT data; (7) Wikipedia, 2010-15 UN estimates, https://en.wikipedia.org/wiki/List_of_countries_by_population_growth_rate; (8) 2013 data from world bank; (9) Same as (8), two significant digits for 2015 data; same as 8, average of whichever years are available between 2011 and 2015; (10) World Bank, based on FAO data; (11) current international $, World Bank data. Average of whichever years are available between 2011 and 2015; (12) percent change of arable land between 1991-95 and 2009-13. Based on FAOSTAT data; (13) same source as (6). The variable is the percentage of cereal imports in the total available cereals, i.e. the sum of imports and local production.

Agricultural production and trends

The total agricultural production of recent years is shown in table 5.4 below. It amounts to 212.9 million ton per year for the main crop categories, including 44.2 million ton per year of cereals. This is approximately equivalent to 200 kg per person per year.

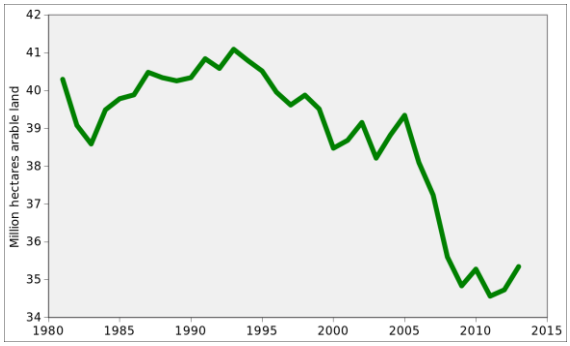
Table 5.4. Production and imports of crops in the Middle East (2012-2014 average)

	Production		Imports	
Crop category (source)	MT/Y	%	MT/Y	%
Cereals (1)	44.2	36.3	42.1	72.1
Vegetables (2)	41.9	34.4	9.1	15.6
Fruits	23.9	19.6		
Roots (3)	7.6	6.2	0.6	1.0
Oil-crops	1.7	1.4	4.7	8.0
Pulses	1.6	1.3	1.1	1.9
Fiber crops	1.0	0.8	0.8	1.4
Total	**212.9**	**100**	**58.4**	**100**

Notes: MT/Y= million tons/year. (1) Cereals include rice as milled equivalent; (2) for imports, vegetables and fruits are combined; (3) production includes "roots and tubers" but imports include only potatoes.

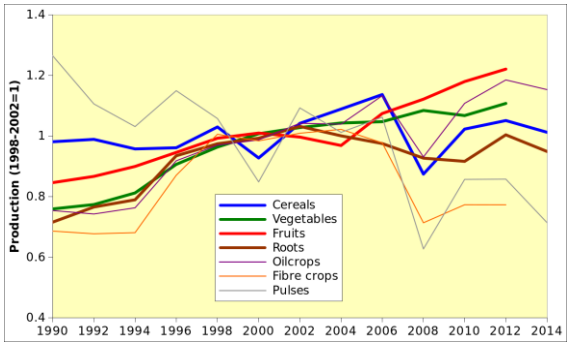
Arable land has been decreasing in most of the region over the last 20 years (figure 5.4), and so has the contribution of agriculture to the GDP (values are low and variable, from 0% to 9% in Turkey; table 5.3). Table 5.3 provides additional detail about arable land shrinkage, with drops particularly large in Palestine (-54%), Yemen (-21%), Iraq (-19%), Israel and Turkey (-15%), and Saudi Arabia (-14%). Increases have taken place in some of the smaller countries where non-renewable water is liberally used in agriculture.

