# Drought Assessment Mission

# Syria

# 2007/2008

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**First draft**

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# 1. Overview

In the Near East region, drought is a recurrent phenomenon affecting a number of countries. Drought has three critical but interrelated components, as follows:

- Meteorological drought: this occurs when rainfall is below 39.1 inches per year.
- Agricultural drought: in this case, dryness/low moisture in soil has an adverse effect on plants and crops.
- Hydrological drought: water levels in wells, surface reservoirs and dams are reduced, severely affecting livestock and leading to water rationing among households and sectors.

The recent drought that affected countries across the region, including the Syrian Arab Republic, the Republic of Iraq and the Islamic Republic of Iran, persisted throughout the winter growing season. The 2007/08 agricultural cropping season, considered to be worse than the 1998/99 growing season, has been characterized by very low rainfall, particularly in the northern, eastern and southern regions of Syria.

Little or no rain fell between October and December 2007 when farmers were planting wheat and barley. The crops, therefore failed to grow. This drought is the worst to hit Syria in four decades and has seriously affected crop production, livestock raising and natural vegetation, as well as rural communities.

The drought has impacted on the production of basic crops that grow in rainfed areas, particularly wheat, barley, lentil and chickpea. National crop production has been significantly reduced and the rangelands (Badia) and marginalized areas have experienced decreased pasture capacity. The availability of natural pasture has been most severely affected in agro-climatic zones 4 and 5.

The loss of grazing opportunities in the rangelands (Badia) and a lack of crop residues have resulted in livestock movements in drought-affected areas, increased mortality rates and reduced animal body weight. This has affected the livelihoods and incomes of herders in drought-affected areas.

Herders and farmers dependent on rainfed crop production have been most severely impacted by the drought. Owing to the lack of forage and high feed prices, herders have been selling their animals for 60 to 70 percent below normal prices and, in many cases, have exhausted their herds. Some 59 000 small herders (owning less than 100 animals) lost almost their entire herd and 47 000 medium-scale herders (owning 100 to 300 animals) lost between 50 and 60 percent of their livestock. Herders have also started to sell off other assets to maintain their livelihoods.

The situation is compounded by the fact that herders and farmers did not store sufficient food and fodder to feed their animals. Prices of cereals, particularly of barley, have increased and herders' ability to feed their animals was considerably reduced. Mass livestock sales have reduced the price they fetch for their animals. Despite the Government's extensive efforts to reduce the impact of the drought, especially on herders and farmers (by providing feed and food rations and rescheduling loan repayments), these groups are struggling to cope.

Rural communities, especially the most vulnerable groups in the Badia and northeastern regions, have become severely food insecure. Food production by farmers relying on rainfed agriculture was much lower than in previous years (zero or close to zero), particularly in villages in Al-Hassaka and Al-Raqqa governorates. As there was little or no production and the little that could be harvested in May and June had already been sold, households were without reserve stocks of food grains and seeds. In previous years, the combination of crop stores and casual labour secured

rural households' self-sufficiency during the lean season. However, the 2007/08 yield at best could meet their needs for less than two months.

This has had serious repercussions on the food security of a large segment of the population, as household incomes have fallen sharply. The price of the basic food basket has risen and the purchasing power of the rural population has fallen. Prices of food items may continue to rise, while the price of livestock and land has dropped sharply and is likely to fall even further. The situation is compounded by soaring fuel prices, which have doubled transport costs.

Households have pursued a number of coping mechanisms in response to the drought:

(i) People are reducing their food consumption and caloric intake, with adults having only two daily meals, although children continue to eat three times a day, which has affected their nutritional status and health. A large portion of the reduced income is being spent on food, fodder and drinking water and little is going towards health.
(ii) School dropout rates seem likely to increase as families cannot afford the basic costs of schooling – clothing, shoes and stationery. For parents struggling to meet basic needs, schooling has ceased to be a priority.
(iii) Seasonal migration to cities in and outside of the governorate, as well as across borders, is becoming more frequent.

In response to a request from the Minister of Agriculture and Agrarian reform on 23 June 2008, the United Nations (UN) dispatched a drought impact assessment mission team, including experts from the Food and Agriculture Organization of the United Nations (FAO), the World Food Programme (WFP), the World Health Organization (WHO), the United Nations Children's Fund (UNICEF) and the International Organization for Migration (IOM). The team visited the country from 11 to 25 August 2008 to assess the impact of the rain shortfall on crop production, range vegetation, livestock, vulnerable groups, herders and household incomes, as well as to determine their critical needs until the rainfall in the next growing season. The team consisted of experts from UN agencies based in Syria and undertook extensive field visits to a number of affected areas, as well as meeting with populations impacted by the drought. These included the Badia rangelands and Hama, Al Raqqa, Al Hassaka, Deir Ezzor and Homs provinces. The mission's findings are based on discussions with Government ministries, governors, farmer's organizations and related departments and on interviews with herders, farmers and women-headed households.

## 2. Country background

Syria has a surface area of 185 518 km², of which 32.2 percent is cultivable land (6 million hectares), 23.3 percent is uncultivable, 2.5 percent is forests and 45 percent is stepped and pasture lands. The irrigated area represents only 6.6 percent (1.3 million hectares).

Syria consists of 14 governorates, with 61 districts, 111 cities and 6 309 villages. It has a population of 19.6 million and the total rural population in 2006 was 8.808 million, 50.8 percent male and 49.2 percent female. The percentage of the agricultural labour force out of the total labour force is 19 percent (2007).

In recent years, agricultural production has contributed over 26 percent of the GDP. Animal wealth, of which Syria possesses many varieties, also contributed significantly to agricultural production (between 28 and 35 percent).

# 3. The agriculture sector

## 3.1 Land use

Of the 6 million hectares of cultivable land, around 5.7 million hectares are actually used. In the 2007/08 cropping season, approximately 3.2 million hectares (76 percent) were rainfed and 1.9 million hectares (24 percent) were irrigated. Normally, irrigation is used only to supplement rainfall. However, owing to the drought, irrigation was the main source of water for irrigated farming.

Equally important are the 8.2 million hectares of rangeland and pasture in the Badia region, where most of the country's nomadic herders and sheep populations are located. The drought has devastated Badia vegetation, which is extremely important in the feed cycle of sheep.

Agroclimatically, the country's land is divided into five zones – stabilization zones – based on the level of annual precipitation received. The characteristics of these zones and proportion of the country that they occupy are summarized in Table 1.

**Table 1: Agroclimatic zones (stabilization zones)**

| Stabilization zones | Annual rainfall (mm) | Area (hectares) | Cultivated plants | Percent of the total country area |
|---|---|---|---|---|
| 1 | Over 350 | 2 701 000 | | 14.6 |
| 1a | Over 600 | | Field crops | |
| 1b | 350 – 600 | | Wheat, legumes and summer crops | |
| 2 | 250 – 350 | 2 475 000 | Barley, wheat, legumes and summer crops | 13.3 |
| 3 | 250 | 1 303 000 | Barley and legumes | 7.1 |
| 4 (Marginal) | 200 – 250 | 1 830 000 | Barley | 9.9 |
| 5 (Desert and steppe) | Less than 200 | 10 209 000 | Prohibited cropping | 55.1 |

## 3.2 Rainfall and temperature

The water sources for irrigation are rainfall, the Euphrates and other rivers, springs and groundwater. Normal rainfall contributes an estimated 70 percent to the available water in the Syria. Rainfall, in normal years, is concentrated in the winter months, with most falling between December and March. The period from October to March is the main agricultural season, during which most food crops are cultivated. The summer months from May/June to September are dry and hot, particularly in eastern areas.

