



South and East Asia

The 2014 Rainfall Season

- The dominant feature of the 2014 season across East Asia so far has been widespread rainfall deficits that led to delayed starts of the growing season across vast areas of the continent.
- Conditions were worst around mid July, followed by a general improvement, which still left moderate rainfall deficits as the predominant pattern. SE Pakistan has been the worst affected area, in particular for livelihoods dependent on rainfed agriculture and pastoral resources.
- In early September, extreme rainfall events, the heaviest in at least 30 years, led to flooding and loss of life in Kashmir. In contrast, heavy rainfall relieved dry conditions in Gujarat, India.
- Seasonal forecasts indicate a continuation of broadly drier than average conditions across the continent. Weakening El Nino conditions may change these perspectives.

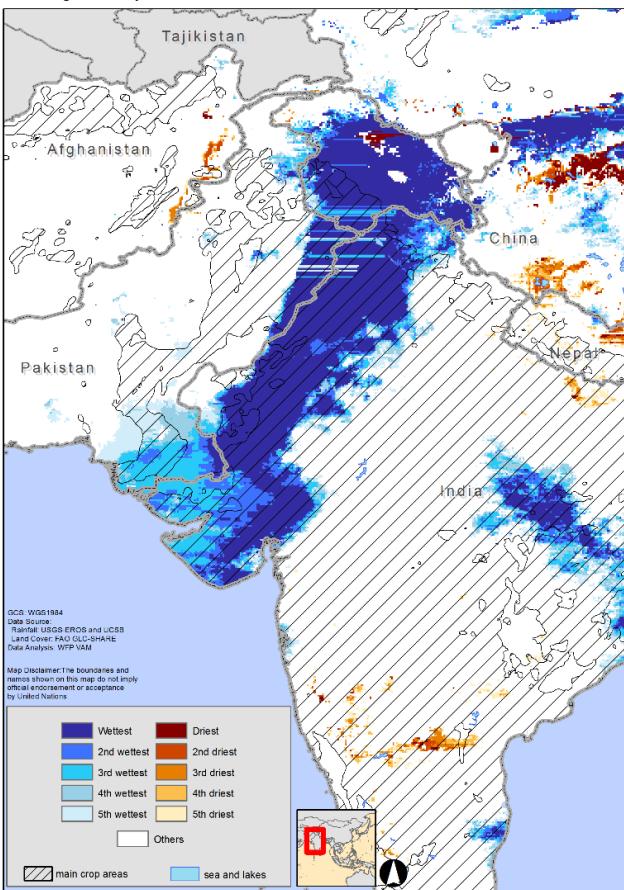
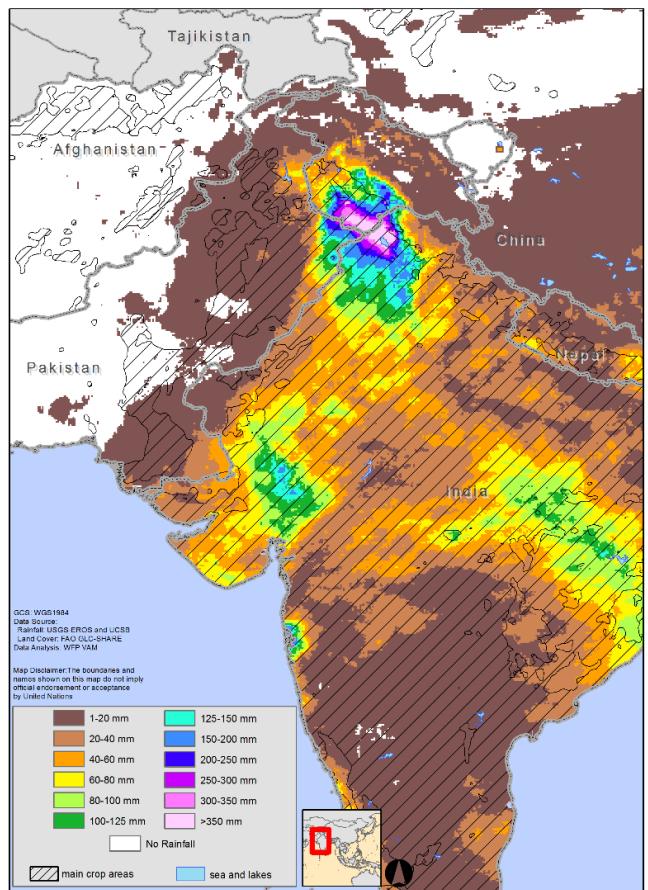
Current Situation and Near Term Perspectives

SOUTH AND EAST ASIA SEASONAL ANALYSIS - 2014

PAKISTAN and INDIA
Total Rainfall 01 to 05 September 2014



PAKISTAN and INDIA
Dry and Wet Extremes 01 to 05 September 2014
Ranking with 30 years data



Left, 5 day rainfall amounts over India and Pakistan (1-5 September 2014). Note area of extremely high rainfall over the Pakistan-Kashmir-India border. Estimated peak values have reached in excess of 500mm.

Right, Map of the rank of 1-5 September 2014 rainfall in the past 30 years, highlighting wettest and driest extremes. Note the extensive area along the Pakistan-India border where this period has been the wettest since 1984. National reports state rainfall to have been the heaviest in 50 years.

LATEST (1-5 September)

Extreme rainfall in Kashmir and along the India-Pakistan border

In early September, extreme rainfall events affected Kashmir and areas along the border between India and Pakistan.