Figure 5.4. Total arable land variation from 1981 in the Middle East



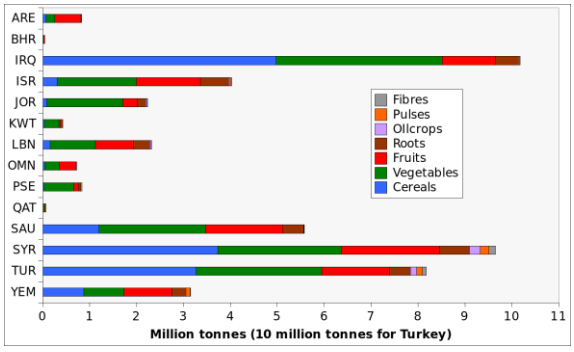
Source: Based on FAOSTAT data

Figure 5.5. Production trend for main crop categories in the Middle East



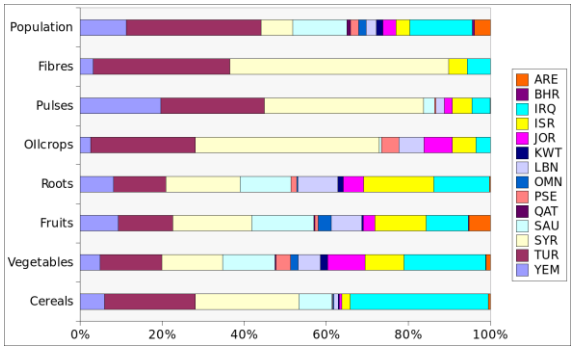
Source: Based on FAOSTAT data

Figure 5.6. Total production by crop-type and country



Source: Based on FAOSTAT data

Figure 5.7. Relative share of population and crop production between countries



Source: Based on FAOSTAT data

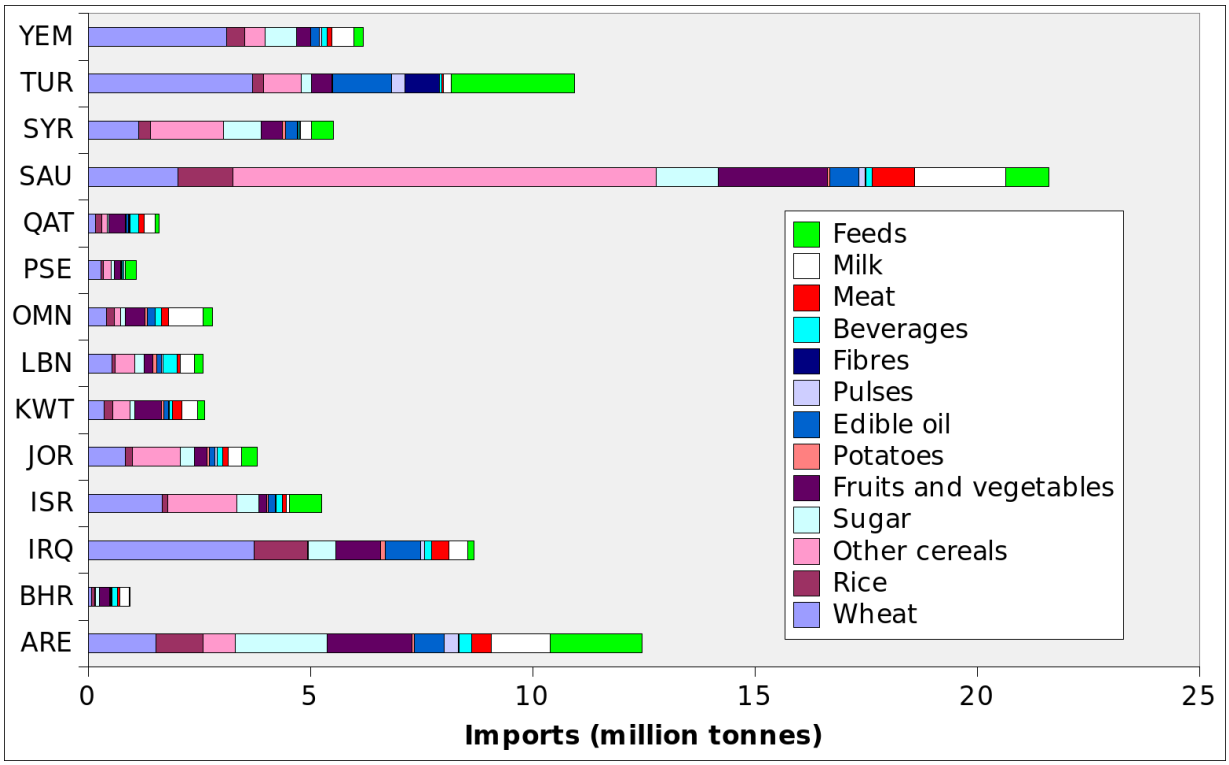
To some extent, improvements in water use efficiency, varieties, and management have allowed a stabilization in the production of roots and tubers and cereals (figure 5.5), while fruit and vegetable production has continued to increase slowly over time. In fact, in most countries the production of fruits and vegetables has received a lot of attention (at the expense of cereals), to the extent that their production in several countries is of the same order of magnitude as that of cereals (Iraq, Turkey, and Syria) or even exceeding cereals (Israel, Jordan, Lebanon, Yemen and most small countries, sometimes by a large factor). This is illustrated in figure 5.6. Obviously, the income generated from fruits and vegetables, often for export, plays against the more traditional crops.