The 2007/08 cropping season was seriously affected by drought, with the lowest levels of rainfall in four decades. In addition to a one-month delay in the onset of rains, the season also finished early in most areas and was poorly distributed. The areas worst affected were in the east/northeast and south.

Cropping systems and production are highly influenced by the intensity and distribution of rainfall. In rainfed areas, the main crops are cereals and pulses. Areas with comparatively high precipitation are planted with wheat and legumes, while barley and drought-resistant wheat varieties are grown in areas with less rainfall. In zones 3 and 4, which are low rainfall areas, only barley is cultivated.

The rainfall data obtained from the rain enhancement project showed that cumulative precipitation from October 2007 to the end of the cropping season in May/June 2008 was below the average, as recorded by 97 percent of 154 weather stations spread across Syria's agroclimatic zones. The total

rainfall from October to May (especially in the rainfed area) was significantly below average. Seventy percent of weather stations recorded 25 to 85 percent less rains than average, 36 percent of weather stations recorded 51 to 80 percent less than the average, 26 percent recorded 26 to 50 percent less than the average and 35 percent of weather stations recorded 1 to 25 percent less than the average for the same period. Low rainfall levels, irregular distribution and the delay in the rains led to seed germination failure and very poor crop growth. The Badia recorded very low rainfall, which is essential for the growth of pasture plants.

The temperature was around average throughout the year, except in some months when the minimum was below average for a period exceeding 40 days, which were below 0 ºC, causing frost which adversely affected crops and vegetation growth, especially in the Badia.

Overall, the drought has affected all regions of the country. However, it has been most severe in the northeast and east regions, which are cereal production and pasture areas.

# 4. Cereal production

## 4.1 The impact of the drought

Owing to the limited rainfall, most of the wheat and barley fields did not germinate and in those fields where germination did occur, the growth and development of plants were delayed and/or not completed. The 2007/08 drought affected the agriculture sector in all stabilization zones, particularly zones 3, 4 and 5, and vegetation in the Badia rangelands. The total rainfed cultivation area is 3.4 million hectares, including cereal and legume crops (755 657 hectares of wheat, 1.4 million hectares of barley, 133 802 hectares of lentils and 72 400 hectares of chickpeas). The remaining areas were under an assortment of summer and winter fodder crops.

## 4.2 Wheat production

The drought during the 2007/08 cropping season significantly affected the production of basic crops, which are grown in rainfed areas, as well as partially impacting on crops grown in irrigated areas, especially wheat, barley, lentils and chickpeas. This has resulted in a serious fall in the production of crops and in pasture capacity in the Badia and marginalized areas, contributing to a sharp increase in the price of most agricultural products.

From early January 2008, it became apparent that the area was experiencing a significant drought. NASA satellite images show a marked decline in total vegetation area compared with last year. As such, a large portion of Syria's non-irrigated wheat crop will not be harvested in 2008 in the drought-affected areas and that which survives will have extremely poor yields.

**Figure 1: Wheat productivity for the 2006/07 and 2007/08 cropping seasons in stabilization zones**

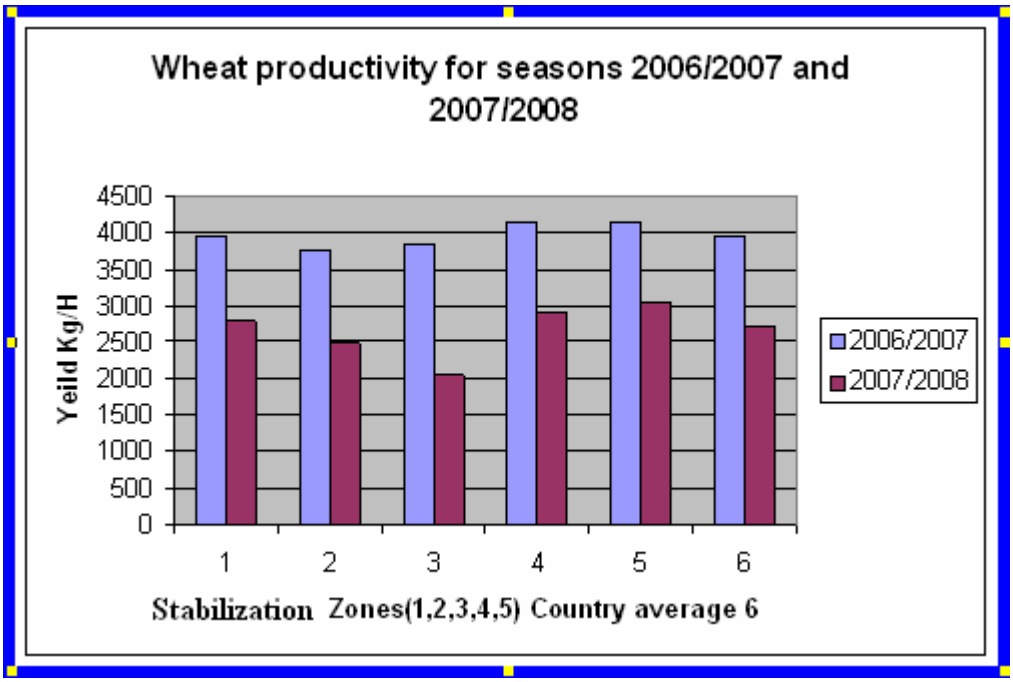
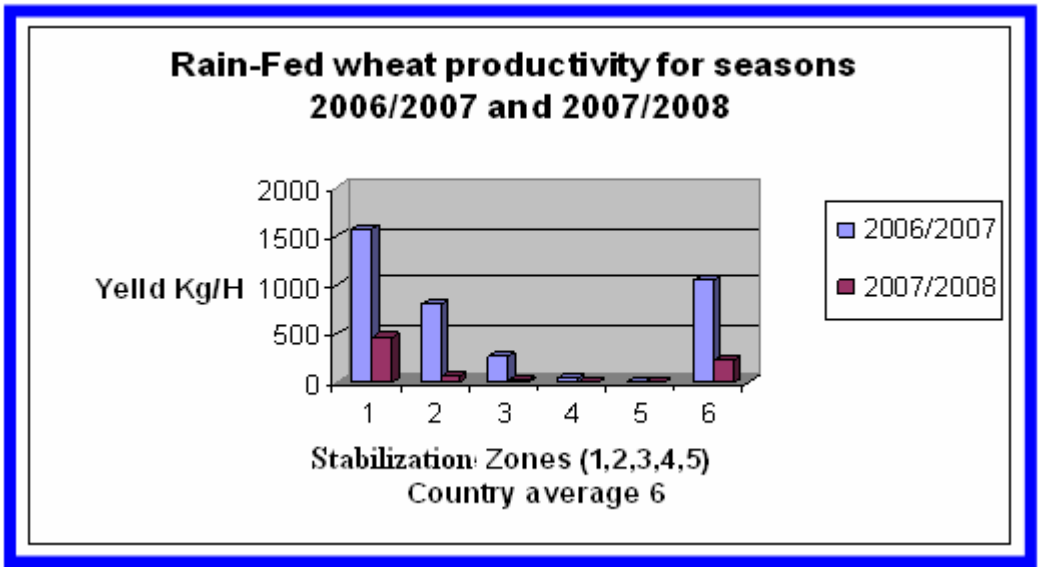