Very intense 5 day rainfall reaching over 500mm led to extensive flooding and loss of life. Other areas of intense rainfall are noted in Gujarat-Rajasthan, India.

These events are part of a wider phenomenon of exceptionally high rainfall for this period – whereby most of the regions along the India-Pakistan border registered the wettest conditions in at least the last 30 years.

Though Kashmir has seen generally wetter than average conditions this season, Sindh, Gujarat and Rajasthan have suffered persistently drier than average conditions since early June.

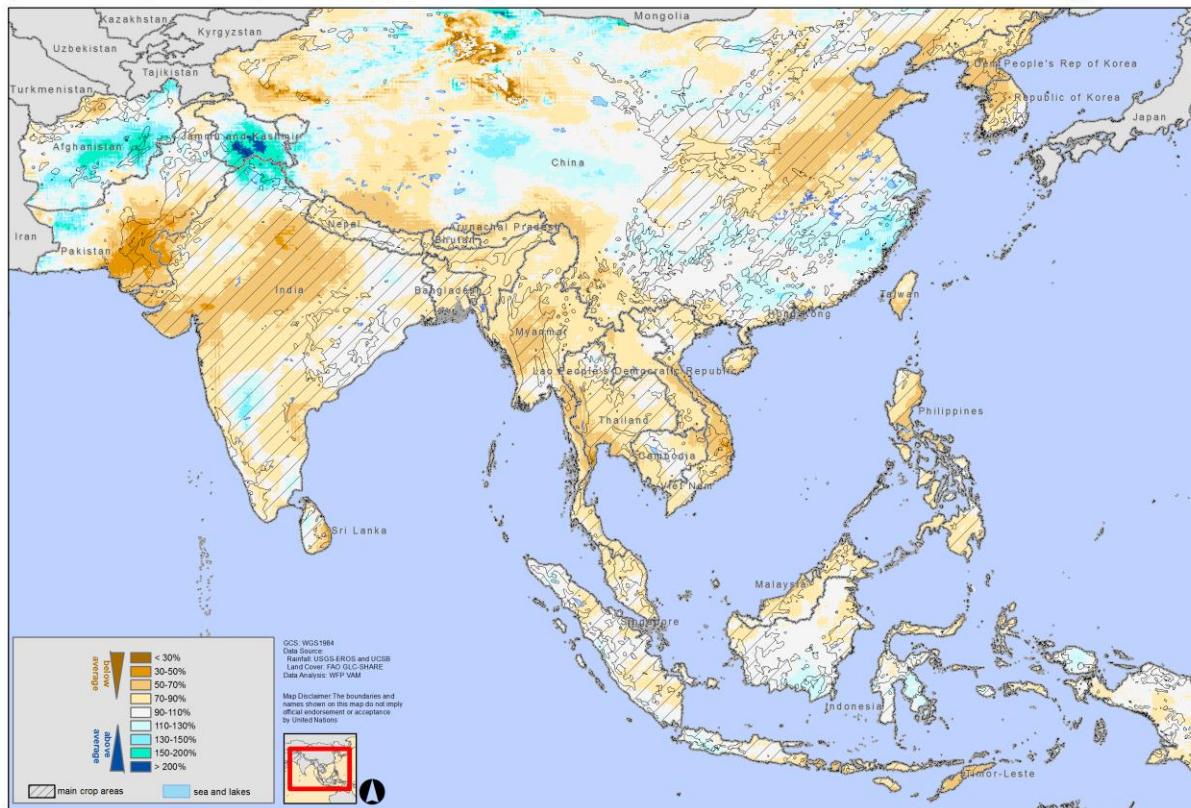
No further heavy rainfall affected Kashmir after September 5, but over Gujarat, much wetter than average conditions have remained until now.

SOUTH AND EAST ASIA SEASONAL ANALYSIS - 2014

10 Sep 2014

SOUTH-EAST ASIA

Total Rainfall (percent of average) by 10 Sep 2014



Total rainfall from 1 February to 31 August 2014 as a percentage of the 20 year average.

Hashed pattern indicates main agricultural areas.

Brown shades indicate below average rainfall, blue shades indicate above average seasonal rainfall

Overall Rainfall Performance

The dominant feature of the 2014 season has been the widespread rainfall deficits that led to delayed starts of the growing season across vast areas of the continent; these were associated with El Nino like conditions that affected weather across the globe.

Seasonal rainfall until early September still displays clear patterns of rainfall deficits, in particular in W India – SE Pakistan as well as NE China and parts of SE Asia (Myanmar and Vietnam).

This is actually an improvement relative to the marked rainfall deficits that reached maximum depth in mid July.