Figure 5.7 illustrates that there is some degree of specialization in different crop groups. For instance, although Yemen makes up about 10% of the population of the region, it produces about 20% of pulses of the Middle East. Similarly, Syria, in spite of the ongoing war, with only about one tenth of the population, produces 50% of its fibers, about 40% of its pulses, and about 20% of its roots, fruits, vegetables and cereals. Except for cereals, Israel, Lebanon and—to some extent Jordan—produce more than their share of most crops, and especially roots and tubers (potatoes, partially for export but mostly for consumption within the region, as shown by low import numbers for roots and tubers). Meanwhile Iraq (between 15 and 20% of the Middle Eastern population) produces about 35% of the cereals.

Imports

Stagnating or shrinking productions must be complemented by imports to keep pace with the demand of fast growing populations. The region imports about 86 million ton of various agricultural commodities. Saudi Arabia, the Emirates, Turkey, and Iraq are the largest importers in the region, although the detail of imports varies significantly between countries (figure 5.8). Table 5.4 also compares local production and imports for some major crop categories.

Figure 5.8. Product imports by country (million tons)



Wheat is the major staple in the region and constitutes also the bulk of imports, about one fifth (19.6%). This is followed by “other cereals,” (mostly maize as cattle feed (17.1%)), which compares with feeds and fodder, making up 8.7%. The region also imports sizeable volumes of meat (2.8% of imports) and milk products (7%). Edible oil (4.7%) and sugar (7.2%) also deserve mentioning.

Turkey and Iraq are the largest wheat and edible oil importers, while Turkey and the Emirates are the largest feed importers. Saudi Arabia is the major importer of “other cereals,” fruits and vegetables, as well as meat and milk products.

In most countries of the region, about 90% or more of the cereal consumption is obtained through imports. Exceptions are the United Arab Emirates (only 13% of cereal imported), Israel (50%), and Turkey (45%) (see table 5.3). All countries import more wheat than rice, and wheat accounts for 16% (Syria) to 78% (Yemen) of cereal imports. Most countries import between 100 and 200 kg of “wheat+rice” per capita.

Discussion

Several countries in the Middle East region (including Iraq and Syria) that used to be considered “bread baskets” have become very vulnerable to food insecurity due to their heavy dependence on imported food. The region is currently among the largest food—and especially wheat—importers in the world and derives about 50% of its calories from imports (35% of calories are derived from wheat only). According to a publication by the World Bank, FAO and IFAD (2009) this percentage of calories from imports is to increase to 64% by 2030.[7] This happens against the backdrop of sustained population increases and declining agricultural production due to land degradation and policies, including policies to protect ground water resources. Many people in the region are poor and spend between one third and more than half of their income on food (World Bank/FAO/IFAD, 2009).

The causes of national food production declines are complex. They also include under-investment in agriculture, war, and endemic unrest in many areas, as well as the perception of agriculture as a minor sector compared with the “oil rent” of many countries.

In reality, it is difficult to clearly separate causes from effects, but water and land availability are among the main issues. Countries now resort to several forms of “non-conventional water” obtained by desalination of sea and brackish water or recycling of waste-water and agricultural drainage water. The over-use of river water combined with the climate-conditioned reduction in flow of the Jordan, Euphrates, and Tigris Rivers have led to a drop in national production compared with their peak in the early 21st century, most evidently in Syria, Iraq, and Jordan.