**Figure 2: Rainfed wheat productivity for the 2006/07 and 2007/08 seasons**



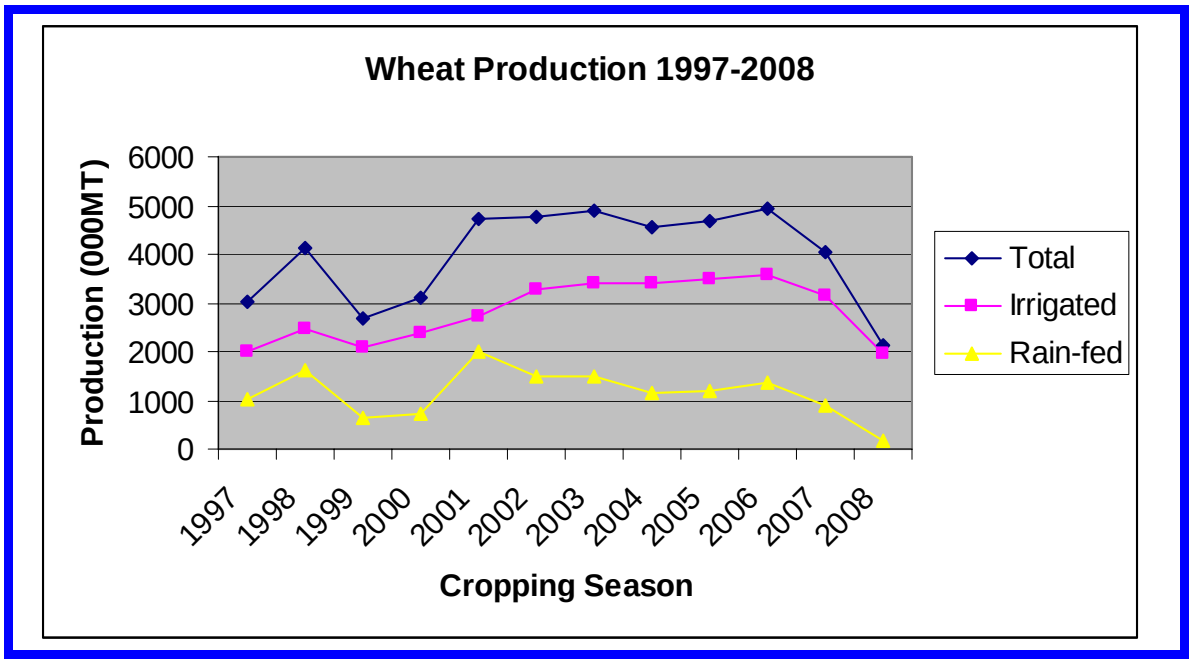

The south and northeast regions have been seriously affected by the drought in both irrigated and rainfed areas. The average yield for irrigated areas fell by 31.6 percent, from 3 955 kg/ha in 2006/07 to 2 703 kg/ha in 2007/08. For rainfed areas, the average yield fell by 78.9 percent, from 1 040 kg/ha to 219 kg/ha.

The drought particularly impacted on rainfed crop production. Wheat productivity was zero and close to zero in zones 5, 4 and 3, while in zone 2 (which usually receives 250–350 mm of rain annually) production was very low – only 50 kg/ha. The barley crop followed the same trend, with zero harvest in zone 5, 53 kg/ha in zone 4, 36 kg/ha in zone 3 and 186 kg/ha in zone 2 (see Table2).

**Table 2: Rainfed wheat and barley crop production, yield and cultivated area 2007/08**

| Agroclimatic zones | Wheat | | | Barley | | |
|---|---|---|---|---|---|---|
| | Cultivated area (1 000 ha) | Yield (kg/ha) | Production (1 000 tonnes) | Cultivated area (1 000 ha) | Yield (kg/ha) | Production (1 000 tonnes) |
| Zone 1 | 320 | 458 | 147 | 118 | 361 | 42 |
| Zone 2 | 356 | 50 | 18 | 522 | 186 | 97 |
| Zone 3 | 68 | 10 | 0.7 | 385 | 38 | 15 |
| Zone 4 | 10 | 0 | 0 | 332 | 53 | 18 |
| Zone 5 | 0.4 | 0 | 0 | 3 | 0 | 0 |

**Figure 3: Wheat production for 1997–2008**




Total rainfed wheat production was 166 398 tonnes, 81.7 percent below production in the 2006/07 season. Irrigated wheat production declined by about 36.9 percent, from 3.13 million tonnes in the 2006/07 cropping season to 1.97 million tonnes in 2007/2008. However, total national wheat production for the 2007/08 cropping season was 2.14 million tonnes, 47.1 percent below last year's yield and 48.5 lower than the ten-year average (see Table 3 ).

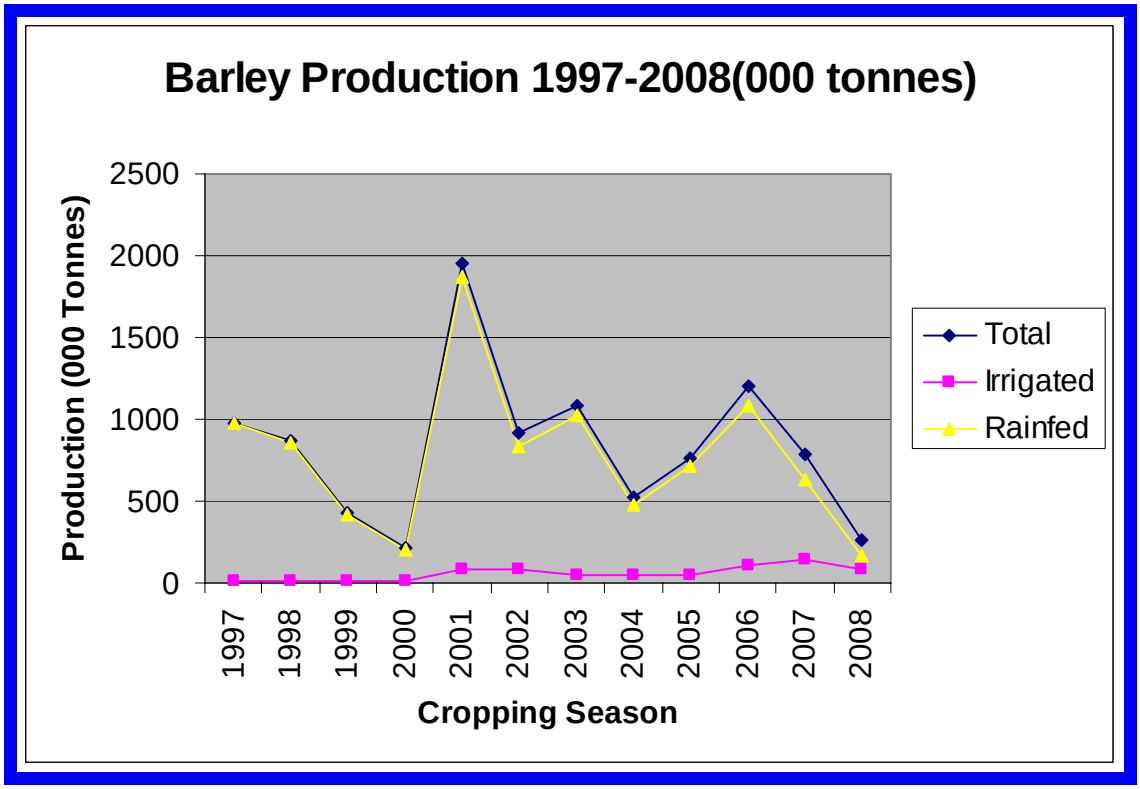
**Table 3: Crop production, cultivated area and yield for the ten-year average and for the 2007/08 cropping season**

| Crop | Cultivated area (1 000 ha) | | Yield (kg/ha) | | Percent | Production | | Percent |
|---|---|---|---|---|---|---|---|---|
| | 10-year average | 2007/ 2008 | 10-year average | 2007/ 2008 | | 10-year average | 2007/ 2008 | |
| Wheat | 1 744 | 1 486 | 2 373 | 1 440 | 60.7 | 4 151 | 2 140 | 51.6 |
| Barley | 1 356 | 1 433 | 666 | 182 | 27.3 | 786 | 261 | 33.2 |
| Lentil | 136 | 136 | 947 | 251 | 26.5 | 130 | 34 | 26.2 |
| Chickpea | 87 | 76 | 723 | 367 | 50.8 | 63 | 28 | 44.4 |