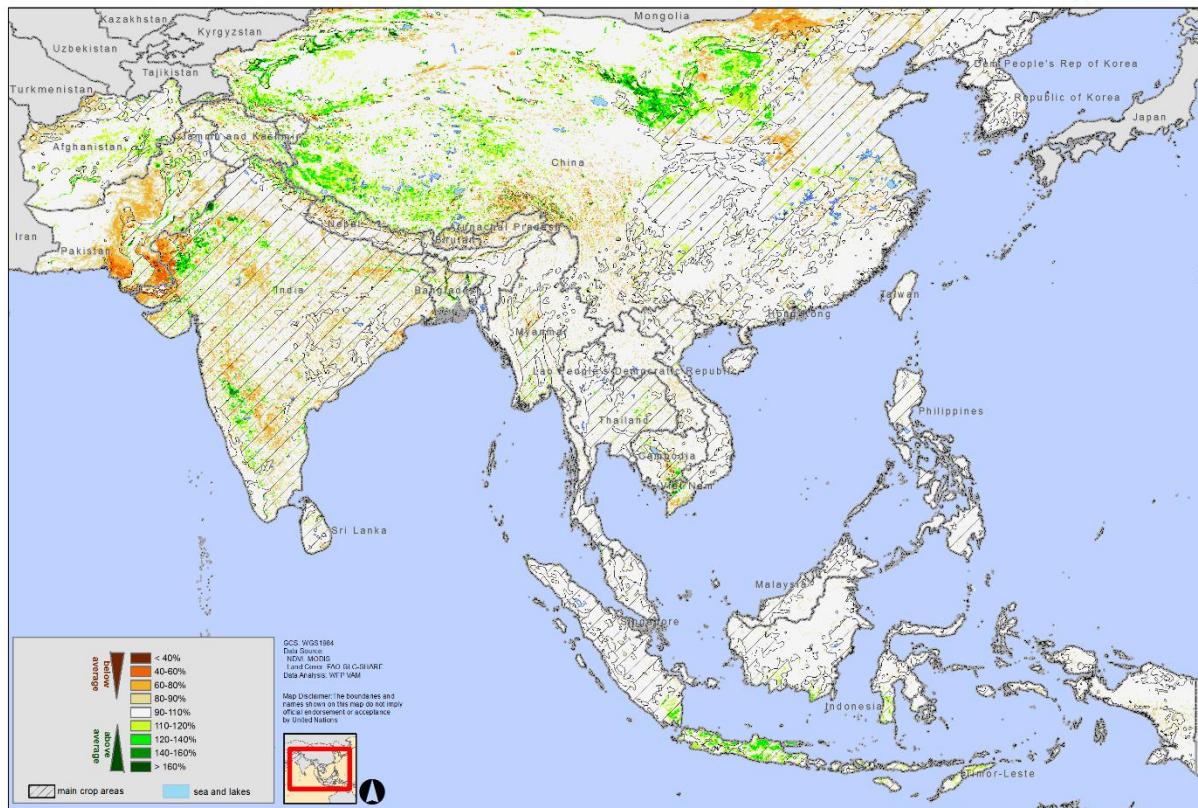
Worst affected area is the Sindh province of Pakistan with persistent and serious dryness since early 2014; wetter conditions in early September were not enough to overturn seasonal deficits.

Dry conditions observed in Gujarat, India have now subsided due to heavy rainfall since early September.

The Kashmir region has had a much wetter than average season even without considering the heavy rains of early September.

SOUTH AND EAST ASIA SEASONAL ANALYSIS - 2014

21Aug-06Sep 2014 | SOUTH-EAST ASIA
NDVI (percent of average) 21Aug-06Sep 2014



Vegetation index in late August 2014 as a percentage of the 12 year average.

Hashed pattern indicates main agricultural areas.

Yellow-orange shades indicate below average vegetation, green shades indicate above average vegetation

Overall Vegetation Status

The current vegetation status is largely consistent with the observed rainfall patterns. The more favourable rainfall in August alleviated widespread below average vegetation levels, which had been fairly pronounced in the NW India - SE Pakistan border areas.

Sindh province, away from the major irrigated areas shows pronounced vegetation deficits indicating serious problems for households dependent on rainfed agriculture and/or pastoral resources. Recent rainfall, unless it continues, is unlikely to provide significant respite.

Elsewhere, delays in the onset of the growing season are not expected to lead to major impacts on crop production, but may have consequences for poorer households in marginal rainfed or pastoral areas.

SOUTH AND EAST ASIA SEASONAL ANALYSIS - 2014

ECMWF Seasonal Forecast

Prob(precipitation > median)