Due to the well-established links between water and energy consumption (Siddiqi and Anadon 2011 and ECOMENA 2016), badly needed economic development is bound to further increase water needs in a region that already suffers from the highest per capita rates of freshwater extraction in the world (804 m^3/year) and already over-exploits its renewable water resources. The water cycle uses up to 12% of national electricity consumption and this number is continuously on the rise. In the United Arab Emirates, about 20% of electricity is used for desalination, while in most other countries the percentage is still relatively low (around 10%).

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[7]. The issues have been known for years and many insightful analyses and recommendations exist (Jury and Vaux 2007; Earthscan/FAO 2011; LPI 2011; Sowers et al 2011; GEO5 2012; GWP/INBO 2012; Islar 2012; Hendrix and Brinkman 2013; and Mekkonen and Hoekstra 2016). Proposed solutions, on the "technical side", include land reclamation, salt-tolerant agriculture, improved water and energy use efficiency in agriculture and society at large, improved food processing, investments in agriculture and agronomic research, strengthening of safety nets, improved access to family planning services, education, outsourcing production to other countries, and even the "more effective use of financial instruments to hedge risk” (World Bank/FAO/IFAD 2009).

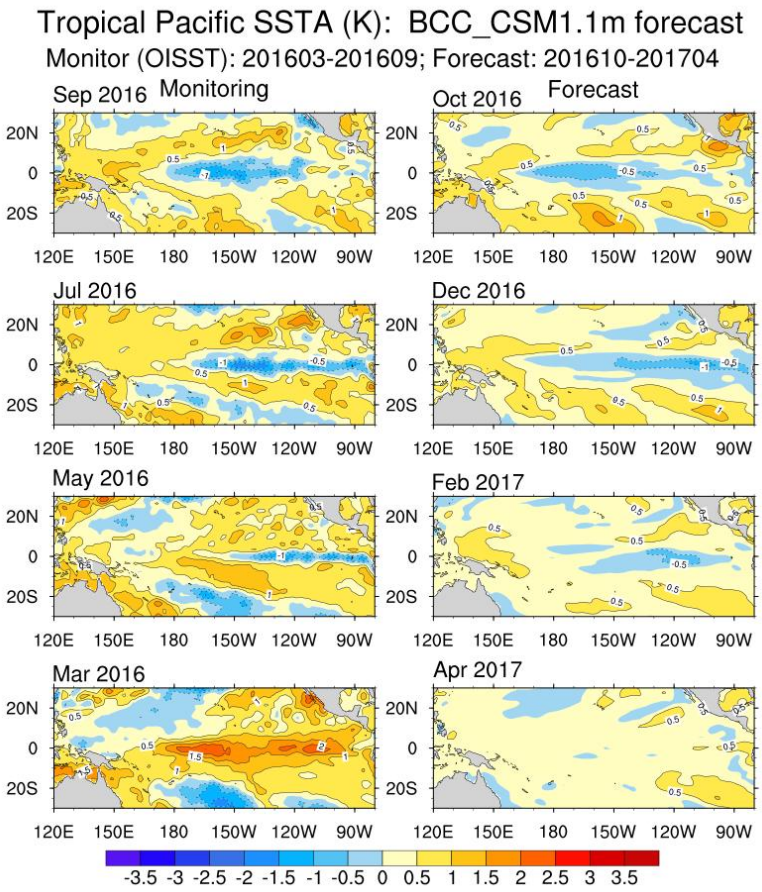
Due to the interconnectedness of climate, food production, demographics, the oil rent, overconsumption of water, energy use, environmental conservation, economic development, and the inherently international dimension of surface and ground water resources, no evident way-out exists for the many kinds of insecurity (RBAS, 2009) that affect the Middle East region.

5.3 Update on El Niño

EI Niño has continued to be neutral and La Niña did not cross critical thresholds during the third quarter of 2016. The eastern tropical Pacific Sea Surface Temperatures (SST) have cooled rapidly between March and October 2016, based on the OISST (Optimum Interpolation SST). SSTs are predicted to remain cool but average until the first quarter of 2017, according to forecasts from the 15 models at Beijing Climate Center (figure 5.8).