## 4.3 Barley production

Barley production is almost entirely dependent on rainfall, principally in low rainfall areas of zones 2, 3 and 4, which have been seriously affected by the drought. During the 2007/08 season, about 1.43 million hectares were planted with barley. Yields fell sharply between zero and 182 kg/ha. Total barley production was 261 136 tonnes, 66.7 percent below last year's harvest and 66.8 percent below the ten-year average (see Figure 4). Zone 5 saw a zero harvest of the rainfed barley crop, while in zones 2, 3 and 4, the harvest was 53 kg/ha,38 kg/ha and 186 kg/ha respectively. For both irrigated and rainfed barley, productivity levels dropped by 68.4 percent from 576 kg/ha in 2006/07 to 182 kg/ha in 2007/08 and by 72.6 percent compared with the ten-year average of 666 kg/ha (see Table3).

**Figure 4: Barley production for the 1997–2008 cropping seasons**




The sharp decline in production widened the domestic supply gap, leading to increased import requirements and higher prices, compounding the impact of global soaring food prices.

## 4.4 Lentil and chickpea

In 2007/08, 206 202 ha were planted with rainfed legumes (lentils and chickpea), which was 23 000 ha less than in the previous season. Lentil productivity fell by 65.7 percent to 251 kg/ha, compared with 731 kg/ha in the 2006/07 season and was 73.5 percent below the ten-year average. Chickpea production fell by 37.3 percent compared with 2006/07 and was 49.2 percent below the ten-year average (see Table 3).

Table 4 summarize the area planted, productivity and production and percentage differences compared with 2006/07 for cereal and legume crops in both irrigated and rainfed areas.

**Table 4: Planted area, productivity and production for cereal and legume crops for the 2006/07 and 2007/08 cropping seasons**

| Parameters | Cropping season 2006/07 | Cropping season 2007/08 | Percent compared with 2006/07 |
|---|---|---|---|
| **Wheat production** | | | |
| **Irrigated area** | | | |
| **Planted area (ha)** | **791 358** | **730 334** | **92.2** |
| **Yield (kg/ha)** | **3 955** | **2 701** | **68.3** |
| **Production (tonnes)** | **3 130 010** | **1 972 902** | **62.9** |
| **Rainfed area** | | | |
| **Planted area (ha)** | **876 374** | **755 657** | **86.2** |
| **Yield (kg/ha)** | **1,040** | **220** | **21.2** |
| **Production (tonnes)** | **911,090** | **166 398** | **18.3** |
| **Total production (tonnes)** | **4 041 100** | **2 139 300** | **52.9** |
| **Barley production** | | | |
| **Irrigated area** | | | |
| **Planted area (ha)** | **63 428** | **82 752** | **+30.4** |
| **Yield (kg/ha)** | **2 215** | **1 079** | **48.7** |
| **Production (tonnes)** | **140 508** | **89 269** | **63.5** |
| **Rainfed area** | | | |
| **Planted area (ha)** | **1 299 345** | **1 350 463** | **+3.9** |
| **Yield (kg/ha)** | **496** | **127** | **25.6** |
| **Production (tonnes)** | **643 971** | **171 861** | **26.7** |
| **Total production (tonnes)** | **784 479** | **261 130** | **33.3** |
| **Lentil production** | | | |
| **Irrigated area** | | | |
| **Planted area (ha)** | **2 571** | **1 983** | **77.1** |
| **Yield (kg/ha)** | **1 098** | **1 166** | **+6.2** |
| **Production (tonnes)** | **2 823** | **2 259** | **80** |
| **Rainfed area** | | | |
| **Planted area (ha)** | **14 6571** | **133 802** | **91.3** |
| **Yield (kg/ha)** | **725** | **238** | **32.8** |
| **Production (tonnes)** | **106 210** | **31 857** | **30** |
| **Total production (tonnes)** | **109 033** | **34 116** | **39.5** |
| **Chickpea production** | | | |
| **Irrigated area** | | | |
| **Planted area (ha)** | **1 647** | **3 193** | **+93.9** |
| **Yield (kg/ha)** | **1 531** | **1 630** | **+6.5** |
| **Production (tonnes)** | **2 521** | **5 203** | **+6.4** |
| **Rainfed area** | | | |
| **Planted area (ha)** | **83 943** | **72 400** | **86.2** |
| **Yield (kg/ha)** | **566** | **312** | **55.1** |
| **Production (tonnes)** | **47 523** | **22 569** | **47.5** |
| **Total production (tonnes)** | **50 044** | **27 772** | **55.5** |

## 4.5 Cotton

The total area cultivated with the summer cotton crop in the 2008 season fell to 160 000 ha, compared with 200 000 ha in 2006/07 as a result of water shortages.

# 5. Livestock

## 5.1 Animal wealth and production

As a result of growing internal and external demand for animal products in general and for Awassi sheep meat and milk in particular, the sheep, goat, cattle and camel populations in Syria have increased significantly. (Table 5 compares livestock numbers in 1976 and 2006.)

**Table 5: Growth in livestock population in Syria**

| Year / Species number (head) | 1976 | 2006 | Percent |
|---|---|---|---|
| Sheep | 6 489 000 | 21 380 000 | 329 |
| Goat | 956 000 | 1 420 000 | 148 |
| Cattle | 574 000 | 1 121 000 | 195 |
| Camel | 73 000 | 267 000 | 365 |

Awassi sheep were the main source of red meat and of a large quantity of milk products in 2006. (See Table 6 for cattle, sheep, goat and buffalo production in 2006.)

**Table 6: Milk and meat production in Syria (2006)**

| Species | Cattle | Sheep | Goat | Buffalo | Total |
|---|---|---|---|---|---|
| Milk (tonnes) | 1 615,68 | 824 067 | 91 138 | 3 794 | 2 534 682 |
| Percent | 63.7 | 32.5 | 3.6 | 0.2 | 100 |
| Meat (tonnes) | 60 305 | 187 467 | 7 437 | 0.266 | 255 475 |
| Percent | 23.6 | 73.4 | 2.9 | 0.1 | 100 |

In Syria, about half a million households work directly or indirectly in the small ruminant subsector, whose products are ranked first or second among the country's agricultural exports. Small-scale herders are the main group involved in sheep production activities (125 275 families). About 47 percent own less than 100 heads of sheep and 84 percent own less than 200 heads.

**Table 7: Sheep flock size and distribution**

| Flock size / head | Number of families | Percentage of herders |
|---|---|---|
| 100 > | 59 000 | 47 |
| 100-200 | 470 00 | 37 |
| 300 -500 | 15 000 | 12 |
| 500- 1000 | 3 750 | 3 |
| 1 000 < | 625 | <1 |

This emphasizes the importance of stabilizing animal production and, therefore, the livelihoods of livestock herders in Syria. Livestock and animal products are the main source of income for poor households in the Badia steppe and the second source of income in suburban areas.