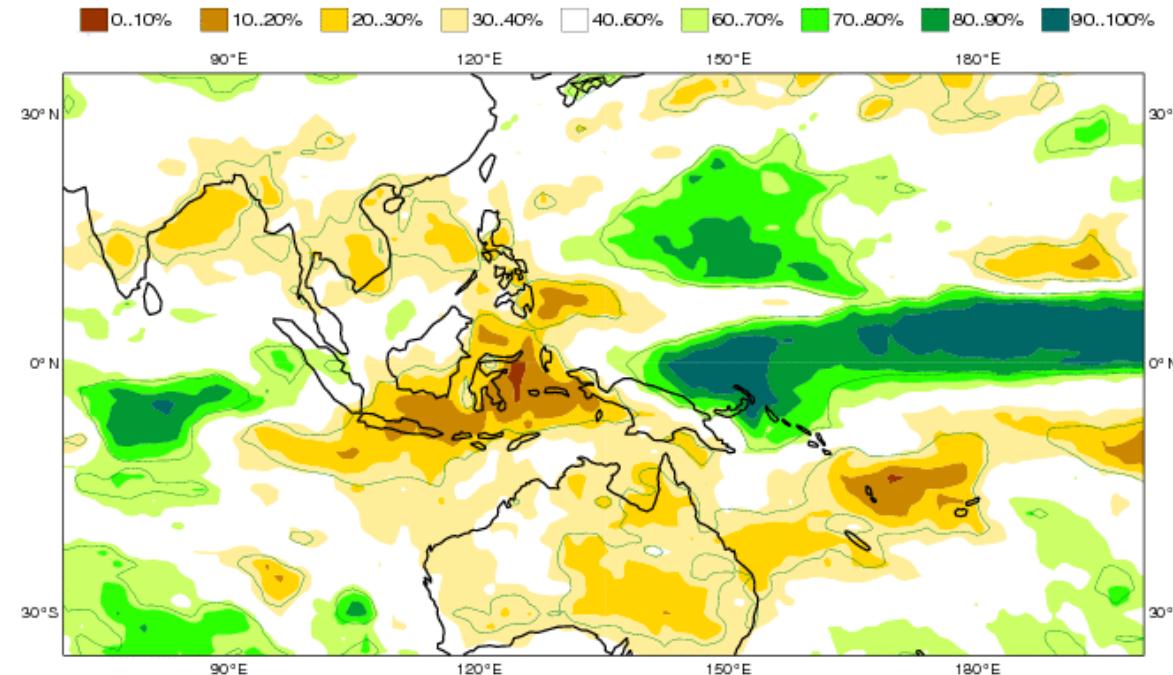
Forecast start reference is 01/09/14

Ensemble size = 51, climate size = 450

System 4

OND 2014

Solid contour at 1% significance level



Forecast for the September-October-November (SON) 2014 rainfall: Probability of SON rainfall exceeding the usual amount (long term median).

Green shades – higher likelihoods of wetter than usual conditions, yellow/browns – higher likelihoods of drier than usual conditions. Source: ECMWF.

Forecasts for the remainder of the season (October-December 2014)

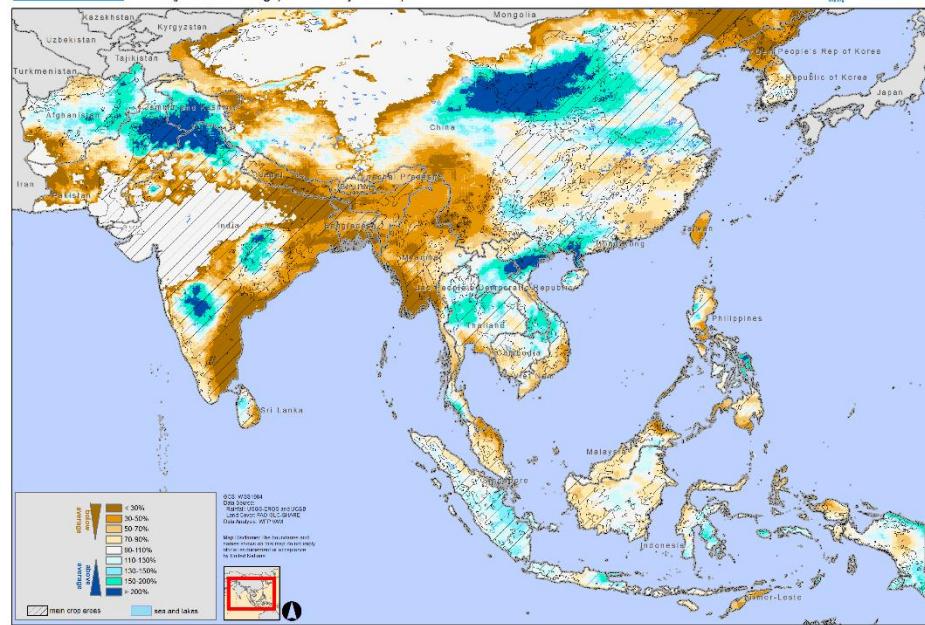
Latest forecasts for rainfall within the October to December 2014 period indicate drier than average conditions in SE Asia as well as parts of southern and NE India and Bangladesh. This represents a continuation of the drier than average patterns that have dominated across the continent in 2014. Marginal and rainfed areas in southern Pakistan are unlikely to see any relief from these persistent drier than average conditions since early 2014 (notwithstanding recent short lived rainfall events)

Drier than average conditions are also forecast for Indonesia, despite the weakening likelihood of an El Nino event.