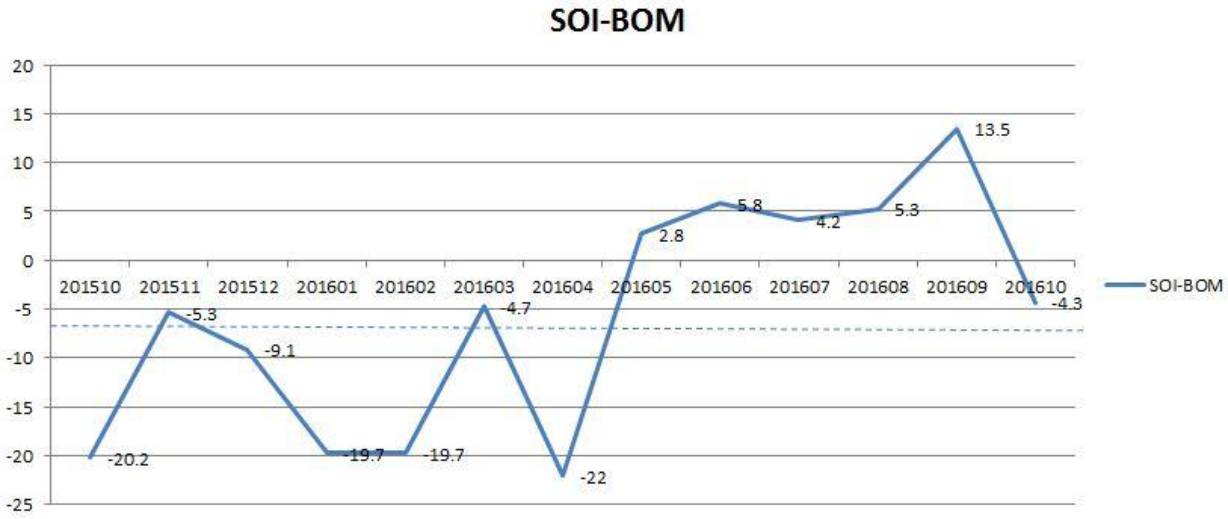
Figure 5.9 illustrates the behavior of the standard Southern Oscillation Index (SOI) of the Australian Bureau of Meteorology (BOM) from October 2015 to October 2016. During the current season, SOI has increased gradually from +4.2 in July to +5.3 in August and increased rapidly to 13.5 in September, before dropping sharply to -4.3 in October, indicating neutral conditions of EI Niño and the possibility of a weak La Niña at the end of 2016. NOAA confirms the cooler-than-average SST in the central-eastern tropical Pacific Ocean and also that La Niña has only about a one in two chance to persist through the winter of 2016-17 (figure 5.10).

Figure 5.8. Tropical Pacific SSTA (Forecasted and monitored datasets)



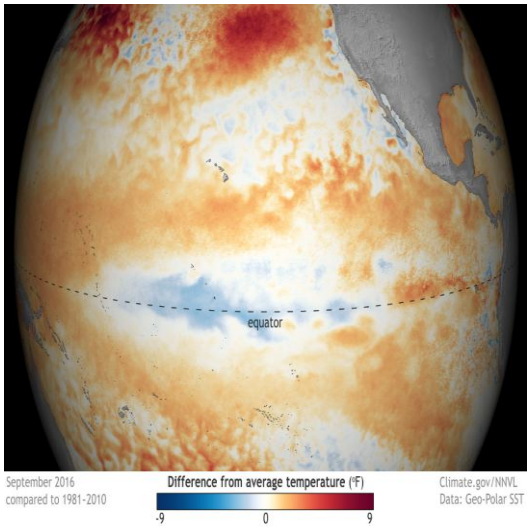
Source: http://cmdp.ncc-cma.net/download/ENSO/Variables_evolution/ENSO_SSTA_Patterns_O7P7_20161001.png

Figure 5.9. Monthly SOI-BOM time series for October 2015 to October 2016



Source: http://www.bom.gov.au/climate/current/soi2.shtml.

Figure 5.10. Sea surface temperature difference from average temperature, September, 2016



Source: Climate.gov, https://www.climate.gov/sites/default/files/geopolar-ssta-monthly-nnvl--1000X555--2016-09-00.png

Both BOM and NOAA nevertheless issued a La Niña watch, stating conditions are weak for La Niña to emerge in late 2016 and early 2017. In the next few months, CropWatch will keep a close eye on the development of La Niña and the regions that show sensitivity to this event.