## 5.2 Feed balance in Syria

The latest study of feed balance for 2005[1] showed that local feed resources met 82.6 percent of the total requirements of dry matter (DM), 55.6 percent of metabolic energy (ME) and 45.6 percent of digestible protein (DP).

[1] Arab Centre for the Study of Arid Zones and Dry Lands (ACSAD), 2008.

In order to reduce the gap between total nutrient requirements of animal wealth and local feed resources, Syria imported feed grains (corn, barley and protein additives). The imported feed met about 23 percent of DM, 30.4 percent of ME and 45.6 percent of DP requirements. However, there remained deficiencies of 14 percent in ME and 14 percent in DP (see Table 8).

Although feed resources remain the same, the number of livestock has been growing at the following rates: 5.2 percent for sheep, 1.1 percent for mountain goats, 12.7 percent for shami goats, 5 percent for improved and Friesian cattle and 1 percent for local Akshi. This means that Syria's livestock subsector will require more feed resources than estimated in the feed balance study for 2005. However, livestock productivity is expected to remain at low or medium levels.

**Table 8: The overall feed balance in 2005**

| Feed resources | Nutrient components | | |
|---|---|---|---|
| | DM* | ME** | DP*** |
| Total local recourses | 8 795 | 60 962 | 362 |
| Imported feeds | 2 451 | 33 259 | 322 |
| Total used resources | 11 246 | 94 221 | 684 |
| Exported feeds | ----- | ----- | ---- |
| Total available feeds | 11 246 | 94 221 | 684 |
| Total animal requirements | 10 649 | 109 340 | 794 |
| Feed balance | +597 | -15 119 | -110 |
| % of sufficiency | 106% | 86% | 86% |

***DM: 1 000 tonne.***
****ME: million mega joules.***
*****DP: 1 000 tonnes.***

## 5.3 The main livestock feed resources

### Natural pastures

Syrian nomads/herders have developed an effective yearly feeding cycle. This involves the movement of sheep to the east to the pastures in the Badia rangelands and to the west for crop residues. These feeding systems met about 60 percent of the annual feed requirements of millions of sheep.

### Crop residues

These mainly include wheat, barley and lentil straws. The quantity and quality of the crop residues depend on the crop yields in rainfed areas. Vegetables, fruit trees and other residues also used to be an important component of the livestock feeding cycle. Crop residues contributed 72.3 percent of DM, 55.3 percent of ME and 35.9 percent of DP to the total local feed resources in 2005[2].

### Feed grains

This is mainly barley, as well as corn, wheat and legume seeds. Barley grain is the main resource of energy in the rations of all ruminants and is also partly a resource for poultry. Feed grains contributed 13 percent of DM, 25.5 percent of ME and 28.7 percent of DP to the total local feed resources in 2005[3].

The barley yield is strongly influenced by the amount and distribution of rainfall, as well as by other climatic conditions.

[2] ACSAD 2008.
[3] ACSAD 2008.

### By-products of agricultural food industry

This includes wheat bran, cotton seed meal, beet pulp, molasses, olive oil industry and other residues. The quantity and quality of these residues are affected by the availability of water resources, through rain and irrigation. The cotton seed meal/cakes are considered the main protein source in the diet of ruminants. By-products contributed 7.6 percent of DM, 11.4 percent of ME and 25.6 percent of DP to total local feed resources in 2005[4].

### Fodder forage

This includes irrigated fodder crops, such as alfalfa and maize, and rainfed fodder crops, such as barley and vetch. The yield of fodder forages depends on the availability of water resources. Fodder forages contributed 2.3 percent of DM, 2.7 percent of ME and 5.5 percent of DP in 2005[5].

### Protected conservation reserves

The total area of these ranges is about 970 000 ha distributed in the Badia. They belong to the Ministry of Agriculture. The areas are used for sheep grazing for two periods between 15 March and 15 May and from 15 September to 15 November.

## 5.4 Impact of drought on livestock numbers and performance

The 2007/08 drought has negatively affected animal production throughout Syria. The most affected areas were in the Badia (zone 5), which includes a wide area of several provinces (Damascus suburban, Homs, Hama, Al-Raqqa, Deir Ezzor and Al-Hassaka). Suburban areas in zones 3 and 4 were also badly affected. The area is home to 75 percent of the sheep, 65.7 percent of the goat and 68.1 percent of the cattle populations in Syria.

The data about the impact of the 2007/08 drought was collected through field trips and discussions with herders and local agricultural authorities in selected sites and villages in the affected areas (see Table 9).

**Table 9: The relative distribution of the main farm animals in Badia (2008)**

| State/province | Sheep | | Goat | | Cattle | |
|---|---|---|---|---|---|---|
| | Head | Percentage | Head | Percentage | Head | Percentage |
| Syria | 22 865 | 100 | 1 561 | 100 | 1 168 | 100 |
| Damascus suburban | 2 107 | 9.2 | 272 | 17.4 | 229 | 19.6 |
| Homs | 2 965 | 13.0 | 112 | 7.2 | 123 | 10.5 |
| Hama | 2 758 | 12.1 | 129 | 8.3 | 66 | 5.6 |
| Al-Raqqa | 2 860 | 12.5 | 199 | 12.7 | 22 | 1.9 |
| Deir Ezzor | 3 437 | 15.0 | 86 | 5.5 | 247 | 21.1 |
| Al-Hassaka | 3 009 | 13.2 | 228 | 14.6 | 110 | 9.4 |
| Total | 17 136 | 75 | 1 026 | 65.7 | 797 | 68.1 |

The visited sites were:

- Tal-Snan, Ashekh helal and Wadi Al-Azeb in Hama province;
- Al-Ertewazia and Tal-Tamr in Al-Raqqa province;
- Al-Qameshly city, Jajet Al-Hajea, Al-Shadadeh and Al-Zianat in Al-Hassaka province;
- Al-Shola and Kabajeb in Deir Ezzor province; and
- Qaser Al-Halabat and Palmyra in Homs province.

[4] ACSAD 2008.
[5] ACSAD 2008.

The impact of the drought was similar in all the sites visited. Table 10 summarizes the status of livestock and related feed resources, as well as factors that affect herders' livelihoods. It was clear that the 2007/08 drought had a significant impact on livestock numbers and productivity in the Badia (zone 5) and the marginal and suburban areas.

**Table 10: Comparative estimation of livestock status in 2006/ 2007 and 2007/ 2008 seasons**

| Parameter | 2006 / 2007 | 2007/2008 |
|---|---|---|
| **Body weight (kg)** | | |
| **Adult ewes** | **40 – 50** | **30 – 35** |
| **Birth weight** | **4 – 4.5** | **2.5 – 3** |
| **Fattened lamb** | **40 – 50** | **----** |
| **Unfattened lamb** | **-----** | **15 – 18** |
| **Milk yield (kg)** | | |
| **Sold milk** | **80 – 100** | **0 – 10** |
| **For family** | **15 – 20** | **0 – 10** |
| **Culling for slaughtering (%)** | | |
| **Adult ewes** | **15 – 20** | **50 – 100** |
| **Young females** | **5 – 10** | **80 – 100** |
| **Young lambs** | **0 – 5** | **80 – 100** |
| **Mortality (%)** | | |
| **Adult ewes** | **5 – 10** | **25 – 30** |
| **Young stock** | **5 – 10** | **40 – 50** |
| **Lambing rate (%)** | **60 – 70** | **45 – 50** |
| **Mating rate (%)** | **70 – 80** | **10 – 20** |
| **Twining rate (%)** | **5 – 8** | **0** |
| **Live animals prices (SYP)** | | |
| **Adult ewes** | **5 000 – 6 000** | **1 200 – 1 500** |
| **Fattened lambs** | **4 000 – 5 000** | **0** |
| **Unfattened lambs** | **0** | **500 – 1 200** |
| **Feeds prices (SYP)** | | |
| **Barley** | **12 - 14** | **18 – 20** |
| **Cotton seed meal** | **12 - 14** | **15 – 18** |
| **Straw (barley/wheat)** | **13 – 15** | **20 - 22** |
| **Rental of 1 ha of harvested land** | **3 000 – 4 000** | **8 000 – 10 000** |
| **Grazing period on the rangelands (day)** | **50 – 60** | **0** |
| **Cost of transportation (SYP)** | | |
| **One truck** | **20 000** | **38 000** |
| **Grazing protected conservation reserves (day/ year)** | **120** | **0** |