How the Season Evolved

SOUTH AND EAST ASIA SEASONAL ANALYSIS - 2014

30 Apr 2014 SOUTH-EAST ASIA
Rainfall (percent of average) in the 30 days to 30 Apr 2014

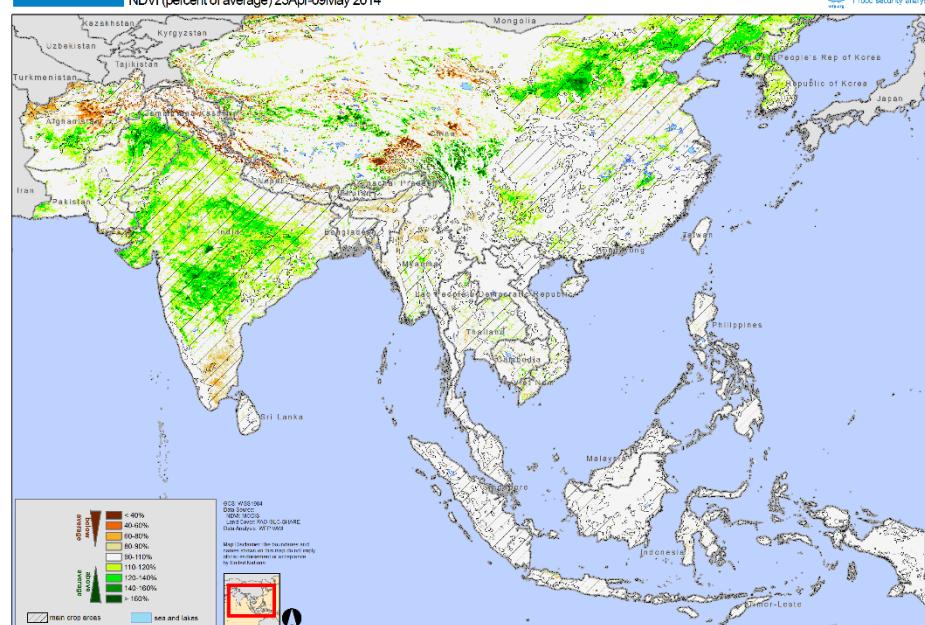


April 2014

The early stages of the season (March to April) presented a variable picture across the continent, with markedly wetter than average conditions in northern India, northern Pakistan, central India and northern China. This led to earlier than usual vegetation development in these areas.

Although elsewhere drier than average conditions persisted, they posed less concern as it was during the early stages of the agricultural season.

23Apr-09May 2014 SOUTH-EAST ASIA
NDVI (percent of average) 23Apr-09May 2014



April 2014 total rainfall as a percentage of the 20 year average (top).

Brown shades indicate below average rainfall, blue shades indicate above average seasonal rainfall

Early May 2014 Vegetation index as a percentage of a 12 year average (bottom)

Orange shades for below average, green shades for above average vegetation conditions

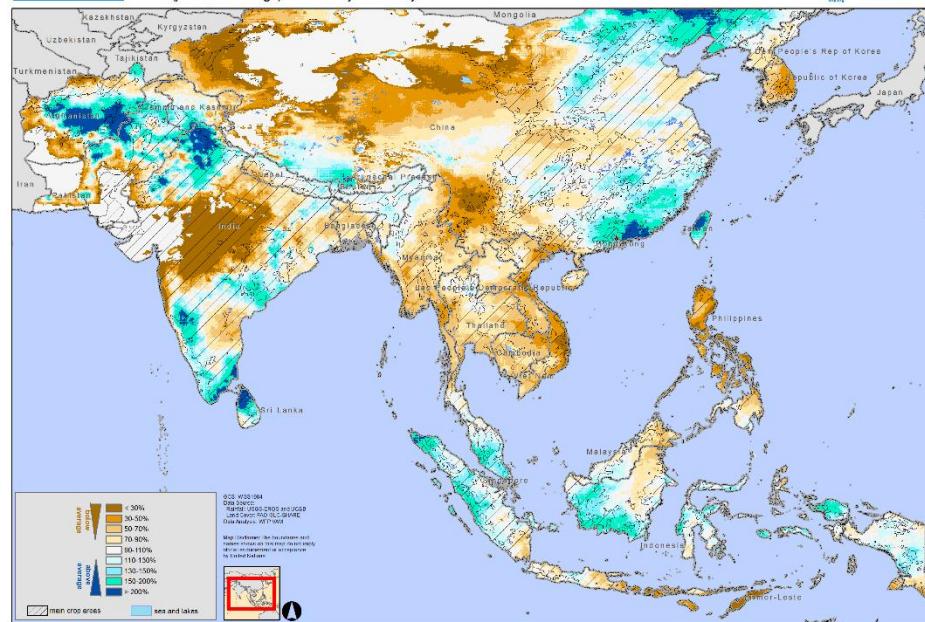
Hashed pattern indicates main agricultural areas.

SOUTH AND EAST ASIA SEASONAL ANALYSIS - 2014

31 May 2014

SOUTH-EAST ASIA

Rainfall (percent of average) in the 30 days to 31 May 2014



May 2014

During May, wetter than average conditions continued in a vast region from Afghanistan to Nepal as well as Southern India and SE China.

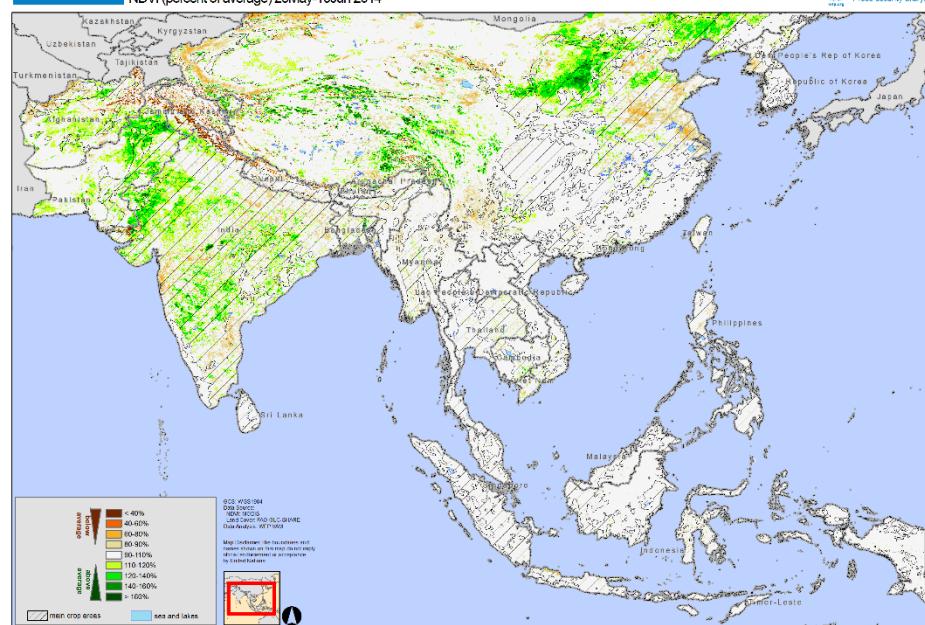
Dry conditions also continued across Madhya Pradesh and Gujarat, India. Southeast Asia and the Philippines also faced drier than average conditions, though this did not extend to Malaysia and Indonesia.

Vegetation levels started to converge to normal as previous rainfall surpluses decreased.

25May-10Jun 2014

SOUTH-EAST ASIA

NDVI (percent of average) 25May-10Jun 2014



May 2014 total rainfall as a percentage of the 20 year average (top).

Brown shades indicate below average rainfall, blue shades indicate above average seasonal rainfall

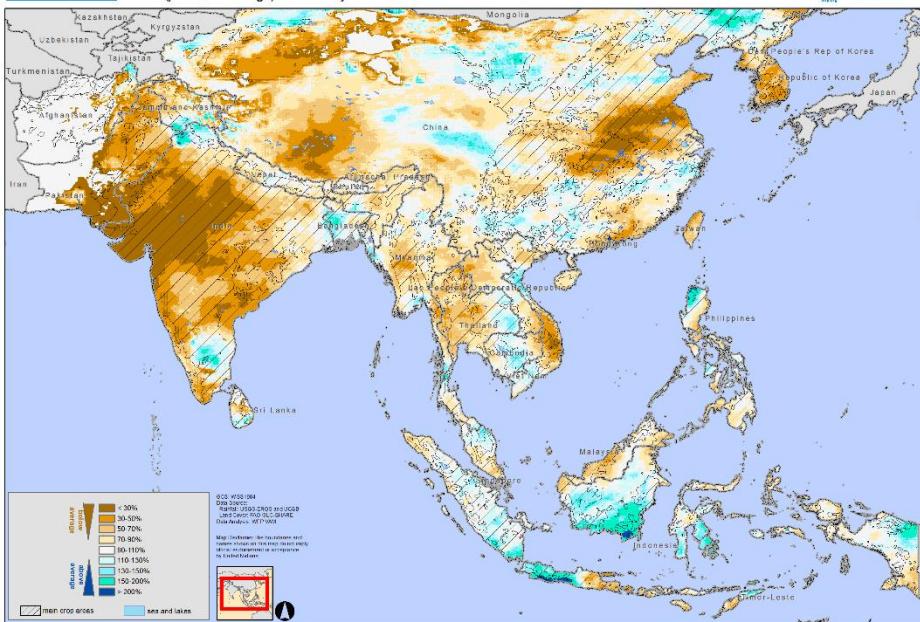
Early June 2014 Vegetation index as a percentage of a 12 year average (bottom)

Orange shades for below average, green shades for above average vegetation conditions

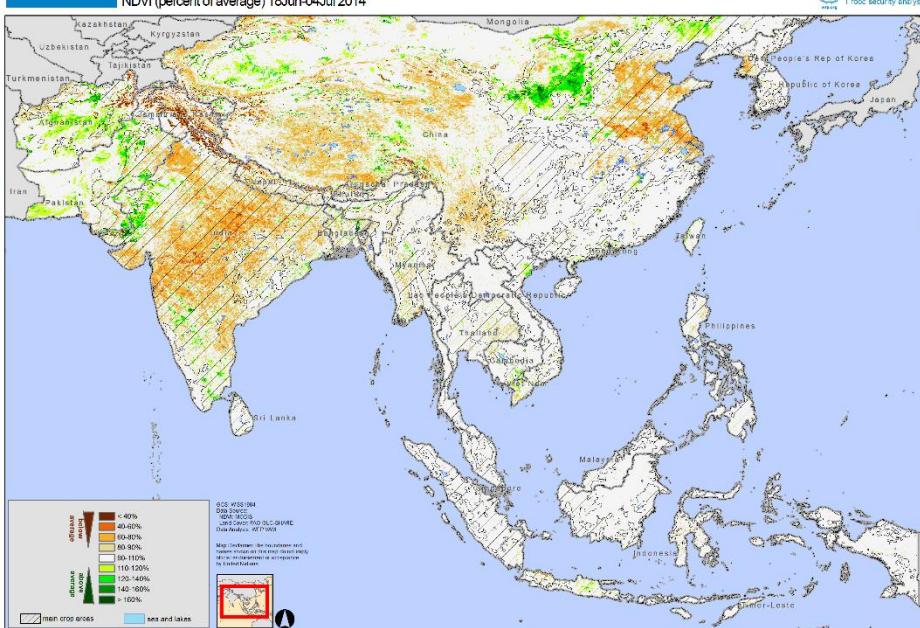
Hashed pattern indicates main agricultural areas.

SOUTH AND EAST ASIA SEASONAL ANALYSIS - 2014

30 Jun 2014 SOUTH-EAST ASIA
Rainfall (percent of average) in the 30 days to 30 Jun 2014



18Jun-04Jul 2014 SOUTH-EAST ASIA
NDVI (percent of average) 18Jun-04Jul 2014



June 2014

In June, El Nino like conditions spreading across wide areas of the globe led to marked dryness across much of Asia. In particular much drier than average conditions extended further across India spreading from Gujarat – Madhya Pradesh into southern Pakistan.