### The consequences of the drought were:

- decreased vegetation in the natural ranges, which caused feed resources to drop to zero;
- decreased production of the main elements of animals' daily ration (barley and straw) to almost zero under rainfed farming;
- decreased prices of sold/culled ewes and young animals by 70 – 80 percent;
- decreased lambing rate by about 15 – 20 percent;
- decreased mating rate by about 50 – 70 percent;
- twining rate fell to zero;
- herders forced to sell about 80 – 100 percent of the female replacements;
- increased mortality rate of adult ewes and young stock by 25 – 50 percent;
- feed prices increased by about 50 to 75 percent compared with last season; and
- the price of drinking water increased to two or three times its previous level.

This situation is ongoing despite the Government's efforts to resolve these problems. The situation has been compounded by global soaring food prices, which have limited the Government's capacity to manage the emergency with its own resources.

# 6. Food security

Food production by farmers relying on rainfed agriculture was much lower this year, particularly in Al-Hassaka and Al-Raqqa governorates. Yields of the two main staple crops – wheat and barley – were either zero or very low. Although irrigated areas had better results, yields were about 50 percent below the previous year's levels. Water sources for irrigation were affected by scarce and irregular rainfall during the last cropping season. In addition, rising fuel prices affected the use of water pumps.

The crops that were harvested were quickly sold and/or met household needs for only about two months. Families were therefore left without food grain and/or seed reserves.

Cereals are usually sold to the Government at fixed prices. Farmers sell all their produce and keep only a small amount as seeds. Thus, staple crops can be also considered cash crops. Many farmers also plant cotton in Al-Hassaka and Al-Raqqa governorates. The September 2008 harvest is expected to be poor. Farmers in these areas hardly produce any crops other than wheat, barley and cotton and almost all their food items are purchased at the market.

In addition to raising animals, herders usually sell food products at the markets, including milk and cheese. In 2007/08, the number of herders selling their produce has been very low because production barely meets their own consumption needs. Livestock production was much lower than in previous years and many herders had to sell more than half of their animals to ensure fodder and survival for the rest.

## 6.1 Market purchases and other sources of food

Food markets are very important in this context, particularly for farmers who sell most of their own produce. The price of cereals and other main food items has risen sharply following the global trend in soaring food prices, as well as decreasing Government subsidies of food items and gasoline. The price ratio of cereals to livestock is particularly unfavourable for herders. Wage rates have remained roughly the same, despite the increased supply of casual labour. The price of the basic food basket has risen and the purchasing power of rural households has fallen.

## 6.2 Income and cash sources

Although the affected population has tried to diversify their income sources to cope with the drought, these strategies have not proved sustainable. Wives and children have migrated to seek seasonal agricultural work and casual work in urbanized zones in higher numbers than usual. Some people also rely on wage labour in the public sector. However, these incomes are too low to compensate for the loss of crop and/or livestock revenues. Seasonal migration to cities inside Syria, as well as to Lebanon and Jordan, is increasing. Remittances are becoming more important in the overall household economy and are usually spent on food.

## 6.3 Expenditures

The proportion of cash income or savings spent on food differs for farmers and herders. While farmers do not have to provide a lot of inputs for their crops during the season, herders have to cover the rising costs of fodder. Livestock survival is the basis of their livelihoods. Therefore,

farmers can spend a larger share of income on food items. Both livelihood groups are, however, negatively affected by rising food prices.

Both groups are spending increasing proportions of their income on drinking water. Water is no longer available in many wells and groundwater is often polluted, showing high rates of nitrates and calcium. Drinking water is delivered by tanks, implying higher household expenditure outside urban areas. The Government delivers drinking water to some villages, but the price of this water has also risen sharply in the past year.

Transport costs have almost doubled as a result of rising fuel prices (up to 300 percent). Given the low level of agricultural production this year, this has not significantly affected sellers' market access, but does impede the search for casual labour because transport costs offset earnings. Spending on other essentials, including healthcare and schooling, is reduced. Although the Government provides free healthcare in urban centres, villagers cannot afford the cost of transport to reach these centres and tend to rely on traditional medicine. School dropout rates are likely to increase as families cannot afford basic costs of schooling. For parents struggling to meet basic needs, schooling has ceased to be a priority.

## 6.4 Coping strategies and food consumption

Most herders have sold some of their livestock at reduced market prices and resorted to borrowing. Some of family members have migrated to urban centres or Lebanon to support household income. Farmers rely on seasonal agricultural work to meet their food deficit, but this has become scarce as a result of the drought. The most vulnerable families have started to sell other household assets.

Debts are an increasing burden on affected households. These will have a long-lasting impact on production as they cannot possibly be repaid in the coming seasons. Some herders in Al-Hassaka governorate have reported debts as high as USD 15 000. Job and loan applications in unemployment centres have tripled, particularly by Bedouin herders who live in remote areas of Al-Badia.

Adults have reduced their food consumption as a result of the drought and the range of foods in household diets is considerably narrower compared with previous years. Bread and rice are being replaced by less preferred foods, such as barley. People tend to reduce or eliminate essential protein-rich foods from their diet, such as meat and dairy products. Meal sizes are also significantly reduced.

Migration is a key coping strategy. Farmers are leaving their lands in search of casual labour in urban centres. This migration is still temporary as only a small proportion of farmers have sold all their assets. If the next season is better and farmers receive the necessary support, people will return to cultivate their land. Herders, however, are tied to their livestock. The most vulnerable herders live in remote areas of Al-Badia. They move in search of fodder for their shrinking herds. Permanent migration and a radical change in livelihoods is probable among these groups. In some areas, up to 70 percent of the population has already left.

To-date, all of these coping strategies have been unsuccessful.

## 6.5 Current and expected household food security needs

The majority of herders in the Badia region with less than 100 animals and farmers relying on rainfed agriculture in zones 4 and 5 will be unable to access sufficient food over the coming

months without adopting damaging coping strategies. Multisectoral assistance is required for these groups if their livelihoods are to be restored in time for the next agricultural season. For most drought-affected households, food insecurity can be considered to be temporary.

Farmers require assistance for approximately nine months (from September to May) and herders for about six months (September to February). The required food assistance includes is partial household rations of the staple food (i.e. wheat flour) during these periods. Food aid could be distributed free or as part of a food-for–work scheme. Emergency school feeding does not appear to be a viable response mechanism as school dropouts are mainly related to family migration.

A combination of food and cash assistance might be the best response for herders, as they could sell/exchange part of their rations to provide for their animals. Assistance needs to be delivered to the affected populations quickly to avoid further distress sales and outmigration. While food aid in this context could help prevent a further deterioration in the food security situation of affected households, other non-food assistance, mainly in the agriculture sector, is required to restore livelihoods.