This was also the case in Myanmar, Thailand and Vietnam as well as in the agricultural regions of eastern China. Indonesia and, to a lesser degree, Malaysia were not really affected.

In the more seriously affected regions, below average vegetation levels show the impact of the rainfall deficits, particularly across India's agricultural regions.

June 2014 total rainfall as a percentage of the 20 year average (top).

Brown shades indicate below average rainfall, blue shades indicate above average seasonal rainfall

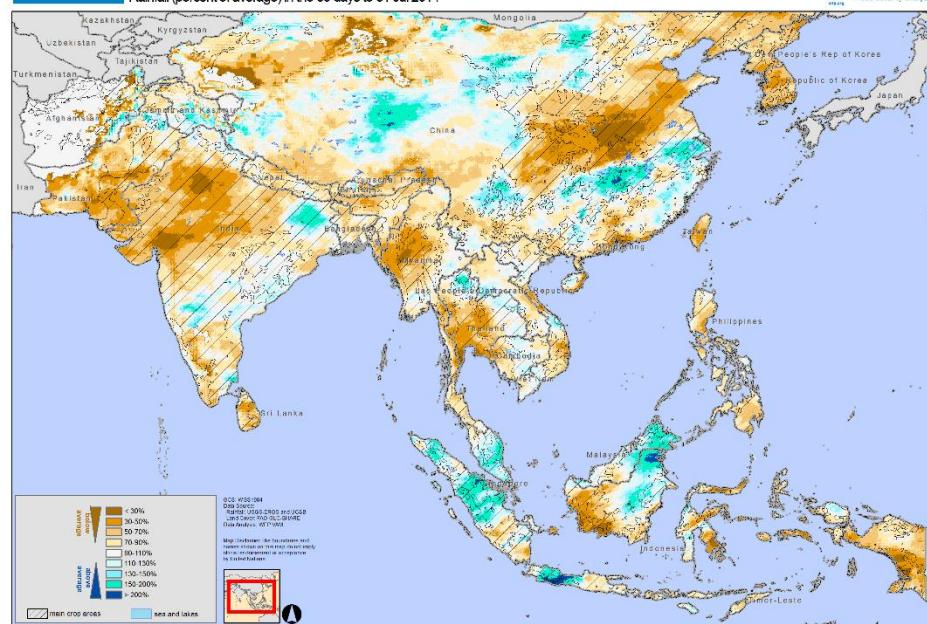
Late June 2014 Vegetation index as a percentage of a 12 year average (bottom)

Orange shades for below average, green shades for above average vegetation conditions

Hashed pattern indicates main agricultural areas.

SOUTH AND EAST ASIA SEASONAL ANALYSIS - 2014

31 Jul 2014 SOUTH-EAST ASIA
Rainfall (percent of average) in the 30 days to 31 Jul 2014



July 2014

Drier than average conditions were again much in evidence across Asia. These reached maximum intensity around mid-July in India and SE Pakistan. Other affected regions included the Myanmar dry zone, central Thailand, southern Vietnam and eastern China (Shandong-Henan).

Late July brought significant improvement across most of these regions but overall dryness remained.

Greater rainfall deficits led to more markedly below average vegetation levels in NW India and in SE Pakistan, but the wetter conditions in late July brought significant recovery elsewhere.

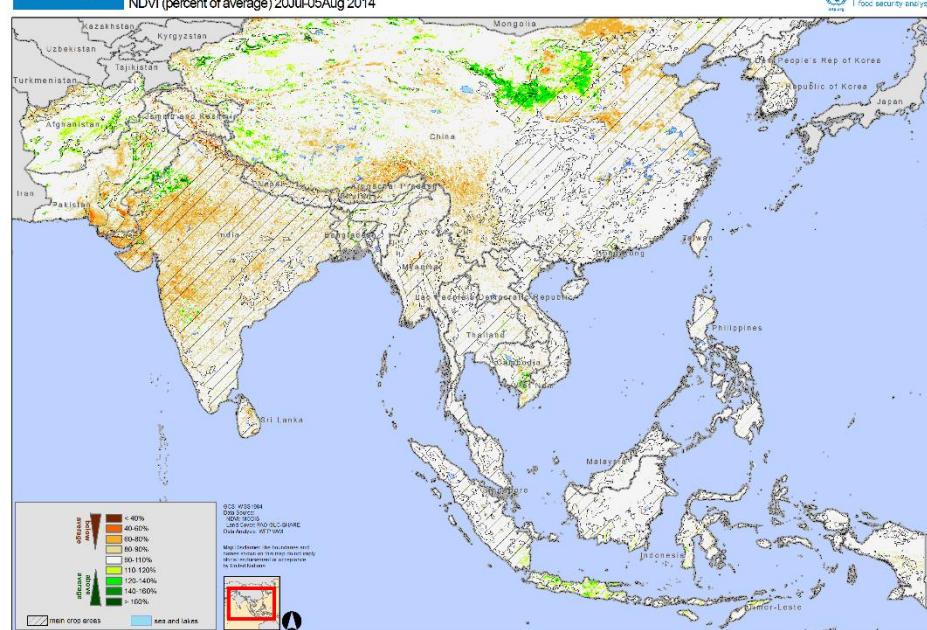
July 2014 total rainfall as a percentage of the 20 year average (top).

Brown shades indicate below average rainfall, blue shades indicate above average seasonal rainfall

Early August 2014 Vegetation index as a percentage of a 12 year average (bottom)
Orange shades for below average, green shades for above average vegetation conditions

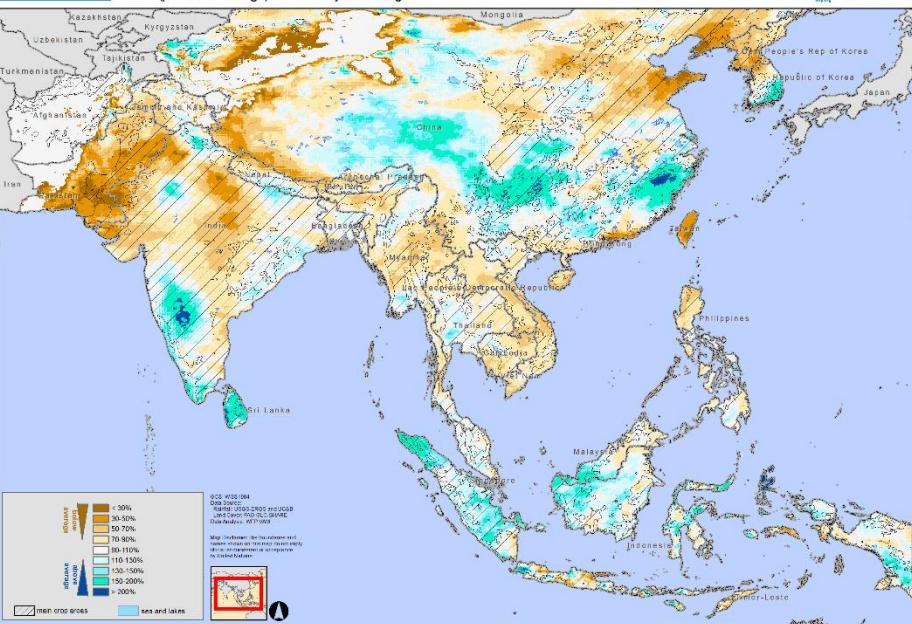
Hashed pattern indicates main agricultural areas.

20Jul-05Aug 2014 SOUTH-EAST ASIA
NDVI (percent of average) 20Jul-05Aug 2014

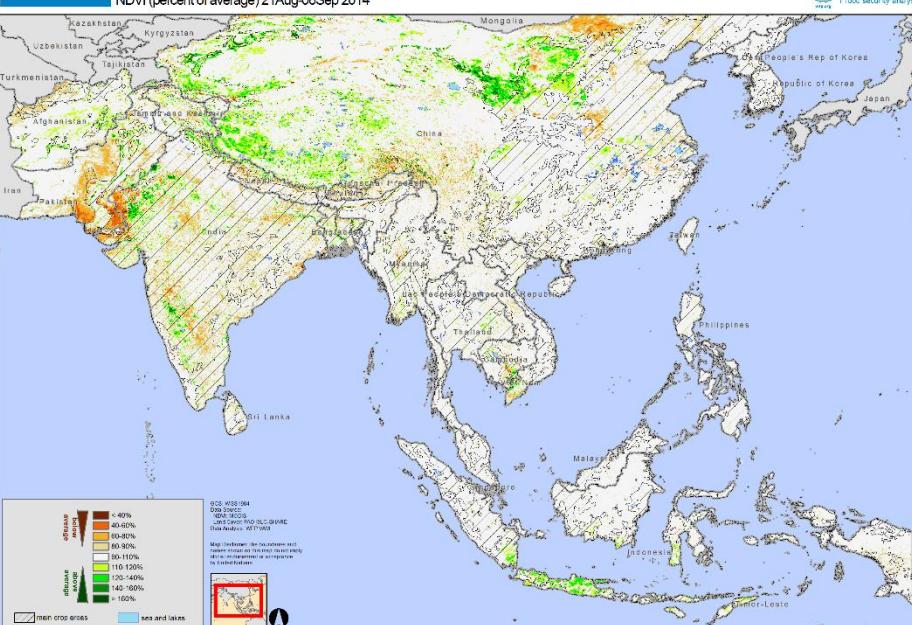


SOUTH AND EAST ASIA SEASONAL ANALYSIS - 2014

31 Aug 2014 SOUTH-EAST ASIA
Rainfall (percent of average) in the 30 days to 31 Aug 2014



21Aug-06Sep 2014 SOUTH-EAST ASIA
NDVI (percent of average) 21Aug-06Sep 2014



August 2014

Conditions in August improved as rainfall deficits became less intense. Previously affected regions registered only moderate deficits this month, except for southern Pakistan where rainfall deficits were maintained or even increased. Here, impacts on rainfed crops may be significant.

Noticeable improvements were observed over China while conditions remained good across Indonesia and Malaysia.

More favourable rainfall has helped to recover vegetation back to normal levels across the region by the end of August. However, unfavourable conditions still remain in SE Pakistan.

August 2014 total rainfall as a percentage of the 20 year average (top).
Brown shades indicate below average rainfall, blue shades indicate above average seasonal rainfall

Late August 2014 Vegetation index as a percentage of a 12 year average (bottom)
Orange shades for below average, green shades for above average vegetation conditions

Hashed pattern indicates main agricultural areas.

Data Sources:

Rainfall: CHIRPS, Climate Hazards Group, UCSB

Vegetation: MODIS NDVI, EOSDIS-NASA

Land Cover: FAO GLC-Share

Processing:

VAM software components, ArcGIS

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