# 7. Drinking water and drought

The northeastern and Badia regions of Syria are currently facing meteorological and hydrological drought owing to a rainfall deficit and a decrease in groundwater and surface water levels. Pressure on Syria's water resources has been growing in recent years as a result of water scarcity, climate change, migration of populations and increased urbanization and agricultural production.

Water flow in the Euphrates has decreased compared with average levels. During March 2008, total actual water quantity in reservoirs was decreased by 25 percent. Water storage capacity in the Badia (where there are 33 dams) was only 17.2 percent of the total capacity. Traditional groundwater irrigation systems have experienced reduced discharge and some of wells have dried up because of low precipitation and the resulting low recharging of groundwater.

Water scarcity, global warming and improper agricultural irrigation techniques employed by Syrian farmers have led to the drying up of many water sources in northeastern regions of the country, while the water levels of rivers, lakes and dams have also dropped considerably.

Rural populations that rely on the production of water from their own wells are most affected by drought. In some areas, potable water production has fallen to 10 litre per capita per day, while the average norm for rural areas was 125 litre/capita/day. As a result, most rural populations buy drinking water or have it transported by tanker from available water sources nearby.

One of the most serious impacts of drought is the enforced migration of large numbers of people who are unable to access drinking water or food. The current drought in Syria has led to the large migration of rural populations to less water-stressed urban areas. The areas into which the migrants move are often already overcrowded and social services are facing additional strain, well in excess of their capacity. As a result, the impact of drought has spread over larger areas and safe water availability remains a challenge to a large proportion of the population.

Al-Salamiya district in Hama governorate depends solely on water from deep wells. It has approximately 1 100 wells (with a depth up to 50 m). The current average water production for one well is approximately 20 $m^3$ of potable water per day, compared with 100 $m^3$/day in 2006 and 300 $m^3$/day in 2000. This significant drop in water production has resulted in severe water shortages for 300 000 inhabitants of this district. Al-Salamiya district has one operational reverse osmosis (RO) unit and has requested assistance from the UN to procure two additional RO units.

Al-Hassaka governorate is also experiencing the impact of the drought as a result of a fall in water levels in rivers, lakes and dams. For example, the water output of Khabour river has decreased from 45 $m^3$/sec in 1990 to zero in 2005 and the river is now essentially a swamp. As per Al-Hassaka Water Authorities, water levels of dams and wells have also dropped, particularly during the last two years. Rural areas of Al-Raqqa governorate have been hit hard by the drought and the drinking water for humans and livestock has became the most urgent problem. Ninety percent of Al-Raqqa governorate's rural population is affected by drought. Shortages of diesel to pump water have also been reported.

Drought conditions also influenced water quality. Many communities have reported problems with the quality of water from their utilities and, therefore, people are buying drinking water from other sources.

## 8. Health and education

The data available to health authorities in drought-affected areas indicated that there was a marked increase in anaemia, malnutrition and diarrhoea among children under five years in Salamia, Al-Raqqa and Hassaka districts. Data indicates that there was an increase in malnutrition cases among children under five years in 2008. In Salamia district, 1 472 cases were recorded compared with 890 cases in 2007 and in Al-Raqqa district, 97 729 cases were recorded, compared with 78 576 cases in 2007.

Health authorities recorded an almost twofold increase in the number of anaemia, malnutrition, and diarrhoea cases among children under five and pregnant women, compared with the same period in 2007. This is indicates that the impact of the drought on livestock and crop production has led to shortages of the food and other resources necessary to secure alternative food sources and healthcare insurance for households in drought-affected areas. There is, therefore for a need for urgent action to mitigate these risks and provide households with appropriate food sources to prevent further deterioration in their health status (see Tables 11 – 13).

**Table 11: Prevalence of anaemia among children under five in drought-affected areas in the first six months of 2007 and 2008**

| Area | 2007 | 2008 | Percentage |
|---|---|---|---|
| Salamia | 331 | 992 | 299.7 |
| Raqqa | 48 133 | 61 290 | 127.3 |
| Hassaka | 6 930 | 14 330 | 206.7 |

**Table12: Prevalence of malnutrition among children under five in drought-affected areas in the first six months of 2007 and 2008**

| Area | 2007 | 2008 | Percentage |
|---|---|---|---|
| Salamia | 890 | 1 472 | 165.4 |
| Al-Raqqa | 78 576 | 97 729 | 124.4 |
| Hassaka | 7 930 | 13 440 | 169.5 |

**Table 13: Prevalence of diarrhoea in drought-affected areas in the first six months of 2007 and 2008**

| Area | 2007 | 2008 | Percentage |
|---|---|---|---|
| Al-Raqqa | 12 007 | 10 101 | 84.1 |
| Hassaka | 18 394 | 24 230 | 131.7 |

The drought impacts on children's morbidity, according to the health authorities, who indicated that the prevalence of acute respiratory infection (ARI), brucellosis, typhoid, bloody diarrhoea and dermatitis diseases had increased.

The drought also had a negative impact on education. The drought-affected areas showed a notable increase in the dropout and absenteeism rate of school children. Cases of students searching for job employment rather than attending school are increasingly reported. Four percent of school students (241 527 students) were absent from school during 2008. In the drought-affected Badia areas, the percentage of student dropouts increased by 18 percent and in some areas was even higher (e.g. 30 percent in Al-Saen area) as a result of family migration and a shortage of household financial resources. In Hassaka, the drought affected five districts with 46 schools, of which 23 were closed as a result of the outmigration of students' families.

# 9. Required emergency assistance

Syria has a Mediterranean climate, with rainfall concentrated in the cold or relatively cold seasons, while the dry period coincides with high temperatures. Drought is a recent phenomenon and one of the main environmental issues facing Syria, with drought conditions occurring more frequently in recent years as a result of global climate change. The impact of the drought could be seen on all agricultural activities to varying degrees.

Most cultivated areas in Syria are rainfed areas and the production of basic crops in these areas – wheat, barley, lentils and chickpeas – was badly affected by the drought. This has resulted in a serious fall in crop production and poor pasture capacity in the Badia rangelands and marginalized areas. Reduced agricultural production and the failure of the harvest across large areas have resulted in severe shortages of agricultural seed needed for planting in the upcoming season to restore the production cycle and provide households with a source of income to meet household food and livelihoods needs. Rural communities, particularly the most vulnerable groups in the Badia rangelands and northeastern regions (Hama, Al-Raqqa, Al-Hassaka and Deir Ezzor governorates) had zero rainfed crop production and more than 206 000 farming households have become severely food insecure, lost their productive capital and are facing a serious reduction in employment opportunities.

The drought had a severe impact on livestock production and the lack of pastures for grazing forced herders to buy feed for their animals much earlier than usual. As a result, small and medium-sized herds (below 100 heads) have been seriously affected because herders were not able to purchase fodder and concentrated feed and provide adequate veterinary services. Sheep mortality rates in the original herd and newborn animals increased and there was a fall in milk production. Temporary migration in search of employment, sale of livestock, sale of household assets, credit from money lenders and further reductions in food consumption levels have been reported as coping mechanisms.

The majority of small-scale herders in the Badia region and farmers that rely on rainfed agriculture in zones 4 and 5 will be unable to access sufficient food in the coming months without adopting damaging coping strategies.

Negative impacts on health and education have been reported, with increased rates of diseases in children under five, child-bearing women and more school dropouts and absenteeism.

Most herders and farmers in drought-affected areas have virtually no income to cover their expenses (food, feed, healthcare, children's education) and their assets are being sold to cover their most urgent needs.

The Government implemented emergency measures to assist drought-affected populations, including herders and farmers, through the provision of subsidized extra feed rations on a loan basis to be repaid next season. It also provided, free of charge, food baskets (far below actual need) for the most vulnerable drought-affected households, provided veterinary medicines and vaccines for free, increased the purchase price of cereal crops by the state to enable farmers to cope with drought, rescheduled repayment of farmers' loans and authorized the fodder establishment to import barley grain to cope with the feed shortage.

The Government also initiated the rural women's developing programme by providing vulnerable women with interest-free loans to start small projects and therefore gain a new source of income. However, the needs of farmers and herders are beyond the assistance provided to-date and their productivity and herds have incurred huge losses, which they might not be able to recover for several seasons. The situation remains extremely serious and is likely to deteriorate over the coming months. If the drought recurs in the 2008/09 cropping season, it would have a catastrophic impact on the population and livestock in the entire country and in drought-affected areas in particular. The emergency response required for the different sectors is presented below.

## 9.1 Agricultural inputs

The emergency provision of wheat and barley seed assistance will be limited to the most vulnerable drought-affected farmers in rainfed areas. This is in response to the acute shortage of wheat and barley seeds as a result of zero or low crop yields in these areas. Most of wheat and barley that was produced was consumed as food and none was left as seeds for the coming season.

Wheat and barley seeds will distributed to farmers in Al-Raqqa, Deir Ezzor and Al-Hassaka provinces. In other provinces, seed distribution will be limited to farmers in zones 3 and 4 for barley seed and zone 2 for wheat seed to enable them to restart production in the coming season. The seeds will be sufficient to plant 3 ha/household. Total requirements are:

- wheat seed: 33 750 tonnes (at a cost of USD 22 million); and
- barley seed: 33 750 tonnes (at a cost of USD 17 million).

Wheat and barley crop varieties adapted to rainfed cultivation will be identified in consultation with the General Organization for Seed Multiplication (GOSM) and the General Commission for Scientific Agricultural Research at the Ministry of Agriculture.

Seeds will be processed and treated according to quality seed standards or conform to the Government's standards for emergency seeds. A list of potential beneficiaries (vulnerable drought-affected farmers) will be compiled by local authorities according to a pre-defined set of criteria.

Although the distribution of seeds on a loan basis is normally considered to be more sustainable in the long term, in this case the seeds will be distributed free of charge because of the nature of the emergency. The livelihoods of the poorest farmers have been severely affected by the drought and, in these circumstances, repayments in cash or in kind would reduce the impact of the intervention on these beneficiaries.

## 9.2 Livestock

Major structural problems exist with the Syrian sheep subsector that have resulted in a doubling of livestock numbers to 23 million head over the last ten years – a number that exceeds the local feed capacity even in non-drought years. The long-term sustainability of the sheep subsector

requires a radical review of existing policies and that strategies be put in place that restore the balance between stock numbers and feed resources. Emergency support to the livestock sector has to balance the humanitarian aspects of alleviating the immediate threat to the livelihoods of the most vulnerable livestock-owning families with the broader ecological and environmental implications of maintaining unsustainable sheep numbers. In many cases, food or cash for work will be the most appropriate immediate response to the plight of the most vulnerable herders. In exceptional circumstances there may be some justification in providing the following direct assistance.

- Provision of emergency supplementary feed to allow up to ten breeding females and young stock to survive the critical dry period (December to February). Supplementary feed would be in the form of cereal (mainly barley) grains (whole, rolled or crushed) fed 250 g/head/day to 50 000 of the poorest livestock owners in the drought-affected areas. This would cover livestock feed requirements for at least two months at a cost of USD 21 million.

  There are two critical periods in the feeding cycle of sheep raised in the Badia:

  1. The mating season (July to the end of September/beginning of October): sheep flocks graze on the Al-Badia rangelands or on barley and summer crops residues. Both sources of feed were badly impacted by the 2007/08 drought. The feed shortage will negatively affect sheep fertility. Therefore, providing herders with some feed during this period will have a positive impact on sheep fertility.
  2. The lambing and after-lambing period (December to February): ewes require food, especially concentrated at the start, to support lactation for suckling lambs, which would decrease mortality rates.

- Restocking sheep (five heads/household) for 30 000 families that lost all their livestock (USD 22.5 million) to enable them to establish new herds, which will be their main source of income for their food and livelihoods. Particular attention should be given to women-headed households.

- Preventing animal morbidity through drug assistance, such as internal and external anti-parasites, antibiotics and multivitamins. This will protect animals weakened by the drought and increase their immunity. The improved health and productivity of the herds will preserve the livelihoods and food security of many rural families. The specific veterinary inputs provided will be determined following a further assessment of the impact of the drought on animal health.

## 9.3 Food assistance

The overall objective of food assistance is to support the Government's efforts to preserve the livelihoods and improve the nutritional status of people affected by the current drought. Food aid should be complemented by assistance to the agriculture sector.

The immediate objective is to provide emergency food assistance for six months to the most vulnerable households among the drought-affected herders. This will reduce the impact of drought and high food prices on their livelihoods and prevent further large-scale migration to urban centres and a further reduction in food consumption levels during the lean season.

Food assistance needs to be mobilized urgently to sustain affected households during the coming months. Food aid distribution can be facilitated through the coordination of related UN agencies,

local authorities and non-governmental organizations (NGOs) in provinces, as well as farmers' unions, women's unions and transport unions. Beneficiary lists will be compiled by local authorities in affected areas according to a pre-defined set of criteria.

## 9.4 Health and education

(1) Support to nutrition interventions for pregnant women and children.
(2) Increase availability of potable water.
(3) Monitoring of school dropouts during the next school year.

## 9.5 Medium-term recovery programme

Medium-term programmes are essential to help populations deal with droughts, which has are occurring more frequently in the region and which can strike at any time of the season. The main effect of drought is the reduction in agricultural productivity, which can impact negatively on other economic sectors. Severe drought places added pressure on urban resources through increased migration of vulnerable rural people from drought-affected areas and accelerates existing desertification processes, particularly in marginal areas. As a result, vulnerability to drought and water shortages will increase and threaten the food security of the whole country.

The development of strategies to cope with drought have become essential policy for the Syrian Government, including the establishment of early warning systems and plans to mitigate the impact of drought on agriculture and rural communities in the medium and long terms.

A national drought management strategy must be developed to mitigate the impact of drought. Priority areas may include:

- Comprehensive study/ies of drought-affected areas, particularly of land use policies and technologies for drought-prone areas and underground water use.
- Review present national plans, strategies and policies for drought management and make necessary adjustments.
- A medium-term recovery programme for affected areas would focus on:
    - a quick-impact special programme for food security enhancement;
    - development and implementation of a drought management strategy;
    - with low levels of water in rivers and wells and increased demand for water, there is a need to examine, develop and implement a water management and water harvesting policy, strategy and plan of action so as to balance water needs and the available water resources;
    - community-based recovery and management of rangeland;
    - development and implementation of an improved herd management policy, taking into account pasture capacity and fodder/feed availability;
    - support community volunteer activities in public healthcare awareness ;
    - enhancement of social services;
    - awareness campaigns for water conservation measures in drought-affected areas;
    - liaising and managing all efforts of the Government, NGOs and international agencies to support local communities and agricultural production systems in areas vulnerable to droughts.

**Sources: Relevant ministries, FAO and interviews with farmers, herders and women-headed households.**